



GLOBAL  
BIOECONOMY  
SUMMIT 2015

# IEA Workshop: The Future Role of Biorefining

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Chair: **Gerfried Jungmeier**, Wageningen UR

IEA Bioenergy

# The Role of Biorefining in the Bioeconomy

Parallel Workshop

organised by

**IEA Bioenergy Task42 Biorefining**

Thursday 26 November, 11:30 – 13:00



25 to 26 November  
Berlin, Germany

René van Ree, Gerfried Jungmeier  
Coordinator Task42 Biorefining  
November 2015



IEA Bioenergy, also known as the Implementing Agreement for a Programme of Research, Development and Demonstration on Bioenergy, functions within a Framework created by the International Energy Agency (IEA). Views, findings and publications of IEA Bioenergy do not necessarily represent the views or policies of the IEA Secretariat or of its individual Member countries.

# There is Competition for Different Biomass Uses

**Bioenergy**  
*(heat, electricity, transportation fuels)*



**Feed**

**Food**

*(e.g. vegetables, meat)*

**Biomaterials**

*(e.g. paper, construction material, chemicals, cotton, rubber, fertilizer)*

# The Most Sustainable Use of Biomass? – Example Maize

This plastic bag is made from maize, a renewable resource, and decomposes naturally



Do we need both for the BioEconomy?

This biofuel is made from maize, a renewable resource to reduce GHG emissions



# Corn fed cars are better for the environment.

All it takes is a little ethanol  
to reduce greenhouse gases and smog.  
Save money and the environment.  
Visit [www.greenfuels.org](http://www.greenfuels.org)



Growing cleaner, affordable fuels.



Canadian  
Renewable Fuels  
Association

# The Answer!

Is this true?

Is there  
(scientific)  
evidence?



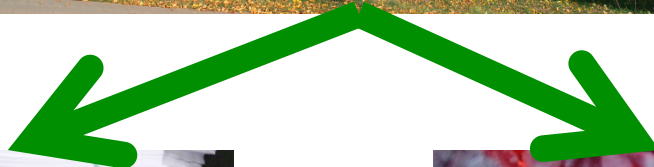
# How to Use a Tree?



Questions:

1) Which part of the tree do you mean?

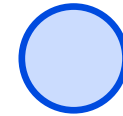
(stem, branches, tops, roots)



***Pulp & paper***



***Power & heat***



# How to Use a Tree?

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## Questions:

1) Which part of the tree do you mean?

(stem, branches, tops, roots)

2) Today or in future?

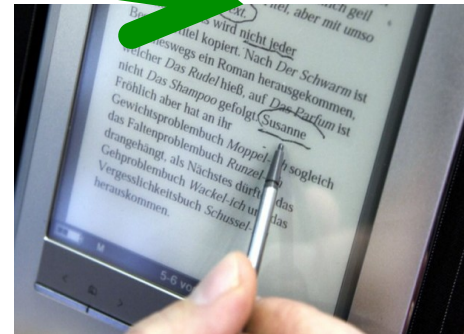
(bioplastic&biopower for e-book)



**Pulp & paper**



**Power & heat**



**Plastic & power**



# A Statement

“There is no scientific evidence that the material use of biomass provides greater sustainability benefits than the energetic use, or vice versa.

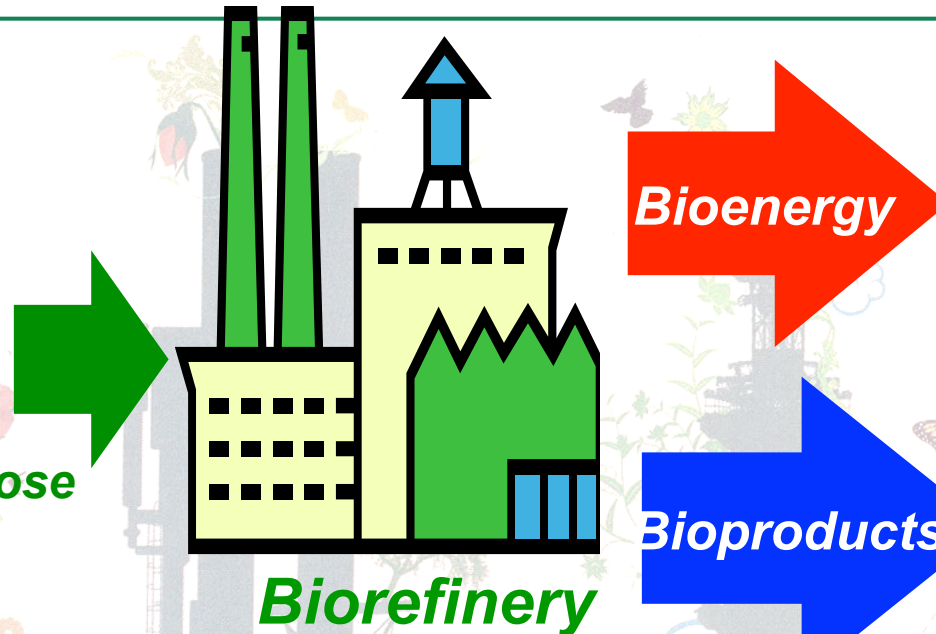
**BUT** there is evidence that the combined energetic and material use (“biorefining”) of biomass has the potential for large sustainability benefits.”



# This is a Biorefinery

## Biomass Resources

- oil
- starch
- sugar
- lignocellulose
- .....



- *liquid/gaseous transport biofuels*
- *electricity*
- *heat*
- *solid fuels*

- *bulk chemicals*
- *fine chemicals*
- *animal feed*
- *food*
- *pulp&paper*
- *materials*
- *fertilizer*
- *gases*
- *.....*

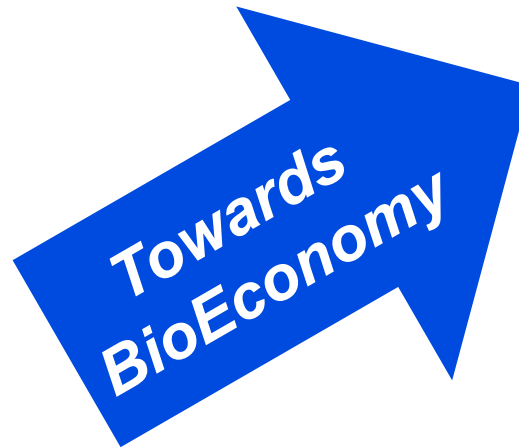
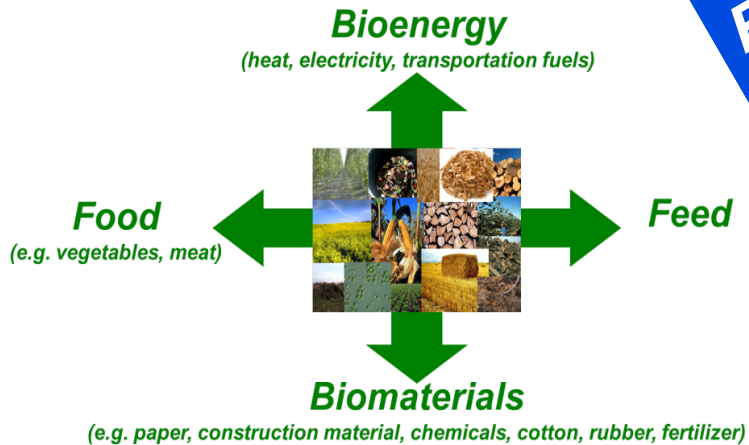
## Based on different conversion processes

- *Bio-chemical*
- *Thermo-chemical*
- *Physical-chemical*
- *Others*

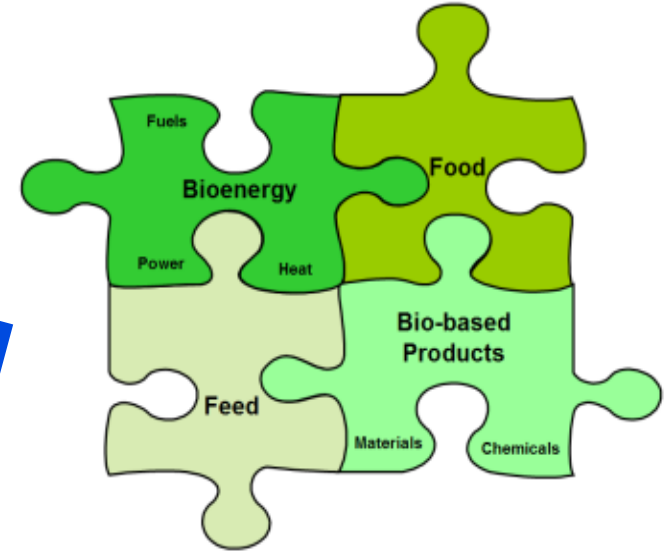
*“Biorefinery is the sustainable processing of biomass into a spectrum of marketable products”*

# The New Way in BioEconomy: From Competition to Integration

## Competition



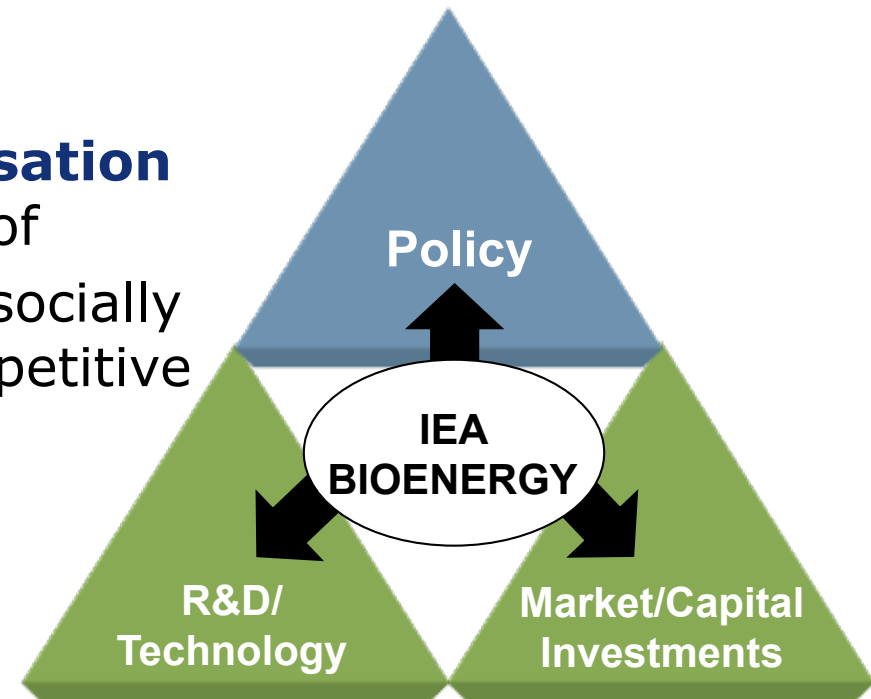
## Integration



# IEA Bioenergy

## Goal

- ✓ Facilitating **commercialisation** and market deployment of
- ✓ environmentally **sound**, socially acceptable and cost-competitive
- ✓ **bioenergy systems** and technologies ...



## Role

Independent body to give clear and verified **information on bioenergy**

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Task42 Biorefining

# IEA Bioenergy

## 23 contracting parties

- **ASIA/AFRICA**

- Australia
- Japan
- Korea
- New Zealand
- South Africa

- **AMERICA'S**

- Brazil
- Canada
- United States

- **EUROPE**

- Austria
- Belgium
- Croatia
- Denmark
- European Commission
- Finland
- France
- Germany
- Ireland
- Italy
- Netherlands
- Norway
- Sweden
- Switzerland
- United Kingdom

# Task42

## Activities in 2016

AT, AUS, CAN, DEN<sub>(tbc)</sub>, GER, IRE, IT, NL, US

- 1. Biorefinery Systems** – Analysis and assessment of biorefining in the whole value chain
- 2. Product Quality** – Reporting on related biobased products/ bioenergy standardisation, certification and policy activities
- 3. Evolving BioEconomy** – Analysing and advising on perspectives biorefining in a Circular BioEconomy
- 4. Communication, dissemination & training** – Knowledge exchange by stakeholder consultation, reporting and lecturing

# Goal of the Workshop

To present and discuss the potential **role of biorefining** and its stakeholders in the **transition** to a future **BioEconomy** in which biomass (from agriculture, forestry, residues, and aquaculture) is sustainably used for the synergistic co-production of:

- ✓ **human food / animal feed**
- ✓ **biobased products** (chemicals, materials)
- ✓ **bioenergy** (fuels, power and heat)
- ✓ **minerals**, ... (closing the loop)



IEA Bioenergy

Task42 Biorefining

# Key questions

- ✓ Who will take the **lead**?
- ✓ **Views and roles of stakeholders** in the transition to a BioEconomy as part of a Circular Economy
- ✓ **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**?

# NOVAMONT: AN INTEGRATED APPROACH TO BIOECONOMY AND BIOCHEMICALS

GIULIA GREGORI  
BERLIN  
26/11/2015



NOVAMONT



# NOVAMONT: WHO WE ARE

WORLD'S LEADING  
COMPANY IN THE SECTOR  
OF BIOPLASTICS AND  
BIOCHEMICALS FROM RRM

1996: RESEARCH CENTRE  
2014: 145 MIO/€ TURNOVER  
412 PEOPLE EMPLOYED

INDUSTRY



25-YEAR R&D EXPERIENCE  
7.2% OF TURNOVER  
20% OF EMPLOYEES  
~ 1,000 PATENTS

R&D



HUMAN  
CAPITAL

MORE THAN 260 TRAINING  
PROGRAMMES SINCE 2000 IN  
COLLABORATION WITH  
LEADING R&D INSTITUTIONS



# OUR DEVELOPMENT MODEL

## DEVELOPMENT MODEL OF INTEGRATED BIOREFINERY

Biorefinery integrated in the local area:

- ☞ primarily dedicated to the production of chemicals and high added-value products
- ☞ different local raw materials (low-input crops, scraps, etc.) – respect for local biodiversity
- ☞ use of marginal lands and re-industrialization of deindustrialized/no longer competitive sites
- ☞ integration of a wide and rising range of low-impact technologies and plants
- ☞ based on an interdisciplinary approach and interconnection with the world of farming, research, environment, consumers and with local institutions

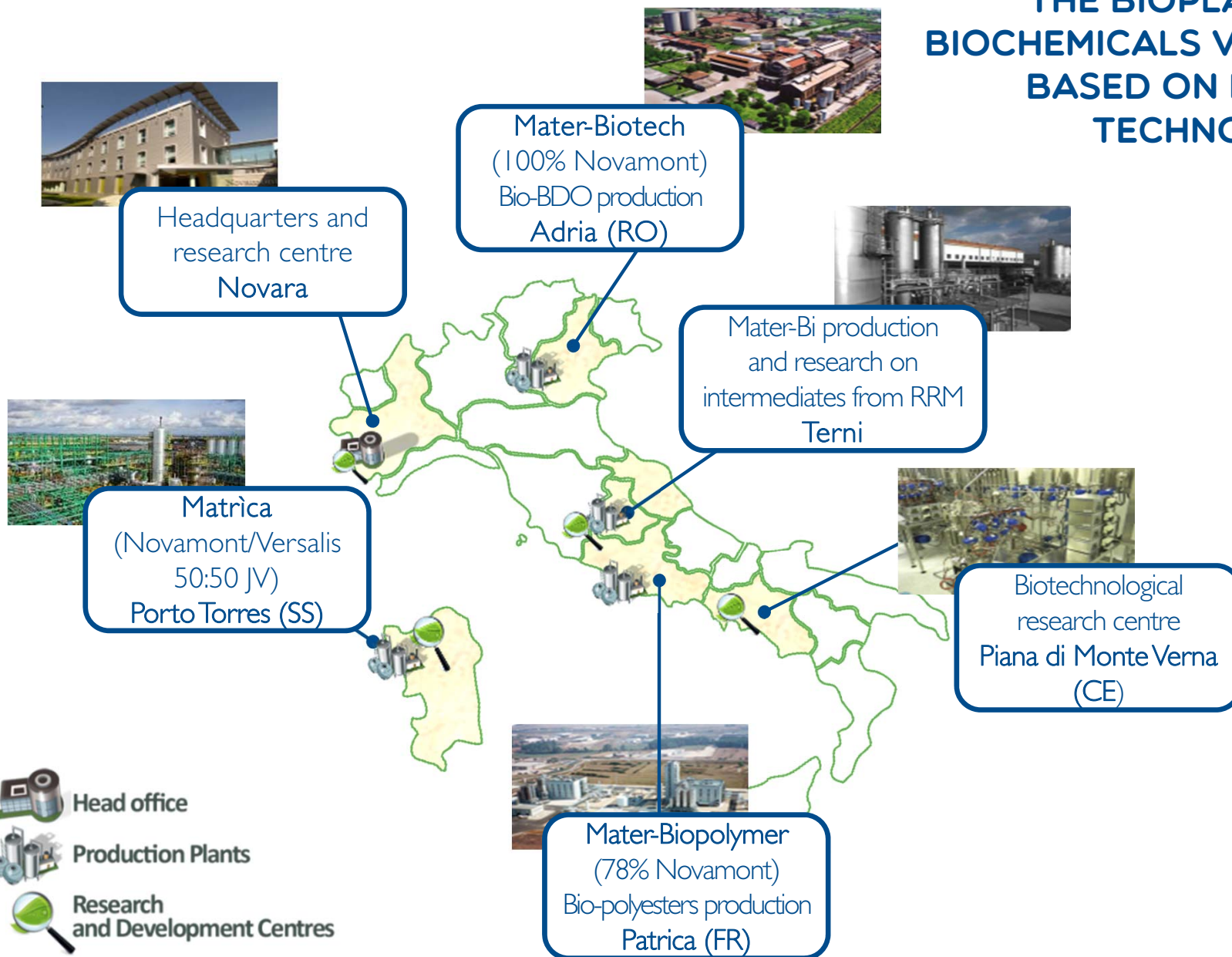
## PRODUCTS FROM THE BIOREFINERY

Innovative bioplastics and biochemicals based on renewable resources, which are biodegradable and compostable according to the most important international standards.

Solutions economically and environmentally sustainable in specific application sectors with a view to rethinking the overall system.

# NOVAMONT 'S NETWORK

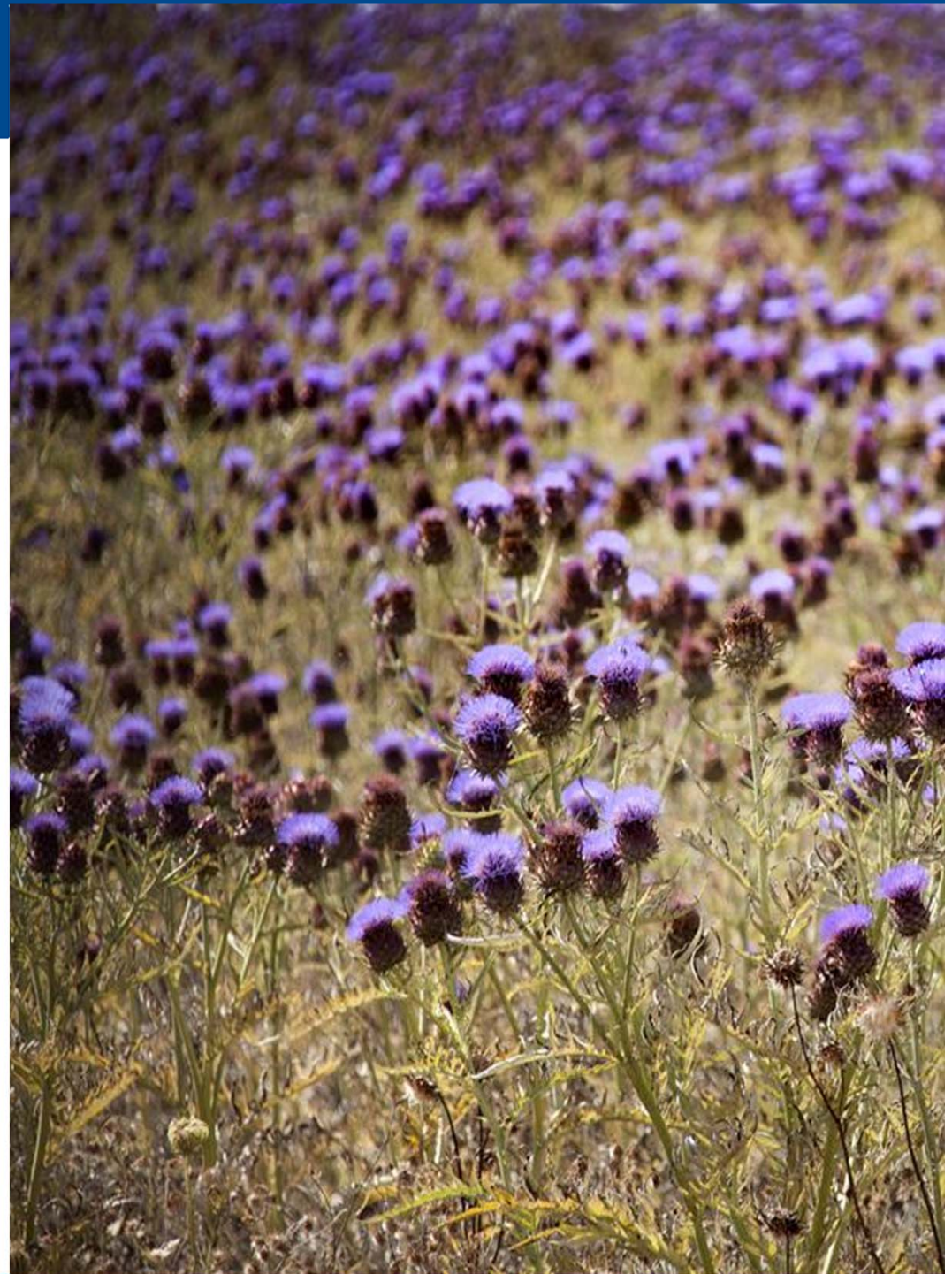
NETWORK OF SITES RELATED TO  
THE BIOPLASTICS AND  
BIOCHEMICALS VALUE CHAIN AND  
BASED ON NOVAMONT  
TECHNOLOGIES



# THE INNOVATION INDUSTRY...



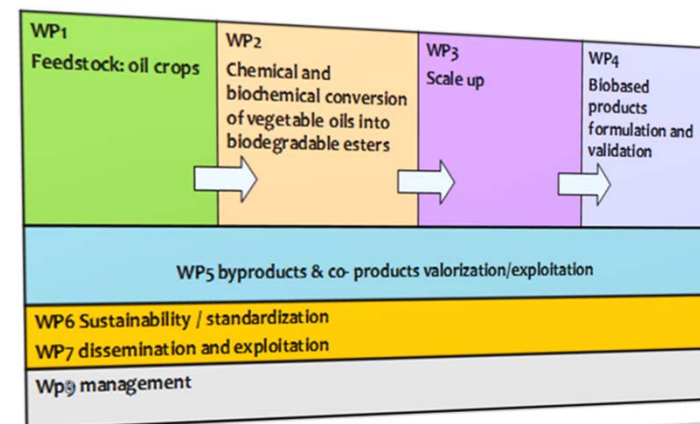
# ...MEETS THE AGRICULTURAL SECTOR



# FLAGSHIP FIRST2RUN



- ❑ Horizon 2020 / BBI-JU; Call: H2020-BBI-PPP-2014-1
- ❑ Topic: BBI.VC3.FI / Type of action: BBI-IA-FLAG
- ❑ Action type: innovation Action
- ❑ 6 partners from 4 different countries
- ❑ The total effort in the project is relevant, being 1.665 MMs with a total eligible cost of 25.022.688,75 € and around 30 mil € of estimated Additional Activities (Granted: 16.995.882,00 €)



This project has received funding from the Bio Based Industries under European Union's Horizon 2020 research and innovation programme under grant agreement No 669029

# MATRICA: A FULLY INTEGRATED BIOREFINERY IN SARDINIA

## A NEW COOPERATION MODEL BETWEEN INNOVATION INDUSTRY AND FARMERS FOR LOCAL REGENERATION

SETTING UP OF AN «ALL ITALIAN AGRICULTURAL CHAIN» ON THE THISTLE CULTIVATION

CULTIVATION OF ABANDONED LAND NOT PROFITABLE FOR FOOD PRODUCTION

INVOLVEMENT OF SHEPHERDS: USE BY-PRODUCTS OF THISTLE AS A LOCAL PROTEIN SOURCE FOR THE LIVESTOCK SECTOR, REDUCING DEPENDENCY ON ABROAD

TESTING OF VARIOUS PRODUCTS OF THE BIOREFINERY: BIOLUBRICANTS FOR AGRICULTURAL MACHINERY, BIOHERBICIDES, MULCHING FILMS, ETC.



RECONVERSION OF A DEINDUSTRIALIZED PETROCHEMICAL SITE

PROPRIETARY WORLD-FIRST TECHNOLOGIES FOR THE PRODUCTION OF INNOVATIVE BIOPRODUCTS WITH LOW ENVIRONMENTAL IMPACT

RESEARCH CENTRE WITH PILOT PLANTS - COOPERATION WITH LOCAL UNIVERSITIES AND R&D INSTITUTIONS

COOPERATION WITH LOCAL COMPANIES FOR BIO-BASED DOWNSTREAM PRODUCTIONS

NEW JOBS AND HUMAN CAPITAL VALORIZATION

# LESSON LEARNED

- ☰ 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**.
- ☰ **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..
- ☰ 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.



# THANKS FOR YOUR ATTENTION!

«The challenge of our millennium is in the balance between the technical means that humanity possesses and the wisdom in how we will make use of them »

Umberto Colombo

# Recommendations from the SCAR Collaborative Working Group “Integrated Biorefineries”

Global Bioeconomy Summit Berlin

26 November 2015

# The SCAR

- The **Standing Committee on Agricultural Research** (SCAR) was established in 1974 through a Regulation of the Council of the EU.
- It was given a revised mandate in 2005 by the Council, reflecting the significant changes to the agricultural research agenda over the years.

# The SCAR

- The Committee currently represents 37 countries, mainly through ministries or organisations such as research councils, from all EU Member States and observers from Candidate and Associated Countries.
- SCAR has grown to become a respected source of advice on European agricultural and research related to the wider bioeconomy.

# CWG Integrated Biorefineries

- Setting up the CWG was decided at the SCAR Plenary meeting on 6 June 2013. The group was kicked off on 13 November 2013.
- It brought together delegates from 14 Member States (AT as observer; BE, DK, ES, FI, FR, IE, IT, NL, NO, PL, SE, UK; DE as coordinator).
- Three meetings were held, surveys among the members were performed, and biorefineries as well as pilot plant facilities were visited.

# CWG Integrated Biorefineries

- At the third and final meeting on 17 September 2014, the group discussed the conclusions derived from its activities and the recommendations it could make to national funders and the EU Commission.

# Recommendations

## 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 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.

# Recommendations

## 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.***





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**THANK YOU FOR YOUR  
ATTENTION!**

# Survey of major Bio(based) Economy Strategies in the 22 member countries of IEA Bioenergy

**Martin Beermann**

WS: The Future Role of Biorefining and  
its stakeholders in the Bioeconomy  
Global Bioeconomy Summit 2015, Berlin

*The Austrian participation in Task 42 of IEA Bioenergy is financed by  
the Austrian Federal Ministry for Transport, Innovation and Technology /  
Department for Energy and Environmental Technologies*



# Outline of the survey

- Performed in October 2014 by JOANNEUM RESEARCH (AT) in cooperation with ITABIA (IT) and the national IEA Bioenergy representatives
- Report available on: [www.IEA-Bioenergy.Task42-Biorefineries.com](http://www.IEA-Bioenergy.Task42-Biorefineries.com)
- For each of the 22 IEA Bioenergy countries, the report presents the results in a comparable format:

IEA Bioenergy Task 42 Biorefining BioEconomy Survey 2014 Country (1)

Assessed strategies				Scope of Strategies			Position of bioenergy in a bioeconomy		
Governmental strategies	Industry strategies	Regional strategies	Policy advice by research consulting	Bio-economy	Biobased economy	Biobased industries	Priority	Equal to other sectors	Less importance
X	V	V	V	X	V	V	V	X	X

Economic sectors in the focus of strategies						Vision and targets		Current focus of implementation			
Agriculture + forestry	Food	Energy	Pulp + paper	Wood-processing	Chemical industry	Medical industry	Vision and general target	Measurable targets	R&D	Transition to market	Policies
V	X	V	V	X	X	V	X	X	V	X	X

**Tabular summary**

IEA Bioenergy Task 42 Biorefining BioEconomy Survey 2014 Country (2)

1. Governmental „top-down“ or regional, industrial „bottom-up“ strategy?
2. Position of bioenergy in a Bioeconomy?
3. Priority economic sectors, focus of implementation?
4. Measurable targets defined?
5. National balance of biomass stocks and flows?

**Comments**

IEA Bioenergy Task 42 Biorefining BioEconomy Survey 2014 Country (3)

Assessed strategies	Scope of Strategies	Position of bioenergy in a bioeconomy
Governmental strategies	Bio-economy	Priority
Industry strategies	Biobased economy	Equal to other sectors
Regional strategies	Biobased industries	Less importance
Policy advice by research consulting		

Economic sectors in the focus of strategies	Vision and targets	Current focus of implementation
Agriculture + forestry	Vision and general target	R&D
Food	Measurable targets	Transition to market
Energy		Policies
Pulp + paper		
Wood-processing		
Chemical industry		
Medical industry		

**List of documents**

Document name	Description of scope considered (national, regional, name of industry sectors)
Biobased economy (BE)	Biorefineries
Biobased Industries (BI)	Industry sector Pulp+Paper-Regional- South Australia
Biobased Economy (BE)	National- Biomass Feedstocks and supply
Biobased Economy (BE)	National- Biomass Feedstocks and supply
Other documents	Opportunities for Primary Industries in the Bioeconomy Sector / National Research, Development and Extension Strategy (2014)
Other documents	Primary Industries- Sustainability, biomass feedstocks, supply logistics, policy analysis, capacity building
Other documents	Pulp and Paper Industry Strategy Group- Final Report (2013)
Other documents	Innovation (a. general of bioenergy/biofuel production- Integrated in P&P processes, support of establishing a Bio Refinery Research Institute, investment (i. a. expansion of timber plantations), sustainability (i. a. sustainable biomass growth) and productivity
Other documents	Australian Government response to the 'Pulp and Paper Industry Strategy Group Report' (2013)
Other documents	Establishment of Manufacturing Industry Council, measures taken to support P&P industry strategy (i. a. incentives for private sector investment in new biomass plantations), no statement concerning the establishment of a Bio Refinery Research Institute
Other documents	Bioenergy Scoping Study- Tropical Biomass (2013)
Other documents	Advice to government for development of Biobased Economy Strategy, focusing on the use of sugarcane
Other documents	Scoping BioRefineries- Temporary Business Value Chain (2013)
Other documents	Advice to government for development of Biobased Economy Strategy, focusing on the use of sugarcane biomass
Other documents	Biotechnology and Australian Agriculture (2008)
Other documents	Advice to government for development of a Strategy for agricultural biotechnology- optimising the contribution of the next generations of biotechnologists and Australian agriculture and diversify markets as part of an emerging bioeconomy
Other documents	Building a Bioeconomy in South Australia 2013-2015 (2013)
Other documents	Strategy to foster the bioeconomy industry in South Australia, focusing on medical devices, environmental solutions, water management and cleantech
Other documents	Economic Impact of a Future Tropical Bio Refinery Industry in Queensland (2014)
Other documents	Report examines a potential future bioeconomy industry in Queensland and involving the manufacture of both fine and commodity compounds, and polymers for the global chemical and pharmaceutical sectors, derived from green or biobased feedstocks

# BioEconomy aspects covered in the survey

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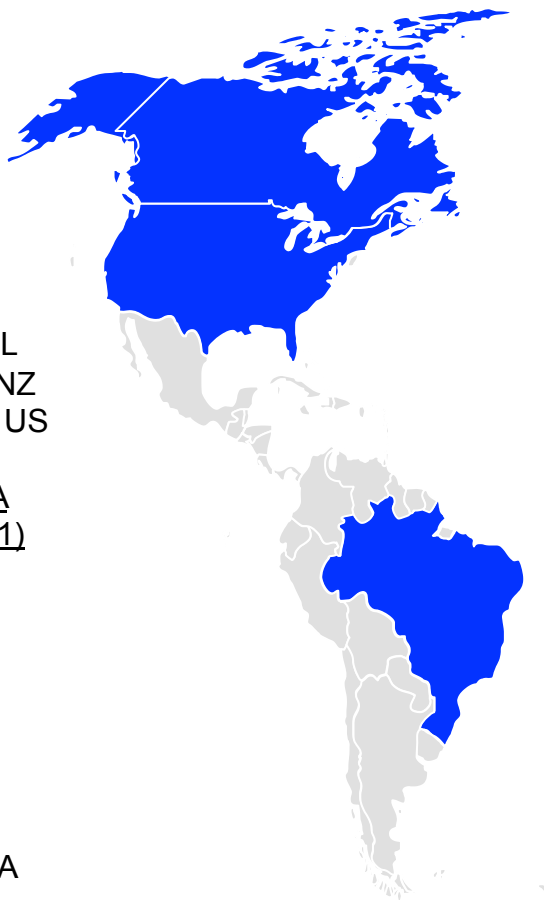
- Governmental “**top-down**” versus regional / industrial “**bottom-up**” strategies
- **Scope of strategies** (bioeconomy, biobased industries, bioenergy)?
- Which **economic sectors** are described as priority areas in a BioEconomy?
- What is the future **position of Bioenergy** in relation to other sectors?
- Have been **measurable targets** defined? Which?
- Current status / **focus of implementation** (R&D / transition to markets / policies)?
- Total national **balance of biomass resources, use and flows** available?
- **Sustainability** as core strategy element? (added later, not in the survey)

# 22 countries covered

## Task 42

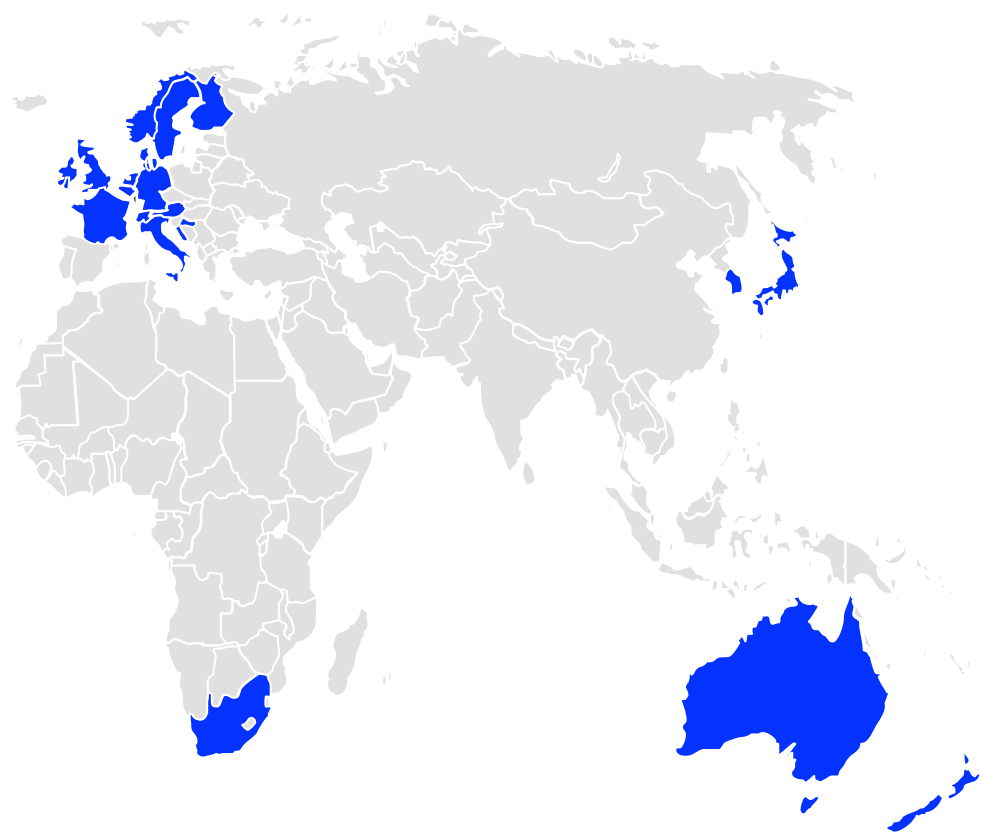
### partnering countries (11)

1. Australia - AU
2. Austria - A
3. Canada - CA
4. Denmark - DK
5. Germany - DE
6. Ireland - IE
7. Italy - IT
8. Japan - JP
9. Netherlands - NL
10. New Zealand - NZ
11. United States - US



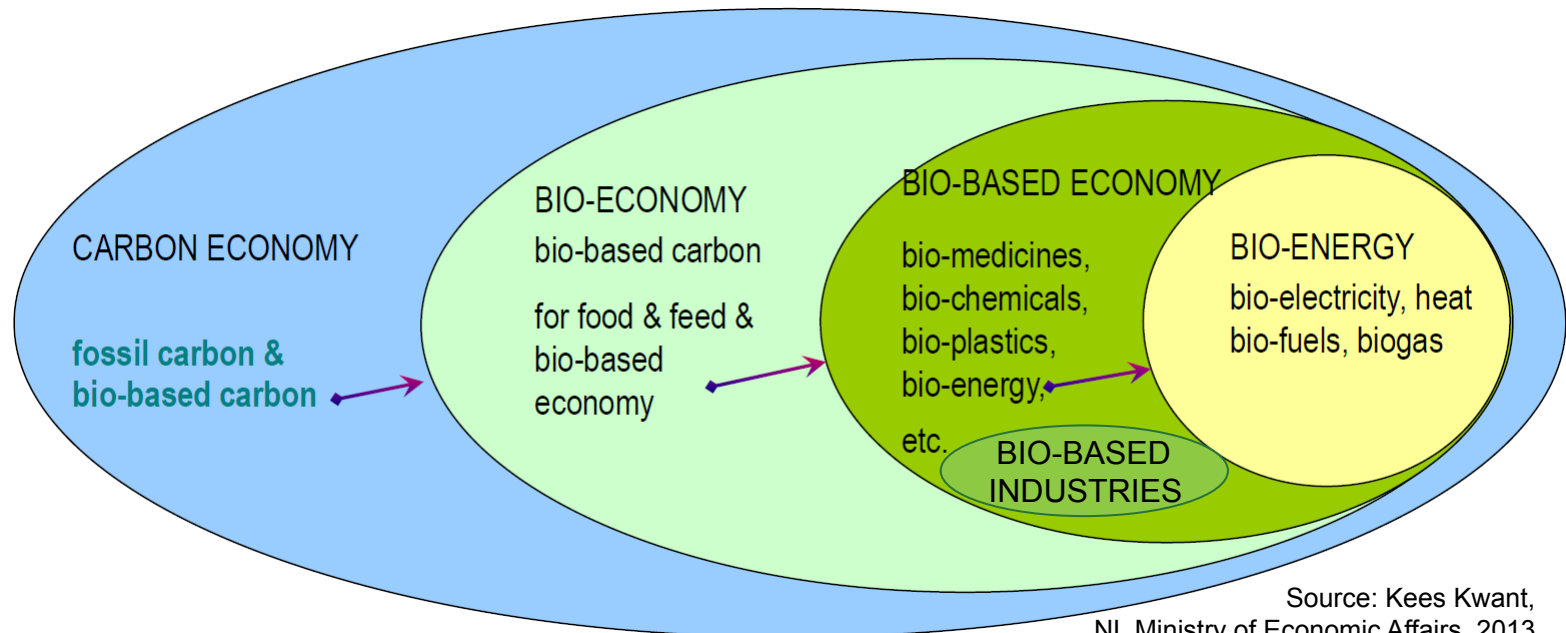
### Other IEA Bioenergy IA partnering countries (11)

12. Belgium - BE
13. Brasil - BR
14. Croatia - HR
15. Finland - FI
16. France - FR
17. Korea - KR
18. Norway - NO
19. South Africa - ZA
20. Sweden - SE
21. Switzerland - CH
22. UK - GB



# Definition of BioEconomy in the survey

**BioEconomy (BE)** as an integrative policy concept for sustainable production and valorisation of biomass to **food, feed, biomaterials, bioenergy**



Source: Kees Kwant,  
NL Ministry of Economic Affairs, 2013

# BioEconomy aspects covered in the survey: example results

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- Governmental “**top-down**” versus regional / industrial “**bottom-up**” BioEconomy development
- **“top down”**: Bioeconomy is not a single sector, requires coordinated and integrated action by various ministry departments; typically agriculture, environment, science, technology and innovation, economy
  - Austria, France, Germany, Japan, Nordic countries, Netherlands, South Africa, U.S.
- **“bottom up”**: Bioeconomy as a sustainable concept building upon regional strengths and stakeholders, “bringing it to the ground”, government sets policy framework
  - Australia, Belgium, Canada, Italy

# Economic priority sectors in a future BioEconomy

- generally today's main (fossil+bio) carbon-dependent economic sectors of the countries are also in the focus of future BioEconomy development
- R&D focus is in all countries on sustainable biomass supply and bioenergy production, and in most countries on chemical industry

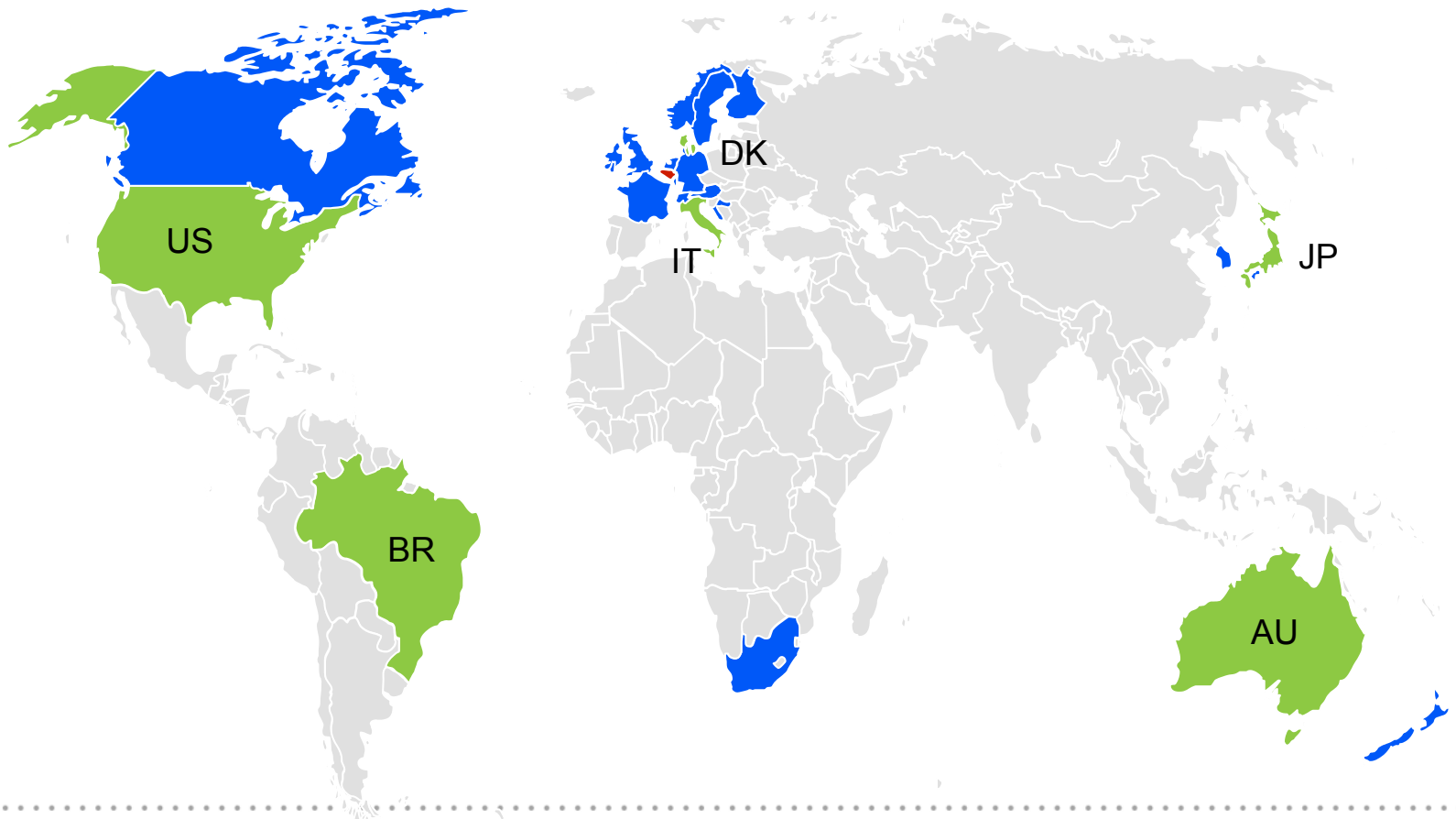
Tas42 countries	Agriculture + forestry	Food	Energy	Pulp + paper	Wood-processing	Chemical industry	Medical industry
Australia	✓	x	✓	✓	x	x	✓
Austria	✓	✓	✓	✓	✓	✓	✓
Canada	✓	x	✓	✓	✓	✓	x
Denmark	✓	✓	✓	x	x	✓	x
Germany	✓	✓	✓	✓	✓	✓	✓
Italy	✓	x	✓	x	x	✓	x
Japan	✓	x	✓	✓	✓	✓	✓
Netherlands	✓	x	✓	x	x	✓	✓
New Zealand	✓	✓	✓	✓	✓	x	x
United States	✓	x	✓	x	x	✓	✓



# Position of bioenergy in a future Bioeconomy

(shift of current priorities for bioenergy due to increased competition for biomass)

(priority / equally important to other sectors / less important)



# Measurable targets for BioEconomy (market) development

## ■ “Monitoring biobased economy in Nederland” (2014)

“Knowledge position” (indicating the investments and funding into R&D of BiobasedEconomy), “**number of projects** related to BiobasedEconomy”, “**amount of biomass** into BiobasedEconomy”, “**market development** in NL and worldwide”, “value added from BiobasedEconomy”

## ■ Biobased Economy Indicators U.S. (2011)

16 measurable targets, include 4 input-, 4 investment-, 8 output-related indicators  
input indicators: e.g. **amount of cropland** in energy-dedicated crops, quantity of **chemical and other inputs** used in biobased production.

investment indicators: e.g. **government spending** on bioeconomy research and development (R&D), **private capital investment** in plant and equipment,.

output indicators: e.g. **production levels** of chemical-based products, **emissions** from biobased production, **direct value added** from biobased production, production levels of biofuels, and quantity of by-products from biofuel production.

# Sustainability as core strategy element

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- Sustainability is an ever-present term in all strategies
  - The emphasis of the strategic objectives is in all strategies on economic growth, value maximisation, providing new employment, focusing on knowledge and technology development
  - Global 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 comes from elsewhere
  - Generally, European countries' strategies tend to put more focus on resource related sustainability issues, due to scarce domestic biomass and land resources and the need for imports
  - Still the global view, securing sustainable development also in countries supplying and large scale exporting biomass resources, could be more emphasized in national Bioeconomy strategies, to ensure truly sustainable bioeconomy.
-

# More information



Pope Francis's  
„Strategy on sustainable development“

Stop exploiting the poor + environment,  
learn from them.

Respect life,  
don't play god.

Austrian Task 42 leader: Gerfried Jungmeier  
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martin.beermann@joanneum.at

# Role of Industry in a Transition Towards the Bioeconomy in Relation to Biorefinery



**Senior Researcher PhD Henning Jørgensen**  
Center for BioProcess Engineering  
E-mail: [hejr@kt.dtu.dk](mailto:hejr@kt.dtu.dk)

DTU Chemical Engineering  
Department of Chemical and Biochemical Engineering

### **Results from the IEA Bioenergy Task 42 survey: The role of industry in a transition towards the BioEconomy (BE) in relation to biorefinery**

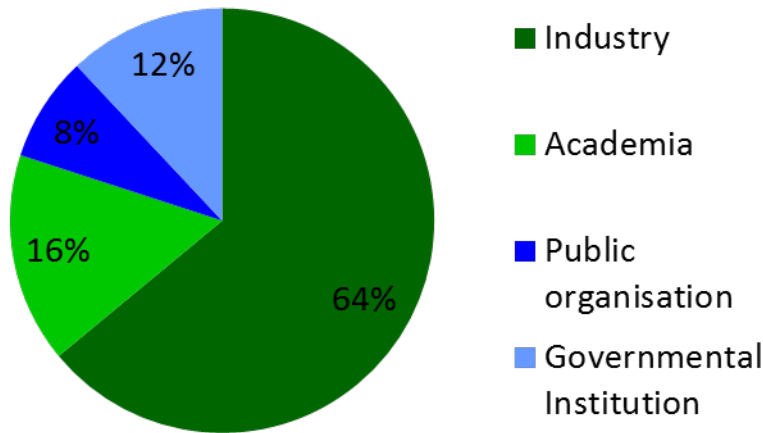
#### **Purpose of questionnaire:**

- Review the general opinion among stakeholders of the challenges and their role in the transition towards BE
- Identify factors that stakeholders identify as critical for increased cross-sector collaboration
- Create a knowledge base with strategies for how to facilitate increased collaboration

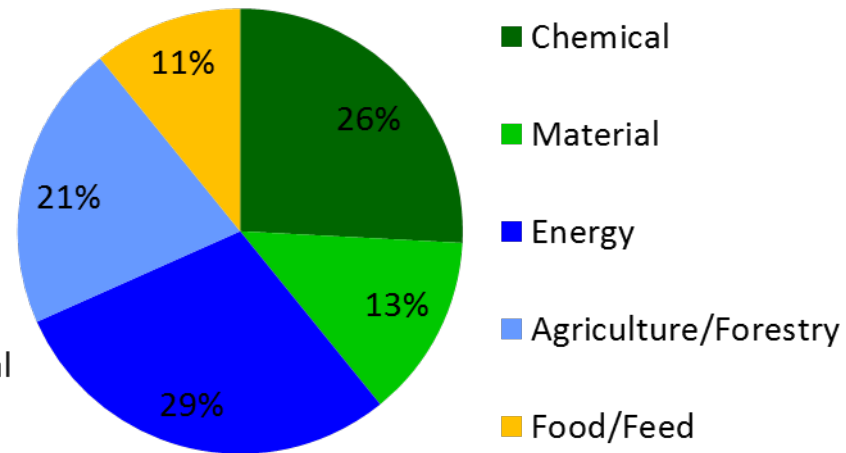
Results based on total of 75 respondents from AT, AUS, CAN, DK, IT, JP, NL, NZ, USA

# Background of the respondents

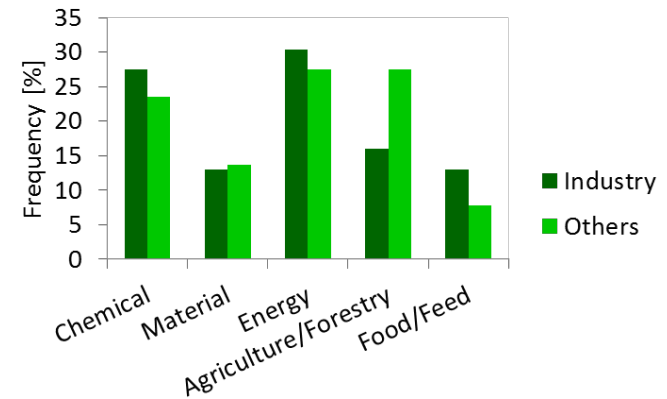
### Affiliation



### Sector

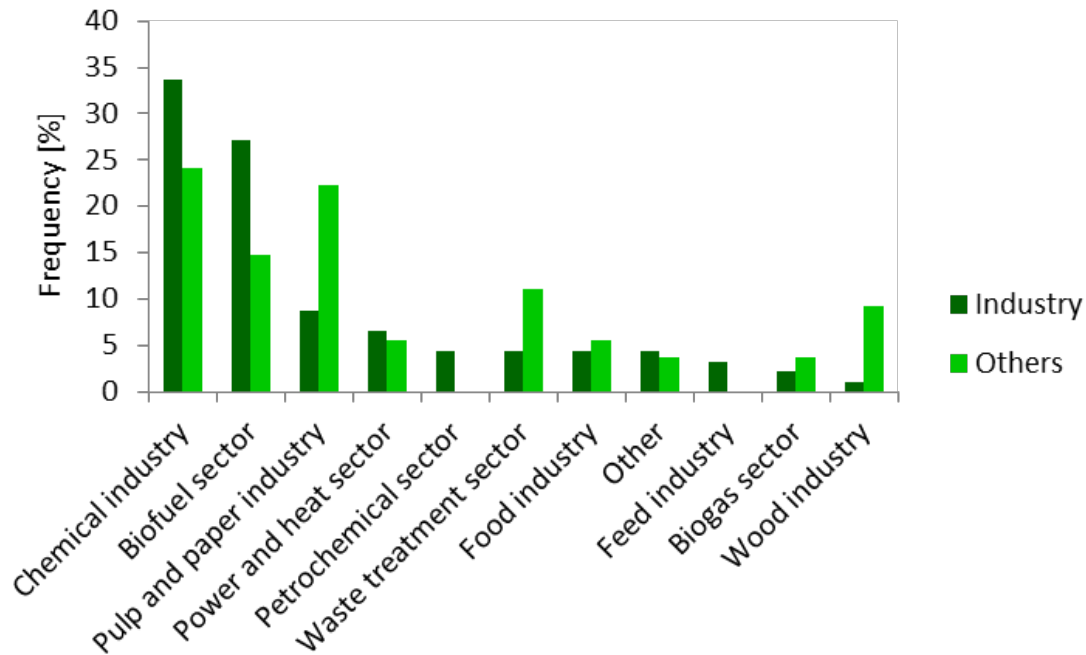


- Largest share of respondents are from industry.
- The energy and chemical sectors are the most represented, but from academia agriculture/forestry is relatively higher represented.



# The role of different sectors in the transition

Which market sectors are most important in the transition towards the BioEconomy (BE)?

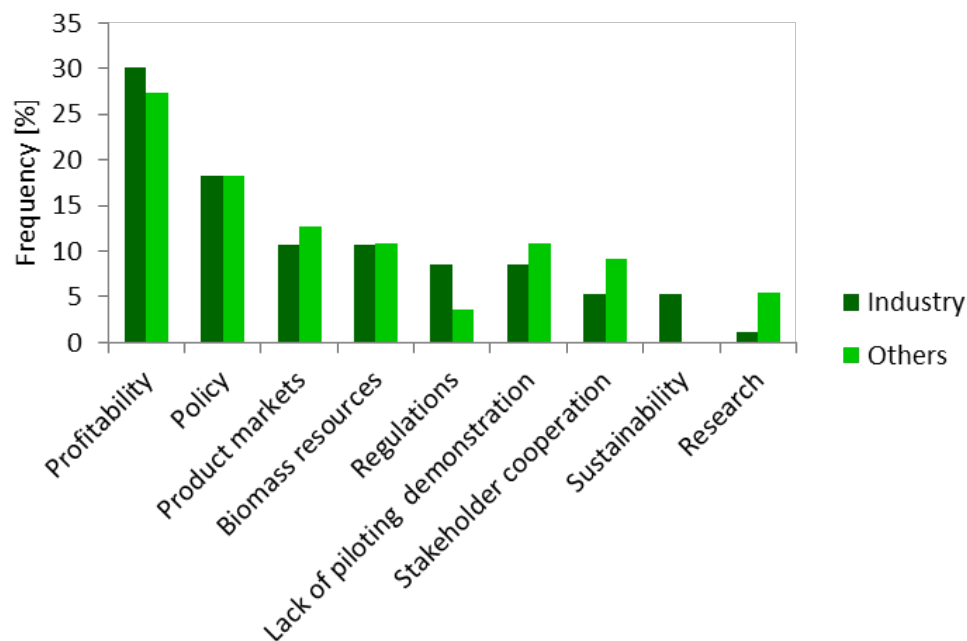


The chemical industry is seen as the most important market sector (selected by 59% of all) followed by biofuels (44%) in the transition towards BE. For the group “others” the pulp and paper sector is identified as more important than biofuel sector, but overall it ranks third.

This is likely due to the background of the respondents being largely from the chemical industry or the energy sector. Forestry is overrepresented in the group “others”.

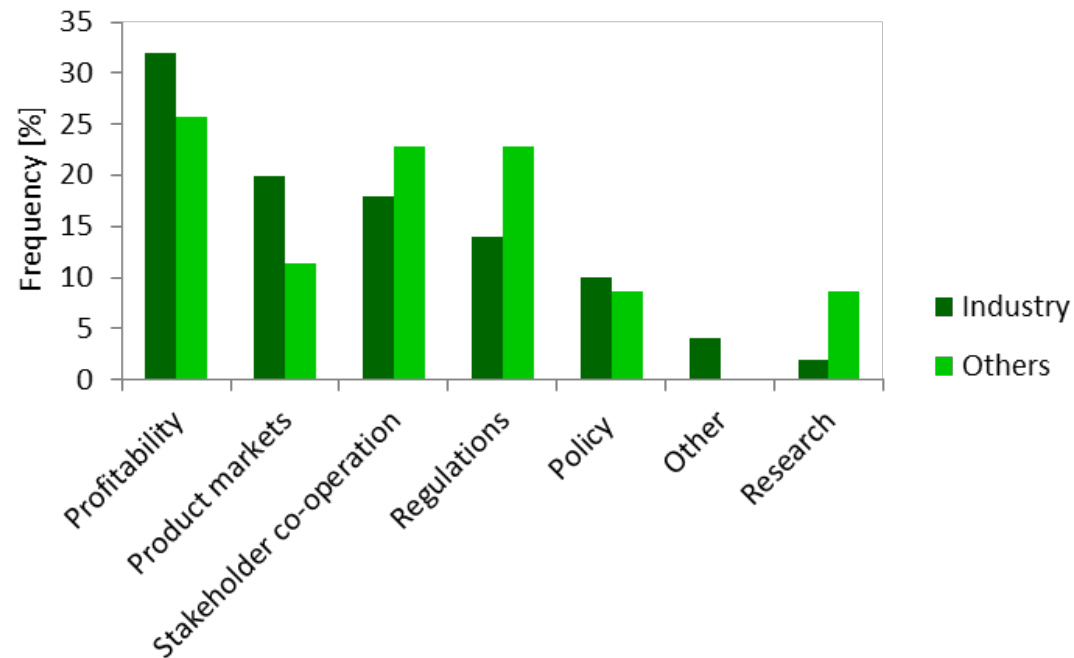


Which barriers are the most important for the transition towards the BE in general?



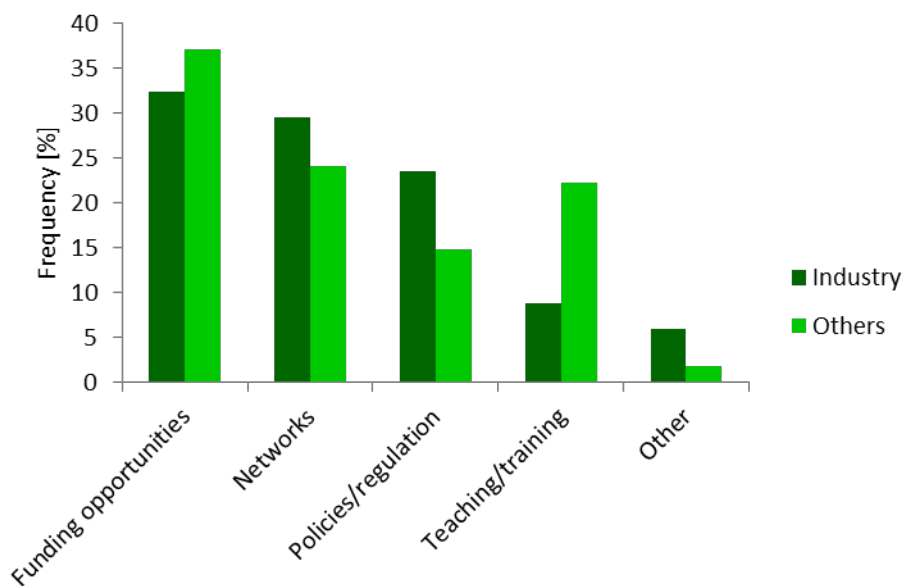
- Profitability is seen as main barrier among all (selected by 57% of all respondents), followed by policy barriers (selected by 36% of all).
- Availability of biomass resources is ranked 4th.
- Lack of collaboration is not identified as a critical barrier as it ranks 7 out of 9.

What barriers are limiting the collaboration across traditional markets ?



Profitability is again seen as main barrier for collaboration (selected by 33% of all), followed by stakeholder co-operation (23%) and regulations (20%). There is quite some difference between industry and “others” in the perception of most important barriers for collaboration.

What is needed to facilitate collaboration between stakeholders currently working in different marked sectors in order to accelerate the development of the BE or can it anyway be driven by normal marked demands?



- Policies/regulations to stimulate or ease collaboration
- Create funding opportunities that support cross marked sector integration
- Create networks across different marked sectors
- Teaching/ training to increase understanding and awareness of possibilities
- Other

- **87% responded that facilitation is needed.**
- Slight difference what “Industry” and “others” identified as best approach to facilitate collaboration.
- **Funding opportunities** that supports cross market sector integration identified as the most important driver to facilitate collaboration and acceleration of the development of BE (selected by 44%)

How can stakeholders currently working in distinct marked sectors collaborate in order to accelerate the development of a BE?

- **Creation of networks** is needed
  - Many exists already, but usually within same sector
  - Focus should be on **networks crossing traditional sectors** (e.g. agriculture and biotechnology) and supply chains
- Need for technology and personnel exchange to build skills across sectors
- **Opening and sharing of test sites**
  - Universities could be hub for to do initial demonstration
  - Universities could use private facilities for scale-up

Barriers:

- Problem is **trust** (commercial and competitive market).
- Long term agreements also with respect to biomass supply needed to ensure trust and confidence
- Difficult to engage producing industries (e.g. 1G ethanol) which are focused on production and not testing new innovation

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

[www.IEA-Bioenergy.Task42-Biorefineries.com](http://www.IEA-Bioenergy.Task42-Biorefineries.com)



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