

The Future Role of Biorefining in the Bioeconomy

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A stakeholder dialogue

Workshop GBS2015



Chairs: Gerfried Jungmeier (JOANNEUM RESEARCH, Austria).

Time: 11:30 – 13:00, 26th November 2015

Aim: To present and discuss the potential role of biorefining and its stakeholders in the transition to a future BioEconomy in which biomass will be sustainably used for the synergistic co-production of food, feed, biobased products and bioenergy.

Key topics:

- Views and roles of different stakeholders on the transition towards a BioEconomy and/or a Circular Economy; who will take the lead?
- Role of Biorefining within this transition process

- Main drivers that support this transition process
- Main technical AND non-technical barriers that hinder this transition process
- Role of national and international governments
- Supporting policies & instruments.

Agenda:

- 11:30 – 11:40 **Welcome and Intro of IEA Bioenergy Task42 “Biorefining”**, *Gerfried Jungmeier, Joanneum Research, Austria*
- 11:40 – 11:50 **Novamont: An Integrated Approach to Bioeconomy and Biochemicals**, *Fabio Fava, University of Bologna, Italy (substituting for Giulia Gregori, Novamont, Italy)*
- 11:50 – 12:00 **"Integrated Biorefineries" - Recommendations from the SCAR¹ Collaborative Working Group**, *Stefan Rauschen, Juelich Division Bioeconomy, Germany*
- 12:00 – 12:10 **Results Survey of Major Bio(based) Economy Strategies in the 22 Member Countries of IEA Bioenergy**, *Martin Beermann, Joanneum Research, Austria*
- 12:10 – 12:20 **Results Survey on the Role of Industry in a Transition Towards the Bioeconomy in Relation to Biorefinery**, *Henning Jorgensen, Technical University of Denmark, Denmark*
- 12:-20 – 13:00 **Panel Discussion: Moderator Gerfried Jungmeier, Panelists from speakers and interaction with the audience.**

Key messages from presentations:

Novamont: An Integrated Approach to Bioeconomy and Biochemicals, *Fabio Fava, University of Bologna, Italy*

- 1) The first challenge is a cultural one: the transition from our current resource intensive growth model to a resource efficient growth model, towards a circular economy.
- 2) Bioeconomy is not just dealing with renewable resources, but with territorial regeneration, addressing issues such as the recovery of abandoned land for sustainable productions, soil improvement, reindustrialization of deindustrialized/polluted sites, rethinking of agricultural value chains not economically sustainable through new integrated technologies, etc..
- 3) In order for Europe to have a solid competitive advantage vis a vis global players, we need to focus where know-how, technology and innovation components are much stronger than those offered by the other countries: added value products produced by integrated biorefineries able to leverage on sustainable feedstock available locally in an efficient manner.

"Integrated Biorefineries" - Recommendations from the SCAR Collaborative Working Group, *Stefan Rauschen, Juelich Division Bioeconomy, Germany*

1. Target funding instruments to capture the complete innovation cycle up to demonstration: There is a gap in funding for demonstration activities, at Member State and EU level. For SMEs, it is difficult to get even small amounts of finances for certain activities and investments, despite

¹ Standing Committee on Agricultural Research

their innovation potential. Access to finance for demo scale activities (including equipment, CAPEX) must be expanded and made easier.

2. Use other instruments to create market opportunities: The large amount of R&D spending has built the basis for a technology push but there have been too little activities geared to market creation. Other instruments such as procurement, subsidies, regulation, “Green Deals” must be used to create markets (in a similar way to the BioPreferred Scheme in the USA).
3. Involve existing facilities in research programs; give vouchers for access to SMEs: A number of open pilot and demonstration facilities are available. The access to these existing installations must be made possible EU-wide, especially with financial means for SMEs. ERA-Nets should involve pilots and demonstration facilities, vouchers for use of pilots and other open access facilities for development should be made available under Horizon 2020.
4. Network existing infrastructures: The existing infrastructures would benefit from an exchange of knowledge, closer coordination and developing a common voice. Networking of existing infrastructures could be facilitated via a dedicated call under the Infrastructures part of Horizon 2020. This could also lead to the identification and closing of gaps that might exist.
5. Embrace different kinds of biorefineries with a regional perspective: Biorefineries can come in different shapes and sizes (specialized vs. general; centralized integrated vs. small-scale, mobile) offering a multitude of business and employment opportunities, especially at regional level. All of them should be considered valid options in implementing the bioeconomy and should receive appropriate funding.

Results Survey of Major Bio(based) Economy Strategies in the 22 Member Countries of IEA Bioenergy,
Martin Beermann, Joanneum Research, Austria

1. The majority of BioEconomy strategies are governmental “top-down” strategies, a few countries currently follow a “bottom-up” approach with regional and industrial strategies, even fewer combine both approaches
2. The economic priority sectors are in all countries the primary sector for (sustainable) biomass supply, bioenergy production, and in most countries the chemical industry
3. The position of bioenergy, following the increased competition for biomass, is stated to be equally important to other economic sectors in most countries
4. Measurable targets for BioEconomy (market) development have been defined only in a very limited number of strategies so far. Targets and indicators are mainly economically oriented (e.g. value added, public and private capital spending, market development), related to additional job creation, and to environmental aspects of biomass production and biobased industries
5. Sustainability is an ever-present term in all strategies; however the emphasis of the strategic objectives is in all strategies on enhancing the economy; resource availability, biomass production and its impacts on environment and land use, but also food supply, is often only addressed to a limited extent, in particular if the biomass is not domestic, but comes from elsewhere

Results Survey on the Role of Industry in a Transition Towards the Bioeconomy in Relation to Biorefinery,
Henning Jorgensen, Technical University of Denmark, Denmark

1. The chemical industry and the biofuels sector are the sectors that are going to drive the development and transition towards a BE

2. The main barrier for developing a BE is profitability and lack of appropriate policies (political stability to ensure long term planning and commitment)
3. Profitability is also limiting collaboration between stakeholders in distinct market sectors – there is a need to see economical benefits => good examples needs to be better exposed and communicated
4. It is a competitive market and trust between stakeholders is needed in order to build the synergies needed for driving the BioEconomy development
5. Funding programs that facilitates/encourage collaboration across traditional market sectors can stimulate the development
6. But also cross sectorial networks could facilitate collaboration (Task 42 role)
7. Task 42 can play an active role by monitoring and communicate the progress within demonstration of technologies and highlighting success stories.

Panel Discussion:

1. Audience: about 70% from research and 30% other stakeholders
2. GMO use in BioEconomy / Biorefineries – to be included or excluded?

Relevant issue but difficult to take a final decision, because there are risks and opportunities e.g. insulin production is one positive example.

In general GMO derived biomass is not very much wanted due to public concerns, but maybe more related to EU. Even more difficult to answer the relevance of GMO for conversion processes as modified organisms are already in use in the food industry.

An important aspect regarding a discussion of GMO is if they are used in nature (GM plants) or contained in controlled environments with minimum risk of release to nature (fermentation).

3. Will biorefineries only be possible on large scale?

There is no general answer, scale depend on site specific conditions and the product.

Scale depends on products, e.g. chemical production usually requires large scale facilities.

Scale is also related to complexity of technology, e.g. low tech biogas production is possible in small scale.

As a rule of thumb, high value-added products, e.g. pharmaceuticals can be produced at small scale while low value-added products, e.g. bulk chemicals require large scale facilities due to the economy-of-scale.

4. Consumer perception: How does society see Biorefineries?

Big industrial facilities are usually not perceived as “friendly to the people and region”, smaller units might be more “trusted”

The question was not addressed in the survey (Survey on the Role of Industry in a Transition Towards the Bioeconomy in Relation to Biorefinery), hence, no answers were received.

However, consumer issues are considered as relevant and related questions might be included in the next survey.

5. How to close the gap of financing pilot and demo facilities?

Need for increased public funding and investment support. However, if the market would pull then there were no gaps. Demo scale is relevant for commercialisation and at current conditions most bio-based products are not cost-competitive, niche products are an exception.

6. Will micro-biological processes be a key process in biorefineries?

Yes, microbes are integral part of (, important or most) biorefinery processes, except Thermochemical conversion and chemical-catalytic processes do not require microorganisms.

The development of new fermentation processes is more challenging, while the scale-up is usually not an issue

7. How is IEA addressing the sectors using fossil carbon to stimulate change to renewable/biogenic carbon?

In the historic development the IEA is mainly addressing the energy sector and its use of Carbon and carbon emissions.

But new developments in IEA see the Bioenergy as a part of the biobased industry and BioEconomy so the integrated use of biomass for energy and products becomes more and more relevant in the IEA activities.

The IEA Bioenergy Task 42 “Biorefining” started in 2007 with the main focus of coproducing food, feed, energy and materials in sustainable processes in biorefineries to maximise the value chain based benefits of integrated biomass use.

8. In which biorefinery should we invest now?

An important biomass resource is residues from existing biobased industries (mainly food industry), which should be used in biorefineries also to produce new types of biobased products (food, chemicals ...).

Summary and conclusions:

1. Views and roles of different stakeholders on the transition towards a BioEconomy and/or a Circular Economy; who will take the lead?

- Currently researchers seem to be the main leaders towards a BioEconomy.
- From feedstock side it is the agriculture and the forestry,
- from the industry side the biofuel and chemical industry and maybe also P&P industry and energy sector
- There are established sectors using already with biomass, e.g. food, chemicals, p&p and partly energy. They will most likely remain and thus be an integral part of a future bioeconomy.
- Currently bioeconomy is a political concept and will remain as such as long as bio-based products will become cost-competitive or the market condition will change.

2. Role of Biorefining within this transition process:

- Biorefinery is one but not the only relevant element for a BioEconomy
- The food sector currently is the biggest existing part of BioEconomy

- Existing industrial infrastructures is an attractive starting point to further develop the BioEconomy by implementing new biorefineries
3. Main drivers that support this transition process:
- Reach more sustainability
 - Use more renewable materials and energy
 - Substitute fossil based resources
 - BUT: TODAY there is no real and broad market drive. The transition depends on the political framework conditions; e.g. if fossil raw material industry is allowed to externalize costs and the bio-based industry is forced to be sustainable, then there won't be a market pull or transition as long as feedstock supply is not endangered. SO: Currently there is no level playing field.
4. Main technical AND non-technical barriers that hinder this transition process
- Profitability of new innovative biorefineries
 - Availability of sustainable biomass
 - Trust of various stakeholders in the BioEconomy and their beneficial cooperation
 - Efficient and cost effective technologies
 - Markets and acceptability of new biogenic products
5. Role of national and international governments:
- “bottom up” and “top down” approaches necessary
 - Indicators to evaluate the benefits/impacts of the BioEconomy
 - High lighten success stories
6. Supporting policies & instruments:
- Subsidies/financing of pilot and demo plants: Money (from industry and investors) will become available for scale up if the market pulls. If there is no business case there won't be a relevant market impact; this situation will not change whether or not demo plants are publicly financed.
 - Funding or cutting hidden subsidies of non-sustainable sectors.
 - Introducing a proper carbon-tax and redistributing the money among sustainable industrial activities might also be an option.
 - Targets for the BioEconomy for products and energy