



Bioraffinaderiets möjligheter att skapa kemikalier och material

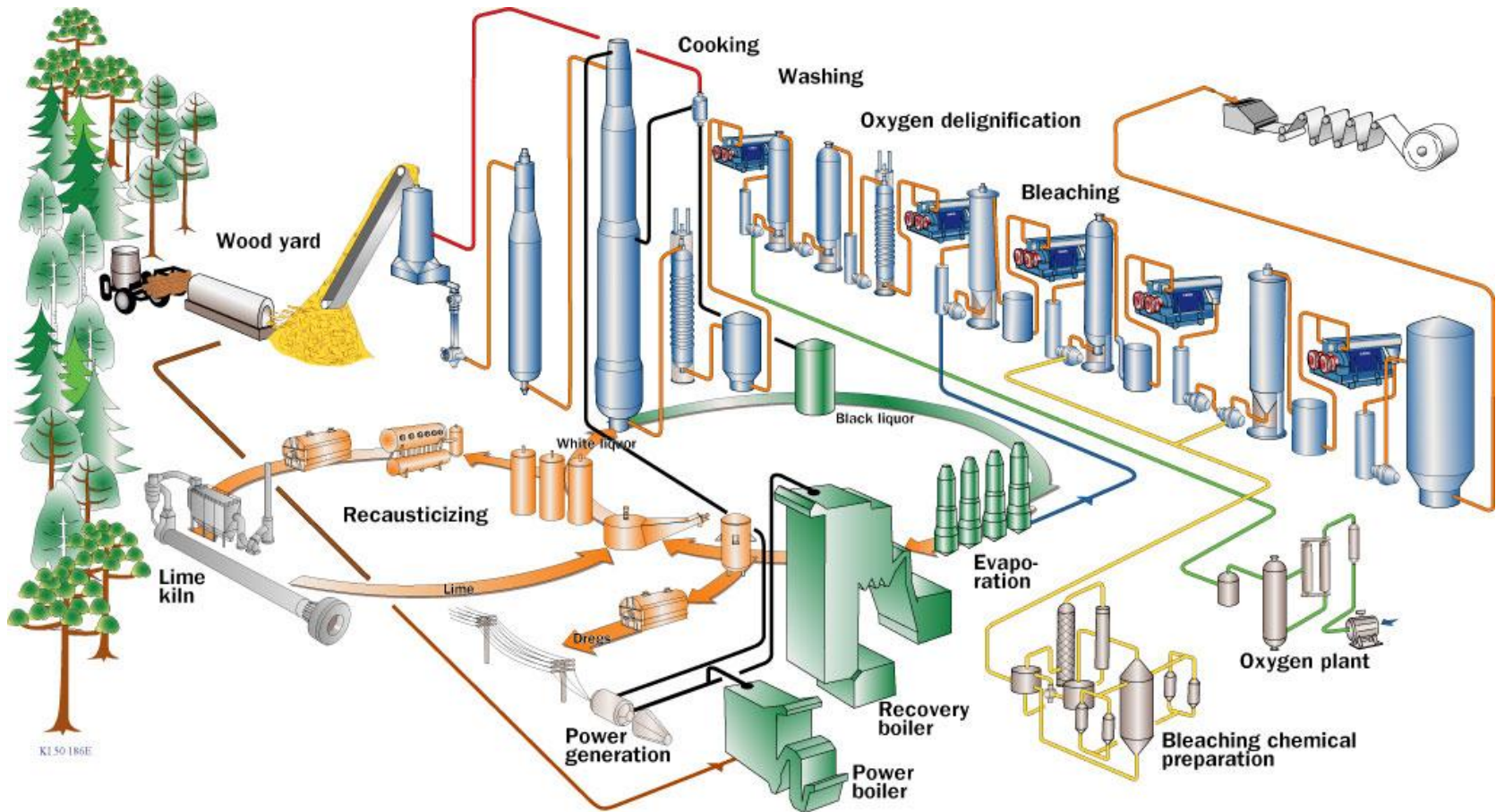
Peter Axegård, Innventia

Framtidens förpackningsmaterial

Kista Entré Konferens, 15 november 2011

The Modern Kraft Pulp Mill –

A Biorefinery Platform



Source: Aker Kvaerner

Organic Substance in a Kraft Pulp Mill, kg

	Spruce/ pine	Birch	Eucalypt	
Pulp fibres	1000	1000	1000	All can be used
Lignin	600	470	440	2/3 can be removed
Xylan	70	260	210	1/3 can be removed

- **Cellulose fibres - main product**
- **Added value from other components**

Lignin



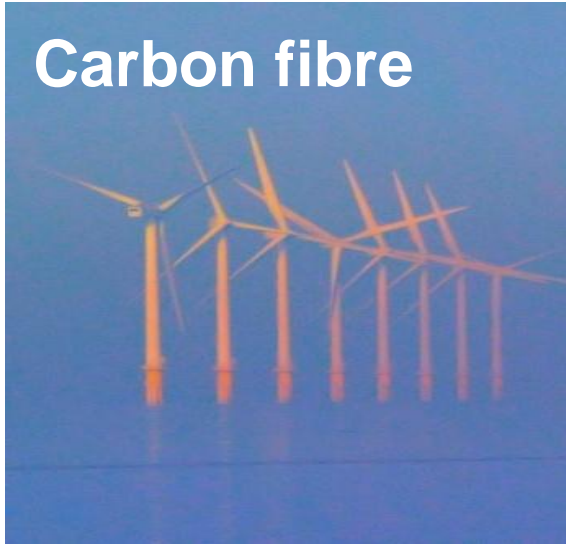
Kraft Lignin from LignoBoost Demo Plant

Carbon	64 – 66 %
Ash	0.3 - 1 %
Carbohydrates	0.5-1.5 %

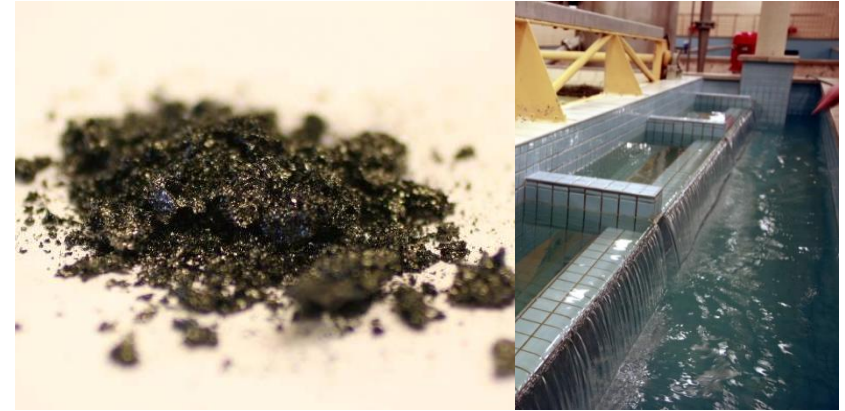


Lignin Applications

Carbon fibre



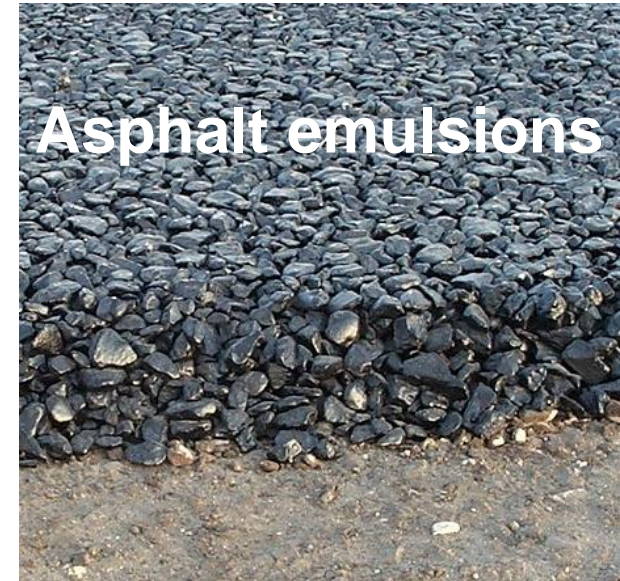
Activated carbon



Hydrofobizing agent



Asphalt emulsions



Binder in fibreboard



Hemicelluloses

Polymeric Xylan from Birch Black Liquor



Extrudable Co-polymer from Birch Xylan

- New materials based on hemicellulose lactic acid co-polymers



Other Xylan Applications

- Fibre additive (higher surface charge)
- Chemical modification
- Cellulose fibre composites

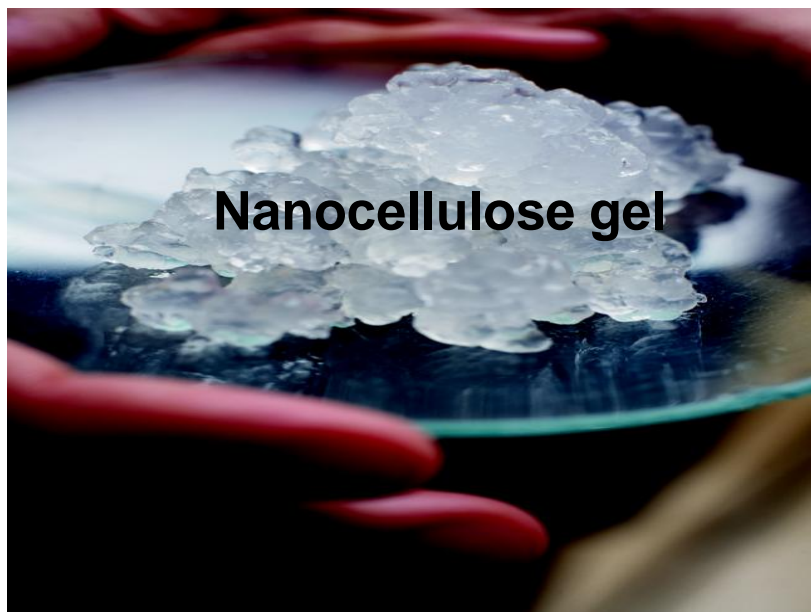
- Gas barriers
- Hydrogels
- Emulsifiers

- Xylitol
- Xylose
- Lactic acid

Cellulose



Cellulose Products



Kraft Pulp Cellulose for Cotton Fibre Replacement

CelluNova project Partners

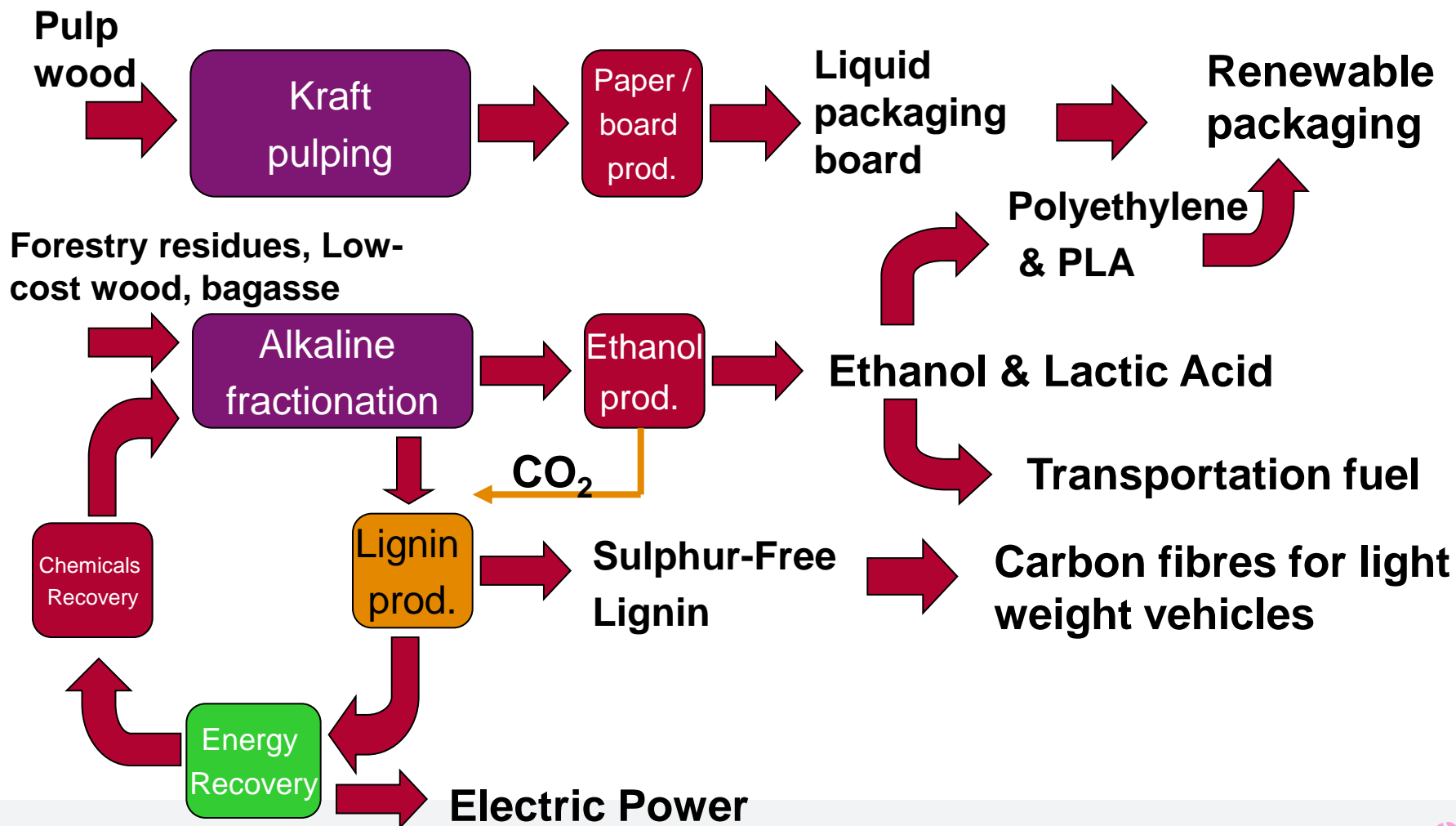
- Project initiative by KIRAM AB in 2008
 - Research, development and demonstration project (2009-2012)
 - Managed within EcoBuild - a Vinnova Excellence Center
 - Project Manager Dr. Mats Westin
-
- **Industrial / Institutional Partners**
 - EcoBuild SP Träteck
 - Swerea|VF
 - IKEA
 - H&M
 - Södra Skogsägarna
 - Svenskt Konstsilke
 - KIRAM
 - **University/Institutional partners**
 - Lunds University
 - Physical Chemistry
 - Theoretical Chemistry
 - Chem.Eng LTH
 - Karlstad University
 - Cellulose Technology
 - University of Coimbra
 - Chalmers
 - Innventia
 - IBWCh



CelluNova project From forest to textiles and apparels



POLYNOL Project - Overall Concept



Products from the Kraft Pulp Mill Biorefinery

Cellulose	Paper pulp, composites, barriers, special cellulose
Lignin	Fuel, carbon fibres, activated carbon, binder, hydrophobizing agent
Hemicellulose	Fibre additive, barriers, co-polymers, lactic acid
Forestry residues	Power, heat, transportation fuels, pellets
Extractives	Tall oil, turpentine, specialty chemicals