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OCTOBER 15-16, 2024

# Forest and bioeconomy development

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## Why a focus on bioeconomy?

Our development model is strongly based on fossil resources:

- For energy consumption
- For material use

Forests, supporting the bioeconomy development, can play a relevant role in the **decarbonization** process

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## How the forest-based bioeconomy can contribute to decarbonization?

- a. Increasing carbon stocks
  - a.1 In the forest land pools: living biomass, dead organic matter (dead wood and litter) and soils
    - a.1.1 In the existing forests
    - a.1.2 In new forests
  - a.2 In the HWP pool
- b. Substitution effects, i.e. using wood to replace:
  - b.1 GHG-intensive materials (e.g. cement, steel, etc.)
  - b.2 Fossil fuels for energy

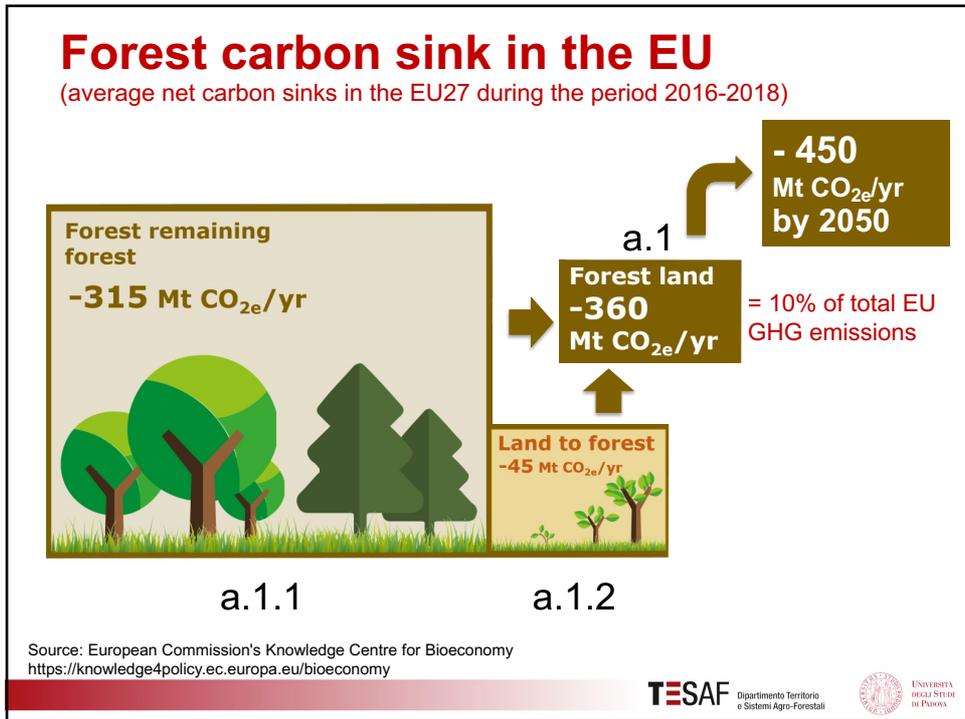
Source: European Commission's Knowledge Centre for Bioeconomy  
<https://knowledge4policy.ec.europa.eu/bioeconomy>

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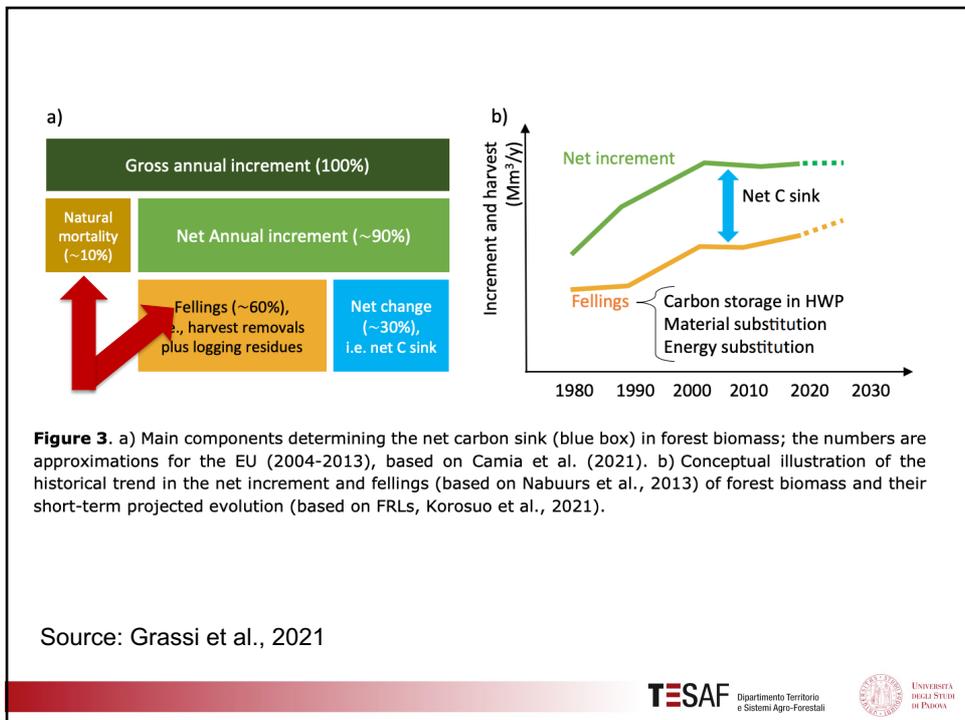
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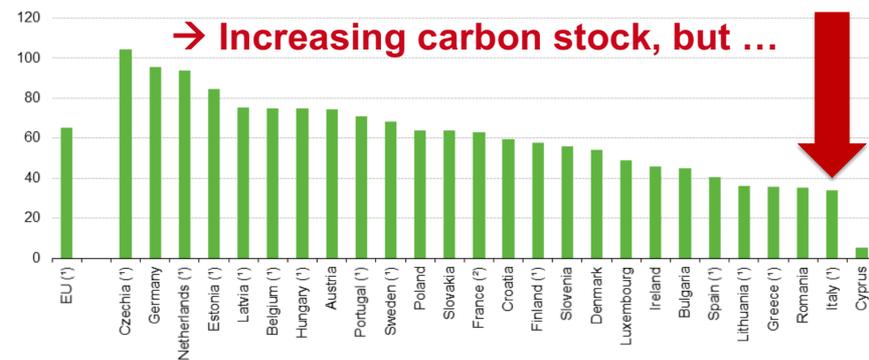


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## In Italy much less wood removal than the average EU data...

Share of timber removals to net increment in EU forests, 2020

(%)



(\*) Data are estimates.

(†) Data refer to metropolitan France and only forest available for wood supply.

Note: Increment refers to the volume of wood grown less average annual mortality. Removals are measured overbark. Malta: not available.

eurostat

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## ... extreme events are becoming ordinary

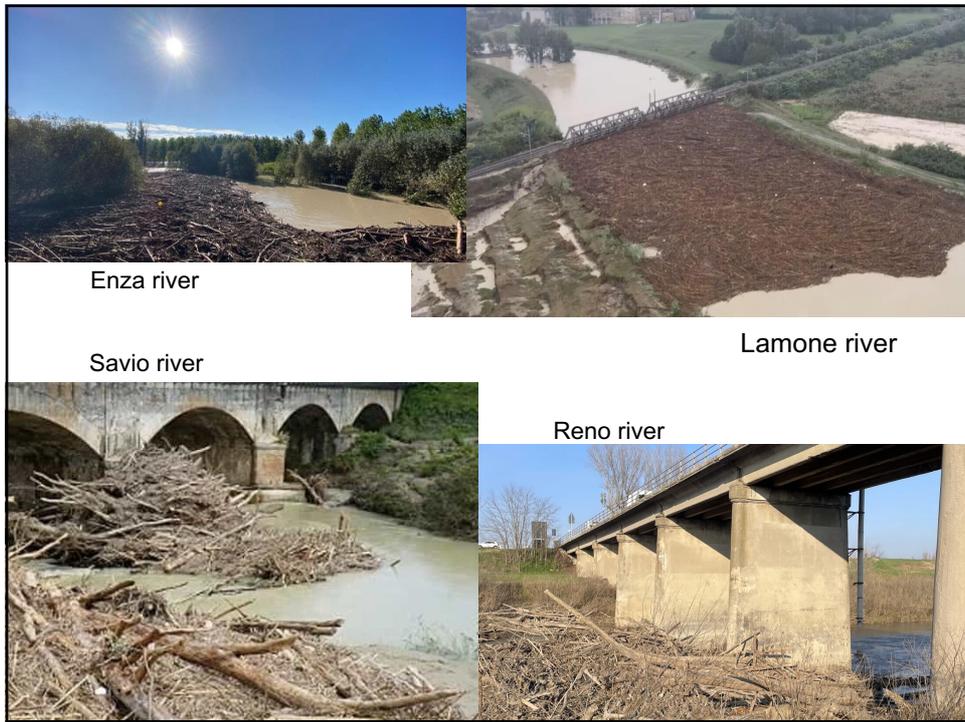
Increasing frequency of extreme events:

- **Vaia storm (2018):** 38,200 M ha; 10.2 M m<sup>3</sup>
- **Fires (2021):** 170,000 ha; 8-10 M m<sup>3</sup>
- **Bark beetles (2021-24) :** +35.800 ha
- **Floods (2023-24):** 2+1 in Emilia-Romagna
- **Evergreen oaks decline (2024):** in Eastern Sardinia (80,000 ha)

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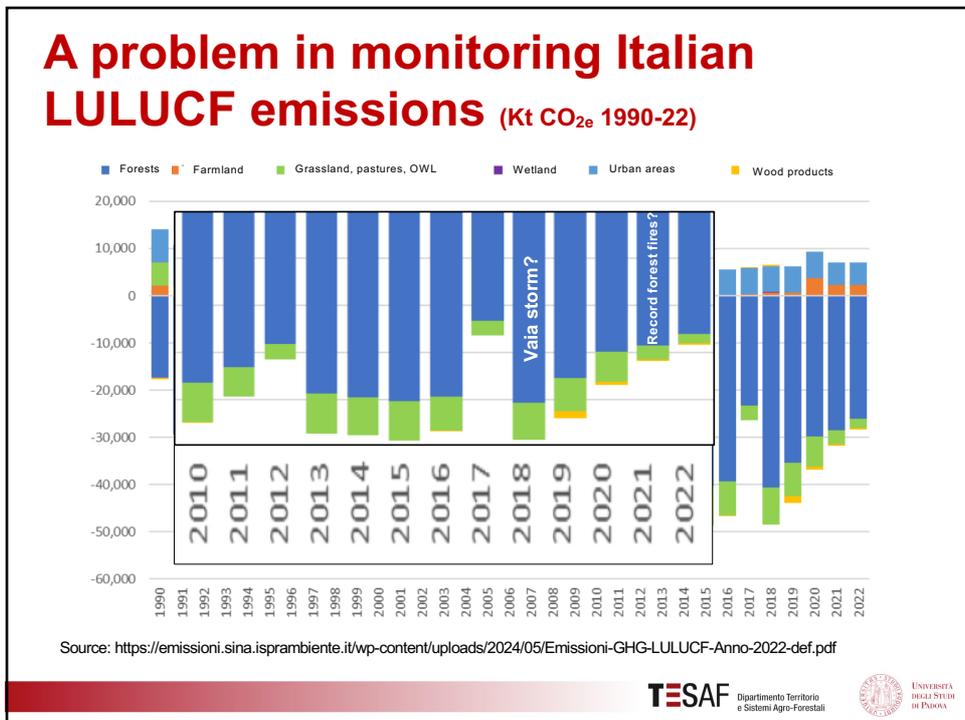
Enza river

Savio river

Lamone river

Reno river

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## a. Increasing carbon stocks

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### a.2 In the HWP pool

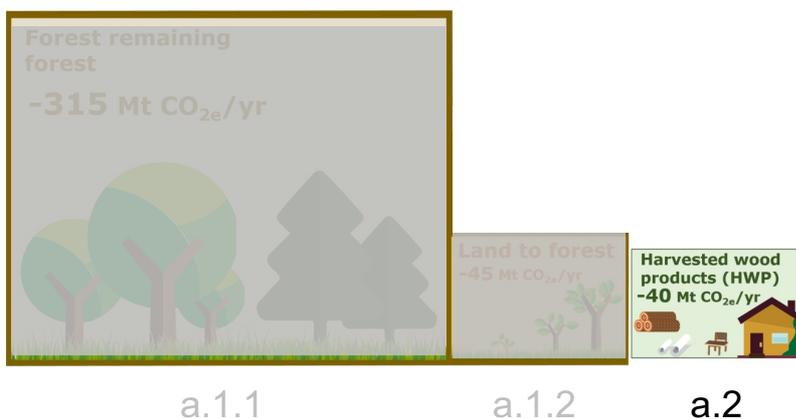
b. Substitution effects, i.e. using wood to replace:

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## Harvested wood carbon (HWP) pool in the EU

(average net carbon sinks in the EU27 during the period 2016-2018)



Source: European Commission's Knowledge Centre for Bioeconomy  
<https://knowledge4policy.ec.europa.eu/bioeconomy>

## Harvested Wood Products (HWP) pool in Italy

**The pool is remarkable** (old buildings, high quality solid wood furniture) but...

... with 70% of the wood harvested in Italy used for energy, the impact of **increased use** of national wood in long-living products is **very limited**.

Most of this increase is connected to the **import of wood**.

### En example: University of Padova Engineering Hub at University of Padova

**2,540 m<sup>3</sup> X-LAM**  
and **1,030 m<sup>3</sup>**  
**laminated beams:**

4 floors, for 3,500  
students, built in 2  
months by Rubner (in the  
Brixen plant based on sawnwood  
from the group's Austrian sawmill in  
Styria - 400,000 m<sup>3</sup>/year)

More info [here](#) and [here](#).



## Importing more biomass to support European bioeconomy development

**More than 1/3** of biomass inputs for the EU bioeconomy are **sourced and imported from extra-EU areas**

**nature**

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[nature](#) > [comment](#) > article

COMMENT | 26 October 2020 | Correction [12 November 2020](#) | Correction [21 December 2020](#) | Correction [03 March 2021](#)

### Europe's Green Deal offshores environmental damage to other nations

Importing millions of tonnes of crops and meat each year undercuts farming standards in the European Union and destroys tropical forests.

[Richard Fuchs](#) , [Calum Brown](#) & [Mark Rounsevell](#)

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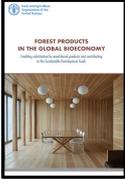
## Forest-based bioeconomy: 5 industrial strategic sectors for substitution

- Engineered wood products**
  - Cross-Laminated Timber (CLT or X-LAM): +37% annual growth (2014-20)*

  - Laminated Veneer Lumber (LVL): +6% annual growth*

- Bio-textile products**









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## 5 strategic sectors

- Bio-plastics and wood-based composites (e.g., : PWC- Plastic-Wood Composite)**

- Packaging**

- Panels, foams and wood insulation**






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## The Italian bioeconomy

| Industrial sectors                                | Production values (M€) |                |                | %          | Employment   |            |                          |
|---|------------------------|----------------|----------------|------------|--------------|------------|--------------------------|
|   | 2020                   | 2021           | 2022           |            | 2022         | .000       |                          |
| Agricoltura, silvicoltura e pesca                 | 60.519                 | 64.671         | 69.940         | 16,8       | 895          | 44,8       | (3,7%) = 26 <b>0.03%</b> |
| Alimentare, bevande e tabacco                     | 139.814                | 150.615        | 176.900        | 42,6       | 485          | 24,3       | (5%) = 8,845             |
| Tessile bio-based                                 | 7.695                  | 9.292          | 10.998         | 2,6        | 51           | 2,5        | (10%) = 1,099            |
| Abbigliamento bio-based                           | 12.246                 | 14.625         | 17.962         | 4,3        | 95           | 4,8        | (10%) = 1,796            |
| Concia e pelletteria/<br>calzature bio-based      | 12.513                 | 15.276         | 18.898         | 4,6        | 76           | 3,8        |                          |
| Legno e prodotti in legno                         | 11.667                 | 15.873         | 19.104         | 4,6        | 91           | 4,5        | (100%) = 19,104          |
| Carta e prodotti in carta                         | 22.689                 | 26.006         | 33.569         | 8,1        | 86           | 4,3        | (100%) = 33,569          |
| Chimica bio-based                                 | 3.612                  | 4.547          | 5.540          | 1,3        | 9            | 0,4        | (30%) = 1,662            |
| Farmaceutica bio-based                            | 14.034                 | 14.288         | 16.407         | 4,0        | 37           | 1,9        | (30%) = 4,922            |
| Gomma e plastica bio-based                        | 1.163                  | 1.417          | 1.630          | 0,4        | 5            | 0,3        | (30%) = 489              |
| Mobili bio-based                                  | 9.995                  | 12.489         | 14.011         | 3,4        | 63           | 3,1        | (100%) = 14,011          |
| Bioenergia  | 2.209                  | 2.818          | 4.150          | 0,9        | 2            | 0,1        | (50%) = 2,075            |
| Biocarburanti                                     | 292                    | 1.843          | ND             | ND         | ND           | 0          | (20%) = 369 <b>2.8%</b>  |
| Ciclo idrico                                      | 12.417                 | 14.369         | 15.375         | 3,7        | 50           | 2,5        |                          |
| Gestione e recupero dei rifiuti<br>biodegradabili | 8.741                  | 10.116         | 10.824         | 2,6        | 52           | 2,6        |                          |
| <b>TOTALE BIOECONOMIA</b>                         | <b>319.604</b>         | <b>358.245</b> | <b>415.308</b> | <b>100</b> | <b>1.996</b> | <b>100</b> | <b>87,967 M€ (21.1%)</b> |

Source: Intesa San Paolo on EUROSTAT and JRC data

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**A strong EU commitment towards the use of wood in the construction sector**

**NEW EUROPEAN BAUHAUS**

beautiful | sustainable | together

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# France Bois 2024

FRANCE BOIS 2024

Paris Olympics: 40% with the the "Bois de France" brand with a 30% emission reduction effect compared to London and Rio

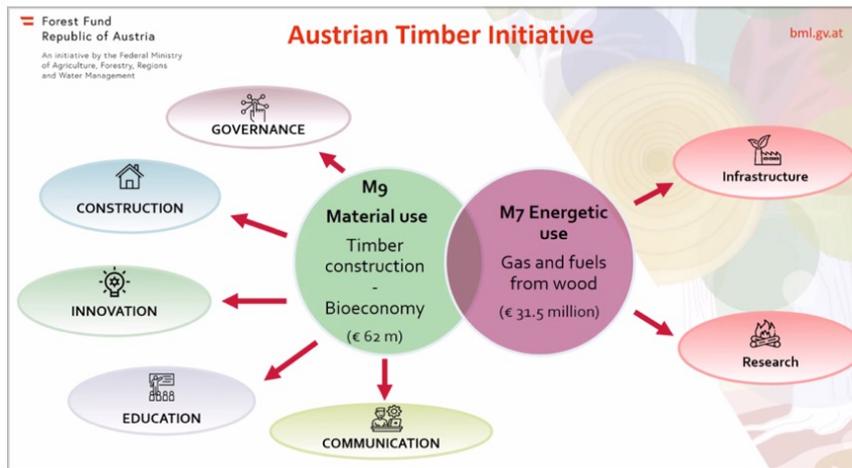
FRANCE BOIS 2024 DOCUMENTATIONS FORMATION LE BOIS ET LES JEUX ANNUAIRE APPELS D'OFFRE

<https://www.francebois2024.com/>

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## Austrian Wood Initiative in 2022 “Creating a sustainable future with wood”: 93.5 M €



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## The dominant perception of bioeconomy: a strong emphasis on biorefinery

- 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)

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## Technological approach to bioeconomy



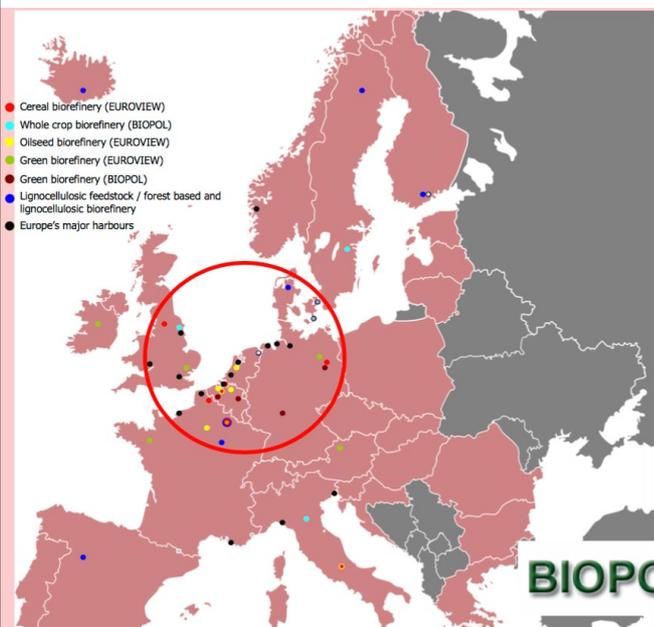

<http://bioproductmill.com>

- 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**

|  |   |  |  |
|--|---|--|--|
| <br><b>1,2</b> EUR<br><small>BILLION</small><br><small>INVESTMENT</small> | <br><b>1,3</b> MILLION<br><small>TONNES</small><br><small>CAPACITY</small> | <br><b>240</b> %<br><small>ELECTRICITY SELF-SUFFICIENCY</small> | <br><b>6.5</b> MILLION M <sup>3</sup><br><small>USE OF WOOD</small> |
|--|---|--|--|

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- Cereal biorefinery (EUROVIEW)
- Whole crop biorefinery (BIOPOL)
- Oilseed biorefinery (EUROVIEW)
- Green biorefinery (EUROVIEW)
- Green biorefinery (BIOPOL)
- Lignocellulosic feedstock / forest based and lignocellulosic biorefinery
- Europe's major harbours

**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**




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

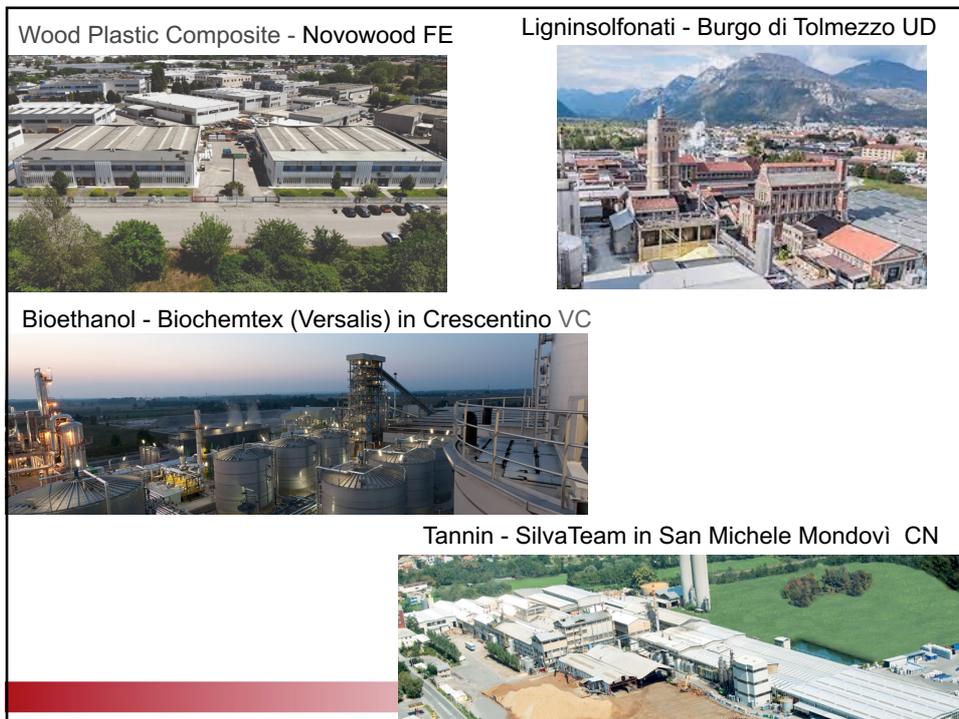


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## Wood biomass energy use in Italy

We could satisfy the energy demand using less biomass for al larger group of efficient users)

- Residential use (80-90% in old burning equipment) 83%
- District heating (small scale, strict links with local resources, sometimes CHP) 5%
- Large plants for power production 12%
- Bio-fuel, Sustainable Aviation Fuels (SAF) 0%

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## Power production plants based on wood biomass (tons)

| Region        | 2014             | 2019             | average          | %             |
|---------------|------------------|------------------|------------------|---------------|
| Calabria      | 526.283          | 1.067.956        | 837.369          | 51,5%         |
| Veneto        | 131.773          | 186.248          | 145.970          | 9,0%          |
| Sicilia       | 161.209          | 101.436          | 137.267          | 8,4%          |
| Emilia-R.     | 145.332          | 106.078          | 127.193          | 7,8%          |
| Piemonte      | 109.233          | 89.239           | 111.942          | 6,9%          |
| Sardegna      | 90.797           | 160.456          | 90.724           | 5,6%          |
| Lombardia     | 36.487           | 119.114          | 74.615           | 4,6%          |
| Lazio         | 49.462           | 33.176           | 43.296           | 2,7%          |
| Toscana       | 0                | 38.280           | 25.429           | 1,6%          |
| PA Bolzano    | 407              | 28.487           | 21.152           | 1,3%          |
| Puglia        | 33.403           | 21.797           | 9.410            | 0,6%          |
| Molise        | 958              | 1.814            | 2.559            | 0,2%          |
| <b>Totale</b> | <b>1.285.346</b> | <b>1.954.080</b> | <b>1.626.926</b> | <b>100,0%</b> |

Since 1992 financially supported by consumers with their monthly payments of the power bills.

These payments are going to be blocked with the implementation of RERDIII

Source: MIPAAF

## Lenzing

### What Modal?

Innovative by nature

Modal is an artificial textile fiber obtained by spinning the cellulose extracted from beech trees. Modal part of the viscose family, it is a variety of Rayon originally developed in Japan in 1951 and marketed in the form of "artificial silk".

The main difference between Rayon and Modal resides in the raw material used: Rayon fiber is commonly extracted from the wood pulp of different trees, while the fiber of Modal it is extracted only from beech wood.

It is important to know that Modal it is not a natural fiber, but an artificial fiber of natural origin: although the beech plant is the natural raw material used for the production of Modal, this textile fiber is born thanks to the help of numerous chemical substances.

### LENZING™ Modal

Natural softness and comfort, efficient moisture management, enhanced breathability, good color fastness and the compliance with recognized safety standards for food contact make LENZING™ Modal fibers suitable for use in work wear, botanic nets, coated and car seat fabrics.

Lenzuola Completa in Modal  
Completo Lenzuola - Su Misura Estratto Dal Legno Di Faggio  
da 199,00€

SCEGLI

Federa Modal Estratto Dal Legno Di Faggio  
da 35,48€

SCEGLI

Lenzuola Sotto Con Angeli - Su Misura - Modal Estratto Dal Legno Di Faggio  
da 85,62€

SCEGLI

Copripiumino + Federa - Su Misura - Modal Estratto Dal Legno Di Faggio  
da 222,94€

SCEGLI

Fonte: <https://www.lenzing.com/products/lenzingtm> e <https://www.purocotone.it/>

Locally sourced raw material from sustainably managed forests

**≡ Pollmeier**  
**BauBuche**

The green alternative to reinforced concrete posts and beams.  
Outstanding CO2 storage!  
BauBuche stores 1.171 kg CO2 per cubic meter.

Hardwood laminated veneer lumber – known as BauBuche – enables proprietors, architects and other decision-makers to construct buildings that preserve resources, especially in multi-story post and beam construction where softwood reaches its limits.





Fonte: <https://www.pollmeier.com/baubuche/>

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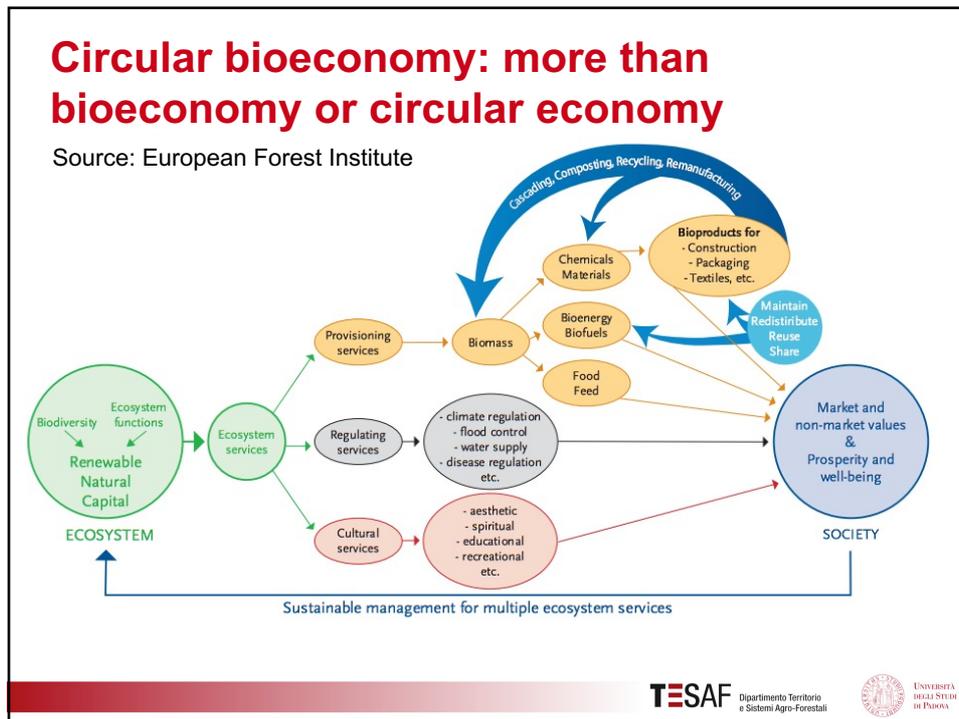
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## Some concluding remarks

(the conventional bioeconomy concept is not adequate to define a proper set of values and targets)

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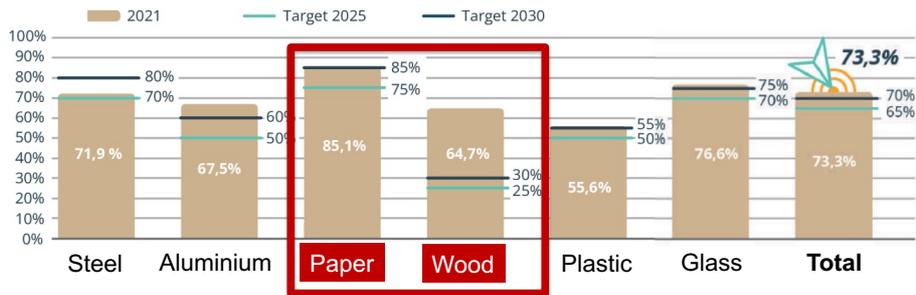


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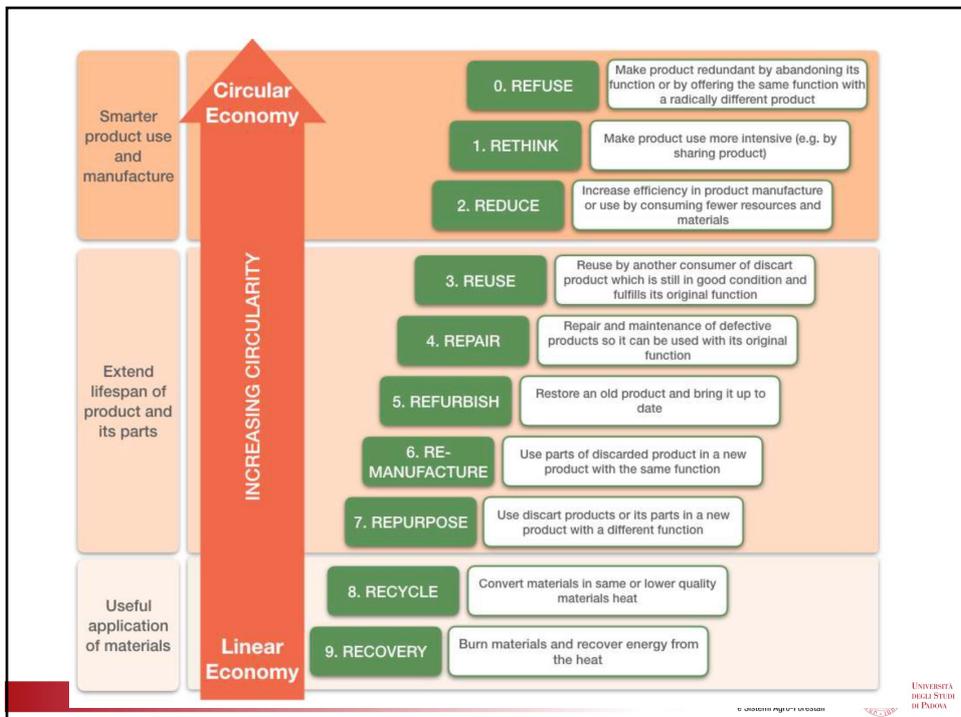


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## Recycling rate of products at the end-of-life in Italy in relation to EU targets defined for Italy for 2025 e 2030



Source: [https://www.fondazionevilupposostenibile.org/wp-content/uploads/dlm\\_uploads/Sintesi-Il-Riciclo-in-Italia-2022.pdf](https://www.fondazionevilupposostenibile.org/wp-content/uploads/dlm_uploads/Sintesi-Il-Riciclo-in-Italia-2022.pdf)



## The social and environmental components of the bioeconomy

(Circular bioeconomy) “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)

## Social Innovation in Mediterranean forests 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  |
|-------------------------------------|--|---|
| <i>Focus on</i>                     | <ul style="list-style-type: none"> <li>• Technological innovations</li> <li>• Large scale investments</li> <li>• Value chain perspective</li> <li>• Sectorial development</li> <li>• Vertical integration</li> </ul> | <p><b>Bioeconomy: an opportunity to re-think to our consumers' patterns</b></p> <p>It not only considers the protection of natural capital, "but it stresses as well the importance of addressing <b>equity and social inclusion challenges</b> in moving toward a green economy"</p> |
| <i>Input/output diversification</i> | <p><b>1 or more inputs</b></p> <p>Diversification in outputs</p>   |   |
| <i>Market power</i>                 | <p>Increasing role of business owning/controlling the (new) technologies</p>   |   |
| <i>Model regions</i>                | <p><b>Northern EU</b> (UK, Scandinavian countries)</p>   |   |

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In other words, it is a matter of the direction to be taken...



... but also of the optimal tools to be used



These slides can be download from the web (search with «pettenella»)

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