



SUS VALUE WASTE

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Competing visions for the transition to the bioeconomy

*Nordic Research and Innovation Pathways towards a Circular Bio-economy
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Background

- Grand challenges central issues for policymaking and academia.
- Concept of bioeconomy put forward as important part of the solution.
- Little consensus about what a bioeconomy actually implies.
- «Bioeconomy» concept still in development and a narrative open for different interpretations.

→ What are the visions for the bioeconomy?



sustainability



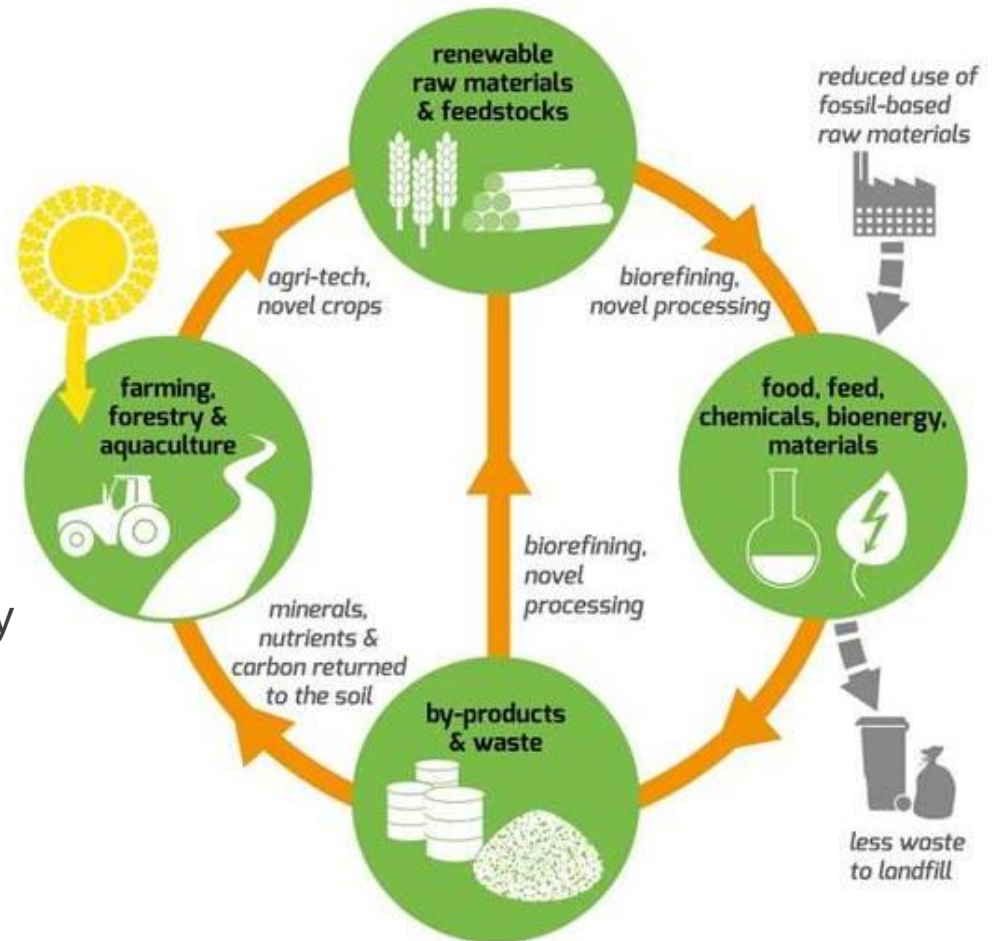
Review

What Is the Bioeconomy? A Review of the Literature

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Research focus

- What are the origins of the term “bioeconomy”?
- What are key interpretations of the bioeconomy concept?
- What are the differences in the understanding of the bioeconomy concept that are put forward in the academic literature?



Source: BioVale

Research design and data: Bibliometric analysis



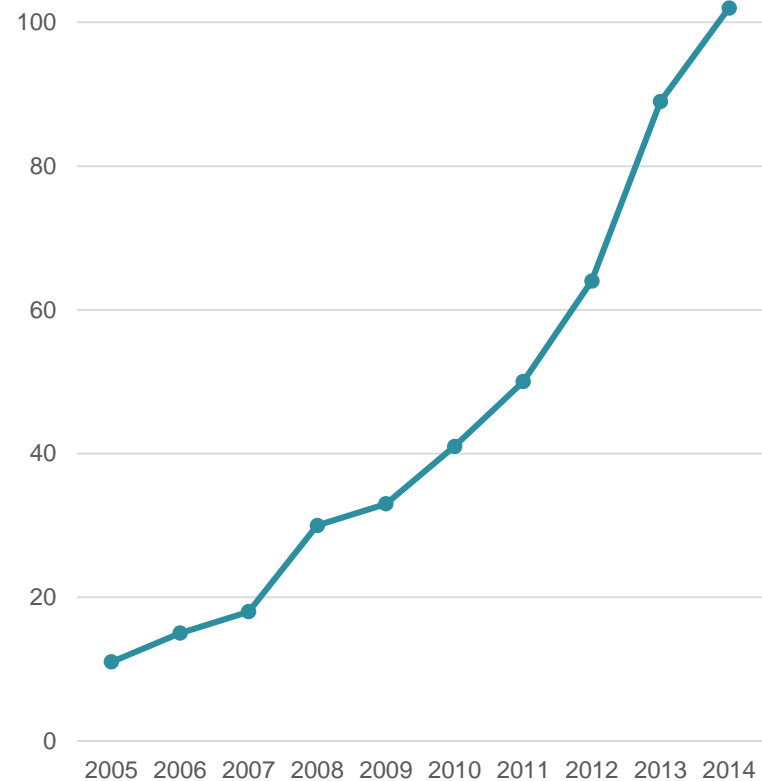
- Core collection Web of Science
- 2005-2014
- Keyword approach: bioeconomy, bio-based economy, bio-based industry, circular economy and bio*, bio-based society, bio-based products, bio-based knowledge economy
- 453 paper
- 242 papers co-authored by researchers affiliated to more than one organisation
- All research domains and all countries
- **Analysis of most active organisations and their co-publishing patterns with Social Network Analysis (SNA) – Network diagrams, created with Borgatti (2002) NetDraw. Analytic Technologies**

Increasingly popular topic in the discourse, but dominance of higher education institutions, highly fragmented and dispersed over many fields of science

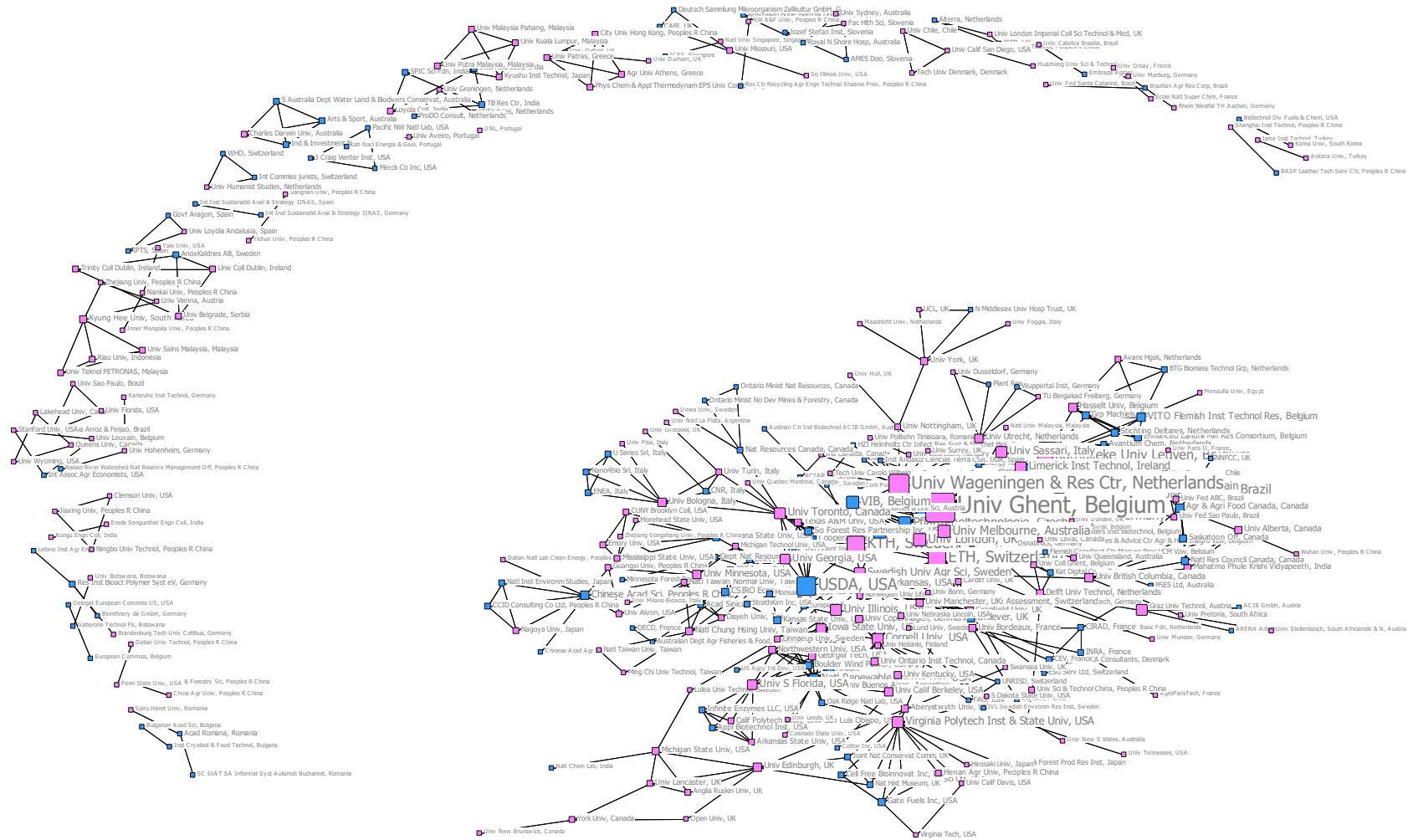
Types of organisation by their share of the total number of papers

Type of organisation	Share
Higher education institution	72,9 %
Research institute	12,8 %
Company	5,9 %
Public agency	5,6 %
International organisation	1,4 %
Science agency	0,9 %
Cluster organisation	0,5 %

Numbers of papers per year (N=453 papers)



Social network diagram of the authors' organisations ($N_o=357$ nodes) listed in the papers with more than one organisation ($N_p=242$ papers), based on degree centrality



Research design and data – Literature review

- Included papers should focus on conceptual aspects of the bioeconomy
- Analysis of bioeconomy visions that result from academic analysis of the actions of policymakers, industry actors, etc.
- Screening of 110 abstracts
- Selection of 65 papers for further analysis
- Database of these articles summarizing main characteristics regarding research objectives, methods, central concepts, sectoral and geographical scope and conclusions
- All articles read by at least two researchers and characteristics developed in collaboration
- **Synthesis of analysis and developing three ideal type visions of the bioeconomy**



What means *ideal type* visions?

- Ideal type visions focus on important characteristics of these visions, such as aim and focus, concepts for value creation in the bioeconomy and drivers & mediators of innovation in the bioeconomy
- Individual papers included in the analysis do not necessarily subscribe to one of these visions.
- Aim: identify the key interpretations of the bioeconomy concept, which are put forward in the academic literature.



Ideal type visions of the bioeconomy

- *A bio-technology vision* emphasises the importance of bio-technology research and application and commercialization of bio-technology in different sectors.
- *A bio-resource vision* focuses on the role of RD&D related to biological raw materials, as well as on the establishment of new value chains.
- *A bio-ecology vision* highlights the importance of ecological processes that optimise the use of energy and nutrients, promote biodiversity and avoids monocultures and soil degradation.





The bio-technology vision

- Aims & objectives:
Economic growth and job creation
- Value creation:
Application of biotechnology, commercialisation of research and technology
- Drivers & mediators of innovation:
R&D, IPR, TTOs, Research councils and other funding agencies
Technological progress will solve resource shortages and waste no issue
- Innovation model:
Science push – linear model of innovation
- Spatial focus:
Global clusters and central regions



The bio-resource vision

- Aims & objectives:
Economic growth and sustainability
- Value creation:
Processing, conversion and up-grading of bio-resources (process oriented), cascading use of biomass, prevention of organic waste
- Drivers & mediators of innovation:
Interdisciplinary, improve land productivity, use and availability of bio-resources, waste management, engineering, science & market, cross-sector collaboration
- Innovation model:
Interactive and networked production mode
- Spatial focus:
Rural and peripheral regions - importance of external linkages

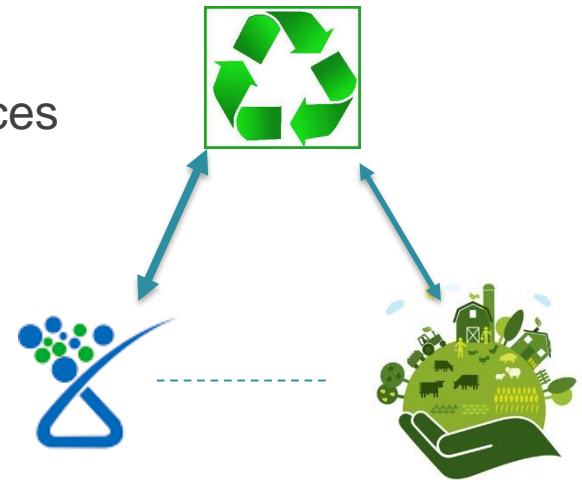
The bio-ecology vision



- Aims & objectives:
Sustainability, conservation of eco-systems
- Value creation:
Development of integrated production systems that prevent soil degradation, and promote biodiversity, provide ecosystem services and high quality products with territorial identity
- Drivers & mediators of innovation:
Identification of favourable agro-ecological practices, ethics, risk perception, transdisciplinary research, ecological land use, waste prevention, re-use & recycling of waste
- Innovation model:
Circular and self-sustained production mode
- Spatial focus:
Rural and peripheral regions - development of locally embedded economies

Conclusions 1

- The visions interrelate to each other.
- Overlap of bio-technology vision and bio-resources vision allows complementary strategies in terms of applying biotechnology to localized bio-resources and domestic upgrading.
- Bio-ecology vision and bio-resource vision have focus on sustainability, waste recycling and spatial focus on rural regions in common.
- Concerns regarding unsustainable consequences of the application of bio-technology on the biosphere.



Conclusions 2

- Bioeconomy discourse rather young and encompasses several sectors and many scientific disciplines.
- Less focus on systemic contributions of the emerging bioeconomy to address grand challenges!
- System optimization vs. system change

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