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The role of forest management and accounting
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Forests in the bio-based economy: an unconventional perspective

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Outline

1. Introduction: a few key definitions
2. Two approaches to bioeconomy
3. Social innovations and role of science in implementing a bioeconomy policy
4. Some final considerations

Slides available on the web (search "pettenella")

1. Introduction: a few key definitions

Bioeconomy: various definitions

Bioeconomy...

- ... encompasses the **production of renewable biological resources** and their conversion into **food, feed, bio-based products and bioenergy**. It includes agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of chemical, biotechnological and energy industries (EC, 2012)
- ... refers to the set of economic activities relating to the invention, development, production and use of biological products and processes. [It] is a world where **biotechnology** contributes to a significant **share of economic output** (OECD, 2009).
- ... is based on the use of research and innovation in the biological sciences to create **economic activity and public benefit** (US National Bio-economy Blueprint, The White House Administration 2012)

Definitions of bioeconomy

A fuzzy word...

No consensus was found in the literature as to whether it presents:

- a **concept** (Cooper 2007, p. 27; Rose 2007, p. 6–7; Thorup Larsen 2007, p. 9; Schmid, Padel & Levidow 2012; Arancibia 2013, p. 79; McCormick & Kautto 2013, p. 2593),
- a **paradigm** (Kitchen & Marsden 2011, p. 753; Marsden 2012, p. 258),
- a **master narrative** (Levidow, Birch & Papaionnou 2012, p. 100)
- or a **discourse** (Cooper 2007, p. 37; Birch & Tyfield 2013).



(Staffas, Gustavsson, & McCormick, 2013) (Pülzl, Kleinschmit, & Arts, 2014) taken from material prepared by Carmen Rodriguez and Valentino Govigli

Different visions on bioeconomy

(Bugge *et al.*, 2016 – p.1)

- **bio-technology vision** that emphasises the importance of **bio-technology research and application** and commercialisation of bio-technology in different sectors of the economy
- **bio-resource vision** which focuses on processing and **upgrading biological raw materials**, as well as on supply and new value chains
- **bio-ecology vision** highlighting **sustainability** and ecological processes.

	Vision	The bio-technology	The bio-resource	The bio-ecology
<i>Aims</i>		Economic growth, job creation	Economic growth (and environmental sustainability)	Sustainability (circular and self-sustained production model)
<i>Value creation</i>		Application and commercialisation of biotechnology	Processing biological resources, new value chains, new products (waste reduction)	Biodiversity, ecosystem services, prevention of soil degradation, high quality products with territorial identity
<i>Drivers of inn.</i>		R&D, scientists	Cross-sectoral collaboration to optimise land use	Identification of favourable organic bio-ecological practices
<i>Type of inn.</i>		Linear	Experts-network-based	Network-based
<i>Spatial focus</i>		Concentration in a few regions	Rural/peripheral regions	Place-based, rural/peripheral regions
<i>Main promoter</i>		OECD	EC	ETP (TP Organics)
<i>Target</i>		Consumers (industry, final market)	Consumers (final market)	Community
<i>Main investors</i>		Large-scale industry, TNCs	Associations, networks	Also SMEs


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Faculdade de Economia da Universidade do Porto

Currently dominant visions are the bio-technology and the bio-resource ones!

Example:

EU definition of bioeconomy comprises those **parts of the economy that use renewable biological resources** from land and sea – such as crops, forests, fish, animals and micro-organisms – **to produce food, materials and energy** (Europe's Bioeconomy Strategy, European Commission, 2012).

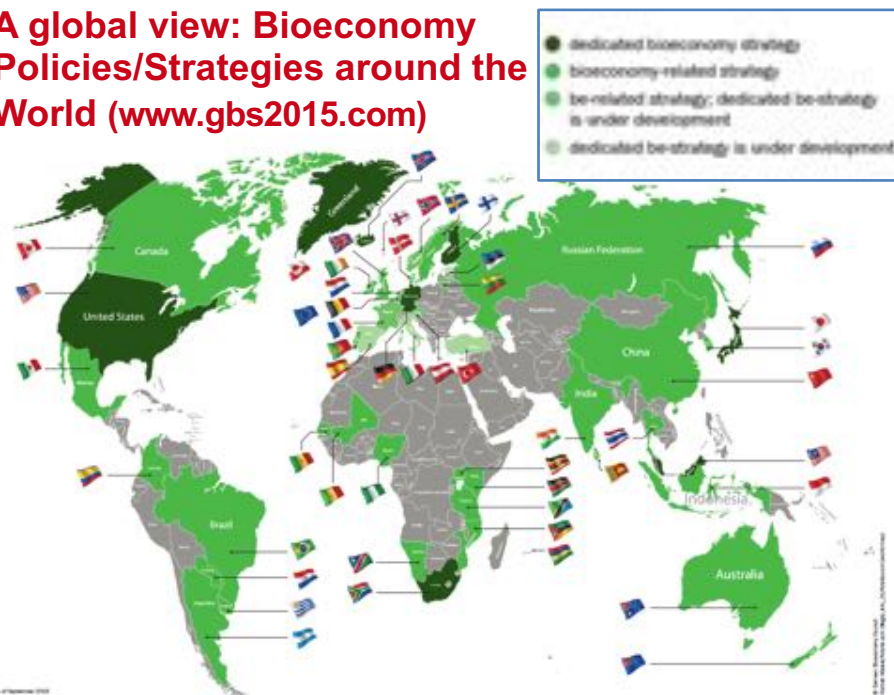
It "includes **agriculture, forestry, fisheries, food and pulp and paper production**, as well as parts of chemical, biotechnological and energy industries" (European Commission 2012b: 5).

Other similar and connected terms ...

- Green economy
- Circular economy
- Circular bio-economy
- Bio-resources economy
- Bio-technology economy
- Knowledge-based bioeconomy
- ...

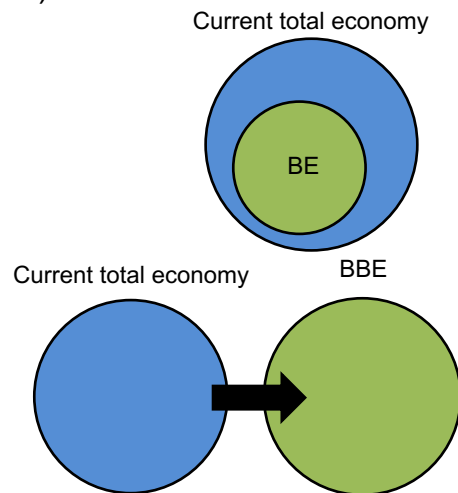
→ **Borders/meanings not always clearly defined!**

**A global view: Bioeconomy
Policies/Strategies around the
World (www.gbs2015.com)**



A difference that is not outspoken nor defined (Staffas *et al.*, 2013)

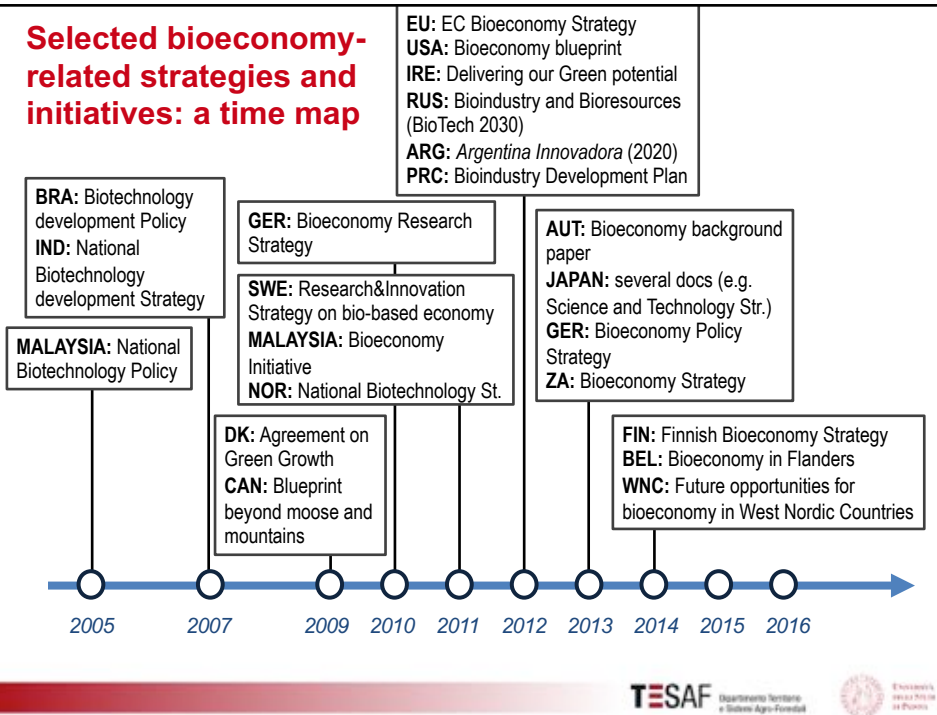
- **Bioeconomy (BE)** → a sub-part of the nation's total economy (often in relation to white biotech and life science)
- **Biobased economy (BBE)** → an economy where renewable resources instead of fossil ones constitute feedstocks for both energy, food, feed and materials

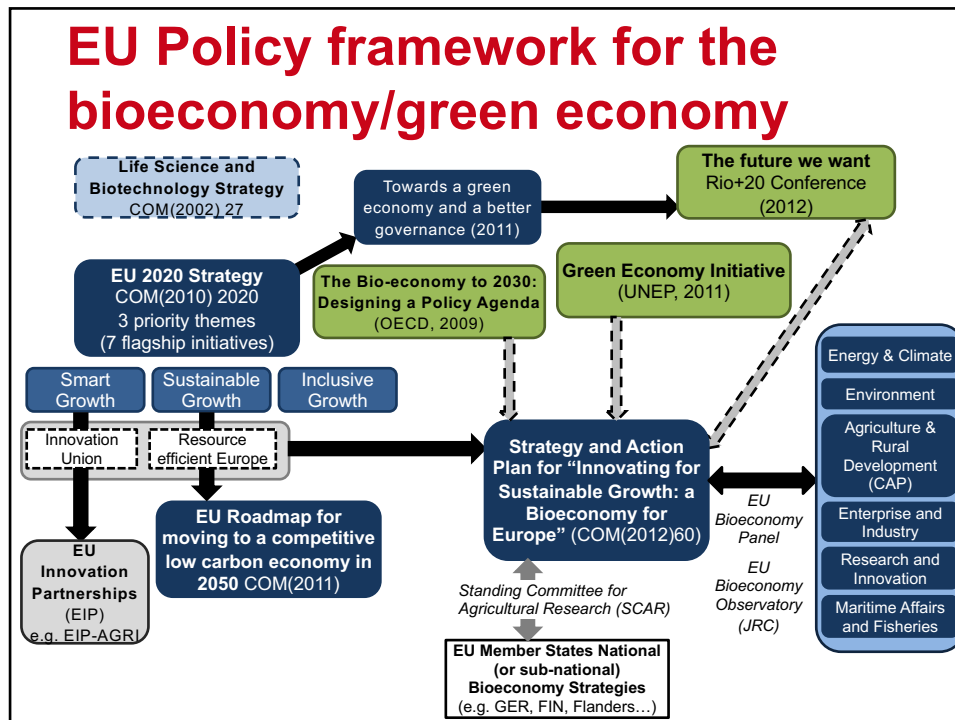


TESAF Departamento Territorio e Sistema Agro-Forestal



Selected bioeconomy-related strategies and initiatives: a time map





Five points about the bio-economy strategies and visions that demand critical attention (Staffas *et al.*, 2013)

- **Sustainability focus** → Sustainability is not heavily emphasized and it is over shadowed by economic growth
- **Measures of success** → Few measures are presented in the documents, but the importance of measures is highlighted
- **Scarcity of resources** → Only mentioned in a few of the documents
- **Consumption patterns** → Not addressed (except for the documents by Finland and Sweden)
- **Stakeholder interaction** → This is acknowledged in the documents as critical, but needs increased efforts.

Synergy: an EFI proposal

Circular Bioeconomy: more than bioeconomy or circular economy

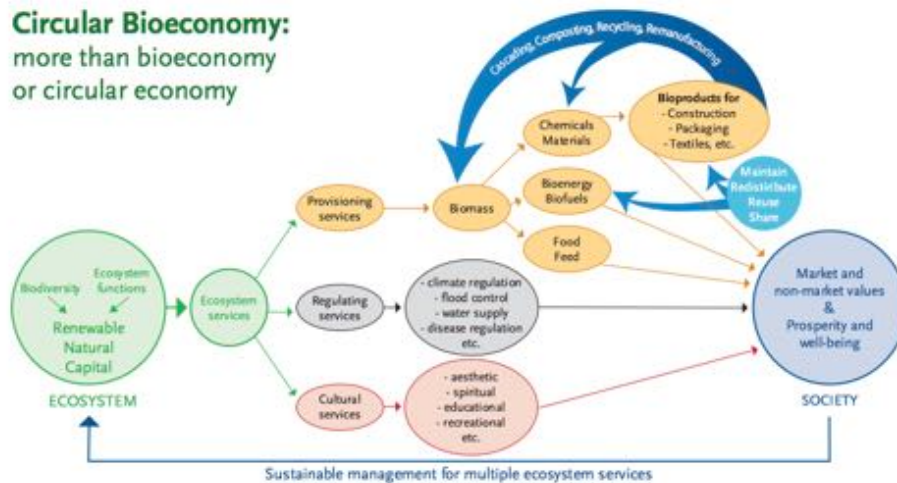
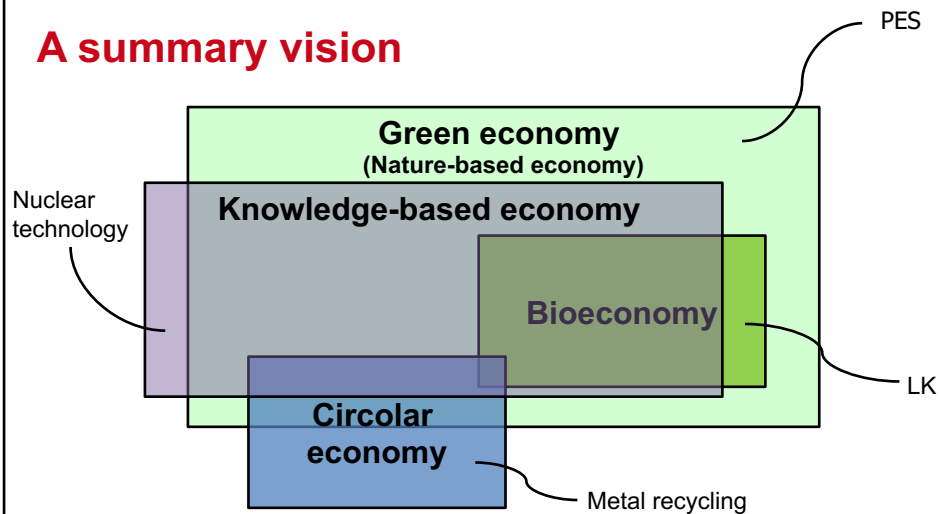


Figure 4. Illustration of circular bioeconomy flows. Source: EFI

A summary vision



A risk: are we playing with the words?

2. Two approaches to bioeconomy

Approaches to bioeconomy

2 different (complementary?) approaches that may help to understand the territorial differences in bioeconomy policies:

- the traditional, **technological** approach
- the emerging, **social** approach

The traditional (dominant) approach (modified from Toman, 2012; Pettenella, 2015; Secco *et al.*, 2015)

	Technological approach
Focus on	<ul style="list-style-type: none"> • Technological innovations • Large scale investments • Value chain perspective • Sectoral development • Vertical integration
Input/output diversification	1 or more inputs Diversification in outputs
Market power	Increasing role of business owning/controlling the (new) technologies
Model regions	Northern EU (UK, Scandinavian countries)

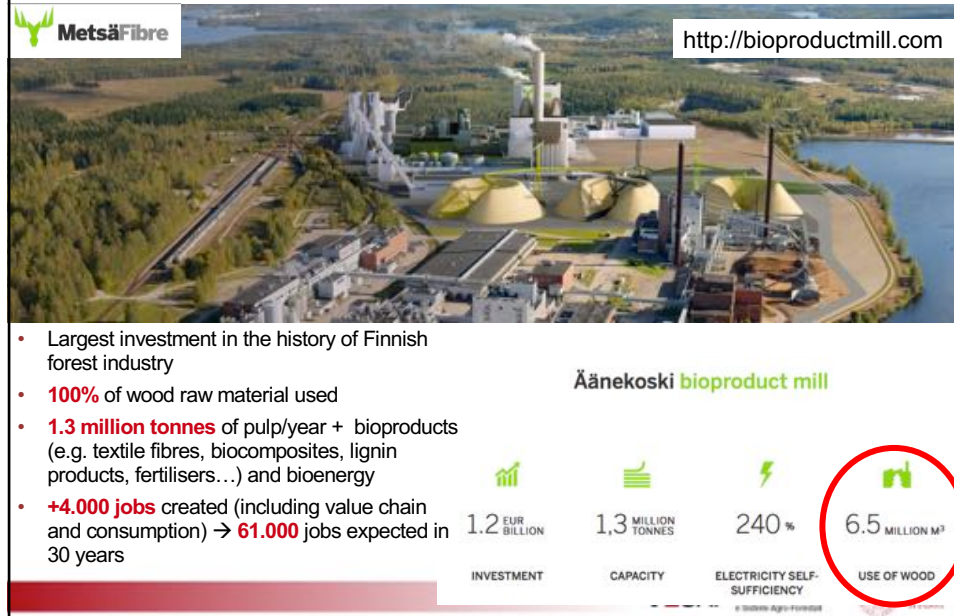
Technological approach: example 1, UK



The Tees Renewable Energy Plant (Tees REP) is a proposed 299MW biomass power station that will generate electricity for the equivalent of 600,000 homes, 24 hours a day. The scheme will help to meet the UK's legally binding renewable energy target of 15% of all energy consumed by 2020, accounting for around 1% of the target. It will save about 1.2million tonnes of CO₂ per year by displacing a mix of coal and natural gas from UK generation.

- From 2019
- Area: 14 ha
- Expected consumption of wood biomass: **1.2 M tons/year → 299 MW**
- Fuelled by wood **pellets** and **chips**, imported by ship primarily from the **United States**.
<http://teesside.mgtpower.com/>

Technological approach: example 2, Finland



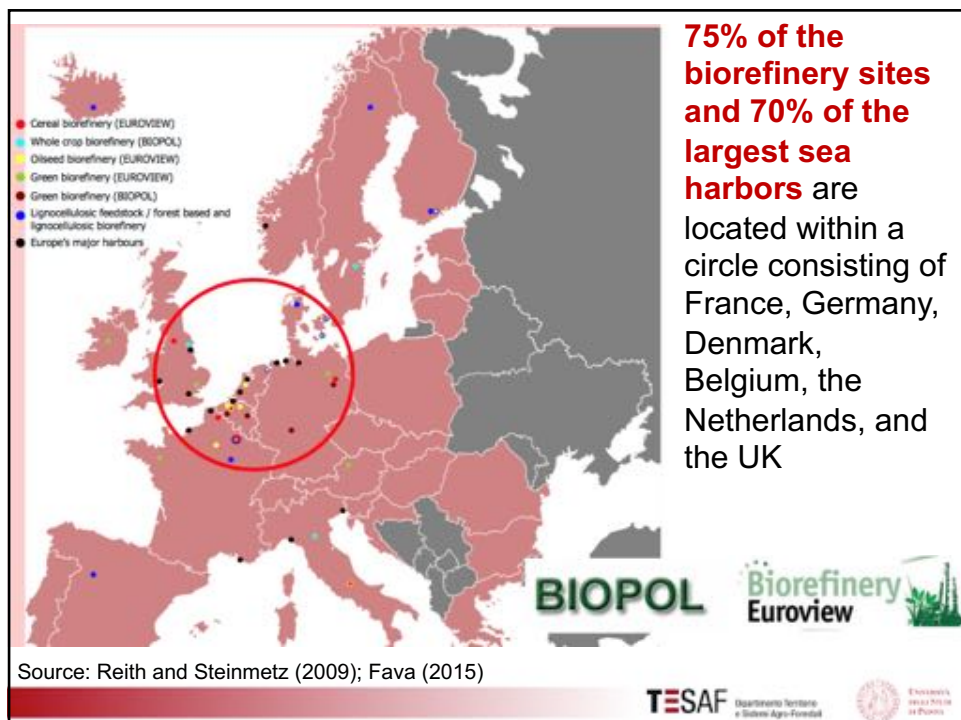
A strong emphasis on biorefinery within the bioeconomy framework

- “A **key factor** in the transition to a bio-based economy will be the **development of biorefinery systems**” (Scarlat et al., 2015)
- “Biotechnology and the biorefinery concept are **essential components** of the bioeconomy” (McCormick and Kautto, 2013)
- “The bioeconomy is integrating traditional agricultural, forest and marine biomass feedstock production systems with a **range of biorefinery options and applications**” (SCAR, 2014)
- “Biorefineries are increasingly **at the core** of the bioeconomy vision at the EU level and worldwide” (World Bioeconomy Summit, 2015)

2 large biorefinery models

(Europabio, 2011, European Commission, 2012, Ceapraz *et al.*, 2016)

- A. Port-biorefinery** → **strongly connected to global flows of raw materials**, key-logistic location (inside/nearby harbors, along channels...), high specialization, threshold effects, and economies of scale
- B. Territorial biorefinery** → **strongly connected to local/surrounding territory** and (in general terms) dependent on a more diverse and more thorough valuation of various biomasses



And... what about the rest of EU?

Does this approach really support rural development and general economic growth?

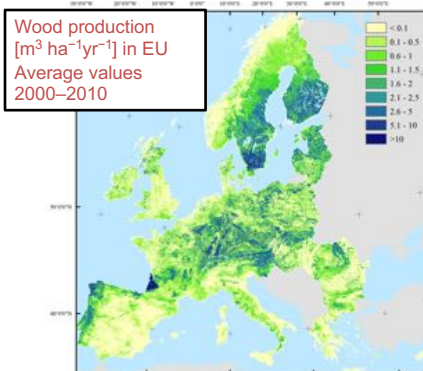


Is it the most appropriate approach for the Southern Europe context?

Mediterranean forests in a nutshell



Source: FAO, 2013



Source: Verkerk *et al.*, 2015

- Highly **fragmented** forestland **estates** (many small private forests)
- Large majority of **SMEs**
- **Difficult forest management conditions** (geomorphological constraints/limits)
- Broad **range of forests/environments**
- **High exposition to risks** (fires, climate change, floods, soil erosion)
- **Production diversification** (constellation of niche markets, NWFP)
- **Limited investments** in technical assistance, innovation and R&D
- **Low financial profitability**, provision of high value **ecosystem services** (water, soil protection, cultural services...)

Average values of the ecosystem services

Average economic **value for biodiversity and recreation services** provided by European forests (benefit transfer approach; TEEB, 2009)

	Mediterranean EU	Northern and Central-Northern EU	Scandinavian EU
	Latitude 45-65	Latitude 65-71	Latitude 35-45
Range US\$ (2000)	356-615	123-182	123-255
Average \$ (2000)	485.5	152.5	189.0
€ (2000)	379.3	119.1	147.7
€ (2008)	467.1	146.7	181.9

Source: TEEB Report; CLIBIO project cit. in ten Brink *et al.* (2009); figures ha/year

The social and political components of the bioeconomy

(Biobased economy) “will also involve achieving smooth and just adjustment in labor markets by ensuring that workers have the means to find opportunity in change. **More generally, the success of a green growth strategy will rest on addressing political obstacles and distributional concerns about the costs of change**” (OECD 2011, page 20)

“The key aim for a transition to a green economy is to eliminate the trade-offs between economic growth and investment and gains in environmental quality and social inclusiveness... the environmental and social goals of a green economy can also generate increases in income, growth, and enhanced well-being” (UNEP 2011, page 16)

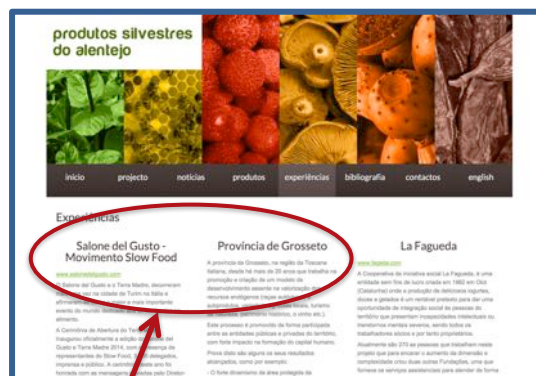
The social approach

(modified from Toman, 2012; Pettenella, 2015; Secco *et al.*, 2015)

	Technological approach	Social approach
Focus on	<ul style="list-style-type: none"> • Technological innovations • Large scale investments • Value chain perspective • Sectoral development • Vertical integration 	<ul style="list-style-type: none"> • Social innovations • Small scale • Networks • Cross-sectoral development • Horizontal integration (= forests and agriculture as the green infrastructures for rural development)
Input/output diversification	1 or more inputs Diversification in outputs	Diversification in the use of inputs High added value products & services
Market power	Increasing role of business owning/controlling the (new) technologies	Role of networks, groups, associations, public-private partnerships...
Model regions	Northern EU (UK, Scandinavian countries)	Southern EU (Mediterranean region)

Social Innovation in Mediterranean forests

Example 1: Produtos silvestres do Alentejo (Portugal)



International cooperation/exchange of best practices

...but local knowledge, specialties and typical products, niche markets

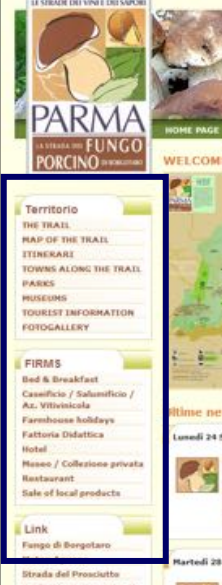
- 7 municipalities
- 16 associations and cooperatives
- 5 research institutes
- 2 national business associations
- 59 individual private promoters



Source: www.alentejosilvestre.com

Social Innovation in Mediterranean forests


Example 2: Borgotaro network (territorial marketing)



Enterprises: 62

- 15 Agro-tourisms/ Farm businesses
- 12 Hotels/Guest quarters
- 8 B&B/Inns/Hostels
- 9 Cheese, sausage and wine growing and producing factories
- 2 Didactic farms
- 3 Museums/Private collections
- 30 Restaurants/Porterhouses
- 26 Typical products sellers

Imago product:
Boletus mushroom



Different (complementary?) strategies

(modified from Toman, 2012; Pettenella, 2015; Secco *et al.*, 2015)

	Technological approach	Social innovation approach
Focus on	Adaptive strategy ("Old wine in new bottles") → conventional wisdom of innovation generation Focus on forests, agriculture, fishery as raw materials providers with biotechnology being the engine of the growth	"Strategies for synergies" It not only considers the protection of natural capital, " <i>but it stresses as well the importance of addressing equity and social inclusion challenges in moving toward a green economy</i> "
Input/output diversification		
Market power		
Model regions		

3. Social innovation and role of science in implementing bioeconomy policy

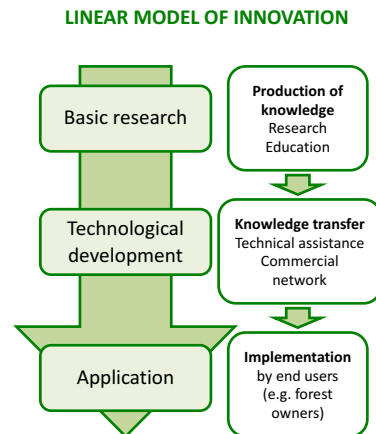
Social innovation as an issue of growing importance in Europe



EU2020 Strategy (smart, sustainable and inclusive) by mobilizing people's creativity → **SI as an effective way to develop novel solutions behind technological innovations**, to make better use of scarce resources, and to promote an innovative and learning society (BEPA, 2011: 7)

What is the role of scientists and stakeholders in the 2 approaches?

In the **technological innovation approach**, expert knowledge and investment on traditional R&D science-based activities are core components of innovation, while **stakeholders** are likely to be involved as for **consultation needs** (e.g. to increase the acceptance of the establishment of the large investment/industrial plant by the community).

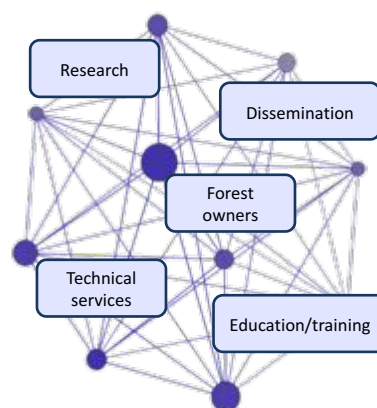


(Source: Illuminati, 2014 – mod.)

What is the role of scientists and stakeholders in the 2 approaches?

In the emerging **social innovation approach**, the role of **public-private partnerships, co-management contractual arrangements, civic society-led initiatives** seem able to provide novel solutions to emerging social needs and societal challenges of forest policy (Secco and Pettenella, 2016).

INTERACTIVE MODEL OF INNOVATION

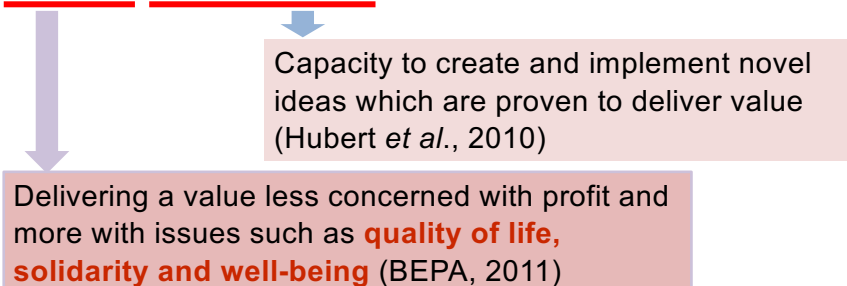


(Source: Illuminati, 2014 – mod.)

Social innovation: definitions

"[...] lack of a universally accepted definition of social innovation and ambiguity surrounding the term"
(de Bruin 2012: 373)

Social innovation



Social innovation: definitions

- Development and implementation of **new ideas (products, services and models) to meet social needs** and create new social relationships or collaborations (EC, 2013)
- Innovation focusing on social return and transformation → **improvement of human well-being** = improvement of either the quality or the quantity of life (Pol and Ville, 2009); meeting social needs (Caulier-Grice *et al.* 2012; Mulgan 2007; Murray *et al.* 2010); solving a social problem (Phills *et al.*, 2008)
- Social innovation is not the tangible improvement itself rather new intended forms of collaborative action that enables the improvement in the first place → building **coalitions/networks** that leads to some tangible improvement for the actors involved or even beyond (Neumier, 2012)

Some knowledge gaps

- **Empirical evidences of the cause-effect links** between social innovation and economic performance in forestry.
- **Short and long-terms effects of new institutional and policy frameworks/policy reforms** on SI implementation in Mediterranean forests (e.g. EU RDP 2014-2020 art. 35 Cooperation)
- Development of new/refinement of sets of **methods to measure social dimensions in innovative forestry** (e.g. Social Network Analysis)
- Role of networks and Social Capital in **increasing the provision of ecosystem services**
- **Comparison studies** of the effects of different strategies/policies for bioeconomy (e.g. Italy-Australia?)

The strategy of the EC in the sector: Strategic Research and Innovation Agenda for 2020 (SRA)

Contents

- 1.1 The performance of the sector in a perspective of global change
- 1.2 Citizen's perception of the sector
- 1.3 Policies and good governance
- 2.1 Multi-purpose management of forests
- 2.2 Forest ecology and ecosystem services
- 2.3 Enhanced biomass production
- 2.4 Secured wood supply, forest operations and logistics
- 2.5 Cascade use, reuse and recycling systems
- 3.1 Resource efficiency in manufacturing
- 3.2 Renewable energy solutions
- 3.3 Sustainable water stewardship
- 3.4 Biorefinery concepts
- 3.5 New business models and service concepts
- 4.1 Building with wood
- 4.2 Indoor environment and functional furniture
- 4.3 New bio-based products
- 4.4 Intelligent packaging solutions
- 4.5 Hygienic, diagnostic and healthcare products
- 4.6 Integration of new solutions in printed products

Strategic Research and Innovation

Released in 2006 and revised in 2013, more than 230 research projects with over € 1 billion of EU funding

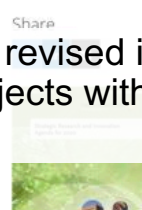
Built on the Vision 2030, it offers the perspective of the forest-based sector in support of public sector initiatives to stimulate innovation, in particular the EU Framework Budget for Research and Innovation Horizon 2020, that spans from 2014 to 2020.

19 Research and Innovation Areas (RIAs):

- Excel
- Create
- The fi
- 12 out of 19 RIAs are mainly technologically-oriented
- only 3 are mainly socially-oriented
- 4 can be considered as mixed

The SRA is unlocking competitiveness, to reflect the growing interest in the research and innovation phase and also clustered under four Strategic Themes:

- The forest-based sector in a bio-based society
- Responsible management of forest resources
- Creating industrial leadership
- Fulfilling consumer needs





Carlos Moedas
Commissioner Research, Science and Innovation

European Commission > ... > Announcements >

SPEECH | 3 May 2018

Speech at the Agri-Research Conference: Innovating for the Future of Farming and Rural Communities

Commissioner Hogan,
Minister Porodzanov,
Chairman Siekierski,
Distinguished guests,
Ladies and gentlemen,

Earlier today, Commissioner Hogan has already informed you about the decisions we have taken today on the EU's multiannual budget. A budget that in my view represents how I see my Friend Phil Hogan: Supporting a strong Europe, future oriented and with a clear understanding of the importance of agriculture.

With a proposed budget of € 100 billion for research and innovation, the Commission is crystal clear about the importance it attaches to the future and competitiveness of Europe.

And it is unprecedented that € 10 billion, or **one tenth** of the total budget, will go towards research and innovation in food, agriculture, rural development and the bio-economy.

This means we can make a leap in supporting the most innovative agro-businesses; supporting rural communities through the bio-economy; developing new agricultural technologies; innovating the entire food value chain; and improving sustainability and combating climate change.




4. Some final considerations

Conclusions

Bioeconomy is a multifaceted, complex concept that can be understood in multiple ways and shall be addressed with an **appropriate and tailored mix** of:

- Policies
- Tools (taxes, incentives, standards, ...)
- Players/actors
- R&D funding resources

Conclusions

The real innovative aspects of bioeconomy are related to **equity, social inclusiveness, promotion of local knowledge and employment creation**, i.e. to **social innovation**, more than to problems connected to technology innovation (that can be market driven, without much public support).

Conclusions

... the governance of the (bio)economy should stress the needs for **investing adequate resources in research in social innovation**, with a large stakeholders' participation

HOW IS RESEARCH GOING ON?

WE FIND LOTS OF THINGS, EXCEPT MONEY

