

Main Conclusions from the Second World Conference on
Biomass for Products, Energy and Climate change
Rome, 11 - 14 May 2004

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1. The goal of this conference

In the invitation for this conference, the chairman makes it clear that large steps remain to be made in order to achieve substantial contribution of bioenergy. He adds that on this road challenges and obstacles can be expected. Given the urgent need to achieve a major contribution of bioenergy around the world the following **goal** was formulated:

- Derive distinct **conclusions** with respect to desired and needed future **actions** for advancing the capabilities of and benefits from biomass and bio-energy

During the conference, the application of biomass for products and bioenergy was discussed in a great number of sessions. The chairmen of these sessions were requested to report on the conclusions and actions needed for advancing their specific topic. Based on the input from these reports, and my own interpretation, the following conclusions could be derived in the different areas of bioenergy.

2. Overall Observations

This second World Conference on Biomass, four years after the first world conference in Seville, has presented a larger number of papers, posters and sessions than the first one. The papers and posters are of a good quality and contain accurate, validated data that can be a valuable resource for further deployment of bioenergy. However the format of the conference with the presentations, and discussions, could only to a limited extent lead to conclusions, and the formulation of actions that are needed to advance the benefits from biomass. At the same time there is an urgent need for these actions: the threats of climate change are becoming clear, the security of supply is at stake and the deadlines for the targets set in the European Directives are short.

This conference could not agree upon overall conclusions, actions, and policy recommendations. However the participants went home with *their* conclusions, observations and contacts. **Networking** between researchers, industry, and governmental representatives is the main result of this conference. Based on these contacts, collaborations and the international knowledge position have been strengthened.

Another main observation that I derive from this conference, is that biomass and bioenergy become a **global issue**. International trade of biomass and biofuels is closing markets. There is an increased need for international collaboration and exchange of information and research results to achieve our overall goals.

3. Biomass Availability and Trade

Conclusion: Biomass, as an international resource with global production of energy crops, will become a global commodity. International biofuel trade is already taking place since 7th May 2004 futures in bioethanol are traded at the New York stock exchange.

Compared to the first world conference, the amount of presentations on energy crop production has decreased. However from the sessions it can be concluded that:

- High quality fibers can be produced from Giant Reed (*Arundo Donax*) for paper making.
- Cynara oil can be produced at half the price as rape seed and sunflower oils.
- Energy feedstock production relies on dedicated herbaceous and woody crops.
- Guidance on how to protect existing willow production from diseases is available
- Increased wood use will result in a rise in wood price (+75%)
- Biomass production can be used to combat desertification
- GIS tools can be very helpful in policy development

Actions:

1. Develop crops that can grow on saline grounds and address desertification.
2. Develop guidelines to assure the sustainability of the world-wide growth and production of biomass.
3. Develop and implement norms and standards for quality of the feedstock and biofuels

4. Conversion to Power and Heat

Biomass combustion has a large potential at low cost, but received rather low attention at this conference. World-wide, about 150 coal fired plants are co-firing biomass in a successful way, and this could be replicated. Know how on ash behaviour is available and is a commercial success. A new route to produce electricity and heat from biomass is the production of synthetic natural gas from biomass, and use it in power plants or domestic heating facilities after transportation through existing gas networks. Gasification (next paragraph) or anaerobic digestion are the conversion technologies involved, the resulting biogas can be upgraded to synthetic natural gas by existing and commercial technology. At present waste as a resource of power is achieved at increasing electric efficiencies to about 30% and gains importance. A stronger political will and support for utilisation of waste for power is needed. Also, utilisation of biomass for heat got a low attention at this conference but has a great potential.

Actions:

- Develop an action programme on bioenergy to achieve the 2010 Renewable Electricity targets in Europe
- Pay specific attention for the utilisation of energy from waste.
- Support and implement Renewable Heat from Biomass.
- Develop Synthetic Natural Gas as an intermediate between biomass and local production of power and heat.

5. Biomass Gasification

Several sessions and workshops highlighted the achievements with biomass gasification. In the power market, gasification as a simple pre-treatment before a coal fired power plant is operational (Lahti, Ruien, Amer). On a small scale, gasification is competitive with combustion due to the high feed in tariffs for renewable electricity in some countries. Demonstrations show improved operation (e.g. Guessing, Harboore) and new plants are considered (UK).

The Guessing demonstration started in November 2001, with gas engine start-up in April

2002 and to date: 6000 hrs of gas engine operation is achieved. In the Guessing plant 98 to 99% of the tar is removed by scrubbing raw gases with RME (esterified rape-seed oil). The tar absorbed RME fraction and the carry over char separated in a cyclone are totally oxidised in the combustor. For production of syngas from biomass, several pilot plants are operational around the world and here is strong commercial drive to produce renewable liquid biofuels from biomass (see next paragraph). Gas-cleaning and reliability of the system needs further development and improvement.

Actions:

- Continue demonstration to show reliability in long term performance, to reduce costs and fine tune the process on a larger scale
- Need for realistic assessments of R&D results and information sharing on bad and good experiences
- Develop co-gasification of bio-oils in large scale fossil facilities

6. Conversion to Liquid biofuels

There are strong drivers for the implementation of liquid biofuels from biomass: in Europe the driver is set in the directive with specific targets for 2005 and 2010, and in other parts of the world by the desire to become more energy independent. At the conference, there was overwhelming attention for this subject and rooms were too small on some occasions. The major achievement of this conference is a common understanding about the roadmap for biofuels:

- a) At present conventional biofuels for commercialisation (bio-ethanol, biodiesel)
- b) After 2010: biofuels from ligno-cellulosic biomass

There is major development of the new biofuels and at present successful pilot plants and first demonstration plants are available with: Fischer Tropsch, DME, methanol and ethanol from lignocellulosic biomass. Several companies around the world announced the first semi-commercial plants.

Actions:

- Issue transparent and continuous policies to develop the market and improve production technologies.
- Develop introduction strategies with car manufacturers and governments in a stakeholder dialogue.

7. Biomass for Chemical Products

Biomass has a potential in sustainable development as a resource for industry. The integrated use of biomass as food, fodder, fibre, fuel, fertilizer or fire to energy ($f * f$) should be considered. In several sessions, the biorefinery concept was presented, where biomass is used for high value products, replacing chemicals and saving energy. A quick to market example is the combined production of methanol for fuel and paper in existing paper mills, at the moment, there is a need for retrofitting black liquor boilers.

While producing these high value products, an exergetic optimisation is required. It appears that fresh cultivated biomass and biological conversion in using enzymes yields very specific high value food or chemicals at low volumes, while the large volume residual flows of this process can be converted by thermo-chemical conversion to bulk fuels or energy.

Action:

- Stimulate the co-operation between end-users, research, government and industry to achieve the integrated policy and market approach

8. Policy

In the short term (until 2010) there are strong political drivers for the development and implementation of biomass and bioenergy. In Europe we have the Kyoto agreement, directives on renewable electricity and fuels, followed by national mandates or financial support strategies. Worldwide there is a strong need for security of energy supply, specifically when the oil price exceeds the 40 \$/barrel. I conclude that there is a rapid increase of interest for bioenergy implementation on all political levels. The international approach and the trading of biomass will develop sustainable energy in developing countries and these local bio-energy initiatives will result in job creation.

The **strategy** to implement the utilisation of biomass at this moment, can be described as:

1. Integration in the existing (infra) structure:
 - Power by co-firing in existing power plants
 - Power by utilisation of waste in the waste treatment structure
 - Chemicals by co-feeding into existing plants or
 - New chemicals or fuels by tapping from existing plants (methanol)
 - Transport: by blending bio-ethanol or diesel in existing fuels (etc.)
2. Implementation at the best place on earth:
 - Accelerate implementation of CDM/JI mechanisms
 - Mobilise agriculture's role in Carbon market
 - Create a commodity market for bioenergy and trading
 - Trading and local bio-energy initiatives will result in job-creation

For the long term (beyond 2010 an till 2050), a major energy transition is required, where both society, economy and technology will have to change into a sustainable direction and where research and innovative biomass applications will play a major role. However, biomass has to be accepted by consumers as a sustainable resource; it competes with food, major logistics are involved and non-CO2 pollutants have to be carefully considered.

Action:

- Develop policy schemes beyond 2010 for bioenergy and biomass
- Develop charter on sustainability
- Accelerate implementation of CDM

9. Conclusion

The overall result of this conference is the improved Network, to know who is doing what and how to collaborate. And this intensified collaboration in Europe, but also international between the continents is a real must to achieve our goals in a cost-effective and rapid way.

However there is strong need for an outreach of the biomass message to other parts of the society, so I encourage all of you to organise biomass sessions at existing conferences, like the PowerGen and from the Chem. Eng. Series.

To conclude I wish all of you success with your work and enjoy it!