Sustainable bio-feedstock Availability in the EU: A Look into Different Scenarios towards 2050

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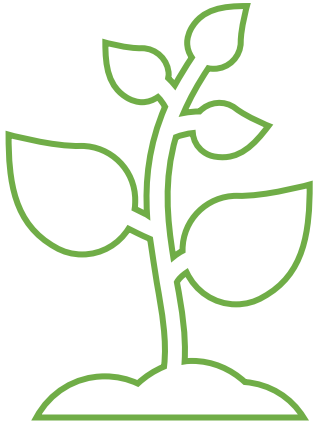

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1 Biomass availability: Setting the scene

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Biomass availability: Setting the scene

Aim and context

- Overview of the sustainable biomass availability in the European Union and the UK by 2030 and 2050.
- Only domestic (EU27 & UK) feedstocks of agricultural, forest and waste origin included in Annex IX of RED II (Part A and B).
- A short overview of the potential for imports and algae, based on other studies has been included as an Annex. Food and feed crops are not included in this study.
- The Concawe study considers up-to-date assumptions, that are in line with the European Green Deal, for the sustainable increase of available biomass acknowledging the biophysical restrictions of land resources and feedstocks as well as the adverse effects of climate change.

Main assumptions

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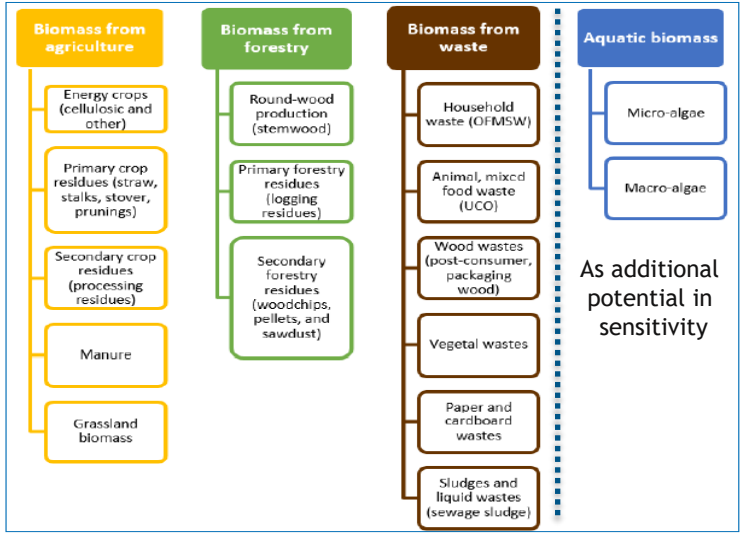
General assumptions in all scenarios

- Strong political will to deliver the European Green Deal
- COVID-19: The economic recovery promotes the economic benefits for local producers while broaden the feedstock base
- Focus on biofeedstocks in RED II Annex IX (Part A and B).
  - Traditional biofuel crops (1st generation) not included
  - Biomass sustainability criteria of RED II
- Granularity at EU country level by 2030 and 2050
- Low ILUC risk concept
- No negative effect on biodiversity:
  - conservation of land with significant biodiversity values
  - land management without negative effects on biodiversity
- Imports potential
- Allocation of biomass raw materials to biobased products (bioplastics, biopharmaceuticals, construction materials, etc.)

Types of biofeedstocks included in the study



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2 Scenarios and assumptions

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Concawe Scenarios

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1. **LOW. Low mobilization:**
   - Farming and forest practices at 2020 levels

2. **MEDIUM. Improved mobilisation in selected countries:**
   - Improved mobilisation in countries with high biomass availability

   (total estimated biomass potential ≥20 million tonnes per year) in combination to:
   - Strong infrastructure, good institutional framework, established policies/ targets for bioenergy, strong innovation profiles (Germany, France, Sweden, Finland, Italy, United Kingdom, Austria, Spain)
   - Or low costs (Poland, Romania, Czech Republic, Hungary, Bulgaria)

3. **HIGH. Enhanced availability and improved mobilisation:**
   - Improved research & innovation addressed for all countries (Pushed to a higher technical sustainable potential)

Improved Research & Innovation:

Raw materials

- Increase yields with the use of varieties that are better adapted to local ecosystems, the introduction of crop rotations, the use of cover crops to prevent soil erosion in sensitive areas and at the same time increase crop production, etc.

Practices

- Improved agricultural management practices (e.g. selection of varieties, crop rotation and intercropping, fertilization, water management, adoption of precision agriculture practices).
- Improved harvesting practices and machinery
- Cultivation of crops in unused, abandoned and severely degraded land due to low quality.
- Advances in separation, collection and energetic usage of UCO/Fats Oils & Greases and the organic waste fractions.

Main assumptions

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	Scenario 1 (Low)	Scenario 2 (Medium)	Scenario 3 (High)
Agriculture			
Removal rate of field residues	40%	45%	50%
Use of prunings	5%	20%	50%
Moderate yield increases in perennial lignocellulosic crops in unused, degraded and abandoned land	1%	1%	2%
Share of unused, degraded and abandoned land for dedicated crops, excluding biodiversity rich land and on land with high carbon stocks	25%	50%	75%
(Current share of unused, degraded and abandoned land for dedicated crops: There are no offical statistics- only at experimental and demonstration scale)			
Forestry			
Stem wood used for energy purposes (Current stemwood for energy: 45%)	25%	30%	50%
Primary forestry residues availability for energy production	40%	50%	60%
Secondary forestry residues and post consumer wood availability for energy	55%	60%	65%
Wastes			
Biowaste used for energy production	60% in 2030 (65% in 2050) of biowaste is recycled and 40% in 2030 (35% in 2050) is separately collected and available for bioenergy	50% in 2030 (55% in 2050) of biowaste is recycled and 50% in 2030 (45% in 2050) is separately collected and available for Anaerobic Digestion	40% in 2030 (45% in 2050) of biowaste is recycled and 60% in 2030 (55% in 2050) is separately collected and available for Anaerobic Digestion

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Results

Work-in final review

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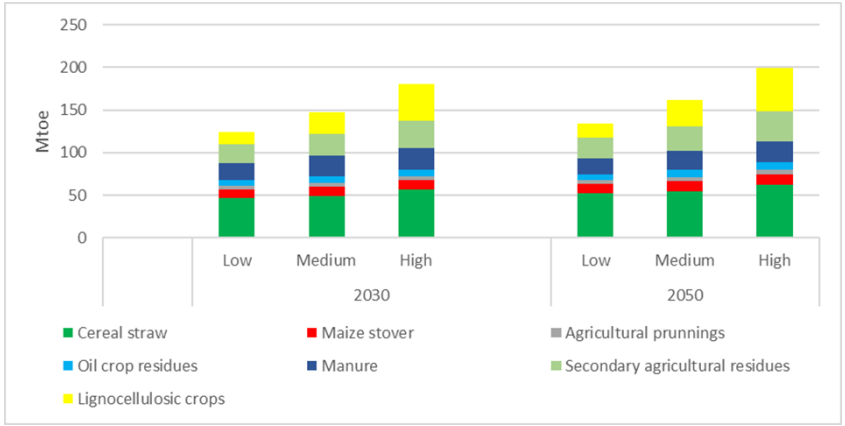
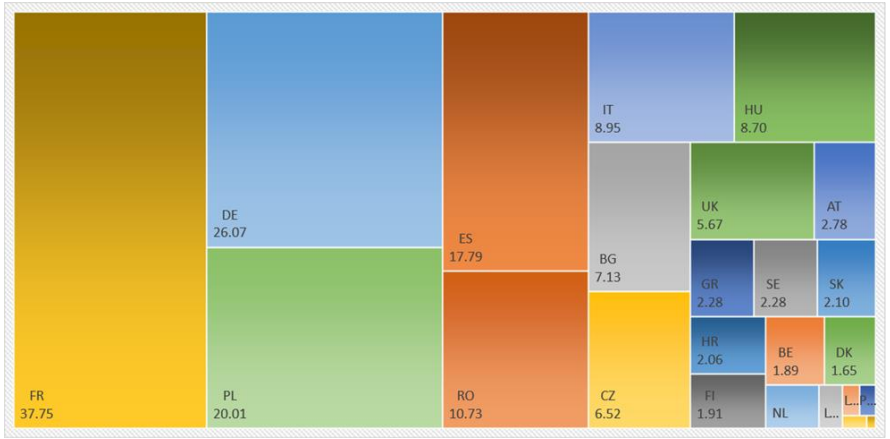
Agriculture

Estimated biomass potential from agriculture for all markets

Estimated biomass potential from agriculture



Regional distribution



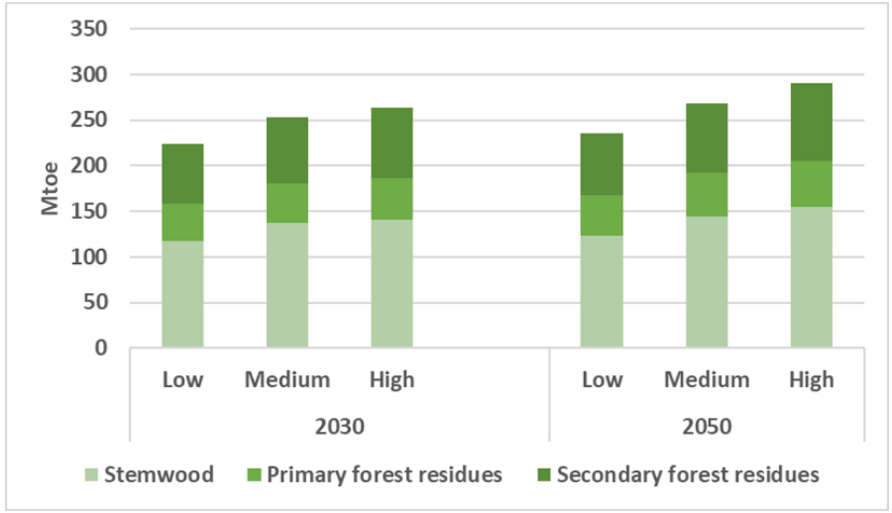
Note: Regional distribution for Scenario 1 (million dry tons).
Similar for Scenario 2 and 3

	Key parameters	Low	Medium	High
Agriculture	Share of marginal land for lignocellulosic crops	25%	50%	75%

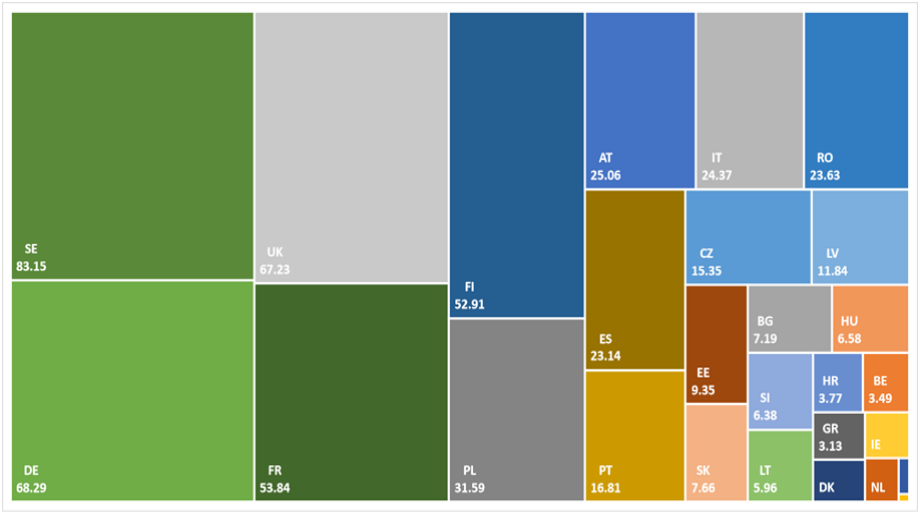
Forestry

Estimated biomass potential from forestry for all markets

Estimated biomass potential from forestry



Regional distribution



Note: Regional distribution for Scenario 1 (million dry tons).
Similar for Scenario 2 and 3

	Key parameters	Low	BAU	High
Forestry	Stemwood for energy	25%	30%	50%

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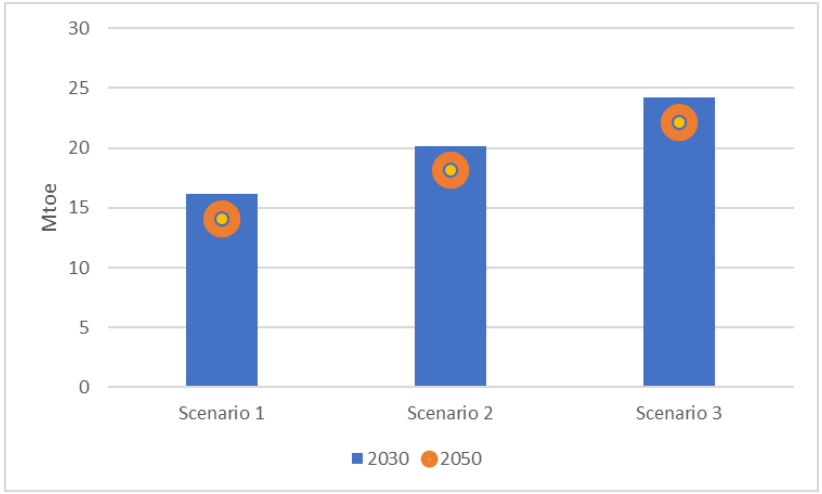
Biowastes

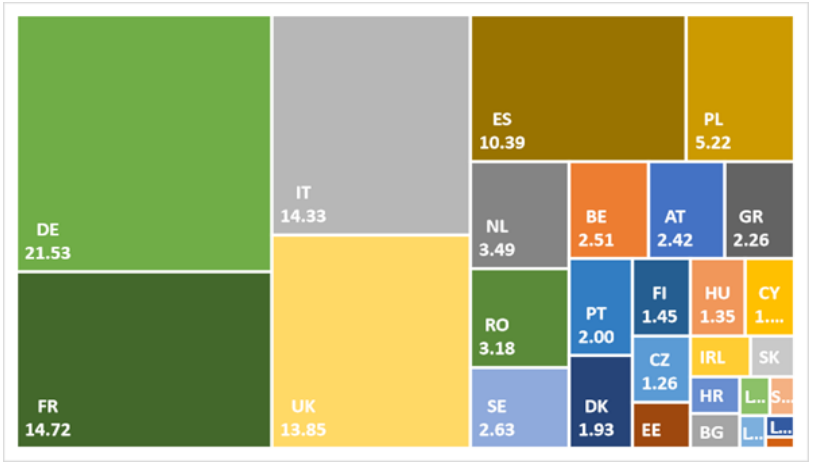
Estimated biomass potential for biowastes for all markets

Estimated biomass potential from biowastes



Note: Chart for bioenergy.
To be updated

Regional distribution



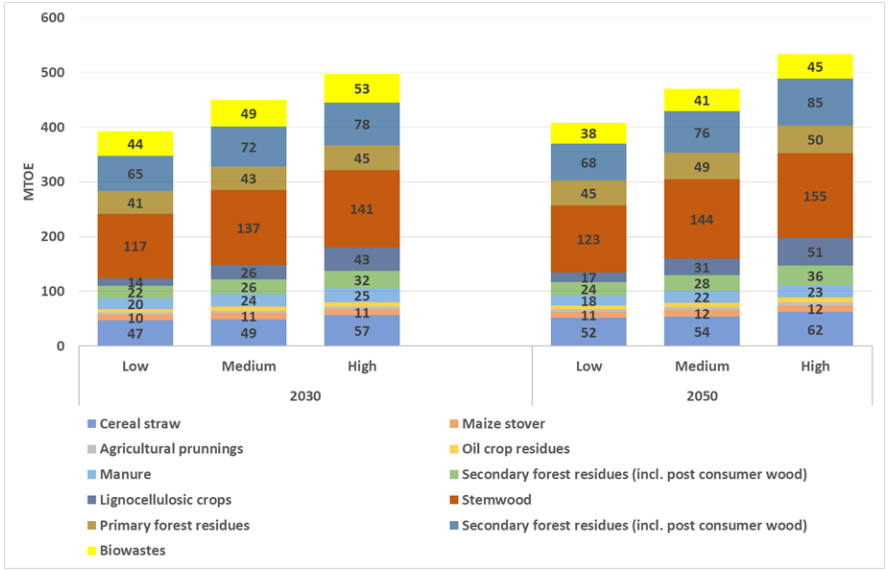
Note: Regional distribution for Scenario 1 (million dry tons).
Similar for Scenario 2 and 3

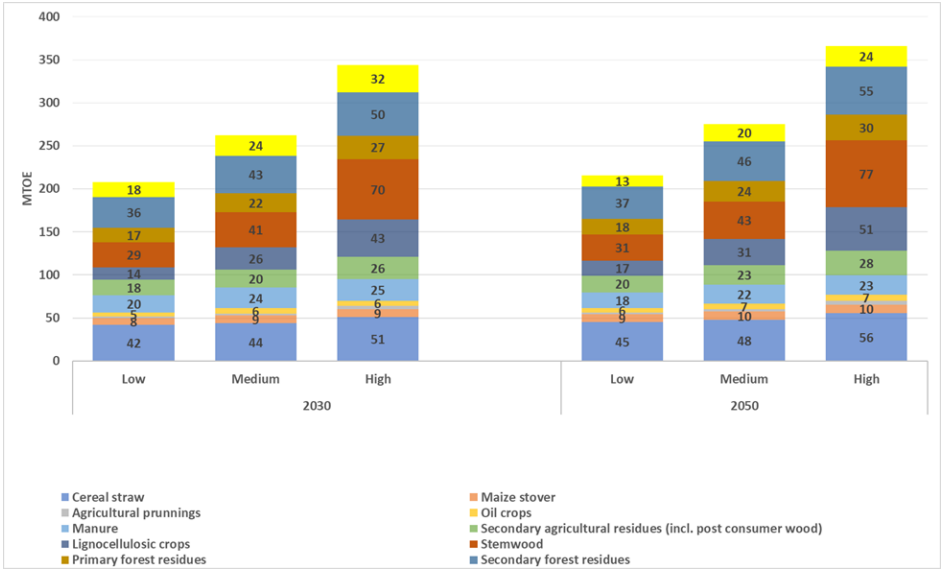
	Key parameters	Low	BAU	High
Wastes	Biowastes for energy	35%	45%	50%

Estimated total sustainable biomass (Mtoe)

Subtracting allocation to biobased products

All markets → **Bioenergy**





- ✓ Concawe's scenarios forecast a total EU potential biomass for all sectors of 392-533 Mtoe/y by 2030/2050.
- ✓ Allocation to bioenergy sector of 208-366 Mtoe/y by 2030/2050

4 Conclusions

Conclusions

What is the sustainable biomass availability (2030/2050) with no impact on biodiversity?

- Many different publications providing different ranges with not always transparent assumptions
- Concawe has commissioned a study with Imperial College. Main results:
  - ✓ Total EU potential sustainable biomass availability (agriculture, forestry and biowastes) for all sectors of 392-533 Mtoe/y (low-high scenario) by 2030/2050.
  - ✓ Allocation to bioenergy sector of 208-366 Mtoe/y (low-high scenario) by 2030/2050.
  - ✓ These results show the total bioenergy sector, as competition in bioenergy sectors (power, industry, residential, transport) have not been explored in detail.
  - ✓ The European Commission (A Clean Planet for all, Impact Assessment) is allocating ~120-170 Mtoe/y (2030/2050) of the bioenergy to power + industry + residential sectors. This means that, even with EU COM power allocation, there is a potential of 88- 196 Mtoe/y of biomass for transport sector in 2050.
- To realise this potential, additional R&D would be required as well as the implementation of improvement management strategies. Even if the potential is there, supply chains would need to be developed to mobilise all these resources.
- Concawe will use this estimate to support our assessment on the potential deployment of low carbon fuels in the transport sector towards 2050.