LAMNET-NEWS 3rd issue – June 2003

LATIN AMERICA THEMATIC NETWORK ON BIOENERGY

LAMNET

During its first year the LAMNET global network on bioenergy succeeded in setting-up a trans-national forum for the promotion of the sustainable use of biomass in Latin America, Europe, China and Africa.

LAMNET supports the elaboration of recommendations for the development and implementation of policy options for the promotion of biomass and bioenergy as well as the identification of commercially available and reliable biomass technologies worldwide.

This LAMNET-News is issued on the occasion of the 5th LAMNET workshop organised in the framework of the International Seminar on Bioenergy and Sustainable Rural Development on 26 - 28 June 2003 in Morelia, México.

For the first time this international seminar brings together in México more than 60 bioenergy specialists from the academic, governmental and industrial sector.

International Seminar on Bioenergy & Sustainable Rural Development

www.bioenergy-lamnet.org

This Thematic Network is funded by the European Commission, DG Research, in the framework of the programme 'Confirming the International Role of Community Research' (Project No. ICA4-CT-2001-10106).

Contents of this Issue:

LAMNET Networking Activities

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

In order to promote the sustainable use of biomass in Latin America and other emerging countries, the LAMNET global network on bioenergy has established close collaboration links with other organisations, institutions and multilateral initiatives engaged in the field of Renewable Energies and Sustainable Development. ***page 13***

INTERNATIONAL SEMINAR ON BIOENERGY AND SUSTAINABLE RURAL DEVELOPMENT

Casa de Gobierno
Paseo de la República 1500 Col. Oviedo Mota

Morelia, México

26-28 June 2003

This LAMNET Newsletter is issued on the occasion of the 5th LAMNET project workshop organised in the framework of the International Seminar on Bioenergy and Sustainable Rural Development on 26 - 28 June 2003 in Morelia, Michoacán, México.

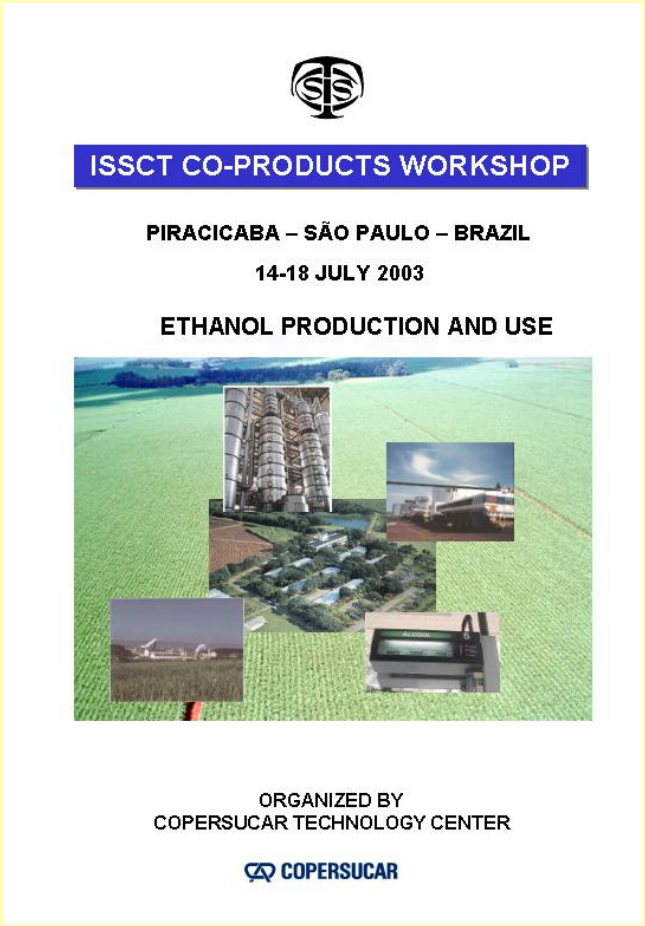
For the first time this international seminar co-organised by the Universidad Nacional Autónoma de México (UNAM) – Instituto de Ecología, the Asociación Nacional de Energía Solar (ANES), the Food and Agriculture Organization of the United Nations (FAO), the State Government of Michoacán and the LAMNET project brings together in México more than 60 bioenergy specialists from the academic, governmental and industrial sector.

Within this seminar an overview of the current conditions of biomass energy use in México and in the world will be presented, focusing on the availability of resources, bioenergy conversion technologies and the development of policies for the promotion and financing of bioenergy.
Additionally, this seminar will act as an interdisciplinary forum to establish contacts and co-operation projects in the various fields of biomass and bioenergy applications.

International Seminar on Bioenergy & Sustainable Rural

ISSCT CO-PRODUCTS WORKSHOP 14-18 July 2003

In July 2003, the LAMNET member Copersucar Technology Center is organising a workshop in Piracicaba, São Paulo, Brazil, on behalf of the International Society of Sugar Cane Technologists (ISSCT). The objective of this workshop is to bring together a group of technologists interested in the various aspects of ethanol production and use as well as environmental issues.
For more information on the workshop, please contact Dr. Manoel Regis L. V. Leal, Copersucar Technology Center, at regis@copersugar.com.br or visit the ISSCT web site http://issct.intnet.mu.



LAMNET-NEWS
Latin America Thematic Network on Bioenergy
3rd issue – June 2003

For a Sustainable International Fuel Ethanol Market

by Dr. Sergio C. Trindade
SE2T International Ltd., USA

Today, there is no international fuel ethanol market, although, over the past ten years there have been occasional transactions, limited to Brazilian imports from various sources, particularly from the USA. It would however be possible to establish a sustainable international market for fuel ethanol by 2005, but this would take considerable political will, skillful negotiations, systematic effort and focus to build a consensus among the key stakeholders.

Introduction

Ethanol can be obtained from biomass feedstock (bio-ethanol), originating from agriculture (sugarcane, corn, cassava, rice, etc.), forestry as well as rural and urban residues. Ethanol can also be obtained from fossil feedstock such as natural gas, petrochemical naphtha and coal. Ethanol markets include:

- fuel markets (neat fuel, blends with hydrocarbons or converted to ETBE)
- industrial markets (solvents and chemical feedstock)
- beverages markets (based on agricultural bio-ethanol)

Until 1975, the year of the launch of the Proalcool programme in Brazil, the ethanol market was predominantly beverages and industrial. From then onwards, the fuel ethanol market developed fast and today accounts for some 60 percent of the world consumption (Figure 1). The latter has fluctuated at the level of 30-35 million m^3/yr, with an economic value ranging from US$ 9 to 12 billion. The main world producers in 2001, in million m^3/yr were Brazil (11.4), the USA (7.3), China (3.1), European Union (2.2), India (1.8), Russian Federation (1.2), Saudi Arabia (0.39), South Africa Customs Union (0.39) and *Thailand (0.12) (Figure 2).*

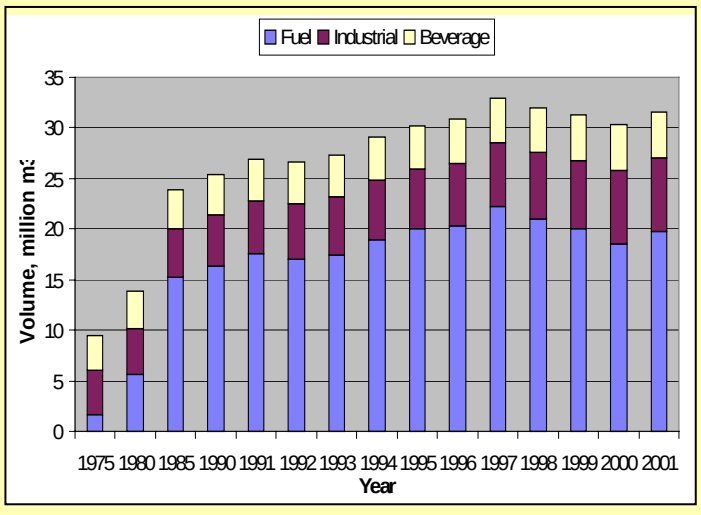


Figure 1: World ethanol markets

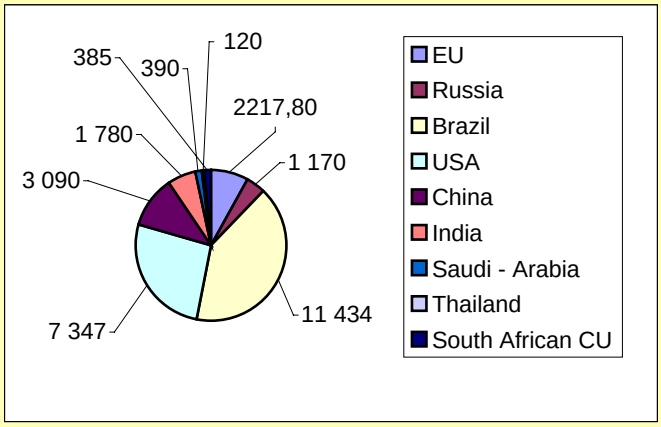


Figure 2: Major ethanol producers in 2001 (in thousand m^3)

International ethanol trade

During 1992-2001, the total international trade of ethanol in the fuel, industrial and beverage markets varied in the range of 2.4 to 4.2 million m^3/yr. Trade was dominated by fuel ethanol transactions, particularly the Brazilian imports. Trade has represented between 7-15 percent of world ethanol output of all types. In 2000, the largest exporting regions were Europe (29.1 percent), the Americas (28.8 percent) and Asia (21.4 percent), for a total trade of 3.36 million m^3. In 1996, for a total trade of 4.16 million m^3, the shares were as follows: the Americas (39.6 percent), Europe (25.7 percent) and Asia (13.9 percent). Back in 1992, the trade distribution replicated that of 2000, with Europe (30.8 percent) leading, followed by the Americas (25.4 percent) and Asia (25.2) for a total trade of 2.43 million m^3. Figure 3 displays the world exports by continents.

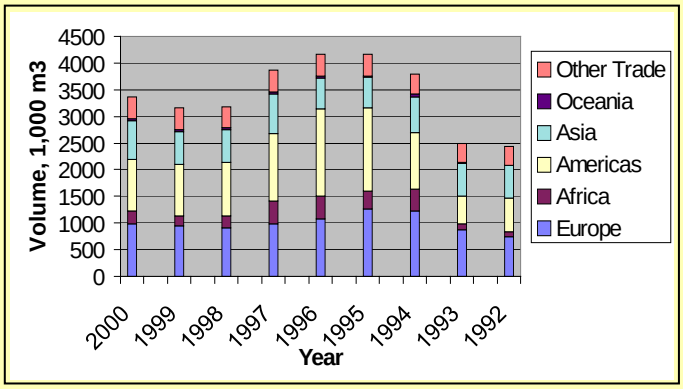


Figure 3: World ethanol exports

Considering specifically the international trade of fuel ethanol, the only importers during 1980-2001 were Brazil and the USA. But, the latter shut off the door to fuel ethanol imports in the middle of the '80s, except for the CBI (Caribbean Basin Initiative) regime. The fuel ethanol exporters during the same period of time were Brazil, the USA, Saudi Arabia, South Africa, the CBI (re-exporters mainly) and the EU (via the CBI).

Opportunities and strategies

In the long run, to promote a sustainable international ethanol fuel market, it will be crucial to emphasize the common interests of the key stakeholders. These are ethanol producers, consumers and other ethanol economy stakeholders, such as farmers, oil refiners, automakers, governments, banks and NGOs in the relevant countries, namely, Australia, Brazil, Canada, China, Colombia, France, Germany, México, Spain, Sweden, Thailand and the USA. It is necessary to find a consensus space, where all the conflicting interests of the stakeholders can be resolved and subsumed, thus promoting a gradual freeing up of the international ethanol fuels market. The prevailing subsidies in the national fuel bio-ethanol markets, in the USA, Europe and other countries, cause a great distortion in the market and prevent the free flow of fuel ethanol. As a matter of fact, presently, there is no international market for fuel ethanol. There have been, of course, over the past decade, occasional transactions, mainly between Brazil and the USA, in times of domestic supply shortages in Brazil. As the almost sole participants of the international ethanol fuel transactions, and the prominent world producers, Brazil and the USA bear special responsibility for initiatives to free the international market. All other countries, which import ethanol, use it in the industrial and beverage markets.

Possible evolution of the international fuel ethanol market

In the years to 2005, the USA ethanol fuel market may grow rapidly. This would be the result of the banning of MTBE as the provider of oxygen in reformulated gasoline (RFG), first in California and then in the East Coast and eventually all over the country. Although the MTBE phase out date in California has been moved to 31 December 2003, BP, Shell, Exxon/Mobil have joined Phillips/Tosco in substituting fuel ethanol for MTBE in RFG formulation, beginning with the winter gasoline season of 2002. These refiners represent about 60% of the gasoline market of California. This market penetration alone is of the order of 1.8 million m^3/yr of fuel ethanol. If the remaining main refiners, Chevron/Texaco, Valero and Tesoro convert to fuel ethanol, the market could reach 3 million m^3/yr. The US East Coast market is estimated at the same level of 3 million m^3/yr of fuel ethanol, if its MTBE replacement potential is fully realized, but would build up gradually from 2004.

Ongoing developments in the US Congress might have a significant impact on the size and geography of the USA fuel ethanol market. The US Energy bill, presently under negotiation by a House/Senate conference, would remove oxygen requirement from RFG formulation, but would mandate a Renewable Fuels Standard (RFS), which if enacted into law, may increase the USA fuel ethanol market to some 18 million m^3/yr. During the same timeframe a number of countries in Latin America, Asia, Europe and Oceania might expand their ethanol producing capabilities to respond to their emerging domestic ethanol fuel markets. Figure 4 shows a possible evolution of the world ethanol market.

The following five years (2006-2010) will be affected by deliberations within the European Union. In November 2001, the Commission of the European Communities presented a Communication and two Directives with respect to the promotion and fiscal incentives to bio-fuels in the EU.

The Communication refers to ‘alternative fuels for road transportation and to a set of measures to promote the use of biofuels’ (COM (2001) 547 final) and the proposals for Directives refer to ‘the promotion of the use of biofuels in transportation’ (2001/0265 (COD)) and to ‘amending Directive no. 92/81/CEE with regard to the possibility of applying a reduced rate of excise duty on certain mineral oils containing biofuels and on biofuels’ (2001/0266 (CNS)).

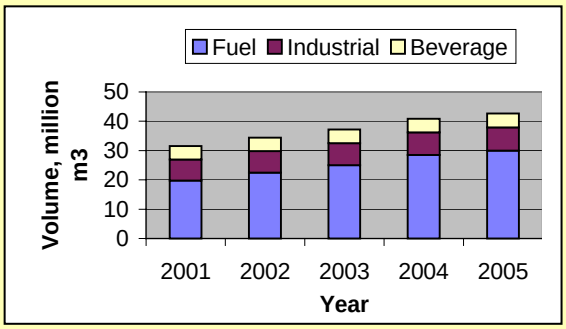


Figure 4: World ethanol markets, 2001 - 2005

The European Union's new measures to promote the use of 'green' transport fuels will soon become law, when formally signed in May 2003 by the President of the European Parliament. This new legislation, which was given the green light by the Council of Ministers on 8 April 2003, lays down targets for the progressive introduction of biofuels derived from agricultural, forestry and organic waste products between now and 2010. Member States now have until 31st December 2004 to transpose the Directive into national law.

The adoption of this Directive is a further a step in the European Union's quest for alternatives to petrol and diesel and will enable progress towards a more sustainable transport system for the future. For the first time, each Member State will have to set targets for the market share of biofuels. These targets will have to be based on challenging benchmarks set by the Directive: 2% market share by December 2005; 5.75% market share by December 2010. Any country setting lower targets will have to justify them using objective criteria.

This new EU biofuels directives will contribute to the emergence of domestic ethanol markets in various countries. It may lead to the production of surpluses or deficits, which would reinforce the incipient international ethanol fuel market, which in the immediately preceding years was confined to occasional imports by Brazil from the USA. Evidently, the protectionist regimes, which might have been established in the emerging fuel ethanol countries, would have to be relaxed, at least partially, for the international market to establish itself and grow.

From 2010 onwards, the future of the ethanol fuel market is influenced by the following long-term driving forces:

- CLIMATE CHANGE AND KYOTO PROTOCOL COMMITMENTS
- SUSTAINABILITY OF DOMESTIC FUEL ETHANOL MARKETS
- FREEING OF FUEL ETHANOL TRADE
- EU MARKET EVOLUTION
- CONTINUITY OF RENEWABLE FUEL MANDATES IN USA AND EU
- RENEWABLE FUEL ALTERNATIVES
- TECHNOLOGICAL PROGRESS AND MARKET EVOLUTION (e.g. FUEL CELLS, FFVs CELLULOSIC FEEDSTOCKS)

Motivation, obstacles and solutions for the international fuel ethanol market

A sustainable international fuel ethanol market is desirable, in the short term, for countries with existing large-scale bio-ethanol programs, such as Brazil and the USA. It would provide a means to balance domestic supply and demand and limit the risks resulting from failures of harvests that supply the feedstock for the production of ethanol. It would also control the temptation of short-term attractive prices in the ethanol co-product markets, as cane sugar in the Brazilian case and high-fructose syrup in the American case.

Nevertheless, there are obstacles, as well as opportunities, for the creation of a sustainable international fuel ethanol market. One key obstacle is the motivation of domestic fuel ethanol programs, whose objective is to support national agriculture and to find non-food markets for agricultural output, which originate the subsidies and other protective measures by national governments. Thus, a free fuel ethanol market can be construed as a threat to national ethanol production by foreign producers, either more efficient or more subsidized than the domestic producers.

Another difficulty is the difference in the scale of production and consumption of the two largest markets currently, Brazil and the USA, and the other national producing and consuming markets. This imbalance makes it difficult, for instance, to provide fuel ethanol to Brazil, when occasional supply shortages occur in that market. In the Brazilian case, future occasional deficits could be balanced by varying the ethanol content in gasoline blends, as has happened in the past. However, this tactic alone would not resolve neat ethanol shortages. The international market could certainly play a role balancing short-term deficits in certain national markets with surpluses in other domestic markets.

A possible solution, which would reconcile national agricultural interests in expanding national fuel ethanol markets, as seems to be the USA case, would be the establishment of contingent markets. For instance, the US West Coast, and perhaps the US East Coast, could have access to fuel ethanol imports, with dispensation, temporary or permanent, from the onerous tariff wall. Meanwhile, the US Midwest, the largest US producing area would remain closed and protected from imports. As previously mentioned, should the RFS pass the US Congress, the US Midwest market is likely to become an even larger fuel ethanol market in that country.

Another initiative, which would promote a sustainable international fuel ethanol market, would be to stimulate the emerging producing countries to create growing national markets that, from time to time, would produce surpluses or suffer deficits. The international market so created, with a larger number of players than just Brazil and the USA, would be much more sustainable than the present situation, where there are occasional transactions, but no market.

Future trends

Looking into the future, one would expect a growth in the demand for fuel ethanol during 2001-2010 in a few countries. The **USA** market will be stimulated by the banning of MTBE; the establishment of the RFS; policies to sustain non-food markets for farmers; to some extent lessen dependence on imported oil; and even climate change, if California law no. 1493 is replicated throughout the country. In **Brazil**, ethanol is a standard component of gasoline, and there is a sizable neat ethanol fleet. The market there is likely to grow as a result of the growth of the automotive gasoline fleet and perhaps the neat ethanol market revival, and even the prospect of flexible fuel fleets. The market in the **EU** may grow as a consequence of the Directives on bio-fuels, stimulated by concerns over the local and global environment; support to non-food markets for agriculture; the wine ethanol regime; climate change mitigation, and, to some extent, security of supply. **Thailand** has the rudiments of a national fuel ethanol program, to respond to the need to support agriculture, through non-food markets; to attenuate balance of payments issues; to improve local urban air quality and to lessen dependence on imported oil. **México**, a country that belongs to the NAFTA free trade area with Canada and the USA, and is a net oil exporter, may feel encouraged to develop fuel ethanol production to supply California needs; to support local non-food agriculture and to improve local urban air quality. **Colombia**, **Australia**, **India** and **China** may expand their incipient fuel ethanol markets motivated by agricultural and environmental concerns.

Obviously, the process of implementing a sustainable international fuel ethanol market implies the removal of the present tariff and non-tariff barriers to imports. In the immediate future (2002-2005), the only potential importers of fuel ethanol are Brazil and the USA. The potential exporters will possibly be Brazil, the USA and the other participants in the occasional transactions of the recent past, namely Saudi Arabia, South Africa, the CBI countries and the EU wine ethanol via the CBI.

Global Ethanol Coalitions

Brazil and the USA are the natural leaders of initiatives to implement a sustainable international fuel ethanol market. One way of exercising this natural leadership would be to get the private and public sectors of both countries organized to rapidly achieve this objective. It is possible to visualize such a process, guided by a stakeholder consensus-based strategy and supported by "Global Ethanol Coalitions (GEC)". These would gather both government and the private sector of Brazil, the USA, and the emerging ethanol producers (Canada, China, Colombia, EU, India, México, Russian Federation, Saudi Arabia, South Africa and Thailand). These GECs would facilitate platforms of dialogue, negotiation and partnership to explore common interests and mutual benefits. A key task of these platforms would be to stimulate large-scale fuel ethanol production in emerging markets, to satisfy growing domestic demand in a variety of countries, thus building up a common interest in sustainable international markets, which accommodate surpluses and deficits of domestic outputs.

Political initiatives in Brazil, the USA, the EU and the other countries would surely be needed to promote a sustainable international market for fuel ethanol. Perhaps, in the beginning, import markets could be limited to satisfy the immediate concerns of local agricultural interests, but gradually engaging them in the benefits accrued by an expanded market. Bilateral and multilateral negotiations will be required among all interested countries to free markets for fuel ethanol, in the context of the present World Trade Organisation (WTO) round, the Free Trade Area of the Americas (FTAA) process and the Kyoto Protocol.

Agro-Energy: A New Function of Agriculture

by Dr. Gustavo Best, Senior Energy Coordinator Environment and Natural Resources Services, Food and Agriculture Organisation of the United Nations

A renewed bioenergy strategy, containing Wood Energy and Agro Energy Programmes, is being developed in FAO to capture the new context for energy issues in sustainable agriculture and rural development. Globalisation, climate change considerations and, more importantly, the urgent need to bring development and energy services to the millions of rural poor in the world, are some of the issues guiding this new effort.

This newsletter article describes the approach and strategy adopted by FAO in its revitalized bioenergy activities, particularly for Agro-Energy, the biomass energy derived from agricultural practices, mainly energy crops purposely grown for energy as well as agricultural and livestock residue (co-products) management and utilization.

FAO is assessing its activities on bioenergy taking into account the new challenges arising from globalisation and privatisation, and the new opportunities offered by climate change negotiations and financial mechanisms. It has defined a new Bioenergy Strategy which is composed of two major programmes: A Wood Energy Programme and an Agro-Energy Programme. This brief note refers only to the latter, which is less understood and has its own complexities related to agronomy, land use, agricultural practices, farming systems, product marketing and, above all, farmers and farmers' organizations.

Access to adequate and affordable modern energy services is indispensable for satisfying basic human needs, improving social welfare and achieving economic development. Reasonable quality of life requires energy either in commercial or in non commercial forms, but sustainable from the points of view or supply, conversion and use. However, energy is also a source of undesirable problems in the form of residues and emissions and hence, energy systems should be adopted without endangering the quality of life of current and future generations and without exceeding the carrying capacity of ecosystems.

The energy consumption in many rural areas of developing countries barely covers the cooking, heating and lighting needs. Present energy consumption and production patterns in these areas rely on biomass, often used in an inefficient manner; the energy consumption in OECD countries is largely based on the use of fossil fuels. Biomass energy provides 14% of the world's energy (55EJ or 25 M barrels oil equivalent, offsetting 1.1 PgC of net CO2 emissions annually), both in traditional and modern forms, whilst it can represent over 90% of total energy use in many developing countries and as much of 20% in industrialised ones. The potential role of bioenergy has recently attracted new attention because of global concerns such as environmental pressures, privatisation of the energy sector and concerns with sustainability.

Bioenergy originates from various types of agricultural and forestry residues, however, increasingly, different kinds of energy crops and plantations are expected to contribute substantially. Within the bioenergy context, Agro-Energy refers to the energy obtained from energy crops (plants grown for obtaining energy) and from agricultural and livestock by-products, including food processing and slaughter by-products.

Considering biomass a potential major source of energy in the 21st century requires an understanding that this will have a significant impact on agricultural development.

Agro-Energy refers to the energy function of agriculture. It can make significant contributions to achieving social and environmental sustainability at local, national, regional and global levels. In fact, agricultural and livestock resources are abundant in most parts of the world, and various commercially available conversion technologies could transform current traditional and low-tech uses of these resources to modern energies. If Agro-Energy is produced efficiently and in a sustainable manner, benefits compared to fossil fuels can be achieved including food security, rural development, local self-reliance, sustainable agricultural management, biodiversity conservation and climate change mitigation, whilst offering improved energy supply and security.

Attention should be placed on the trade-offs of Agro-Energy systems. Main concerns include development priorities, environmental impacts, conflicts with other land uses, technological conversion efficiency, high raw material costs and the cost-effectiveness of Agro-Energy technologies. In economic terms, incentives might be necessary at least to put Agro-Energy on a more equal footing with fossil fuels, for which environmental and social costs are not internalised. Increasing attention is focussed on global climate change considerations. Agro-Energy could play a major role in helping meet the limits and mechanisms proposed by the Kyoto Protocol, especially if GEF funding, or an appropriate value for carbon emissions reductions can be obtained through the Clean Development Mechanism, which could be used to support the investment costs.

FAO is striving to develop Agro-Energy for food security, rural development and climate change mitigation through the following 5 objectives:

- Stimulate the integration of Agro-Energy issues into the agricultural sector.
- Promote the potential of Agro-Energy in the energy market.
- Promote sustainable management of energy resources, of energy conversion systems and of end-uses.
- Enhance food security and rural development through the implementation of Agro-Energy systems.
- Contribute to climate change mitigation through the implementation of Agro-Energy systems.

FAO is interested in establishing collaboration with a number of partners at the national and international levels to get bioenergy in general, and Agro-Energy in particular, off the ground for the benefit of Mankind.

Biomass and Renewable Sources of Energy at the Basis for a Sustainable Development in México

by Dr. Eduardo A. Rincón Mejía, President of the Méxican Association of Solar Energy (ANES)
School of Engineering, UEAMéx

In order to adequately exploit the abundant potential of renewable energies in México, there is a strong need for the development of new technologies, which are less expensive, locally available and suit the end users' requirements. These efficient and economically sound technologies offer the opportunity to boost the technical and industrial development in México and they will contribute to the alleviation of the country's serious environmental and social problems.

México has a territory of almost 2 million km^2 with an average solar irradiation of about 5,8 kWh/m^2 per day, and more than 10 000 km of seashore including regions with an extremely high wind potential. Although its renewable energy resources are plentiful, the country does not take advantage of them. Instead, México's energy system is based on fossil fuels, representing more than 90% of the primary energy consumption.

It is commonly agreed upon that México's energy requirements can be covered by renewable energies in future centuries, but uncertainties exist how this can happen in short term and in an economically feasible manner. In this newsletter article it is argued that México has to transit from the present unsustainable oil-based energy system to a system based on renewable energies in a period of about 20 years. In order to achieve this change, there is a strong need to promote research and development activities at universities, technology institutes and research centers, which must be accompanied by awareness-building and communication activities towards all actors involved including politicians, entrepreneurs and media as well as the final users of clean technologies.

The advantages of such a change comprise the generation of hundreds of thousands of permanent jobs, a large reduction in pollutant emissions, the reduction of deforestation and desertification, important savings on fossil resources and the advancement of science and technology in the country. Thereby, an energy system based on renewable energies will contribute to the alleviation of economical, social and health problems such as the emigration of poor inhabitants from rural regions to other countries.

Today, the energy problem in México (and in other poor countries) can be summarised as follows:

- The present electric and thermal energy production is not sufficient for México's 100 million inhabitants. The currently installed 42 000 MW of electric generation capacity in México are significantly below the level of 75 000 MW, which would enable the country to reach European standards, following the commonly accepted fact that the per capita energy consumption is an indicator of a country's welfare and development.
- Almost 90% of primary energy is generated by fossil fuels.
- Energy, as well as revenues and incomes, are shared very unequally among the Méxican population.
- The present way of production and distribution of energy and its consumption patterns are mainly unsustainable. Therefore, the use of renewable energies is indispensable for a sustainable future, as it is not possible to significantly increase the number of thermo-electric or large hydro-electric plants.

Renewable energies are ideal for decentralised application. They are almost free of pollutants, they do not contribute to the greenhouse effect and they are in line with policies of environmental protection. But, most of the technologies available nowadays are still too expensive for inhabitants in developing countries. However, there are many cheap, reliable and efficient systems that can be immediately implemented in order to increase the welfare of everybody. These systems include water and air heating systems, solar hot plates and ovens for cooking, wind generators and photovoltaic applications, which are economically competitive and easy to manufacture and operate.

Recently, several wind projects with more than 300 MW of nominal capacity have been implemented, which is a rather small figure compared to the large wind energy potential in México of about 30 000 MW. Additionally, the biomass potential for electricity production is estimated to exceed 40 000 MW, with a currently installed capacity of less than 400 MW. As 'biological biomass solar collectors' can cover hundreds of square kilometers at moderate costs, it is apparent that in the near sustainable future, cogeneration plants based on biomass are the most economical and technical feasible source of clean energy for Latin American as well as for developed countries.

Renewable resources are most plentiful in México, but they are not used adequately today. Therefore, there is a strong need for the development of new technologies, which are less expensive, locally available and suit the end users' requirements.

Conclusions

- Renewable energies are a plentiful resource, which is available almost everywhere in developing countries. They have the potential to cover the future energy needs of these countries, but presently these resources are wasted.
- The use of currently available renewable energy technologies can supply an important part of the electric and thermal energy demand without adverse environmental impacts. Thereby, biomass is of particular importance, even though nowadays it is applied in an unsustainable way.
- The development of cheaper and more efficient technologies, which are optimized to the local availability and price of resources, will lead to great opportunities for technical and industrial development. In addition, an energy supply based on renewable energies will generate thousands of jobs and contribute to the alleviation of serious environmental and social problems in countries such as México.
- Only renewable energies can provide the basis for sustainable development. But, in order to provide sufficient clean energy for all mankind at low costs, increased activities in the field of research, development and dissemination are required.

LAMNET-NEWS
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3rd issue – June 2003

Promoting clean multiple-fuel cooking for improving rural livelihoods in Mexico

by Dr. Omar Masera, Director Bioenergy Laboratory, Centro de Investigaciones en Ecosistemas (CIECO), UNAM

An innovative, field-tested, participatory and replicable multiple-fuel cooking model is being developed by CIECO-GIRA in collaboration with the Energy and Resources Group of the University of California. It focuses on the improvement of rural livelihoods in México and it will facilitate the transition of poor households and micro enterprises from the Central Méxican Highlands to a cleaner and more sustainable pattern of energy use.

Introduction

Currently, about 25 million people cook with fuelwood in rural México. Most of them are located in the highlands of Central and Southern México – such as the Purepecha Region in Michoacán State. This region shows an intensive pattern of fuelwood use, which dominates the energy use pattern both in households as well as in thousands of micro-enterprises devoted to hand-made tortilla making (Figure 1). Large quantities of fuelwood are used in traditional open fires, with negative consequences for local inhabitants. Particular concerns come from the practice of tortilla making, which accounts for about half of total fuelwood consumption, and requires women to spend 2-4 hrs/day inhaling the smoke from the fires, and up to 8 hrs/day for those women devoted to tortilla-making for selling. Local forests are highly bio-diverse but increasingly degraded with negative local and global environmental impacts. During the past two decades, there has been an increasing penetration of LPG, particularly on the larger urban centers and the higher income levels. However, rather than switching completely to LPG, economic and cultural reasons favor a long-standing pattern of multiple fuel use, with very few savings in fuelwood and health benefits.

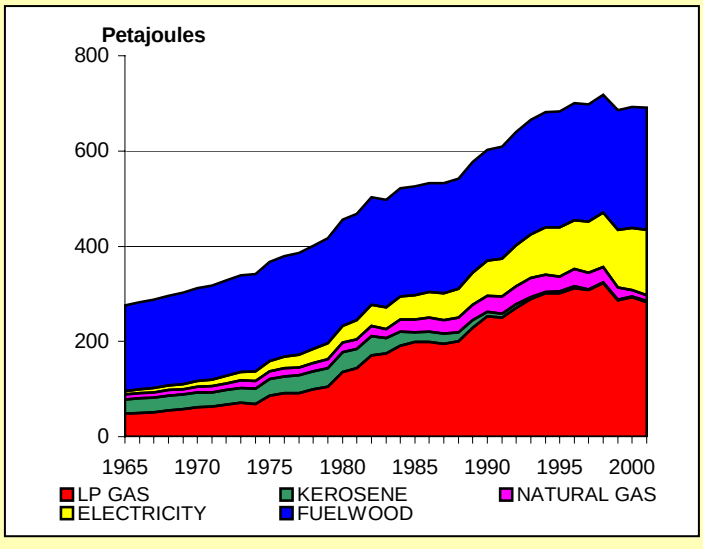

Figure 1: Fuelwood Use in the Residential Sector- México 1965-2001 (PJ/yr)

GIRA, a local non-governmental organization, the Centro de Investigaciones en Ecosistemas (CIECO-UNAM) and the Energy and Resources Group of the University of California, Berkekely (ERG) started 10 years ago a long-term partnership to promote a cleaner and more sustainable pattern of energy use in rural households, based in the concept of **multiple fuel cooking.** As a result of the partnership, detailed studies on the patterns of household energy use, and their social, cultural, economic, and environmental implications have been undertaken. Primary data on indoor air pollution (IAP) exposure levels and associated health problems derived from the use of traditional devices and the mitigation associated to cleaner devices have been collected. A process of technology adaptation-innovation has led to the development of smoke-free Lorena-type cookstoves that iare well adapted to the conditions of local cooking (Figures 2 and 3). Undertaking a user-centered approach, with strong emphasis on women's training on IAP issues, an integrated multiple-fuel model has been promoted initially, which allows capturing the benefits derived from both modern fuels as well those from cleaner and efficient biomass devices. The resulting pattern of household energy use is highly resilient with tangible environmental, economic and health benefits.

Figure 2: Traditional Cookstove

Figure 3: Improved Cookstove

Objective

To tackle the above-mentioned problems CIECO-GIRA and ERG have launched a 3 year project funded by the Shell Foundation Household Energy and Health Program.

The project will set up an innovative, field-tested, participatory, and replicable multiple-fuel cooking model focussing on rural women to facilitate the transition of poor households and micro enterprises from the Central Méxican Highlands to a cleaner and more sustainable pattern of energy use. Specifically, the project will work simultaneously with end-users, small-entrepreneurs, tortilla-making micro-enterprises, local NGO's, research institutions, and local authorities to:

a) facilitate the dissemination and adoption of clean and efficient biomass cookstoves, through self-replicating mechanisms;

b) strengthen local tortilla-making micro-enterprises, with direct implications for local poor women;

c) promote the adoption of LPG, which complements rather than substitutes biomass fuels;

d) reduce the environmental impacts of present fuelwood consumption and harvesting; and

e) educate local women on the associated health problems of indoor air pollution.

Mechanism

The project team has developed an integrated biomass cookstove dissemination strategy that includes a participatory tailor-made training package on IAP and stove O&M issues, reliable, field-tested and smokeless biomass cookstoves adapted to local conditions, a financial incentive program, management support for cookstoves builders and micro-enterprises, and an intensive promotional campaign with relevant stake holders. A financial incentive based on a partial and decreasing subsidy on stoves front-costs will be used to establish a market of efficient cookstoves of critical size that will allow local entrepreneurial stove builders to continue the dissemination process in the long-run.

Deliverables

The project will deliver a fully integrated model for improving the living conditions and sustainability of energy use in rural households and micro-enterprises. It will allow disseminating 1 500 clean and efficient cookstoves for household use and 70 cookstoves for tortilla-selling micro-enterprises. It will help establish at least 25 small entrepreneurs devoted to stove construction and will train local women in IAP problems and basic mitigation measures. Finally, the project will provide new primary data on GHG emission factors and IAP in the conditions of Latin-American households. The project will also document and promote the process in forms accessible to other project promoters, local and international institutions and governments. It will deliver a mechanism by which the model can be replicated throughout México, and possibly to other countries of Latin America.

Ethanol Gelfuel as Efficient Alternative Energy Source

by Sandy Wynne-Jones D&S Gelfuel Ltd., Malawi

The large-scale replacement of firewood and charcoal by Ethanol Gelfuel in Malawi offers the opportunity to alleviate major health, social and environmental problems currently afflicting the country such as the deforestation of vast areas of the country and respiratory diseases due to indoor charcoal use. Ethanol Gelfuel provides a safe, spill-proof, non-toxic, smoke free and efficient alternative energy source for the urban poor who are the main consumers of charcoal in the country.

History

D&S Gelfuel Ltd was incorporated in Malawi in 2002 to provide a realistic, affordable energy alternative to firewood and charcoal for cooking. The Gelfuel that the company produces is an ethanol based product with the ethanol and indeed 90% of the ingredients being sourced in Malawi itself. The product is a thick green jelly which is utilized by being poured into a purpose made burner, not unlike the traditional "fondu stoves", and lit (Figure 1). It provides an extremely safe, spill-proof, non-toxic, smoke free and efficient alternative energy source for the urban poor in Malawi who are the main consumers of charcoal in the country. It is estimated that up to 50 000 ha of forest is annually lost in Malawi due to the incessant demands for firewood and charcoal. Currently 98% of Malawi's energy is derived from firewood and with a rapidly increasing urban population this percentage of use is totally unsustainable. With Gelfuel it seems that at least some of the major issues can be addressed such as the endemic problem of respiratory diseases due to indoor charcoal use in the urban centres and the deforestation of the country with its attendant social and economic problems (decreased soil fertility, increased flooding, interference of power supply, and increased CO2 emissions). D&S Gelfuel Ltd has being working very closely with the Government of Malawi to waive all duties and taxes on Gelfuel in order to make it affordable to the poor, with encouraging results. Today, Gelfuel is available in major stores in the urban centres of Malawi and has been widely accepted by the urban and peri-urban population.

The Future

With the current power rationing causing a massive demand for charcoal, Gelfuel is the only realistic large scale alternative for cooking in Malawi and D&S Gelfuel Ltd is rapidly gearing up its operational output in order to meet the market demand which has been created by the shortage of electricity. With the help of grants from the Government of the Netherlands, DANIDA and sponsorship from Toyota Malawi the company is currently capable of producing 15 000 litre of Gelfuel per week with immediate plans being implemented to double capacity by the end of April 2003. The mechanisms for the outreach of Gelfuel into the peri-urban and rural areas have been investigated and a decision was made very early on to attempt to utilize the existing sales structures already in use by the current charcoal sellers by simply converting the charcoal sellers to Gelfuel retail. This approach would have the added advantage of providing an alternative and guaranteed source of income for the charcoal sellers which in turn would encourage them to convert rapidly without depriving them of their much needed income. Gelfuel is available in any quantity wholesale from the factory to allow small scale businesses to access this eco-friendly technology and D&S Gelfuel is committed to helping the start-up of Malawian small scale businesses in order to minimize overhead costs, improve micro-economies in urban areas and minimize the end cost of Gelfuel.

Figure 1: Burner for Ethanol Gelfuel

The long term plans of the company are to provide enough Gelfuel to the market to replace 30% of the charcoal industry over a 5 year period. This would entail the building of a purpose made factory close to the source of the ethanol to keep production and transport costs to a minimum. D&S Gelfuel Ltd is also determined to continue to work closely with the Government of Malawi in various social and economic programs to improve the availability of modern clean renewable energy technologies to the urban and rural poor in the country at an affordable price. This would include partnerships with various NGO's and donor agencies with experience in the manufacture and outreach of new technologies into primary care institutions, schools, local markets, prisons as well as aggressive marketing in charcoal production areas in Malawi.

D&S Gelfuel Ltd would like to thank the Government of Malawi for its continued support as well as to Toyota (Malawi), DANIDA, and the Government of the Netherlands for their support over the start-up of the Gelfuel program. Any correspondence can be addressed via e-mail to Gelfuel@africa-online.net or to D&S Gelfuel Ltd, P.O Box 40530, Kanengo, Lilongwe 4, Malawi.

Biomass Energy and Technology Development in China

by Prof. Wang Mengjie China Association of Rural Energy Industry (CAREI)

Biomass energy has an essential strategic and practical significance for China, as the exploitation of biomass resources involves rural development, energy development, environmental protection, resource conservation, state security and ecological conservation. During the last more than 10 years the Chinese Government has regarded research and demonstration activities in the field of biomass and bioenergy as priority topics for sustainable development.

It is well known that China is a large agricultural country with 70% of the population living in rural areas. Biomass is one of the major energy resources in rural areas, thereby significantly influencing the national energy structure. China is rich in biomass resources such as straw (720 million t/yr), firewood (127 million t/yr), livestock wastes (130 million t/yr) and urban wastes (120 million t/yr). The total amount of biomass resources in China is about 700 million t/yr. However, the resources are not properly utilised. It is estimated that the utilisation ratio is only 30% and the utilisation methods are very primitive. At present, biomass is mainly used through direct burning with an efficiency of less than 10%. The Chinese Government has always focussed much attention to the development of biomass energy. The Ministry of Science and Technology has chosen research on and application of biomass resources as key research projects for three consecutive Five-Year-Plan periods (1990-2004).

Today, there are about 7 million household biogas digesters and more than 30,000 large- and medium-scale biogas digesters in China with total volume of more than 1.37 million m^3. There are also 630 large biogas plants with a volume of more than 100m^3, mainly used for treating livestock wastes and organic waste water. Besides, more than 300 gasification stations, over 100 systems for rice husk gasification and electricity generation as well as 20 MW-level biomass gasification and electricity generation systems were constructed. The application of these technologies has brought considerable social, environmental and economic benefit.

In future, further efforts will be made in China to provide rural people clean energy resources and to improve rural living environment and rural people's living standard. In order to improve the value of biomass energy, technologies on conversion from biomass to high-quality energy resources will be developed. Mountainous areas, wasteland, and desert will be used to develop new resources of biomass and establish energy farms and forests. At the same time, industrial utilisation of biomass will be enhanced, thus increasing the proportion of biomass energy in the total energy consumption.

During the 10th Five-Year-Plan period (2000-2004), the Ministry of Science and Technology will continue to regard the development of biomass utilisation technologies as key and preferable research target. The focus of the 10th Five-Year-Plan Program will be on technological demonstration of applicable technologies, such as:

- Optimised 4MW biomass gasification and electricity generation systems
- Ethanol production from cellulose waste including the demonstration of a production of 600 tons/year
- Ethanol production from sweat sorghum juice including the demonstration of an annual production of 5,000 tons of ethanol (Figure 1)
- Biomass fast pyrolysis including the demonstration of an annual production of 400 tons of pyrolysis oil.

Additionally, research projects have been granted on biogas utilisation, waste water treatment, pyrolysis oil and energy crops.

In order to reach the ambitious target to significantly increase the implementation of biomass technologies the Chinese Government seeks support from international organizations, foreign governments and scientists. Utilising various forms of cooperation and exchange to promote technological progress will therefore contribute to an accelerated development of biomass energy in China.

Figure 1: Sweet Sorghum plantation in China

LAMNET - Promotion of Bioenergy Technologies

by Dr. Giuliano Grassi, European Biomass Industry Association (EUBIA) and Francesco Cariello, ETA – Florence, Italy

It is a main objective of the LAMNET project to identify currently available, efficient, cost-competitive and reliable bioenergy technologies which provide opportunities for the conversion of biomass to energy services in Latin America, Europe, Africa and China. Additionally, opportunities for international co-operation, technology transfer and joint-ventures in the field of bioenergy technologies are identified and promoted by the LAMNET network. Currently, information documents are available on biomass pellets and briquettes, micro-distilleries for ethanol production and modern bioenergy village complexes.

Relevant technologies and systems are selected on the basis of maturity of the technology, cost-effectiveness, simplicity of maintenance, social acceptability and the impact on development. Moreover, opportunities for international co-operation, technology transfer and joint-ventures in the field of bioenergy technologies are identified and promoted by the LAMNET network. Within the framework of the LAMNET project the establishment of initial business contacts is supported through advice and recommendations by expert network members.

The LAMNET project is particularly focused on the promotion of small-scale, decentralised bioenergy technologies as their penetration is expected to be much easier in terms of the supply of biomass resources and the investment level. Information documents describing bioenergy projects and technologies, which include a detailed technological and economical analysis, are elaborated in the framework of the LAMNET project. Currently, information documents are available on biomass pellets and briquettes, micro-distilleries for ethanol production and modern bioenergy village complexes. A new document on cooking fuels and syngas generation will be published on the occasion of the 5th LAMNET workshop in Morelia, México, in June 2003.

The thematic leaflets can be downloaded at www.etaflorence.it under “Publications/Online Brochures” and at www.bioenergy-lamnet.org.

For more information on the LAMNET thematic leaflets contact Eng. Francesco Cariello (francesco.cariello@etaflorence.it), Dr. Rainer Janssen (rainer.janssen@wip-munich.de) or Dr. Giuliano Grassi (eubia@eubia.org).

Use of Biomass for District Heating/Cooling in Greece

by Dr. Petros Axaopoulos, Agricultural University of Athens, Greece

A technical and economic feasibility study was performed on a biomass based district heating/cooling system for a university hospital in the city of Larissa, Central Greece. It was shown that a subsidy of about 15 EURO/t for the provision of straw is required in order to achieve economic viability of this bioenergy system.

Biomass potential

The Agricultural University of Athens has analysed the potential of biomass resources for energy production in the city of Larissa located in Central Greece, a region characterized by intensive agriculture. In order to investigate the potential of biomass for energy purposes, the existing types of biomass and the quantity of available material in the region have been identified. Larissa lies within an area of extensive arable farmland with easy access to agricultural biomass (straw, stalks, etc.) as well as to agricultural residues (field crops residues, orchard pruning) and urban wastes. Taking into consideration the factors affecting biomass availability for energy production such as competitive uses, collection and handling, the available technical potential for energy uses has been estimated (Figure 1).

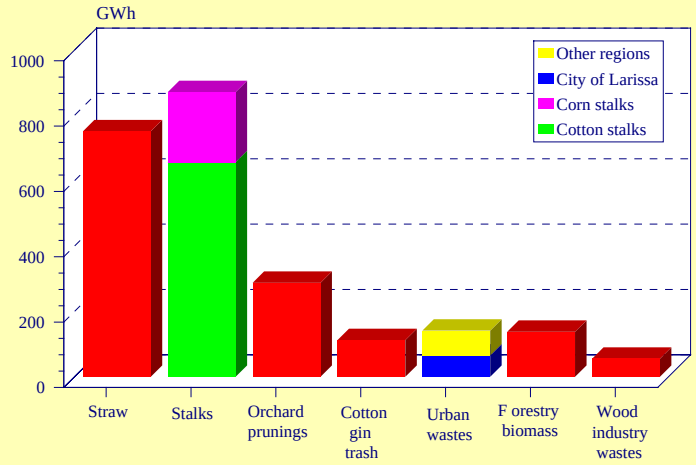

Figure 1. Annual technical potential for energy purposes in the prefecture of Larissa, Central Greece

Technical concept

The investigated district heating/cooling system was based on straw as biomass resource and an energy production plant consisting of a straw-fired boiler and an absorption machine. District heating and cooling systems are best used when heating and cooling loads as well as the annual load factor are high. Thereby, a high annual load factor is important because the total system is capital intensive. In order to meet these requirements the study has been performed for a district heating/cooling system at the new and large university regional hospital of the city of Larissa.

Economic analysis

The economic analysis for air conditioning, heating and electricity production at the university hospital in Larissa is based on the discounted cash flow and the present economic and financial boundary conditions. The price for heat was estimated to 30 EURO/MWh (i.e. the alternative energy cost of generating heat utilising oil fired boilers), and a site specific analysis of the price of straw has been performed. For the realistic case of a 13.5 % heat load factor for the CHP plant and a grant of 40% on investment, the economic analysis lead to the result that a subsidy of about 15 EURO/t of straw is required in order to achieve economic viability of the district heating/cooling system.

The author acknowledges the contributions to this work by L. Kalivroussis and Prof. S. Kyritsis. For details on this study on biomass based district heating/cooling in Greece, please contact Dr. P. Axaopoulos (pax@teiath.gr).

LAMNET Networking

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

In order to promote the sustainable use of biomass in Latin America and other emerging countries, the LAMNET global network on bioenergy has established close collaboration links with other organisations, institutions and multilateral initiatives engaged in the field of Renewable Energies and Sustainable Development.

Within the framework of the LAMNET global network on bioenergy, the analysis of the current energy policy framework and support for the elaboration of policy options for the promotion of the sustainable use of biomass in Latin America and other emerging countries follows three main lines:

- *Involvement in major international events and initiatives focussing on Renewable Energies and Sustainable Development*
- *Monitoring of the national/regional policy frameworks and the elaboration of advice and recommendations for the development and implementation of policy options for the promotion of bioenergy in close cooperation with the national network members*
- *Active networking with other organisations, institutions and multilateral initiatives engaged in the field of Renewable Energies and Sustainable Development*

Among others, close collaboration links have been established between LAMNET and the following organisations, initiatives and networks:

World Bank Regional Programme for the Traditional Energy Sector (RPTES) – African Support Group

RPTES is an energy programme of the World Bank for the African Region. It performs studies and carries out projects in Sub-Saharan Africa. It aims to achieve sustainable development through reviewing policies, strategies and programmes in the energy sector, as well as through the implementation of concrete projects and initiatives. It focuses on traditional, rural and decentralised energy supply.

Further information is provided at *www.worldbank.org/energy*

European Energy Initiative for Poverty Eradication and Sustainable Development

The European Energy Initiative for Poverty Eradication and Sustainable Development strives to create focus on better access to sustainable energy services for the world's "energy poor". It was launched at the Johannesburg World Summit for Sustainable Development to help achieve the Millennium Development Goals. It seeks to create a focus on better access to sustainable energy services for the more than two billion "energy poor" of our planet. Actions will be driven by the needs and priorities of the participating Developing Countries.

Contact: *dev-eu-energy-initiative@cec.eu.int*

Global Village Energy Partnership (GVEP)

The Global Village Energy Partnership brings together developing and industrialized country governments, public and private organizations, multilateral institutions, consumers and others in an effort to ensure access to modern energy services by the poor. This Partnership of partnerships aims to help reduce poverty and enhance economic and social development for millions around the world.

Further information is provided at *www.gvep.org*

Global Network on Energy for Sustainable Development – (GNESD)

GNESD is a global network of developing world centres of excellence and network partners, renowned in energy, development, and environment issues. The objective of GNESD is to make it easier for these centres and partners to contribute to the provision of environmentally sound energy services supporting sustainable development. GNESD was launched by UNEP at the Johannesburg World Summit on Sustainable Development.

Further information is provided at *www.e4sd.net*

Global Forum on Sustainable Energy (GFSE)

GFSE orchestrates dialogue to facilitate decision-making on policy issues, foster public-private partnerships, and promote concrete cooperation endeavours.

The GFSE grew out of the outreach efforts of the World Energy Assessment and was launched by the Austrian Foreign Minister in September 1999. Public relations is an important activity field of the GFSE. This includes lobbying on behalf of energy for sustainable development in diverse public, private and civil society institutions, aiming at initiating concrete cooperation undertakings.

Further information is provided at *www.gfse.at*

International Energy Agency (IEA) Bioenergy

IEA Bioenergy is an organisation set up in 1978 by the International Energy Agency (IEA) with the aim of improving cooperation and information exchange between countries that have national bioenergy programmes.
IEA Bioenergy provides an umbrella organisation and structure for a collective effort where national experts from research, government and industry work together with experts from other member countries. The collaboration offers many benefits at both the policy and technical level including the ability to strengthen national R&D capabilities, network researchers, disseminate information on technology capabilities, accelerate the deployment of new technologies, investigate barriers to implementation and contribute to energy policy development.

Further information is provided at *www.ieabioenergy.com*

3rd LAMNET Project Workshop 2-4 December 2002, Brasilia

The 3rd LAMNET project workshop on Bioenergy Policies and Innovative Biomass Technologies was organised by WIP-Munich, Germany, in collaboration with ETA-Florence, Italy, and the Brazilian National Reference Centre on Biomass (CENBIO). The workshop took place in December 2002 at the venue of the National Confederation of Industry (CNI) in Brasilia.

Scientific contributions by members of the LAMNET project and invited speakers focussed on national and international programmes and strategies for the promotion of bioenergy. (Figure 1) Presentations were given on bioenergy implementation opportunities in several Latin American countries (Brazil, Costa Rica, Cuba) as well as bioenergy technologies such as ethanol and bio-oil production, biomass densification, biomass fermentation and biofuel driven micro-turbines.

Additionally, this workshop included a Thematic Priority Session on ethanol based fuel cells and a technical tour to the Copersucar Technology Center (CTC) one of the world's most advanced research and development centres in the sugar and ethanol sector.

Figure 1: 3rd LAMNET Workshop in Brasilia

The proceedings of the 3rd LAMNET Project Workshop including a workshop summary and a selection of publications are available at the LAMNET project web site *www.bioenergy-lamnet.org*.

LAMNET at the World Bank Energy Week 2003

The LAMNET Steering Committee members Dr. Peter Helm and Dr. Giuliano Grassi and the project coordinator Dr. Rainer Janssen were invited to give presentations on 'Green Power for Development' and 'Bioenergy and Climate Change – The LAMNET Experience' at the Biomass Energy Workshop organised by the World Bank in the framework of the Energy Week 2003, February 24 to 27, in Washington.

As in previous years, the World Bank Energy Week provided a forum for energy staff to network with each other and with a broad spectrum of professionals from outside the institution. Central to the discussions were the issues raised by the:

- decreasing role of foreign private investment in developing countries, with particular focus on improving the enabling environment and governance issues; and
- challenges in the energy sector in light of the World Summit on Sustainable Development Agenda increasing access to modern forms of energy for the poor, improving the targeting of subsidies and increasing the role of renewable energy.

The Biomass Energy Workshop aimed at strengthening the role of bioenergy within the activities of the World Bank and to provide the World Bank staff with the opportunity to discuss crucial bioenergy topics with renowned experts in this field. During the Energy Week 2003 the LAMNET project representatives established contacts with World Bank staff and widely disseminated the concepts and objectives of the LAMNET global network on bioenergy.

For more information on the 2003 World Bank Biomass Energy Workshop & Exhibition contact Boris E. Utria, RPTES Program/AFTEG, The World Bank (burtia@worldbank.org).

Implications of the Johannesburg Summit on Renewable Energies

by Vera Sandic,
WIP-Renewable Energies, Germany

Considered as an exceptional opportunity for the world to move towards a sustainable future, the Johannesburg Summit 2002 aimed at turning plans into action. For the first time countries adopted commitments towards increasing the use of renewable energy "with a sense of urgency", however binding targets and timetables were not agreed upon.

During the Johannesburg Summit, energy was recognized as a key component of a sustainable future, a fact not clearly perceived at the Earth Summit in Rio de Janeiro in 1992. Results of the World Summit 2002 include a negotiated Implementation Plan and concrete partnership initiatives.

For the first time countries adopted commitments towards increasing the use of renewable energy "with a sense of urgency", however binding targets and timetables were not agreed upon. With respect to energy access, the **Plan of Implementation** contains the following key commitments:

- challenges take joint efforts to improve access to reliable and affordable energy services;
- promote sustainable use of biomass; and
- support transition to cleaner use of fossil fuels.

Additionally, the Summit has also generated concrete **partnership initiatives**, all voluntary, by and between governments, citizen groups and businesses:

- The nine major electricity companies of the E7 signed a range of agreements with the UN to facilitate technical cooperation for sustainable energy projects in developing countries;
- The South African energy utility Eskom announced a partnership to extend modern energy services to neighboring countries;

The full version of this article is available at the LAMNET project website *www.bioenergy-lamnet.org.*

LAMNET Activities

4th Project Workshop in Guangzhou, P.R. China, 22-25 April 2003

The 4th LAMNET Project Workshop was scheduled to take place in the framework of the International Bioenergy Forum focussed on cooperative efforts in the field of bioenergy between China, the EU and other supporting countries. This Forum was organised jointly by the Ministry of Environment of Guangzhou, the Guangdong University of Technology, the European Biomass Industry Association (EUBIA), ETA-Florence and WIP-Munich.
Due to recommendations issued by the World Health Organisation (WHO) this project workshop had to be postponed.

5th Project Workshop in Morelia, México, 26-28 June 2003

The 5th LAMNET project workshop is organised in the framework of the International Seminar on Bioenergy and Sustainable Rural Development on 26-28 June 2003 in Morelia, Michoacán, México. For the first time this international seminar co-organised by the Universidad Nacional Autónoma de México (UNAM) – Instituto de Ecología, the Asociación Nacional de Energía Solar (ANES), the Food and Agriculture Organization of the United Nations (FAO), the State Government of Michoacán and the LAMNET project brings together in México more than 60 bioenergy specialists from the academic, governmental and industrial sector.

6th Project Workshop in Dalian, P.R. China, 24-26 September 2003

This workshop on Biomass Utilisation Technologies and Policies is scheduled to take place in September 2003 in Dalian, a city of 5.5 million inhabitants in North Eastern China. The event will be organised by the LAMNET members Ministry of Science and Technology and Ministry of Agriculture of the People's Republic of China and the Chinese Association of Rural Energy Industry (CAREI) in collaboration with the LAMNET project.

7th Project Workshop in Havana, Cuba, 12-14 November 2003

The 7th LAMNET project workshop is organised in the framework of the 2nd International Seminar on 'Energy in the Sugar Cane Industry' taking place at the National Hotel of Cuba in November 2003. The seminar is co-organised by the LAMNET member Cuban Ministry of Sugar (MINAZ) and a variety of other high-level organisations engaged in the field of sugarcane industry and policies. This international seminar invites specialists, innovators and executives to discuss technological, financial and political aspects of sugar cane biomass as renewable energy source.

LAMNET Web Site

The web site of this global network on bioenergy was established early in 2002 under **www.bioenergy-lamnet.org.** It 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. The documentation on workshops and seminars organised in the framework of the project includes the workshop proceedings, a workshop summary and a selection of photographs. Additionally, links are provided to other organisations and companies engaged in the field of bioenergy and an on-line registration for Associate LAMNET members is integrated in the project web site.

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 are 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 35. Application forms can be downloaded from www.bioenergy-lamnet.org under 'Associate Membership'.

This Newsletter is intended to provide information on the LAMNET activities.
Please visit our Website for the latest news on the LAMNET project:

http://www.bioenergy-lamnet.org
http://www.wip-munich.de

This publication has been produced with support of the European Commission, DG Research. LAMNET-NEWS is the newsletter of the Latin America Thematic Network on Bioenergy and is published by WIP-Munich and ETA-Florence.

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This Thematic Network is funded by the European Commission, DG Research, in the framework of the programme 'Confirming the International Role of Community Research' (Project No. ICA4-CT-2001-10106).