# LATIN AMERICA THEMATIC NETWORK ON BIOENERGY

# LAMNET

**LAMNET, a Global Network on Bioenergy, organises its 3rd project workshop in Brazil, 2-4 December 2002.**

**The scientific programme of the workshop includes:**

- **Bio-fuels and Sustainable Electricity Generation in Latin America**
- **Analysis of innovative Bio-energy Systems such as Bagasse Cogeneration, Bio-fuel Micro-turbines and Fuel Cells**
- **a Thematic Priority Session on Ethanol based Fuel Cells**
- **a Technical Tour visiting a Sugar Mill in the State of São Paolo producing Sugar, Alcohol and Electricity for the grid.**

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www.bioenergy-lamnet.org

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## LAMNET Workshop on Biomass, Rural Energy and the Environment

by Dr. Rainer Janssen, WIP – Renewable Energies, Germany

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. 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. ***page 12***

## LAMNET at the JOHANNESBURG SUMMIT

In the framework of the LAMNET project a position paper on 'biomass, rural energy and the environment' was elaborated and distributed on the occasion of the Johannesburg Summit. The position paper provided recommendations for the development and implementation of policy options for the promotion of the sustainable use of biomass in Latin America and other emerging countries. Thereby, the main focus was to indicate means to overcome barriers to the implementation of bioenergy. ***page 14***

## KwaZulu-Natal Minister of Agriculture and Environmental Affairs at the LAMNET Workshop in Durban

Honourable Narend Singh, Minister of Agriculture and Environmental Affairs of the KwaZulu-Natal province in South Africa, acknowledged the role of the 2nd LAMNET workshop on biomass, rural energy and the environment 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. ***page 13***

## The Brazilian Energy Initiative

by José Goldemberg,
Secretary of State for the Environment, São Paulo, Brazil

**An ambitious proposal for a revolution in the planet's energy matrix was brought to the Johannesburg conference by Brazil. The Brazilian Energy Initiative, conceived by Prof. José Goldemberg, São Paulo State Secretary of the Environment, calls for extended use of alternative sources like solar, wind, geothermal, tidal, biomass and small hydroelectric facilities. Its goal is to raise the share of these sources from 2.2% today to 10% by 2010.**

Development – understood as access to food, health, sanitation, education and employment – is the aspiration of a large fraction of the world's population living in the poorer countries in the Southern hemisphere which have not reached yet the level of affluence of countries in the Northern hemisphere. This requires a variety of ingredients such as natural resources, minerals, agriculture, industry and all the aggregated technologies. Concerns over the exhaustion of natural resources have been raised over the time but have proven to be either exagerated or baseless. What has not been proved baseless is that mankind with 6 billion people is moving around all kinds of materials at the average level of 8 tons per capita per year, i.e., "circa" 50 billion tons per year.

This is approximately the amount of materials that natural forces such as wind, rain, volcanic eruptions, earthquakes, etc. move around every year. In other words man has become a "geological force". The environmental problems we are creating are the most immediate reason to be concerned with the use of natural resources. A good part of the materials used by mankind is made up of fossil fuels (coal, oil and gas) which are used as sources of energy as heat or motive power, basic for our civilization. Energy is not only one of the ingredients of our system but a fundamental one; without it there is no availability of water, agriculture is impossible and so is the access the other resources responsible for development.

The use of energy around the world is very uneven: while an average citizen in the United States consumes per year 35 times more electricity and 17 times more overall total energy than a citizen in India. In the aggregate, average "per capita" consumption in the OECD countries is almost five times higher than in the rest of the world (IEA 2000). One naive solution to this problem is to propose the increase in energy consumption in the developing countries. This can be done to some extent but is not viable in the long term. If all the population of the world were to reach the level of consumption of OECD countries, global consumption would increase threefold.

The consequence of this is, that fossil fuel reserves which are limited, would be consumed very rapidly. In addition to that, pollution at the local, regional and global level would increase rapidly and jeopardize the conditions of the environment we live in.

Renewable energy is thus a basic ingredient for sustainable development. Such sources can supply the energy we need for indefinite periods of time polluting far less overall than fossil or nuclear fuels. According to Figure 1, renewable energy (including renewables and waste, geothermal, solar and hydro) represented, in 1998, 13.33% of total world consumption. According to IEA renewable energy includes hydropower, biomass, wind, solar (thermal, photovoltaics), geothermal and marine energy (wave and tidal).

**World shares**
**of total primary energy supply 1998**
**414.6 EJ**
**(source: IEA Energy Balances)**

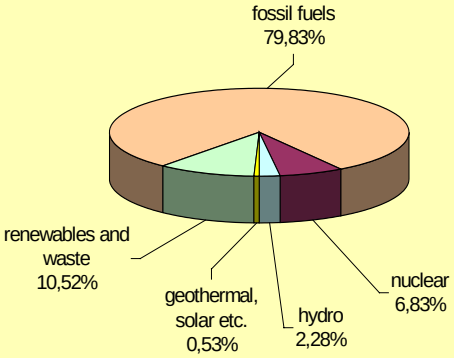


*Figure 1: World shares of TPES - total primary energy supply (source: IEA, 2000).*

These shares, though, are quite different for developed and developing countries, as shown in Figures 2 and 3.

**OECD countries (222.6 EJ)**

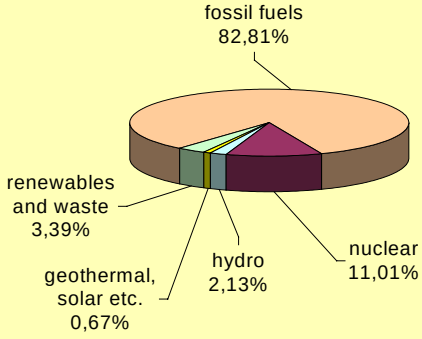


*Figure 2: Shares of TPES in developed countries as of 1998 (source: IEA, 2000).*

**Non-OECD countries (192.0 EJ)**

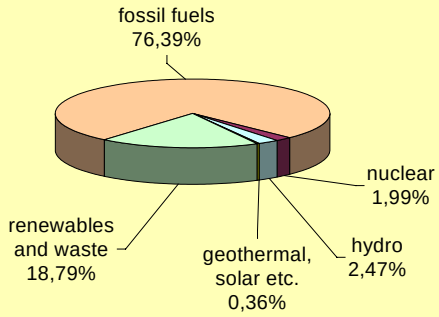


*Figure 3: Shares of TPES in developing countries 1998 (source: IEA, 2000).*

At the Johannesburg World Summit on Sustainable Development (WSSD), the European Union presented a proposal to increase the share of renewables which reads as:

*"Diversify energy supply by developing cleaner, more efficient and innovative fossil fuel technologies, and by increasing the global share of renewable energy sources to at least 15% of global total primary energy supply by 2010. To achieve this all countries should adopt and implement ambitious national goals for renewable energy. For industrialized countries, these goals should aim at an increase of the share of renewable energy sources in the total primary energy supply by at least 2 percentage points by 2010 relative to 2000".*

There are three problems with this proposal when applied to developing countries:

- it includes hydro (small and large scale) with no restrictions, although some large hydro are subjected to heavy criticism since they can lead to social (relocation of populations) and environmental (loss of biodiversity) reasons, as well as potential damages to archaeological sites.
- "renewable" includes biomass used either in a sustainable or unsustainable way; it is well known that in many countries the widespread use of trees as fuelwood is not sustainable.
- it is a very modest proposal: a "2% points increase by 2010" implies a growth rate of only approximately 40 % in 10 years, which is less than 4% per year, practically a *business-as-usual* approach. Several renewables (PV, wind) are growing much faster than that. According to the WEA (as of 2000), wind and photovoltaics (PV) grows at an yearly rate of 30%. Other sources are: biomass heat, ethanol and electricity (3%/yr), low temperature solar heat (8%/yr), geothermal electricity and heat (4%/yr and 6%/yr respectively), small and large hydro (3%/yr and 2%/yr). Fossil fuels consumption grows at 2%/yr.

Another approach is to distinguish from the start between "traditional biomass" used as a non-commercial source - usually with very low efficiencies for cooking in many countries - and "modern biomass" which is sustainable and used as commercial energy for the production of heat and electricity mainly in industrialized countries. Figure 4 shows the world consumption of primary energy using the above characterisation.

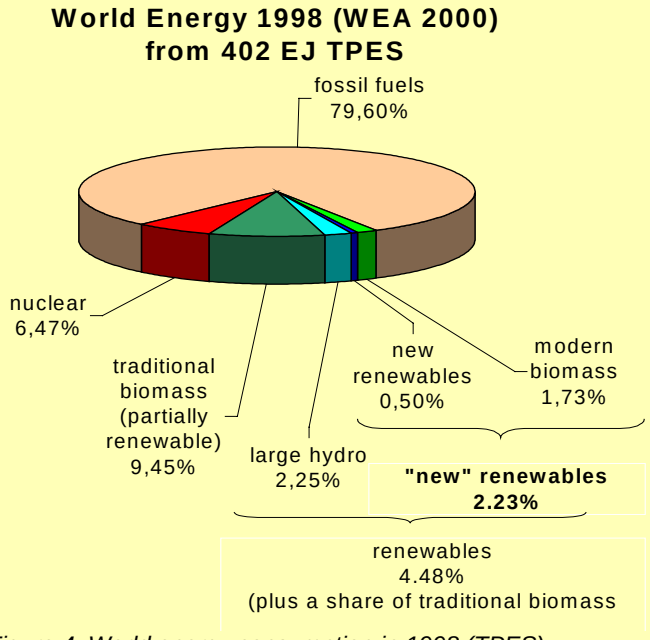


*Figure 4: World energy consumption in 1998 (TPES) (source: WEA, 2000).*

Biomass, the most important energy source in several developing countries, is only sustainable under certain conditions. It is only "renewable" if realistically replaced. Much biomass use in developing countries is leading to deforestation both for either domestic small scale or large scale for industrial purposes. Moreover, biomass use for cooking and heating in developing countries is a major cause of serious indoor pollution, particularly to women, small children and the elderly.

Figure 5 shows growth rates for the different types of renewable energy and an extrapolation to 2003 and 2008 assuming these growth rates will be the same as they were in the period 1993-1998.

This Figure is the basis for the Brazilian Energy Initiative which proposes an increase of "the use of new renewable sources to 10% as a share of world energy matrix by 2010". "New renewable sources" include modern biomass, small hydropower, geothermal energy, wind energy, solar energy (including photovoltaics) and marine energy. "Modern biomass" excludes traditional uses of biomass as fuelwood and includes electricity generation and heat production from agricultural and forest residues and solid waste. With such caveats "new renewable energy sources" could be labelled as "sustainable renewable energy sources". Large hydro were not included originally in the proposal but were included later provided they are "socially and environmentally acceptable".
This proposal was submitted to the Ministers of the Environment of the Latin American and the Caribbean region this year, approved with the inclusion of all hydropower sources (see Annex I).

With this compromise it is seen that a 10% share of renewables by 2010 is within reach requiring a small additional effort on top of the increase that is taking place today in the world (3.73%/year).

The Brazilian Energy Initiative, differently from the Kyoto Protocol, requires that all countries should reach by year 2010 a fraction of renewables in their energy mix, not only Annex I countries. Such goals are to be achieved "individually or jointly", which opens the way for flexibility mechanisms and trading of renewable energy certificates. In principle this should remove one of the main objections of the United States to agreements of this type.

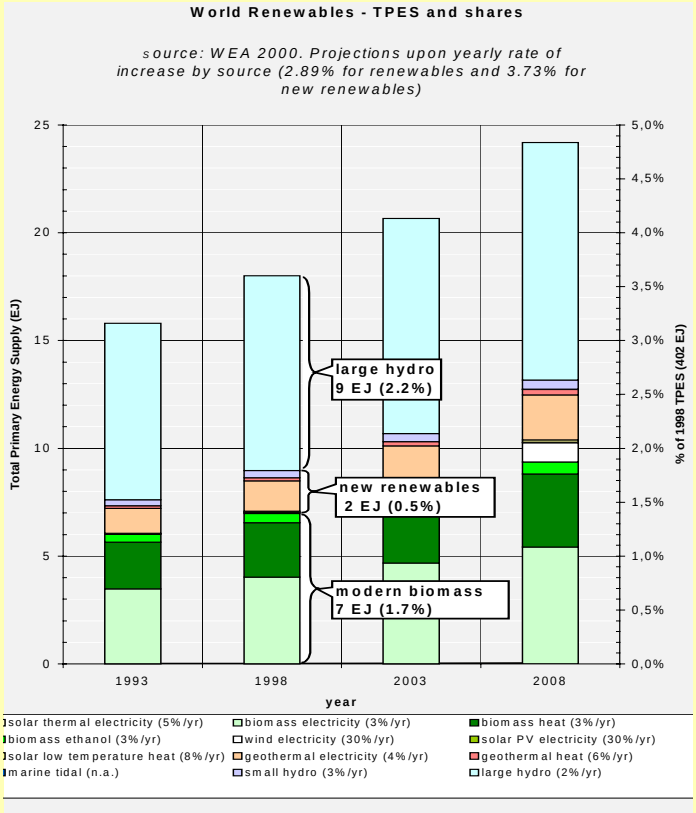


*Figure 5: World renewables - TPES and shares (adapted from WEA, 2000).*

Clearly the OECD countries would not have many problems in attaining, by year 2010, 10% of sustainable renewable energy in their systems. As seen in Figure 2, such energies represent already 6.19%.

For developing countries the situation may be more complex. As seen in Figure 3 they use a lot of "renewable and waste" energy (18.79%), a good part of which is not strictly sustainable.

Economic development will at first encourage them to reduce their use of biomass either through efficiency improvements and fuel switch which may reduce deforestation but will not lead necessarily to sustainability. Economic development will also inevitably lead to some increase in the use of fossil fuels. In many of them, however, "modern or sustainable biomass" is already significant and could be easily increased. Examples are Brazil (20.4%) and India (4.7%) among others.

Renewable energy, just like any infant technology, needs support until having conditions to compete with conventional fossil fuel sources. Subsidies for environmentally sound energy options are harmful only if they persist in the long term without the so-called "sunset clauses". To push forward renewables it is necessary to have on its favour stronger market forces, not only alternative experiments. Figure 6 shows the effect of higher production volumes in decreasing the costs of renewable energy sources: the learning curves of wind energy, solar photovoltaics and ethanol in Brazil.

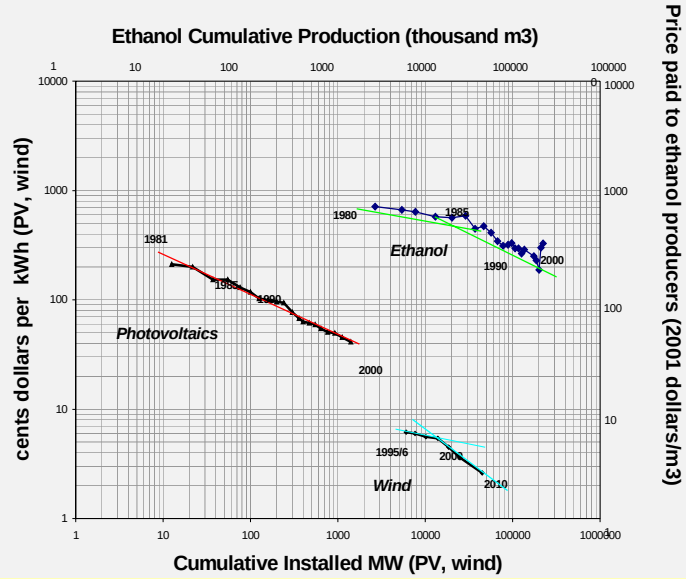


*Figure 6: Wind, solar PV energy and ethanol learning curves (source: CENBIO, 2000).*

Brazil, a country with a large experience in the development of renewable energy, has proven this paradigm: today, dedicated sugarcane alcohol fuelled cars are on the streets without subsidies. Ethanol is also added to all gasoline at 25% as a lead-free carburant, much less polluting than MTBE. Urban air pollution has dropped considerably due to this measure and carbon dioxide is recaptured by photosynthesis.

The WSSD Plan and both the Brazilian and the European proposals recognize clearly the advantages of renewables as far as they enhance diversity in energy supply markets; secure long-term sustainable energy supplies; reduce local and global atmospheric emissions; create new employment opportunities offering possibilities for local manufacturing and enhance security of supply since they do not require imports that characterize the supply of fossil fuels. Table I compares the number of jobs (in person-years) generated by the production of energy of different types.

Secretaria de Estado do Meio Ambiente
Governo do Estado de São Paulo

**Table I**
Direct jobs in energy production

| Sector | Jobs (person-years) Terawatt-hour |
|---|---|
| Petroleum | 260 |
| Offshore oil | 265 |
| Natural gas | 250 |
| Coal | 370 |
| Nuclear | 75 |
| Wood energy | 1000 |
| Hydro | 250 |
| Minihydro | 120 |
| Wind | 918 |
| Photovoltaics | 76,000 |
| Ethanol (from sugarcane) | 4,000 |

References:

1. CENBIO - The Brazilian National Reference Centre on Biomass. **Personal communication, 2000, 2001**
2. IEA **Energy Balances of non-OECD Countries 2001.** International Energy Agency, 2002
3. IEA **Energy Balances of OECD Countries 2001.** International Energy Agency, 2002
4. UNDP **World Energy Assessment 2000.** United Nations Development Programme, Washington, 2000
5. WSSD **Plan of Implementation, advanced unedited text**. World Summit on Sustainable Development, Johannesburg, 5 September 2002

Collaborators:
Suani T. Coelho, Oswaldo Lucon and João Wagner Alves

## ANNEX I

The Latin American and Caribbean region has agreed in May 2002 on the following proposal for targets and timeframes on renewables, stated as:

*"Increase in the region the use of renewable energy to 10% as a share of total by 2010" (Draft of the Final Report of the 7th Meeting of the Intersessional Committee of the Forum of Ministers of Environment of Latin America and the Caribbean, São Paulo, May 2002)*

Paragraph 19 of the World Summit on Sustainable Development (WSSD) Plan of implementation adopted in Johannesburg reads as:

*19. Call upon Governments, as well as relevant regional and international organizations and other relevant stakeholders, to implement, taking into account national and regional specificities and circumstances, the recommendations and conclusions of the Commission on Sustainable Development concerning energy for sustainable development adopted at its ninth session, including the issues and options set out below, bearing in mind that in view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. This would include actions at all levels to: (...)*

*(c) Develop and disseminate alternative energy technologies with the aim of* ***giving a greater share of the energy mix to renewable energies****, improving energy efficiency and greater reliance on advanced energy technologies, including cleaner fossil fuel technologies;*

*(d) Combine, as appropriate****, the increased use of renewable energy resource****s, more efficient use of energy, greater reliance on advanced energy technologies, including advanced and cleaner fossil fuel technologies,* ***and the sustainable use of traditional energy resources****, which could meet the growing need for energy services in the longer term to achieve sustainable development;*

*(e) Diversify energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies, including fossil fuel technologies and renewable energy technologies, hydro included, and their transfer to developing countries on concessional terms as mutually agreed.* ***With a sense of urgency, substantially increase the global share of renewable energy sources with the objective of increasing its contribution to total energy supply, recognizing the role of national and voluntary regional targets as well as initiatives, where they exist, and ensuring that energy policies are supportive to developing countries' efforts to eradicate poverty, and regularly evaluate available data to review progress to this end;***

## Technical Document on Biomass Supporting the Brazilian Energy Initiative

by José Roberto Moreira,
CENBIO – Brazilian Biomass Reference Centre

**As an effort to mitigate climate change and improve life quality in developing countries Brazil presented a proposal at the Johannesburg Conference on Sustainable Development. The proposal preparation was supported by several technical background papers to quantify the world capacity to obtain a significant amount of energy by the year 2010 from new and renewable energy sources. It is shown that through the use of 300 million hectare of land it is possible to fulfill the total global energy demand by using the most advanced agricultural and industrial technologies.**

The LAMNET co-ordination partner Prof. José Roberto Moreira from CENBIO was involved in the elaboration of the document on biomass, and more specifically the issue of using alcohol in the transportation sector. This newsletter article presents a brief summary of the document and the full version is available at the LAMNET project web site www.bioenergy-lamnet.org under 'Publications'.

The technical document discusses the global biomass potential coming to the conclusion that some particular energy crops are significantly superior to others. Sugarcane as a source of alcohol fuel and electricity has very favourable potential as one of the leading crops due its high agricultural yield, the high conversion efficiency from primary to useful forms of energy, and the co-production of liquid fuel, heat and electricity.

Additionally, the document discusses several barriers and shows that economic feasibility, which has already been achieved in Brazil, is not enough to open a significant market. The price figures for ethanol in Brazil are the best in the world. This is due to the synergetic effect of simultaneous production of sugar and ethanol which helps to reduce costs. Moreover, Brazil has produced over 200 million $m^3$ of ethanol in the period 1975-2000, leading to a production cost decline as a function of the increase in production. Thereby, the cost reduction can essentially be attributed to the "learning-by-doing" effect since R&D financial resources were negligible in Brazil as well as in other developed and developing countries.

Other barriers, mainly in the socio-economic field, prevent the use of biomass energy sources. The following main barriers have been identified:

- Data, information, knowledge, awareness
- Access to capital, especially smaller firms
- Risk aversion in financial institutions
- Trade barriers such as tariffs or export restrictions
- Human and institutional capabilities
- Missing codes and standards
- Low, subsidised conventional energy prices
- Absence of full-cost pricing
- Individual preferences/ lifestyle
- Poverty

Finally, the document concludes with a list of practical actions promoted by the Brazilian Energy Initiative that, if implemented, would allow most of the 102 sugarcane growing countries to rely on energy from sugarcane in the short-term:

- Immediate increase of the ethanol production by reducing the exportation of molasses and its use as a feedstock for animal feeding.

  This action can be applied in about 150 countries, producing sugar. The production of 100 kg sugar generates molasses for the production of at least 15 litres ethanol. From the production of 120 Mt sugar from sugarcane and sugarbeet it would therefore be possible to produce 18 $Mm^3$/yr of ethanol, sufficient to replace 0.7% of the total fuel consumption in the world within few years.

- Immediate conversion of a share of the sugarcane production from food to fuel.

  This action can be carried out in 102 countries. The present world sugar production from sugarcane is around 100 Mt/yr while the international market turns out to be approximately 30 Mt/yr. Therefore, a reduction of the sugar production by a few percent will increase the international market price yielding a premium to sugar exporting countries. On the other hand, several sugar producers have large stocks that are not being commercialised due to the risk of further reducing the price. Balancing these aspects, a reasonable decision would be to divert 10% of the sugarcane to ethanol production. This means 10 Mt of sugar, yielding 7 million $m^3$/year of ethanol one or two years after the decision is taken This is the maximum time required to install industrial facilities, whereas blending a few percent ethanol in gasoline is an easy task and can be initiated in a few months. Around 6 million $m^3$/yr equivalent of gasoline will be replaced representing 0.3% of the global fuel.

# Green Power for the World Summit on Sustainable Development – A First Step for Green Power in Africa

by Glynn Morris,
AGAMA Energy, South Africa

**AGAMA Energy, a green energy service company based in Cape Town, South Africa, established a regulatory and trading framework for Green Power in SA and facilitated the supply of 845 MWh of green power to two of the main venues of the World Summit on Sustainable Development (WSSD) held in Johannesburg between 26th August and 4th September 2002.**

The electricity was sourced from existing and new green generation capacity in South Africa, including small hydro, solar PV, wind, bagasse (sugar cane waste) and symbolic donations of wind (Costa Rica) and geothermal (Italy) power. The new capacity included the first grid-connected wind electricity in South Africa. The Green Power was certified by the National Electricity Regulator (NER) and supplied to the venues by City Power (the distributor in Johannesburg, the location of the WSSD).

The Green Power for the WSSD Project was conceived by Glynn Morris, the CEO of AGAMA Energy, who formulated the project outline and proposed outcomes and approached various organisations for funding. The project was supported by a grant under the South African Department of Environmental Affairs and Tourism climate change programme, funded by the United States Agency for International Development (USAID).

The main results of the project included:

- Delivery of a powerful and practical mechanism for immediately scaling up the proportion of green energy in the southern African energy economy.
- Supply of green power to two main venues of the WSSD.
- Stimulation of new green generation capacity in South Africa.
- Establishment of a green power regulatory and trading mechanism with the NER.
- Increase of the public awareness of Green Power.
- Establishment of a regulatory and trading mechanism (and an associated green electricity tariff) for actually valuing and transacting the 'greenness' of renewable energy and energy efficiency in South Africa.
- Paving the way for the decentralisation of electricity generation in Southern Africa. This will encourage black empowerment and job creation through the development of independent power production businesses and particularly through community-based independent power producers (IPPs).

All of these are firsts in South Africa and Africa. Furthermore, these are lasting legacies of the WSSD process which have advanced the status of more sustainable development. As a result of the project, the National Electricity Regulator, as a key stakeholder, has set up an on-line certification and trading mechanism on the NER website, www.ner.org.za. Although these trades are limited to the WSSD project at present, the principles and the systems are established to make this a long-term reality for South Africa (especially the Southern African region).

Other notable aspects of this project are:

- The supply of 100% of the electricity needs at two of the main venues – Ubuntu Village and NASREC – with Green Electricity for the duration of WSSD.
- The participation of more than 60 MW of green electricity generation capacity (mostly existing biomass and small hydro, but including new PV and wind).
- The installation of a new grid-connected PV system at the GreenHouse Project to demonstrate a small distributed generator supplying into the City Power system.
- The supply of two symbolic green energy certificates from Costa Rica and Italy (ideally these international trade will go the other way in future, i.e. from SA to more developed economies).
- The dovetailing of this local initiative with international Tradable Renewable Energy Certificate Mechanisms (refer to www.treckin.org).
- The co-ordination with and integration of the project within the "Greening the WSSD" initiative (refer to www.greeningthewssd.com).

In conclusion, this project provided a successful example for a generalized mechanism which can provide an immediate opportunity for scaling up Renewable Energy and Energy Efficiency contributions to the overall energy mix. It remains for this mechanism, and the recent WSSD experience, to be included in the Department of Minerals and Energy's draft White Paper on Renewable Energy and then to be implemented as a formal mechanism of the NER.

*Figure: New 750 W wind turbine at the Moshoeshoe Eco-village supplying Green Power onto the grid*

AGAMA Energy is now into the evaluation phase of the project. Elements of the project are documented on the AGAMA Energy web site, www.agama.co.za.

# The Use of the Kyoto-Mechanisms for the Market Introduction of Renewable Energies

by Dr. Roland Geres,
FutureCamp, Germany

**The Kyoto Protocol will exercise a major influence on the renewable energy sector as it provides a significant additional source of revenue and competitive advantages for renewable energies. CDM and JI will help to accelerate the introduction of renewable energies into markets opening the door to an extensive use of renewables for the production of power and heat.**

The Kyoto Protocol demands from the contracting states to reduce their greenhouse gas (GHG) emissions – mainly $CO_2$. It sets individual GHG-targets for each country that they will have to fulfill as of 2008. In order to comply with its target, each member state fixes a certain amount of emissions per year (absolute cap) that shall not be exceeded. Corresponding to the amount of allowed emissions, each state allocates tradable certificates to its companies (1 certificate allows to emit 1 ton of carbon dioxide equivalent during a specified period of time). The amount of certificates will be reduced on a pro rata temporis basis – which will automatically reduce the amount of GHG emissions.

### The Flexible Mechanisms of the Kyoto Protocol

To reach the GHG emission targets, the Kyoto Protocol offers "Flexible Mechanisms" (Emissions Trading, Clean Development Mechanism and Joint Implementation). These mechanisms intend to facilitate the compliance and to decrease the costs of emission reductions.

- *Emissions Trading* introduces a great degree of flexibility for the participants as they can either reduce emissions in their own companies or buy emissions certificates on the market if their current situation – e. g. financial situation or investment cycle – does not allow active mitigation. Thus, emissions trading can contribute to the reduction of costs. Moreover, companies can partly finance their investments in energy saving measures by selling certificates that, due to reduced emissions, they do no longer require.

- The project based mechanisms of *CDM* (Clean Development Mechanism) and *JI* (Joint Implementation) enable companies to acquire themselves certificates if they invest in or realize projects that reduce GHG emissions either within developing countries (⇨ then CDM) or within industrialised and EIT countries (Economies in Transition ⇨ then JI). The reduction of emissions must be real and measurable – which has to be verified by a third party or operational entity. The certificates gained from CDM or JI are equally valuable as those from Emissions Trading. They can either be used to comply with a company's individual reduction target (cap) or be sold on the market.

### The Impact of these Flexible Mechanisms on the Renewable Energy Sector

An outstanding advantage of these Flexible Mechanisms is that they substantially support technologies with a low or even non-existing carbon content (esp. renewable energies). Thanks to the Flexible Mechanisms the reduction of GHG-emissions becomes a new commodity. Projects to reduce such emissions that are based on renewable energies will henceforth be able to "generate" GHG-certificates. These certificates constitute a financial add-on for investors that can:

- make a project more profitable or cost-effective
- sustain the company & shareholder value
- enhance price competitiveness of renewable energies
- secure loans from banks

Furthermore, it will make the public aware of the specific role of renewable energies for the protection of our climate, thereby providing an ideal marketing-platform. This will additionally facilitate and accelerate their introduction into the markets. These advantages would still be valid, even if the prices for certificates should not exceed US$ 3–5 thereby not sufficing to fully cover the expenses of the investment. On the contrary, the World Bank Experience with the Prototype Carbon Funds shows clearly that even a revenue stream based on emission reduction at US$ 3/t $CO_2$ – as assumed by the Bank – can have substantial impacts on the change in internal rate of return (IRR) of projects.

**Impact of Emission Trading**

| Technology | IRR |
|---|---|
| Energy Efficiency - District Heating | 2.0 – 4.0 |
| Wind | 0.9 – 1.3 |
| Hydro | 1.2 – 2.6 |
| Bagasse | 0.5 – 3.5 |
| Biomass with methane kick | Up to 5.0 |
| Municipal Solid Waste with methane kick | > 5.0 |

*PCF, at PCF and Climate Change Synergy Workshop, Beijing, November 30, 2001*

### Actual example: National biomass project of FutureCamp

One of FutureCamp's recent climate projects has been a biomass project of a Bavarian company. The key element of this project was the bundling of more than 20 (in the year 2001, in 2002 it will presumably be 45) smaller decentralised biomass units to a single project. The project bundling allowed an exceeding reduction of transaction costs due to a standardised baseline for a multitude of small and medium local plants. This approach enables even medium-sized companies (and their customers) to take part in and to profit from emissions trading. The system is being validated by an independent party (TÜV Süddeutschland) – and the first VERs (Verified Emissions Reductions) from the year 2001 are already sold.

### Conclusion

To conclude, the Kyoto Protocol will henceforth exercise a major influence on the renewable energy sector as it provides a significant additional source of revenue and competitive advantages for renewable energies. CDM and JI will help to accelerate the introduction of renewable energies into markets. Therefore the Kyoto Protocol opens the door to an extensive use of renewables for the production of power and heat. The protection of climate is not only and necessarily a restraint but also a great business opportunity.

:FutureCamp

## Treckin Parallel Event at the World Summit on Sustainable Development

**This special Parallel Event to the World Summit aimed at disseminating information on Tradable Renewable Energy Certificates systems to representatives in developing countries. TREC systems provide a promising policy tool to stimulate renewable energy markets in many parts of the world. LAMNET Coordination Partner ETA-Florence is directly involved in the Treckin network.**

On 28th August, a special Parallel Event to the World Summit has been organised by the Treckin network, supported by the European Commission. The event aimed at disseminating information on Tradable Renewable Energy Certificate (TREC) systems to representatives in developing countries and thus to:

- stimulate interest in TRECs
- provide an insight into the opportunities for using TREC mechanisms in developing countries
- provide information to national policy makers on TREC systems
- identify focal points for an international TREC network

The Treckin consortium is building a worldwide network enabling the exchange of knowledge about TRECs and helping to move towards global harmonisation facilitating international trade. More information on the Treckin project can be found at www.treckin.org.

TREC systems are of large interest for the LAMNET project as they are emerging as a policy tool to stimulate renewable energy markets in many parts of the world. The "green" character of energy produced from renewable sources is guaranteed by TRECs issued by a central organisation to the producer of renewable energy. The producer therefore generates "normal" electrical energy plus the environmental benefit and each are sold separately. The electrical energy can now be mixed with that from other energy sources without losing track of its 'greenness'. It has been shown that TRECs increase return on investment in renewable energy sources in a very effective way. This is related to the fact that the installations can be realised in optimal locations, whereas demand for the environmental benefits may be elsewhere. Many governmental organisations, like the European Commission, are starting to include the concept in their energy policy and developing countries are increasingly becoming aware of the potential of TRECs as an export commodity.


Marianne Haug (left), Director of Energy Efficiency and Technology at the IEA, chaired the morning session of the Treckin workshop. Keynote presentations were given by Dr. Corrado Clini (right), Director General of the Italian Ministry of the Environment and Territory and Prof. José Goldemberg, São Paulo State Secretary of Environment, Brazil

## Columbia Paving the Way in Renewable Fuels for Transport

by Henry Echeverri
CORPODIB, Colombia

**A new renewable fuels programme in Colombia aims to improve environmental standards while making better use of domestic resources, providing an economic stimulus to the rural economy, and reducing $CO_2$ emissions. The programme will include expanded cultivation of sugar cane and construction of twelve new bio-refineries for production of ethanol and blending with gasoline.**

### Introduction

Colombia is a nation of 30 million inhabitants and 1.14 million square kilometers, making it the fourth largest country in South America after Brazil, Argentina and Peru. Much of the country is located in the Torrid Zone, but the mountains of the Andean system criss-cross the country and have created ecological resources that are rich in biodiversity. Colombia's environmental heritage and its geographical proximity to major trading centers make it a strategic country for sustainable economic development through expanded renewable energy sources.

The Corporation for Development of Biotechnology and Clean Technologies (CORPODIB), a governmental/private entity, has developed an ambitious programme for renewable transport fuels. The programme aims to reduce mobile source emissions and conform to Colombian use of oxygenates in gasoline as of 2001.

The High Chamber of Congress recently approved an innovative law requiring use of bio-alcohol in all Colombian gasoline after 2003. The environmental benefits of the programme range from local impacts in the form of improved air quality to a global contribution through greenhouse gas ($CO_2$) reduction.

### Ethanol from Sugar Cane

Colombia's ECOPETROL refineries do not produce enough gasoline to satisfy domestic demand, and the balance is imported as high octane gasoline, incurring additional transportation costs. Ethanol from sugar cane offers an octane enhancer that can meet the quality requirements while also saving costly investments at the ECOPETROL refineries. An immediate goal of the CORPODIB project is therefore to produce sufficient anhydrous ethanol from sugar cane for a 10% blend with gasoline. A 10% ethanol blend would require 730 million litres/year of ethanol, which is roughly equal to current gasoline imports in Colombia.

Currently, a half million hectares of sugar cane are being cultivated in Colombia, 180 thousand of which lay in the highyielding Cauca Valley region. It is estimated that the new ethanol programme will require planting of 150 thousand additional hectares, distributed in different regions of the country. It will also require construction of twelve bio-refineries in the first phase of the project. The agroindustrial complexes will be located close to the more suitable regions for sugar cane and around demand centres for gasoline.

**Rural Economic Benefits**

It is estimated that the programme will generate 150 thousand new jobs, mainly in the agricultural sector. Colombian farmers will provide fuel that was previously imported, resulting in foreign exchange savings of US$ 150 million per year. The precarious position of farmers will be greatly improved through the new economic opportunities available. The rural economy will benefit further through expanded domestic markets for agro-industrial products and services with linkages to cane and ethanol markets.

A 10% ethanol fuel does not require any modification in vehicle engines, and the Brazilian experience with ethanol shows that it is possible to go up to 25% blend. Indeed, the project is considering maximizing ethanol content in remote areas where there are sources of crude oil to obtain straight run nafta in small refineries for blending with ethanol. This is the case in Putumayo, a southern region close to the border with Ecuador that is included in the government's peace program, under which renewable biofuels are seen as a substitute for illegal crops protected by the guerrillas.

**Energy Efficient Production**

Production units will use efficient technologies to optimally extract energy from the waste streams at the factory and distillery. Vinasse from the alcohol plant, which would otherwise pose contamination threats to surface water, will be transformed to biogas in anaerobic digestors. Along with bagasse, the feedstocks will be employed in a modern cogeneration unit adjacent to the agro-industrial complex. In addition to providing all on-site demands for steam and electricity, an excess of power will be available to sell to the national electric grid.

The production cost of ethanol, according to CORPODIB analyses, should be US$ 1.00/gallon (26 cents/litre). The selling price is estimated at 1.4 to 1.6 US$/gallon (37–42 cents/litre), representing the opportunity cost to substitute a gallon of imported gasoline. The consumer price of gasoline will not increase because taxes from the ethanol portion will be transferred to the alcohol production chain, as compensation for the social benefits of the project and to provide incentives to private investors. Total private investment in the project is expected to reach 400 million US$. The after-tax rate of return for investors in the bio-refineries has been estimated at 20%.

**Environmental Benefits**

Fleet and engine tests by CORPODIB in Bogotá (2600 meters above sea level) using different blends of ethanol-gasoline, resulted in a reduction in CO and hydrocarbon emissions of 27% and 20%, respectively. In Bogotá this would mean an emissions reduction of 245 thousand tons per year. Overall, the programme would reduce national $CO_2$ emissions by six million tons, offering an excellent opportunity to obtain financial resources for the project via the CDM mechanism of the Kyoto Protocol.

**Conclusions**

Production of biofuels such as ethanol from sugar cane, takes advantage of year round cultivation potential in a tropical country like Colombia. Benefits extend from local to regional to national to global. Local rural economies benefit through new economic opportunities and employment in the agricultural sector. Urban regions benefit through cleaner air and health improvements. The nation benefits through substituting domestic resources for costly imported gasoline. The world benefits from reduced $CO_2$ emissions. The project in Colombia could be replicated elsewhere, and CORPODIB looks forward to a regional and global dialogue on expanding use of ethanol and other renewable fuels to promote sustainable development.

## Energetic Diversification of the Caribbean Sugar Agroindustry

by Julio Torres Martínez,
Cuban Observatory for Science and Technology

**The large energy potential of sugarcane biomass can be taken advantage of in most of the Caribbean countries, if modern technologies are used for the production of electricity and alcohol. For this, a profound technological change is required affecting not only the sugar factories, but also agricultural and harvesting practices.**

Most of the Caribbean countries grow sugar cane and depend more or less on sugar prices for their economic development and the decline of sugar prices during the last years has put those countries into a very difficult situation. Many sugar mills have been shut and sugar cane has been substituted by other more profitable crops. At the same time, mainly the Caribbean Islands produce the major part of their electric energy with oil derivatives and electricity generation often constitutes the prime greenhouse gases (GHG) emitter.

The production of electric energy and alcohol from sugar cane can help to alleviate the dependence of Caribbean countries on imported oil and contribute to the mitigation of GHG emissions. But the persistent lack of funds in these developing countries proved to be an obstacle to the introduction of modern technologies until now. Therefore, a regional or local production of the required equipment is necessary in order to reduce the cost of the technological change.

When the Cuban Development Program for National Energy Sources was formulated in 1993, the importance of the Sugar Agroindustry for the development of the National Electroenergetic System (NES) has been analysed. Then, the Cuban Sugar Agroindustry was established as the third largest national energy source (only preceded by Energy Efficiency and National Crude Oil), and its strategic role for the NES development was highlighted.

Currently, the Cuban Observatory for Science and Technology, in partnership with the Centre for World Economy Studies (CIEM) and the Ministry of Sugar, is investigating the main questions concerned with the transformation of the Sugar Agroindustry into a modern, flexible and more decentralized NES, which is able to satisfy Cuban electricity needs while avoiding or reducing GHG emissions. The study entails an analysis of technical, economical and social problems related to the introduction of the profound technological changes turning the Sugarcane Agroindustry into a reliable, competitive and environmentally friendly source of electricity and liquid fuel.

Additionally, this study will explore the costs and benefits of interconnecting the electric systems of Caribbean Islands in order to increase the efficiency of installed capacities and to develop strong networks based on sugar cane biomass and other renewable energy sources.

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

by Dr. Rainer Janssen,WIP – Renewable Energies, Germany

**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 the LAMNET Project Coordinator 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. 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.**

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. 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. However, the economic viability of green energy is dependant upon the interventions of national governments and requires incentives through supportive policies.

The political impact of the workshop 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.

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.

A brief summary of the inauguration address by Honourable N. Singh is presented in the next article of this LAMNET newsletter issue.

The workshop programme included 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.

Additionally, examples for successful implementations of bioenergy in Africa, Latin America and China were presented at the workshop. Prof. Francis Yamba from the Centre for Energy, Environment and Engineering Zambia presented a sustainable mitigation scenario of the Southern African Power Pool (SAPP), ensuring security of supply, industrial competitiveness, poverty reduction and sustainable development, while emphasising the role of bio-energy from bagasse, agricultural and industrial waste. 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. Dr. Ramon Pichs, Centre for World Economy Studies – CIEM in Cuba, focused on the requirements for the promotion of bioenergy in rural areas of developing countries whereas Prof. Wang Mengjie from the China Association of Rural Energy Industry reported on the recent developments of bioenergy policies and technologies in China.

Sezela Downstream Sugar Factory (operated by Illovo Sugar, South Africa)

In the framework of 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 at Illovo's Sezela Sugar Mill, which are increasing the 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 4.8-5.0 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.

Finally, 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 dependant 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.

Participants of the LAMNET workshop on biomass, rural energy and the environment in Durban, South Africa

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

## KwaZulu-Natal Minister of Agriculture and Environmental Affairs at the LAMNET Workshop in Durban

Honourable Narend Singh, Minister of Agriculture and Environmental Affairs of the KwaZulu-Natal province in South Africa, acknowledged the role of the 2nd LAMNET workshop on biomass, rural energy and the environment as an input to the United Nations WSSD 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 bio-fuels from 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.

### KwaZulu-Natal Department of Agriculture and Environmental Affairs

The KwaZulu-Natal Department of Agriculture and Environmental Affairs serves the whole farming community of the Province of KwaZulu-Natal. This complex community consists of a range of farmer groupings namely household food security farmers, farmers producing in excess of household needs, developing commercial farmers, commercial farmers with all sizes of enterprises, and agri-business industries. The Department provides extension and development support based on the development needs and the viability of projects associated with each of the various farmers groups.

For further information, please visit the official website: http://agriculture.kzntl.gov.za.

## LAMNET at the JOHANNESBURG SUMMIT

**In the framework of the LAMNET project a position paper on 'biomass, rural energy and the environment' was elaborated and distributed on the occasion of the Johannesburg Summit. The position paper provided recommendations for the development and implementation of policy options for the promotion of the sustainable use of biomass in Latin America and other emerging countries. Thereby, the main focus was to indicate means to overcome barriers to the implementation of bioenergy.**

Since the Rio Earth Summit in 1992, sustainable development has emerged as a new paradigm of development, integrating economic growth, social development and environmental protection as interdependent and mutually supportive elements of long-term development. Sustainable development also emphasizes a participatory, multi-stakeholder approach to policy making and implementation, mobilising public and private resources for development and making use of the knowledge, skills and energy of all social groups concerned with the future of this planet and its people.

Ten years after Rio, the United Nations World Summit on Sustainable Development was held in Johannesburg from 26th August to 4th September 2002 at the Sandton Convention Centre. More than 100 presidents and prime ministers, along with thousands of government representatives, NGOs and business leaders attended the summit marking an historic opportunity to commit to actions that will improve people's lives and protect the environment.

The overriding theme at the summit was to promote action and major progress was made in Johannesburg to address some of the most pressing concerns of poverty and the environment. Commitments were made to increase access to clean water and proper sanitation, to increase access to energy services, to improve health conditions and agriculture, particularly in drylands, and to better protect the world's biodiversity and ecosystems.

The major outcome document, the Plan of Implementation, contains targets and timetables to spur action on a wide range of issues, including halving the proportion of people who lack access to clean water or proper sanitation by 2015, to restoring the depleted fish stocks by 2015, and phasing out of toxic chemicals by 2005. In addition, for the first time countries adopted the commitment towards increasing the use of renewable energy, although a proposed target for this was not adopted. More information on the results of the World Summit are available at www.johannesburgsummit.org.

Many bioenergy projects are technically feasible today, but investments do not proceed because other forms of energy are more cost competitive. High cost is the most significant barrier to achieving an increased uptake of biomass. The removal of barriers to implementation is a challenge for developers and policy makers in order to increase the sustainable use of bioenergy systems. Faster uptake could be made by offering a number of incentives:

***Economic Instruments***

- Carbon taxes imposed on a society in order to increase the costs of fossil fuels, making biomass more competitive since, being carbon neutral, it would be exempt.
- Climate change levies on electricity sales, having the potential both to provide revenue and to create awareness if the revenue were used to encourage the use of biomass and other renewable projects.
- Carbon trading offering additional value to bioenergy projects in terms of measurable carbon offset.
- Long-term feed in tariffs in order to stimulate the renewable energy market.
- Grants and subsidies offered by governments.
- Increased depreciation rates on plant and equipment for tax purposes.
- Reduced excise taxes to the use of fuels with a biofuel component.

***Non-economic Instruments***

- Targets set by governments for new renewables.
- Green electricity markets enabling retailers to trade the renewable energy certificates after generation. The green certificate value can be capped by imposing a penalty for not meeting the green electricity targets.
- Education and access to information about the problem of GHG emissions in order to create greater awareness and encourage companies, communities and individuals to be prepared to act.

It was therefore recommended by the Latin America Thematic Network on Bioenergy to make use of these economic and non-economic instruments in order to exploit the opportunities offered by reliable and commercial bioenergy technologies, as promoting bioenergy can contribute to the achievement of the goals of a fair and more sustainable development around the globe.

Today it is generally agreed upon that political commitment and appropriate policies are an essential pre-requisite for a significant increase of the renewables share of the global energy supply and should complement the efforts in improving the technological and economical capabilities of renewable energy sources.

Additionally, the activities of LAMNET included the participation at the Forum on Science, Technology and Innovation for Sustainable Development, an official parallel event at the World Summit. It was the objective of this Science Forum to provide a strong platform for highlighting the critical contributions of science and technology in policies for sustainable development. A series of workshops and seminars covered a wide spectrum of topical themes emphasizing the vital, cross-cutting interface of knowledge and innovation as enabling tools for human development. Information on the Science Forum is available at www.scienceforum.co.za.

During the opening ceremony of the Science Forum the secretary-general of the World Summit, Nitin Desai stated that the greatest danger that we face today is the growing gap between those who have access to knowledge and those who do not. Therefore, increased efforts are required to build linkages between scientific activity in the developed and developing world, and also a major strengthening of scientific and technological capacity in developing countries. Additionally, there is the urgent need to strengthen the scientific basis of decision-making at all levels, in particular to use scientific insights to help apply the 'precautionary principle' to decisions that might have a significant impact on the social and natural environment. Multi-stakeholder knowledge-based initiatives such as the global LAMNET project bringing together 48 bioenergy expert institutions from 24 countries worldwide will contribute to achieving these essential future goals.

## LAMNET Activities

### 1st Project Workshop in Amsterdam, 19 June 2002

The first LAMNET Project Workshop was organised as Conference Related Event of the 12th European Conference and Technology Exhibition on Biomass for Energy, Industry and Climate Protection. This workshop constituted a platform for dialogue between the members of LAMNET and interested delegates who would like to benefit from a group of international experts working on the application of bioenergy in Latin America.

### Forum on International Co-operation, 20 June 2002

This Forum organised in the framework of the 12th European Conference and Technology Exhibition on Biomass for Energy, Industry and Climate Protection discussed a possible action plan for international co-operation to accelerate the world-wide deployment of bioenergy.

### 2nd Project Workshop in Durban, 19-21 August 2002

Two weeks prior to the Johannesburg Summit a workshop on biomass, rural energy and the environment was organised as a joint event of the three Thematic Networks CARENSA, SPARKNET and LAMNET. 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.

### 3rd Project Workshop in Brasilia, 3-4 December 2002

This workshop is co-organised by the Brazilian National Reference Centre on Biomass – CENBIO and the scientific programme includes innovative bio-energy systems such as bagasse cogeneration, bio-fuel micro-turbines as well as a thematic priority session on ethanol based fuel cells. Additionally, a technical tour is scheduled visiting a sugar mill in the state of São Paulo producing sugar, alcohol and electricity for the grid.

During 2003 several further workshops are planned in China, Europe and Latin America. In November 2003 a LAMNET project workshop will take place in Cuba in the framework of the 2nd International Workshop 'Energy in the Sugar Cane Agroindustry' co-organised by the LAMNET member Cuban Ministry of Sugar (MINAZ).

### LAMNET Web Site

The web site of this global network on bioenergy was established early in 2002 and provides detailed information on the objectives, activities and scientific publications of this trans-national forum as well as the contact details of all network members. Additionally, links are provided to other organisations and companies engaged in the field of bioenergy.

For further information and latest updates, please visit our Website at **www.bioenergy-lamnet.org**.

### LAMNET Bioenergy Database

This project database is embedded in the project web site and will be continuously enlarged and up-dated within the scope of this project. The main goal of this project database is to provide information on the energy demand and the energy resources in Latin America and other selected Emerging Economies covering the current status as well as the future potential of bioenergy. Access to up-to-date data is a necessary pre-requisite for the evaluation of successful bioenergy implementation strategies.

### LAMNET Associate Membership

In order to broaden the scope of the network and to facilitate the involvement of other interested organisations in the network activities, a project Associate Membership has been introduced. Associate Members of the Latin America Thematic Network on Bioenergy will be regularly informed about events and activities of the LAMNET project and they are invited to make use of the dissemination platforms established in the framework of the LAMNET project.

The requests for a participation in project activities is large and currently the number of associate network members is about 30. Application forms can be downloaded from www.bioenergy-lamnet.org under 'Associate Membership'.

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