

Latin America Thematic Network on Bioenergy - LAMNET

Joint Workshop - South Africa

Timing:

19th August 2002 – 21st August 2002

Location:

Kwa-Shukela Convention Centre 170 Flanders Drive, Mount Edgecombe (Durban) P O Box 804 Westville 3630 Republic of South Africa

WORKSHOP SUMMARY





Supported by the European Commission Fifth Framework Programme for Research This workshop was organised by WIP-Munich, Germany and Illovo Sugar Ltd., South Africa, within the framework of the LAMNET project as a joint event of the following Thematic Networks funded by the European Commission, DG Research:

CARENSA - Cane Resources Network for Southern Africa Coordination: SEI – Stockholm Environment Institute, Sweden Francis X. Johnson (francis.johnson@sei.se)

SPARKNET – Sustainable Energy Policy and Research 'Knowledge Network' on cost effective, ecologically sound and healthy energy alternatives for low-income rural households Coordination: ITDG - Intermediate Technology Development Group, United Kingdom Dr Smail Khennas (Smailk@ITDG.org.uk)

LAMNET - Latin America Thematic Network on Bioenergy Coordination: WIP, Germany Dr Rainer Janssen (rainer.janssen@wip-munich.de)

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Workshop on Biomass, Rural Energy and the Environment, 19-21 August 2002, Durban, South Africa

Two weeks prior to the World Summit on Sustainable Development (WSSD) in Johannesburg a workshop on biomass, rural energy and the environment was organised in Durban by WIP-Munich and Illovo Sugar Ltd. as a joint event of the three Thematic Networks CARENSA, SPARKNET and LAMNET, which are funded by the European Commission Fifth Framework Programme for Research.

The Cane Resources Network for Southern Africa (CARENSA) focuses on the role of bio-energy from sugarcane in promoting sustainable development and improving global competitiveness in the region of southern Africa (www.carensa.net). SPARKNET is a multi-stakeholder interactive Knowledge Network focusing on how people, in the context of acute poverty, can gain access to better energy services and improve their livelihoods (www.sparknet.info) and LAMNET, a Global Network on Bioenergy, constitutes a transnational forum for the promotion of the sustainable use of bioenergy (www.bioenergy-lamnet.org).

This workshop aimed at strengthening synergies and initiating future co-operation of the three multi-stakeholder networks in order to promote sustainable energy for development by assessing energy demand and resources, expanding the institutional knowledge base, and by creating a broad-based discussion forum to evaluate innovative policy options. Additionally, a position paper with recommendations for the utilisation of bioenergy for sustainable development was jointly elaborated and promoted at the Johannesburg Summit.

The workshop took place at the Kwa-Shukela Convention Centre and the contributions by presenters from several European, Latin American and African countries and China focused on the issues Rural Energy, Environment and Bioenergy from Sugar Cane Bagasse. Thereby, the importance of the latter topic was emphasised by the workshop coorganiser Illovo Sugar, which also invited the participants to a technical tour including a field visit on harvesting and collection of sugar cane and a visit to Gledhow Sugar Mill and Glendale Distillery, both situated in the vicinity of the Durban conference centre.

Inauguration Session

Don Macleod, Managing Director of Illovo Sugar, welcomed the participants of the workshop at the 'headquarter' of the South African Sugar industry stating that the production of energy from both sugar cane bagasse and molasses is a known technology and therefore sugar by-products can contribute to the global movement towards sustainable "green energy" whilst also improving the return to producers of sugar. Illovo Sugar utilises bagasse for the generation of electricity for its factory and field operations as well as supplying power to the company housing estates, whereas currently the supply of excess power during the season into the grid is not encouraged by the national energy suppliers.

Mr. Macleod showed strong interest in new technologies providing potential to companies like Illovo to improve their energy generation. The pelletising technology for a variety of biomass feedstocks will be an important step in providing energy from bagasse on a year-round basis and the contributions on this subject were of specific interest to the Illovo group. In addition, the provision of alcohol as part of the coutry's gasoline policy is an opportunity for growth in the production of fuel alcohol. However, the economic viability of green energy is dependent upon the interventions of national governments and requires incentives through supportive policies.

The political impact of the event was underlined by the fact that Honourable Narend Singh, KwaZulu-Natal Minister of Agriculture and Environmental Affairs, and Dr. Adi Paterson, Deputy Director-General of the South African Department of Science and Technology, accepted the invitation to give inauguration addresses to the delegates of the workshop.

Honourable Narend Singh acknowledged the role of this workshop as an input to the United Nations World Summit on Sustainable Development in Johannesburg intending to turn the world away from a self-destructive course in which the economic and other activities of humankind threaten to deplete the natural resources and destroy the basis of human existence. He stated that South Africa represents a microcosm of the challenges to be addressed by the WSSD, as it is unique in having a developed industrial economy, with all its challenges of sustainability caused by over-consumption of vast quantities of the planet's natural resources such as oil, gas, timber and metals, virtually side by side with an under-developed rural economy with all the evils of erosion, contamination of water resources, destruction of natural foliage, over-stocking and exhaustion of the soil's fertility through unscientific cropping.

For sustainable development a balance is required between environmental/conservation, economic and social interests adjusted appropriately to suit every particular circumstance, and it is generally the role of Government to serve as a catalyst and regulator, in partnership with the private sector wherever possible. With respect to the supply of green energy in the province of KwaZulu-Natal Honourable Singh pointed out the opportunity provided by the sugar and timber industry as well as the production of alcohol fuel and bio-diesel from biomass resources such as sugar cane, sunflower seeds and the Jatropha plant. In conclusion, he stated that the near future may well be bright for energy from biomass as the demand in South Africa will exceed electricity generation capacity within three to five years, and

decisions will have to be made about new generation, while a Draft White Paper on Renewable Energy and Clean Energy Development requires a five percent increase in the use of Green Electricity by 2012.

Dr. Paterson highlighted that the contribution of science and technology for sustainable development in countries such as South Africa has to include the support of the eradication of poverty, as well as the development of advanced manufacturing and logistics. This process can only be achieved through greater capital investment in local human resources and local technological capacity development, rather than in the importation of knowledge and technologies. South Africa recognises that developing countries need to invest in R&D and it is essential that levels of investment by Governments in civilian R&D are increased and sustained for a significant period to develop the necessary human capital. Knowledge is the key to sustainable development and forums such as this workshop offer further opportunities in developing the country's human capital.

Referring to the opportunity to initiate sustainable energy supply in South Africa due to the expected growth of the electricity demand, Glynn Morris of Agama Energy presented the results of a pilot project co-ordinating the supply of Green Electricity to the main venues at the WSSD between 24 August and 4 September 2002. This project is a Department of Environment & Tourism initiative with the aim to act as a catalyst for a green power market in southern Africa, a likely mechanism is 'green power certificates'. A green power producer, certified and monitored by the National Electricity Regulator (NER) will acquire green power certificates for any green power supplied to the national grid. Any distributor or supplier (also licensed by the NER) that desires to offer a green electricity 'product' will be able to buy green power certificates to back up the sales to discerning customers. Green electricity sales will be regulated within a green electricity tariff structure to be established and regulated by the NER.

After the inauguration addresses the morning session of the first workshop day was concluded by introductory presentations on the three networks by Dr. Rainer Janssen, LAMNET, Prof. Gerry Garland, CARENSA, and Dr. Smail Khennas, SPARKNET. It was agreed upon that close links shall be established between the networks, for example through the set-up of 'Associate Memberships'. Delegates from all three networks will be invited to take part in all project events and activities and project results will be communicated and discussed on a regular basis.

Bioenergy in Emerging Economies

The afternoon session of the first day focused on the implementation of bioenergy in Zambia, Colombia and China. Prof. Francis Yamba from the Centre for Energy, Environment and Engineering Zambia presented the status-quo of the energy supply of the Southern African Power Pool (SAPP) including conventional scenarios up to the year 2050 with a very low share of renewable energy sources. A sustainable mitigation scenario, ensuring security of supply, industrial competitiveness, poverty reduction and sustainable development, was elaborated emphasising the role of bio-energy from bagasse, agricultural and indusial waste. Based on this sustainable mitigation scenario a variety of bioenergy projects can be developed which can attract partial project finance under the Clean Development Mechanism (CDM) through advanced sale of carbon credits.

David Cala Hederich from Corpodib in Colombia reported on a promising initiative for the promotion of bioenergy by the Colombian Government. The Congress of the Republic of Colombia on June 19th 2001 approved a new law, which mandates the use of bioethanol from sugar cane in Colombian gasoline and diesel fuel oil in order to improve the quality of these fuels and decrease emission levels. This law is an example to the world of how a congress of a developing country takes an advanced initiative to promote the use of renewable fuels for the development of a new agroindustrial industry leading to the creation of a significant number of new employments. The new law will allow private industry (national and international) to start production of bioethanol to be blended with gasoline (10% volume) in the year 2006 thereby saving 6 million tons of CO_2 per year. The Corporation for the Industrial Development of Biotechnology and Clean Technology (Corpodib) has been actively working in this project during the last seven years. It has elaborated the feasibility study and the implementation plan, and will follow the project during its implementation stage.

Prof. Wang Mengjie, China Association of Rural Energy Industry, pointed out the vast potential of biomass resources in China (straw: 720 million tons/year; firewood: 127 million tons/year; livestock wastes: 130 TCE/year; urban wastes: 120 million tons/year) which up to date are not utilized in an efficient way. The Chinese Government always emphasised the importance of the bioenergy and the Ministry of Science and Technology regards the development of biomass utilization technologies as key and preferable research projects. The focus of the current 10th Five-Year-Plan Program will thereby be on the solution of technological difficulties and the demonstration of applicable technologies, including biomass gasification and electricity generation systems, ethanol from cellulose wastes, ethanol from sweat sorghum juice and biomass resources involves rural development, energy development, environmental protection, resource conservation, state security and the ecological balance. China is striving to obtain support from international organisations, foreign governments and scientists and shows strong interest in cooperation to promote technological progress.

Thematic Session: Bioenergy from Sugar Cane Bagasse

The second day of the workshop started with a thematic session on bioenergy technologies. Gavin Dalgleish, Manufacturing Manager of Illovo Sugar, illustrated the company's strategic intent to be the leading sugar and downstream products operation in Africa and to optimise the return on every stick of cane by adding value to its core commodity products fibre, sugar and molasses. Thereby, the downstream products increasing output diversity and economic profit from sugar cane comprise syrup, furfural, furfuryl alcohol, diacetyl, acetoin, 2,3-pentanedione, ethyl alcohol, lactulose, dextran and electricity.

A bioenergy technology with significant potential for the sugar industry is the pelleting of sugar cane bagasse. This densification of biomass raw material produces a standardised biomass fuel with diameters in the range of 6–18 mm and an energy level of 4.8-5 kWh per kg. Advantages of bagasse pelleting comprise the simplification of material handling, the economic storage and transportation, the reduction of dust explosion potential and an efficient control of combustion. Three different technologies for the pelleting of sugar cane bagasse were presented in the framework of this workshop by representatives from Amandus Kahl GmbH & Co, Germany, CPM / Europe b.v., The Netherlands, and an Italian manufacturer. Thereby, the technology developed by Amandus Kahl is based on a Flat Die pelleting press whereas CPM pelletisers and the Italian technology operate with Ring Dies. The latter technology, which was presented by Francesco Cariello from ETA-Florence, is showing the potential to significantly reduce the energy consumption for the production of high-quality pellets.

A different bioenergy technology focusing on the provision of rural energy was presented by Greg Austin from the company Biogas, Energy & Agricultural Development. Biogas digesters (BGD) convert a renewable resource, animal and/or human manure, into biogas and liquid manure by means of the biological process termed anaerobic digestion. The biogas produced consists of ~ 70% methane and ~25% carbon dioxide. The local benefits of BGD comprise the generation of energy (both thermal and electrical), the production of liquid organic fertiliser, the elimination of diseases such as cholera, the reduction in deforestation and soil erosion and the reduction in menial labour time. Promising results by two pilot plants, a residential and a school biogas digester, indicate that each household switching from fuel wood to biogas would reduce the emission of CO_2 by as much as 4.9 tons/year. By extrapolating this result to 300 000 households of rural South Africa, 1.5 million tonnes per year CO_2 emissions can be avoided.

Thematic Session: Rural Energy – Woodfuels, Charcoal and Household Issues

This presentation provided the link to the afternoon session on rural energy. An introductory speech was given by Dr. Smail Khennas of the Intermediate Technology Development Group (ITDG), United Kingdom, who stressed the importance of biomass in meeting basic domestic needs which today are mainly based on charcoal in urban areas and wood in rural areas. Constraints to rural energy development can be identified to be poverty, the low population density and a poorly developed energy infrastructure. Therefore, policies for the improvement of rural energy supply have to include financial schemes for rural communities and private energy providers as well as supportive regulatory interventions of governments. Additionally, the low impact of rural electrification programs in the past necessitate a change in the strategy, namely a prioritisation of the income generating activities in rural areas. These increase the demand of modern energy in rural areas and hence create a base upon which modern energy and especially electricity can be extended to households.

Focusing on the situation in South Africa, Qase Nomawethu of Rural Area Power Solutions presented activities on the assistance to rural communities for the access to improved energy services. Energy service delivery in rural areas generally lags behind that of urban areas, but is currently receiving attention from the government and private sector, while local communities are being drawn in to participate in finding solutions. In South Africa, for example, the government is supporting the extension of grid electricity services, and in areas where this is considered too costly, concessionaires have been appointed to provide basic electrical services through the use of photovoltaic solar home systems (SHS). Thereby, availability and affordability of energy services are equally important issues for household health, safety, nutrition and livelihoods and improved energy services are particularly important for the upliftment of the status of women and rural development.

Finally, Dr. Helen Watson, School of Life and Environmental Sciences, Unitersity of Natal, presented a research approach using structured questionnaires to interview householders and key stakeholders to acquire information on the frequency and amounts of natural resource products used and traded, which enabled a calculation of the value of the resource as a source of energy, food, fodder, medicine, building material, utensils and income. Information on the species used for different purposes, the perception of their availability, and factors that may have influenced this over the past decade, was also obtained. One of the important results of the study was, that most households in the province of Kwa-Zulu Natal use fuel wood as a source of energy, thereby creating great pressure on the natural resource. The introduction of exotic woods cannot alone address the resulting socio-economic problems of the area, as they more often displace other valuable natural resources. In conclusion, it was found to be essential to assess and evaluate the socio-economic potential of all resources prior to the introduction of exotic woods or other mono-investment practices.

Conclusions

The concluding round table discussion of this two day workshop on bioenergy served to summarise the following main results of the event:

- The South African Sugar Industry has a large potential to contribute to the global movement towards sustainable green energy. Thereby, the economic viability of green energy is dependent upon the interventions of national governments and requires incentives through supportive policies.
- The pelleting technology will be an important step in providing energy from bagasse on a year-round basis leading to the simplification of material handling as well as the economic storage and transportation of a standardised biomass fuel.
- Bioenergy technologies have the potential to significantly contribute to sustainable development. Thereby, a balance is required between environmental/conservation, economic and social interests adjusted appropriately to suit specific framework conditions.
- Sustainable development in emerging economies is largely dependent on a greater capital investment in local human resources and local technological capacity development, rather than in the importation of knowledge and technologies.
- Successful rural electrification programs require a change in strategy, namely a prioritisation of the income generating activities in rural areas. These increase the demand of modern energy in rural areas and hence create a base upon which modern bio-energy and especially electricity can be extended to households.

More detailed information on this workshop is provided in the workshop proceedings which are available on the LAMNET project web site **www.bioenergy-lamnet.org**.