Low Carbon Manufacturing Program in Pearl River Delta

MSc. Hu Qiying - Ecofys, Bejing, China

This presentation introduces the Low Carbon Manufacturing Program in Pearl River Delta in China, which issues carbon label to the participant companies committing to improving their energy and carbon performance.

Introduction

In the current competitive global business environment with increasing consumer sensitivity on environmental issues, retailer pressure on the carbon footprint of products and rising energy cost, carbon accounting and management has become a strategic imperative for manufacturers in the Pearl River Delta.

The Pearl River Delta represents a large share of Chinese and global manufacturing for the retail sector and there is significant potential to improve the energy and greenhouse gas (GHG) emissions in this region. For example, electronics and textiles account for 57% of the total value of Chinese exports. While the energy intensity of these sectors is relatively low, there is nonetheless ample scope for energy efficiency improvements. Case studies carried out in the textile industry internationally point to typical energy cost savings of 5-25% through the implementation of an energy audit and energy management system. Typical energy savings through quick-wins for first-time audits across small and medium sized industries are in the order of 5-10% per year. Thus, significant cost savings can be achieved through energy saving and carbon emission reductions.

The LCMP is consistent with all key international carbon accounting and reporting standards and initiatives. Participating in the LCMP therefore means that a manufacturer can also report directly to these other initiatives according to international standards. However, the LCMP is different from existing international initiatives in that it primarily aims to recognize positive action to reduce GHG emissions by manufacturers in the PRD and to equip them with the tools to identify and report areas for GHG and cost savings. The LCMP is a tool for manufacturers.

The LCMP is specifically developed for manufacturers in the Pearl River Delta. The overall goal of the LCMP is to establish a carbon accounting and labelling system to support the improvement of carbon performance of Pearl River Delta manufacturers.

The objectives of the Low-Carbon Manufacturing Program and the label are to:

- Provide recognition for the achievements of manufacturers in reducing GHG emissions;
- Provide tools to manufacturers to assist in measuring and reducing GHG emissions.

- Create an institutional framework to stimulate continuous carbon emission reductions across PRD manufacturing;

Initially the LCMP focuses on the plastics, electronics and textile sectors in the Pearl River Delta. In the future the LCMP may be extended to other sectors.

Conclusion

Low Carbon Manufacturing Program provides first time in China a scheme which encourages the companies in Pearl River Delta area to consistently improve their energy efficiency and reduce GHG emissions. By joining the program, the companies could not only distinguish themselves with LCMP label and LCMP certificate, but also gain profit by reducing their energy cost through energy audit and management.

It was planned to disseminate LCMP to country wide in China and covering more sectors in the future.

Drivers for carbon management in the PRD

- Costs
- Pressures from buyers
- Policy
- CSR

- Low carbon manufacturing is becoming a long-term business imperative

- For manufacturers this is about competitiveness

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Low-Carbon Manufacturing Program & LCMP Software

2009-10
Vietnam Workshop

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Content

- Background of LCMP
- How to get the LCMP label?
- LCMP software introduction

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Background of Low Carbon Manufacturing Program

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Low-Carbon Manufacturing Program (1)

- Partnership of WWF-HK (lead), HKPC and Ecofys

- GHG accounting and labeling framework for PRD manufacturers

- Designed for and with manufacturers

- Responding to international developments

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What is needed to respond?

- Carbon accounting standards and tools
  "If you don't measure it, you can't manage it"
  - current carbon performance
  - opportunities for improvement
  - impact of low-carbon corporate strategies

- Finance

- Technical services

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International developments in carbon accounting and reporting

- Carbon Disclosure Project
  - Supply Chain Leadership Collaboration
- GHG Protocol (WRI/WBCSD)
  - GHG supply chain accounting and reporting standard
- ISO 14064
- UK Carbon Trust
  - Product level carbon footprinting

- Large consumer goods and retail corporations engaging

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Problems in supply chain carbon management

- Data availability, standardization and accuracy

- Comparability

- Initiatives driven from consumer/retailer side

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How to Get Label from Low Carbon Manufacturing Program?

Low-Carbon Manufacturing Program (2)

- Consistent with GHG Protocol
- Label provides a metric for comparison of carbon performance
- Offering low-cost accounting tools to manufacturers
- Label provides a communication tool

LCMP implementation process

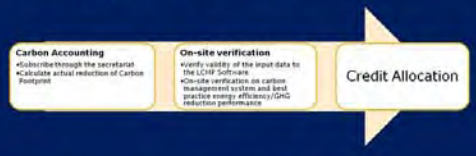
- Phase 1: Concept development (Completed)
- Phase 2: Label and tools development (Completed)
  Pilot program (Dec 2008 – March 2009)
- Phase 3: Roll-out (May 2009)

Pilot activities

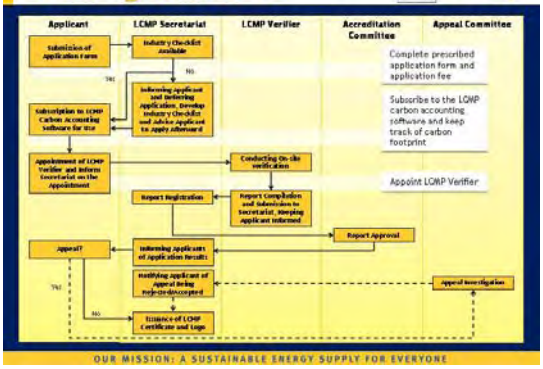
- Initial data exchange
- on-site verification based on check-lists
- energy audit – identifying improvement options
- verification report to WWF
- Results:
  - label issued by WWF
  - complete carbon footprint
  - clear recommendations on cutting cost and energy use

Verification Process

- Applicants will be assessed through a 2-phase evaluation process which includes:
  - Phase 1: Carbon Accounting (via LCMP software)
  - Phase 2: On-site verification work



Labeling Procedure

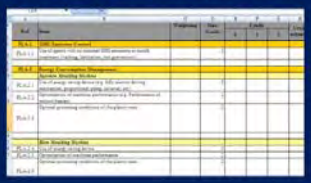


Project Planning

Project Planning

Credits Allocation and Methodology

- Best Practices
  - Based on a checklist approach (common practice)
  - Credits allocation = score / 100 x 40% (max. credit allocation)



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Credits Allocation and Methodology

- Credits will be given to applicants in each phase with regard to their achievement and performance in respective areas. Credits allocation:

Phases	Assessment Focus	Maximum Credits Allocated
Phase 1	Actual GHG Emissions Reduction Achievement	25%
Phase 2	GHG/Energy Management System	35%
	Best Practices	40%
	Total	100%

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Credits Allocation and Methodology

- GHG emissions reductions
  - An important criterion for the labeling
  - Measured per unit of appropriate performance indicator
  - Credit allocation = Score/100 x Max. Credits Allocated

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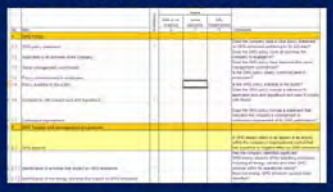
Credits Allocation and Methodology

- GHG management system
  - Based on a checklist approach (common practice)
  - Credits allocation = score / 100 x 35% (max. credit allocation)



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LCMP Software Methodology-- Greenhouse Gas Protocol

- World Business Council on Sustainable Development and World Resources Institute
- Internationally accepted GHG accounting and reporting standards for business.

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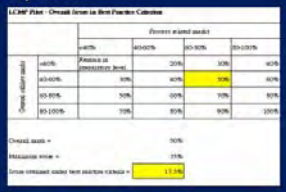
Credits Allocation and Methodology

- Company has to get min. 40% in General utilities as well as Process related utilities in order to remain in preparatory level



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Credits Allocation and Methodology

- The LCMP logo comprises 4 levels which would be awarded according to the total credits received.

Accreditation Levels	Total Credits
Certified	< 40%
Silver	40%-60%
Gold	60%-80%
Diamond	>80%

- Re-verification: Once every two years
- A company can stay at Level 1 LCMP Grade for a max. of 3 years, otherwise de-listed

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Low Carbon Manufacturing Program Software

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Method for Scope 3 GHG Emission Calculation

- Distance-based method for indirect GHG emission such like employee business travel and employee commute.
- Calculation of emission from employee commuting will be based on a survey of commuting habits, which provides activity data on the distance employee travel to and from work and the mode of transportation they use.

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Scopes under LCMP

- Under LCMP, following scopes will be considered for the pilot:
  - Scope 1: direct emissions from stationary combustion unit and company owned/controlled vehicles;
  - Scope 2: indirect emissions from electricity/steam/heat;
  - Scope 3: other indirect emissions such as employee commute, business travel, non-company owned/controlled vehicles.

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Method for Scope 1 GHG Emission Calculation

- Calculation based methodology for direct emissions from stationary combustion

* stationary combustion: burning of fuels to generate electricity, steam, heat, or power in stationary equipment such as boilers, furnaces etc.

- Fuel-based method is being used for direct GHG emission from company owned vehicles.

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Method for Scope 2 GHG Emission Calculation

- Emission Factor-based Methodology

Activity Data x Emission Factor = CO2 Emissions

→ Activity data: quantified measure of an activity, such as electricity consumption

→ Emission factors: convert activity data into emission values.

- The activity data is the quantity of purchased electricity, heat, and/or steam consumed.

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LCMP Software Tool Advantages

- Web-based and easy to access;
- Reduce verification costs;
- Bi-lingual user interface: Chinese and English;
- PRD specific emission factors;
- Selected scope 3 emissions (e.g. business travel, employee commute)

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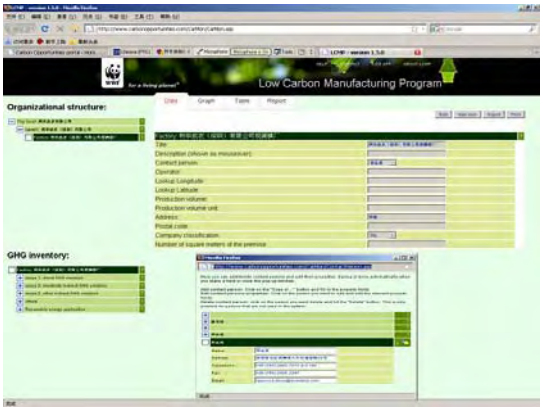
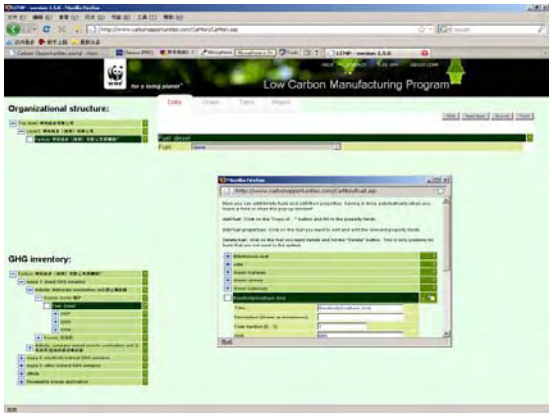
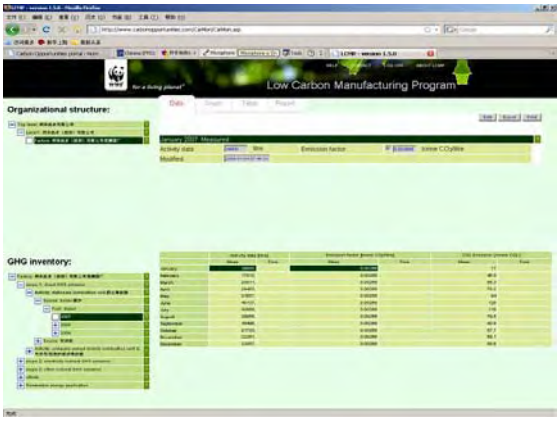
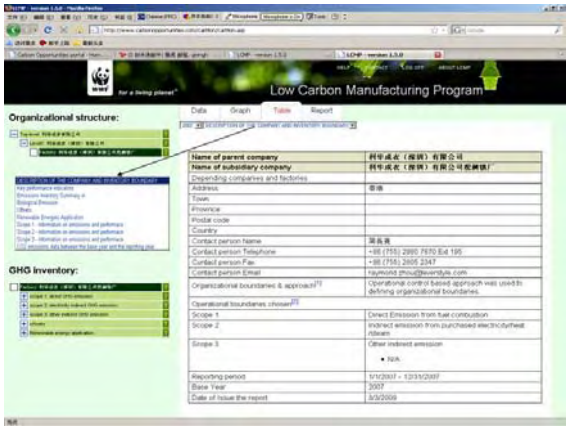


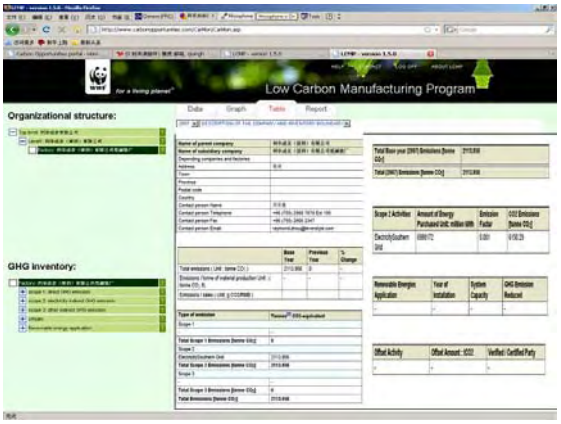


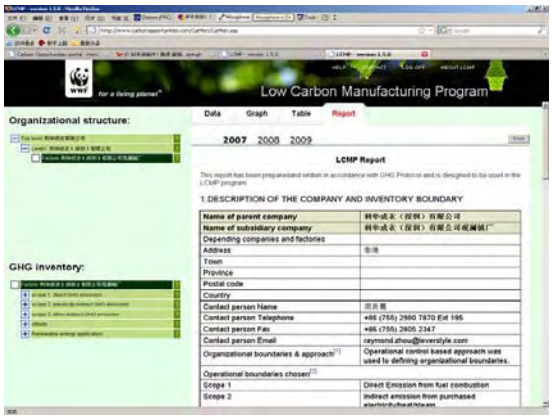


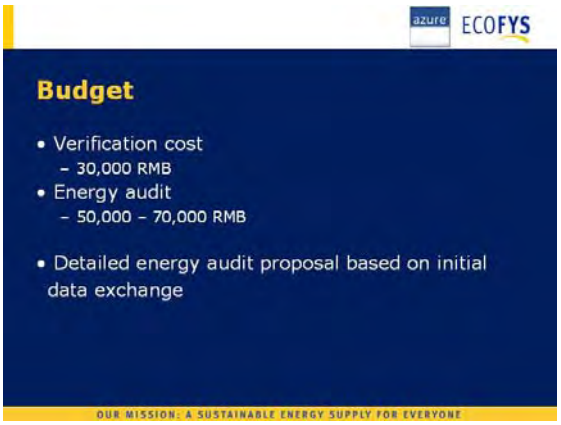

Low Carbon Manufacturing Program
Organizational structure:
GHG inventory:
last 12 months
scope 1: direct
scope 2: electricity
scope 3: other
offsets
Renewable energy


Low Carbon Manufacturing Program
Organizational structure:
GHG inventory:


Low Carbon Manufacturing Program
Organizational structure:
GHG inventory:


Low Carbon Manufacturing Program
Organizational structure:
GHG inventory:


Low Carbon Manufacturing Program
Organizational structure:
GHG inventory:
2007 2008 2009
LCMP Report
1.DESCRIPTION OF THE COMPANY AND INVENTORY BOUNDARY


azure
ECOFYS
Budget
• Verification cost
– 30,000 RMB
• Energy audit
– 50,000 – 70,000 RMB
• Detailed energy audit proposal based on initial data exchange
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azure
ECOFYS
www.carbonopportunities.com
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Renewable Energy development in Rural Areas in Inner Mongolia

MSc. Jie Zhang, Inner Mongolia Agriculture and Animal Husbandry Department

Eco-environment system protection is a big issue. The grassland in Inner Mongolia is the main body of eco-environment system in China, the eco-environmental defence line for Beijing and north part of China, and also the important foundation of agricultural economic development. But grassland degeneration is getting worse and worse in recent years because of the natural reasons and human activities.

In the past 30 years, the livestock economic Inner Mongolia has developed greatly. The herders livelihood has improved compared with 30 years ago. But the grassland degeneration in Inner Mongolia has become worse and worse, because of global climate change and big animal population. Global climate change should be one important reason. According to the statistics data, the temperature has increased 2^{o}C in the past 50 years, the total rainfall has not changed to much but reduced slightly. The extreme climate events frequency has increased greatly. Sandstorms, rainstorms, snowstorms, hail, droughts, floods have increased dramatically compared with 20 years ago. In 1978, the opening-up policy had been carried out in China. From then, the central and region government divided the land and grassland into pieces and let the farmers and herders manage the production processing freely, encouraged them to breed more live stocks and plant more to improve their living level. The whole region has got benefit from that. At same time, we learned some lessons and payments are heavy.

From 1998 the central and region governments begun to conduct the eco-environment system protection project in Inner Mongolia. The main targets of the project are to solve the grassland degeneration, improve the herder' livelihood and eco-environment. The main measures are:

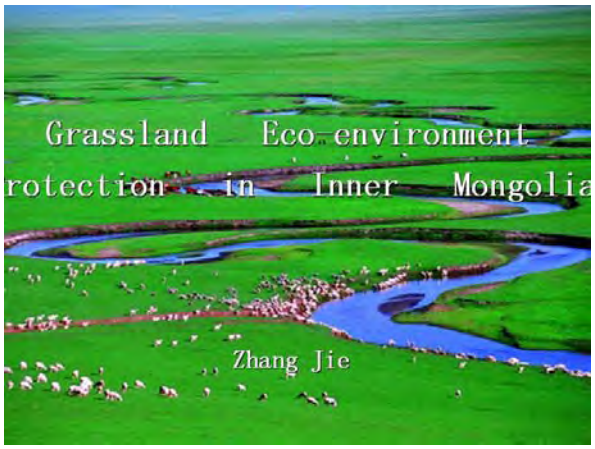
- Set-up herd-banned area, herd-rested area, herd-turned area to return the cultivated area back to the grassland.
- Set-up grassland-fenced area.
- Set-up man-made grassland to increased the grass production
- Breeding industry has gradually transformed from grassland to agricultural area.
- To evaluate the producing ability of the grassland and sign contacts with the herder households to keep the balance between livestock number and grass production.
- To change the traditional breeding way. For example, to short the feeding period from 2—3years to less than 1 year and reduce the feeding cost.
- To setup green ecologic garden household.

Achievements

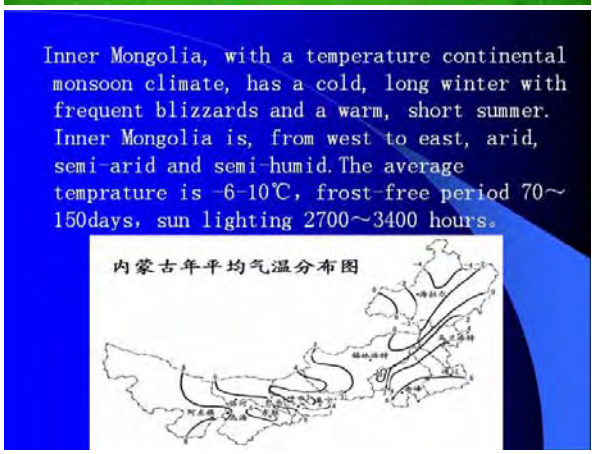
- To 2008, the total protective area has reached to 48 million ha. The herd-baned area 18 million, herd-rested area 20million, herd-turned area 10 million ha. The average

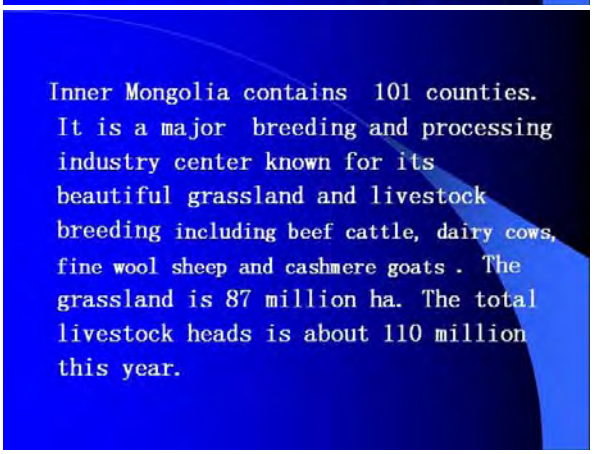
grass height, vegetation, grass production has increased 8-10cm, 20%, and 20-40% grassland respectively.

- The grassland-fenced area has reached to 28 million ha in 2008.
- Breeding industry has gradually transformed from grassland to agricultural area. Before 1998, 80% to 20%.2008, 30%to 70%.
- To change the traditional breeding way. For example, to short the feeding period from 2—3years to less than 1 year and reduce the feeding cost.
- Set-up including the biogas-digester, ensiling-digester, energy-saved bed, solar-cooker, green-house barn, greenhouse six-in-one system.


Grassland Eco-environment
rotection in Inner Mongolia
Zhang Jie


Inner Mongolia is located in the north of China. It is bordered to 8 provinces and covers 1.18 million Sq. meter. It is 2400 kilometer from east to west and 1700 Kilometer from south to north.
Map of China
Locations of provinces, autonomous regions and municipalities.
Heilongjiang
Jilin
Liaoning
Xinjiang
Gansu
Inner Mongolia
BEIJING
Tianjin
Hebei
Ningxia
Shanxi
Shandong
Qinghai
Shaanxi
Henan
Jiangsu
Shanghai
Tibet
Sichuan
Hubei
Anhui
Zhejiang
Chongqing
Jiangxi
Hunan
Guizhou
Fujian
Yunnan
Guangxi
Guangdong
Taiwan
Hong Kong
Hainan
Islands of South China Sea
Islands of South China Sea


Inner Mongolia, with a temperature continental monsoon climate, has a cold, long winter with frequent blizzards and a warm, short summer. Inner Mongolia is, from west to east, arid, semi-arid and semi-humid. The average temprature is -6-10℃, frost-free period 70~150days, sun lighting 2700~3400 hours.
内蒙古年平均气温分布图


Inner Mongolia contains 101 counties. It is a major breeding and processing industry center known for its beautiful grassland and livestock breeding including beef cattle, dairy cows, fine wool sheep and cashmere goats . The grassland is 87 million ha. The total livestock heads is about 110 million this year.


Grassland


Grassland


Grassland


Grassland

Grassland

The herder in the grassland

The grassland degeneration

The grassland in Inner Mongolia is the main body of eco-environment system in China, the eco-environmental defense line for Beijing and north part of China, and also the impportant foundation of agricultural economic development. But grassland degeneration is getting worse and worse in recent years because of the natural reasons and human activities.

Degeneration of the grassland

Globle climate change

- Globle climate change should be one important reason. According to the statistics data, the temperature has increased 2℃ in the past 50 years, the total rainfall has not changed to much but reduced slightly. But the extreme climate events frequency have increased greatly. Sandstorms, rainstorms, snowstorms, hails, droughts, floods have increased dramatically compared with 20 years ago.

Some examples

- The rainfall was 148.9mm with hail on 17-18 July 1999 in Huhhot.
- The rainfall was 63.5 mm in Bayahaote county where is desert center. That was the heaviest in the record history in the area with the average 50mm precipitation yearly.
- It rained continuously for more than 40 days in the east grassland from June to July this year and brought out many floods disaster and was draught in the west at the same time.
- Sandstorm in Inner Mongolia on 17,Apr.2006.The total dust drop in Beijing nest morning about 300 thousand tons. Beijing air pollution level reached to the highest level 5.

Sandstorm in Inner Mongolia

Next morning in Beijing street

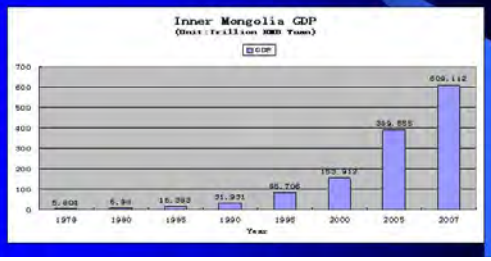
Rainstorm and hail

Influences of Human Activities

In 1978, the opening-up policy had been carried out in China. From then, the central and region government divided the land and grassland into pieces and let the farmers and herders manage the production processing freely, encouraged them to breed more livestocks and plant more to improve their living level.The whole region has got benefit from that. At same time, we learned some lessons and payments are heavy.

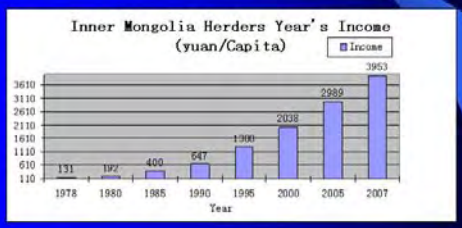
Inner Mongolia GDP (Unit:Trillion RMB Yuan)

Year	1978	1980	1985	1990	1995	2000	2005	2007
GDP	5.804	6.84	16.383	31.931	85.706	153.912	389.555	609.112
Increasin ratio	8	1.7	17.2	7.5	21.1	10.8	23.8	19.1



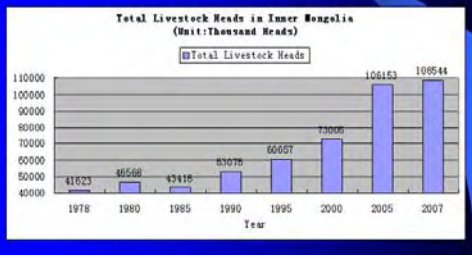
Inner Mongolia Herders Year's Income (Yuan/ Capita)

Year	1978	1980	1985	1990	1995	2000	2005	2007
Income	131	192	400	647	1300	2038	2989	3953



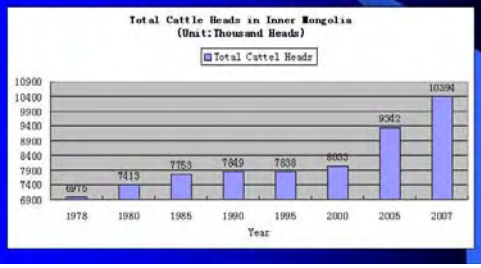
Total Livestock Heads in Inner Mongolia (Unit: Thousand Heads)

Year	1978	1980	1985	1990	1995	2000	2005	2007
Total Livestock Heads	41623	46568	43418	53075	60657	73005	106153	108544



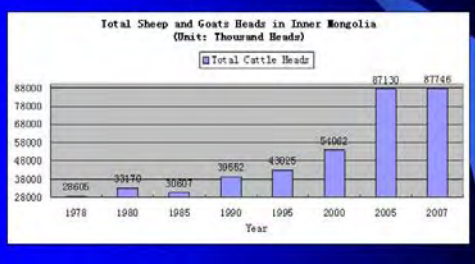
Total Cattle Heads in Inner Mongolia (Unit: Thousand Heads)

Year	1978	1980	1985	1990	1995	2000	2005	2007
Total Cattle Heads	6975	7413	7753	7849	7838	8033	9342	10394



Total Sheep and Goats Heads in Inner Mongolia (Unit: Thousand Heads)

Year	1978	1980	1985	1990	1995	2000	2005	2007
Total Cattle Heads	28605	33170	30607	39552	43025	54062	87130	87746



Problems

- Overloaded. The total livestocks heads had increased from 41600 thousand in 1978 to 73000 thousand in 2000.
- Overgrased.Ther livestocks had been herded at random in the grassland.
- Overcultivated

Eco-environmental system protection project in the grassland

The project started from 1998.

The main targets of the project are to solve the grassland degeneration, improve the herder' livelihood and eco-environment.

The main measures are,

Set-up herd-baned area, herd-rested area,herd-turned area. To return the cultivated area back to the grassland.

Set-up grassland-fenced area.

Set-up man-made grassland to increased the grass production

Breeding industry has gradually transformed from grassland to agricultural area.

- To evaluate the producing ability of the grassland and sign contacts with the herder households to keep the balance between livestock number and grass production.
- To change the traditional breeding way. For example, to short the feeding period from 2—3years to less than 1 year and reduce the feeding cost.
- To setup green ecologic garden household.

Achievements

To 2008,the total protective area has reached to 48 million ha. The herd-baned area 18 million, herd-rested area 20million, herd-turned area 10 million ha. The average grass height, vegetation, grass production has increased 8-10cm, 20%, and 20-40% grassland respectively.

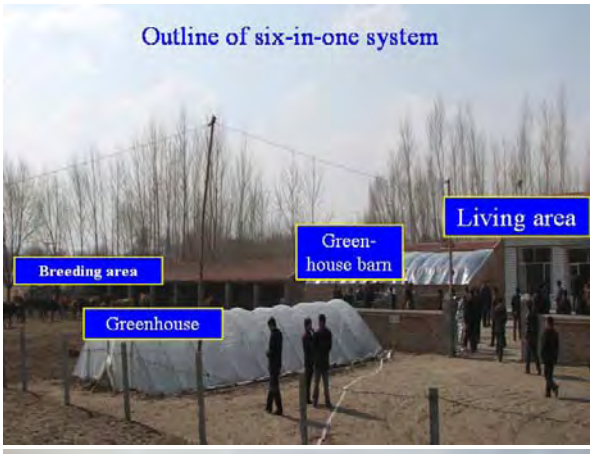
The grassland-fenced area has reached to 28 million ha in 2008..

Breeding industry has gradually transformed from grassland to agricultural area. Before 1998,80% to 20%.2008, 30%to 70%.

To change the traditional breeding way. For example, to short the feeding period from 2—3years to less than 1 year and reduce the feeding cost.

Six-in-one green eco-garden household

Set-up including the biogas-digester, ensiling-digester, energy-saved bed, solar-cooker, green-house barn, greenhouse six-in-one system.



Sx-in-one model solve some problem

To prolong the renewable energy utilization into the grassland,

To provide the vegetables for the household the year around,

To provide the forage for the animal in winter.

The Socio-economic role of Wind Power to reduce Rural Energy Poverty in Nepalese Community

MSc. Shrestha Sharada, Program coordinator Flensburg Association for Energy Management-Nepal

Abstract

Access to energy is today's urgent need to reduce poverty in Nepal. Nepal's involvement in development of wind energy is quite short. Production of energy from existing wind conditions in the environment is relatively a new subject in Nepal to the date. Electrification is feasible with the help of wind energy resources in the remote rural areas of Nepal where the national grid connection is not available yet.

Alternative Energy Promotion Centre (AEPC) is an apex body of Nepal Government, to promote renewable/alternative energy resources whole over the country. Accordingly, four small wind turbines of 400W each capacity was installed at Hanshapur, Pyuthan.

In total 30 households, a Masjid and the School are connected with the systems. The total beneficiary population is about 185 in 30 households by installed three systems. Uses of wind power to run computer, other electrical devices and lighting purposes for households is acting as a great socio-economic force in Hanshapur. These wind power plants have replaced kerosene wick lamps in the households connected with system. The wind power reducing expenses required for purchasing kerosene. The local people can use this significant saving for other meaningful expenses such as food, education and health. The wind power plants have contributed to reducing the emission of green house gas. They do not have any adverse effects on the environment. The indoor pollution is one of the major causes of different long term diseases in the rural areas. The Wind Power Plants have contributed to reduce the indoor pollution and support for the sustainable use of the available potentially renewable resources. The replacements of kerosene lamp have significantly reduced eye infection in women and children. Thus health cost is also reduced by wind power. Wind power is helpful to achieve education, awareness, information and other economic activities. There is participation from the poorer sections of the community, it also truly empowering socially excluded (Dalits) community. Development of institutional mechanism for sustained operation and management is possible through active participation of local users group.

Establishment of wind power technologies in remote rural sites is a milestone to achieve real fruits of development for ethnic/marginalized group. It also helps to bring socially disadvantaged/vulnerable community in the main stream development. Poverty reduction and energy management both are burning issues today with global climate changes in the world. Where the people are poor, they play vital role to bring adverse impact on climate thus development of wind power will contribute significant role to reduce poverty through accessibility of clean energy at local level. However, these efforts are not sufficient, there need to develop some projects in the areas which has reliable wind mapping data and which will act as a demonstration plant there by attracting more investment to harness the wind power in Nepal.

Challenges in Integrating Wind Energy and Poverty reduction in Nepal are; Low level of awareness, Difficulty of access, to satisfy basic and productive need, meeting the energy demands of the poor, to develop energy self reliant, enhancing energy technology absorption capabilities, to ensure sustainability and other socio-political events. Thus the promotion of wind power in large scale will help drastically to upgrade socio-economic status of rural people and also contributes to reduce GHGs emissions in both local and global perspectives.

I have been involved in wind energy sector since three year from (Flensburg Association for Energy Management) FAEM Nepal. It is pleasure to involve for the promotion of wind power in rural Nepal which has key role to uplift rural poor. The team has commitment and desires in the field of RETs especially Wind Power in Nepal.

ARTES/SESAM ALUMNI WORKSHOP ON POLICIES AND STRATEGIES TO MITIGATE CLIMATE CHANGE AND ENERGY POVERTY IN SOUTH EAST ASIA AND CHINA

The Socio-economic role of Wind Power to reduce Rural Energy Poverty in Nepalese Community

SHARADA SHRESTHA
NEPAL

HANOI AND HALONG BAY, VIETNAM
5-9 OCTOBER 2009

Contents of Presentation

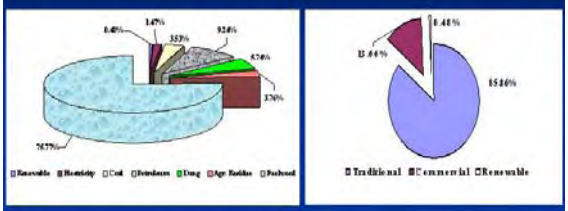
- Energy Scenario (resources and use) in Nepal
- Introduction of Wind Solar hybrid system
- Socio-economic impacts
  - Savings
  - Contribution in Health and Education
- Environmental Impacts
  - Indoor air pollution
  - Reduction in GHG emissions

MAP OF Nepal

Country Overview

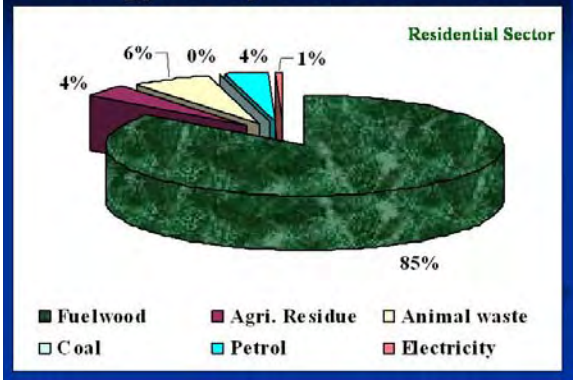
- Total land area: 147181 sq.km
- Geographical division:
  - Himalaya region coverage: 19%
  - Hilly region coverage: 64%
  - Terai region coverage: 17%
- Total population: 28901790, female: 51% and male: 49%
- Growth rate: 2.1%
- Literacy rate: Male 65.5%, Female 42.8%
- Per capita income: 300 $
- Population access to health services: About 57% in rural areas and 89% in urban areas

Energy Scenario

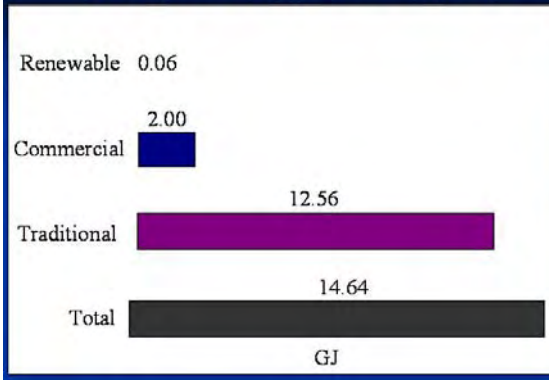


Energy Use Pattern | Energy Share

Energy Use by Residential Sector



Per Capita Energy Consumption



Status of Energy

Technology	Status	Target(2007-10)	Potential
Biogas	156500	100000	1.3 million
ICS	164228	300000	X.X million
MH	9824 kW	11.5MW	43000MW
SHSs	96673	90000	
Solar Cooker and Dryer	1031	1500	
Improved Ghatta	3552	4000	
Wind Data	5 locations	50 kW/ Pre feasibility study	
Grid based	615 MW		

WIND ENERGY IN NEPAL

History

- Windmills were used extensively in Northwestern Europe to grind flour beginning in the 1180s and many Dutch windmills still exist.
- The first wind energy generator of 20 kW capacity (10 kW each) was installed in mountainous area of Nepal (Kagbneni) in 1989 as a demonstration project. However, within the three months period, blade and tower of the wind generator were broken. The main reason reported was structural failure to withstand the gusty wind speed (source: WECS, 2002).

Potential of wind energy

- The studies by DANGRID a Danish consulting firm in 1992 reported that a potential to generate 200 MW of electrical power with an annual energy production of 500 GWh from the wind resources along the 12 km valley between Kagbeni and Chusang in Mustang.
- AEPC (Alternative Energy Promotion Center) has been collecting and analyzing the ground measurement wind data form five anemometer stations which were handed over to AEPC in 2002 by Water and Energy Commission Secretariat (WECS).
- AEPC has been developing mapping for wind potential data.

FEATURES

- Reliable, Durable and simple to operate.
- No consumable fuel required.
- Wind, the only source.
- Pollution free and therefore environment friendly.
- Spare parts service readily available from 100W to 400W
- Low operation and maintenance cost.

WIND TURBINE

FEATURES:

- Reliable, Durable and simple to operate.
- No consumable fuel required.
- Wind, the only source.
- Pollution free and therefore environment friendly.
- Spare parts service readily available from 100W to 3000W
- Low operation and maintenance cost.
- Includes Turbine Generator Set, Battery, Regulator and accessories.
- High efficiency electronics and luminaries.

Application:

Ideal for domestic use, schools, colleges, farm houses, Health centers etc. for lighting, watching TV, VCR, battery charging, operating computers etc.

SPECIFICATIONS

WIND TURBINE MODEL : KG-400-064

Rotor Diameter	2.4m	No. of Blades	3nos.
Rated Power Output	400 watt	Design Wind Speed	3 m/s
Tower Hight	12m	Rated wind Speed	9 m/s

Establishment of wind/solar pv hybrid system in Rural Arias Nepal (Case Study in Pyuthan District)

Wind Site Selection

- Identified potential wind sites through field surveys.
- Enough space for installation of systems and potentiality of demonstration effects
- Village without electricity and no possibility of grid electricity connection for coming 5 years

Installation of Wind/Solar pv hybrid system

Kaskot

- In this area, households are scattered and majority of them are Mushlim families.
- Initially, total families and one local Masjid were connected with the Wind Solar PV hybrid system which directly benefited 85 persons.
- After one year, another system was installed which serves five additional households

Installation of Wind/Solar pv hybrid system

Neta

- A Wind Solar Hybrid System (400 W + 150 Wp) at Neta installed in 2007 has been serving 14 households
- After one years operation, 5 more families were connected to the system
- In 2008, one more system was installed at local School, where 625 students are directly benefited.

Installation Process, carrying wind turbine

Alternative energy system as a future option for sustainable energy use and Rural development in Thailand

Jitiwat Yaungket - Department of Socio-Environmental Energy Science, Graduate School of Energy Science, Kyoto University, Japan

Abtract

The government of Thailand is firmly committed to promoting the quality and way of life of the Thai people, whether it concerns improving the economy and living conditions, and creating employment incomes. Residents of rural area especially must receive conveniences just as those residing in cities. Nonetheless, a variety of limitations lead to delayed development, including installation of utilities, or the inability to implement due to obstructive rules, regulations, and requirements, necessitating finding different approaches or means for development to proceed.

This study is proposes to determine the solar PV system for remote electrification in rural Thailand with energy and economic study, and to study the socio environmental as well as life style of solar PV systems for remote electrification. For this purpose 3 types of solar PV systems were consider, namely, Solar Home System (SHS), Solar Battery Charging Station system (SBC), and PV power house system. Data was conducted in the form of a questionnaire and interviews with villagers from the solar PV systems installation site in rural Thailand based on purposive sampling.

The base load of household (HH) in rural Thai area is 297.5 Wh/day per HH derived from Provincial Electricity Authority (PEA)'s load forecast model. PV array life time is assumed to be 20 years, where as same for diesel generator assumes 10 years.

The economic analysis of the study found that the life cycle costs of SHS, SBC, and PVH were 52,968, 51,015 and 100,512 THB respectively. Life cycle unit cost of energy generated by each of these considered systems were found to be THB 24, 23.5, and 46.2 respectively. The cost of electricity generated by SHS and SBC was found to be low than PVH, because of the cost of battery of PHV system is costly, and PHV is still using in school and countryside clinic.

From the study SHS systems were found to be more suitable for scattered rural household electrification and no need to take the heavy battery to the SBC system for charging.

The interesting point from visiting the Solar PV system installation site in the remote village and interviewing of end user showed that after the completion of warranty period for the solar PV systems, these seem to be no future plans for the user for system maintenance, repair etc., So, some sort of policies have to be incorporate for providing support for further operation of the system.

Solar Energy Systems as a Future Option for Sustainable Energy Use and Rural Development in Thailand

Jitiwat YAUNGKET

Department of Socio-Environmental Energy Science,
Graduate School of Energy Science, Kyoto University, Japan

Content

- Introduction
- Three types of solar energy systems
- Aim of This Survey
- Methodologies adopted
- Empirical results of the Photovoltaic system's survey
- Conclusions and further study

Introduction

Since the first Solar PV system was installed in the village in **1992**, the situation for rural electrification has changed:

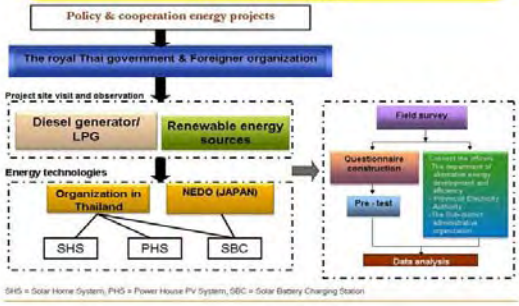
- Technology development offers new options; for example, solar PV systems and electrical appliances.
- There is no change for the village to connect to the national grid because of regulation constraint on setting up distribution lines in the area.

About the village

Aim of This Survey

The aim of this study is to investigate the way of rural area development in Thailand especially from the solar PV systems for remote electrification in rural Thailand with energy and economic study as well as the total cost of owing of solar PV systems.

Conceptual of survey on rural energy system in remote village



SHS = Solar Home System, PHS = Power House PV System, SBC = Solar Battery Charging Station

Methodologies adopted

- 1) Field visits, systems inspection & interview with end-users
- 2) Economic analysis PV systems

Three types of solar energy systems which have been successfully used for rural electrification

- Solar Battery Charging station (SBC):

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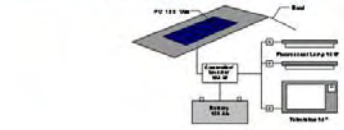
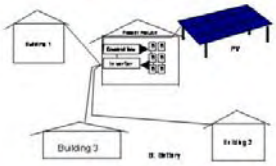
Solar Home System (SHS)



Power house PV System



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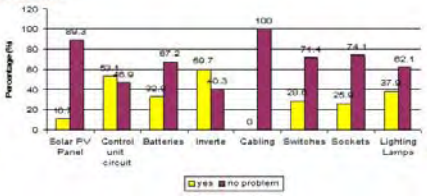
Empirical results of the Photovoltaic system's survey

- Evaluation of impacts of solar energy systems in the village
- Installation and maintenance of solar energy systems



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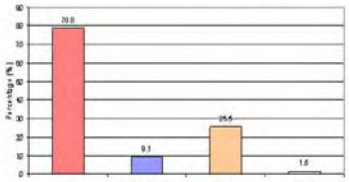
Empirical results of the Photovoltaic system's survey

- The status of fuel consumption in the village



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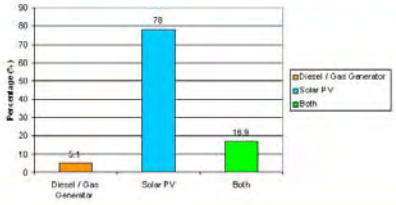
Empirical results of the Photovoltaic system's survey



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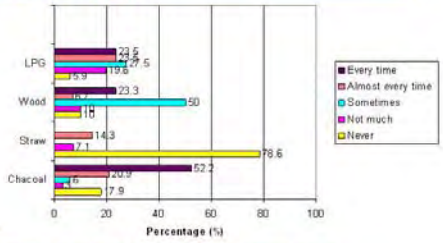
Empirical results of the Photovoltaic system's survey



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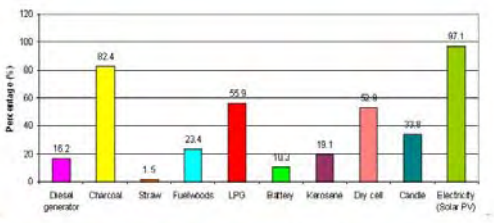
Empirical results of the Photovoltaic system's survey



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Empirical results of the Photovoltaic system's survey

Poor maintenance & it's risk to households

Poor wiring connections without insulation in a house.

By passed charge controller in SHS

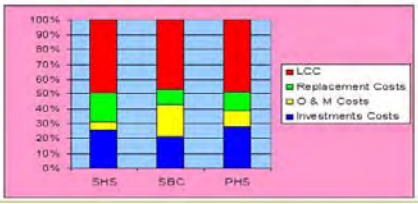
Empirical results of the Photovoltaic system's survey

Rural community electrification

- Based load 297.5 Wh/day per household (PEA's load forecast model)
- Service life time of PV module assumed to be 20 years,
- Discount rate 10%, general inflation rate 6.3%

Empirical results of the Photovoltaic system's survey

Different costs associated with Solar PV Systems



Empirical results of the Photovoltaic system's survey

To enhance the sustainability of electricity supply by photovoltaic systems, the two following aspects should be considered:

1) Suitability of renewable energy provided to community

- Villagers should have some experiences on this selected technology and know accurately how to operate with it.
- Villagers have an acceptance on this selected technology.
- Villagers should be able to conduct the system maintenance by themselves.
- There should spare parts and skilled technician taking in charge of equipment when equipment fails or damaged.

Empirical results of the Photovoltaic system's survey

- 2) Readiness and acceptance of villager on the related changes.

In order to make any renewable system sustainable and long serving to the villagers or community, following points should be satisfied first:

- Villagers desire of electricity supply and satisfy with the selected technology.
- Willingness to pay for the maintenance fee of electrical equipment within their house.
- Willingness to pay for PV systems maintenance fee.

Conclusions and further study

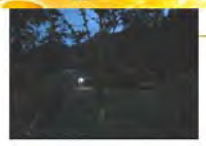
- The choices for energy supply in the village are presently limited to imported petroleum products, and to a very insignificant extent, solar energy. The utilization of solar energy systems in Ban Bon Khao Kang Riang Village at present is largely for lighting. To a limited extent, solar energy systems are used for household electrical appliances (TV, radio, and fan), etc
- This is in order to supply greater power reliability to the community through introduction of a community micro grid. Such a PV hybrid system can also be integrated with micro-hydro or bio-diesel generators and supply the community with a decentralized micro-grid to provide more reliable power supply.

Conclusions and further study

- Solar PV System should be installed properly to gain the maximum yield from the installed system and a strict installation and wiring standard should be implemented to avoid any accidents. It should be noted that the house is made of wood, it could easily cause the fire in the house. It is very important to avoid such poor wiring in terms safety reason.
- After the completion of warranty period for the solar PV systems, these seem to be no future plans for the user for system maintenance, repair etc., So, some sort of policies have to be incorporate for providing support for further operation of the system .

Conclusions and further study

- From the study method taken by the researchers, it is expected that results from conducting this research could be utilized as a new alternative approach in development of research work on energy. This includes development of natural resources in limited supply in the study area that could be developed as suitable energy source.



Thank you for your attention

Sustainable regional cooperative planning - an experience in Auroville, India

MSc. Mona Doctor - Architect, India

Abstract

One of the most urgent challenges facing humankind is how to build more sustainable cities, towns and villages. Places that consume less energy, create less pollution and that are uplifting to live and work in. The quest is to identify and determine new forms of urbanism fit for the 21st century.

Community planning can play a vital role in taking this agenda forward and accelerating its delivery. Although government commitment to community involvement in planning has increased dramatically in many countries, in India it is a practice in name only. Moreover even in the countries where community consultation is welcome, it is very important to recognize the difference between consultation and participation. Consultation without participation is simply asking people to agree with what has already been decided by others and is likely to prompt a negative reaction. Full participation, as in a properly organized Community Planning event and ongoing process is not about getting people to agree to proposals drawn up by professionals: it is about creating better proposals and therefore better places. Improving quality of life becomes a shared goal, around which a vision for the future and specific projects can then be developed.

In February 2009, Auroville hosted such a community planning workshop / seminar, involving all the stakeholders from the Bio-region. The paper will present the processes followed as well as the outcomes, experiences and follow-up that have precipitated as a result of the workshop. The replicability of this kind of process can lead to a high degree of motivation in different countries in applying the policies of climate change and mitigating the adverse effects of bad urban planning.

Demand Side Management and Energy Efficiency: Its Impact on Reducing Greenhouse Gas Emissions in Vietnam

MSc. Tran Hong Ky - Worldbank, Vietnam

VIETNAM COMPACT FLUORESCENT LAMP PROGRAM

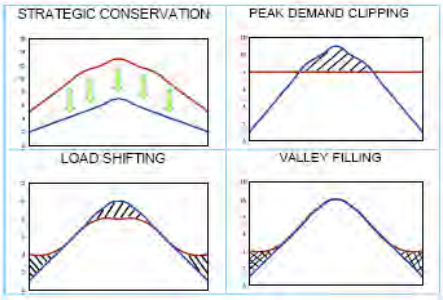
Its impacts and lessons learned

APEC/SEAM Alumni Workshop
Vietnam Oct 5-9, 2009

Why DSM for Vietnam

- Experienced power shortage, especially in dry season up to 20% of the system capacity and expected to continue in coming years.
- Rapid demand growth:15-18% for last 10 years requiring large investment cost.
- Large different in demand between peak and off-peak: 1.8 – 2 times
- EVN is facing lost of each kWh sold in peak load: Diesel generation – Flat tariff for residential customers (VND 3,000 – VND 550)
- Contribution to reduction of GHG emission

What is DSM?



CFL program under the DSM and Energy Efficiency Project

- EVN conducted CFL program in 2005 as a component of Vietnam DSM and Energy Efficiency Project financed by GEF and WB. Total GEF financing is $10 million.
- Budget for CFL program is about $800,000 targeting to distribute 1 million CFL in two years in rural and suburban areas

Objective of the CFL program

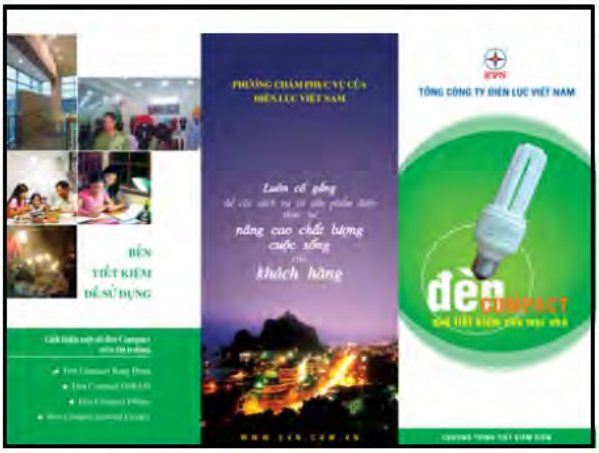
- Provide immediate relief to Vietnam's power shortfall in northern Vietnam
- Reduce EVN's overall investment in system expansion caused by rapid demand growth;
- Reduce the cost of electricity consumption;
- Increase awareness of CFLs among people in provincial cities and towns; and
- Reduce the GHGs emission, improve global environment.

CFL program

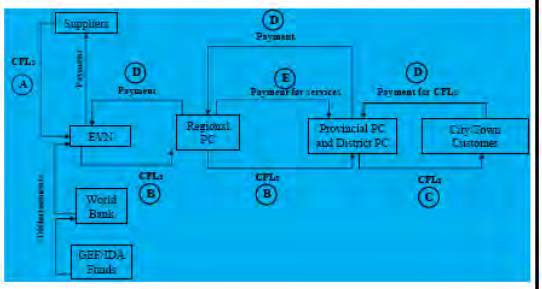
- Market survey on both supply and demand sides to find main barriers and provide input to design and implementation of the program
  - High demand for CFL to replace incandescent lamps, particular in rural and suburban areas
  - Market dominated with low quality CFL. Color of CFL light
  - Low awareness on the CFL
  - Quality of power network
  - High cost for quality CFL
  - Local manufacturers have sufficient capacity to meet the demand
  - Basically meet the technical requirements. Need some improvement
  - Weak in marketing and suffered from cheap, low quality products

CFL program - Activities

- Design an appropriate marketing and awareness program which widely used mass media such as TV, radio, local communication system plus posters, leaflets, bands, etc. User's guidance on use of CFL was widely distributed.
- Set up technical specification for CFL to be procured and distributed to ensure the quality of the CFL
- Determination of CFL price
- Establish distribution network using EVN existing network in collaboration with mass organizations: youth union, women union, etc, after sell service; financial management and M&E mechanism.
- Training EVN and mass organizations staff
- Distribution of 1 million CFL to almost 500,000 HH in two years
- Collaboration with other manufacturers in marketing campaigns, selling the products and support in improvement of CFL quality. EVN allowed two local manufacturers to add its logo in the manufacturers' CFL



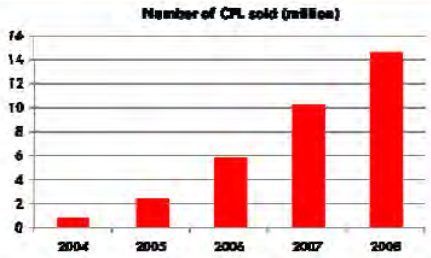
Distribution and Payment Scheme for CFLs



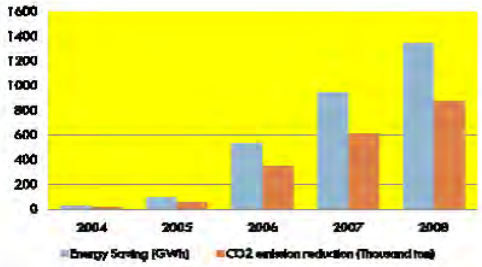
CFL Impact Assessment

A	Incandescent bulbs	75	W
B	Replaced with CFLs	20	W
C	Watt savings per installed CFL	55	W
D	Quantity	1,000,000	CFL
E	Number of hours during peak time	4	h/day
F	Average marginal cost	8	USD cent/kWh
G	Average marginal revenue from provincial towns	4.5	USD cent/kWh
H	Net loss on each provincial customer	3.5	USD cent/kWh
I	Coincidence factor (% on at peak)	75%	
J	T & D Losses	15%	
L	Peak saving (C * D * I * (1+J))/(1,000,000)	47.438	MW
	Annual saving		
K	Energy savings (C * D * E * 365 * (1+J)/1,000,000)	92,345	GWh/year
M	Reduction of CO2 emission (K*0.65)	60,024	Ton CO2/year
	Project Lifetime (5 years)		
	Energy savings (C * D * E * 365 * (1+J)/1,000,000)	461,725	GWh/year
	Reduction of CO2 emission (K*0.65)	300,121	Ton CO2
M	EVN's avoided marginal losses on sales to provincial	865,673	USD/year

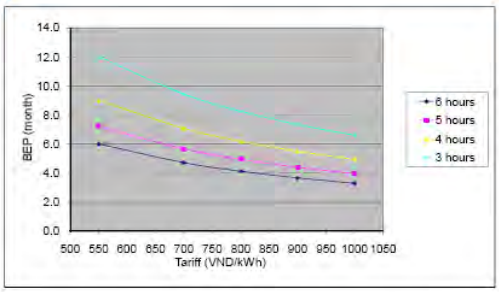
CFL Program Impact – Market Transformation



Energy Saving and Reduction of GHG emission

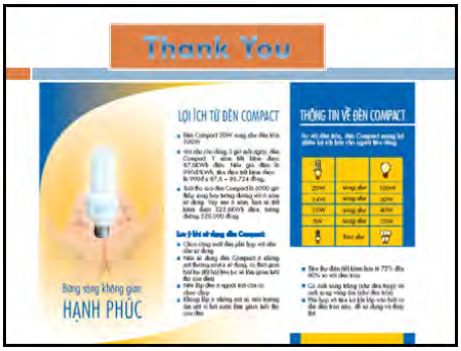


End-user Benefit



Lessons learn

- Quality of CFL and after sale service
- Appropriate marketing/awareness campaign
- Support and collaboration with local manufacturers
- Suitable distribution network with support from mass organizations



Challenge to Implementation: Waste Energy from Palm Oil in Indonesia

Dr. Ir. H. Didik Notosudjono Ms, Pakuan University - Bogor and BPP. Teknologi , Jakarta, Indonesia

Abstract

The Government of Indonesia has a substantial potential for development of renewable energy resources, and particularly in rural areas of the country that have not been electrified. The government policy is therefore to achieve the goal of rural electrification based on the utilization of renewable energy resources. This policy is considered cost efficient, it achieves the goals of energy diversification, it is consistent with the national environmental policies of sustainable development, and it promotes greater community participation in the management of their basic services.

Indonesian palm oil production is the first largest in the world and the second place is Malaysia. With total planted area of over 6.074 million ha, the annual production of crude palm oil in 2006 was 13.39 million tons processed in 340 palm oil mills (POMs). New POMs are being planned to meet milling shortages. The number of POMs and volume of fresh fruit bunches (FFB) being processed gives rise to large quantities of solid and liquid waste. When properly managed the wastes can be a viable energy source, providing a sustainable economic benefit while managing the adverse environmental impacts typically associated with POMs. and other opportunities for renewable energy (RE) projects utilizing POM waste. The long term sustainability of the waste management and energy capture projects from the POM has immense potential to become the backbone of rural electrification initiatives in Indonesia. The high cost of rural electricity production which is normally isolated systems with diesel generators can be displaced using excess power from the POM.

The implementation of such widespread rural electrification initiatives requires some support in the initial stages, particularly to prove the technical, commercial and economic viability to the investing organizations and to prepare the guidelines to effectively tap the inherent potential on a nationwide basis. The waste management and energy capture initiatives have good long term potential for Indonesia. Loan assistance to realize the application of the technology and adoption of the country-wide commercialization strategies may be necessary. Implementation support for the development of practical integration guidelines for incorporation of POM waste management and energy capture as part of the provincial energy services to encourage the sustainability aspect of the initiatives identified.

Keyword: *Potential POM, Biomass Power Plant, Cluster system, Interconnection Implementation renewable energy.*

CHALLENGE TO IMPLEMENTATION: WASTE ENERGY FROM PALM OIL IN INDONESIA

Prof. Dr.Ir.H Didik Notosudjono M.Sc., Indonesia
Pakuan University - Bogor and
BPP. Teknologi – Jakarta
Hanoi-Vietnam 5 -9 October 2009

BACKGROUND

PROBLEMS IN THE EXPANSION OF PLANTATION

- Expansion of plantation will faced serious issues, such as:
  - Deforestation;
  - Erosion, salinasion;
  - Decrease in area;
  - Biodiversity.
- Complaint from NGO and consumer

BACKGROUND

Problems in the expansion of plantation

Complaints from NGO and consumer will be resulted in:

- The inability of Indonesian palm oil to enter international market;
- High demand of Indonesian palm oil

BACKGROUND

Production of World's Palm Oil

- World's production of palm oil:
  - 1.2 million tonnes in 1996;
  - 33.33 million tonnes in 2005 (28 times)
- Production growth from previous year:
  - Palm oil 7,7%
  - Soybean oil 5.5%
  - Rapeseed oil 6.3%
  - Sunflower oil 3%
- Growth in palm oil production will suppress the production of other vegetable oils

BACKGROUND

Indonesian palm oil in world's market

- Production of palm oil:
  - Indonesia produced 36% from world's production,
  - Indonesia and Malaysia produced:
    - 85% from world's production
    - or 23% from world's production of vegetable oils in the year of 2005
- By 2004 Indonesian palm oil:
  - Second position in export of non oil commodities and;
  - First position in the export of industrial commodities

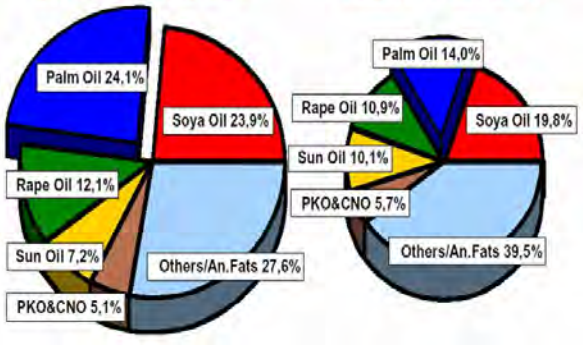
BACKGROUND

Palm oil as potential commodity

- Palm oil helped to reduce poverty:
  - 4.5 million of Indonesian population worked in oil palm plantation
- Palm oil is a potential commodity with fast growth and will become the future of Indonesian industry

World Production of 17 Oils & Fats

2005/06 - - 145.8 Mn T



1990/91 - - 80.5 Mn T

Area growth of Indonesian oil palm plantation

294,560 ha (1980)

Growing for over 480%

6,074,926 ha (2006)

- PBS (52,9%)
- PTPN (12,5%)
- Smallholder (35,4%)

Indonesian palm oil

Area of Indonesian Palm Oil 1997 – 2006

Year	Area (Ha)			
	Smallholders	Government	Private	Total
2000	1,166,758	588,125	2,403,194	4,158,076
2001	1,561,031	609,943	2,542,457	4,713,431
2002	1,808,424	631,566	2,627,068	5,067,058
2003	1,854,394	662,803	2,766,360	5,283,557
2004	1,904,943	674,983	2,821,655	5,401,581
2005	1,971,038	676,408	2,914,773	5,508,219
2006*	2,636,425	696,699	2,741,802	6,074,926

*: preliminary
Sources: Indonesian Palm Oil Statistics (2005), BPS-Statistics Indonesia,
Directorate of Estate Crops (Department of Agriculture)

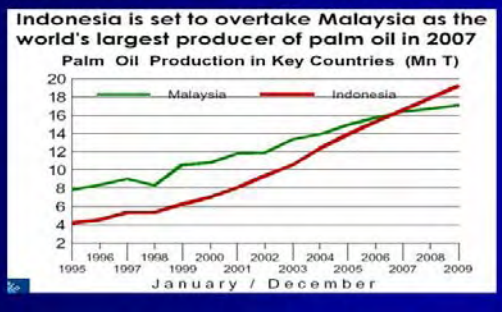
Indonesian palm oil

Production of Indonesian Palm Oil 1997 – 2006

Year	Smallholders	Government	Private	Total
2000	1.91	1.46	3.63	7
2001	2.8	1.51	4.08	8.39
2002	3.43	1.61	4.59	9.63
2003	3.52	1.75	5.17	10.44
2004	3.85	1.62	5.37	10.84
2005	4.5	1.45	5.91	11.86
2006	5.13	1.94	6.32	13.39

*: preliminary
Sources: Indonesian Palm Oil Statistics (2005), BPS-Statistics Indonesia,
Directorate of Estate Crops (Department of Agriculture)

Indonesia vs Malaysia



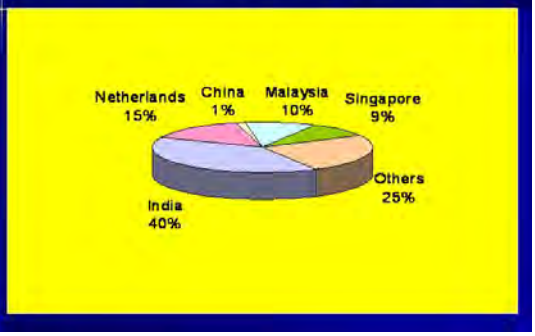
Prediction of Malaysia and Indonesia Palm Oil Production

Production (million ton)	2005	2006	2010
▪ MALAYSIA	15,0	15,8	17,7
▪ INDONESIA	13,6	15,7	22,5

▪ Source: Oil World 29,VOL 49 ,2006

Indonesian Palm Oil Export

Destination country of CPO export (2005)



Environment

COMPLAINTS FROM NGO

- ✓ Tropical forest deforestation is at 2 million ha per year and Indonesia reached 9 million ha
- ✓ Forest fire effected in the loss of protection area of endangered species
- ✓ Land ownership, land use and property rights, land use conflicts
- ✓ Land belongs to local people is taken by big companies
- ✓ Human rights violation related to land use

KONDITION BIOMASS BEI PKS (BEFORE)

DESIGN BIOMASS FOR ENERGY (AFTER)

5,000 kW BIO-MASS POWER PLANT

- *Empty Fruit Bunch, Fiber & Shell are wastes from the palm oil mills.*
- *Without proper disposal, these wastes attract pests & create a poor environment*
- *However, wastes can be utilized as feedstock fuels for Bio-Mass Power Plant.*

5,000 KW BIO-MASS POWER PLANT

- The Power Plant utilizes the wastes from the POM as fuel for the boiler to produce steam.
- The steam then is used to run the Steam Turbine & generate electricity power supply.
- The steam from the steam turbine is not 100 % recovered. Approximately 41% of the steam is extracted for the POM.
- The remaining of the steam will be condensed & recycled

5,000 kW BIO-MASS POWER PLANT

- Immediate potential
  - Connection of dormant RE power to the grid
  - Reduce diesel consumption in POMs
  - Displace rural DGs with gasification systems
  - Recover remnant oil from EFB for biodiesel production
- Medium term potential
  - Biogas methane capture system
  - 5 MWe modular biomass power plant
- Long term initiatives
  - Organic diesel generation from biomass

5,000 KW BIO-MASS POWER PLANT

Plant Operation Flow Chart

BIO-MASS POWER PLANT

The Bio-Mass Power Plant consists of 4 major stations,

1. **Fuel Preparation Station**
2. **Boiler Station**
3. **Power Generating Station**
4. **Water Treatment Plant**

Environment

Allegations made to Indonesian palm oil

- ✓ Labor rights and core labor standards
- ✓ Living conditions (housing, health care, education, etc.)
- ✓ The use of restricted chemical compound which pollute land and air
- ✓ Improper waste management from palm oil mills
- ✓ Reduce to zero waste from Palm Oil
- ✓ Waste of Palm Oil to development energy
- ✓ Reduce Diesel Oil in Area Palm Oil

Environment

EFFORTS TO BUILD POSITIVE IMAGE OF INDONESIAN PALM OIL BY IPOC

- ✓ Collecting data to counter palm oil negative campaign;
- ✓ Promote accurate data and restore any data inaccuracy
- ✓ Respond to the claim from international forum
- ✓ Involved in the Roundtable on Sustainable Palm Oil
- ✓ Promote the use of sustainable palm oil
- ✓ Cooperate with NGO as second opinion to overcome existing issues

CONCLUSION:

1. **The future of Indonesian palm oil is bright;**
2. **The Power Plant utilizes the wastes from the POM as fuel for the boiler to produce steam.**
3. **Immediate potential**
   - **Connection of dormant RE power to the grid**
   - **Reduce diesel consumption in POMs**
   - **Displace rural DGs with gasification systems**
   - **Recover remnant oil from EFB for biodiesel production**
- **Medium term potential**
  - **Biogas methane capture system**
  - **5 MWe modular biomass power plant**
- **Long term initiatives**
  - **Organic diesel generation from biomass**

Solar Thermal Energy Application in China

MSc. Shi Cong Cong - Heat-Timer (Beijing) Technology Co. LTD, China

Abstract

Comparing with most Europe countries, China has abundant solar resource, even in the poor solar irradiation areas; it reaches to 1167Kwh/m^2. There is a huge potential market to use solar thermal energy. After 2000, Chinese solar thermal market develops very rapidly; it becomes No.1 in the world both in installed collector capacity and also in production of collector. Here it is not to analyze why it develop so fast, but from aspects of domestic and international market situation of solar collector , dominant solar collector technology , research activities , national certificates and standard etc to give a introduction about solar thermal application situation in China.

Some market facts like following:

- In 2008, the production capacity of solar water heater increased at 30% than 2007. Total production of collector is about 23.5 million m^2 (16380MWth), collector in service is 108 million m^2 (75600MWth), production capacity is twice than europe's, 4 times than North American. Application and production have share of 60% of world capacity.
- 2008 sales turnover of solar water heater industry is 4.1 Billion Euro; thereof production turnover is 2.1billion Euro. And it increases at 30% every year from 2004.
- 2008 export of solar industry increases 28%, with turnover of 65 million USD, solar collector is exported to over 50 countries.
- Manufacturers of solar water heater are over 3000, but only 20 companies have achieved a turnover over 10million Euro.
- Whole market is dominant by all glass vacuum tube collector, market share is over 85%, the rest are flat plate collector about 15% market share.

Besides market factor, collector technology plays also very important role in this industry, Chinese research invented vacuum tube collector and it brings exploding application in China, quality of solar collector has been improved a lot, laser welding and ultrasonic technology are used in production; it becomes more and more competitive, Europe solar hydraulic system is introduced to China, it helps to improve the whole application level. In order to expand the application field, solar association has also do a lot of efforts to initiate some demonstration projects, like solar air-conditioning, combined solar and heat pump for heating etc to help solar companies. As a mature industry, national standard and certificates are necessary, from 2007, many standards are recompiled; now it approaches to international standard. Solar thermal industry chain is complete built.

Solar Thermal Energy Application in China

for Oct.05-09.2009
SESAM Vietnam Alumni Workshop

Shi Cong Cong
Oct., 2009

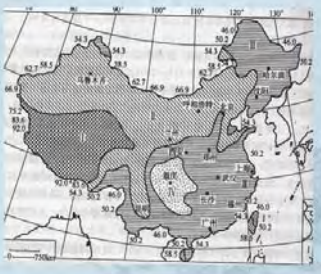
Contents:

- Solar Resource
- Solar market
- International market
- Collector type and technology
- Application
- Main manufacturers and Certificate

Solar irradiation in China

- I richest region
  >=6700MJ/(m2.a)
  or 1861 kwh/(m2.a)
- II richer region
  5400-6700MJ/(m2.a)
  or 1500 – 1861 kwh/(m2.a)
- III normal region
  4200-6400MJ/(m2.a)
  or 1167-1500 kwh/(m2.a)
- IV poor region
  < 4200MJ/(m2.a)
  or 1167 kwh/(m2.a)

Solar irradiation in Germany from Flensburg (980Kwh/m2.a) to Freiburg (1200 Kwh/m2.a)



Main market of solar thermal products in China

- Region A: main market of vacuum tube products
- Region B: main market of flat plate products
- Region C: main market of flat plate products
- Region D: vacuum tube products

Market Data of solar thermal products in 2008

- Production capacity of solar water heater in 2008 increases at 30% than 2007. Total production collector area is about 23.5 million m^2 (16380MWth), Total collector in service is 108 million m^2 (75600MWth), Production capacity is twice than europe's, 4 times than North American. Application and production have share of 60% of world capacity.
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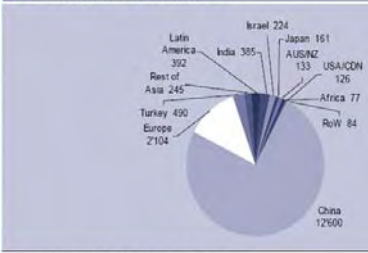
- Whole market is dominant by all gluss vacuum tube collector, market share is over 85%, the rest are flat plate collector about 15% market share.

Solar Market International

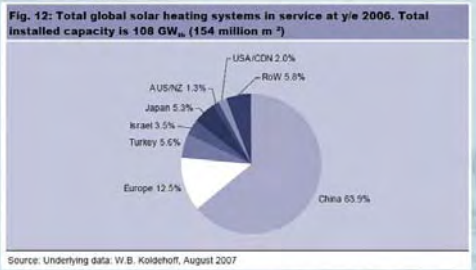
Fig. 11: Global newly installed collector capacity in 2006 in MW_{th}: Total 17,000 MW_{th} (24.3 million m^2)



Source: Underlying data: W.B. Koldehoff, August 2007

Solar Market International

Fig. 12: Total global solar heating systems in service at y/e 2006. Total installed capacity is 108 GW_{th} (154 million m^2)



Source: Underlying data: W.B. Koldehoff, August 2007

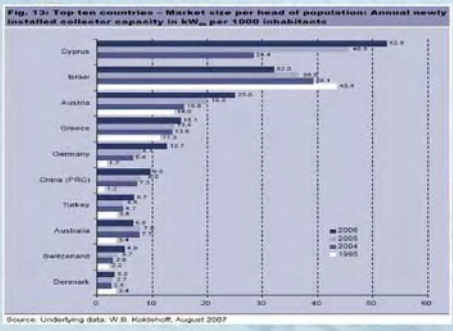
Solar Market International

Fig. 15: Solar heating market in Europe 2006: Overview listed by market share in MW_{th}

Country	2006 in operation (MWth)	EU-market (%)	Installed 2005	Installed 2006	Market growth	2007 Market prognosis	2008 Market prognosis
Germany	5'652	42%	679	1'050	55%	1'050	1'361
Greece	2'301	17%	154	168	9%	189	206
Austria	1'828	14%	163	205	25%	246	307
Italy	530	4.0%	89	130	46%	200	292
Spain	492	3.7%	75	123	64%	228	373
Switzerland	311	2.3%	27	36	33%	46	60
Denmark	254	1.9%	15	18	14%	22	25
The Netherlands	223	1.7%	14	11	-26%	13	13
France (EU)	431	3.2%	85	154	81%	217	393
Sweden	165	1.2%	16	20	24%	24	29
Great Britain	176	1.3%	20	38	93%	49	95
Portugal	127	0.9%	11	14	25%	17	21
Belgium	73	0.6%	14	25	78%	32	56
Norway	18.6	0.1%	2.8	2.8	0%	3.5	3.5
Finland	11.9	0.1%	1.4	2.1	50%	3.2	4.7
Ireland	11.1	0.1%	2.5	3.5	43%	7.0	10.0
New EU-12	800	6.0%	80	104	30%	132	172
Total	13'403	100%	1'450	2'104	45%	2'475	3'421

Underlying data: ESTIF, June 2007; W.B. Koldehoff, August 2007 and own estimates

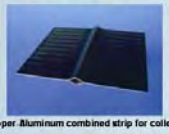
Solar Market International



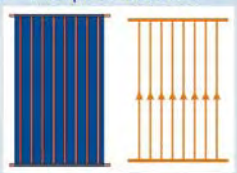
Solar products in China – Heat pipe vacuum tube

Solar Products in China– All Glass Vacuum tube

Solar Products in China – Flat plate collector



Copper Aluminum combined strip for collector



Standard panel:

Size: 2000*1000*80mm

Absorber: copper plate with selective coating.
Absorption >95%,
Emission< 5%

Frame: Aluminium

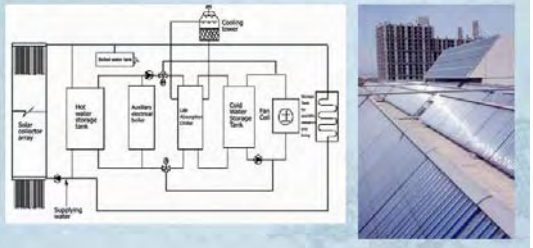
Insulation: 40mm rock woll

Efficiency: Maximum 75%~78%

Full plate laser welding absorber

Application- family system

Application - Solar air conditioning project



Application - Solar hot water project

Top 5 solar water heater manufacturers in China

Manufacturer	Brand	Products type	Logo
Beijing solar energy research insitute Co. Ltd www.beijingsunpu.com.cn	Sunda, Sunpu	Flat plate collector, Heat pipe vaccum tube	sunpu
Himin solar energy www.himin.com	Himin,	All glass vacuum tube and solar water heater	太阳能
Beijing Tsinghua solar Ltd www.thsolar.com	Tsinghua solar	All glass vacuum tube and solar water heater	清华阳光 TSINGHUA SOLAR
Linuo paradigma solar energy co. ltd www.linuo-paradigma.com	Linuo	All glass vacuum tube and solar water heater	
Jiangsu Sunrain solar energy Co. Ltd www.sunrain.com	Sunrain	All glass vacuum tube and solar water heater	Sunrain

The top five firms have a combined market share of 20%.

Solar Certificate in China

- **CGC - SOLAR** : namely golden star labeling, started in 2006, the only one certificate in China. 20 leading manufacturers have been accredited under the Gold Star Labelling System.

certificating procedure : random sample inspection and factory audit+ products thermal character test + annually products supervise after certificate issued.

- **Authorized institute: 2 National grade, 1 province grade**

CTS -Beijing: National center for quality Supervision and testing of solar heating systems in Beijing. www.cts.org

Wuhan: National center for quality Supervision and testing of solar heating systems in Wuhan

Jiangsu products quality supervision and testing institute

Solar Certificate Standard in China

Certified product	Test standard	Aligned to Euro standard
Solar collector	GB/T 4271-2007: test methods for the thermal performance of solar collectors GB/T 6424-2007: Flat plate solar collectors	EN12975-1 & EN12975-2 Thermal solar system and components-solar collectors part1: gerneral rules part 2: test methods
All vacuum tube solar water heater	GB/T17049-2005:	EN12975-1 & 2:2006
Solar water heater	Specification of domestic solar water heating system GB19143-2003	EN12975-2:2006

Available International Certificates in China

Solar keymark: Europe certificate

Bis Oct. 2008, total of 266 manufacturers and distributors from 27 countries get 557 main type certificates (and a similar number of sub type certificates), thereof 23 Chinese manufacturers.

Switzerland

Korea

Australia

Germany

South Africa

Spain

Sweden

Thanks for you attention!

Sustainable Disposal of Municipal Solid Waste of Dhaka City to Generate Electricity & Organic Fertilizer: A System Dynamics Model

MSc. Khatun Jorifa - Sub-Divisional Engineer, Bangladesh Power Development Board, Bangladesh

Abstract

A System Dynamics computer simulation model has been developed in this research for electricity recovery from municipal solid waste in Dhaka city as well as the city's forecasted population growth, trend of solid waste generation and proposed collection. This model also estimates the recovery of organic fertilizer, CO2 emission reduction and credit recovery for CO_2 reduction according to Clean Development Mechanism guideline (Kyoto protocol) and cost of per KWh electricity generation from Municipal solid waste (MSW). This model incorporates the initial values of 1990 and simulates for both existing and proposed scenarios during the period 1990 to 2025 to assess the electricity recovery, organic fertilizer recovery as by-product, CO2 emission reduction and cost per KWh electricity generation from MSW.

Solid waste problem of Dhaka city is dynamic in its nature. So the simulated results show that population, solid waste generation and proposed collection and electricity recovery potential are increasing with time. Simulated results support the previously reported values as well.

Simulated results are the guide for making rational choice among available alternative Technologies for electricity recovery from MSW. For the environmental implications, the simulated results provide potential for analyzing electricity recovery and can be used as a complementary tool for proper solid waste management. On the other hand, municipal solid waste can meet significant portion of electricity demand in Dhaka city.

Economic, ecological and social benefits of the technology for electricity recovery from municipal solid waste as found out through this study should pave the way for electricity recovery from municipal solid waste in Dhaka city.

Introduction

Bangladesh has a population of about 150 million and corresponding area of 147,570 km2, making it the most densely populated country in the world. 85% of the total population live in rural areas and unfortunately only 35% have access to the national electricity grid [1]. Where per capita total primary commercial energy consumption in India is 14.09 GJ and in UK 171.87 GJ, it is only 4.24GJ in Bangladesh, which is the lowest in the World [2]. There are six major cities in Bangladesh namely, Dhaka, Chittagong, Khulna, Rajshahi, Barisal and Sylhet. Dhaka, the capital of Bangladesh and

a city from ancient times, was founded in the early 17th century and has grown into a busy city. The population of Dhaka city is alarming since the city population growth rate is increasing day by day. Dhaka city solid waste disposal problem is a crucial issue. From the beginning there was no particular place for waste disposal. Public land was used for disposal of waste in that period. At present Dhaka City Corporation (DCC) has acquired 2 lands on the outskirts of the city for disposing of waste. If no alternatives are generated in the near future then these lands will not suffice for disposal of increasing amount of waste with time. Solid waste has become a severe problem in most areas of the Dhaka city giving rise to ill effects on environment and health hazard for the citizens. The health impact of waste in DCC causes dengue, headache, respiratory problems, skin diseases, fever, breathing problems, diarrhoea, hepatitis, typhoid, lung disease, mental problems, and even cancer.

A study has shown that the daily generation of solid waste in Dhaka City was about 5340 tons in the year of 2005 [3]. Out of 5340 tons, organic material was the highest fraction.

1.1 Solid Waste Management System

Local government bodies do the solid waste management in Bangladesh. Dhaka City Corporation (DCC) is responsible for solid waste management in Dhaka city. Due to lack of financial support, not enough subsidies, and other constraints, DCC is not capable enough for proper collection and disposal of such waste properly [5]. So most of the waste remains visible on the streets, open spaces and in the drains. As a result environment is contaminated and thus creates bad effect on health of the Citizens.

Some solid waste in Dhaka City is recycled by Waste Pickers from DCC dustbins and containers, composted by Waste Concern, discharged by citizens to roadsides, drains, open spaces and illegal dumping and final disposal at landfills in unhygienic manner without any energy recovery. DCC can collect about 50% of the total generated wastes; remaining 50% of the wastes are dumped in low lying areas [4].

At present DCC has no waste treatment or recycling plant such as Land filing, Incineration or Anaerobic Digestion. Some informal sectors are involved in resource recovery and recycling of waste such as industry, households, and waste pickers. It is found from a study that 15% of the total generated waste comprising of mainly inorganic and recyclable materials are collected by 87,000 people in informal sector [6]. Inorganic recyclable materials such as old newspapers, empty bottles, containers, old clothes, shoes and others from DCC bins /containers, dustbin or from open areas are separated by street waste Pickers [5]. The recyclable materials are sold in market for resource re-using leaving behind large amount of organic waste which is dumped/land filled without any energy recovery. A large amount of solid waste is generated in Dhaka city everyday. According to the study of M. Alamgir, the composition of solid waste organic/biodegradable material fraction in Dhaka city was about 68.3% [5] and

according to Rahman & Moqsud, in the year 2005 it was about 62%-88% and calorific value 3.2-6.04 MJ/kg [7,8]. High moisture content waste does not burn without any fuel. So it needs natural gas or diesel for burning of such waste. DCC waste .

1.2 Present Status and Scope of this Research

Only 35% people in Bangladesh have access to the national electricity grid [1], a figure lowest in the world. In the Updated Power System Master Plan (PSMP) of 2006 the benchmark load forecast was based on about 8% growth rate. However, due to shortage in generation capacity, the actual demand could not be supplied for the last few years. The maximum demand served so far is 4162.0 MW (Ist May, 2009). More than 89% electricity comes from gas based and 4.77 % comes from coal based plants in Bangladesh and the rest are from oil and hydro [1]. The electricity development is required to be accelerated to increase access and attain economic development. Desirable economic growth rate would be about 6-7% p.a. According to the forecast, peak demand would be about 5112 MW in FY2007, 9786 MW in FY2015 and 13,993 MW in 2020[1].

For fulfilling electricity as well as energy demands all over the country the GOB has set a target in the National Energy Policy (NEP) to electrify the whole country by the year 2020 including 10% electricity from renewable sources [8]. To achieve the target with declining gas or coal reserve and increasing prices of fossil fuels the search for alternative raw materials to replace fossil fuels has been intensified all over the world. According to Power System Master Plan 2005-2025 of Bangladesh Power Development Board, there will be shortage at traditional energy sources like gas or coal, so good planning of alternative energy sources/renewable energy sources is inevitable. To meet the future power demand this practice is also observed in almost all other countries of the world.

Solid waste generation of Bangladesh is increasing proportionately with the growth of its population. Solid waste management in Bangladesh is primitive and needs modernization and innovative approach for its proper management. In this research, attention has been set to focus on electricity recovery model development through modern Technology from municipal solid waste in Dhaka city. As an analyzing tool, System Dynamics methodology is used to develop a mathematical computer simulation model for electricity recovery. The scope of this research is limited to develop a System Dynamics model to analyze the electricity recovery from MSW and demonstrate existing and proposed scenario of MSW management in Dhaka city. The model only covers the area of Dhaka city and not other cities of Bangladesh.

1.3 Objective

This research aims to develop a System Dynamics computer simulation model for electricity recovery from municipal solid waste through modern Technology.

2. Energy Modelling by System Dynamics Methodology

System Dynamics Modelling is an approach to mathematically simulate any given complex system achieved by analysis of the dynamics of the system and all of its subsystems. For a complex system involving many interactive technical parameters it is difficult for a conventional financial analysis to resolve policy formation and decision making issues. So System Dynamics focuses on policy and how policy determines behaviours. Saeed analyzed the rural development and income distribution policy planning of Pakistan through System Dynamics [10]. Saeed claims that the System Dynamics is a promising technology for multidisciplinary education on technology [11]. It has been seen that the different modelling approaches are developed by Researchers and Scientists engaged in analysis of energy recovery from various aspects. Bangladesh energy system configuration is nonlinear, dynamic and contains natural time–delay characteristics. For this reason this proposed research has considered a System Dynamics methodology for formulation of mathematical simulation model for electrical energy recovery from MSW in Dhaka city of Bangladesh.

3. Choice of Technology

Several Technologies have been adopted worldwide for recovery of electricity from MSW such as Landfill, Incineration, Anaerobic Digestion and Gasification etc.

Anaerobic Digestion (AD) Technology

Waste to electricity recovery through AD is preferable to incineration in terms of global warming potential. The negative global warming impact means that the global warming potential is avoided due to both fertilizer and electricity recovery through AD [13]. In AD, higher energy saving is possible through organic fertilizer production. But due to high moisture content, 50-70% in solid waste of Dhaka city [7], it needs diesel or gas for initial burning of waste in boilers. MSW Incineration generates more solid residues usable only for landfill than AD, and ash generation accounted 582 Kg per ton of MSW incinerated [13]. Also, due to acute shortage of land in and around Dhaka City for disposal of waste, anaerobic digestion Technology for electricity recovery, as well as being an environmentally sound Technology, will also be a good option for treatment of MSW.

5. Modelling Approach

System Dynamics Modelling Approach

Models are tools that substitute for an object or system; their nature can be dynamic or static. Model can be used to predict the future behaviour of a system. It is used to simulate the behaviour of the real system. The main approaches of System Dynamics are verbal description of the model, flow diagram of the model and flow diagram to convert mathematical equation. J.J Forrester developed a computer programming language STELLA through which it is possible to simulate the mathematical equation of a complex system [12]. But any system dynamics model also can be simulated by FORTRAN or Basic programming language (Visual Basic).

The selection of modelling depends on the nature and purpose of the problem. In this research, the methodology to be used for modelling of MSW to electricity recovery will deal with a large number of variables and nonlinear multifaceted characteristics. The computer modelling is one of the most appropriate techniques to analyze the variables characteristics. So System Dynamics methodology has been considered for model developing. STELLA 8 software is the icon-oriented software, which was developed by High Performance System [14]. It is an enormously powerful and flexible tool and an object-oriented programming.

Structural & Mathematical Modelling

Municipal solid waste management is the collection, transportation, recycling, energy recovery and disposal of waste materials which are usually produced by human activity, that seek to minimise their effect on human health and environment. In this research existing and proposed scenario of solid waste management in Dhaka city are explained through the structural model in Fig.5.1. In the Developing / Developed countries solid wastes are generated by residential, commercial, industrial, healthcare, agricultural and mineral extraction activities and accumulate in streets and public places. Main solid waste generation sources in the city of Dhaka, Bangladesh, are residential, commercial and industrial which have been shown through the structural model in Fig.5.1.

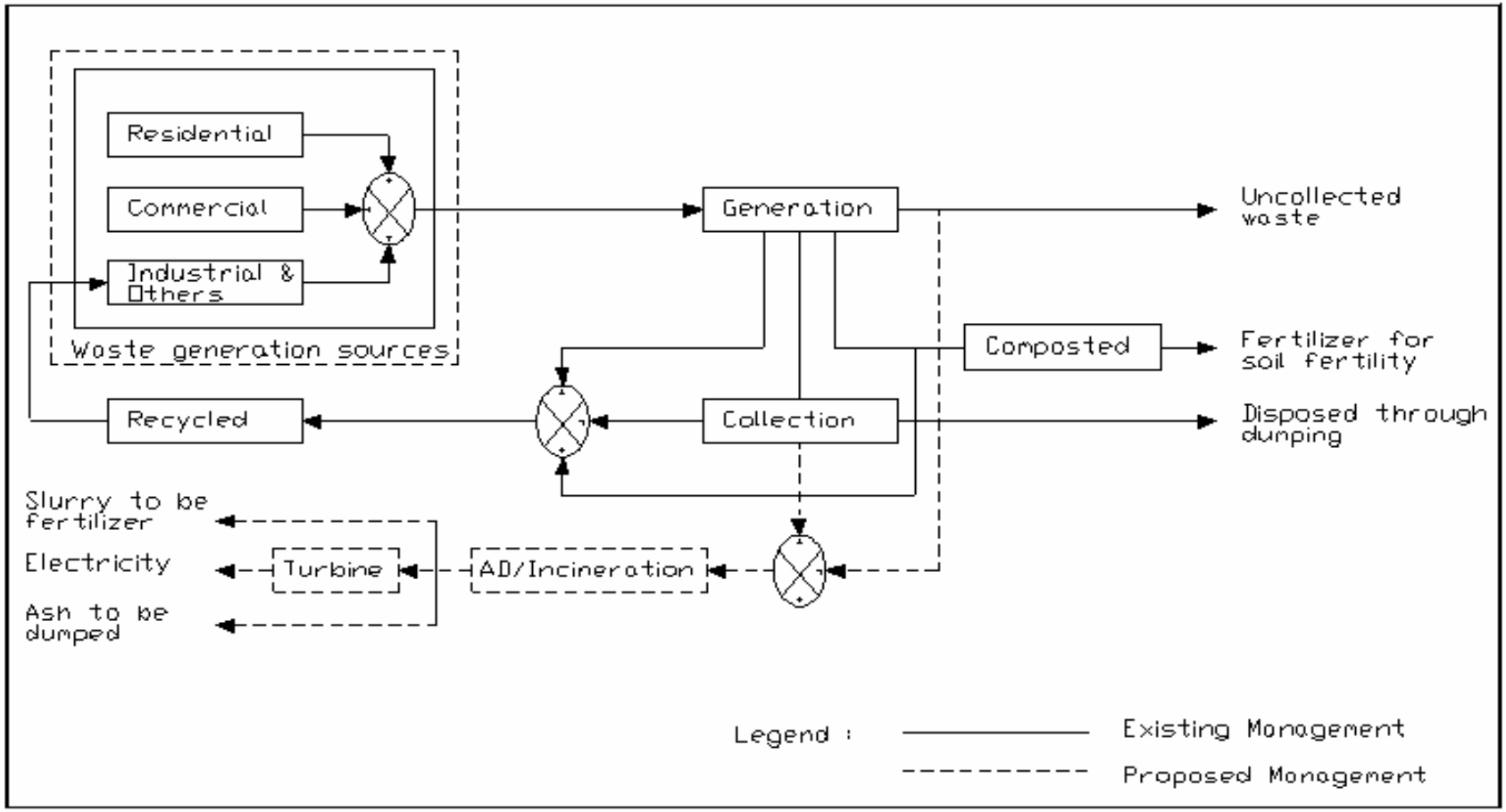


Figure 5.1 Municipal Solid Wastes to Electricity Flow Diagram for Dhaka City

5.1 Mathematical Modelling

Mathematical model has been developed here by using System Dynamics methodology based on the structure model of Fig.5.1. Therefore, using System Dynamics methodology the mathematical model of electricity recovery has been converted to System Dynamics flow diagram in fig 5.2.

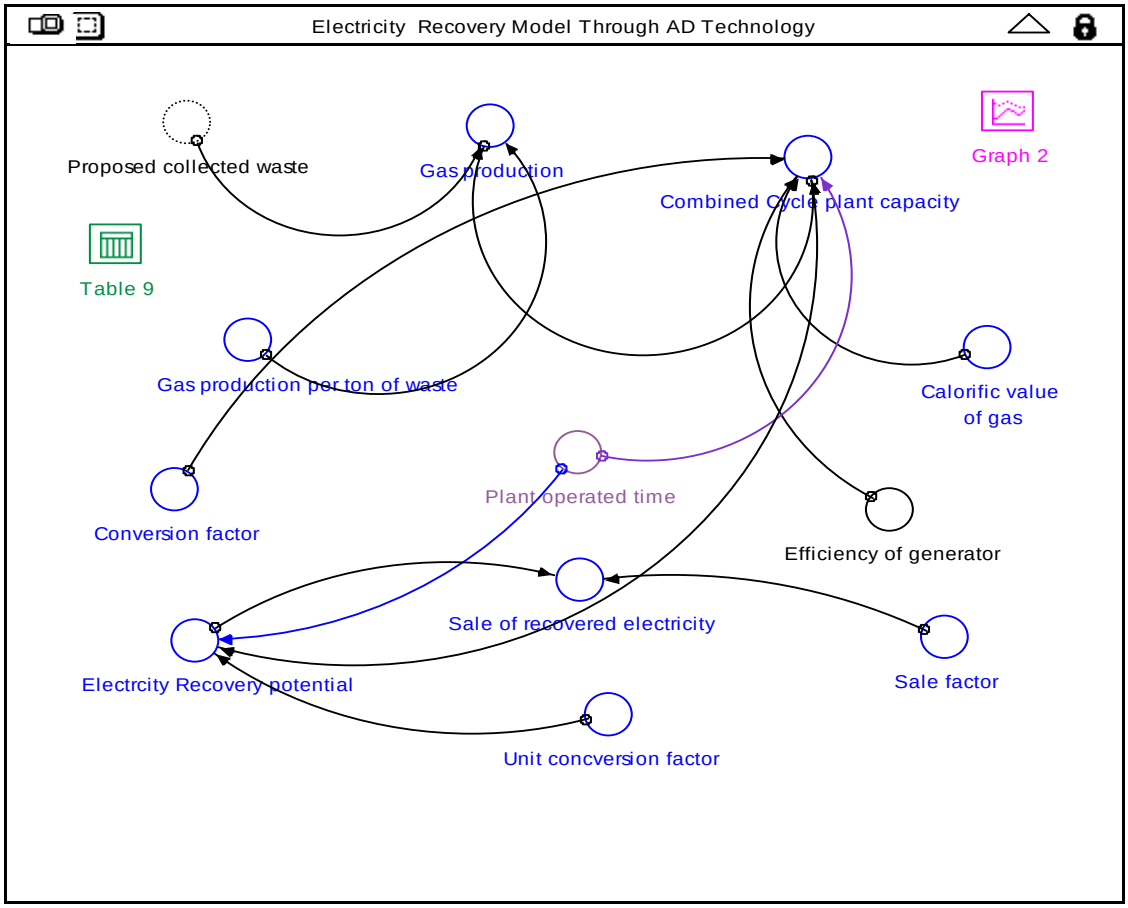


Fig. 5.2 System Dynamics flow diagram of Electricity recovery Model through Anaerobic Digestion Technology

Therefore, by using System Dynamics methodology the mathematical model of CO2 emission reduction and cost recovery from CO2 emission reduction has been converted to System Dynamics flow diagram in Fig 5.3.

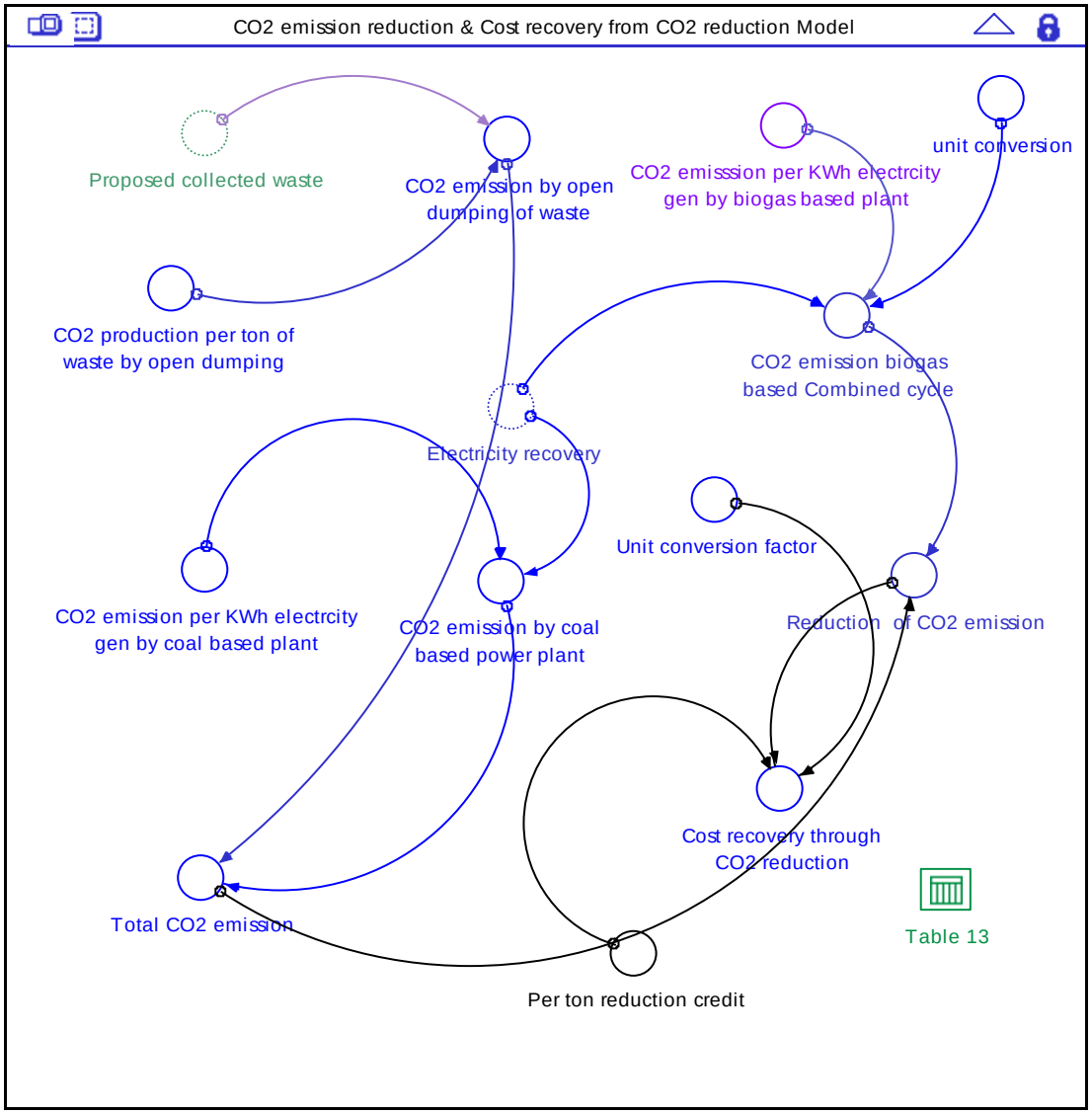


Fig. 5.3. System Dynamics flow diagram of CO2 emission reduction & Cost recovery from CO2 reduction Model

5.2 Total cost recovery Model

Therefore, by using System Dynamics methodology the mathematical model of gross treatment cost and total cost recovery has been converted to System Dynamics flow diagram in Fig 5.4.

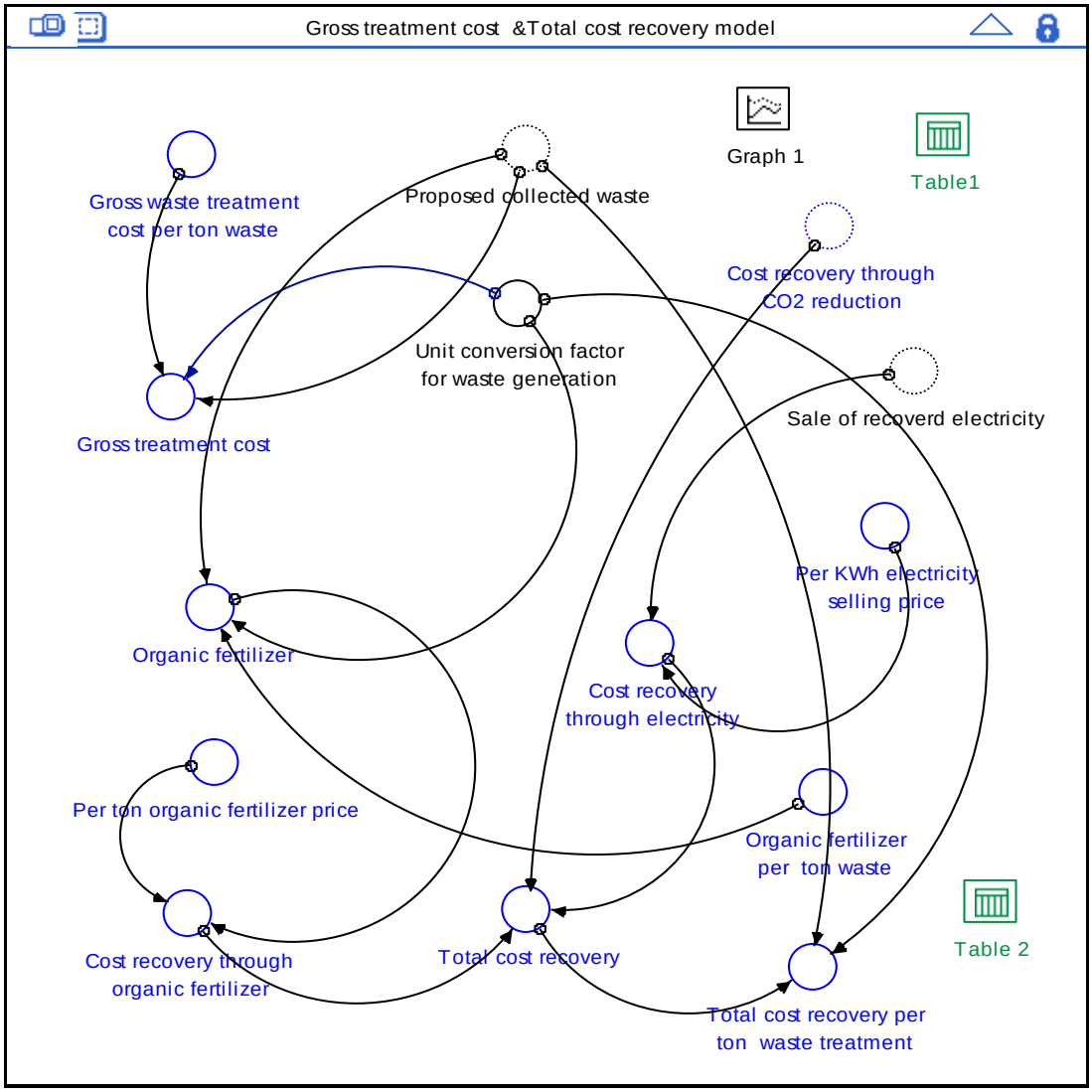


Fig. 5.4. System Dynamics flow diagram of gross treatments cost & total cost recovery model

5.3 Per KWh Electricity Generation cost Model

Therefore, by using System Dynamics methodology the mathematical model of per KWh electricity generation cost has been converted to System Dynamics flow diagram in Fig 5.5.

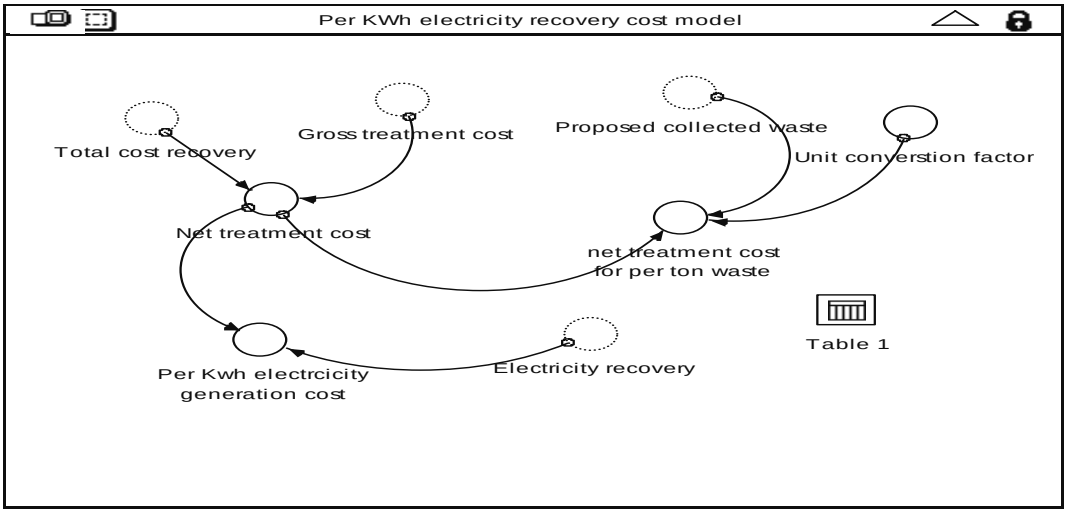


Fig.5.5 System Dynamics flow diagram of cost per KWh electricity generation model

5.4 Electricity Recovery Model through Incineration Technology

Therefore, by using System Dynamics methodology the electricity recovery mathematical model has been converted to System Dynamic flow diagram in Fig 5.6.

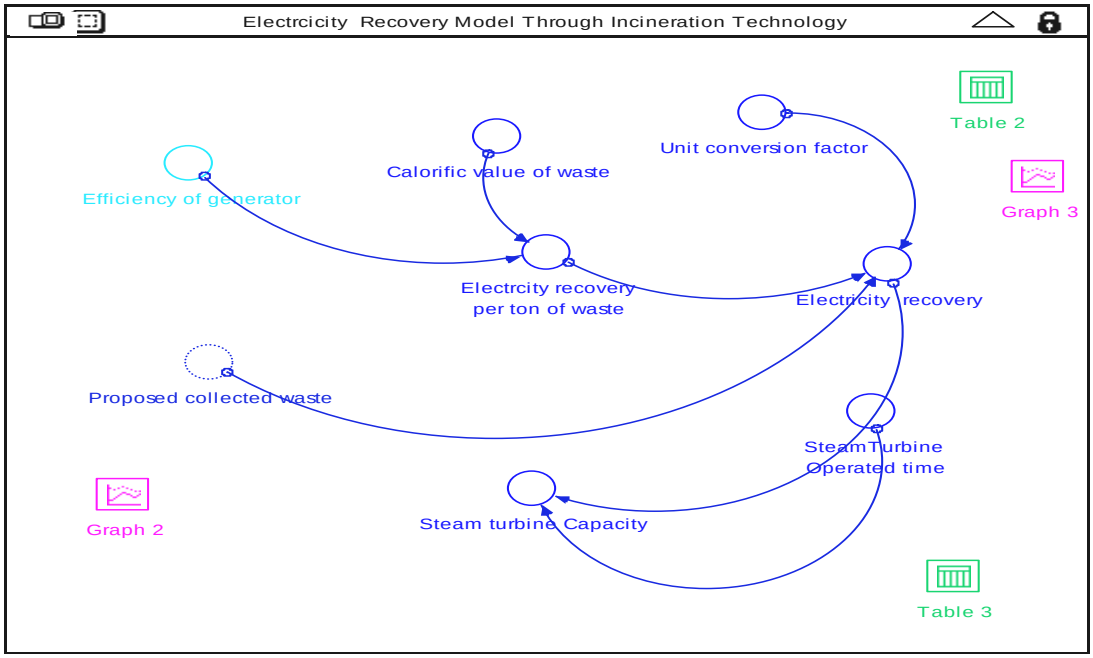


Fig. 5.6. System Dynamics flow diagram of Electricity recovery model through Incineration Technology

6. Model Calibration

To calibrate the model, model parameters were obtained from the available practical data. Model parameter estimations are population growth rate, waste generation and proposed collection, electricity recovery, CO2 emission reduction and credit recovery for CO_2 reduction according to Clean Development Mechanism guideline (Kyoto protocol), organic fertilizer recovery and cost per KWh electricity generation from MSW.In this model the year 1990 has been considered as base year, the simulation takes place upto 2025 for status projection. The simulated period is shown along X axis with time horizon of 34 years in the midst of equal intervals. Simulated variables are shown along the Y-axis.

6.1 Electricity Generation cost through Coal Based Plant in Bangladesh

Bangladesh has its own natural coal resources. Government is in the process of finalizing the ``Coal Policy 2009``. The Policy will enforce the establishment of coal based electricity generation plant through the year of 2015. Per KWh electricity generation cost from coal is around $0.055 [1] which is lower than biogas and oil based power plants. In this model Incineration and Anaerobic digestion Technologies have been adopted for municipal solid waste to electricity recovery. In comparison to both the Technologies, Anaerobic Digestion Technology is preferable for electricity recovery from municipal solid waste of Dhaka city. If considered in the context of electricity recovery only, then the AD Technology is not economically viable. But considering the optimum energy utilization and environmental implications it has importance in context of Bangladesh.

6.2 Simulated Results

To demonstrate the use of the model as a tool for policy planning, it has been evaluated in existing and proposed scenario of MSW during the period of 1990-2025. Existing scenario corresponds to current conditions of Dhaka city MSW management system, whereas the proposed scenario corresponds to electricity recovery from proposed collection of MSW through Anaerobic Digestion as well as Incineration Technology. Fig 6.1, Fig 6.2, Fig 6.3, Fig 6.4 and below table show the simulated results for existing scenario and proposed scenario.

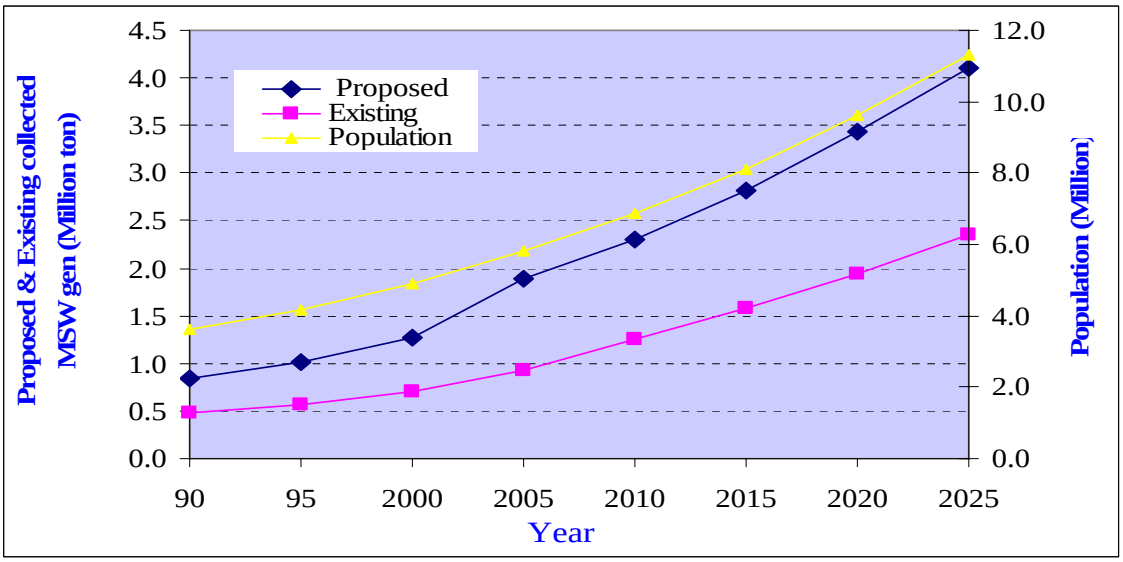


Fig. 6.1 Simulation of Population, Proposed & Existing collected MSW generation during the simulation period (1990-2025)

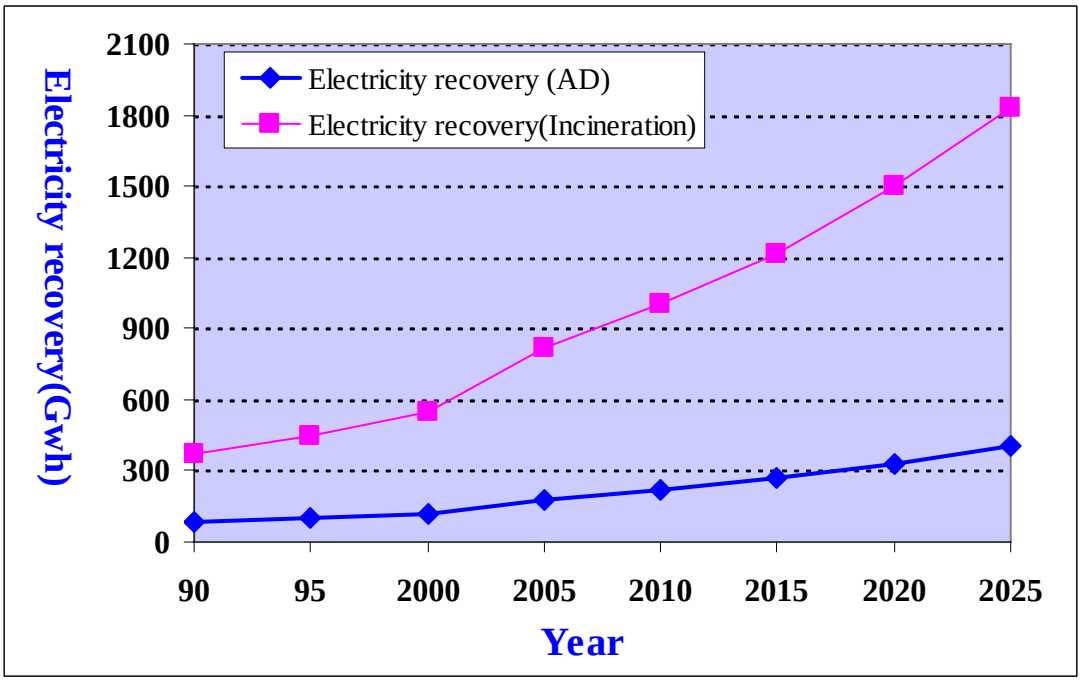


Fig. 6.2 Simulation of electricity recovery from proposed collected MSW through Anaerobic Digestion & Incineration Technology during the simulation period (1990-2025)

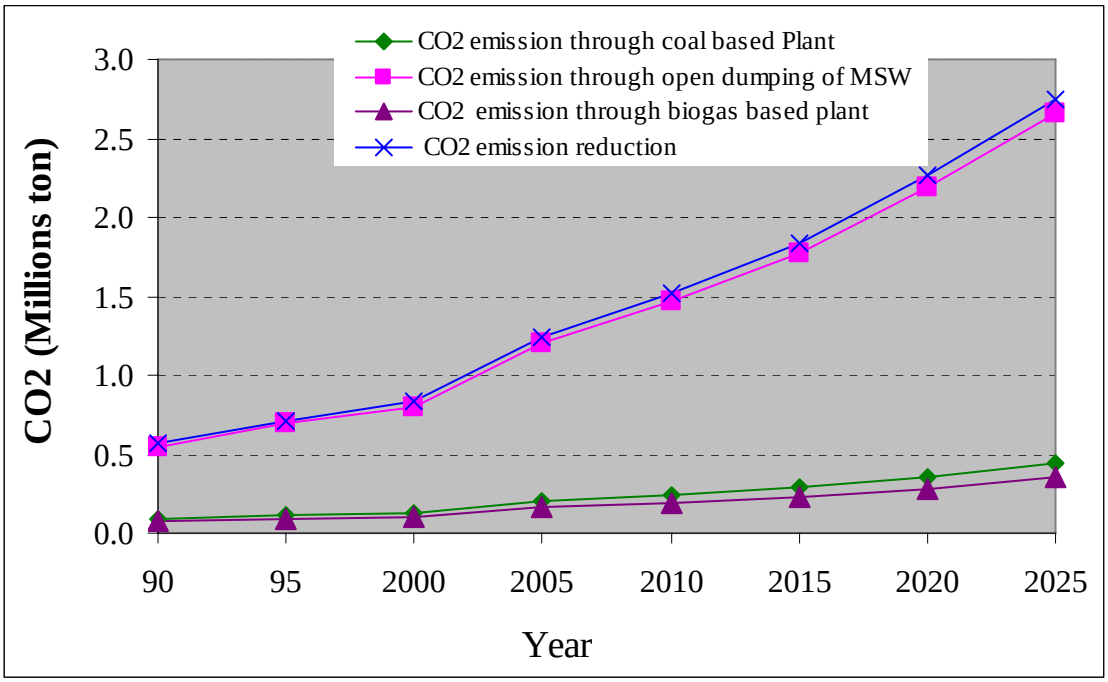


Fig. 6.3 Simulation of CO2 emission and reduction during the simulation period (1990-2025)

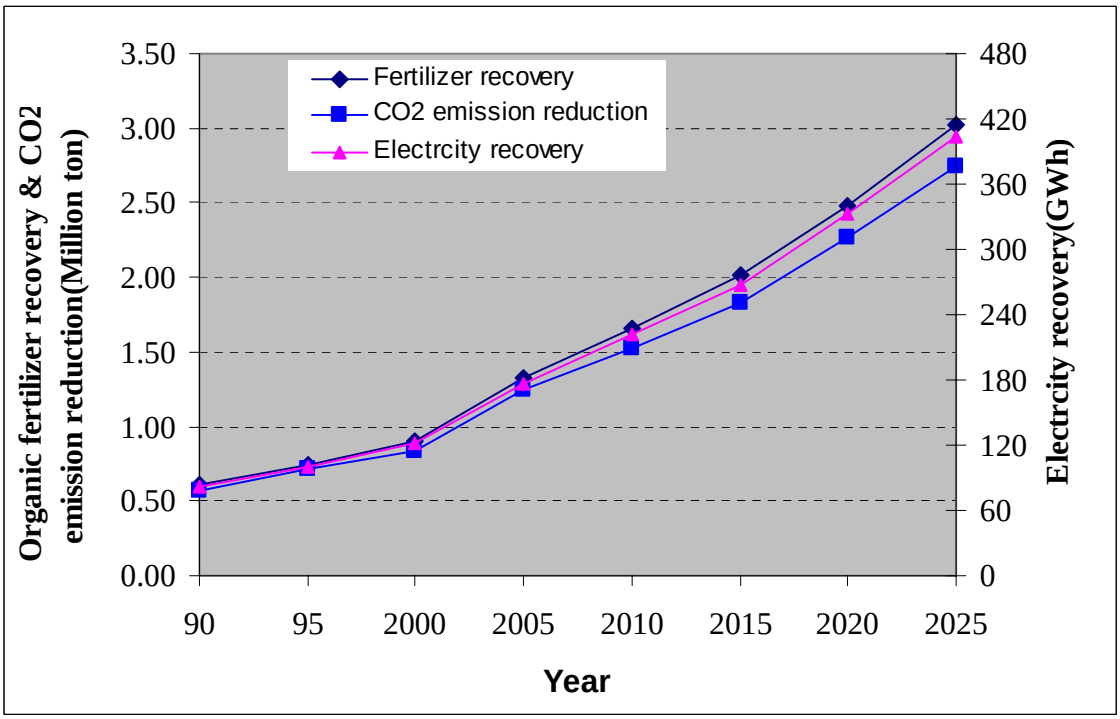


Fig. 6.4 Comparison of simulated results of electricity recovery, organic fertilizer recovery and CO2 emission reduction during the simulation period (1990-2025)

Table shows that simulated result of per KWh electricity generation cost from MSW through Anaerobic Digestion Technology

MSW Collection cost ($/ton)	Gross treatment cost ($/ton)	Total cost recovery ($/ton)	Net treatment cost ($/ton)	Electricity generation cost ($/KWh)
16.00	15.31	8.17	7.14	0.073

7. Conclusion &Recommendations

Proper and efficient management of MSW in Dhaka city through electricity recovery by Anaerobic Digestion Technology can lead to significant economic, social & environmental benefits. In this research a basic systematic structure model has been developed through status projection. The model is used for estimating various parameters related to electricity recovery from MSW. There is scope for further research and updating the study. This model can also be applied for Landfill, Gasification or Pyrolysis Technology by adding or subtracting flow loops. According to the Clean Development Mechanism (CDM) guideline, International grants for CO2 emission reduction can be achieved by implementing this model for electricity recovery from MSW.

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IMPROVEMENT OF JATROPHA OIL IMPLEMENTATION FOR DIESEL GENERATORS ON THE ISLAND OF NUSA PENIDA, INDONESIA

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ABSTRACT

The State-owned Electricity Company (Perusahaan Listrik Negara/PLN) Bali in 2007 initiated the project of Jatropha oil utilization for diesel generators on the island of Nusa Penida, which is located near the island of Bali, Indonesia. It was aimed to reduce diesel fuel consumption of the 3.43 MW diesel power plants for local electrification, as well as to contribute on economic growth, to increase community capacity building, and to give positive effects on the environment. Some stakeholders from academic, business and government (ABG) institutions such as Udayana University, PLN, and local government involved in this project.

There are technology problem as lack of proven information on how to produce Jatropha oil, how to check the quality of the fuel, what effect it would have on the diesel generators; socio-economic problem that business of Jatropha cultivation is not feasible due to uncertainty of price and buyer as well as lack of support during the beginning of cultivation; and environmental problem related to greenhouse emission of Jatropha oil life cycle. This research is conducted to address all of problems and to provide improvement plan for achieving the expectations effectively.

The research uses participation and systemic approaches and applies methods/techniques of literatures study, Rapid Rural Appraisal (RRA), field experiment, Life Cycle Analysis (LCA), diamond competitiveness analysis, and Logical Framework Analysis (LFA). These are utilized to do assessment of technical, socio-economic, environmental aspects, identification of problems and objectives, as well as formulating improvement plan regarding Jatropha oil implementation.

In relation to Jatropha cultivation in Nusa Penida, the findings show that the yield from 1500 plants/ha is 1800 kg dry seeds/ha/y in the 5^{th} year and 6 kg seeds could produce 1 liter oil. The possible improved yield from 2500 plants/ha is 4,000-4,500 kg dry seeds/ha in 5^{th} year with around 4 kg seeds provide 1 liter oil. Concerning Jatropha oil production, improvement suggested covers applying revolution of 30-40 rpm based on best practices since the existing revolution is 255 rpm. The other suggestions are re-cleaning filter and centrifugation devices periodically after long duration of utilization, drying and storing seeds appropriately, and

immediate utilizing of oil produced in order to fulfill standard of Germany for Pure Plant Oil (PPO) related to properties of acid value, phosphorus content, sediment content, and water content as well. Applying 20% fuel blend is expected to avoid side effects of Jatropha oil utilization. The potential side effects include coking formation on the injectors, carbon deposits, fuel system failure, oil ring sticking, thickening and gelling of lubricating oil.

In order to solve socio-economic problems, farmers and PLN as buyer need to do negotiation and make commitment about purchasing contract for long term period and self consumption of oil for cooking for short term period. The purchasing contract is set at profitable price. Recently at the price of Rp 700 kg seeds/kg, cultivation of Jatropha intercropped with corn is feasible but monoculture Jatropha cultivation and oil production business are not feasible. Self consumption of oil for cooking is to make the plantation survives for the first several years.

CO2 emission of Jatropha oil life cycle in Nusa Penida is 5.8% lower than that of diesel fuel life cycle. Contributors of that emission are seeds transportation using motorcycle and oil production using diesel fuel. Changing transportation means with pickup vehicle makes CO2 emission of the Jatropha oil life cycle less 65% than that of diesel fuel.

Concerning efforts to raise competitiveness of the Jatropha oil from Nusa Penida, it is suggested to continue collaboration among Unud, PLN and BPP, to increase accessibility to local finance institutions, to diversify buyers, to use idle oil production facilities. The other necessary effort is to propose subsidy for Jatropha oil to compete with diesel fuel.

Regarding improvement plan, the detailed expectations are local people's income improved (option A: total labors income of Rp 104.5 million; option B: total labors income of Rp 154.5 million; option C: total labors income of Rp 722.6 million), cost saving due to oil use achieved (option A: Rp 6 million/y; option B: Rp 30 million/y; option C: Rp 238.2 million/y), community involvement raised (plantations located at each village and managed by farmers groups), CO2 emission decreased compared to that of diesel fuel (option A: 58.2%; option B: 30.5%; option C: 24%), and degraded lands utilized (89 ha degraded lands for option A and B; 385 ha degraded lands for option C). There are 3 options of strategy (options A, B and C) to achieve that expectations based on several parameters including cultivation area of 89 or 385 ha; seed price of Rp 800, 850 or 900/kg; Jatropha oil price of Rp 4000, 4200 or 4400/liter; plantation of 1500 or 2500 plants/ha; oil to seed ratio of 1 liter oil from 4 kg seed; using 20% blended fuel; applying better design/method of oil production; utilizing pickup truck for seeds transportation; and increasing plant productivity of 10% by use of better seedlings.

Improvement of Jatropha Oil Implementation for Diesel Generators on the Island of Nusa Penida, Indonesia

by **Meiwardi Yuswan**
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Vietnam, October 8th, 2009

Outline

- Introduction
- Research Design
  - Direction and Framework
  - Methodology and Data Collection Activities
- Literature Study
- Assessment
  - Progress of Jatropha Oil Implementation
  - Technology, Socio-Economic, Environment, Competitiveness
- Improvement Plan
- Conclusion and Recommendation

Introduction

Site Description

- **Village and Area**: 16 villages, 79 sub-villages (202.84 km2)
- **Population**: 47,709 persons, 8,506 households (2005)
- **Tourism**: renewable energy park
- **Other energy**: kerosene (3,919 households as users), biogas and firewood for cooking

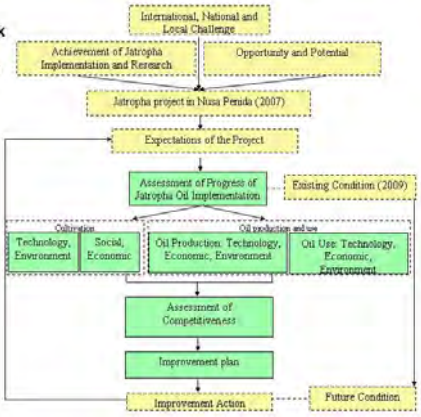
Introduction

Jatropha Oil Demand and Implementation

- **Demand to replace diesel fuel**
  - 1,400,000 liters/day (Bali Island)
  - 6,600 liters/day (Nusa Penida Island)
- **Implementation of Jatropha oil use in Nusa Penida**
  - Social project of PLN and application of ABG concept
  - To use Jatropha oil for 3.43 MW local diesel generator

Research Design

Framework of the Research



Research Design

Methodology

Data Needed	Data Collection Method	Data Analysis Method	Output of Analysis
Progress of Technology and Implementation	[illegible] oil production, properties	Comparison between [illegible]	Input, activity, output, Technological [illegible] oil production and implementation
Competitiveness: condition Economic impact	Literature study, interview, observation Rapid Rural Appraisal	Porter's diamond competitiveness analysis Financial feasibility analysis	Production factors, demand, supporting institutions, business strategy and rivalry Payback period, NPV, IRR, PI

Research Design

Data Collection Activities

- Initial meeting with PLN Bali (planning manager, deputy IT/Information Technology, system plan staff)
- Collecting data from Stakeholders and Beneficiaries
  - Interviewing PLN Bali and PLN Nusa Penida
  - Interviewing Local Government (district government; regency and district agriculture offices)
  - Interviewing Udayana University (lecturer of agriculture faculty)
  - Interviewing and doing rapid rural appraisal with local farmers
- Observing plantation, oil production place and diesel generator in Nusa Penida
- Field Testings
  - Testing oil production in Nusa Penida
  - Testing oil properties in chemical laboratory of Udayana University
- Discussing with local supervisor and colleagues
  - Discussing with supervisor from EOC (Prof. Uwe Rehling)
  - Discussing with students and lecturers of "energy management" master program of Udayana University

Literature Study

Best Practices

Drying before oil production:
- Impurities in seeds: water (7%) [12, p.14], phosphorus (0.31%) [9, p.4]
- Drying seeds until water content (2-4%) to increase oil recovery [1, p.80] and decrease phosphorus [Ibid, p.96]

Design of oil production:
- Revolution of press machine (30-40 rpm) [2, p.5]
- Temperature of pressing process <60°C to reduce phosphorus [11, p.7]

Production devices:
- Using strainer type of press machine [2, p.5]
- Filtering and centrifuging to reduce sediment [11, p.9]
- Storing the oil to reduce acid [Ibid, p.8-9]

Output:
- Oil quantity: 25% clean oil (efficiency of 85%) [2, p.5] and seed oil content (29.36%) for IP-1 A provenance [8]
- Oil quality: water (0.075%), phosphorus (0.0015%), ash (0.01%), acid (2 mg KOH/g) [11, p.5]

Assessment

Implementation Progress

Assessment

Village History

- 1954: Community institutions ("banjar", "dusun"); Land certification
- 1976-1977: Land conservation ("Gamal", "Lamtoro")
- 1980: Social norms (agriculture)
- 1987: Dam (husbandry)
- 1992: "Jambu Mete" cultivation
- 2001: Land conservation ("Jati", "Mahoni", "Cendana")
- 2006: Banana cultivation
- 2007: Jatropha cultivation

"Local people have a lot of experiences in agriculture and land rehabilitation as a worthy capital to make Jatropha business successful"

Based on Rapid Rural Appraisal (RRA) in Baturnadeg Village, Nusa Penida

Assessment

Village Institution

- Traditional Institution:
  - Desa Pekraman
  - Banjar Adat
  - Lembaga Perkreditan Desa (LPD)
  - Korop Klian Banjar
  - Sekaa Truna
  - Pecalang
- Formal Institution:
  - Desa Dinas
  - BPD and LPM
  - PKK, Karang Taruna
  - Pertahanan Sipil (Hansip)
  - Kelompok Tani (Farmer Group)
  - Petugas Penyuluhan Lapangan (PPL)
- Potential Institutions for cultivation management:
  - Kelompok Tani to coordinate sales, etc
  - Banjar Adat to bind farmers based on culture/religion
  - Lembaga Perkreditan Desa (LPD) to provide fund
  - PPL to provide agricultural information

Based on Rapid Rural Appraisal (RRA) in Baturnadeg Village, Nusa Penida

Assessment

Agricultural Product Flow

For other Agricultural Product

Farmers

Local Collectors (5 persons)

Traders in Mentigi Market

End Consumers in Nusa Penida, Bali, and others

For Jatropha

Farmers

Farmer Groups

End Consumers: PLN, others

Based on Rapid Rural Appraisal (RRA) in Baturnadeg Village, Nusa Penida

Assessment

Existing Jatropha Business

Cultivation		
Land and water	Rocky dry land; Without irrigation	
Practice	Monoculture; 1500 plants/ha	Intercropping with corn, etc; 1500 plants/ha
Product	Seed price of Rp 700/kg, 6 kg seeds gave 1 liter oil	
Feasibility	Not feasible (negative NPV)	Feasible but NPV/O&M cost of 24% < 30%
Oil Production		
Product	Oil price of Rp 5,200/liter; Local diesel fuel price of Rp 5,500-6,500/liter	
Feasibility	Not feasible (negative NPV)	

Year	% Harvest of Jatropha	Harvest (kg/ha)
End of 1st Year	22%	400
End of 2nd Year	42%	750
End of 3rd Year	61%	1100
End of 4th Year	81%	1450
End of 5th Year	100%	1800
End of n-th Year	100%	1800

Assessment

Environmental Impact

Total CO2 Emission	❖ Jatropha oil: 103.4 tons CO2/year ❖ Diesel fuel: 109.8 tons CO2/y (1.24 tons CO2/ha/y [17, p.27, 35], 89 ha plantation) ❖ CO2 emission of Jatropha oil: 5.8% lower than that of diesel fuel ❖ In India, CO2 emission of Jatropha oil: 55% less than that of diesel fuel [84]

Assessment

Competitiveness Assessment

Improvement Plan

Situation Analysis

Problem

Farmer's Motivation Going Down

Uncertainty of Price

Uncertainty of Buyer

Objective and Step

Farmer's Motivation and Earning Increased

Certain Price

Certain Buyer

Purchasing Contract with PLN

Self Consumption of Oil for Cooking

Quality Testing

Negotiation and Commitment

Based on Rapid Rural Appraisal (RRA) in Baturnadeg Village, Nusa Penida

Improvement Plan

Project Planning Matrix

Project Description	Performance Indicators	Means of Verification	Assumptions
Goals/Purposes: •local economic welfare increased •community capacity developed •positive impact on the environment achieved	• Local people's income improved • Cost saving due to oil use achieved • Community involvement raised • Lower CO2 emission compared to that of diesel fuel • Degraded lands utilized	Asking information to: •BPP •Farmers' groups •PLN	
Project Description	Performance Indicators	Means of Verification	Assumptions
Outputs: •Successful cultivation •successful oil production •successful oil utilization	• Jatropha plants grown • Local employment increased • Seeds harvested • Jatropha oil produced and sold • Diesel fuel replaced	• Transaction notes from farmers, PLN/PLN cooperative • Labors payment notes • Notes of purchasing fuel for transportation and oil production • Notes of land used for Jatropha plantation	• Diesel fuel price > Jatropha oil price • There is subsidy for Jatropha • PLN is convinced to use Jatropha oil
Project Description	Performance Indicators	Means of Verification	Assumptions
Activities: •Nursery •Initial planting •Cultivation •Assisting farmers •Pressing seeds •Selling oil •Use of oil for diesel generators	Input/Means: •Lands •Farmers •Unud experts •Fund	Costs: •assisting farmers •Nursery •initial planting •Maintenance •oil production for broker/one	

Improvement Plan

Feasibility of Options

Description	Option A	Option B	Option C
Parameter	• P...	• Pattern A • 89 ha • seed price of Rp 850/kg • oil price of Rp 4200/l • 2500 plants/ha • 1 liter from 4 kg • use 20% blended fuel for diesel generator	• Pattern B • 385 ha • seed price of Rp 800/kg • oil price of Rp 4000/l • 2500 plants/ha • 1 liter from 4 kg • increasing productivity of 10% • use 20% blended fuel for diesel generator
Cultivation	Feasible	Feasible	Feasible
Oil Production	Feasible	Feasible	Feasible
Oil Utilization	Feasible	Feasible	Feasible

Conclusion and Recommendation

Conclusion: Technology Aspect

Existing	Possible Improvement
Cultivation: •Yield from 1500 plants/ha is 1800 kg dry seeds/ha/y in the 5th year	• Yield from 2500 plants/ha is 4,500 kg dry seeds/ha in 5th year • Around 4 kg seeds provide 1 liter oil (by ...
Oil Production: •Revolution of press machine is 255 rpm with pulley diameters: 13, 35, 15, 48 cm •Unclean press and filter devices •Drying seeds in sun for 3 days •Storing seeds for 3-4 months at an open air place •Long duration of storing oil for more than 2 years	• Applying revolution of 40 rpm with diameters of 13, 85, 10, 85 cm (to decrease phosphorus content) • Re-cleaning press and filter devices periodically (to decrease sediment content) • 5 days drying and storing seeds at closed place for <1month (to decrease water content) • Immediate utilizing of oil (to decrease acid content) power) and high viscosity (carbon deposits, incomplete combustion)

Conclusion and Recommendation

Conclusion: Sustainability Aspect

Existing	Possible Improvement
Socio-Economic: Uncertainty of seeds/oil's •price •buyer	Farmers and PLN make commitment of •purchasing contract (long term) •self consumption of oil for cooking (short term)
Environment: •CO2 emission is 5.8% lower than that of diesel fuel life cycle	• Changing transportation means with pickup vehicle • CO2 emission of the Jatropha oil life
Competitiveness: •Finance and knowledge supports from PLN, Unud, BPP was only in 2007 •No finance support from government •Depends on the single buyer (PLN) •Facility of oil production at Puncak Mundi is idle •There is subsidy for diesel fuel	• Continuing collaboration among PLN, Unud and BPP/government to provide finance and knowledge • Increasing accessibility to local finance institutions • Diversifying buyers • Using idle oil production facilities • Proposing subsidy for Jatropha oil

Conclusion and Recommendation

Recommendation

Parameter	Option A	Option B	Option C
Total labors income	Rp 104.5 million/y	Rp 154.5 million/y	Rp 722.6 million/y
Local employment	3,482 person-day/y	5,151 person-day/y	24,087 person-day/y
Parameter	Option A	Option B	Option C
Community involvement	At least 1 village has 1 plantation managed by 1 farmer group (16 farmer groups at 16 villages)		
Parameter	Option A	Option B	Option C
CO2 emission	58.2% lower	30.5% lower	24% lower
Use of degraded land	89 ha		385 ha
Cultivation and selling product (oil)	Monoculture, 1500 plants/ha, IP-1 A, 240.3 ton/y, 60.1 kl/y, Rp 4400/l	Monoculture, 2500 plants/ha, IP-1 A, 400.5 ton/y, 100.1 kl/y, Rp 4200/l	Intercropping with corn, 2500 plants/ha, 85% IP-1 A and 15% IP-2 A, 1,905.8 ton/y, 476.4 kl/y, Rp 4000/l
Oil production service	Pressing-filtering-storing, 1 liter oil from 4 kg seeds, Rp 200/kg seeds		
Oil utilization	Using 20% blended fuel for diesel generator		

Thank you for your kind attention

…… **Hopefully this beautiful island could gain its bright future**

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Abbreviation and Phrase

- ABG: Academic, Business, Government
- asl: above sea level
- Banjar Adat: small community group bound by religion
- BPD: Badan Perwakilan Desa (institution of village people's representatives)
- BPP: Badan Penyuluhan Pertanian (Agriculture Counseling Office)
- Desa Dinas: formal village
- Desa Pekraman: village administration related to local religion management such as village temples, ritual ceremony, graveyard utilization
- DGEEU: Directorate General of Electricity and Energy Utilization
- EOC: European Overseas Campus
- Hansip: Pertahanan Sipil (formal security of Desa Dinas)
- IRR: Internal Rate of Return
- Karang Taruna: formal youth group
- Kelompok Tani: farmer group
- KCl: Kalium Chloride
- KOH: Kalium Hydroxide
- Korop Klian Banjar: elected leader of Banjar
- LCA: Life Cycle Analysis
- LPD: Lembaga Perkreditan Desa (traditional village institution for financial loan)
- LPM: Lembaga Pemberdayaan Masyarakat (institution for community empowerment)
- NPK: Nitrogen, Phosphor, Kalium
- NPV: Net Present Value
- O&M: Operational and Maintenance
- Pecalang: security of Desa Pekraman
- pH: Acidity
- PI: Profitability Index
- PKK: Program Kesejahteraan Keluarga (program of family welfare)
- PLN: Perusahaan Listrik Negara (State owned Electricity Company)
- PLTD: Pembangkit Listrik Tenaga Diesel (Diesel Power Plant)
- PLTG: Pembangkit Listrik Tenaga Gas (Gas Power Plant)
- PPL: Petugas Penyuluhan Lapangan (government personnel for field counseling in agriculture sector)
- RRA: Rapid Rural Appraisal
- Sekaa Truna: traditional youth group
- SP36: Super Phosphate, 36% content
- Unud: University of Udayana

Solar Energy A Limitless, Clean Energy Source

Nguyen Duy Manh Thi, Electronics Department, University of Natural Sciences –National University in Ho Chi Minh City, Vietnam

Introduction to solar energy

The sun is a giant ball with diameter of 1.39 million km and distance of 149.5 million km from the Earth Sun radiates a capacity of approximately 3.8×10^{20} MW, but Earth only receive a part that capacity, about 1.05×10^{18} kWh. Solar energy to the earth surface in a year, source of endless energy, a clean energy source, does not cause environmental pollution. The amount of power from the solar rays is about 1 kW/m2, can produce a power of 200W (power conversion of 20%). In 2002, total solar energy generated in the world around 520.000kW, in which Japan generated up to 48,9% (ca. 255.000kW). Today, Japan is top of manufacturing solar cell, but Germany is the leading market

Exploiting solar energy in Vietnam

Solar energy industry is increasingly able to provide 2.5% of world electricity demand by 2025 instead of fossil fuels. Vietnam has a solar radiation in the high category in the world, with range of sunshine hours from 1600-2600 hours per year, especially in the South. Source of clean energy and potential, but is not interested in research and development.

Advantages:

- Abundant source of radiation, particularly in the middle and south of our country
- Stable power supply for the remote rural regions
- Contribute to the development these areas
- Can supply power from small to very large capacity according to requests
- Promoting power-saving technologies

Difficulties:

- Capital investment and cost of 1kWh solar power still high (for a household for lighting, listening to invest about 5 million VND).
- No incentive policies should not be put into large commercialization, low competitiveness, so price is not reduced quickly.
- Reliable source of information about the ability to develop solar energy for policy makers missing.

Existing developments:

- Water heating systems manufacturated by local firms (around 10 companies, total using 4000m2 until 2005)
- Electricity by solar enegry for using in house, institution, hospital ... (800kW by 2005)

➢ Small scale, spontanous, no orientation for long term

➢ Need support from government for research, application market, investment and policy, information (ad.) ...

Manufacturing and using solar energy

- Photovoltaic (PV) devices convert light into electrical energy
- PV cells are made of semiconductor materials such as silicon
- When light shines on a PV cell, the energy is transferred to electrons in the atoms of the PV cell → become part of the electrical flow, or current, in an electrical circuit.

<u>Advantages of solar system:</u>

- solar panels can be installed on roofs or other places not often used to
- have no moving parts to generate electricity →not cause noise
- life of the electrical system that is highly reliable and does not require maintenance.
- However, one thing inconvenient: impossible to generate electricity at night or when bad
- weather → using storage battery
- The enterprise, Red Sun Joint Stock Company in HCMC has established a plant to manufacture solar cell in accordance with US technology.
- The solar cell panel is produced by industry line which is the first industry in Vietnam

Red Sun's Manufacturing Model

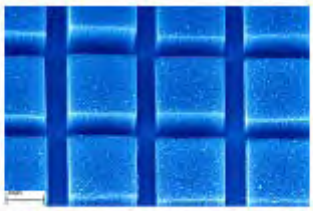
Street Lights

Garden Lights

Solar street lighting
(combined a solar panel, wind turbine)

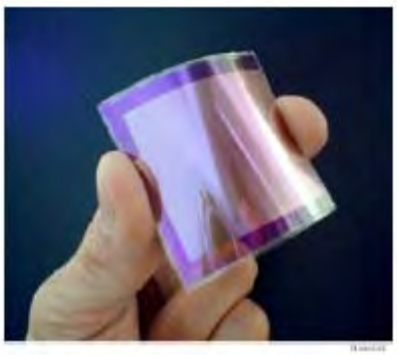
Developing Nanotechnology in solar energy

- Nanotechnology might be able to increase the efficiency of solar cells
- "A revolution" in generating electricity: thousands of mass produced wafer-thin solar cells printed directly on aluminum film, not use silicon
- flexible, light and cheap to produce electricity from sunlight



Carbon nanotubes atop photovoltaic cells

Thin as a layer of paint and can transfer sunlight into power quite efficiently Printed like a newspaper directly on to aluminum foil



Source: Nanosolar

<u>Advantages:</u>

- are not made from silicon, which can be very expensive
- manufacturing of these cells does not require expensive equipment such as clean rooms or vacuum chambers like conventional silicon based solar cells
- lower manufacturing cost would help preserve the environment, reduce pollution and decrease the use of fossil fuels

Conclusion

- Solar photovoltaic systems, through their flexibility in use, offer unique chances for the energy sector
- Potential advancements in Nanotechnology may open the door to the production of cheaper and slightly more efficient solar cells, preserve the environment
- Solar power is already the most economical way of providing electricity in many circumstances, particularly for small-scale devices to large ones
- clean energy sources, very safe, and ensure healthy environment

Building up REEEFAN

MSc. Evans Harvey, The Renewable Energy and Environmental Experts-African Network, Ghana

Presentation

South East Asian ARTES and SESAM Alumni Workshop

PRESENTATION ON

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

OCTOBER 2009

BY: EVANS MENSAH HERVIE

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

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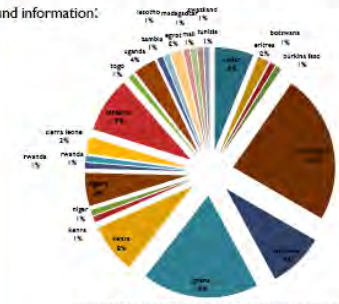
RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Background information:

Map of Africa

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Background information:

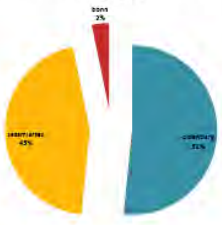


PERCENTAGE DISTRIBUTION SESAM/ARTES/OLDENBURG/BONN

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Background information:

PERCENTAGE DISTRIBUTION BY UNIVERSITY



RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Background information:

In 2007, there was initial discussion between some alumni, SESAM and DAAD Ghana

May 05-08, 2008, An African Alumni workshop was held in Ghana

Theme "Application of Renewable Energy in Fuelling Sustainable Development in Africa"

20 Alumni across Africa attending the workshop

Declaration at the workshop was that, there was a need for an African Alumni Network

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)




RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Objectives are:

Members capacity building through relevant scientific subject matter updating and individual work experience

The Network shall undertake viable renewable and environmental projects targeting alleviating poverty of rural communities

The Network shall have cooperation and collaboration with relevant German organization, governments and NGO's

The Network shall initiate and intensify alumni networking within the African Continent

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Objectives are:

Set up national and regional structures that could form national or international consultancy groups

The Network shall be a window of advertisement for potential students who wish to study in Germany

It shall be a conduit for graduate students or researchers by offering them the chance to do their research term in a relevant organisation

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

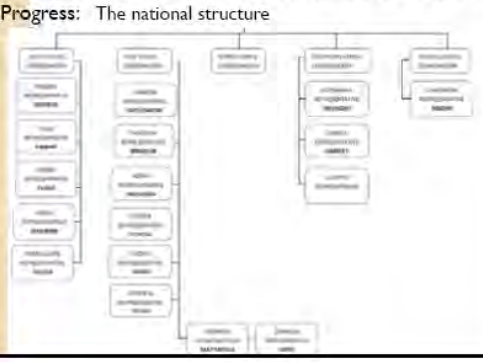
Progress:

Compile members personal information

Establish a communication line

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Progress: The national structure



RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Progress:

Fully registered international NGO – Renewable Energy & Environmental Experts-African Network

Bank accounts – members are encouraged to pay their annual dues of US$50

Letterhead for the network

Workshop proceedings will be published shortly

We have initiated collaboration with GTZ Ghana, KNUST, Austria Biomass Association, DAAD Ghana

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Targets:

Improve and strengthen collaboration with international organization in development cooperation, governments, NGO's

Commence and sustain quarterly publication of newsletter

Form and sustain African regional grouping

Improve the capacity of members to become change agents

Encourage members to pay their dues

Get more participation of members in activities of the network

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Targets:

Form an African Board comprising the African coordinator, regional and country representatives and representatives from universities of Flensburg, Oldenburg and Bonn

A Financial-Committee who shall approve the network financial activities and also seek funding for the Network activities

An Audit-Committee who shall report on the Network accounts and make them known to all members

Collaboration with other regional grouping like **Asian ARTES and SESAM Alumni**

An official functioning office

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Targets:

Network community website

Capacity building workshop for regional and country coordinators

Get countries to undertake projects which will improve the economic and social well being of poor communities in Africa

RENEWABLE ENERGY & ENVIRONMENTAL EXPERTS-AFRICAN NETWORK-(African ARTES and SESAM Alumni)

Greetings from members of the African Alumni with members from Artes, SESAM, Oldenburg and Bonn

The African Alumni wishes South East Asian ARTES and SESAM Alumni Workshop the very best outcome

THANK YOU

Challenges of managing alumni association

Sharada Shrestha / Bhupendra Shakya – FEAM Nepal

Flensburg Association for Energy Management-Nepal

Flensburg Association for Energy Management-FAEM Nepal

Sharada Shrestha / Bhupendra Shakya

FAEM, Nepal

Flensburg Association for Energy Management-Nepal

Contents of Presentation

- About FAEM Nepal
  - Introduction
  - Objectives, Mission, Vision
  - Activities
- Collaboration with SESAM
  - Management of SESAM Community website
- Challenging to manage Alumni

Flensburg Association for Energy Management-Nepal

Introduction of FAEM-Nepal

- An association formed by Nepalese students who have studied at the University of Flensburg, Germany.
- It is an independent, service oriented institution established to bring both former and current Nepalese students from these Universities together in one forum to work towards sustainable energy management solutions.

Flensburg Association for Energy Management-Nepal

Objective of FAEM-Nepal

- Strengthen networking, understanding, support, and solidarity among Nepalese students who have studied at University of Flensburg, Germany.
- Establish a continuous institutional relationship with University of Flensburg and exchange information, experiences and knowledge with similar alumni associations in other countries
- Organize workshops, seminars, orientations and trainings on renewable energy and sustainable development.
- Provide consultancy services to individuals, institutions and agencies on different aspects of renewable energy, management
- Lobbying for right based energy approach as "energy is fundamental human need"

Flensburg Association for Energy Management-Nepal

FAEM-Nepal vision and Mission

Vision

Enhanced livelihood through sustainable energy management

Mission

Increase and improve renewable energy use in Nepal by promoting Sustainable Energy Systems and Management.

Flensburg Association for Energy Management-Nepal

Institutional Arrangement

- FAEM Nepal was established in 2004, as a Non- Government Organization (NGO) in Nepal.
- All together 28 members (4 have just completed)
- General Assembly helds in annual basis
- The AGM elects Executive Committee in every two years
- Regular meeting among the members
- It has own office in Kathmandu
- All the members have to pay annual fee

Flensburg Association for Energy Management-Nepal

FAEM Nepal

- To implement the program activities FAEM Nepal has formed a Program support unit headed by programme coordinator
  - Prepare concepts, write proposals
  - Manage, implement projects, consultancy works
- To establish smooth coordination & networks with other organizations, FAEM Nepal employs one Office secretary.
  - Daily correspondences
  - Coordination among the members, provide supports to executive committee; supports in organizing regular meetings
  - Provide helps to the program support unit

Flensburg Association for Energy Management-Nepal

Activities of FAEM-Nepal

- Organize regional/international workshops/seminars
- Research/Study
- Consultancy works
- Collaboration with University of Flensburg
- Participate various seminars/ workshops
- Networking/lobbying on Renewable Energy Issues

Flensburg Association for Energy Management-Nepal

Activities of FAEM-Nepal

- FAEM-Nepal with support from German Academic Exchange Program (DAAD) organized a seminar on "**Role of Renewable Energy and Sustainable Development Agenda for Nepal**" from 13th to 15th May 2004 in Kathmandu, Nepal.
- FAEM Nepal with supports from DAAD has organized 5 days long SESAM/ARTES South Asian Regional Level Workshop on "**Renewable Energy for the Sustainable Development**" **May 19-23, 2008**.

Flensburg Association for Energy Management-Nepal

Activities of FAEM-Nepal

- FAEM Nepal has been conducting various research and consulting works on different energy related projects like,
  - Study On The Potential Of Using Electricity for Irrigation In Terai region of Nepal
  - Study On The Socio-Economic Feasibility Study For End Use Diversification In Improved Water Mill And Integration Of Other Income Generating Activities Around IWM Sites
  - Implementation of wind-solar hybrid system, pilot project in rural area of Nepal
  - Orientation Training for District Level NGOs on RETs

Flensburg Association for Energy Management-Nepal

Activities of FAEM-Nepal....

  - Quality Verification of Improved Water Mills as precondition for release of outstanding 10% subsidy for all established sites.
  - Project Impact study on Rural Electrification Global Development Alliance – Nepal [REGDAN] , joint program of USAID, Winrock International and Butwal Power Company
- University of Flensburg, Germany and FAEM Nepal have signed a Memorandum of Understanding (MoU) on to manage and moderate the SESAM community website
  - The main purpose of the MoU signed was to to assist FAEM Nepal for 6 months in taking over the management of the SESAM community website
  - Moderation of the world wide SESAM/ARTES community

Flensburg Association for Energy Management-Nepal

Strength of FAEM Nepal

- Maximum number of Alumni in Kathmandu
- All Alumni are professionally established in RE sector (Gov, I/NGO, Private organisation)
- Well established and functioning office
- Experiences in consulting services and networking

Flensburg Association for Energy Management-Nepal

Challenging of managing Alumni

- Busy schedule of the members and executive committee members
- Financial problem
- Still needs to strejgthen the by-laws, regulation
- Lack of co-ordination with alumni from other different countries (FAEM Secretariat)
- Lacking in coordination with German development organisations, universitiy and enterprises

Flensburg Association for Energy Management-Nepal

Thank you !

Ms. Sharada Shrestha Poudel

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The ABCs of Starting an International NGO

Balamatti Arun - Executive Director, AME Foundation, India

Introduction

Sharing professional experiences by the alumni was one agenda in the SESAM/ARTES South Asian Regional Level Workshop on "Renewable Energy for Sustainable Development" organized by Flensburg Association for Energy Management-Nepal (FAEM Nepal) in May 2008. The other important agenda was to discuss formulation of the Asian Alumni Association. The idea was first mooted in the Asian Alumni Workshop held in Bali in November 2006.

With very little preparations on part of the alumni and the SESAM Institute, the discussions in Nepal on the alumni association could only go as far up to identifying individual volunteers from a few Asian countries to study the proposition in detail and make suggestions for further action.

Having volunteered from India, I have studied the opportunities and challenges of starting the Asian Alumni Association on the lines of setting up an international NGO in the Indian context. The effort is aimed at emulating the country example of FAEM Nepal and elevating the networking to the Asian continent, south Asian region, to be precise.

The Extraordinary Purpose of the Asian Alumni Association

The purpose of forming an Asian Alumni Association (AAA) is not merely to continue the exchange of professional experiences among the Asian alumni. This process of exchange of professional experiences was eminently initiated by the SESAM Institute by organising a series of alumni workshops with the generous support from the DAAD, starting with the first Alumni Workshop held in Bangkok (2002) followed by the Summer School in Bonn (2004) and the workshops in Bali (2006) and Nepal (2008). The greater purpose behind the proposed Asian Alumni Association is to take this initiative to the next level of bringing together the competencies and professional experiences of the large number of the ARTES/ SESAM alumni under one institutional umbrella. This endeavour offers unique opportunity for the alumni to extend their professional service on renewable energies and rural development management to the Asian rural communities. After all, the alumni belong to different countries and bring in diverse academic qualifications and professional experiences gathered under diverse cultural settings. The common relationship with the ARTES/SESAM Institute and the special bondage built among the alumni only makes it a very exclusive and excellent opportunity for the alumni to make their relationship among the alumni and with the alma mater more organic. The AAA could be an ideal platform for regular exchange of professional experience on RE and RD issues at the south Asian level, a career option for many alumni, an appropriate forum for the senior alumni, with their vast experience and knowledge gained by being technocrats, bureaucrats, social workers and volunteers, to guide the RE professionals, a place of pride for the ARTES/ SESAM institute for having given birth to a unique transnational, cross-cultural institution and a wonderful site for social networking.

In this background, forming a committed, vibrant, professional organisation by the Asian alumni holds a great promise. It is an opportunity not many professionals are blessed with.

Asian Alumni Association in the Indian Setting – The Process and The Pitfalls

Setting up the AAA on the lines of a non-governmental organization or a non-profit organization (NGO/NPO), in India or elsewhere, can be a lengthy, time consuming process, the difficulties of which can be minimised with some preparation.

Location: The AAA could be established in any of the Asian countries. The question is, which is the strategically most advantageous country for the alumni to start an organisation and run it successfully for a long time? The minimum prerequisites are the political stability in the nation under consideration and the legalities of setting up and running of the organisation. India offers a reasonably stable political atmosphere but not necessarily a very encouraging environment for registering an international NGO. With its somewhat conservative policy on international development cooperation, India rather encourages local organisations by deliberately putting many legal obstacles to discourage foreign nationals setting up an NGO on Indian soils. While it is not impossible, it takes special efforts to make it happen.

Type of the organization: There are many classifications of NGO/NPOs as determined by individual country's laws and regulations. These organizations may qualify for income tax exemption, or other financial benefits. Regional and local tax exemptions may also apply on a region-by-region basis.

In India non profit / public charitable organisations can be registered as **trusts**, **societies**, or a private limited non profit company, under **section-25 companies**. Non-profit organisations in India (a) exist independently of the state; (b) are self-governed by a board of trustees or 'managing committee'/ governing council, comprising individuals who generally serve in a fiduciary capacity; (c) produce benefits for others, generally outside the membership of the organisation; and (d), are 'non-profit-making', in as much as they are prohibited from distributing a monetary residual to their own members.

The setting up of an International NGO shall be the same as any other NGO in India, which means it can either be set up as a Trust under the Indian Trust Acts, a society under the Societies' Registration Act, 1860, or a company under section 25 of the Companies Act, 1956. The formalities for registration and other statutory procedures for setting will depend on the type of organisation. These are the provisions as per the Indian laws.

With respect to the setting up of the organisation at other places such as Nepal, Bangladesh etc., the laws of the land shall prevail for which legal opinion must be sought.

Mandate/ scope of operations of the organisation: Individual operational NGOs vary enormously according to their purpose, philosophy, sectoral expertise and scope of activities. A number of different NGO typologies exist. For example, NGOs have been classified according to whether they are more relief or development-oriented; whether they are religious or secular; whether they stress service delivery or participation and whether they are more public or private-oriented.

In the context of the World Bank-financed activities, national or international NGOs are normally contracted to deliver services, design projects or conduct research. The discussions in Nepal brought out many areas of engagement for the proposed AAA and the activities broadly covered delivering services, designing and executing RE projects and undertaking research and evaluation studies.

Membership, type, roles: While it is critical that a new NGO/NPO ensure that it is properly registered with the public authorities of the country, it is of even more importance to 'register' with its target community - in terms of ensuring acceptability, building trust, programme and project effectiveness, and bringing about real change.

Prior to incorporating or registering, an organization should first establish a Board of Directors or an Advisory Board and develop the organization's mission. The members of the Board, as a group, have trustee and legal responsibility for the actions and operation of the organization. There are minimum levels of involvement required of Board members in organizational and operational management.

Foreigners as Board Members:

Either as an Indian NGO or an I-NGO, the AAA will have an issue with the foreigners as Board Members. As regards a society there is no law under the Societies' Registration Act, 1860, that prohibits a foreigner to be a member of the Board. There are certain case laws, which say "even if all members of the Board are foreigners then also the society shall remain Indian if it is registered in India". However, the society shall not be Indian if all the members are Indian but it has been registered in a foreign country. Similarly, in case of Trust there is no prohibition on foreigners becoming the Trustees.

The Executive Committee (Board of Directors) apart, the FAEM Nepal offers an ideal example of the typology of membership, which has life members, honorary members, general members and co-members depending upon the members' chosen role and contribution to the organisation.

Handling projects and financial transactions: The Indian Income Tax Act gives all categories equal treatment, in terms of exempting their income and granting 80G certificates, whereby donors to non-profit organisations may claim a rebate against donations made. Foreign contributions to non-profits are governed by FC(R) A regulations and the Home Ministry.

For seeking FCRA Registration, the organisation must have been registered for a period of not less than 3 years. Till then, it can receive foreign funds by getting a prior permission from the Ministry of Home Affairs.

However, getting FCRA Registration shall be difficult with foreigners on Board. Under the circumstances, the AAA as an I-NGO would face the challenges of handling international projects and the related financial transactions like receiving money from the client and paying the employees of I-NGO. Under the Income Tax Act, income applied for activities outside India is not eligible for exemption unless the following conditions are satisfied:

- The charitable organisation happens to be a Trust registered before 1.4.1952 or it is engaged in the promotion of International Welfare, in which India is interested,
- Central Board of Direct Taxes has by general or special order granted the exemption.

Conclusion

From the review of information, it appears that India can be a favoured location for setting up AAA. However, the NGO status seems more a workable proposition than an I-NGO. Unless there is other, more favourable country location, a beginning with AAA as an Indian NGO to replicate FAEM Nepal model could provide useful experience before graduating to I-NGO status.

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