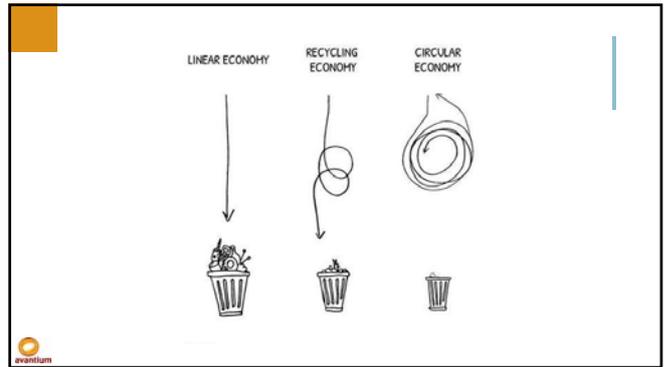


The Building Blocks of a Biobased & Circular Economy

15-MAR-18

Tom van Aken

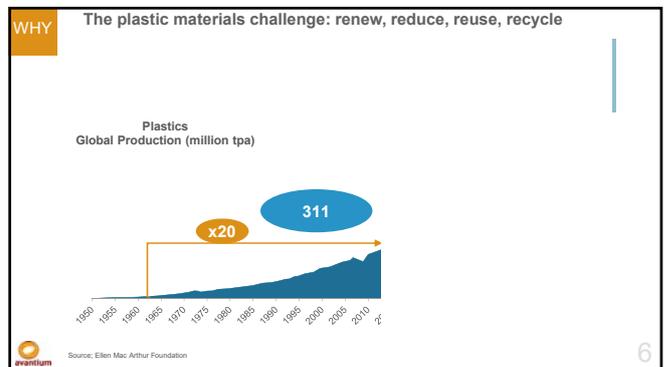
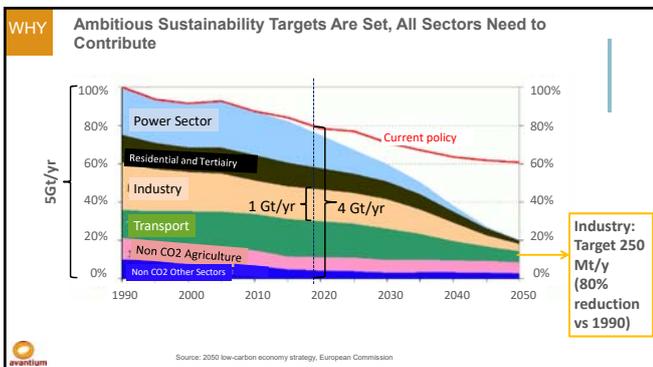
Content

- Why?
- What?
- How?
- Who?
- When?



REDUCE OIL DEPENDENCE AVOID CLIMATE CHANGE

CIRCULATE PRODUCTS POSITIVE BUSINESS CASE



WHAT Alternative Sources of Carbon

FOSSIL



Carbon
C
12.011

RENEWABLE



7

WHAT Renewable Feedstock





Biobased feedstock doesn't need to be an industry constraint, in fact there are multiple options available for feeding the biobased future.

Avantium sees the flexibility to use different types of feedstock as a strategic advantage to deploy its technologies worldwide.

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WHAT Avantium Renewable Chemistries Portfolio

Several Early Stage Projects



New products, processes & technologies

VOLTA
Electrocatalysis



CO2 capture Platform technology
Novel conversions

MEKONG
Bio-Based Ethylene Glycol (MEG)



Single step process
100% bio-based bottle
Pilot plant phase

ZAMBEZI
2nd Generation Sugars



High purity glucose and mixed sugar output
Pilot plant phase

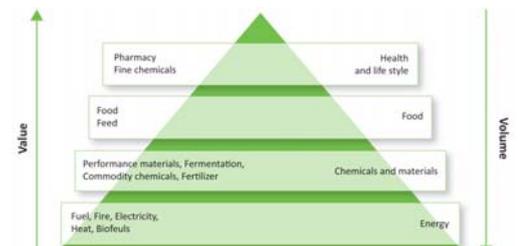
YXX®
Bio-Based Plastic (PEF)



1st commercial plant planned in Antwerp

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WHAT Cascading Biomass



Value ↑ Volume ↓

Pharmacy Fine chemicals, Health and life style
Food Feed, Food
Performance materials, Fermentation, Commodity chemicals, Fertilizer, Chemicals and materials
Fuel, Fire, Electricity, Heat, Biofuels, Energy

Source: <http://www.biobasedeconomy.eu/the-value-of-rand-efb>, www.biobasedeconomy.nl

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HOW Zambezi: Glucose From Non-Food Biomass
Value Added Output from Non-Food Biomass as Feedstock for Bio-Based Economy



Woody Biomass



Improved Bergius-Rheinau process
Two-stage concentrated HCl hydrolysis;
Acid/sugar separation by proprietary evaporation technology



• Glucose
• Mixed C5/C6 sugars



• Clean Lignin
• Tail Oils

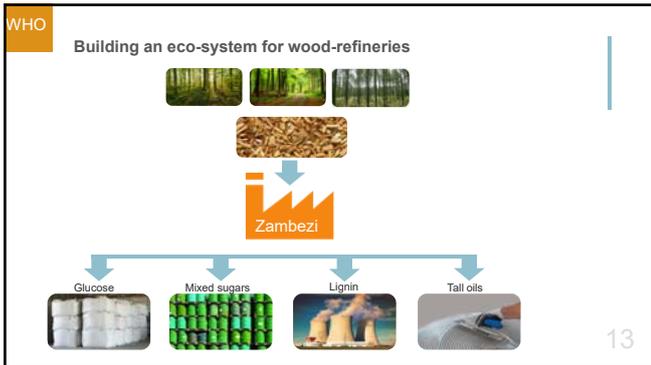
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HOW Woody Biomass
Attractive Readily Available Biomass

- 1 Economical:**
 - Economically available feedstock
 - Efficient and mature logistics
- 2 Technological:**
 - Lab results confirmed positive cellulose content and economic extractability
 - Does not require other pre-processing step
 - Retains structural integrity after process (does not crumble or slump)
- 3 Sustainable:**
 - Good ecological footprint
 - Undisputed

A Range of Other Non-Food Cellulose Containing Feedstocks Are Under Evaluation

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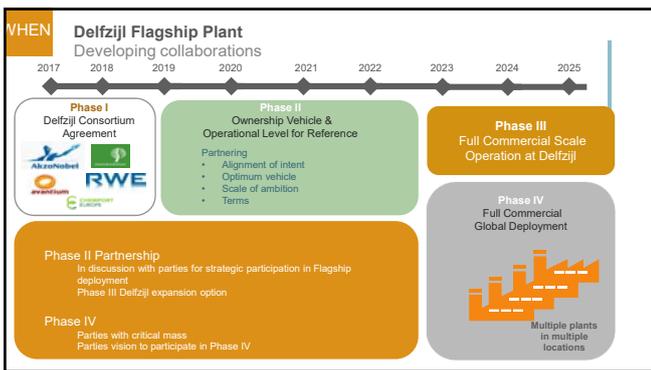
WHO Partnering Trajectory Initiated

The slide shows an aerial view of a refinery complex and a site map with orange markers. To the right, a list titled 'The Fit' includes:

- Safety Culture
- Management Commitment
- Corporate Responsibility
- Technical Expertise in HCl
- Utilities (Steam, Electricity, waste water)
- Site Services/Engineering
- Zambezi Pilot Plant at Delfzijl
- Availability of pilot plant operators
- Logistics Rail/Sea Port
- Biomass availability
- Biomass (co-)firing possibilities
- In the Netherlands

Logos for AkzoNobel, CHEMPORT EUROPE, and RWE are shown at the bottom right.

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The slide features three circular icons: a green field with 'CO2', a woman in a white lab coat, and a circle containing logos for AkzoNobel, RWE, CHEMPORT EUROPE, and C-STAR.

Call to Action **Enabling Technologies** **Partnerships**

avantium logo at the bottom center.

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Thank You!

Questions?

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avantium logo at the bottom left.

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