

To be or not to be a biobased commodity

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Biomass vision:

- We need to mobilize biomass for current and future demands

→ Develop biomass commodities!

- We need biomass commodities for thermal conversion and for second generation biofuels and chemicals.

Not only wood. Herbaceous biomass is underutilized – Often causing pollution problems – how much can be used for biobased applications?

Top 10 crops in the world	Total field	Total mill
	Million hectares	Million ton DM crop residue per year
Maize	185	1,038
Rice, paddy	163	816
Wheat		
Sugar cane		
Oil Palm		
Barley		
Sorghum		
Sunflower seed	25	66
Millet	31	43
Seed cotton	35	35
Sum:	800	3,459
All crops worldwide:	1,414	

What part can we mobilize?
 Can we recycle the nutrients?
 What part is needed for the soil?



Where should a lignocellulose Biorefinery be located?

Location:	Near the biomass	At a large harbour
Factor		
Cost of biomass	+	-
Biomass security of supply	-	+
Availability of Infrastructure	-	+
Maximum scale	-	+
Availability of personnel / expertise	-	+
Value or residues	-	+
Sum	1+	5+

To be or not to be a Biobased Commodity

Real commodity	Not a commodity
<p>Easy to store and transport → high energy density, dry, low volume, low ash, nutrient depleted.</p> <p>Fungible → “exchangeable” = standard quality</p> <p>Standardised transport, contracting, standard insurance, etc.</p> <p>Standard conversion systems</p> <p>Functioning markets:</p> <p>Trade systems, Financial instruments (futures, etc.)</p> <p>High tradability</p> <p>Sustainability</p> <p>Standard certification systems</p>	<p>Not easy to transport</p> <p>Not fungible</p> <p>No broad standards</p> <p>No functioning markets or trade</p> <p>Trust needed between producer and buyer</p> <p>One on one relations between producer and buyer</p> <p>Vertical integration</p> <p>Less security of supply lager</p> <p>High transaction costs</p> <p>Inefficient</p>

How to get there?

- Develop local biorefinery systems with relatively small economy of scale (30.000 ton per year) to remove nutrients, protein and water and produce a lignocellulosic commodity
- Define only a few biomass commodities that cover
 - All lignocellulosic biomass types (wood, EFB, trunks, grass, straw, bagasse, etc.)
 - All applications: heat, co-firing, biorefinery, etc.
- Set wide standards (if possible) and avoid frivolous demands
- Involve all players in the production chain (biomass producers, machine builders, regulators, insurers, bankers, transport, final users)

Trash vs Bagasse quality

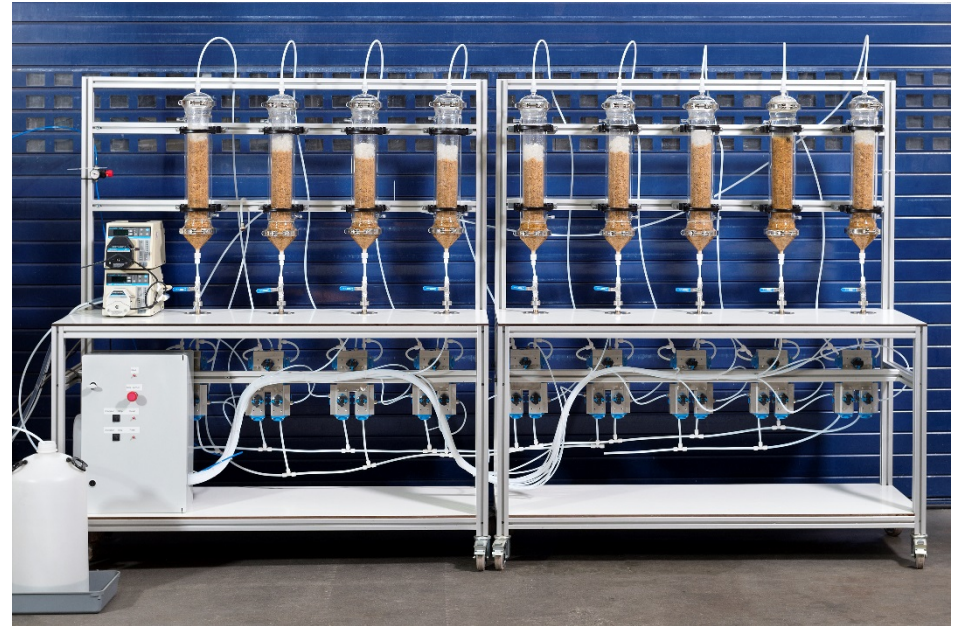
	----- Trash -----			Bagasse
	Dry leaves	Green leaves	Tops	
	----- % of DM weight -----			
Ton DM per hectare	11.8	1.6	0.3	
Moisture content	13.5	67.7	82.3	50.2
Ash	3.9	3.7	4.3	2.2
Fixed carbon	11.6	15.7	16.4	18.0
Volatile matter	84.5	80.6	79.3	79.9
C	46.2	45.7	43.9	44.6
H	6.2	6.2	6.1	5.8
N	0.5	1.0	0.8	0.6
O	43.0	42.8	44.0	44.5
S	0.1	0.1	0.1	0.1
Cl	<u>0.1</u>	<u>0.4</u>	<u>0.7</u>	<u>0.02</u>
	----- g/kg DM -----			
P2O5	<u>0.5</u>	<u>2.0</u>	<u>2.5</u>	<u>0.5</u>
K2O	<u>2.7</u>	<u>13.3</u>	<u>29.5</u>	<u>1.7</u>
CaO	4.7	3.9	2.6	0.7
MgO	2.1	2.2	2.5	0.5
Fe2O3	0.9	0.5	0.2	2.3
Al2O3	3.5	1.4	0.5	2.3



Counter current extraction

2 to 3 liter of water to extract 1 kg of biomass

To lower K or CI by 95% we need more water or more stages



Extraction factor (E)	20	4	2.3	1.8	1.5	1.35	1.30	1.23	1.18	1.10
Nr. of stages or columns needed	1	2	3	4	5	6	7	8	9	10

First estimate of cost for 40.000 ton (DM) per year of biomass will cost 6.5 €/ton, which equals 8 US\$/ton

END

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Referenties

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