Latin America Thematic Network on Bioenergy (LAMNET) (RWS1)

On occasion of the 12th European Conference and Technology Exhibition on Biomass for Energy, Industry and Climate Protection

RAI International Exhibition and Congress Centre, Amsterdam, The Netherlands

Wednesday, 19 June 2002, 11:00-18:00

Organised by: Rainer Janssen, WIP-Munich, Germany

INFORMATION MATERIAL

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).

Latin America Thematic Network on Bioenergy (LAMNET) (RWS1)

On occasion of the 12th European Conference and Technology Exhibition on Biomass for Energy, Industry and Climate Protection

RAI International Exhibition and Congress Centre, Amsterdam, The Netherlands

Wednesday, 19 June 2002, 11:00-18:00

Organised by: Rainer Janssen, WIP-Munich, Germany

Chairperson: Giuliano Grassi, EUBIA – European Biomass Industry Association

In order to promote the sustainable use of biomass in Latin America it is the general objective of the Latin America Thematic Network on Bioenergy to establish a transnational forum of Knowledge Centres (Universities, R&D Institutes) and SMEs from Latin America in collaboration with such organisations from European and non-European countries. The LAMNET network is funded by the European Commission. The overall co-ordination of the network is carried out by WIP-Munich in partnership with ETA-Florence and EUBIA, the European Biomass Industry Association, while the Latin American organisations, Brazilian National Reference Centre on Biomass (CENBIO) and the National University of México (UNAM) act as co-ordination support points on the South- and Central American continent.

Agenda:

11:00 – 11:15	Opening: Introduction and progress of the LAMNET project Dr. Rainer Janssen, WIP, Project Co-ordinaton
11:15 – 11:40	European International Co-operation Policies Mr. Dirk Pottier, European Commission – DG Research
11:40 – 12:00	Promotion of Small-scale Decentralised Bioenergy Systems Dr. Giuliano Grassi, EUBIA – European Biomass Industry Association
12:00 – 12:20	Pre-requisites for Biofuel Programs promoting Sustainable Development Prof. José Roberto Moreira, CENBIO – Centro Nacional de Referência em Biomassa
12:20 – 12:40	Sugar Cane Biomass – Current and potential use for heat & power cogeneration in Cuban sugar cane industry Dr. Paulino López Guzmán, Ministerio del Azúcar, Cuba
12:40 – 13:00	Spatial Analysis of Biomass Energy Production and Consumption Patterns for Strategic Planning: The WISDOM Approach Dr. Omar Masera, UNAM – Universidad Autónoma de México
13:00 – 14:00	Lunch Break
14:00 – 15:40	Plenary Discussion: Pre-requisites for CDM and Joint Implementation projects in Latin America and other emerging economies Moderated by: Dr. Roland Geres, FutureCamp
15:40 – 16:00	Overview on Conversion Technologies of Cellulose Biomass Resources Mr. Jan Lindstedt, BAFF – BioAlcohol Fuel Foundation
16:00 – 16:20	Overview on Biomass based Co-generation and Syngas/Hydrogen Production Dr. Peter Grimm, WIP – Renewable Energies
16:20 – 18:00	Poster Presentation by LAMNET members/Coffee Break

‘LAMNET’ Workshop

Introduction and Progress of the LAMNET Project

Rainer Janssen
WIP
Sylvensteinstr. 2
D-81369 Munich, Germany
Email: rainer.janssen@wip-munich.de
Internet: www.wip-munich.de

Abstract:

Objectives and Strategies of the LAMNET Project

In order to promote the sustainable use of biomass in Latin America it is the general objective of this Thematic Network to establish a transnational forum of Knowledge Centres (Universities, R&D Institutes) and SMEs from Latin America in collaboration with such organisations from European and non-European countries.

The focus of the project will be the identification of technological objectives and the development of policy options to boost deployment of decentralised biomass production and biomass based energy generation. Concerning the large-scale promotion of bioenergy and the realisation of significant benefits from the deployment of modern, efficient and sustainable bioenergy systems, the following key **Thematic Priorities** have been identified and are addressed during the implementation of this project:

- Analysis of the Energy Policy Framework
- Assessment of Energy Demand and Biomass Resources
- Assessment of available Technologies and Systems
- Development and Implementation of Technology and Policy Options for the Promotion of Bioenergy

Focus of Network Activities

- Large-scale implementation of bioethanol production based on sugar cane and other suitable biomass resources (e.g. sweet sorghum) including agro-forestry residues; creation of a global bioethanol market
- Promotion of small- and medium-scale decentralised bioenergy systems such as advanced pelleting technologies, small plants for co-generation and refrigeration systems (tri-generation) syngas generators, micro-distilleries for ethanol production, charcoal pellets, activated charcoal for water purification

Dissemination Activities

The efficient dissemination of the results of this project is realised through the publication of a periodical newsletter and the establishment of a project web site (www.bioenergy-lamnet.org). It is a focus of this project to set-up a shared data-base to allow for enhanced comparability and long-term accessibility of the results of this project.

Several workshops and seminars will be organised during the project with the participation of members of the Thematic Network and interested persons or organisations from Latin America and European as well as non-European countries.

The first LAMNET Project Workshop is organised on the occasion of the 12th European Conference and Technology Exhibition on Biomass for Energy, Industry and Climate Protection on 19th June 2002. The second LAMNET project workshop is scheduled to take place in Durban, South Africa, 19-21 August 2002.

‘LAMNET’ Workshop

European International Cooperation Policies

Dirk Pottier
European Commission, DG Research
Email: dirk.pottier@cec.eu.int
Internet: europa.eu.int/comm/dgs/research/

‘LAMNET’ Workshop

Promotion of Small-scale Decentralised Bioenergy Systems

Giuliano Grassi
European Biomass Industry Association
Rond-Poit Schuman, 6
1040 Brussels, Belgium
eMail: eubia@eubia.org
Internet: www.eubia.org

Abstract:

In the framework of the project LAMNET, it is EUBIA’s purpose to follow a pragmatic focus on the promotion of bioenergy by stimulating joint-ventures and transfer of technologies. EUBIA’s opinion is that it is a main project objective to undertake complementary actions to the development of policy strategies by tackling bioenergy market opportunities in Latin America, China, and on the African Continent.

The contribution of EUBIA will be particularly focused on the promotion of small-scale, decentralised bioenergy technologies. Small-scale is envisaged as its penetration (in comparison to large-scale systems) could be much easier especially in terms of supply of biomass resources and investment level.

In the initial phase of the project, EUBIA is going to prepare a series of documents describing projects and technologies, which can be promoted in the framework of LAMNET activities. These documents include a detailed technological and economical analysis of the following commercial sub-systems, which can be easily implemented in all the regions tackled by LAMNET:

- new, advanced pelletisation/drying technology
- small co-generation plants (50 , 100, 500 kWe) with an overall electrical efficiency η_{el} = 22% and a guarantee lifetime of 15 years
- syngas generators
- micro-distilleries for small-scale ethanol production
- charcoal pellets (advanced technology)
- activated coal for water purification
- refrigeration systems

‘LAMNET’ Workshop

Pre-requisites for Biofuel Programs Promoting Sustainable Development

José Roberto Moreira
The National Reference Centre on Biomass
Avenida Prof. Luciano Gualberto 1289
05508-900 São Paolo, Brazil
Email: bun2@tsp.com.br
Internet: www.cenbio.org.br

Abstract:

1. THE TECHNOLOGICAL ISSUE

Biofuel as other renewable sources of energy has the potential to replace fossil fuel while reducing global pollution (essentially GHG emissions) and local pollution (mainly SOx and micro particulates). A necessary but not sufficient condition for the implementation of a biofuel program is the availability of technology ready to be used. The idea assumes that a biofuel program should be implemented immediately in order to take advantage of the opportunities to curb GHG emission and, from the other hand, to show considerable impact ten years from now.

Technology includes the existence of human know-how to grow, harvest and transport biomass, and transforms it in a useful form of energy. It also includes physical conditions like convenient temperature, abundant solar irradiation, water availability, and the abundance of land areas with reasonable soil quality. Most of these conditions are identifiable in tropical countries.

2. THE ECONOMIC ISSUE

Energy production is extremely intensive in capital. Every dollar expend with energy acquisition, in average, produces seven dollars in the economic activity that uses this energy. Focusing only in capital intensiveness we conclude that it may be more rewarding for a country to import energy saving investment demanded for its production, and invest in other less capital intensive sectors. This may be a good option for developed countries with easy access to hard-currency. For these countries the only drawback is the risk associated with stable energy supply. For developing countries with limited access to hard-currency investment in energy production is a guarantee that this fundamental economic driver is available even during national and international economic crises. These options impose a further pre-requisite for biofuel production – the decision about what degree of external energy supply is acceptable.

Countries willing to invest in energy production should consider that capital intensive activities usually implies in low number of high qualified employment demand. This is the case for the conventional energy sector, where through centralized production and processing large economic revenue is produced with few workers. But, this is not the case for biofuels. Biomass plantation is a dispersed activity, and since biomass transportation is limited to small distances by economic reason, its processing is also dispersed. Energy cropping, maintenance, harvesting, and transformation in final energy are man-power intensive, and more than that uses rural and unskilled labors. Through biofuel production it is possible to create employment for rural population engaging them in the economic market. This advantage also imposes another pre requisite for large-scale biofuel production – availability of low-cost manpower.

Considering previous comments it is clear that some countries are very poor to carry out an investment program for biofuel production, others may have the money but prefer to make more efficient use of it, and finally there are others that have the money and do not want to be over exposed to the risk of supply or poor performance of the economic crises. Any of these situations do not preclude the use of biofuels. The only difference between these approaches is that some countries may invest in autonomous production while others may import the fuel.

Another important consideration is that energy is an international commodity that adds cost to all products. As such, if energy has s high cost in a country it will impact the final cost of all products and even services, in a minor extend, thus decreasing the country competitiveness in the global market. As a conclusion, important pre-requisites is the decision to use such kind of energy, either investing in energy production, either importing, but at a reasonable cost compared with conventional energy price. At this point it is important to remind that since energy is intensive in capital and low-cost money is one important ingredient for energy production at competitive cost. This is an intrinsic advantage for developed countries.

3. ARE AVAILABLE TECHNOLOGY AND ECONOMIC RESOURCES THE ONLY PRE-REQUISITES?

Almost all commercial energy used in the world is derived from fossil fuels. Coal, oil and natural gas represent around 90% of the energy supply, while hydro and nuclear electricity represent 5% of the commercial energy supply. The new and renewable sources (modern biomass, solar, wind, geothermal, small hydro) represent a little over 2%, and from this total 1.7% is due to modern and sustainable uses of biomass.

It is worthwhile to remember that new and renewable sources became to be considered as potential contributors to the energy matrix at almost 30 years ago with the oil crisis of 1973 and 1979. During these 30 years their contribution increased from zero to 2% and one of the most used argument for their historical poor performance up to now is higher cost in relation to conventional energy sources (fossil and hydro). This argument is poor, since if high cost was the main barrier, developed countries would be able to invest significant financial resources in R&D to overcome the barrier. An review of the amount of R&D government investments in new and renewables sources shows that less than 2% of the total investment in energy R&D has been directed to new and renewables, and in particular less than 0.2% to modern biomass uses.

The real explanation for the small participation of new and renewables sources is the difficulty to overcome not only economic barriers but also socio-economic barriers. Even if a new product is cost-competitive economic barriers may obstruct its widespread use due market failures. Market failures includes subsidies to conventional sources of energy and the inability to transfer to the cost of energy some costs that are paid by the society and not by the energy user.

Socio-economic barriers are in general associated with human behavior, values and attitudes. When society recognizes the relevance of a new product it pays a higher price for the new one even if in the short term the new and the conventional products may yield the same result. One example is organic products, which feeds the person as well as the ones produced with traditional agricultural practices, but are sold at higher price since it is supposed to be healthier in the longer term. As opposed to this example, the awareness of persons to acquire an automobile is strong enough to shadow the impact of its use as a source of GHG emission. C emission in the transportation sector has increased at almost a constant annual rate (2.5%) for the last 30 years. During this time better technology was developed making cars more energy efficient but even this effort was unable to avoid the continuous and constant C emission increase every year. This means that values of society are such that use of individual transportation is more valuable than the risk of climate changes.

4. SUSTAINABLE DEVELOPMENT

There are many definitions for sustainable developments and for this discussion it is better to think about the most significant challenges to achieve sustainable development. They are:

- Clean air
- Clean water
- Food
- Energy
- Land use
- Transport
- Housing
- Employment
- Waste management
- Health

From the earlier items presented it is possible to conclude that biofuels have direct connection with some of these challenges and, if properly managed, impacts positively on clean air, energy, food, land-use, and employment. Some energy crops are also food producers providing a benefic synergism. The land-use challenge is addressed by opening opportunities to use lands set in stand-by due food/fodder overproduction and creating demand for unused potentially productive land increasing rural revenue. The three other challenges were already discussed above.

Biofuel has indirect relations with transport, housing, and health. Transport availability depends on fuel quantity, quality and prices. All these attributes may be satisfied through liquid biofuel production. Housing and health issues may be mitigated through the engagement of the population in the market economy. Employment, largely created through biofuel production, is the most direct way for integrating people in the market.

Biofuels production requires water and land management. Planting and harvesting biofuel may impact water quality through soil erosion, fertilizers and pesticides application. Biomass transformation to biofuels may also be a source of pollution. These impacts may be properly avoided with good practices. It is important to note that some energy crops requires pluriannual plantation and forests may take more than 20 years to be renewed. Thus soil erosion is much less intensive with these plantations than with most food cultures. Fertilizers and pesticides are also used with much less intensity in energy crops and forests than in food crops. This is a major requirement to guarantee biofuels cost competitivity with conventional energy sources. Biomass processing to final energy forms requires care with air and water pollution. Air pollution can be controlled with conventional and simple technologies used in industrial boilers while water pollution requires water cleaning or its use as a complement for irrigation. There are examples in the world where these practices are performed in a cost-effective way.

Waste management is directly associated with biofuel production. Large amount of biomass is harvested but with proper design of the energy system all residues may be used in productive ways. One example is sugarcane crop used for ethanol production in Brazil. During many years bagasse was a burden and burned in an inefficient way in sugar mills just to get rid of it. Today, electricity generation for the grid become another interesting commercial activity for sugar mills and bagasse is being used as an efficient source of electricity generation.

5. CONCLUSION

Considering the limited participation until now of new and renewable sources of energy vis-a-vis its importance to mitigate climate change, its contribution to sustainable development, the difficulty to correct market failures, and the slowly changes occurred in habits and attitudes of society we conclude that another necessary category of pre-requisites are policies.

Governments exist for choosing what is the best for society and uses its power to solve complex problems that may not be solved by market forces. Thus, appropriate policies able to increase public awareness for new and renewables sources in detriment of fossil fuels should be set and enforced.

In particular, for the case of biofuels, this last kind of pre-requisites should complement the technology and economic capability, allowing a significant expansion of the market with the consequent decline in cost associated with the "learning-by-doing' mechanism. Such procedure should be applicable to developed and developing countries since as pointed out biofuels can be locally produced or imported, and even when produced it is not clear the advantage of tropical countries over developed ones due the balance between natural resources and capital costs.

'LAMNET' Workshop

Sugar Cane Biomass – Current and Potential Use for Heat & Power Cogeneration in Cuban Sugar Cane Industry

Paulino Lopez
Ministerio del Azucar – Science and Technological Division
P.O. Box 6413
Ciudad de La Habana, Cuba
Email: paulino@ocentral.minaz.cu

Abstract:

Current Situation in the Cuban Sugar Cane Industry

- Total Supply of the Heat Demand for Raw Sugar Production (2500 kcal/kg raw sugar)
- Partial Supply of the Electricity Demand of Raw Sugar Production Process (95%)

Electricity Balance of the Sugar Agro-Industry sector

- Consumption: 2,140 GWh/a
- Production: 1,600 GWh/a
- Supply from Grid: 730 GWh/a

Principal Targets of the Energy Development Programme set-up by the Cuban Ministerio del Azucar:

- Medium Term Co-generation equals Sugar Sector Demand
- Long Term Co-generation exceeds Sector Demand, Sales to National Grid

Strategic Components of the Energy Development Programme

- Increase efficiency of energy use in the industry
- Increase energy production during crushing season with new boilers (efficiency 85-90%) and steam turbines at steam pressure higher than 28 bar
- New power plants fuelled by sugar cane biomass

Technology of Integrated Sugar Cane Power Plants

- Biomass-fired boiler, extraction condensing steam turbine
- Biomass Gasification – Gas Turbine – Combined Cycle
- Biomass Pyrolysis

Long Term Projection

- 39 Sugar Mills have been selected for investment
    - 24 with adjoining power generation plants
    - 15 with existing installed capacity to be expanded/up-graded
- Result: Increase of Installed Capacity by about 1,1015 MW

Impact on Global Climatic Change

- CO_2 Abatement (medium-term) 385 MMt/a
- CO_2 Abatement (long-term) 6,175 MMt/a

‘LAMNET’ Workshop

Spatial Analysis of Biomass Energy Production and Consumption Patterns for Strategic Planning: The WISDOM Approach

Omar Masera
Instituto de Ecología, UNAM
Circuito Exterior s/n cd Universitaria, Delegación Coyocan
04510 México, DF. México
Email: mnetto@unfccc.int
Internet: www.unfccc.int

Abstract:

Adequately assessing priority areas for bioenergy interventions and projects, particularly within developing countries, requires a better knowledge of the spatial patterns of woodfuel supply and demand. Usually, broad generalizations about the impacts and patterns of woodfuel use are made based on aggregate information averaged over the whole nation or state. However, these generalizations lead to misleading conclusions, as the patterns of wood fuel demand and supply are extremely site-specific.

The “Woodfuel Integrated Supply-Demand Overview Mapping” (WISDOM) is a methodological tool designed to provide a spatial representation of woodfuel demand and supply patterns. The combined analysis of these two layers helps to identify current and future priority regions according to woodfuels production/ consumption trends. In other words, WISDOM serves as an ASSESSING and STRATEGIC PLANNING tool to identify PRIORITY places for action (i.e., woodfuels “hot spots”).

WISDOM is being developed by the Wood Energy Programme at FAO together with the Instituto de Ecología, National University of Mexico. It is based on two main spatial layers resulting from the development of DEMAND and SUPPLY modules. The Demand layer is aimed at visualizing the spatial demand of woodfuels situation and its overall dynamics at the lowest administrative level within a country or a large region. The Demand layer helps to identify those regions showing increasing woodfuel needs and potentially facing shortages. The Supply layer is aimed at a spatial representation of natural and man-made woodfuels sources, their change rates and their sustainable productive capacities.

The methodology was initially tested in Mexico, where it helped identified 273 “priority municipios” (counties) –out of a country total of 2,460- showing the: largest consumption of fuelwood, largest growth and density of fuelwood users and a very high pressure from fuelwood collection on local forests.

‘LAMNET’ Workshop

Plenary Discussion: Pre-requisites for CDM and JI projects in Latin America and other emerging economies

Moderated by:

Roland Geres
FutureCamp
Chiemgaustr. 116
D-81549 Munich, Germany
Email: roland.geres@future-camp.de
Internet: www.future-camp.de

Abstract:

The emerging of emissions trading schemes leads to a new paradigm in energy policies: By pricing the greenhouse gas emissions, especially CO_2, environmental benefits become part of business planning on the revenue side.

The presentation is explaining the mechanisms shortly and the steps necessary for project developers to integrate emissions trading into business planning. It focuses on the possible financial impact of emissions trading for projects in the biomass sector.

One project-based example from the electricity sector is explained and discussed more detailed: “The bundling of several decentralized smaller units to a single project”.

Especially the innovative approach of project-bundling is of growing importance for projects under the framework of the Kyoto-Protocol. Projects under the Clean Development Mechanism or Joint Implementation cause special transaction costs (e.g. for baseline determination, verification) that can be to high for single smaller units like small biomass plants.

Method, advantages and uncertainties are shown and, finally, some options for the biomass community are presented.

‘LAMNET’ Workshop

Overview on Conversion Technologies of Cellulose Biomass Resources

Jan Lindstedt
BioAlcohol Fuel Foundation
P.O. Box 826
89118 Ornskoldsvik, Sweden
Email: jan.lindstedt@baff.info
Internet: www.baff.info

Abstract:

In The Green Paper ”Towards a European strategy for the security of Energy supply” the Commission discuss a goal to substitute 20 % of the fossil fuels in the transport sector by the year 2020. The first steps have been taken in the EU commissions proposal for a directive to introduce biofuels, 2 % until 2005 and 6 % to 2010 in the transport sector.

Feasibility’s studies with Energy and material integration’s based on hydrolysis of agriculture and wood waste, show that the price of the ethanol is accounted for in the interval between 0,36-0,45 EURO /litre ethanol.

Ethanol production in a stand alone unit, based on cellulosic raw material is hard to motivate today due to high costs and low energy output. We have made about ten different feasibility studies in Sweden integrating ethanol production with municipality power plants, sawmills, pelletising units etc.

In such a bioenergy refinery, we can utilize up to 85% of the energy input in useful products such as bioethanol, electricity, lignin pellets and heat for dryers or house heating.

With energy- and CO_2 tax reduction on bioethanol, today ethanol fuels is competitive to gasoline in Sweden.

This presentation will cover mainly Swedish developments and the actual situation in other conversion techniques.

‘LAMNET’ Workshop

Overview on Biomass based Co-generation and Syngas/Hydrogen Production

Herbert-Peter Grimm
WIP
Sylvensteinstr. 2
D-81369 Munich, Germany
Email: peter.grimm@wip-munich.de
Internet: www.wip-munich.de

Abstract:

Energy is the basis of all life. In the mankind’s history mainly biomass, and beside of that water and wind, has been the main source of energy. 2000 years ago the specific energy consumption was approximately 7.2 GJ per capita and year. In the 20^{th} century the specific energy consumption increased to approx. 115 GJ per capita and year and it is delivered mainly on the basis of fossil fuels and nuclear energy. Only in the last decades men became aware of the huge impacts on the environment caused by the burning of fossil fuels. And only in the last decades developments are oriented to modify energy generation and to look for solar energy.

Biomass is converted and stored, and storable, solar energy which can be used as a single source and/or in combination with other solar energy sources. As an energy source biomass is available in solid and liquid form and, following to conversion, as gas.

Biomass as a solid fuel can be used for energy production in systems like small units as stoves, boilers, etc., in central heating plants and thermal power plants and, with increased overall conversion efficiency, in co-generation units to generate heat and electricity. Nowadays also systems for tri-generation to produce heat, electricity and also cooling are under development. In co-generation systems biomass is burnt to produce steam, steam is conducted to engines which make use of the energy difference between high pressure, high temperature water vapour and the expanded low pressure, low temperature steam and/or condensate. This energy difference is transformed to electricity either in reciprocating engines and/or turbines.

Solid biomass can be, however, also bio-chemically converted into chemicals as alcohols (bio-ethanol) and/or thermo-chemically by pyrolysis systems converted into a liquid, mainly called ‘bio-oil’. In its natural liquid form biomass occurs as a vegetable oil. The liquids can be fuelled to stationary systems, e.g. burner/boiler combinations, and engines to produce energy by combustion modes. They are also best suited to transportation systems.

Through digestion systems solid biomass can be bio-chemically converted into a gas which in a large extent consists of methane. Thermo-chemically solid biomass can be converted by gasification units to a gas which contains inert compounds like nitrogen and combustible compounds like hydrocarbons and carbon-oxydes. Depending on the technology used and based on the water gas shift reaction gases which contain in a bigger extent hydrogen are produced which, are called ‘Synthesis Gas’. This gas can be either converted by a chemical process to e.g. methanol and/or it can be cleaned and purified to hydrogen.

Gas from biomass sources can be used in burners and engines to produce energy. Very novel technologies, which are not yet state-of-the-art, e.g. fuel-cells can be fuelled directly with synthesis gas and the hydrogen produced after cleaning in order to produce electricity and, depending on the fuel cell system, heat.

LAMNET Project Coordination

WIP
Sylvensteinstr. 2
81369 Munich
Germany
Coordinator: Dr. Rainer Janssen
Phone: +49 89 720 12 743
Fax: +49 89 720 12 791
E-mail: rainer.janssen@wip-munich.de
Web: www.wip-munich.de

LAMNET Coordination Partner

ETA – Energia Trasporti Agricoltura
Piazza Savonarola, 10
50132 Florence
Italy
Contact: **Ms. Angela Grassi**
Phone: +39 055 500 2174
Fax: +39 055 573 425
E-mail: angela.grassi@etaflorence.it
Web: www.etaflorence.it

LAMNET Coordination Partner

EUBIA – European Biomass Industry Association
Rond Point Schuman, 6
1040 Brussels
Belgium
Contact: **Dr. Giuliano Grassi**
Phone: +32 2 28 28 420
Fax: +32 2 28 28 424
E-mail: eubia@eubia.org
Web: www.eubia.org

LAMNET Coordination Support Point South America

CENBIO – Centro National de Referência em Biomassa
Avenida Prof. Luciano Gualberto 1289
05508-900 São Paolo
Brazil
Contact: **Prof. Dr. José Roberto Moreira**
Phone: +55 115 531 1844; +55 115 531 4502
Fax: +55 115 535 3077
E-mail: Bun2@tsp.com.br
Web: www.cenbio.org.br

LAMNET Coordination Support Point Central America

Universidad Nacional Autónoma de México – Instituto de Ecología
Circuito Exterior s/n cd Universitaria, Delegación
Coyoacan
04510 México, DF. México
Contact: **Dr. Omar Masera**
Phone: +52 55 5623 2709
Fax: +52 55 5623 2719
E-mail: omasera@ate.oikos.unam.mx
Web: www.ate.oikos.unam.mx/gira

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).