Developing wood based biorefineries

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Sappi at a glance

North America
- Produces 27% of group sales
- 1 Paper mill
- 1 Specialty paper mill
- 1 Paper and specialised cellulose mill
- 8 Sales offices

Southern Africa
- Produces 23% of group sales
- 2 Paper mills
- 1 Specialised cellulose mill
- 1 Paper and specialised cellulose mill
- 1 Sawmill
- 6 Sales offices
- 492,000ha forests

Europe
- Produces 50% of group sales
- 6 Paper mills
- 1 Specialty paper mill
- 18 Sales offices
Sappi Europe operations

Total paper production capacity: 3.7 million tpa

- **Maastricht Mill (The Netherlands)**
  - 280,000 tons coated fine and speciality paper

- **Lanaken Mill (Belgium)**
  - 530,000 tons coated fine paper
  - 165,000 tons bleached mechanical pulp

- **Stockstadt Mill (Germany)**
  - 445,000 tons coated and uncoated fine paper
  - 145,000 tons bleached chemical pulp

- **Condino Mill (Italy)**
  - 60,000 tons speciality paper

- **Carmignano Mill (Italy)**
  - 100,000 tons speciality paper

- **Kirkniemi Mill (Finland)**
  - 750,000 tons coated paper
  - 300,000 tons bleached mechanical pulp

- **Alfeld Mill (Germany)**
  - 275,000 tons speciality paper
  - 120,000 tons bleached chemical pulp

- **Ehingen Mill (Germany)**
  - 280,000 tons coated fine and speciality paper
  - 140,000 tons bleached chemical pulp

- **Gratkorn Mill (Austria)**
  - 980,000 tons coated fine paper
  - 250,000 tons bleached chemical pulp

- **Rockwell Solutions (United Kingdom)**
  - 100 million m² coated barrier film and paper
Sappi at a glance

Sappi Limited

- **Production Capacity**
  - Paper: 5.56 million tons
  - Pulp: 2.2 million tons

- **Employees**: 12,500

EBITDA 2017: US $785 million
- Paper: 54%
- Specialised Cellulose: 46%

Profit 2017: US $338 million
- Paper: 39%
- Specialised Cellulose: 61%

Sappi Europe

- **Production Capacity**
  - Paper: 3.7 million tons

- **Mills**: 10
- **Sales Offices**: 14

- **Employees**: 1.12 million tons

- **Paper Pulp Production Capacity**: 5,850*
Examples for Value Generation from Lignosulphonates

• Application areas for Sappi’s lignosulphonate products (COLLEX®, HANSA®, ZEWILEX®, LIGNEX® and PERMASOL®):
  • Concrete admixtures
  • Gypsum plasterboards
  • Bricks
  • Pigment dispersions
  • Process water treatment
  • Ceramics
  • Refractory products
  • Pelletizing
  • Dust control
  • Fertilizers
  • Crop protection
  • Chipboard

• Heat produced by Sappi’s Gratkorn Mill is being used for district heating:
  • Newly installed pipelines from Gratkorn to Graz
  • Heating 18,000 households in the city of Graz (Austria) every year.
Our 2020 Vision

EBITDA*

2015

- Printing papers: 47%
- Dissolving wood pulp: 35%
- Packaging and speciality papers: 18%

2020

- Printing papers: 25%
- Dissolving wood pulp: 40%
- Packaging and speciality papers: 25%
- New business**: 10%

Biorefinery products

* Earnings before interest, tax, depreciation and amortisation.
** Biomaterials (eg nanocellulose), biorefinery products and bio-energy.
Our business - Unlocking the full potential of trees

Making the most of a renewable, natural material

Managed forest

Cellulose

Hemicellulose

Lignin

End use

Graphic papers
Specialities and packaging papers
- Commercial print
- Product packaging
- Technical papers

Dissolving wood pulp
- Textiles
- Pharmaceuticals
- Cellophane

Fibre composites
- Automotive parts
- Furniture
- Audio speakers

Nanocellulose
- Reinforcing agent
- Control release agent
- Viscosity modifier

Casting and release papers
- Textures for materials
- Functional films
- Automotive wraps

Xylitol and chemicals from sugars
- Low calorie sweetener
- Toothpaste
- Recyclable plastics

Chemicals from lignin
- Binding agent
- Dispersion agent
- Emulsion stabiliser

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Dissolving wood pulp

Dissolving wood pulp is produced by extracting the cellulose portion of the tree and tailoring the quality of the product to meet customer needs.

This makes DWP a hugely valuable, versatile and sustainable raw material source.

- **Textiles: Rayon & Lyocell**
  Breathable, soft with high moisture absorbency

- **Pharmaceuticals & cosmetics**
  Natural binders for tablets and ethers for cosmetics

- **Food applications**
  Cellophanes for food packaging and maintaining food freshness
Hemicellulose sugars
Pre-hydrolysis kraft process

- Steam
- Neutralisation
- Cooking

Sugar rich stream → Bioproducts

Cloquet
Ngodwana
Initial development work at Sappi Technology Centre

- Simulate the process successfully
- Development work - 2012
The Sugar Demonstration Plant - 2017

• Commissioned in 2017
• > 300 cooks
• >10 000 analyses
• No fouling in reactor
• Similar production time
• Pulp quality – no red flags
Demonstration evaporation plant - 2019
Xylose to high value products

- Sugars extraction
- Evaporation
- Sugar cleanup
- Xylose to high value products

Medium recovery
Organic layer
Lignin
Extractive hydrolysis
Water layer
C5,C6 sugars
Purification

Lignin

Sugars extraction
Evaporation
Sugar cleanup
Xylose to high value products

Furfural
Sapsor
High value lignin applications

Phenolic resins from Sodium Lignosulfonate

- Phenolic resins are made from phenol and formaldehyde, both dangerous and oil based chemicals
- Large focus on finding greener and sustainable feed material
- Functionalised lignin can be this green and sustainable feed
High value lignin applications

Polyurethane foams from Sodium Lignosulfonate

- Foams are made from polyols and blowing agents
- Polyols are expensive and oils based
- Lignin can be modified into a polyol substitute from a greener and more sustainable source
Sustainable Fertilizers

EU Project SusFert:

Sustainable multifunctional fertiliser – combining bio-coatings, probiotics & struvite for phosphorus and iron supply

Consortium: 11 partners

https://www.susfert.eu/
Sustainable Fertilizers

SusFert
Thank you for your attention

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