The role of industry in a transition towards the BioEconomy (BE) in relation to biorefinery
Circular BioEconomy

- Nutrition
- Paper, fibers etc.
- Energy
- Diversification
- Jobs
- Agriculture
- Transportation

And more...

- Efficient use of our natural resources
- Minerals, water
- Business case security
- Sugars, microorganisms, Biochemicals, Manufacturing, Recycling
- Chemicals, Materials

Framework Workshop

Bron: Mosmuller, BFF 2013
What are the changing roles of the different industrial stakeholders (agro, energy, chemical, feed/food industry) in the transition to a BE?

- From a distinct market player to a link in a full multi-product sustainable value chain?
- Co-operation?
- Who will take the lead?

What are the opportunities for upgrading existing industrial infrastructures to sustainable biorefineries?

- Using existing industrial infrastructures as flying start for BR deployment?
- Which infrastructures are most promising?
- Up-/downstream technology integration options?
# Programme

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<tr>
<th>Intro workshop</th>
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<tr>
<td>Intro workshop</td>
<td>René van Ree (IEA-T42/WageningenUR)</td>
<td>5 min</td>
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<tr>
<td>Intro IEA Bioenergy Task42 Biorefining</td>
<td>René van Ree</td>
<td>15 min</td>
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<tr>
<td>The role of the energy sector in the transition to a BE</td>
<td>Benjamin Tromp (RWE/Essent)</td>
<td>30 min</td>
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<td>Approach integration biorefineries in existing industrial infrastructures</td>
<td>Gerfried Jungmeier (IEA-T42/Joanneum Research)</td>
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<td>Coffee break</td>
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<td>Questionnaire based public consultation</td>
<td>Henning Jørgensen (IEA-T42/DTU)</td>
<td>40 min</td>
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<td>Concluding remarks</td>
<td>René van Ree</td>
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Sustainable processing of biomass for marketable food & feed ingredients, chemicals & materials, fuels & energy

René van Ree

Co-ordinator IEA Bioenergy Task42
i-SUP2014, Antwerp, Belgium, Wednesday afternoon 3 September 2014

www.IEA-Bioenergy.Task42-Biorefineries.com
Intro

Framework T42 = Circular BioEconomy

Sustainable & Synergetic Production and Valorisation of Biomass to Food AND Non-food

=>

Biorefinery-based value chain development and implementation

Raw materials
Agro-cultural crops / Wood
Aquatic biomass
Primary (agro) residues
Secondary (process) residues
Tertiary (post consumer) residues

Food/Feed Ingredients, Bio-based products & Bioenergy
Pharmaceuticals / Cosmetics
Chemicals / Materials
Fuels
Energy
Heat
Circular BioEconomy

- Based on full sustainable value chains
- Relatively scarce raw materials availability
- Need for high-efficient zero waste conversion processes

Biorefinery approach is main driver for large-scale biomass implementation in the future BioEconomy
Energy (fuel) vs. Product (chemicals, materials) driven Biorefineries

• **Energy (fuel) driven BRs**
  + Infrastructure (value chains) exists (power plants, digestion plants, biofuel plants)
  - Profitability questionable (often financial governmental support necessary and/or regulated market)

  Upgrading of existing plants / value chains to multi-product BRs to improve full value chain sustainability

• **Product (food/feed ingredients, chemicals, materials) driven BRs**
  - Only limited BBPs facilities in operation yet
  - Chain composing key technologies often still at R&D-phase
  + High potential (interested stakeholders, advanced properties)

  Deploying new high efficient sustainable biorefinery-based value chains co-producing BBPs & BE

*Bioenergy will be the lubricating oil in a future Circular BioEconomy !!!*
Partnering countries (11) and national contacts

Australia – Geoff Bell
Austria – Gerfried Jungmeier
Canada – Maria Wellisch
Denmark – Claus Felby/Henning Jorgensen
Germany – Heinz Stichnothe
Ireland – Matthew Clancy
Italy – Isabella De Bari
Japan – Shinya Kimura
Netherlands – René van Ree/Ed de Jong
New Zealand – Kirk Torr
U.S. – Jim Spaeth
Results so far ....

• Biorefinery definition ....
• Biorefinery classification system ...
  “a <sum platforms> biorefinery for the production of <sum products> from <sum raw materials>”
• Biorefinery Fact Sheets
• Bi-annual Task Progress Meetings in participating countries coupled to industrial stakeholder events and excursions
• Task reports
  • Country reports
  • Bio-based Chemicals (Feb 2012)
  • Biofuel-driven Biorefineries (Feb 2013)
  • Green Building Blocks for Bio-based Plastics (March 2013)
  • IEA Bioenergy Task42 Brochure (August 2014)
• Biorefinery Training Courses (Amsterdam 2010, Paris 2011, Wageningen 2012, Budapest 2014)
• ....
Results so far .... Reports

Bio-based Chemicals

Value Added Products from Biorefineries

Biofuel-driven Biorefineries

A Selection of the Most Promising Biorefinery Concepts to Produce Large Volumes of Road Transportation Fuels by 2035

Green building blocks for biobased plastics

Task 42 Biorefining
Programme 2014-2016

**Goal** To contribute to the development and implementation of sustainable biorefineries – as part of highly efficient zero-waste value chains – synergistically producing Bio-based Food and Non-food Products as base for a global BioEconomy.

**Activities 2013-2015**
1. Assessment market deployment potential integrated BRs
2. **Support industrial/SME stakeholders finding their position in the BE**
3. Optimal sustainable biomass valorisation using market pull approach
4. Policy advice
5. Knowledge dissemination (best practices, ...)
6. Training
1. Assessing market deployment aspects integrated biorefineries – Description Activities

1.1 Tackling technical and non-technical market deployment barriers
- Policies/regulations
- Level-playing-field
- Full chain stakeholder involvement: assessment & learning from each other
- Technical barriers: (best practices)

1.2 Identifying disruptive / game changing technologies
- Type of technology
- State-of-the-art: web, literature & patent assessment
- IP position
- Stakeholders involved

1.3 Central vs. decentral processing
- Central processing vs. regional processing: TEE-assessment 5 country
- Economy-of-Scale vs. Economy-of-Duplication: specific value chains, best-practices, policy recomm.
- International workshop (ws1)

1.4 Biorefinery-Complexity-Index (BCI)
- Indication complexity BR facility
- Time-to-market
- Stakeholders involvement: Classification system -> BCI – see lecture
- Initial investment costs
- Operational costs: Gerfried Jungmeier
2. Stakeholder support finding their position in a future BioEconomy – Description Activities

2.1 Role involved market sectors

- Energy sector
- Biofuel sector
- Chemical sector
- Agro(food/feed) sector
- Co-operation best practices

Assessment current roles, potential future roles, and roles during transition (co-operation !)

International Workshop

2.2 Upgrading of existing industrial infrastructures to Biorefinerries

- Power plants
- Biofuel facilities (pyrolysis-based in coop. T34)
- Oil refineries
- Pulp/paper industry
- Food industry

TEE-assessments
Report & glossy leaflets
International Workshop
in cooperation with T39

2.3 Factsheets major biorefineries / national case-studies

- Success stories
- Classification
- Mass/energy balances
- Capacity
- Costs
- Sustainability issues

Three per country
See lecture
Gerfried Jungmeier

2.4 Added-value products from energy-driven biorefineries

- Update 2012 Bio-based Chemicals Report
- New report on Proteins for Food and Non-food Applications
3. Analysing optimal sustainable biomass valorisation approaches for Food and Non-food applications – Act. Description

### 3.1 Sustainability assessment toolbox testing (T42/T39)
- Development LEEAFF procedure for BR SA
- One case-study per country
- Land use
- Environment
- Employment
- Acceptability (social aspects)
- Financial aspects
- Feedstock issues

### 3.2 Sustainable bioenergy supply chains (T43/T42/T40/T39/T38/T29)
- Partnering in Strategic Fund Project (50% budget Task42, 50% budget SF)

### 3.3 Future market demand biomass for the BioEconomy (T40/T42)
- Supply, trade, demand biomass for BioEconomy
- Improved & new value chains
- Task42: types biorefineries = f(time, location, feedstock use)
- Desk study and international workshop (ws3)

### 3.4 Optimal sustainable biomass valorisation (T42/others)
- Identification BioEconomy Strategies in IEA Bioenergy Member Countries: current status, approaches and opportunities for IEA Bioenergy
4. Preparing policy advise on further needs – Activities Description

4.1 “Roadmap” Biorefinery (T42/IEA Headquarters)
- Contributing to potential project to be defined by IEA Headquarters on “Sustainable Biomass Valorisation by the Biorefining Approach”

No activity – skipped from work programme

4.2 Biorefinery (related) policies in participating countries
- Assessment BR (related) policies in participating countries
- Assessment BR (related) at EC, US, ... Level
- Distribution info to GOs
- International workshop (ws4) on biorefinery (related) policy development and implementation at national and international level

Scheduled for 2015

4.3 Country reporting
- Current status and developments within partnering countries
- Reports prepared in PPT-format once – and updated regularly
- Reports on Task42 website

The planning is that a country report for all countries is available on the website by the end of 2014
5. Organising knowledge dissemination activities

Activities Description

5.1 Bi-annual Task meetings + Tele-conferences in between
- Bi-annual closed internal Task42 progress meetings
- Bi-annual coupled open (industrial) stakeholder meetings
- Bi-annual coupled excursions
  

5.2 Annual Task42 meetings at national level
- Organised minimally once-a-year by the national Task representative

5.3 Task42 website
- www.iea-bioenergy.task42-biorefineries.com

5.4 Task42 newsletters
- After every T42 meeting sent to national contacts, and put on the website,

5.5 Task42 reports
- Activity reports (10)
- Country reports (1 ppt per country + updates)
- Task meeting reports (2 a year)
- Brochure, poster, leaflets -> New T42 Brochure will be available in Summer 2014!

5.6 International workshops/seminars (6); ind. stakeholder meetings (6)
6. Developing and organising training activities – Task Description & Achievements so far

History

• One day training course
  • Ghent, Belgium, 12 June 2009
  • Amsterdam, NL, 13 September 2010
• Four day training course
  • Paris, France, 28 August 2011 – 01 September 2011 (120 att.)
  • Wageningen, NL, 29 October 2012 – 01 November 2012 (75 att.)

2013 – 2015

• Further development and updating
• Given minimally once-a-year in one of the partnering countries
• Lectures made available by web for teaching outside the EU
• Task42 financial involvement: paying travelling costs Task42 lecturers
• 3rd European Biorefining Training School, Budapest, Hungary, 7 – 10 July 2014
IEA Bioenergy
Task 42 Biorefining

Sustainable and synergetic processing of biomass into marketable food & feed ingredients, products (chemicals, materials) and energy (fuels, power, heat)

Content
Activities and results T42 so far
Descriptions, schemes, pictures of about 35 running Biorefineries worldwide

Available @ T42 website from 15 September 2014 !!!
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Part of the sub-activities are co-ordinated by country representatives
Thank you for your attention