



Institute for
European
Environmental
Policy

The Circular-Bioeconomy in agriculture and forestry

Sustainable bioresource pathways

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Institute for European Environmental Policy (IEEP)

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Agriculture and forestry – the bio-economy

- The agriculture and forestry sectors are unique in that they rely on natural resources and cycles as their primary inputs.



Land



Water



Soils



Biodiversity

- Using these resources beyond sustainable limits undermines the future of these sectors and the benefits they generate for society.



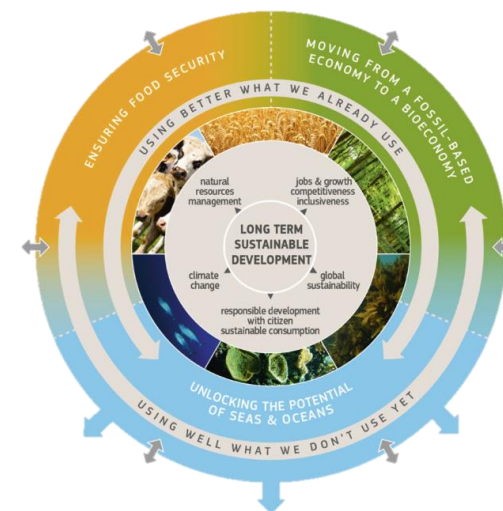
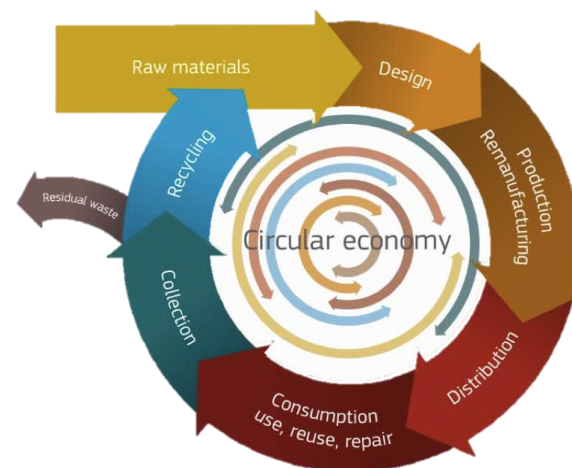
Circular and Bio-economy concepts

Circular economy

- Intrinsic recycling and feedback loops;
- Applies to the whole economy;
- Adding value to waste materials

Bio-economy

- Can be both linear and circular;
- Only bio-based products and systems;
- Reliant on the primary sectors;
- Emphasis on adding value to raw materials with strong knowledge and technical development.



Innovation and new business models

Agriculture and forestry in the circular economy

Upstream

Downstream

Resources

Largely linear

Outputs



↑↑ Rising ↑↑

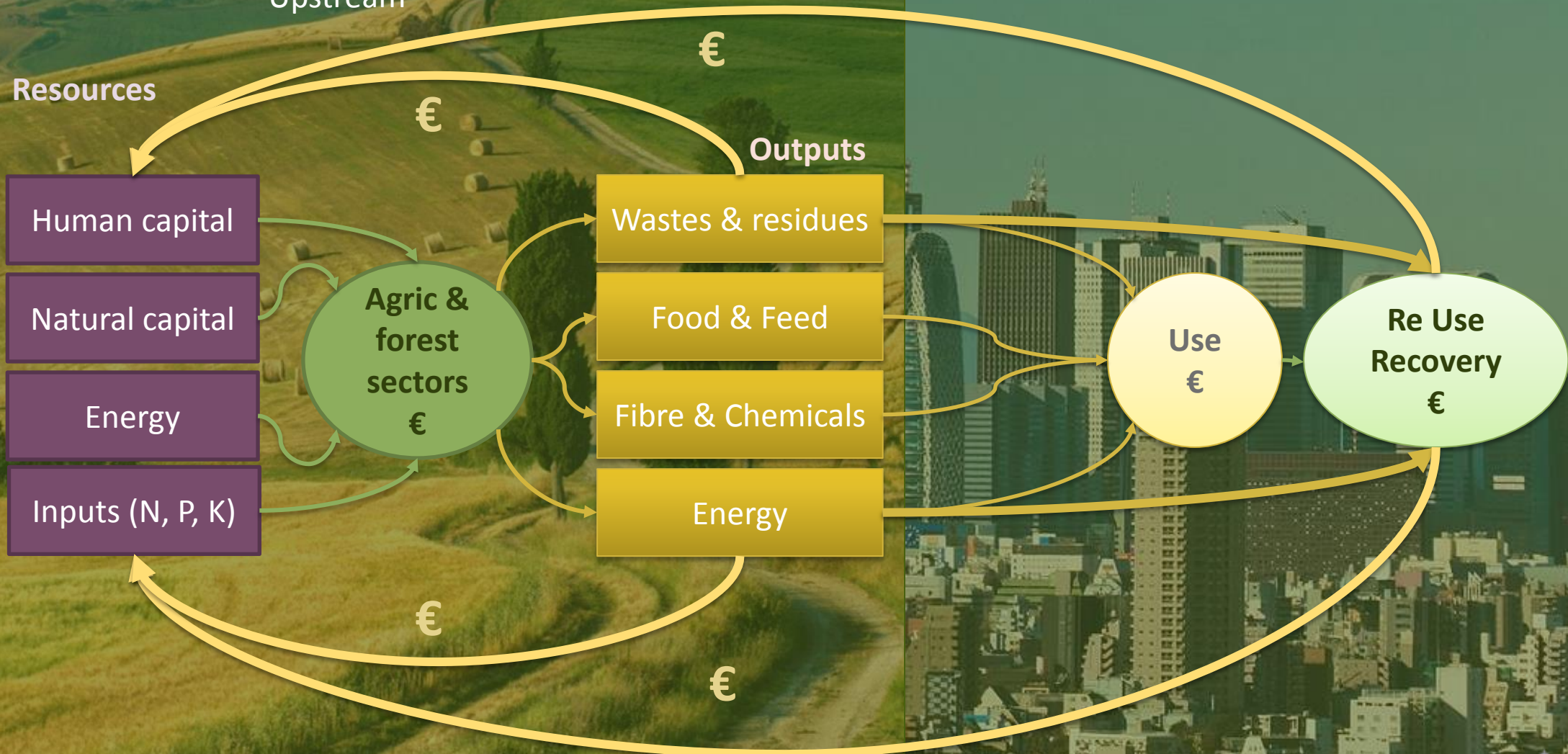
Pressure on resources
Costs
Demands

↑↑ Increased ↑↑
Pressure on environment
Pressure on climate
Loss of resources

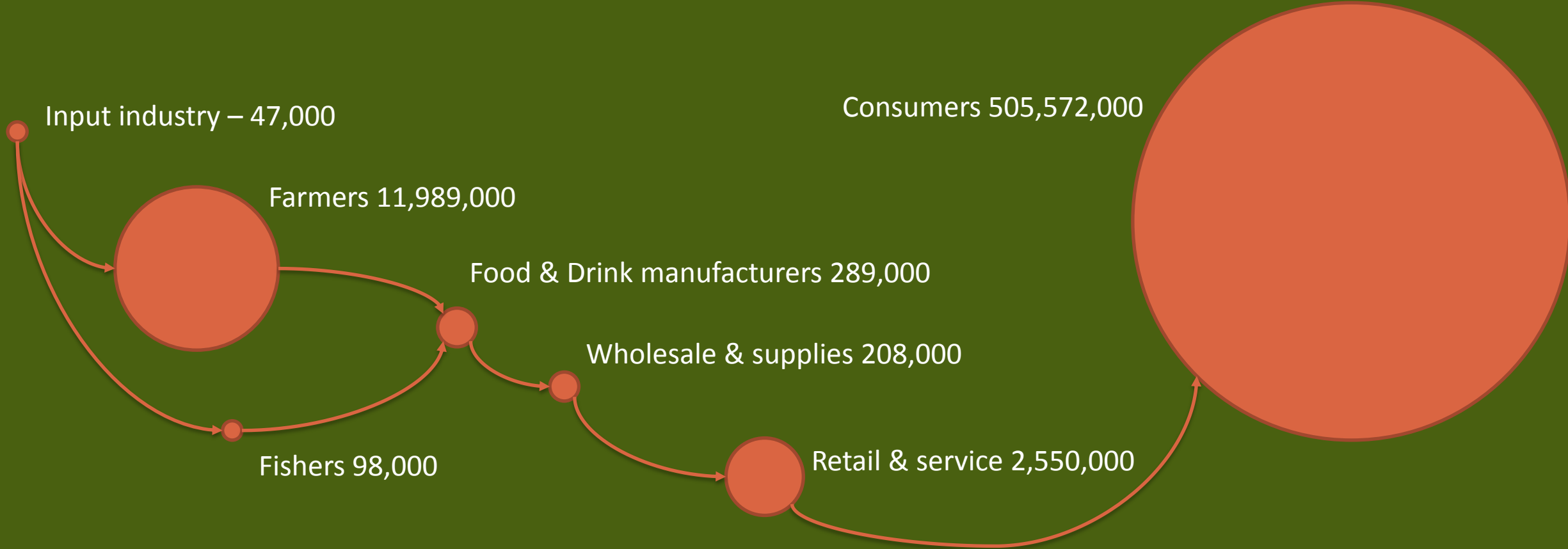
Agriculture and forestry in the circular economy

Upstream

Downstream



Actors within the European food supply chain.



Source: EEA (2017) *Food in a green light - A systems approach to sustainable food*. EEA Report - No 16/2017

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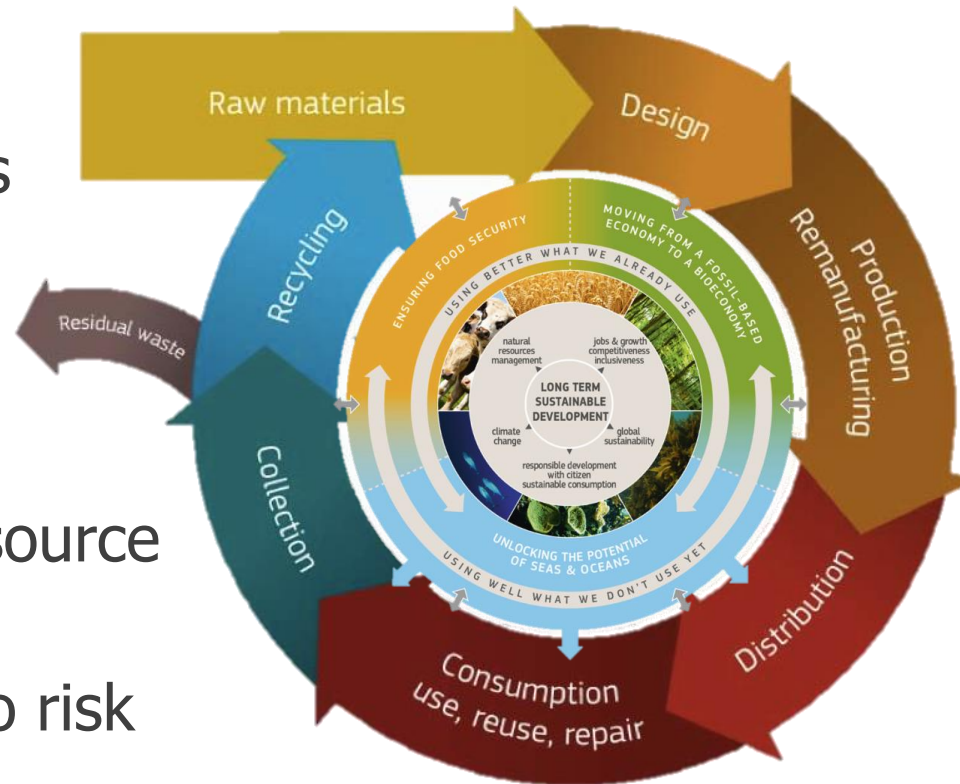
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Agriculture and forestry – A more circular bio-economy

Opportunities

- New income streams
- Future proofing
- Job creation
- Links to new sectors
- More sustainable resource use at lower cost
- Reduced exposure to risk



Circular-Bio-economy

- Intrinsic recycling and feedback loops;
- Applies to the whole economy;
- Supports rural sectors;
- Emphasis on adding value to raw materials, wastes & residues;
- Strong knowledge and technical development;

Bio-economy – a question of scale

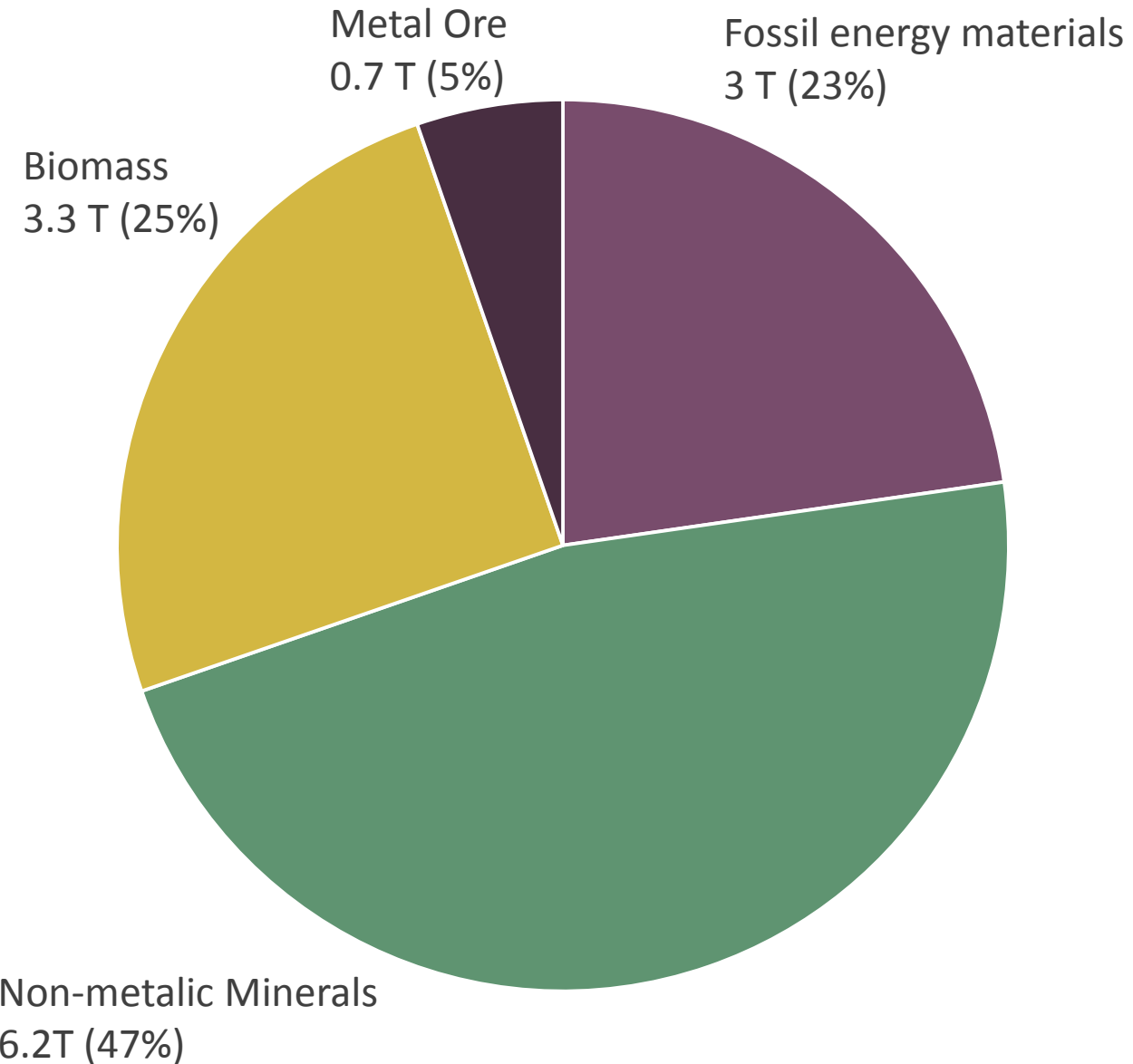


Biomass production

- Biomass produced = 1,466 MT / year
 - 956 MT / year agriculture
 - 510 MT / year forestry
 - (avg figures)
- Harvested and used = 805 MT/year
 - 578 MT / year agriculture
 - 227 MT / year Forestry
 - (2013 figures)

Sources: Eurostat (env_ac_mfa) and (demo_gind);
JRC (2018) *Biomass production, supply, uses and flows in the European Union. First results from an integrated assessment.* doi:10.2760/539520

Material consumption per capita / year (2017)

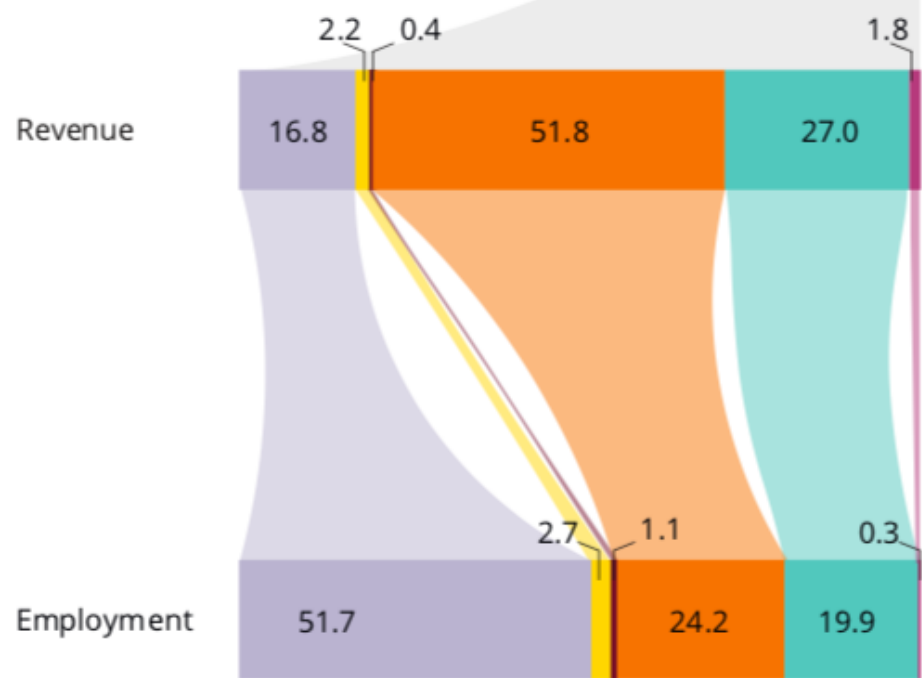


Contribution of the bioeconomy in the EU (%)

Revenue



Bioeconomy revenue and employment (%)

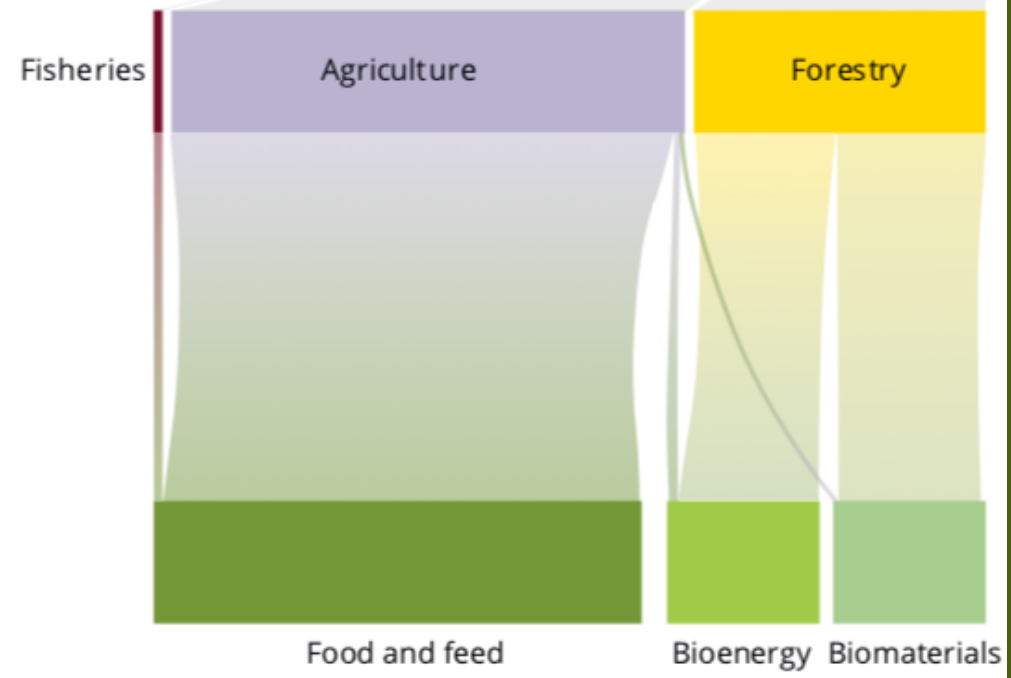


- Agriculture
- Food production
- Material production
- Forestry
- Fisheries
- Energy production

Material flow



Biomass flows in the bioeconomy (%)



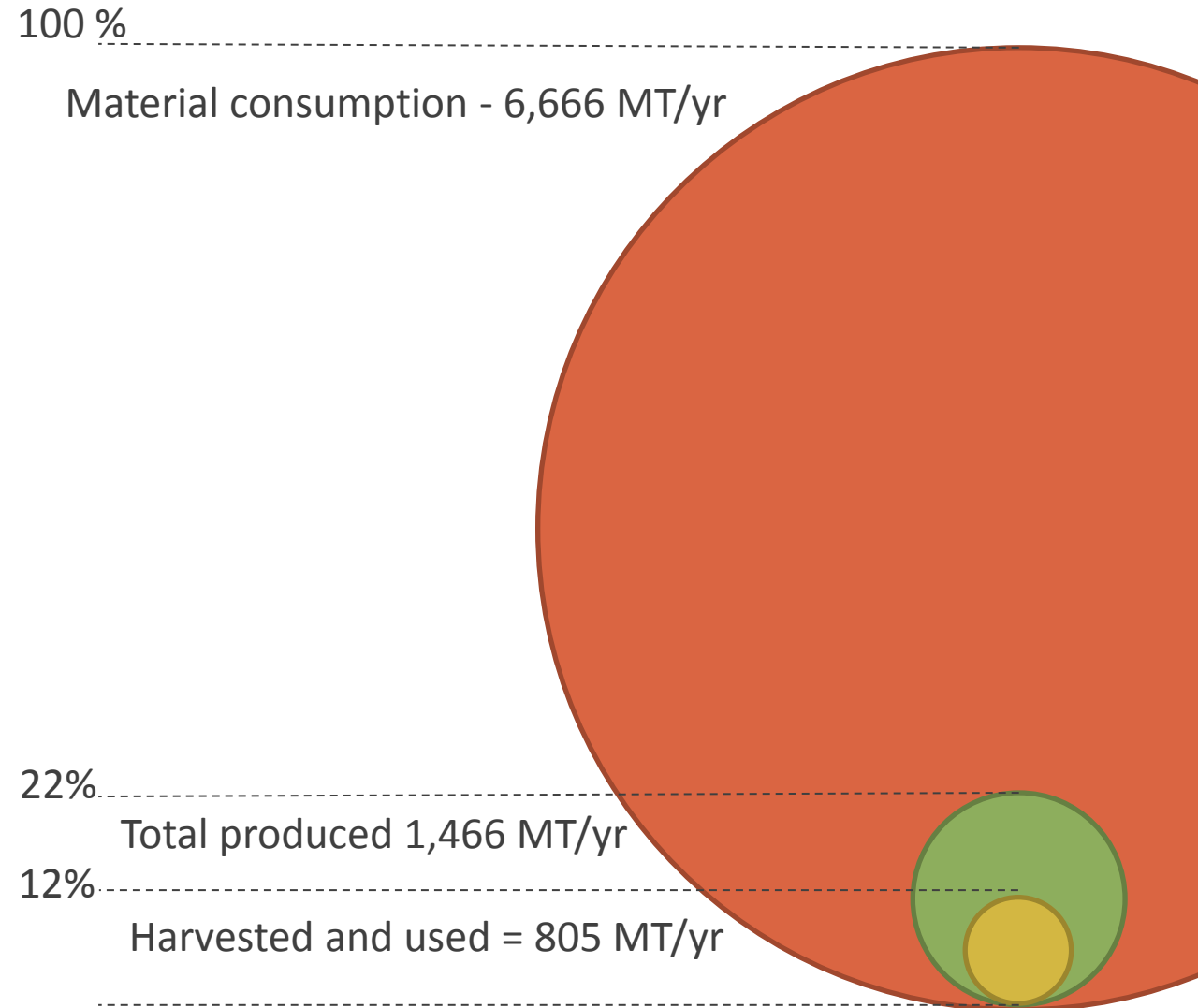
Sources: EEA, 2017 – The circular economy and the bioeconomy; JRC Biomass project; 2016 Bioeconomy report (Ronzon, et al., 2017); Eurostat MFA

Biomass production

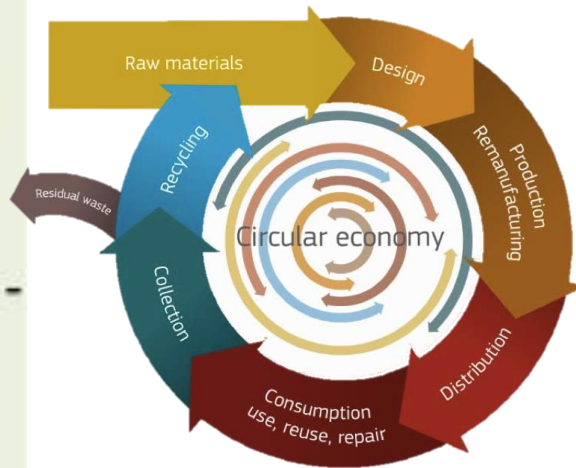
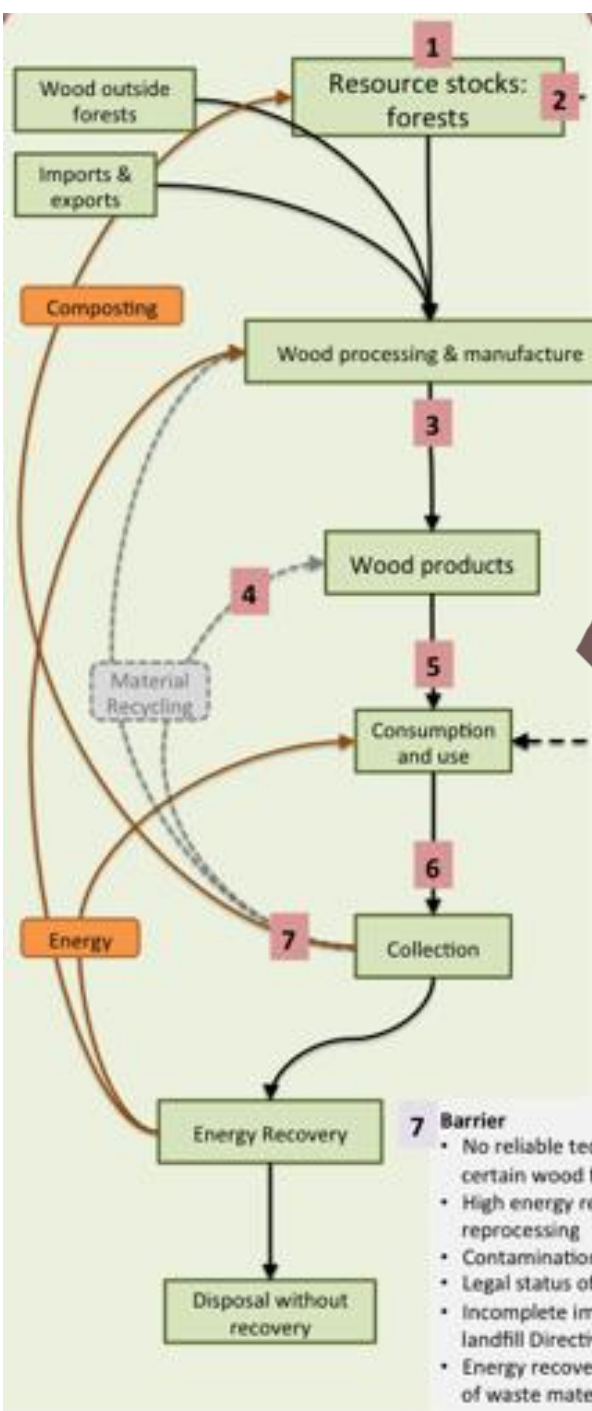
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Consumption versus production



Maximising circularity

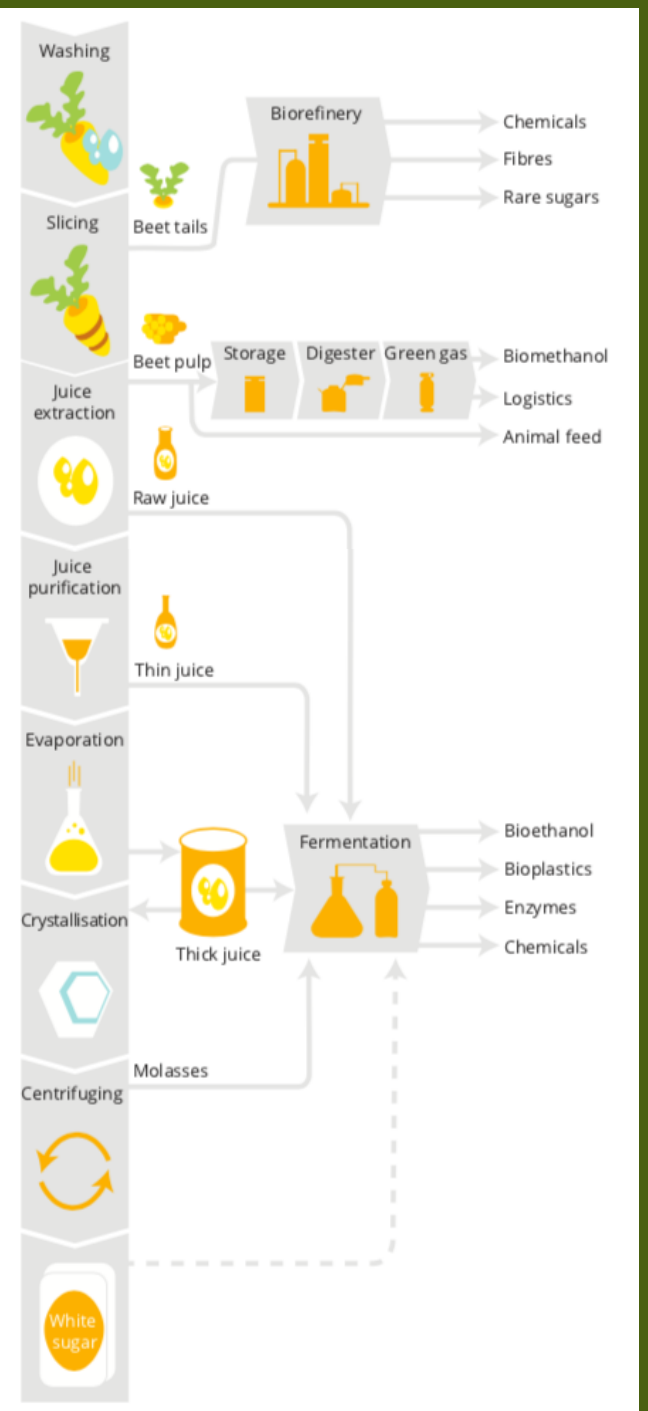


Source: Vis et al, 2016
Cascading use of woody biomass

Circular Bioeconomy



Source: EEA, 2017 – The circular economy and the bioeconomy;

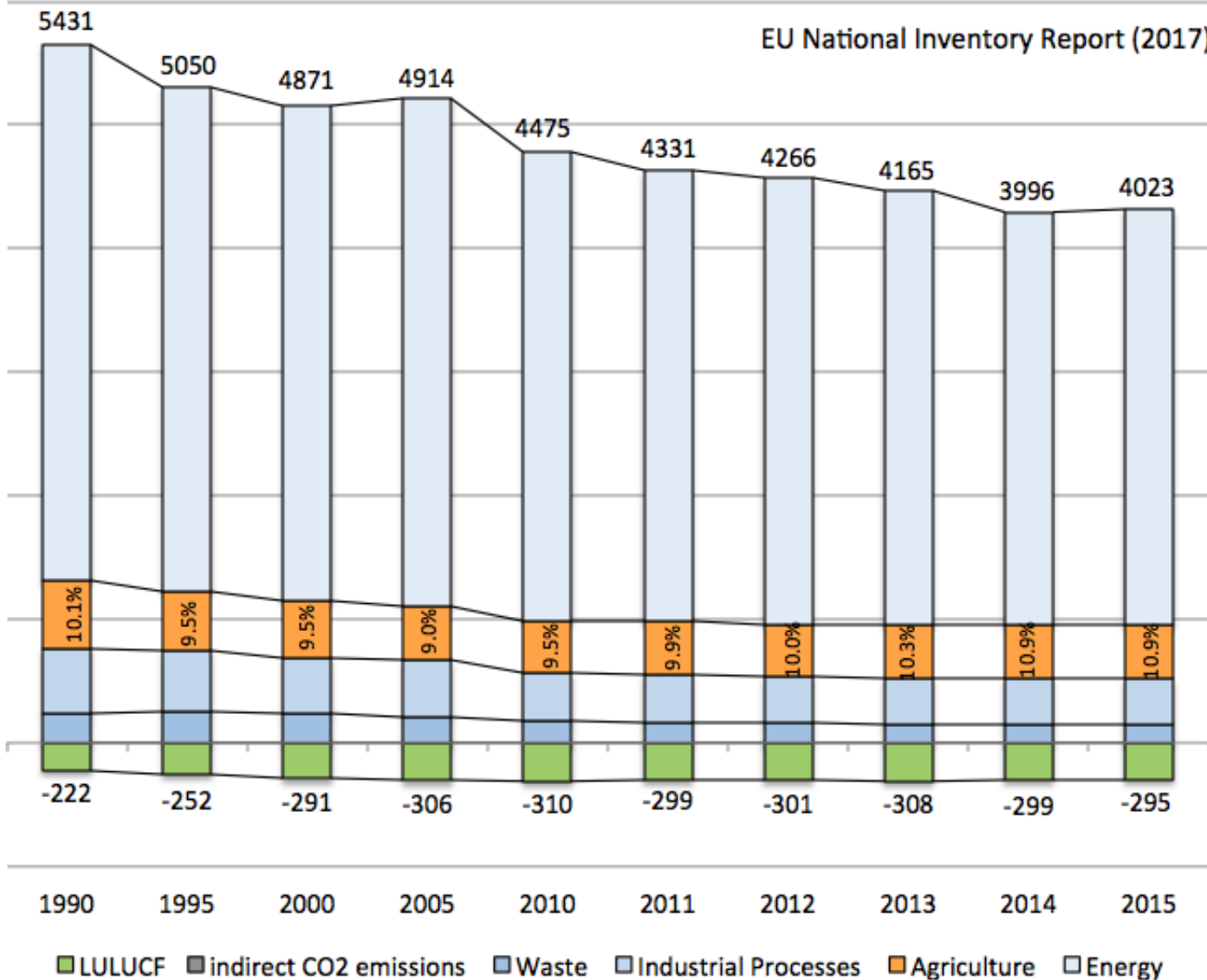


Maximising valorisation

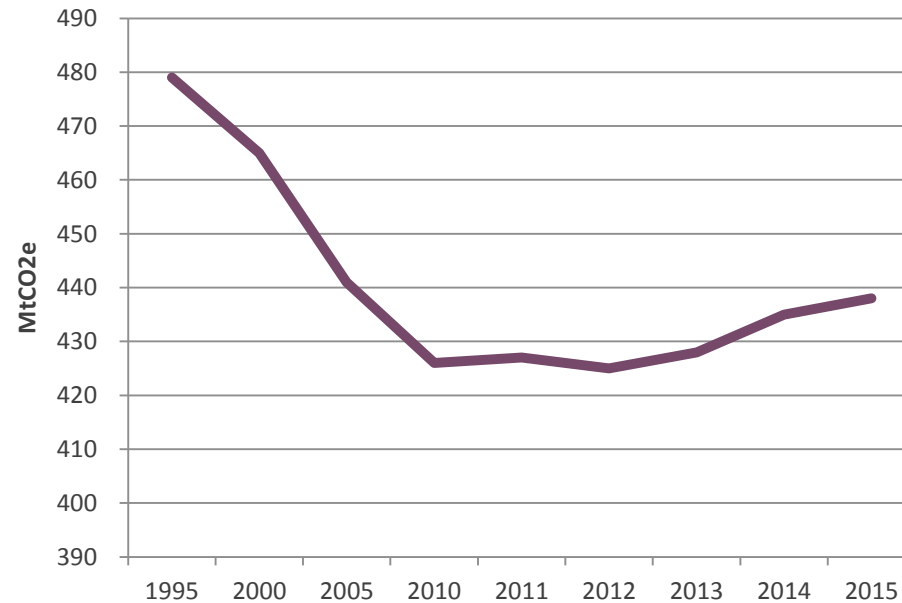


Bio-economy – and climate action

EU National Inventory Report (2017)



- Reductions in other sectors has been more rapid and sustained than in agriculture.



- Emission levels have seen sustained increases since 2012
- Relative share expected to reach 30% by 2050



What makes agriculture & forestry special?

- Potential to compensate for emissions through carbon sequestration and storage
- Mitigation actions can deliver co-benefits: economic, environmental & social
- Agriculture also has a role in
 - Ensuring EU food and nutrition security,
 - Incomes and territorial development,
 - & the social & environmental benefits delivered by the sector

Reduce emissions

- **Efficiency gains:**
 - reduce GHG emissions per unit of production
- **Reduced/change output:**
 - reduced GHG emissions in absolute terms.



Increase removals



- **Increased removals**
 - land use change;
 - building carbon in soils;
 - Greater vegetation/wood

Support other sectors

- **Fossil substitution:**
 - Biomass & Biofuels
 - Space for energy infrastructure
 - Materials for construction; packaging, etc.



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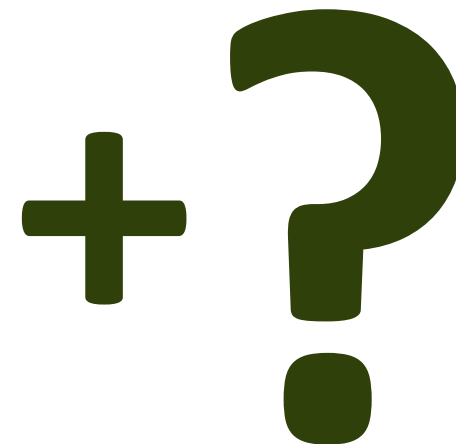
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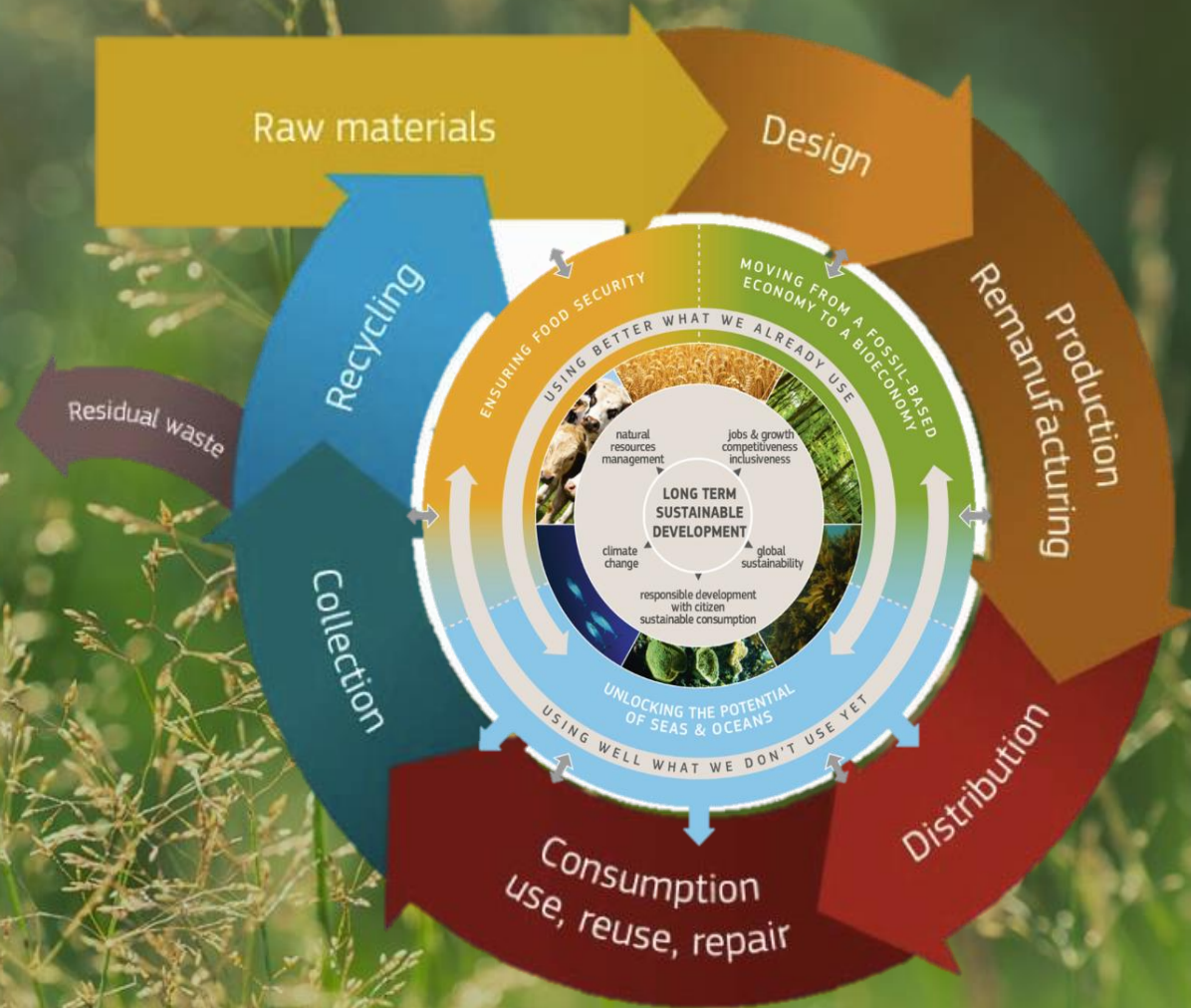


Production



Consumption

Towards a sustainable circular bio-economy



Rural challenges of the bio-economy

1. Increasing demand for natural resources
2. GHG emissions are uncertain and depend on production practices, life of product and end-of-life.
3. High utilisation of existing biomass – and dependence on imports
4. New products and uses counter efforts to reduce waste
5. Loss of value from rural areas

Solutions from the circular economy

1. Circularity can help to reduce competition as can a change in the resource base.
2. Recovery at end of life - change in production practices and closing nutrient loops.
3. Greater cascading use of woody biomass, developing new side-streams from existing wastes & residues
4. Systemic change and focus on consumption
5. Develop rural bio-economy value chains, with greater feedback.

A sustainable circular bio-economy – some solutions

- Policy **coherence** is essential in ensuring a sustainable trajectory for the circular bio-economy (EEA, 2018; Hoff, 2018)
- Policy interventions should be geared towards the **reduction of environmental pressures** along the entire value chain (EEA, 2018)
- Necessity of technological, socio-economic and institutional **innovations**
- Changes in **consumption and behaviour patterns** to address the issue of scale
- Development of **new economic and growth models** are required
- **Sustainability criteria** are important to ensure the bio-economy stays within natural limits and to promote circularity.
- Reconceptualising **what value means** in the bio-economy – not just production
- A new **bio-resources policy**?



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**THINK
2030**

Science-policy
solutions for a more
sustainable Europe

Thank you

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