Deutsches Biomasseforschungszentrum
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HEMIC-OAT

Biomass potential of hemicellulose

In hydrolysate from wood processing industries in Germany and Belgium

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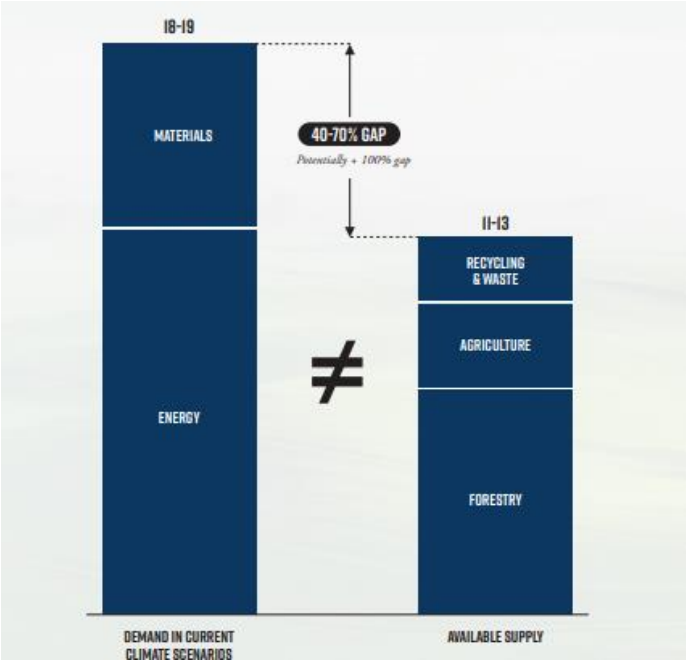
Why analysing biogenic industrial streams?

Biomass gap



Material Economics (2021). EU Biomass Use In A Net-Zero Economy - A Course Correction for EU Biomass

- No monitoring system quantifying and identifying the types and amounts of residues, wastes, and by-products produced exists
- Changing consumer needs and demand
- Environmental pressure

Chance

→ Shifting of economic system from fossil to renewable

→ Industrial residues, wastes and by-products are 2G feedstocks

→ Extraction of high quality fractions adding value to product portfolio

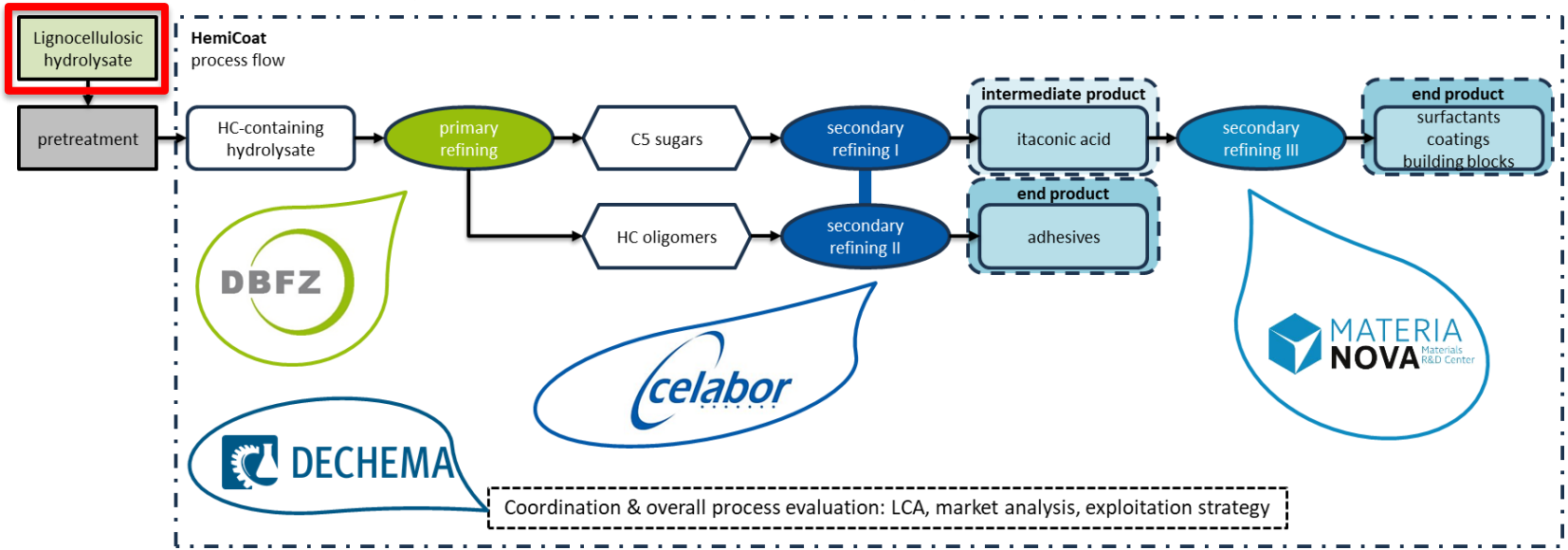
HemiCoat

Main objectives and workflow

(i) Recover most hemicellulose mono- and oligomers from lignocellulose biomass processing

(ii) Use monomeric sugars to produce Itaconic acid as a building block for chemical synthesis of surfactants

(iii) Test the feasibility of oligomers in adhesive manufacturing



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Lignocellulosic hydrolysate

Where, how much, current use?

- Interviews with companies, associations, experts
- Own lab analytics
- Literature review

→ Understanding origins, processes, amounts, extraction dependencies, usage

Where?

Locations of hydrolysate containing hemicellulose

Wood pulp — **7**

- Kraft
- Mg-Sulfit

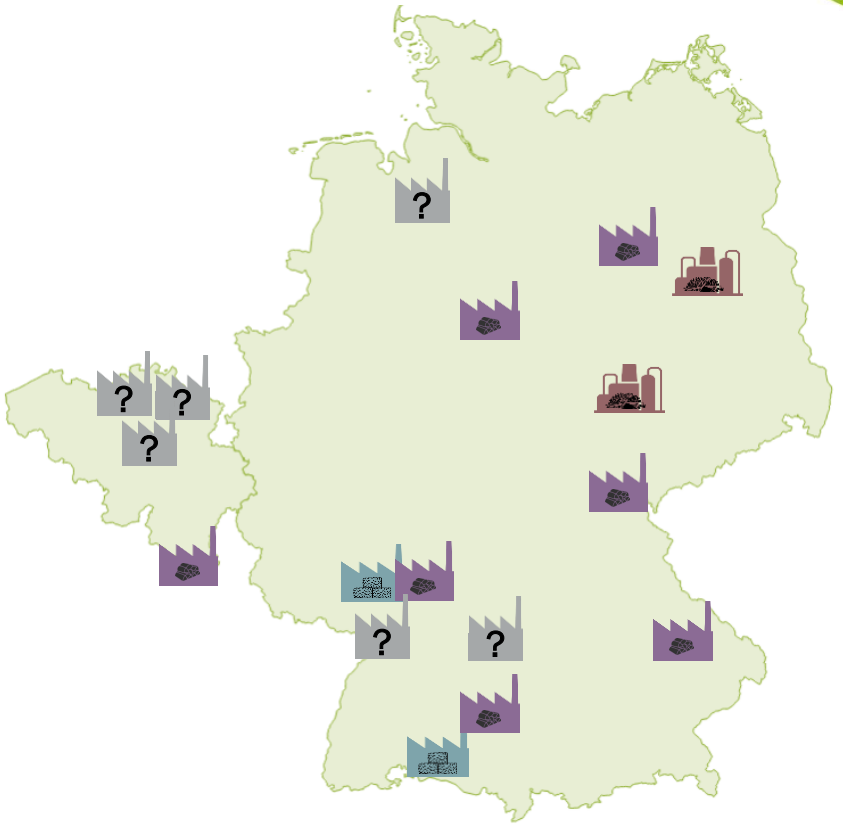
Non – wood pulp — **2**

- Mg-Sulfit
- Steam Explosion

Multi – product — **2**

- Acids
- Steam explosion

Unclear



How much?

Biomass potentials

various terms for potential which quantitatively describe the **resources available** and how the **resources are used** (1)

Theoretical biomass potential

quantifies the maximum productivity of biomass under optimal management (2)

Technical biomass potential

includes biomass-specific restrictions which could limit its use as a raw material or source of energy (2)

Mobilisable technical biomass potential

Results from theoretical biomass potential – technical biomass potential (1)

(1) Brosowski et al., 2019: https://doi.org/10.1016/j.biombioe.2019.105275
(2) Brosowksi et al., 2016 https://doi.org/10.1016/j.biombioe.2016.10.017

How much?

Biomass potentials hemicellulose hydrolysate

Wood pulp

- Kraft
- Mg-Sulfit

Non – wood pulp

- Mg-Sulfit
- Steam Explosion

Multi – product

- Acids
- Steam explosion

→ **Process-related technical potential**

Considers biomass quantities in relation to technical processes

How much?

Process-related technical potential of hemicellulose hydrolysate

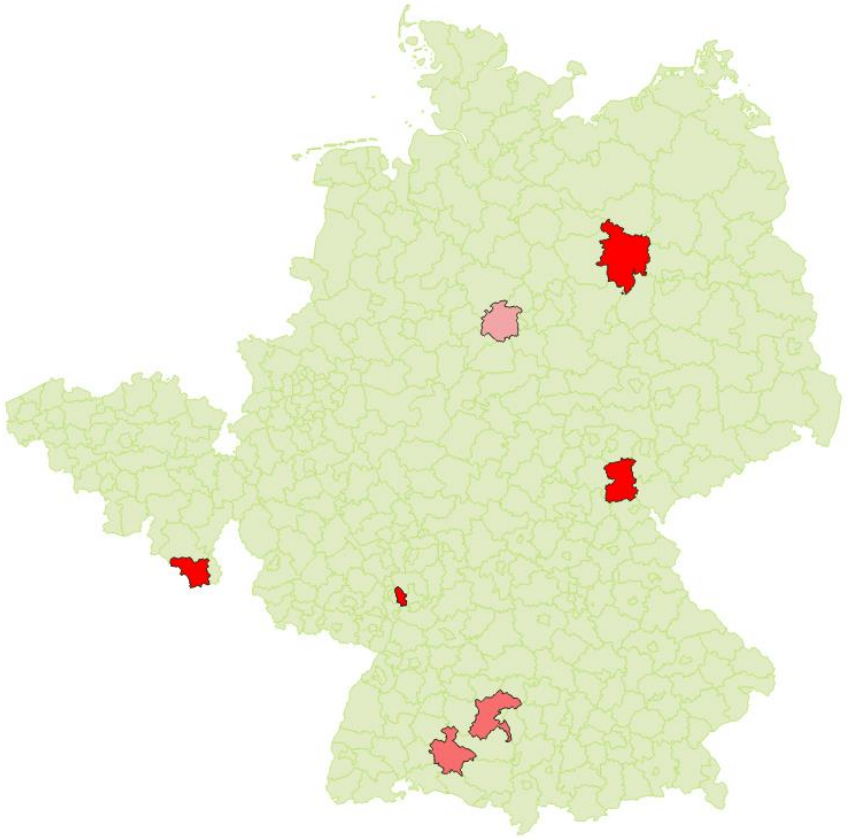
	Process	Hardwood	Softwood	Straw
HC content %		24	23	36
HC content in % in hydrolysate from original available	Kraft	40	37	
	Mg-Sulfit	20	28	93
	PSE			75

For 1000 kg input material

	Process	Hardwood	Softwood	Straw
HC content %		242	226	362
HC content in % in hydrolysate from original available	Kraft	97	82	
	Mg-Sulfit	53	62	337
	PSE			272

→ Amount input material x process related waste factor / 100 = Amount HC in hydrolysate

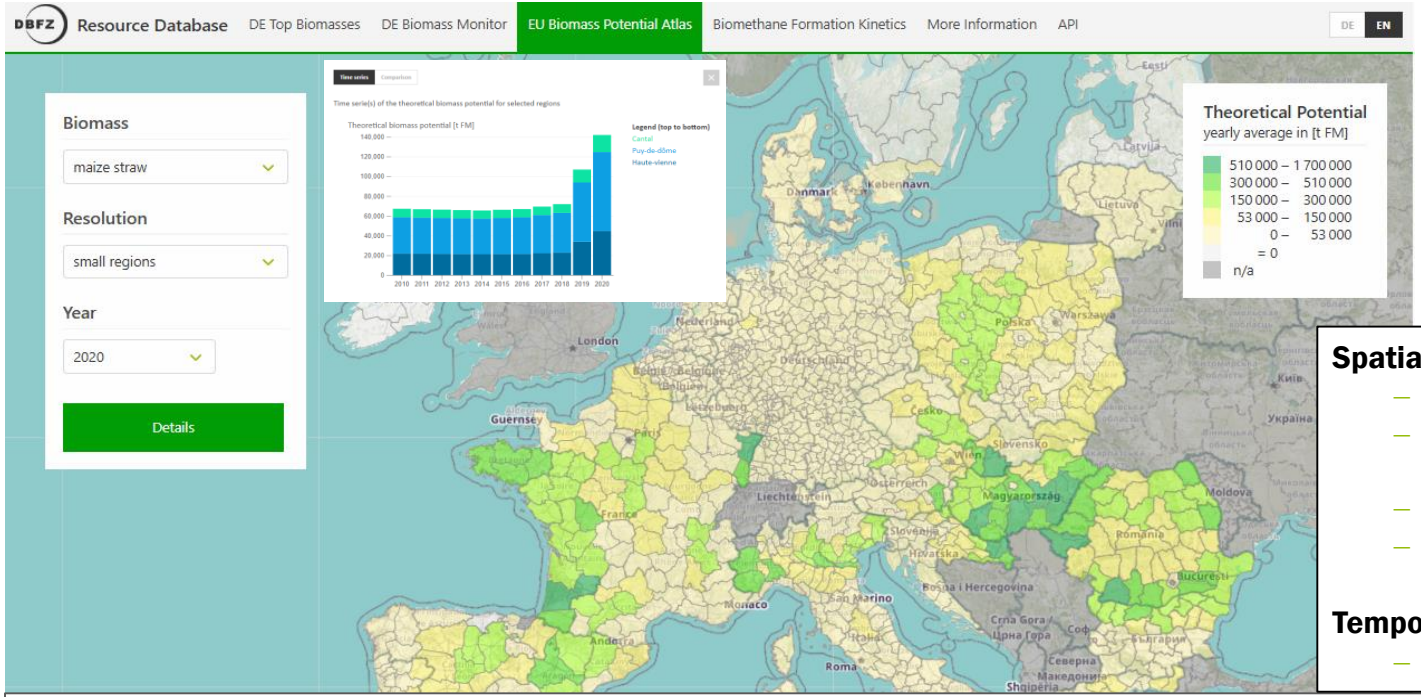
Biomass potential



Current use

- burned burned for energy
- biogas production

Outlook



Spatial Resolution

- NUTS-0 (country)
- NUTS-1 (major socio-economic regions)
- NUTS-2 (basic regions)
- NUTS-3 (small regions)

Temporal Resolution

- Timeseries (2010 - 2020)

Data publication "Theoretical biomass potentials for EU 27" → https://doi.org/10.48480/g53t-ks72

Paper "*Temporal and spatial mapping of theoretical biomass potential across the European Union*"

→ https://doi.org/10.5194/essd-2023-179

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