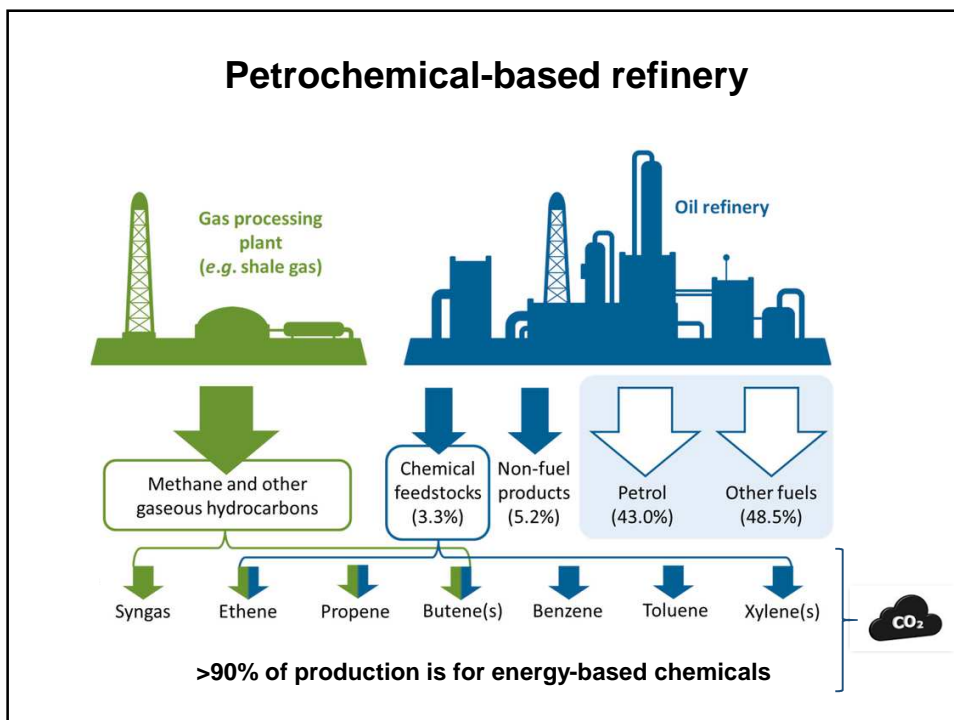


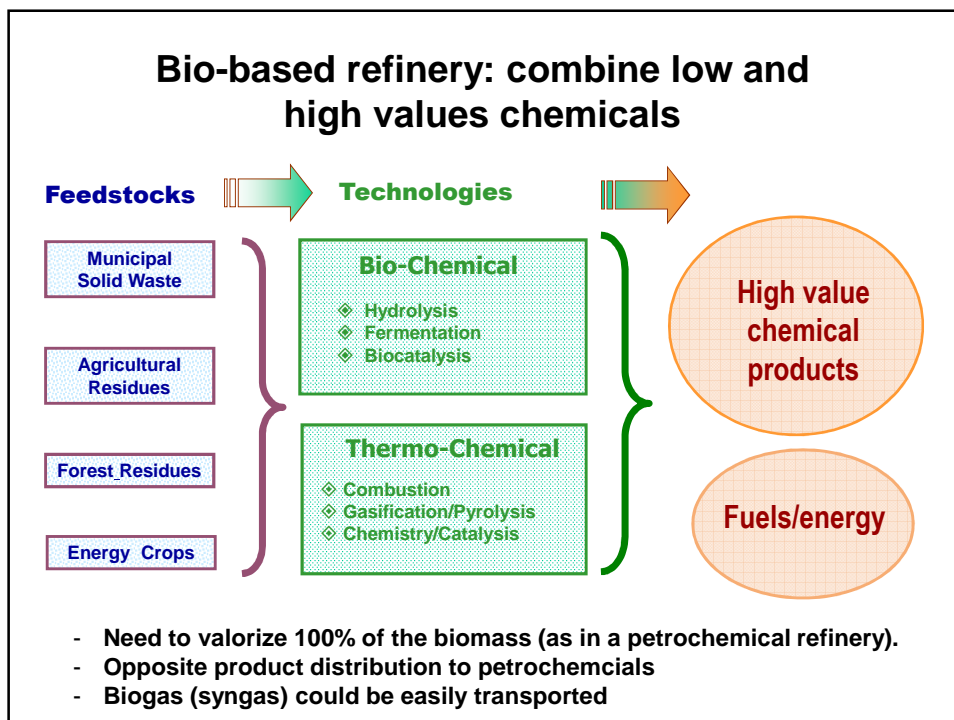
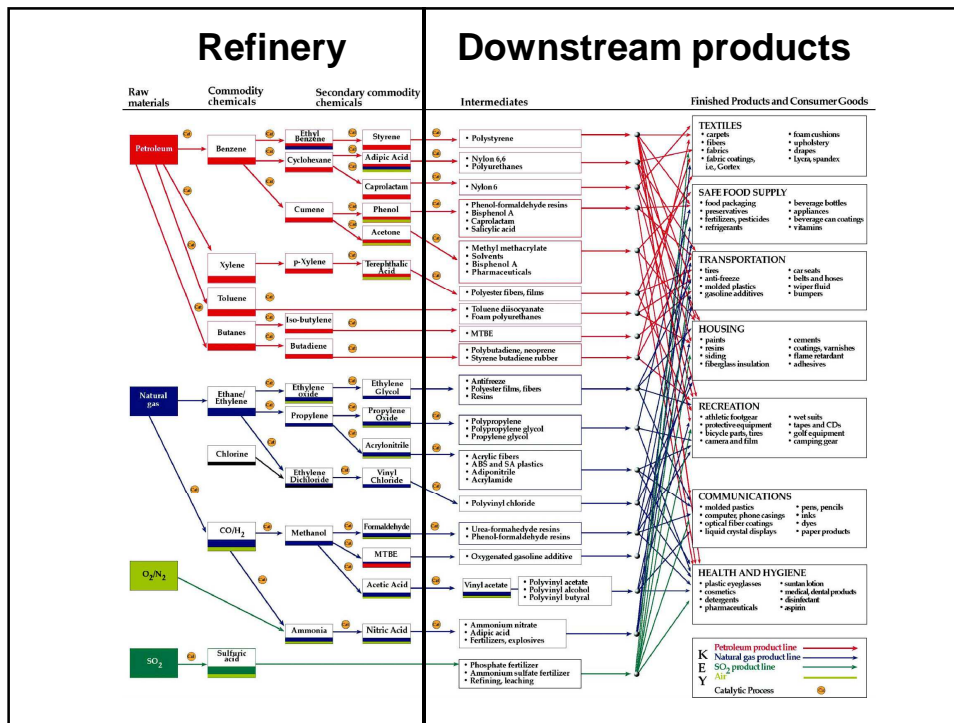
## Concurrent Transformation of Wood into Chemical Commodity Feedstocks

Paul J. Dyson

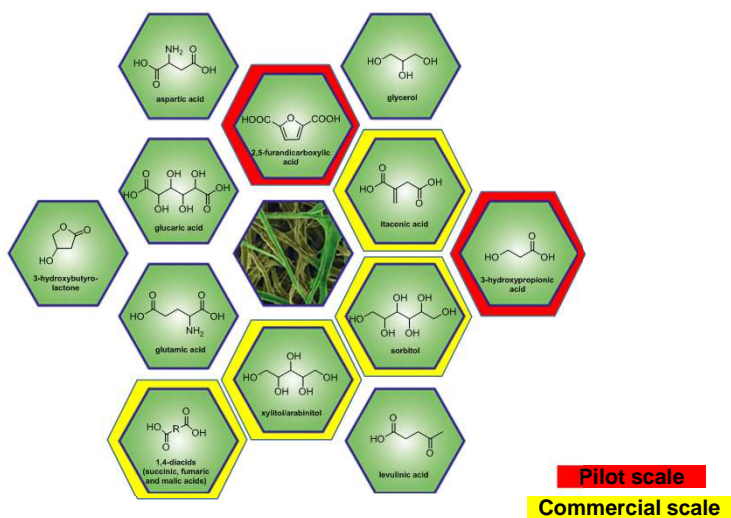
05/02/2016

CHEMICALS

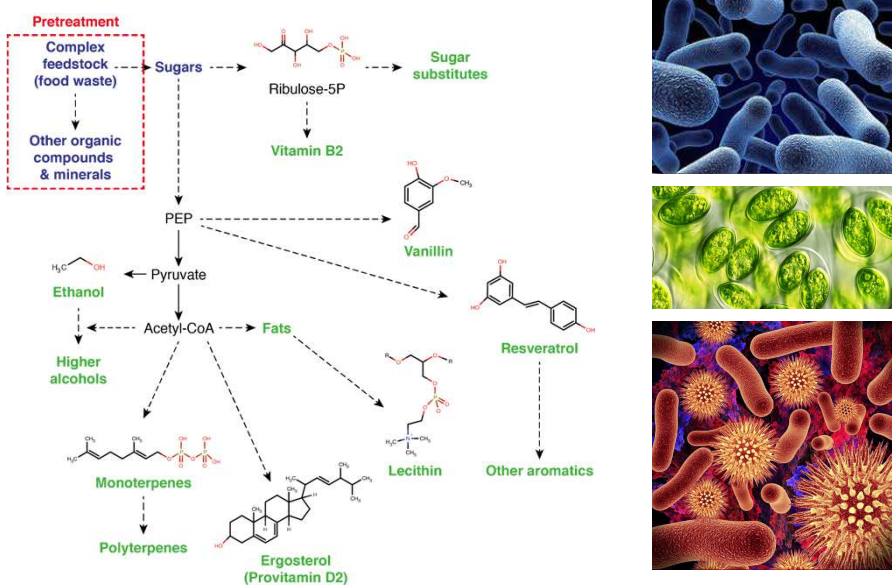




## Top twelve cellulose-derived platform chemicals using chemical routes



## Cellulose-derived products from fermentation



## Lignin valorization

**oligomeric fragments from the pyrolysis of lignin**

**high volume - low value market 100 €/t**

bio-fuel for CHP

bio-char for soil improvement

bio-bitumen for green asphalt

**fuel-additives**

activated carbon, carbon-fibres and carbon-black

additives for flooring material

bio-resins for wood-adhesives

bio-plastics

**low volume - high value market 10000 €/t**

**base & specialty chemicals**

alkylphenols

catechols

guaiacols

syringols

monomeric phenols from the pyrolysis of lignin

## Highest value from combining routes

**Lignin**

**Cellulose**

**Hemicellulose**

**Biological transformations**

**Catalytic transformations**

**High value/low volume compounds**

xanthan

riboflavin (vitamin B2)

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formic acid

2,5-dimethylfuran

1,4-butanediol

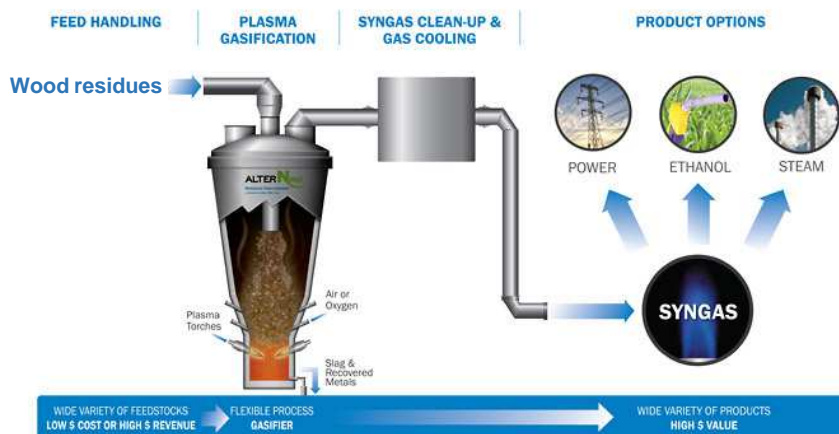
succinic acid

furfuryl alcohol FFA

caprolactone

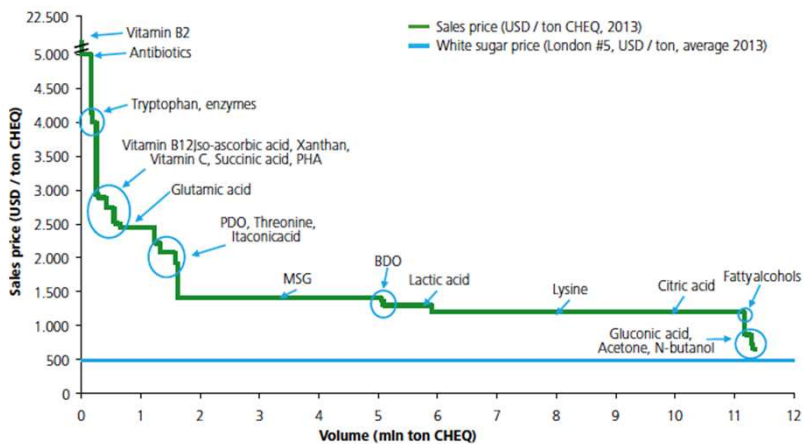
**Low value/high volume compounds**

### The leftovers: energy



### Low-volume/high-value is key to competing with low oil prices

The majority of the volume of this potential market (89%) is currently in five products, namely, lysine, MSG, citric acid, lactic acid, and glutamic acid



Source: BCC Research, FO Licht Renewable Chemicals Database, NOVA Institut, Deloitte Analysis