LAMNET-NEWS 5th issue – September 2004

LATIN AMERICA THEMATIC NETWORK ON BIOENERGY

LAMNET

The LAMNET International Conference on Liquid Biofuel Development in Beijing, April 2004, included a technical tour to the world's largest bioethanol production facility in Jilin City, P.R. China (page 14).

The LAMNET Workshop on the occasion of the 2nd World Biomass Conference in Rome, May 2004, was organised in collaboration with the Food and Agriculture Organisation of the United Nations (FAO) (page 14).

The up-coming International LAMNET Workshop 'Bioenergy for a Sustainable Development' in Viña del Mar, Chile, 8-9 November 2004, will focus on Biogas and Waste Treatment Technologies and Worldwide International Technology Cooperation (page 15).

www.bioenergy-lamnet.org

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LAMNET-NEWS
LAMNET – The Global Network on Bioenergy
5th issue – September 2004

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Highlights:

2nd World Biomass Conference in Rome – A Full Success

One of the largest events in this sector, the 2nd World Biomass Conference and Technology Exhibition on Biomass for Energy, Industry and Climate Protection in Rome, 10-14 May 2004, has combined the forces of the successful series of European conferences of which Rome was the thirteenth, with the equally successful biomass conferences of the Americas (USA, Canada, Latin America). This global event has attracted 1200 participants from 90 countries, providing the opportunity to take a combined look at a wide range of issues, from research to development and demonstration, from strategy formulation to international co-operation, from social/economical issues to sustainable use of resources (www.conference-biomass.com).

New IEA Bioenergy Task 40 on Sustainable International Bioenergy Trade Launched

International biomass trade and related subjects are already on the agenda of various tasks within the IEA. Involving several international organisations (FAO, World Bank, UNECE, UNDP, UNFCC, Greenpeace, WWF), governmental bodies and industrial parties, the new Task 40 under the IEA Bioenergy Agreement aims at the development of sustainable biomass markets, securing supply and demand, on short and long term and on different scale levels (from regional to global). The Operating Agent for this new task is the Ministry of Economic Affairs, the Netherlands, and the kick-off meeting of IEA Bioenergy Task 40 was held in January 2004. At present, the participating countries are the Netherlands, Sweden, Norway and Brazil and observers include the European Commission, Finland and Croatia.

Flexfuel Cars may dominate the Car Market in Brazil

A new technology has started spreading throughout the Brazilian automobile industry. It is the dual fuel engine, powered with gasoline and/or alcohol, giving the consumer total liberty in choosing one of the fuels, or mixing them in the proportion he wishes. The first model that came onto the market was the Volkswagen Gol Total Flex 1.6, and by today the manufacturers Volkswagen, Ford, Fiat, GM etc. have introduced 19 car models on the Brazilian market. It is expected that around 600.000 or 30% of the car sales in Brazil during 2004 will be flexfuel cars, and flexfuel car sales are believed to further increase in the years to come.

Swedish Prime Minister inaugurates Ethanol Pilot Plant

On 26 May 2004 the bioethanol pilot plant Domsjö was inaugurated by the Swedish Prime Minister Göran Persson. The plant is unique and will form the basis for Swedish development of ethanol production using cellulose as raw material.

New Tax Exemption for Biofuels introduced in Sweden

In accordance with a decision of the Swedish parliament, a new tax exemption was introduced for all renewable fuels. This is a milestone for large-scale introduction of renewable fuels as long-term, stable rules for taxes on biofuels make it significantly easier for all players to invest in vehicles, infrastructure or production facilities. It is a very positive development that Sweden, together with Germany, is one of the first EU member states to have announced a tax exemption on biofuels so rapidly and clearly.

German Sugar Giant to Diversify

The German sugar giant Südzucker will break ground on a new plant to produce bioethanol fuel from wheat at Zeitz in East Germany. Earmarked for completion by 2005, the plant will operate in conjunction with the local sugar factory. For an annual output of 260,000 m^3 of bioethanol, the main raw material for the production of ethanol will be wheat, but other products derived from sugar production or other types of cereals will also be used to a limited extent. Südzucker will invest Euro 185 million in the plant to produce 260,000 m^3 of ethanol annually, requiring 700,000 metric tons of grain per year which corresponds to a yield of about 7 metric tons per hectare over an area under cultivation of about 100,000 hectares.

PARTNERS FOR AFRICA – A New Initiative for Sustainable Development in Africa

The project PARTNERS FOR AFRICA, funded by the European Commission's INCO programme, is coordinated by WIP-Munich in partnership with ETA-Florence. The project aims at demonstrating the role of Renewable Energy (RE) in poverty eradication and offering support to policy making activities in sustainable resource management, RE related public health, and enterprise development. This will be realised through the mobilisation of international and local partnerships as well as the establishment of an international forum for information exchange. The project partnership comprises highly experienced actors from Africa and Europe, namely WIP (Germany), ETA (Italy), ITDG (UK), SEI (Sweden), Illovo Sugar (South Africa), CEEEZ (Zambia) and ENDA (Senegal) For more information, see page 6 and visit www.partners4africa.org.

Biomass Pelleting Technology – Opportunities for Southern Africa

Sugar cane bagasse pelleting offers great opportunities for the production of 'green energy' in bagasse-based co-generation plants in Southern Africa. Through improved transportation and storing of the biomass feedstock, bagasse pelleting is an important step in providing energy from bagasse on a year-round basis. Another potential application of bagasse pelleting can be taken advantage of, if a low-temperature pelleting process is employed. With this innovative pelleting technology the economics of the production of high-value chemicals (e.g. furfurals) from bagasse pellets could be significantly improved.

International Feed-in Cooperation Launched at 'renewables 2004' in Bonn

As part of the International Action Programme (IAP) elaborated as one of the key outcomes of the International Conference for Renewable Energies in Bonn, June 2004, the Governments of Germany and Spain have launched an International Feed-in Cooperation. This cooperation activity aims at promoting the exchange of experiences and demonstrating the opportunities offered by feed-in systems as well as assisting other countries in the design and implementation of feed-in systems. A Governmental working group will be created holding semi-annual workshops, the first of which will take place in October 2004 in Germany.

UN-Energy is Launched

Energy is Finally High Up Again in the International Agenda

by Dr. Gustavo Best
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Vice-Chair of UN-Energy

As a follow-up to the World Summit on Sustainable Development (WSSD) in South Africa, the United Nations launched *UN-Energy* in June 2004, a new initiative on energy. UN-Energy will be the principal UN interagency mechanism in the field of energy and it will follow the emphasis placed by WSSD on the relationship between access to energy and poverty eradication in both urban and rural areas as well as the importance of increasing the share of renewable energy resources in the total energy supply, and the importance of energy for achieving sustainable development.

As follow up to the World Summit on Sustainable Development (WSSD) and its Johannesburg Plan of Implementation (JPOI), adopted in South Africa in 2002, the United Nations has launched a new initiative on energy. **UN-Energy**, open to all UN organizations, has been formally established by the UN High-Level Committee on Programmes at its meeting of June 2004. It is the principal interagency mechanism in the field of energy to help ensure (a) coherence in the UN system's multi-disciplinary response to WSSD; and (b) collective engagement of non-UN stakeholders.

Since there is no single international agency dealing with all energy matters, this initiative taps on the collective knowledge and experience of organizations such as DESA, ECA, ECE, ECLA, ESCAP, ESCWA, FAO, Habitat, IAEA, UNDP, UNEP, UNESCO, UNIDO, and others. Mobilizing this unique interdisciplinary potential is of major importance to advance in promoting a sustainable international energy system. UN-Energy will establish cooperation with non-UN agencies active on energy matters such as IEA, OLADE, WEC and UN Foundation.

The main areas of focus of UN Energy will be:

(i) increasing access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services and resources,

(ii) improving energy efficiency,

(iii) increasing the share of energy from renewable energy sources,

(iv) diversifying energy supply through advanced, cleaner, more efficient, affordable and cost effective energy technologies and

(v) implementing transport strategies for sustainable development.

UN-Energy will follow the emphasis placed by WSSD on the relationship between access to energy and poverty eradication in both urban and rural areas as well as the importance of increasing the share of renewable energy resources in the total energy supply, and the importance of energy for achieving sustainable development. Among the initiatives being discussed is an international bioenergy programme suggested by FAO.

The Brazilian Ethanol Learning Curve

by Oswaldo Lucon*, Suani Teixeira Coelho*, José Goldemberg* and Plinio Mario Nastari**
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Economic competitiveness is a frequent argument against the introduction of renewable energies worldwide. The Brazilian experience with bio-ethanol provides the proof that economies of scale and technological advances can lead to increased competitiveness of renewable alternatives with respect to conventional fossil resources. It clearly shows that supportive and sound Government programmes can cause positive environmental, economic as well as social development in emerging economies. This is an important paradigm to developed countries as well, which could review the incentives provided to fossil fuel, shifting to renewable sources and to a more open trading of biofuels and environmentally sound energy commodities.

One of the very common arguments against renewable energies is their failure to economically compete with fossil fuels. Renewable energies can become more competitive with correct incentives - and with corrections of distortive subsidies still given to the conventional fossil sources. The following article presents an example for significant cost reduction of a renewable fuel achieved through supportive Government programmes, acting on the demand side of large markets and thereby lowering costs through the 'learning curve effect'.

The learning curve represents graphically how market experience reduces prices for various energy technologies and how these reductions influence the dynamic competition among technologies. One of the most important examples is provided by the Brazilian Alcohol Program (PROÁLCOOL), established in 1975 with the purpose of reducing oil imports by producing ethanol from sugar cane. The program has positive environmental, economic and social aspects, and has become the most important biomass energy program in the world [1].

In 1975, 91 Mt of sugarcane was produced, yielding 6 Mt of sugar and 555 km^3 of ethyl alcohol (ethanol). In 2002, sugarcane production reached 320 Mt, yielding 22.3 Mt of sugar and 12.6 Mm^3 of ethanol. Since the creation of PROÁLCOOL, prices received by ethanol producers were determined by the federal government, as were the prices of fuels in general. In May 1997, the price of anhydrous ethanol was liberalized, and the same occurred with the price of hydrated ethanol in February 1999.

Ethanol production costs were close to 100 US dollars a barrel in the initial stages of the Program in 1980 (see Figure; Prices paid to producers are proxies for costs). Until 1985, as production increased, prices paid to producers reflected average costs of production. During this initial phase, prices fell slowly reflecting the gains in agro-industrial yield and economies of scale captured by producers, and transferred to consumers through the pricing regulation scheme. After 1985, however, prices were set at levels below the average costs of production, while the federal government tried to curb inflation by controlling public prices, inclusive of fuels. Due to this factor, together with economies of scale, the price fell much more rapidly.

As the efficiency and cost competitiveness of ethanol production evolved over time, and fuel prices were liberalized, this support was no longer needed and was not applied. Of great significance is the fact that the total amount of investments in the agricultural and industrial sectors for the production of ethanol for automotive use in the period 1975–1989 reached a

total of US$ 4.92 billion (US$ of 2001) directly invested in the program. On the other hand, savings with foregone imports evaluated at international prices, have amounted to US$ 52.1 billion (Jan 2003 US$) from 1975 to 2002 [2,3].

Presently, there are no subsidies for anhydrous or hydrated ethanol production. Hydrated ethanol is sold for 60–70% of the price of gasohol at the pump station, due to significant reductions in production costs. These results show the economic competitiveness of ethanol with respect to gasoline in Brazil. This economic competitiveness is a reality for several years already and will continue for years to come, especially with the current increase of the crude oil prices on the world market.

Today, in Brazil so-called 'flexible fuel' vehicles are being sold, which can run with any gasoline-ethanol blend (i.e. from E26 gasoline to E100 hydrated ethanol). Sales are booming and, in very short term, fuel use will be a consumer choice at the pumping station. In 2003, 48 thousand units were sold and forecasts are 280 thousand in 2004. Around 60% of the light vehicles are expected to be fuel flexible by 2007. Ethanol use already has significantly improved the air quality conditions in metropolitan areas of Brazil, removing lead from gasoline and reducing sulphur emissions. Nitrogen oxides can be controlled with appropriate exhaust catalysts and antioxidants. The acetaldehydes emitted are 100 times less toxic than the formaldehydes from gasoline.

Currently, more than 100 countries worldwide - mostly developing countries - produce sugarcane and could also produce ethanol for internal use as well as for export, thereby alleviating their trade balances. OECD countries could also benefit from such imports by improving local air quality and, through a more liberalised market, promoting their environmentally sound technologies.

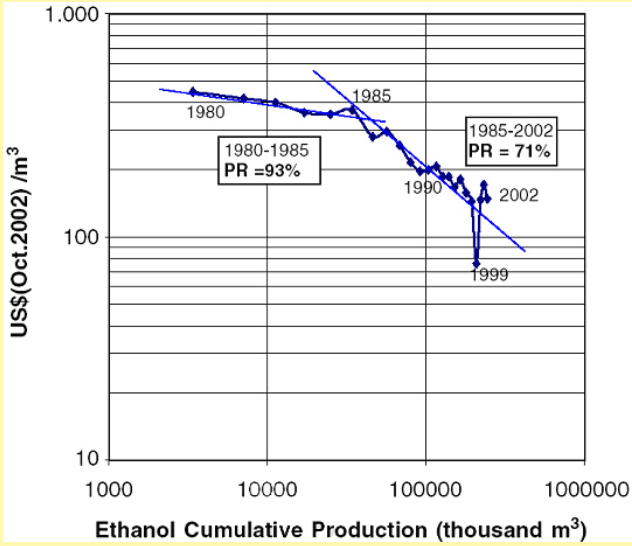

Figure: Brazilian bio-ethanol learning curve

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This LAMNET newsletter article presents excerpts from a paper recently published by José Goldemberg, Suani Teixeira Coelho, Plinio Mario Nastari and Oswaldo Lucon in Biomass and Bioenergy 26 (2004), 301-304.

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Bio-ethanol in China – The Current Status

by Prof. Dehua Liu
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Large-scale application of fuel ethanol in China shows the potential to address three issues of crucial national importance, namely the reduction of dependence on petroleum imports, the improvement of air quality and the development of rural economy. In the framework of the Chinese fuel ethanol program, launched in 2000, field tests of 10,000 vehicles with gasoline-ethanol blends (gasohol) have been performed. By the end of 2005, gasohol will totally replace gasoline in five provinces and partially in four provinces. The consumption of E10 gasohol will exceed 10 million tons, which is about 25% of the total consumption of gasoline nationwide.

Background

China decided to launch its fuel ethanol program in 2000. It was driven by at least three facts, namely grain surplus, fuel shortage and air pollution. The Chinese GDP increased in average by 10.35% per year during 1990-1999, leading to a gasoline consumption increase from 400 to 950 thousand b/d. For 2001-2010, the GDP is expected to increase at an average rate of 7.0-7.5% per year and gasoline consumption will increase from 1.3 to 4.6 million b/d. It is estimated that the Chinese petroleum deficit will reach about 8.5 million b/d in 2010-2020. Automobile sales in China have been increasing at an explosive rate during recent years (see Table). This fact not only contributed to fuel shortage but also to air pollution, causing long-term pressure on economic growth and sustainable development of the country.

	Total	Truck	Passenger vehicle	Special vehicle	Private vehicle
1990 compared with 1980	3.1 x	2.7 x	4.6 x	2.3 x	2.9 x
2000 compared with 1990	2.9 x	1.9 x	5.3 x	1.8 x	7.7 x
2003 compared with 2000	1.5 x	--	--	--	1.5 x

Table: Increase of automobile utilisation in China from 1990 to 2003 (Source: The State Bureau of Statistics)

It has been a main concern of the Chinese government to improve farmers' income. The production of fuel ethanol is regarded as one of the pathways for large-scale use of agricultural products. From 1990 to 1999, the grain production in China increased so fast, that government had to spend large amounts of money to buy and store surplus grain. This situation was a main reason for the government to launch the fuel ethanol program in order to make use of surplus grain. But, since 2000 the Chinese grain production experienced a fast decrease and the development of domestic grain-for-food production became a national challenge again.

As the largest developing country worldwide, China has been acknowledged for its fast economic development during the past 20 years. At the same time, air pollution became more and more serious in many areas, especially in metropolitan areas such as Beijing and Shanghai. Although great efforts have been made

by the government to improve the quality of environment, it is still a serious problem for China. Therefore, it is also attractive for the Chinese government to adopt blends of ethanol and gasoline as vehicle fuel to reduce toxic emissions.

Launching of the Chinese fuel ethanol program

In order to tackle abovementioned problems, the Chinese fuel ethanol program was launched in 2000. But, although China has more than 2000 years of experience of producing alcohol, fuel ethanol is a new issue in China. The Chinese ethanol industry comprises over 200 production facilities in 11 provinces, capable of producing more than 3 million tons of ethanol each year. More than 80 percent of the ethanol is made from grains. As the first step of producing fuel ethanol, two existing large alcohol plants were chosen to be retrofitted with dehydration facilities. At the same time, a series of experiments were conducted on the properties of gasohol (gasoline-ethanol blends) and its corrosion effects on materials used for vehicle manufacturing. Twelve cars produced in China underwent field tests with pure gasoline and three gasohol blends (E7.7, E10 and E15). Additionally, the economics of fuel ethanol were investigated by a group of national experts.

As a consequence of the successful operational experiments, five cities, Nan Yang, Zhengzhou and Luoyang city in Henan province as well as Harbin and Zhaodong city in Heilongjiang province were chosen for field tests with E10 gasohol since June 2001. The total number of vehicles involved in the tests exceeded 10,000. In order to regulate these field tests and the future promotion of fuel ethanol, two national standards were issued for 'Denatured fuel ethanol' (GB18350-2001) and 'Gasohol for vehicles' (GB18351-2001) in April 2001. Based on the economic assessment, proposals on tax incentives for fuel ethanol have been considered, which include exemption of sales tax and fuel tax as well as reduction of value added tax.

Expanding production and application of fuel ethanol

As the second step of launching fuel ethanol in China, three new plants were approved to be constructed in Jilin, Henan and Anhui province. The total capacity of these plants will be 1,220,000 t/y ethanol, and the Jilin fuel ethanol plant with a capacity of 600,000 t/y will be the largest producer worldwide. The Jilin ethanol project will be implemented in two stages, the first of which has been put into operation in October 2003 with an ethanol production capacity of 300,000 t/y. (see Figure).

Figure: Fuel ethanol plant in Jilin, China

As the vehicle fleet involved in gasohol applications increases in Henan and Heilongjiang province, Chinese drivers become more and more familiar with gasohol. In September 2003, the Jilin provincial government decided to totally replace pure gasoline with E10 gasohol. Until today, about 500,000 tons of E10 gasohol have been sold and used nationwide.

Based on the success of using blends of ethanol and gasoline, it was decided by the central government to expand the vehicle fleet and the area for using gasohol. By the end of 2005, gasohol will totally replace gasoline in five provinces and partially in four provinces. The consumption of E10 will exceed 10 million tons, which is about 25% of the total consumption of gasoline nationwide.

Conclusion

Although the adoption of fuel ethanol in China has the benefit to reduce petroleum dependency, to improve the quality of environment and to develop rural economy, this alternative transport fuel is still expensive compared with petroleum. On the other hand, security of grain supply is of crucial importance for China due to its large population. In the coming decades, China will increase investment to promote research and development of renewable energies, including fuel ethanol. Furthermore, China is deeply interested in worldwide cooperation to improve productivity and decrease costs of fuel ethanol through innovations, both in the agricultural and in the industrial sector. Today, Chinese researchers and producers are increasingly engaged in the technology of producing ethanol from lignocellulosic feedstock, which would enable large-scale production of fuel ethanol without affecting national food security.

Bioenergy Policy Recommendations for Southern Africa

by Dr. Rainer Janssen
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www.partners4africa.org

A high-level policy dialogue on bioenergy was held in Durban, South Africa, June 2004, in the framework of the project PARTNERS FOR AFRICA. Based on the results of this policy dialogue workshop, several policy recommendations have been elaborated. A newly established South African Bioenergy Association should provide a common platform for bioenergy stakeholders and act as clearinghouse and focal point for the collection and distribution of clear, credible and reliable data and information on all relevant aspects of bioenergy. As a first step, an Advisory Committee (Task Force) is to be set-up, which shall get in contact with South African Government representatives in order to lay the foundations for strong cooperation links between the Association and the South African Government.

A Policy Dialogue on Co-generation and Bio-ethanol for Southern Africa in Durban, 21-23 June 2004, was organised in the framework of the project PARTNERS FOR AFRICA in close co-operation with the European Energy Initiative for Poverty Eradication and Sustainable Development (EUEI). Interested parties at this workshop included international and local experts from Industrial, Academic and Government sectors.

One of the main aims of this dialogue was to discuss successful Brazilian bio-energy experiences in a Southern African context with representatives from several South African Government Departments.

Figure: Participants of the Bioenergy Policy Dialogue in Durban

The Southern African Context

A presentation on the sugar cane resources for energy production in Southern Africa was given by an internationally recognized academic. Concentrating on bio-ethanol and co-generation, both from the sugar industry, and using a model to forecast demand from 2005 to 2030, the presenter concluded that substantial resources do exist to supply this future demand and that an early adoption of incentives as well as long-term strategies and stability are required for a successful development of bio-energy from sugar cane in Southern Africa.

Presentations from within the South African sugar industry and from other African countries highlighted the current fragile economics of the world sugar market, countering this with supporting theories for the need to develop bio-energy strategies and industries. It was stated that bio-energy may serve to 'rejuvenate' the sugar industry and help to secure the 350,000 jobs currently employed in the South African sugar industry.

Co-operation between Government and Industry

South African Government representatives emphasized their support for a coherent bio-energy strategy and outlined the current status and targets as published in the South Africa White Paper on Renewable Energy Policy approved by the South African Cabinet in November 2003. The target of the White Paper is to achieve a contribution of 10,000 GWh to the final energy supply based on renewable energies (mainly from biomass, wind, solar and small-scale hydro) by 2013. The White Paper's vision of an energy economy in which modern renewable energy plays an increasing role was presented showing how renewable energies could contribute to sustainable development and environmental conservation.

In order to realise this vision, the South African Government is committed to cooperate with bio-energy stakeholders and reliable information and data have been requested from involved industries. It was concluded that for the future development of bio-energy in South Africa a pro-active approach and 'leadership' by the private sector as well as a close dialogue between industries and Government are of crucial importance.

As a main outcome of the policy dialogue workshop, the PARTNERS FOR AFRICA project consortium has elaborated several policy recommendations, two of which are briefly presented in this article.

Establishment of a South African Bioenergy Association

The establishment of a South African Bioenergy Association is recommended as an important enabling factor for the realisation of the target and the vision of South Africa's White Paper on Renewable Energy and Clean Energy Development.

The main aims of this South African Bioenergy Association will be to provide a common ***platform for bioenergy stakeholders*** and to act as ***clearinghouse and focal point for the collection and distribution of clear, credible and reliable data and information*** on all relevant aspects of bioenergy. In the initial stages, emphasis will be given to determining the biomass potential for key South African industries, to exploring the opportunities of small-scale bioenergy technologies for the provision of clean household energy, as well as to assessing the employment generation aspect of bioenergy solutions in South Africa.

In order to ensure impartial and reliable information suitable for the formulation of bioenergy policy recommendations, all relevant stakeholders from the agricultural, environmental, industrial and energy sector shall be involved in the activities of the South African Bioenergy Association and the Association shall set-up a regular forum for contacts with Government representatives.

As a first step for the establishment of the Bioenergy Association, the set-up of an Advisory Committee (Task Force) consisting of selected active representatives from industry (e.g. sugar and paper industry) and research institutes is recommended. This Advisory Committee shall get in contact with South African Government and representatives in order to lay the foundations for strong cooperation links between the Association and the Government.

Establishment of an International Clearing House for Household Bioethanol

Furthermore, it is recommended that an international or African bioethanol clearing house be established focusing on the needs of this emerging market. Bioethanol, in liquid or gel form, offers substantial advantages to households and countries, since it is renewable, locally produced, and clean burning, in simple low-cost locally produced stoves.

The proposed business-oriented network or special interest group would provide a forum for the exchange of information relating to upstream (ethanol production) and downstream (distribution, marketing, user-level technology) development of gel/liquid ethanol businesses aimed at the household sector. The group would act as a clearing house for information on the potential, opportunities, benefits and impacts, as well as facilitate access to local and international sources of financing for bioethanol fuel aimed at energy in the context of poverty.

The international HEDON Household Energy Network (www.hedon.info) would be an ideal home for such a special interest group, and HEDON as well as the PARTNERS FOR AFRICA project consortium offer assistance and support to establish and host this initiative.

The full 'Conclusions and Recommendations' document on this policy dialogue is available at the PARTNERS FOR AFRICA project website www.partners4africa.org.

More information on the activities of the project PARTNERS FOR AFRICA, funded by the European Commission's INCO programme, and the EU Energy Initiative is available at www.partners4africa.org and www.euei.org.

OECD Workshop on Biomass and Agriculture

This century could see a significant switch from a fossil fuel to a biobased economy, with agriculture as one of the leading sources of biomass feedstocks for renewable bioproducts, both bioenergy and biomaterials. In order to move towards a biobased economy, this OECD workshop in June 2003 concluded that new policy strategies need to be developed that work with markets in facilitating a balance between stimulating demand for bioproducts and developing appropriate feedstock supply. Targeted policy options and market approaches need to be promoted that encourage industry innovation and provide maximum long-run benefits to society.

In June 2003, representatives from the LAMNET global network on bioenergy were invited to participate in the 'Workshop on Biomass and Agriculture' organised by the Directorate for Food, Agriculture and Fisheries of the Organisation for Economic Co-operation and Development (OECD) in Vienna, Austria.

This OECD Workshop, hosted by the Austrian government, drew together a wide range of stakeholders representing agricultural, environmental, industrial and energy interests from government, the private sector, International Governmental Organisations and Non-Governmental Organisations.

In the following, excerpts from the workshop's conclusions and recommendations document are presented which have been approved by the Joint Working Party on Agriculture and the Environment (JWP).

Most OECD countries are implementing measures to develop agricultural biomass markets. Many countries employ a range of policy tools and have adopted a policy strategy that seeks to bridge the price gap between biomass and bioproducts with fossil fuel alternatives, through using financial support that is often unrelated to the externality benefit of avoided emissions. This approach, however, is likely to lead to market distortions and long term market dependence on subsidies. An alternative approach could be to focus policies on encouraging technological innovation and reducing technology costs. Also governments need to implement standards and guidelines so that biomass and bioproducts are produced in a manner that protects, and where possible enhances, soil, water and biodiversity resources and ensures that they deliver real carbon savings compared with fossil fuels.

The Workshop concluded that countries need to:

- **evolve a new policy strategy for biomass production,**
- **promote targeted policy options and market approaches,**
- **ensure that biomass and bioproducts are produced to appropriate international standards,**
- **improve assessment of the costs and benefits of using agricultural biomass feedstocks and related bioproducts.**

The full report on the OECD Workshop on Biomass and Agriculture is available at the OECD Biomass website: www.oecd.org/agr/env/indicators.htm.

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Mallorca at the Threshold of Sustainable Energy

by Dolores Ordóñez
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Renewable energies are considered one of the biggest challenges for a future sustainable energy supply of the Balearic Islands. Presently, renewable energy systems used in the Balearics include solar thermal, photovoltaic, wind and biomass. Additionally, public awareness campaigns are performed in order to highlight the opportunities offered by new and sustainable resource management and renewable energy solutions.

Due to the great number of hotels, the Balearic Islands' energy and water consumption is very high. Campaigns to raise public awareness focus on a better management of these resources and the creation of public knowledge in the field of new and sustainable technologies. One of the objectives of these campaigns is to encourage hotels to use thermal energy, mainly for water heating. These campaigns have been very successful in the past and they are being continued with governmental support.

The island government, through the Regional Ministry of Environment, is paying 40% of the installation costs of photovoltaic systems in houses. The Regional Ministry has started implementing a series of actions like installing PV systems in schools. Additionally, 35 kW have been installed at a parking lot in the Municipality of Calvia and 40 kW at the Balearic University parking lot. The Balearic government is also participating in the European Project 'SUNCITIES' implemented under the 5th framework programme. This project aims at installing photovoltaic panels on the roofs of 50 houses in the municipality of Petra, supplying a total of 100 kW with some of the houses feeding electric energy to the grid. The philosophy of the European project 'SESCO' is to give more energy autonomy to isolated regions of the Balearic Islands. In the framework of this project, an evaluation of energy supply options (conventional as well as renewable) will be performed, including biogas, sludge from waste treatment plants, solar energy and wind energy. The demonstration part of this project will focus on the production of biodiesel from waste cooking and vegetable oils. This biodiesel will be used for transportation on land and sea and it will contribute to a reduction of costs as well as of environmental contamination.

On the island of Mallorca, windmills have a long tradition (see Figure). Currently, 2000 windmills are in operation mainly for the production of flour and for water pumping. As many of these windmills are currently in urgent need of renovation, a project to restore 100 systems is carried out in the Municipality Campos on the Southeast of the island. Thereby, this project will solve two of the island's important environmental problems, namely clean energy production and the protection of historical heritage sites. The owners of these windmills will feed electricity into the grid for a guaranteed price of 0.07 EURO/kWh and each windmill will produce enough energy to supply 2 homes. The investment for the project of more than 6 million EURO will be granted by the Spanish Ministry of Environment and the experience gained will then be transferred to other Balearic areas (Sa Pobla, Alcudia) as well as to Sicily and Crete.

On the island of Menorca, hybrid systems are operated combining solar thermal systems and small windmills. Menorca is the flattest of the Balearic Islands and therefore especially suited to exploit these natural resources.

Figure: Traditional windmill on the Balearic Island of Mallorca

The company TIRME was founded in 1992 on the island of Mallorca with a strong commitment to the management and treatment of waste. Apart from various waste treatment installations throughout the island, large and complex recycling of materials and energy is carried out at the Environment Technologies Park. This park is divided into three large areas:

- A business park, including a plant for the treatment of construction waste
- An energy assessment plant, slag treatment plant, safety dump and treatment plant for animal and clinical waste
- A methane production plant and a central building for training activities and visitor reception

The energy assessment plant complies with European Union directives. It reduces the volume of waste by 92% and produces electricity by means of incineration. This plant produces 4.7% of Mallorca's and Menorca's total energy consumption. Gas cleaning systems and continuous environmental controls keep emission levels lower than the limits set by European and Spanish legislation.

At the methane production plant, organic waste is collected allowing a maximum of 15% impurities. This waste is shredded and fed into a digester where biogas or methane is produced by a biological process. In order to generate electricity, the biogas is burnt in an internal combustion engine. All exhaust air produced by the plant is filtered to eliminate contaminants. For more information, please visit www.tirme.com.

Being an important tourist destination, the Balearic Islands have a very high level of energy consumption. The energy consumption exceeds energy production every year, mainly in the summer months. Therefore, a future sustainable energy supply of the Balearic Islands heavily relies on the further development of clean energy production technologies, such as the applications presented in this article.

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Small-scale Biomass Gasification Plant for Rural and Isolated Regions

by Emanuele Scoditti
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A new small-scale gasification system has been developed by ENEA for application in rural areas of developing countries. The system uses agricultural residues as feedstock and the produced gas is provided to households as cooking fuel through a local piping grid. Advantages of this gasification system include modularity as well as simplicity of assembly and operation, thereby facilitating job opportunities for local manpower in rural and isolated areas of developing countries.

Biomass can be used for energy production through various conversion processes, such as thermo-chemical processes and in particular gasification technology. Biomass resources that are most suitable for thermo-chemical conversion include wood and all its derived residues (sawdust, chips), common ligno-cellulosic by-products (cereal straw, fruit tree pruning residues), agro-industrial residues (rice husks, nut shells, corn stalks), as well as residues from sugar cane (bagasse), coffee (pulp and pergamino) and coconut.

These latter biomass by-products and residues are not yet largely used for energy production, but would represent a considerable fuel source in case of the development of the energetic sector at their production sites.

Gasification Technology

The gasification process consists of the transformation of a solid fuel (in this specific case: biomass) into a gaseous fuel through thermo-chemical reaction with oxygen. The product of the gasification process is a LHV gas (900-1200 kcal/Nm^3) with the main components carbon monoxide (CO), hydrogen (H_2) as well as small quantities of hydrocarbons (CH_4). The non-combustible components of this gas are nitrogen (N_2) present in the combustion air, nitrogen oxides (NOx) derived from oxidation of the nitrogen component of the biomass, carbon dioxide (CO_2) and water vapour. Additionally, biomass contains mineral salts that are not gasified but transformed into ashes and dust. In practice, by means of the gasification technology, biomass is transformed into a combustible gas that can be used for household applications and/or fuelled into internal combustion engines for the production of electric energy.

ENEA's Gasification Plants

In the following, the gasification system realised at the ENEA research centre at Trisaia, Italy, is described in more detail. The aim of this project was to evaluate the potential of gasification technology for the production of energy in small-scale applications. The gasification plant was set up in Trisaia and several tests have been carried out to analyse the system performance at different operation conditions. Operation parameters have been optimised in order to reduce energy consumption and environmental impact. The plant consists of three sections, namely gasification, gas purification and cooling, and energy production.

- The ENEA 20-30 kW_e gasifier is a downdraft (co-current) fixed bed unit that uses air as gasification agent, which enters the reactor from the top in co-current with biomass.
- The gas purification and cooling section includes four filtration steps: cyclone, scrubber, dust removal and sawdust final filter.
- The energy production section consists of an internal combustion engine (a Diesel modified to Otto cycle fuelled with gas) coupled with a generator (25 kVA).

For various experimental tests, agricultural biomass (olive tree residues, almond shells) and forest residues have been employed. The process has been optimised in order to limit the production of liquid waste streams and to realise a negligible tar content in the gas. In recent years, ENEA has developed a new 20-30 kW_e gasifier for the Liaoning Institute of Energy Resources (LIER) in Yingkou, China. The plant was first tested in Italy and transferred to China, where the plant underwent considerable improvement on the configuration and the whole plant process.

In more detail, the changes dealt with the biomass feeding system (a screw conveyor was installed) and with the insertion of a vacuum/blower pump between the biomass final filter and the external gas storage tank. In this process only thermal application of the product gas has been foreseen. Due to the high reliability of the gasification system, more than 10 plants have been installed in the Chinese countryside during the last 3 years (see Figure) and other projects are under preparation. The plant capacity, in terms of gas production, ranges between 200 m^3/h and 400 m^3/h, while the raw material used consists of agricultural residues such as tree pruning and corn stalks. The produced gas is stored in gas tanks, which feed the gas to households (200-500 units), which are connected through a local piping grid.

Figure: ENEA gasification plant in Beihai, China

ENEA gasification systems can help to solve the energy problems of many thousands of people worldwide, who currently live without the access to energy. The actual possibility to utilise this technology is given by the biomass availability in respective areas. From the economical point of view, these small plants can easily occupy certain niche markets in developing countries. In fact, the advantages of these gasification systems include modularity as well as simplicity of assembly and transport. In addition, the realisation of these plants does not require sophisticated construction technologies and skilled labour for operation and maintenance. Hence, local manpower can be employed offering job opportunities for rural and isolated areas in developing countries.

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Fast Pyrolysis of Biomass for Fuels and Chemicals

by Prof. Anthony Bridgwater
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Abstract

Fast pyrolysis of biomass offers the advantages of a liquid product, bio-oil, that can be readily stored and transported. Bio-oil is a renewable product, which can be used for production of fuels and chemicals. Fast pyrolysis has achieved a commercial success for production of chemicals and is being actively developed for producing liquid fuels. Bio-oils have been successfully tested in engines, turbines and boilers, and have been upgraded to high quality hydrocarbon fuels although at a presently unacceptable energetic and financial cost.

1. Introduction

Renewable energy is of growing importance in satisfying environmental concerns over fossil fuel usage. Wood and other forms of biomass are some of the main renewable energy resources available and provide the only source of renewable liquid, gaseous and solid fuels.

Thermal biomass conversion has been investigated for many years as a source of renewable solid, gaseous and liquid fuels. Compared to combustion, which is widely practised commercially, and gasification, which is being extensively demonstrated around the world, fast pyrolysis is at a relatively early stage of development.

2. Fast pyrolysis

Pyrolysis is by definition thermal decomposition occurring in the absence of oxygen. Pyrolysis can be operated in a number of modes as summarised in Table 1. Three products are always formed, but the proportions can be varied, as shown, over a wide range.

	Liquid	Char	Gas
Fast pyrolysis moderate temperature (~ 500°C) and very short residence time, particularly hot vapour	75%	12%	13%
Carbonisation low temperature (~ 400°C) and long residence time	30%	35%	35%
Gasification high temperature (~ 800°C) and long residence times	5%	10%	85%

Table 1: Typical product yields obtained by different modes of pyrolysis of wood

The essential features of a fast pyrolysis process for producing liquids are:

- very high heating and heat transfer rates at the reaction interface, which usually requires a finely ground biomass feed,
- carefully controlled pyrolysis reaction temperature of around 500°C and vapour phase temperature of 400-450°C,
- short hot vapour residence times of typically less than 2 seconds,
- rapid cooling of the pyrolysis vapours to give the bio-oil product.

Fast pyrolysis is an advanced process that requires carefully controlled parameters to give high yields of liquid. The main product, bio-oil, is obtained in yields of up to 75 wt.% on a dry feed basis, together with by-product char and gas which are typically used within the process so there are no waste streams other than flue gas and ash.

Figure 1 shows a conceptual schematic of fast pyrolysis process that includes the necessary steps of drying the feed to typically less than 10% water, grinding the feed (to around 2 mm in the case of fluid bed reactors) to give sufficiently small particles to ensure rapid reaction, pyrolysis, separation of solids (char), and collection of liquid product (bio-oil).

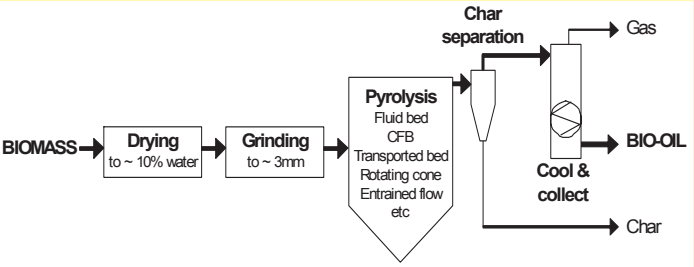

Figure 1: Conceptual fast pyrolysis process

The heart of a fast pyrolysis process is the reactor and this has been the focus of almost all research and development. The rest of the process consists of biomass reception, storage and handling, biomass drying and comminution, and product collection, storage and, when relevant, upgrading. In the following, the current significant operational fast pyrolysis plants for production of liquids are summarised:

Fluid bed	4000 kg/h at Dynamotive in Canada for power generation (commissioning July 2004),
	500 kg/h at Fortum for development (shut down late 2003),
	250 kg/h at Wellman, UK, for development (awaiting commissioning) (Figure 2),
	20 kg/h at RTI for research,
	Many research units,
Transported bed	1700 kg/h at Red Arrow (Ensyn process) in USA for food flavours and chemicals (Figure 3),
	650 kg/h at ENEL for development (Ensyn process), 20 kg/h at VTT for development (Ensyn process),
Circulating Fluid bed	10 kg/h at CRES for research,
Rotating cone	2000 kg/h at BTG for demonstration,
	250 kg/h at BTG for development,
Ablative	10 kg/h at Pytec for research,
	250 kg/h at Pytec for development (under construction),
	20 kg/h at Aston for research and development,
Vacuum	3500 kg/h at Pyrovac, Canada, for demonstration.

The product of fast pyrolysis is vapours, aerosols and gases from decomposition of biomass with any carrier gases from fluidisation or transport. The vapours require rapid cooling to minimise secondary reactions and to condense the true vapours, while the aerosols require coalescence or agglomeration.

Figure 2: Fluid bed fast pyrolysis plant at Wellman, United Kingdom

Figure 3: Ensyn Transported Bed fast pyrolysis plant at Red Arrow, USA

3. Pyrolysis Liquid - Bio-oil

Pyrolysis liquid is referred to by many names including pyrolysis oil, bio-oil, bio-crude-oil, bio-fuel-oil, wood liquids, wood oil, liquid smoke, wood distillates, pyroligneous tar, pyroligneous acid, and liquid wood. The crude pyrolysis liquid is dark brown and approximates to biomass in elemental composition. It is composed of a very complex mixture of oxygenated hydrocarbons with an appreciable proportion of water. Some important characteristics of this liquid that are summarised in Table 2.

Physical property	Typical value	Notes
Moisture content	25%	Water comes from moisture in the feed and reaction water and cannot be separated.
pH	2.5	The low pH comes from organic acids.
Density	1.20	Very high at around 1.2 kg/litre compared to light fuel oil at around 0.85 kg/litre. Bio-oil has about 40% of the energy content of fuel oil on a weight basis, but 60% on a volumetric basis.
Elemental analysis		Typically: C: 57%, H: 6.0%, O: 37%, N: trace.
Ash	0%	All ash is associated with the char.
HHV as produced (depends on moisture)	18 MJ/kg	Bio-oil has a higher heating value of about 18 MJ/kg as produced with about 25 wt.% water that cannot be separated.
Viscosity (at 40°C and 25% water)	50 cP	Viscosity as produced can vary from 20 cP to 1000 cP (measured at 40°C) depending on feedstock, water content, light and ageing.
Solids (char)	0.2 wt.%	0.1 wt.% is a good level.
Vacuum distillation residue	50%	Cannot be completely vaporised. Heating to 100°C causes production of a solid residue of around 50 wt.% of the original liquid and distillate containing volatile organics and water.
Appearance		Typically a dark brown free flowing liquid.
Odour		A distinctive smoky smell.
Miscibility		Water addition can be tolerated up to about 35 wt.% Bio-oil is miscible with polar solvents such as methanol, but totally immiscible with petroleum-derived fuels.

Table 2: Typical characteristics of wood derived crude bio-oil

4. Applications for Bio-oil

Bio-oil can substitute for fuel oil or diesel in many static applications including boilers, furnaces, engines and turbines for electricity generation. The possibilities are summarised in Figure 4. There is also a range of chemicals that can be extracted or derived including food flavourings, specialities, resins, agri-chemicals, fertilisers, and emissions control agents. Upgrading bio-oil to transportation fuels is feasible but currently not economic.

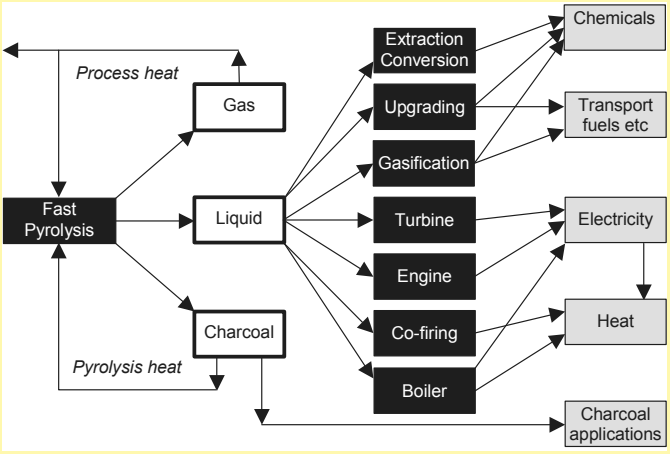

Figure 4: Applications for Bio-oil

4.1 Combustion in burner/furnace and burner/boiler systems

Furnaces and boilers are common devices used for heat and power generation. They are usually less efficient for power generation than engines and turbines but they can operate with a great variety of fuels ranging from natural gas and petroleum distillates to sawdust and coal/water slurries. Bio-oil is a suitable boiler fuel as long as it has consistent characteristics, provides acceptable emissions level, and is economically feasible.

Most research on bio-oil combustion in boilers has been carried out in Finland by Neste Oy and Oilon. The only commercial system that regularly uses bio-oil to generate heat is at the Red Arrow Products pyrolysis plant in Wisconsin USA and has been operated for over ten years. An attractive option can be co-firing of bio-oil with fossil fuels. Large-scale tests have been carried out at the Manitowac power station in the USA, where pyrolysis liquids from the Red Arrow operation were co-fired with coal for the commercial production of electricity.

A consistent and better quality bio-oil at attractive price is necessary for commercial, large-scale applications. Problems of handling (storage, pumping, filtration, atomisation) and optimisation of the burner/boiler design to improve performances and reduce emissions can be solved by relatively minor modifications to the existing equipment.

4.2 Combustion in diesel engines

While boilers are mostly used to produce heat, Diesel engines offer high efficiency in power generation (up to 45%) and can also be adapted to combined heat and power (CHP). Medium and slow speed engines are known for fuel flexibility and can operate on low-grade fuels. The main concerns for operating diesel engines on bio-oils are some specific properties of these liquids such as difficult ignition (resulting from low heating value and high water content), corrosiveness (acids), and coking (thermally unstable compounds). However, potential advantages of using bio-oils for power generation have led to important research activities in several countries.

Tests at VTT Energy and Wärtsilä (Finland) showed that the most important problems were difficulty in adjusting the injection system, wear and corrosion of certain injection and pump elements (acids, particulates), and high CO emissions. Testing has also been carried out at the University of Kansas (USA), MIT (USA) and Ormrod (UK), which showed that the thermal efficiency of bio-oils was approximately equal to that for diesel fuel. Emulsions of bio-oil and diesel have been tested in Italy, Germany and the UK, but these caused substantial and rapid erosion of injectors and pumps.

4.3 Combustion in turbines

The first gas turbine tests on biomass slow pyrolysis liquids were carried out at Teledyne CAE (USA) in the early 1980s using a J69-T-29 gas turbine combustor rig. Emissions of CO were higher but CH and NO_x were within the limits observed for petroleum fuels.

Since 1995 Orenda Aerospace Corporation (Canada) has been actively working on the application of bio-oil in gas turbines combustion on a 2.5 MWe Mashprojekt machine from the Ukraine. The main advantage of this engine is its “silo” type combustion chamber located above the turbine that can be easily modified and optimised for any fuel. The engine has been tested throughout the whole operational range, from idle to full power, and found that NO_x and SO_2 emissions from combustion of bio-oil were less while particulates were higher than those from diesel fuel.

The University of Rostock (Germany) has conducted bio-oil combustion tests in a small commercial 75 kWe gas turbine.

The engine operated in a dual fuel mode at 73% of the full power that would be generated in a standard fuel mode, with about 40% of total power produced from bio-oil and 60% from diesel. CO and HC emissions were significantly higher and NO_x less for dual fuel operation.

4.4 Upgrading of bio-oil to transport fuels

The properties that negatively affect bio-oil fuel quality are foremost low heating value, incompatibility with conventional fuels, solids content, high viscosity, incomplete volatility, and chemical instability. Some of those deficiencies can be improved using relatively simple physical methods while others require more complex chemical processing.

The simplest use of bio-oil as a transport fuel seems to be in combination with diesel fuel. Although biomass pyrolysis oils are not miscible with hydrocarbons, with the aid of surfactants they can be emulsified with diesel fuel. Upgrading bio-oil to a conventional transport fuel requires full deoxygenation, which can be accomplished by two main routes: hydrotreating and catalytic vapour cracking.

Although upgrading to a liquid transport fuel does not currently look promising, bio-oil can become a source of hydrogen by reforming the water soluble fraction, as at the National Renewable Energy Laboratory (USA).

5. Applications of Bio-oil for Producing Chemicals

For many centuries wood pyrolysis liquids were a major source of chemicals such as methanol, acetic acid, turpentine, tars, etc. At present, most of these compounds can be produced at a lower cost from other feedstocks derived from natural gas, crude oil or coal. Although over 300 compounds have been identified in wood fast pyrolysis oil their amounts are small and isolation of specific single compounds is seldom practical or economic, as it usually require complex separation techniques. Therefore, the development of technologies for producing products from the whole bio-oil or from its major, relatively easy separable fractions is the most advanced.

5.1 Chemicals produced from the whole bio-oil

The whole bio-oil can be converted into useful chemicals by taking advantage of its most abundant functional groups: carbonyl, carboxyl, and phenolic and react them in such a way that the non-reacting part of bio-oil would not have to be separated from the final product. For example, carboxylic acids and phenols can easily react with lime to form calcium salts and phenates to give product known as BioLime, which proved successful in capturing SO_x emissions from coal combustors.

5.2 Chemicals from fractionation of bio-oil

Bio-oil can be easily separated into two fractions based on water solubility. By simple water addition to bio-oil, a viscous mostly oligomeric lignin-derived fraction settles at the bottom while water soluble, mostly carbohydrate-derived compounds form a top layer. Although other solvent fractionation methods have also been developed, especially to improve the purity of the lignin-derived material, water addition seems to be the favoured option.

The aqueous extract of bio-oil includes both low-molecular weight aldehydes that are effective meat browning agents (especially glycolaldehyde) as well as phenolic compounds that provide smoky flavours. Based on this, a range of food flavouring compositions have been developed by Red Arrow Products (USA).

The water insoluble fraction that usually constitutes 25-30% of the whole bio-oil is often called pyrolytic lignin because it is essentially composed of oligomeric fragments originating from degradation of native lignin. Pyrolytic lignin can be used as a phenol replacement in phenol-formaldehyde resins. The most important contributions in research and development on pyrolitic lignin based resin formulation have been made at NREL and Biocarbons in the USA, Ensyn and Pyrovac in Canada, and ARI in Greece. Although lignin is less reactive than phenol, 30-50% of phenol can be replaced by pyrolytic lignin in novolak and resole formulations producing high-quality resins.

Some chemicals produced from the whole bio-oil or by its fractionation are already commercial products, for example liquid smoke, or have a chance for short-term commercialisation, especially if a bio-refinery concept based on fast pyrolysis process is implemented.

6. Conclusions

The liquid bio-oil product from fast pyrolysis has the considerable advantage of being a storable and transportable fuel as well as a potential source of a number of valuable chemicals that offer the attraction of much higher added value than fuels. Bio-oil has been successfully used as boiler fuel and also showed promise in diesel engine and gas turbine applications. Upgrading bio-oil to a quality of transport liquid fuel still poses several technical challenges and is not currently economically attractive. Some chemicals, especially those produced from the whole bio-oil (such as fertilizers) or its major fractions (such as for wood resins) offer more interesting commercial opportunities. There are still many challenges to overcome before bio-oil finds large-scale application as fuel, including:

- Cost of bio-oil, which is 10-100% more than fossil fuel.
- Availability of material remains a problem and there are limited supplies for testing.
- Lack of standards for use and distribution of bio-oil and inconsistent quality inhibits wider usage.
- Incompatibility of bio-oil with conventional fuels and, therefore, need for dedicated fuel handling systems.
- Users are unfamiliar with bio-oil.
- Environmental health and safety issues need to be completely resolved.
- Pyrolysis as a technology does not enjoy a good image.

More research is needed in the field of fast pyrolysis and bio-oil testing to develop large-scale applications. The most important issues that need to be addressed seem to be:

- Scale-up and cost reduction.
- Better oil quality.
- Norms and standards for producers and users.
- Environment health and safety issues in handling, transport and usage.
- Encouragement for developers to implement processes; and users to implement applications.
- Information dissemination.

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Recent Events:

International Conference on Bioenergy and Liquid Biofuel Development and Utilisation, Beijing, P.R. China

The International Conference on Bioenergy and Liquid Biofuel Development and Utilisation (7th LAMNET project workshop), held in Beijing, P.R. China, from 20-23 April 2004, was organized jointly by the China Association of Rural Energy Industry (CAREI), the Center for Energy and Environment Protection (CEEP) of the Chinese Ministry of Agriculture, the Chinese Ministry of Science and Technology and the LAMNET Global Network on Bioenergy.

One of the main aims of this conference was to promote international cooperation and knowledge exchange between actors from China, Europe, Africa and Latin America in the field of liquid biofuels. Renowned international bioenergy experts reported on global liquid biofuel strategy and policy issues and presented recent developments in key countries, such as Brazil, Sweden, South Africa and China. Agreements for future co-operation activities have been reached and several biofuel projects are currently under preparation with the assistance of representatives of the LAMNET network.

Presentations given at the international conference in Beijing are available at the LAMNET website: www.bioenergy-lamnet.org.

Production Start-up for Jilin's Fuel Ethanol Plant

The international conference in Beijing included a technical tour to the world's largest bio-ethanol production facility in Jilin City (located about 800 km north-west of Beijing) on 23 April 2004. This technical tour was organised by CAREI in collaboration with Jilin Fuel Ethanol Co. Ltd. (JFA) and the LAMNET partner Vogelbusch. (see Figure)

A grand opening ceremony was held in the city of Jilin in November 2003 to celebrate the production start-up of the first of two lines of a fuel ethanol project implemented by Jilin Fuel Ethanol Co. Ltd. With a final capacity of 600,000 tons per year, i.e. 2.3 million litres per day, the plant will be the world's largest bioethanol production facility. As a major global supplier of advanced alcohol technology since 1921, Vogelbusch (Austria) was selected to provide the process design for the plant.

At the Jilin Fuel Ethanol Plant, the LAMNET conference participants were cordially welcomed by Mr. Yu Zhanchun, JFA Director and Chief Engineer, and Mr. Liu Yu, JFA Technical Department Manager, as one of the first international visiting delegation. A guided tour through this impressive bioethanol production plant and its outstanding research facilities was organised by the JFA management in collaboration with Mr, Josef Modl, Executive Vice President of Vogelbusch, and Mr. Kenneth So, Managing Director of Vogelbusch Hong Kong.

To round off this informative technical tour to Jilin, the LAMNET delegation was invited for a question and discussion round on the technical and economical performance of this modern bioethanol production line as well as the on future opportunities for the development of bioethanol as transport fuel in China. JFA representatives informed the LAMNET group, that the plant start-up and operation is fully satisfactory and that the demand for the produced bioethanol will be guaranteed by the decision of the Jilin and other provincial governments to replace pure gasoline with gasohol, an E10 gasoline-ethanol blend, at all filling stations in respective Chinese provinces.

Figure: Technical tour to the world's largest bio-ethanol production facility in Jilin City

LAMNET Workshop on the occasion of the 2nd World Biomass Conference in Rome, 9th May 2004

The 8th LAMNET project workshop was organised in collaboration with the Food and Agriculture Organisation of the United Nations (FAO) on the occasion of the 2nd World Conference and Technology Exhibition on Biomass for Energy, Industry and Climate Protection, Palazzo dei Congressi, Rome, 10-14 May 2004.

This workshop served as platform for discussions focusing on 'Bioenergy for Rural Income Generation and Sustainable Development' among renowned international experts from a large variety of national and international organisations and knowledge centres. Participating organisations included the Brazilian National Biomass Reference Centre (CENBIO), FAO, the European Biomass Industry Association (EUBIA), the European Biomass Association (AEBIOM), the German Federal Agricultural Research Centre (FAL) and the World Bank – African Support Group.

One of the conclusions reached was that improvements in rural development worldwide can be realised if new income opportunities are opened-up for farmers as 'bio-energy producers'. Thereby, especially for developing countries, sustainable development should focus on '***energy by the poor***' rather than '***energy for the poor***'. A significant increase of income generation in rural areas could be achieved through the provision of bio-energy services to those who can afford to buy them, either within the same country or through renewable energy trading schemes.

The crucial topic of the more than 2 billion people cooking with biomass today was addressed in a presentation on a Mexican case study implementing 1,000 clean and efficient fuelwood cooking stoves in 30 villages. It was pointed out that a reliable and simple technology is only one part of the process, and that an involvement of local users focusing on the improvement of livelihoods is of large importance. Additionally, continuous innovation/adaptation of the stoves and strict monitoring (stove performance, Indoor Air Pollution, health impacts) as well as locally based micro-financing and regional self-reliance through income generating activities is key to success for the implementation of innovative small-scale bioenergy systems.

All presentations given at the LAMNET workshop in Rome are available at the LAMNET website www.bioenergy-lamnet.org.

Up-coming Events:

International Workshop on Bioenergy Policies, Technologies and Financing in Ribeirão Preto, São Paulo, Brazil, 14-17 September 2004

This international bioenergy workshop is organised by WIP-Munich, Germany, in collaboration with ETA-Florence, Italy, the European Biomass Industry Association (EUBIA), Brussels, and the Brazilian National Reference Centre on Biomass (CENBIO) within the framework of the LAMNET project.

Scientific contributions by members of the LAMNET project and invited speakers will cover a large variety of aspects in the field of bioenergy with a ***special focus on policies and technologies concerned with worldwide bio-diesel production and utilisation***.

This workshop will be organised on the occasion of and will include a visit to the international ***industrial fair FENASUCRO***, one of the world's largest technological events in the sugar and ethanol sector. Additionally, a ***technical tour will be organised to a Biomass based Cogeneration Plant in the State of São Paulo*** providing information on the production of sugar, alcohol and bagasse derived electricity.

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International Workshop 'Bioenergy for a Sustainable Development' in Viña del Mar – Chile, 8-9 November 2004

The International Workshop 'Bioenergy for a Sustainable Development' will be jointly organised by the P.- Catholic University of Valparaiso – School of Biochemical Engineering, the European Biomass Industry Association (EUBIA) and LAMNET.

The aim of this international workshop is to promote and improve the knowledge of bioenergies in Chile and in the world as a key tool for sustainable development, and for contributing to the development of clean technologies and the improvement of the quality of the environment. Additionally, this event will provide a forum to discuss policies and regulations related to the use and development of alternative sources of energy in Chile and in the world.

For this bioenergy event, the support of a variety of high-level Chilean organisations has already been ensured, such as the Government of the Valparaíso Region, the National Commission for Energy, National Commission for Environment, the Chilean German Chamber of Commerce as well as the Interamerican Association for Sanitary Engineering (AIDIS).

The scientific programme of this workshop will consist of two days of working sessions including Plenary Presentations of recognized international experts, and Working Groups on specific technology topics of interests, including 'Biogas and Waste Treatment', 'Liquid Biofuels' and 'International Technology Cooperation and Financing'.

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LAMNET Workshop 'Biomass Opportunities in Venezuela' in Caracas, 22 October 2004

This workshop will be jointly organised by the LAMNET project and the Venezuelan organisation Fundacion Momento de la Gente (FMG). The scientific programme of this event will include presentations by international bioenergy experts from the LAMNET partners CENBIO (Brazil), Corpodib (Colombia), WIP (Germany), ETA (Italy) and the European Biomass Industry Association (EUBIA). The objective of this workshop is to support the development of bioenergy in Venezuela and to promote the use of biomass technology applications in the industrial and agricultural sector of Venezuela.

LAMNET Workshop in China, October/November 2004

This LAMNET workshop will be organised on the occasion of the World Wind Energy Conference & Exhibition 2004 – Wind Power Asian 2004, and it will focus on the development and application of innovative Wind-PV-Biomass hybrid systems. Details on the scientific programme of this event will be provided as soon as possible.

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

www.bioenergy-lamnet.org

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New Pellets Markets in Europe – producing wood and agricultural pellets for energy

Workshop in the framework of the Pellets for Europe project

29th October 2004, Federal Institute of Agricultural Engineering, Wieselburg, Austria

This workshop aims to promote the exchange of experience in pelleting wood and agricultural residues. In particular the experiences of established pellets markets such as Austria and Germany will be promoted amongst countries with younger pellets production sectors.

The target audience is new and consists of potential pellets actors of Southern Europe (e.g. Italy, Spain and Greece) and new member states (e.g. Poland and Baltic Countries). The workshop will include researchers, producers and equipment suppliers.

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