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Technological vs. social approach towards the bio-based economy in the European forestry sector: a latent ambiguity in policymaking

Laura Secco, Mauro Masiero,
Elena Pisani and Davide Pettenella
TESAF Dept., University of Padova, Italy

Outline

- Introduction: a few key definitions and background information
- The forestry sector in the EU bioeconomy
- Different approaches to bioeconomy (with a focus on the European forest sector)
- Social innovations as a component of the bioeconomy policy
- Some final considerations

Slides can be downloaded from the web: search “pettenella”

1. Introduction: a few key definitions and background information

Bioeconomy: various definitions

Bioeconomy…

- … 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).

- … 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)

- … 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)

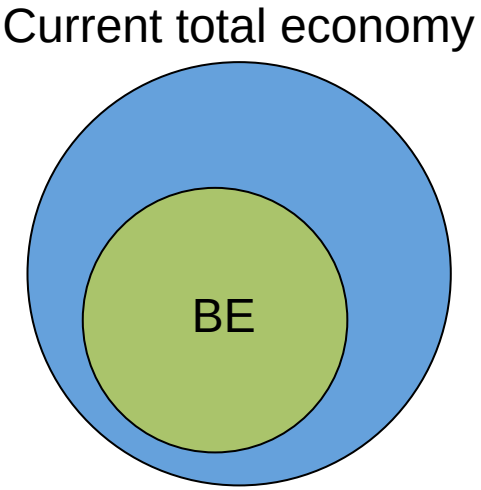
Other similar terms often used as synonymous…

- Biobased economy
- Green economy
- Knowledge-based bioeconomy
- Circular economy
- Circular bio-economy
- …

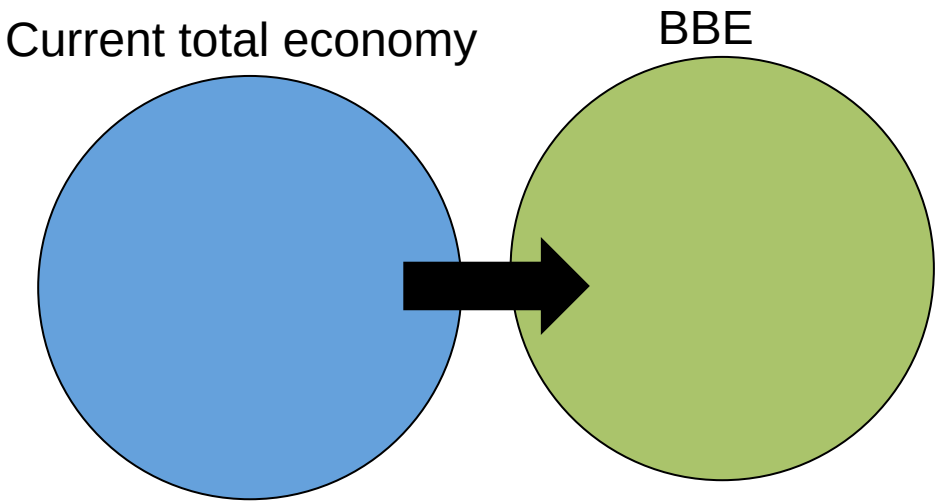
→ **Borders/meanings not always clearly defined!**

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

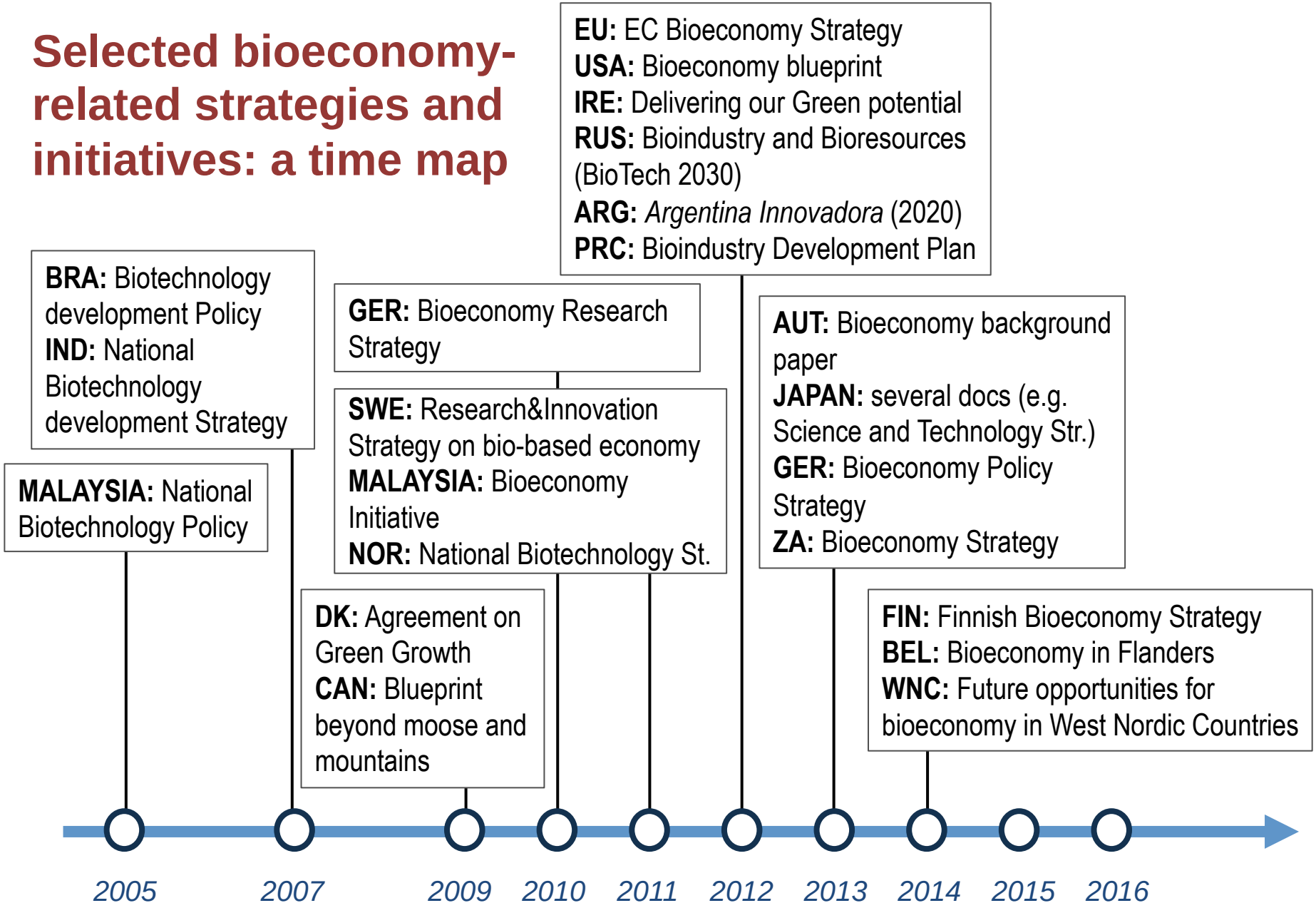
- **Bioeconomy (BE)** → a sub-part of the nation's total economy (often in relation to white biotech and life science)



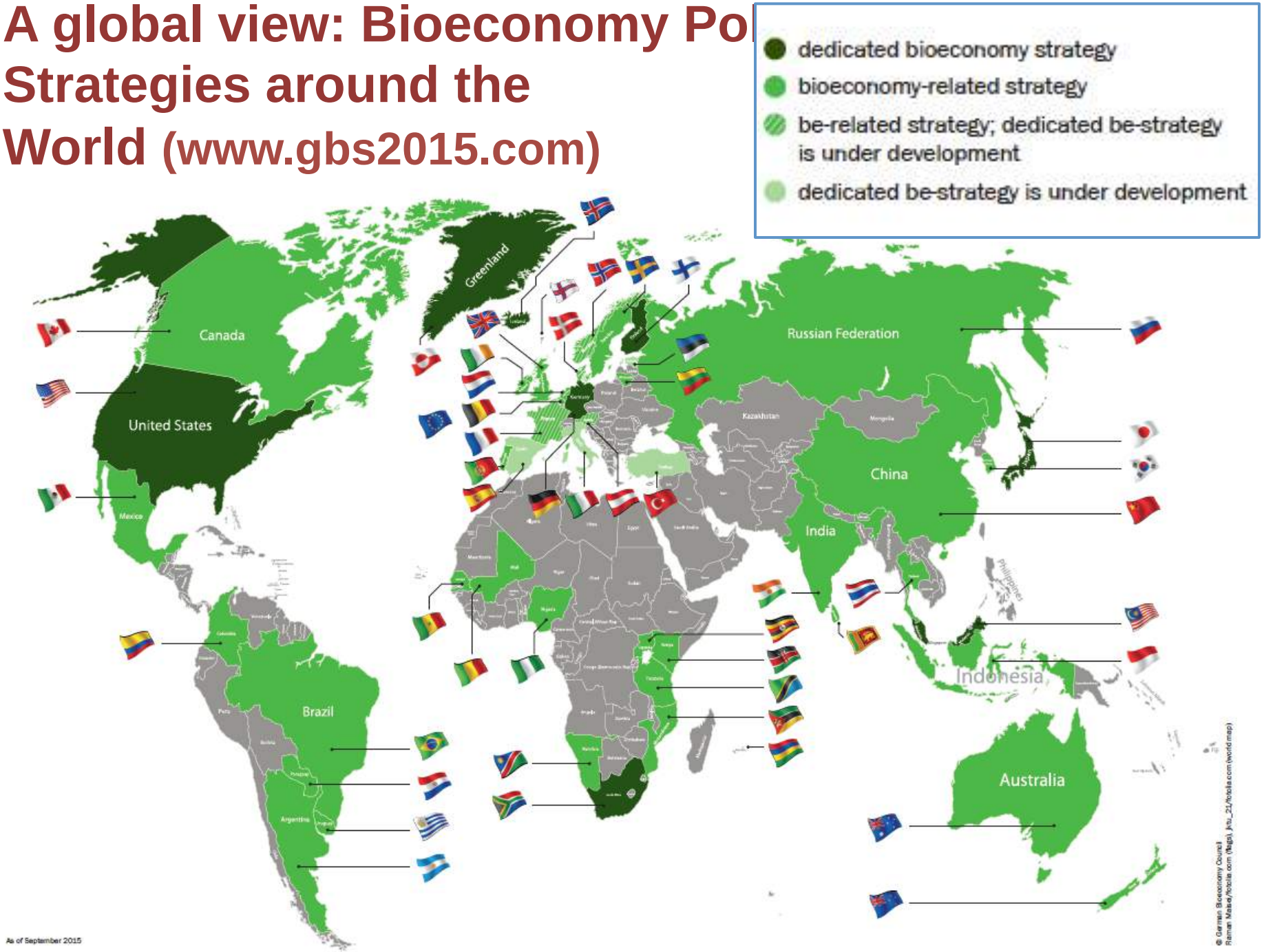
- **Biobased economy (BBE)** → an economy where renewable resources instead of fossil ones constitute feedstocks for both energy, food, feed and materials



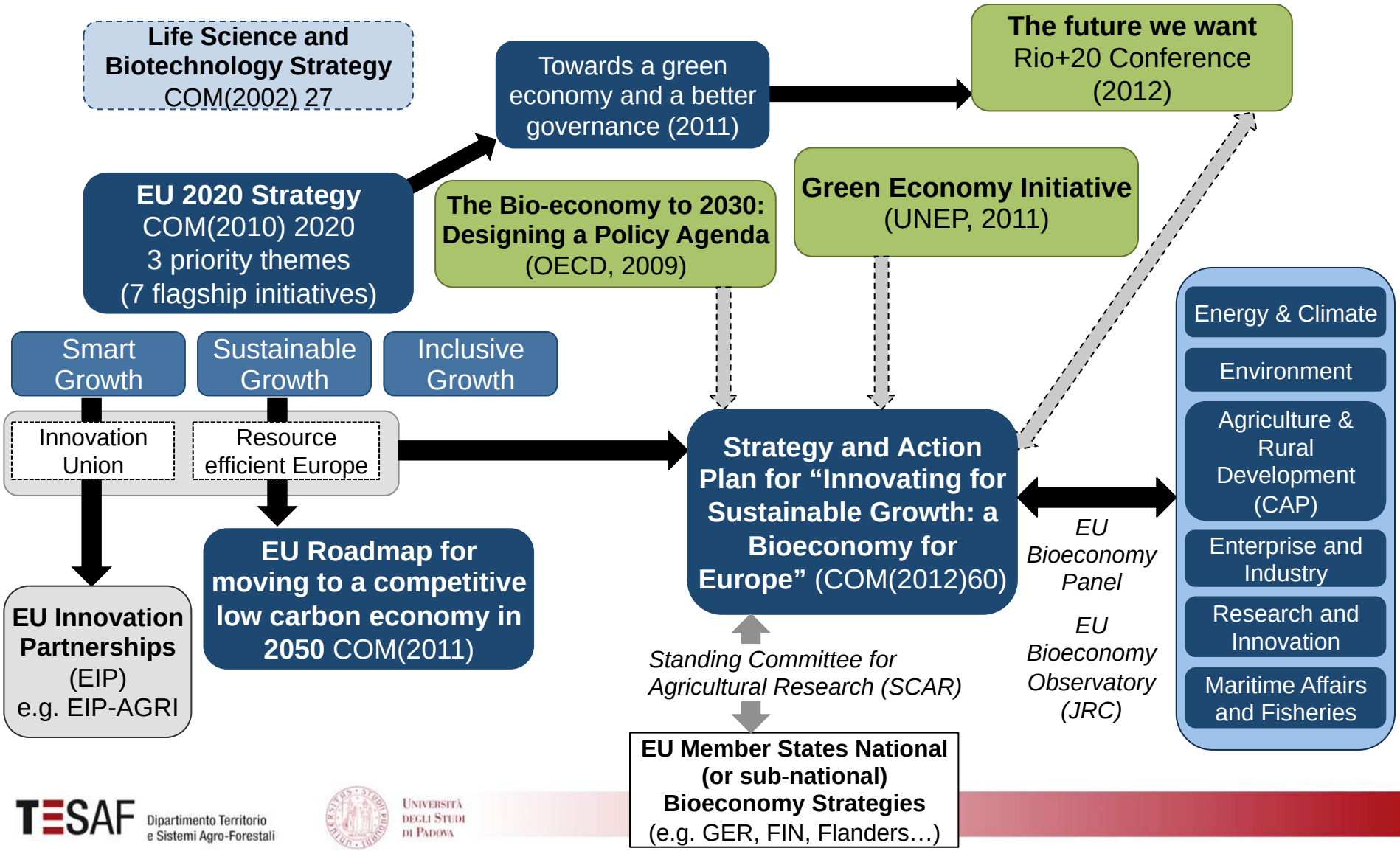
Selected bioeconomy-related strategies and initiatives: a time map



A global view: Bioeconomy Po
Strategies around the World (www.gbs2015.com)



EU Policy framework for the bioeconomy/green economy

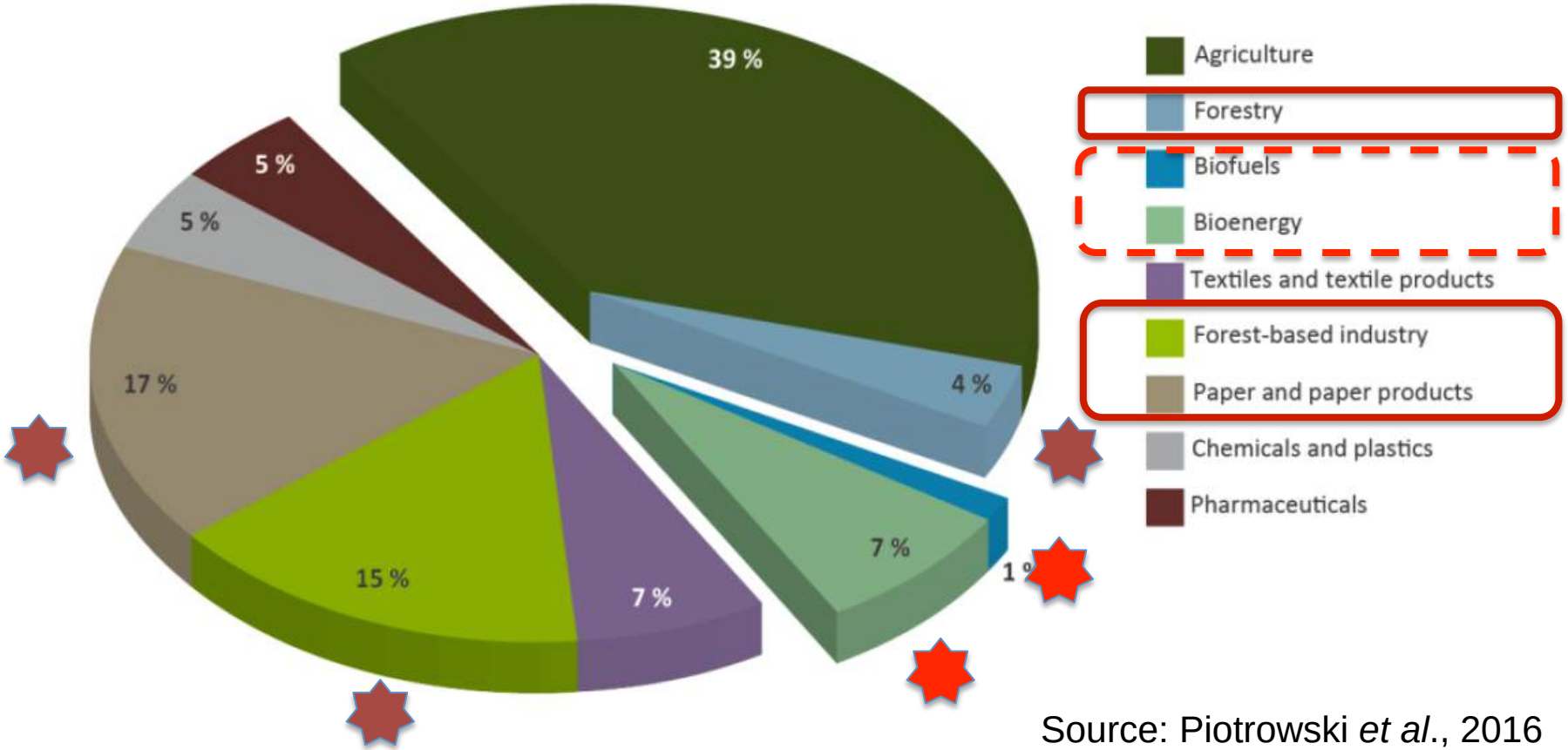


Five points about the bio-economy strategies and visions that demand critical attention (Staffas *et al*., 2013):

- **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.

2. The forestry sector in the EU bioeconomy

Value of production
Not a clearly cutout area of the economy



Source: Piotrowski *et al.*, 2016

Sectoral contribution to bioeconomy in the EU

(Scarlat *et al*., 2015 based on 2014 Eurostat data)

Sector	Annual turnover (€ billion)	Value added (€ billion)	Employment (1000 s)
Agriculture	404	157	10200
Food and beverage	1040	207	468
Agro-industrial products	231	62	2092
Fisheries and aquaculture	36.6	9.7	199
Forestry logging	42	22	636
Wood-based industry	473	136	3452
Bio-chemicals	50		120
Bioplastics	0.4	1.4	
Biolubricants	0.4	0.6	
Biosolvents	0.4	0.4	
Biosurfactants	0.7	0.9	
Enzymes	1.2		
Biopharmaceuticals	30	50	142
Biofuels	16		132
Bioenergy	34		350
Total	2357		21790

21.8%

18.7%

Previous estimations (EC, 2012): 2.078 € billion and 20 million jobs in 2009

3. Different approaches to bioeconomy
(with a focus on the European forestry sector)

Approaches to bioeconomy

Biobased economy: a fuzzy concept with different interpretations

2 different (complementary?) approaches:

- 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	• 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 UKs 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 tonnes/year**
- Fuelled by wood **pellets** and **chips**, **imported by ship primarily from the United States**.

http://teesside.mgtpower.com/

Technological approach: example 2, Finland

- Largest investment in the history of Finnish forest industry
- **100%** of wood raw material used
- **1.3 million tonnes** of pulp/year + bioproducts (e.g. textile fibres, biocomposites, lignin products, fertilisers…) and bioenergy
- **+4.000 jobs** created (including value chain and consumption) → **61.000** jobs expected in 30 years

Äänekoski bioproduct mill

1.2 EUR BILLION	1,3 MILLION TONNES	240 %	6.5 MILLION M³
INVESTMENT	CAPACITY	ELECTRICITY SELF-SUFFICIENCY	USE OF WOOD

A strong emphasis on biorefinery within the bioeconomy framework

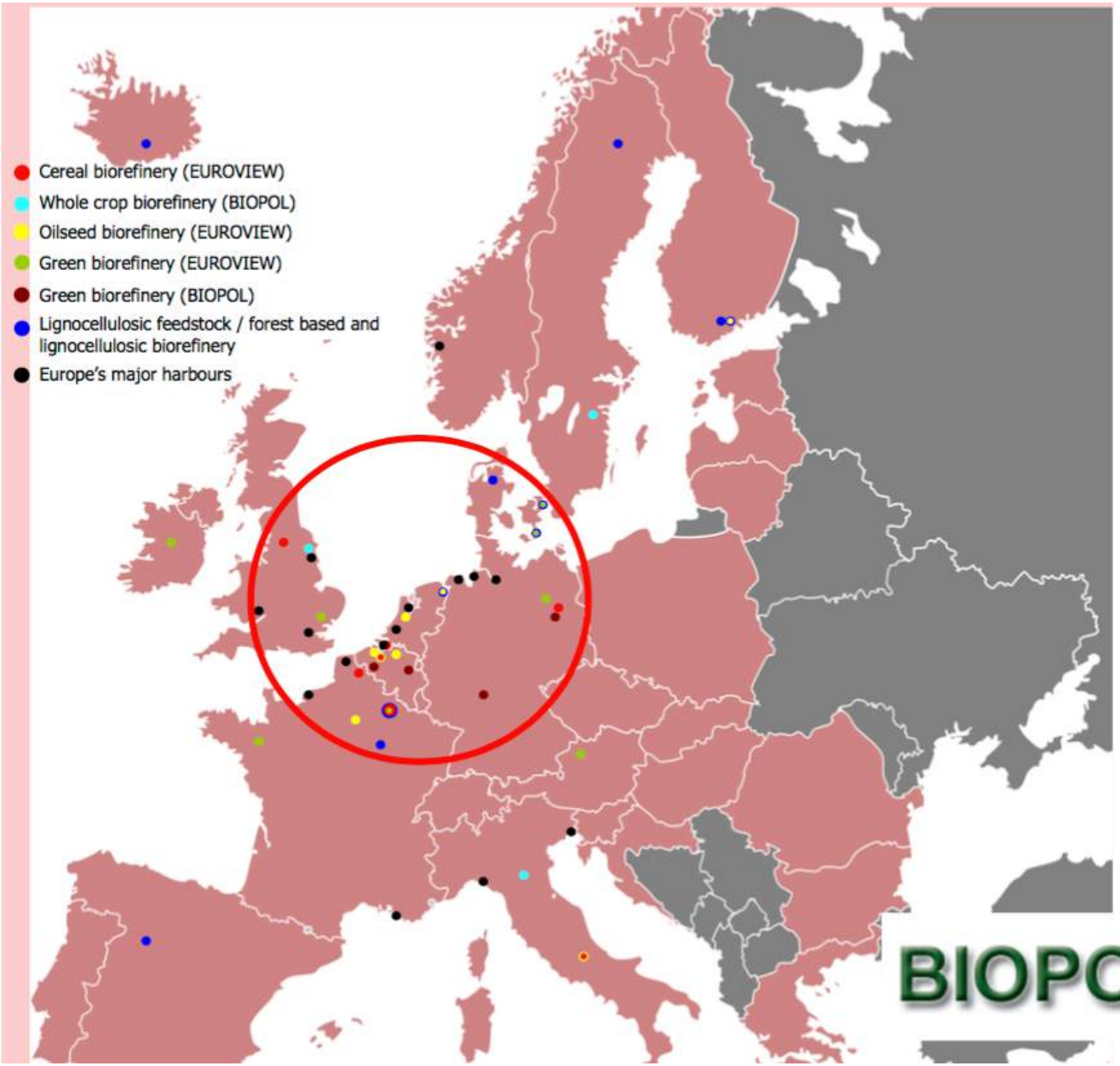
- A **key factor** in the transition to a bio-based economy will be the **development of biorefinery systems** (Scarlat *et al*., 2015)
- Biotechnology and the biorefinery concept are **essential components** of the bioeconomy (McCormick and Kautto, 2013)
- The bioeconomy is integrating traditional agricultural, 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 of agricultural origin



75% of the biorefinery sites and 70% of the largest sea harbors are located within a circle consisting of France, Germany, Denmark, Belgium, the Netherlands, and the UK

BIOPOL

Biorefinery Euroview

Source: Reith and Steinmetz (2009); Fava (2015)

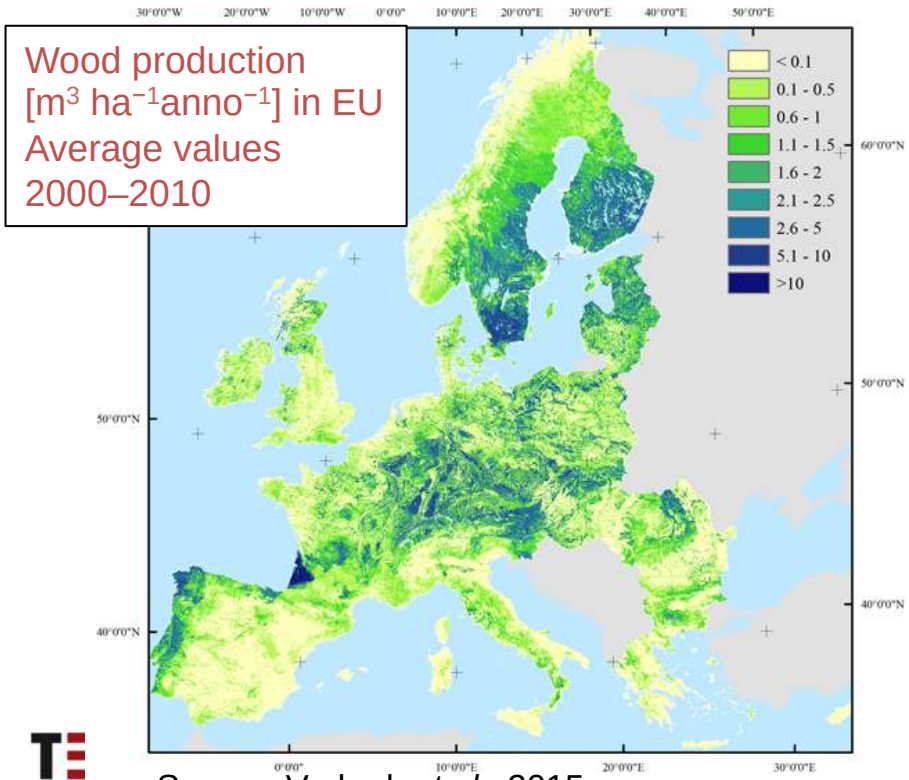
And… what about the rest of EU???

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

Does it fit the Mediterranean context?

Is it the most appropriate one for the Mediterranean context?

Source: FAO, 2013



Source: Verkerk *et al*., 2015

Mediterranean forests in a nutshell

- Highly **fragmented** forestland **estate** (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)
- **Low financial profitability**, provision of high value **ecosystem services** (water, soil protection, cultural services…)
- **Limited investments** in technical assistance, innovation and R&D

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 innovation approach**
Focus on	• Technological innovations • Large scale investments • Value chain perspective • Sectoral development • Vertical integration	• 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)

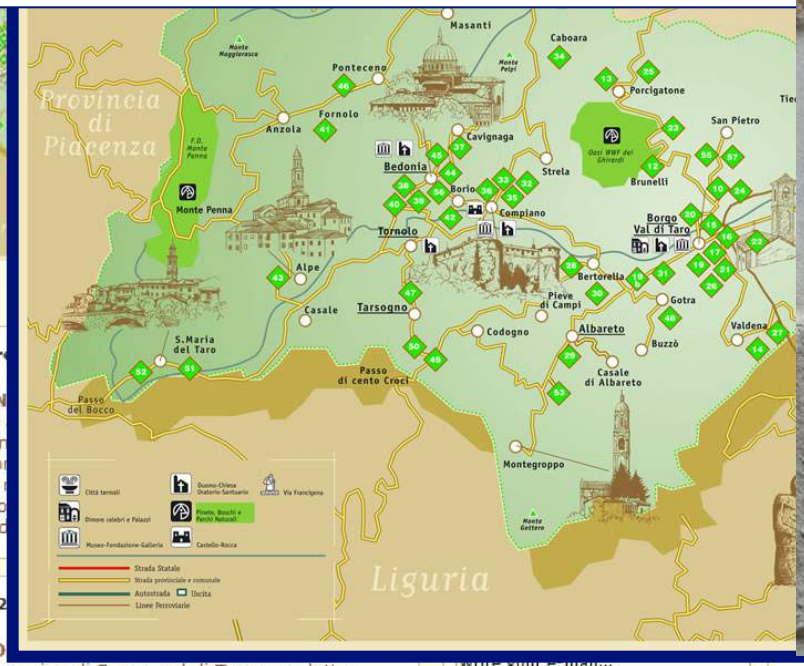
Social Innovation in Mediterranean forests

Example 1: Borgotaro network (territorial marketing)

Enterprises: 62 (in 2008)

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



Social Innovation in Mediterranean forests

Example 2: Produtos silvestres do Alentejo (Portugal)

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

International cooperation/exchange of best practices

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

Source: www.alentejosilvestre.com

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, "*but it stresses as well the importance of addressing* ***equity and social inclusion challenges*** *in moving toward a green economy*"
Input/output diversification		
Market power		
Model regions		

4. Social innovation as a component of the bioeconomy policy

Social innovation: definitions

"[…] *lack of a universally accepted definition of social innovation and ambiguity surrounding the term*"

(de Bruin 2012: 373)

Social innovation

Capacity to create and implement novel ideas which are proven to deliver value (Hubert *et al*., 2010)

Delivering a value less concerned with profit and more with issues such as **quality of life, solidarity and well-being** (BEPA, 2011)

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)

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)

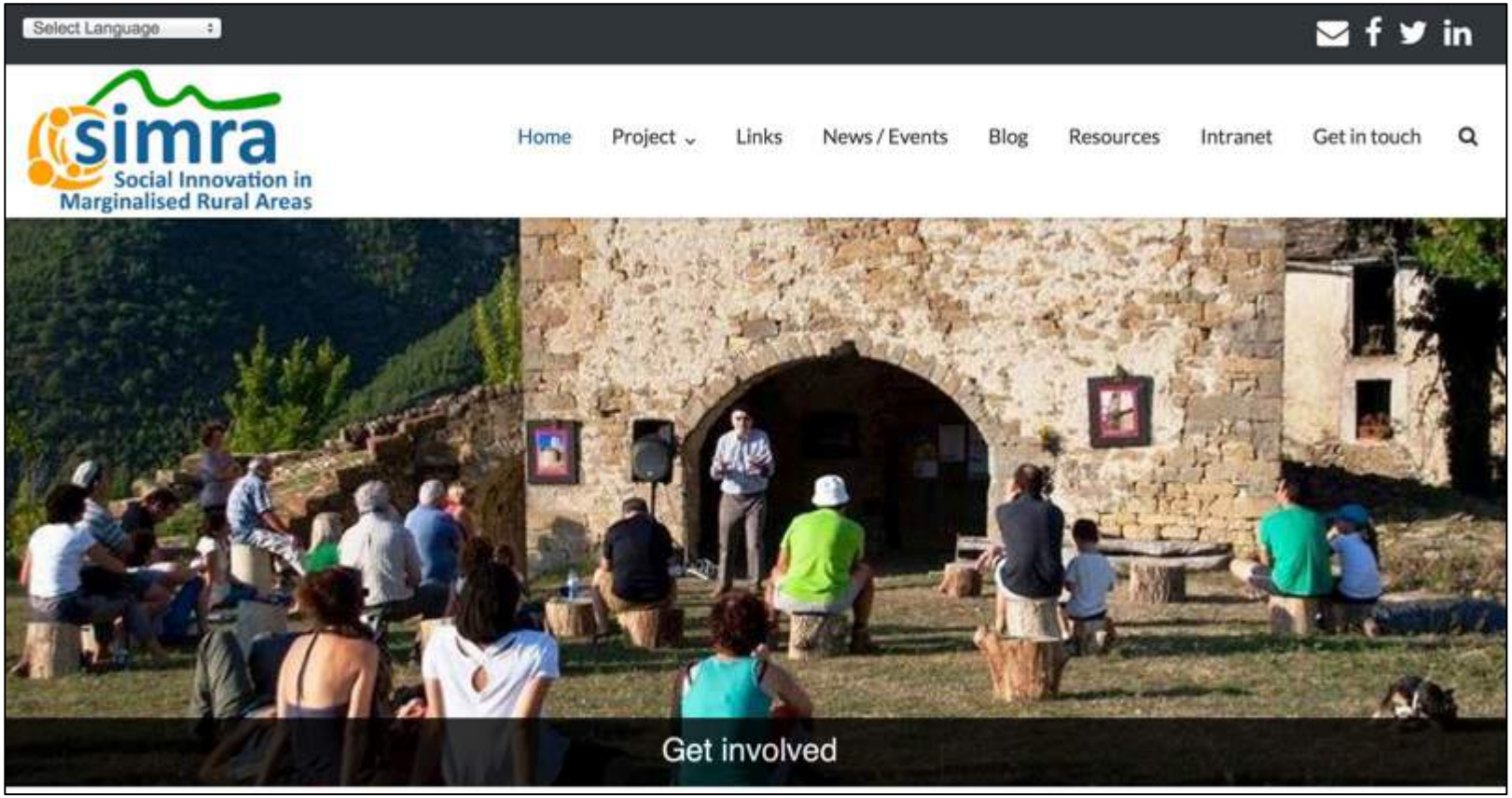
Some knowledge gaps

- **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?)

Are things moving ahead?

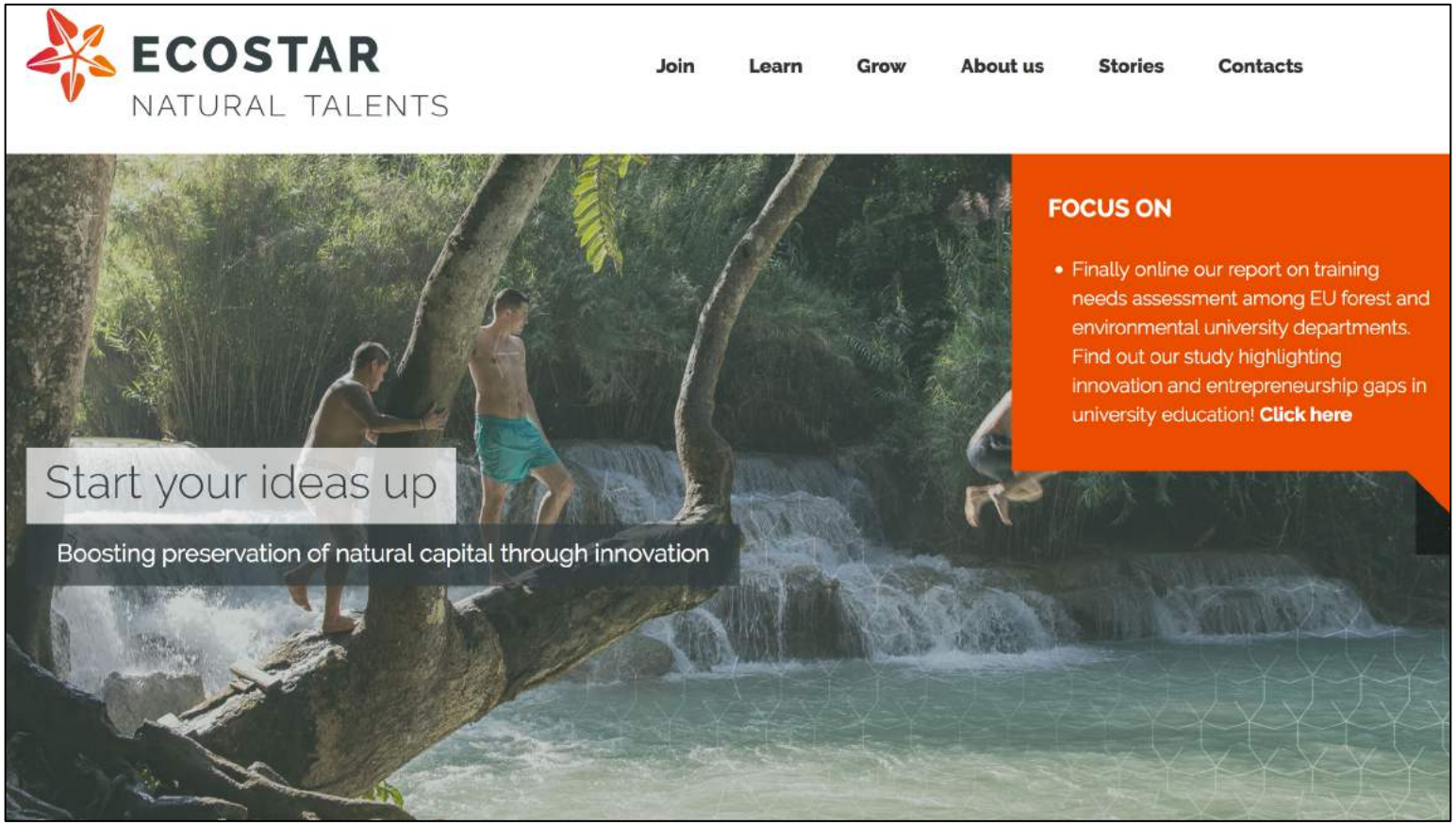
2 recent research projects

Horizon2020 project: SIMRA - Social Innovation in Marginalized Rural Areas, 5.5 M€, 2016-2020, local coordinator



www.simra-h2020.eu

Erasmus+ project: Ecostar (entrepreneurial innovation based on ES, 1.3 M€, 2016-18, coordinator: TESAF)



www.ecostarhub.com

5. Some final considerations

Conclusions (1/3)

From a Mediterranean perspective 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.

Conclusions (2/3)

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 (3/3)

… the governance of the (bio)economy should also include **investing adequate resources in research, innovation**, dissemination and technology transfer



Thanks for attention!

- ***Dipartimento TESAF***
  www.tesaf.unipd.it

- **Spin-off ETIFOR**
  www.etifor.com


Davide Pettenella


Mauro Masiero


Laura Secco


Elena Pisani