

BioreFuture 2008 workshop report



Introduction

What?	BioreFuture 2008 1-day biorefinery workshop
When?	12 February 2008
Where?	Committee of the Regions, Brussels, Belgium
Who?	Over 100 participants from 13 European countries, representing industry, government and academia.
Objectives	To disseminate preliminary results from the EU-funded Biopol and Biorefinery Euroview projects on concepts and future strategies for biorefineries in Europe. To engage the wider European biorefinery community on the technical, political and industrial issues surrounding biorefinery developments, in order to gather valuable inputs for the project and evaluate consensus on the initial findings.

The Projects

Biopol and Biorefinery Euroview are two EU Specific Support Actions (SSA) funded under the 6th European Framework Programme for Research (FP6). Both projects have a duration of two years from March 2007 and are due to conclude in March 2009. The two projects are designed to assess the current status of biorefinery activities in Europe and explore future scenarios for development. By systematically accounting for potential technical, political, social and industrial impacts of such scenarios their outputs will be utilised to inform policy formulation in this area.

Biopol has 8 partners from 6 countries (Netherlands, Germany, UK, Sweden, Poland and Greece). Its work is focused on these countries and covers: Technical status; Social and environmental implications; Political outlook; Current implementation status and Prospects for demonstration plants. Modelling exercises are being carried out to link four proposed technical biorefinery concepts to economic scenarios, with a particular focus on the so-called 'whole crop biorefinery' utilising carbohydrates, lignin, oils and fibres. The acceptance of biorefineries and bio-based products, still in

their infancy, amongst policy-makers, consumers and industry is a key issue that is being surveyed in Biopol. The final output is to be a report on promising biorefinery types and locations, suggestions for beneficial demonstration projects and an analysis of policy barriers and environmental performance.

Biorefinery Euroview involves 6 partners from 4 countries (France, Belgium, Hungary and Finland) plus 2 Europe-wide industry organisations representing the pulp and paper and biotechnology sectors. The project work packages are largely coincident with those of Biopol and are coordinated to ensure exchange of ideas and the widest geographical coverage. At its present half-way point, the project is concluding the initial tasks of identification, classification and mapping of existing biorefineries. Relevant socio-economic factors and existing policies have been surveyed and scenarios are under development based on identified resource availability and technological trajectories. The next year's work schedule aims at a synthesis of this data into an assessment of selected scenarios and recommendations for best practice and future policies.

Report of Proceedings

The workshop began with introductions from the coordinators of the two projects, Bert Annevelink (Wageningen University Agrotechnology & Foodinnovations, Netherlands) from Biopol, and Christophe Luguel (Association Industries & Agro-Resources, France). Both coordinators gave a very warm welcome to all participants and expressed their anticipation for a highly interactive day with much constructive feedback on the presentations and questions raised. The timeliness of the workshop was stressed as both projects are entering a critical phase of focusing efforts on the key findings from the first year of research.

Welcome from the European Commission

Piero Venturi, Scientific Officer of the projects, welcomed the participants on behalf of the European Commission and described how biorefineries had, since the conception of the projects, become one of the key issues in European research. He clearly outlined the potential for biorefinery research to contribute to European economy through its influence on policies such as energy, trade, agriculture and environment.

Dr. Venturi highlighted the Commission's recent Lead Market Initiative as a mechanism of interest for biobased materials that were identified as one of the six emerging lead markets. He also took the opportunity to announce that, in the call KBBE-2008-2B, there will be also a CSA project funded until a maximum of 1 million Euro by the EC on 'Life Cycle Assessment (LCA) for integrated biorefineries'. Furthermore, a Joint Call on Biorefinery with a total budget of 57 MEuro organised jointly by Directorate Agriculture, Energy, Materials and Environment of DG RTD will be published soon.

In summing up, Dr. Venturi told the audience that the Commission has the creation of a roadmap towards future development as a short-term target. In order to optimise

allocation of the Commission's funds for R&D towards genuine bottlenecks he said that they would be glad to have the opinions of participants on every topic in this area.

'Definition and technical status of biorefineries'

Prof. Birgit Kamm (FI biopos e.V., Germany) and Prof. Wim Soetaert (Univ. Gent, Belgium) followed the welcome speeches with a presentation of the technologies employed in biorefineries and routes to their integration. A selection of such integrated concepts were introduced, and it was explained that definitions can be delineated on the basis of either feedstock or technology, which gives rise to both overlap and synergies between the concepts. However, both Professors Kamm and Soetaert were agreed that four main concepts can be identified.

The first of these is a 'green biorefinery' using green plant matter. The inputs include grass, alfalfa or clover, which is less chemically stable compared to other crops and has some of the highest annual crops yield per hectare. As with each of the biorefinery processing schemes, the first step is one of mechanical separation. The subsequent steps in the process chain yield high value chemicals such as proteins and cosmetics precursors, and also fuels and platform chemicals such as ethanol, lactic acid and biogas via processing of the green juices and solid residues.

The other three concepts take mature crops such as cereals, lignocellulosic fibres or oilseeds and apply a range of technologies to extract valuable products from the entire feedstock. Prof. Kamm indicated the status of some of these technologies with examples of first and second generation (demonstration) biofuels plants in Europe and globally. The message from this presentation was that the biomass resources under consideration are suited to different processing methods depending on their content of carbohydrates, oils, proteins and lignin, and that this determines the attractiveness of either biological or thermochemical routes.

This presentation provided an excellent insight into the technologies and product areas under consideration in the two projects. It justified the need to study different feedstocks and types of process integration separately but also raised awareness of the fluidity of biorefinery concepts that arises as the outputs of one process can be suitable inputs to a different biorefinery facility. As pointed out by Prof. Soetaert, biorefinery concepts are becoming increasingly complicated as new technologies emerge, but the four main types presented can usefully underpin research in this field.

'Mapping of EU industry and biorefineries'

The second presentation of the morning session was given by Dr. Vincent Steinmetz (CARINNA, France) and Prof. Klaus Menrad (FH Weihenstephan, Germany). Initial results of a collaborative survey undertaken by Biopol and Biorefinery Euroview were presented. The survey gathers results from 110 industrial actors in Europe working in the relevant sectors of Sugar & Starch, Pulp & Paper, Chemicals, Petroleum and Biofuels. The objective of the survey is to map current biorefinery activities in Europe and collect data on the industrial acceptance of biorefinery concepts, feedstocks, products and future actions.

The initial results showed some important trends. The locations of activities were spread across 19 countries and split quite evenly between the different sectors*. Of the firms who were surveyed, approximately 25% of their combined 40 billion Euro total annual sales were from bio-based products. The results showed a good correlation between existing biomass processing activities in Europe and the future biorefinery concepts under consideration. 80% of the active firms considered that their activities fitted within the scope of these concepts and 75% of firms considered that the biorefinery concept could be implemented in their business. Interestingly, the most pessimistic sector with regard to biorefinery implementation was the chemical industry, possibly for reasons of unfamiliarity, scale and risk compared to petrochemicals.

Another relevant result of the questionnaire was a statistical grouping around five factors needing to be addressed for the advancement of biorefineries. In order of assigned importance these were: R&D and feedstock issues; skills and interest in industry; financial resources; markets for products; knowledge transfer. Addressing the first of these might lower the identified barriers of high investment costs, variable feedstock quality, immature technology, and the low price of fossil feedstock.

The main message from this presentation was that there is already early biorefinery-type industrial activity in Europe, but that its expansion is dependent on industry acceptance which is presently hindered by a number of key factors. Whilst it is hoped that more responses to the survey might be forthcoming in the next few weeks, there is confidence in the data as it corresponds well to results of a similar survey in Canada.

‘EU & national policy regimes affecting biorefineries’

An objective of both projects is to catalogue existing policies that serve to advance or retard the development of biorefineries. The findings of this exercise were presented to the workshop by Camille Burel (Europabio, Brussels) and Dr. Philip Peck (Lund University IIIIEE, Sweden).

At the EU level there are identifiable policies affecting each of the industrial stages – feedstock, technology, markets. Some of these are actually serving as barriers at present. The Common Agricultural Policy (CAP) and directives on waste management were highlighted as policy areas that could assist biorefineries, but also had the potential to create negative impacts unless carefully implemented. CAP is crucial to the provision of reliable and sustainable feedstock at attractive prices, yet has been known to generate incentives for farmers to move away from industrial crop production as political support can alter during transposition. Involving the non-food biomass sector in the CAP policy procedure is considered important in this regard..

The biorefinery concepts demand integration, through partnerships between previously unrelated industries, through new interconnections between processes, and through physical clustering of new ventures in close proximity. This raises a clear question of coherence and coordination of policy. The Lead Market Initiative and Framework Directives were cited as examples of cross-cutting policy that provide

* With the caveat that the sugar & starch industry was relatively under-represented and there was a high concentration of respondents in Germany and The Netherlands.

opportunities for coordination. New financing models and tax incentives for innovative types of industrial integration were recommended in this area.

In the forestry sector the existing Technology Platform and Action Plan were listed as the most relevant policy tools. In the environment sphere the need to incorporate new materials, such as biodegradable plastics, into waste management policy is emphasised alongside the uncertain treatment of chemical and biological processes in IPPC[†]. On the subject of market development the use of standards, labels and public procurement were identified as existing policy measures that have worked for specific products but require more concentrated efforts. Likewise, voluntary and mandatory targets are in effect in some countries, such as for mulching films in Italy and France, and can be effective in stimulating demand. However, it was suggested that combinations of these instruments could be required to stimulate the entire supply chain, without over-reliance on direct subsidies.

A concluding message of Ms. Burel's presentation was that policy-makers need to identify what role they desire from biorefineries and then target the entire supply chain. This theme was taken up by Dr. Peck who presented preliminary results of a survey of political understanding and acceptance of biorefinery concepts. An online questionnaire has been used to target those policy makers who are in positions to influence national policy on biorefineries and advanced bioenergy systems. Their responses have been calibrated against a group of scientific experts on the subject.

Initial results indicate that the people dealing with these issues are generally highly informed. An apparent conclusion is that the course of the biofuels debate is affecting views on biorefineries, with signals of contention on the subjects of food vs. fuel, GMOs and deforestation. There is also a clear sense of a disparity between EU and national policies. One pertinent result so far is that standards and guidelines for aspects of the biorefinery value chain are almost unanimously advocated.

Survey results from a further three countries will shortly be incorporated to complete the picture. This is expected to provide input to the project conclusions on where policy attention might focus in order to overcome barriers of understanding within national governments.

Afternoon Discussion Sessions (confidential)

The workshop proceeded with 6 interactive sessions in the afternoon. The first three of these discussions (A-C) were conducted simultaneously and focused on the results presented during the morning. These discussions were of high value to the project in identifying gaps in its research and gaining additional input to its results. The second set of discussions (D-F) centred on the project objectives for the next 12 months.

Concluding remarks

The workshop was wrapped up with a summary presentation of each of the above sessions, which served as an excellent insight into the position of the debate on biorefineries in Europe. Christophe Luguel closed the afternoon session with an explanation of the next steps for the project and expressed the intention of the two

[†] EU Integrated Pollution Prevention and Control Directive

projects to incorporate the outputs of the workshop into a roadmap for research and activities on biorefineries in Europe. The coordinators of Biopol and Biorefinery Euroview thanked all participants for their valuable input and looked forward to welcoming them in early 2009 to the final workshop for presentation and discussion of the project results and conclusions.

Projects partners:



- Industries and Agro-Resources Cluster (F), coordinator of the project – www.iar-pole.com
- Agrobiopôle Wallon (BE) – www.agrobiopole.be
- Confederation of European Paper Industry- CEPI – www.cepi.org
- European Association on Biotechnology - Europabio – www.europabio.be
- Department Europol'Agro, Champagne-Ardenne Research and INNOvation Agency - CARINNA (F) – www.carinna.fr
- Ghent University (BE) – www.ugent.be/en
- Regional Development Agency of the North Great Plain (HU) – www.eszakafold.hu
- Technical Research Centre of Finland - VTT(FI) – www.vtt.fi/?lang=en

BIOPOL



- Wageningen UR - Agrotechnology and Food Sciences Group, coordinator of the project – www.asfsg.wur.nl/UK
- Research Institute Biopos e.V. – www.biorefinery.de
- Imperial College of Science Technology and Medicine – www.imperial.ac.uk/icept
- Lund University – www.iiee.lu.se
- Institute for Fuels and Renewable Energy – www.clpn.pl
- Energy research Centre of the Netherlands (ECN) – www.ecn.nl
- University of Applied Sciences of Weihenstephan – www.wz-straubing.de
- Institute of Communication and Computer systems – www.iccs.gr