Challenges for biomass valorization for chemicals

Roberto Werneck
March 2017

Braskem

Agropolo Campinas 2017

Agenda

Challenges for biomass valorization for chemicals

Renewables at Braskem

Specific challenges

Agropolo Campinas 2017

Agenda

Challenges for biomass valorization for chemicals

Renewables at Braskem

Specific challenges

Challenges for biomass valorization for chemicals

Renewables at Braskem

Agropolo Campinas 2017

Agenda

Challenges for biomass valorization for chemicals

Renewables at Braskem

Specific challenges

Challenges for biomass valorization for chemicals

Specific challenges

Braskem

Technology

Which biomass?

Which products?

Which routes?

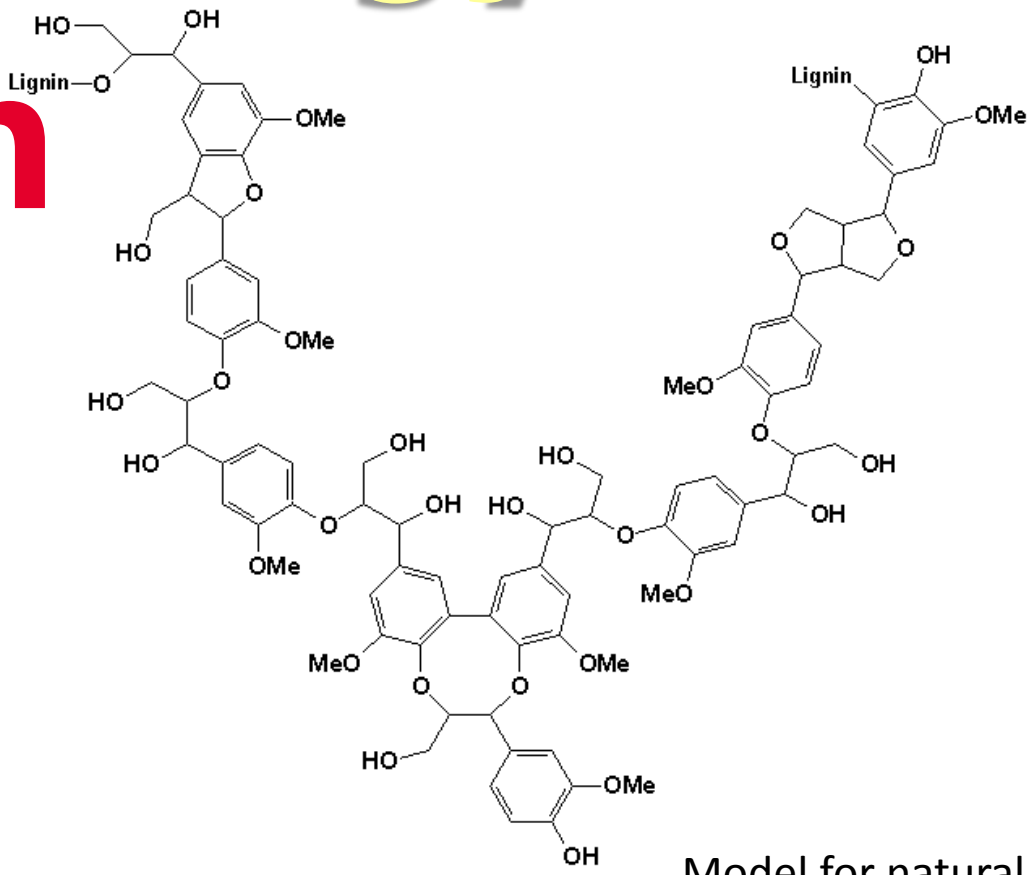
} Biorefinery(ies)

Challenges for biomass valorization for chemicals

Specific challenges

Technology

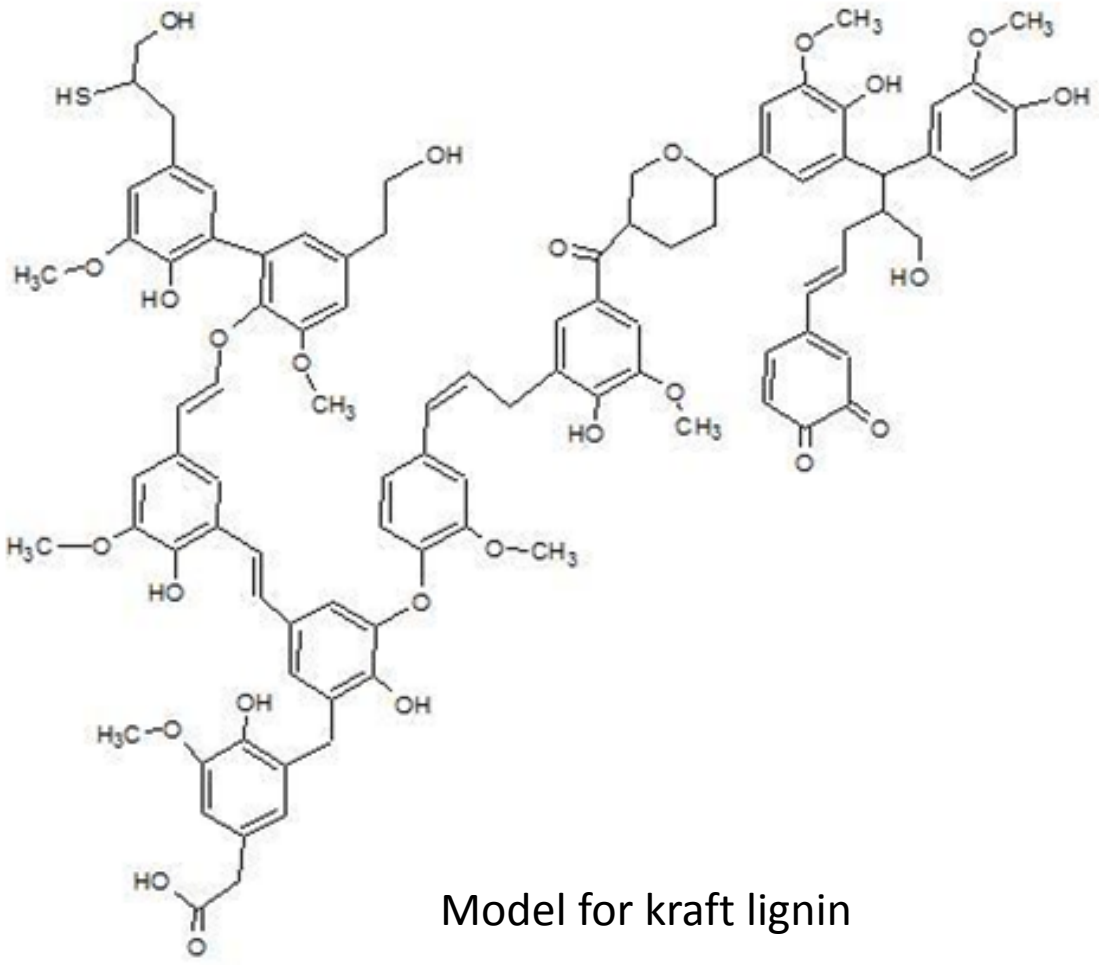
Lignin



Model for natural lignin

Challenges for biomass valorization for chemicals

Specific challenges

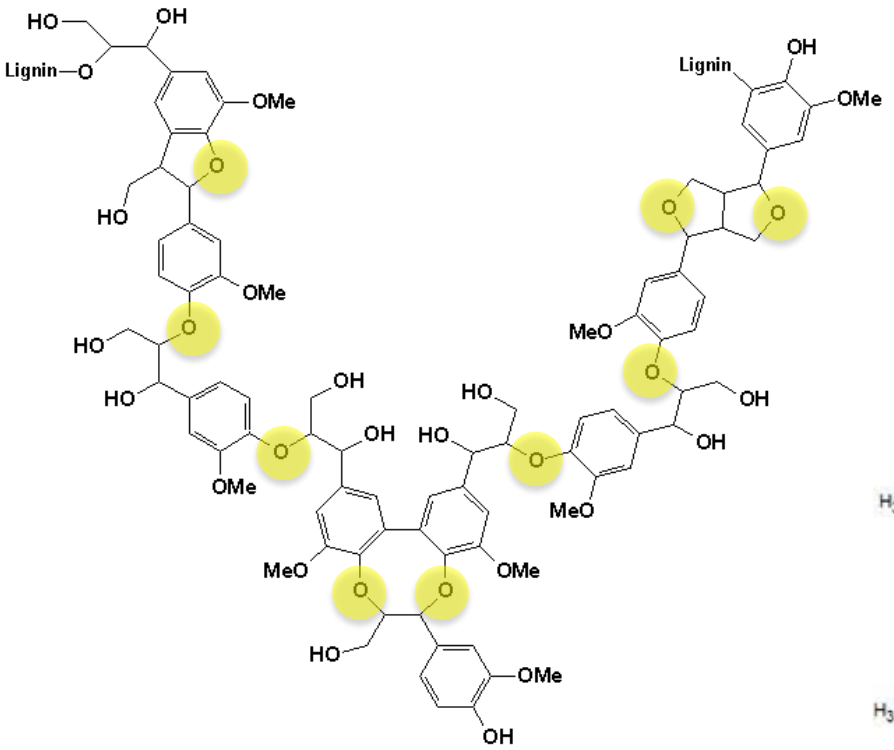


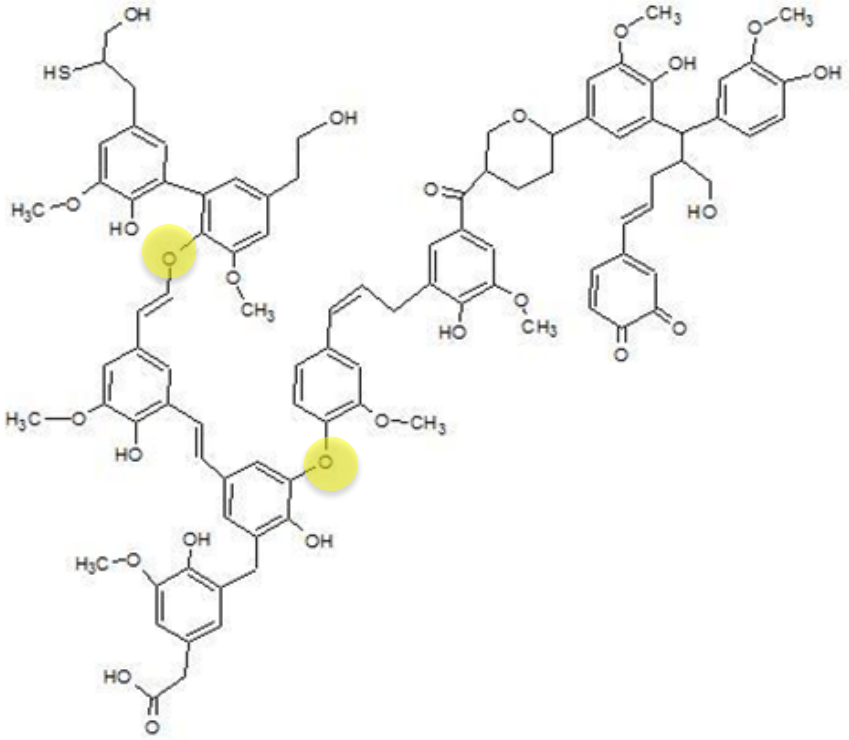
Model for kraft lignin

Image credit (right): Rinaldi, R. New Strategies for catalytic valorisation of lignin, CATBIOR 2016

Challenges for biomass valorization for chemicals

Specific challenges





Very similar

No, wait...

Braskem

Communication

Why biomass?

What are the benefits?

What are the metrics?

Real-world, industrial scale success?

Challenges for biomass valorization for chemicals

Specific challenges

Communication

Metrics

Product yield (mass of product/ mass of raw material)

Carbon emissions (CO_2 equivalent/ mass of product)

Crop productivity (mass of product/ hectare)

Biomass Utilization Efficiency (energy in products/ energy in raw material)

Life cycle analysis (multidimensional)

Challenges for biomass valorization for chemicals

Specific challenges

Communication

Metrics can be confusing

	PLA from corn	PE from sugarcane
Product yield (%) from glucose	80.0	31.1
Crop productivity (kg plastic/ m^2)	0.65	0.38
Carbon emissions (kg CO_2eq/ kg)	0.62 emission	2.78 capture
Carbon content (kg CO_2eq/ kg)	1.83	3.14
Crop productivity (kg **carbon**/ m^2)	0.33	0.32

Source for PLA data: Vink and Davies, Life Cycle Inventory and Impact Assessment Data for 2014 Ingeo™ Polylactide Production, Industrial Biotechnology 11(3):167-180 2015

Challenges for biomass valorization for chemicals

Specific challenges

Communication

Non-food issues

- Emotional arguments
- Crop efficiency

Many other issues

- Recyclable?
- Biodegradable?
- Toxic?
- GMO?
- Local production
- Green chemistry

Challenges for biomass valorization for chemicals

Specific challenges

Technology

which routes will provide the best use of biomass?

Communication

throughout the value chain, reaching the final users