



AVANTIUM

Investor Presentation

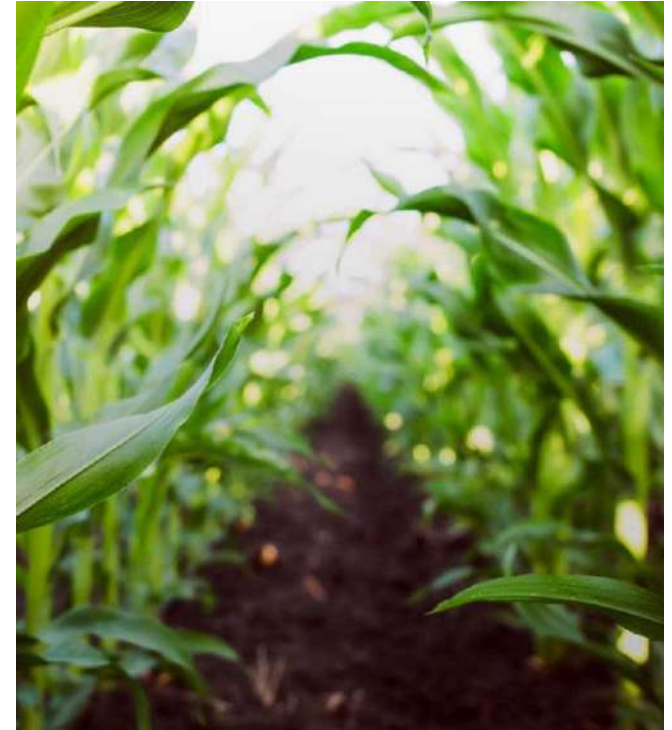
Q1 2021

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Avantium: experienced leadership team

Proven track record of technological and operational excellence

Management Team

Today's presenters



Tom van Aken
CEO
(@Avantium since 2002)

Education:
Economics (Amsterdam) and
Chemistry (Utrecht)

Selected previous / other positions:

- Now: several advisory positions, such as Top Team Chemie
- 1999-2002: Director Business development at DSM
- 1997-1999: Sales manager at DSM



Bart Welten
CFO
(@Avantium since 2020)

Education:
Law (Leiden) and MBA (Boston)

Selected previous / other positions:

- Now: Supervisory Board Sanquin
- 2012-2019: CFO at Centrient Pharmaceuticals
- 2003-2012: CFO at DSM Resins
- 2002-2003: CFO at Kiadis Pharma



Gert-Jan Gruter
CTO
(@Avantium since 2000)



Carmen Portocarero
General Counsel
(@Avantium since 2012)



Zanna McFerson
Managing Director
Renewable
Chemistries
(@Avantium since 2017)



Steven Olivier
Managing
Director
Catalysis
(@Avantium since 2015)

Supervisory Board

- Edwin Moses, Chairman
- Margret Kleinsman
- Michelle Jou
- Cynthia Arnold
- Trudy Schoolenberg

Former CEO Ablynx NV and Oxford Asymmetry International
CFO Agrifirm
President Covestro Polycarbonates Business
Former CTO Sun Chemical and Valspar
Held various senior management positions at Shell and AkzoNobel

Consumers have increasing environmental concerns

Pressure on industries to shift to circularity and decouple plastics from fossil feedstock



Avantium: innovation-driven chemical technologies

Producing chemicals from renewable sources for a wide range of consumer goods

- Two lead products:
 - FDCA, the chemical building block for PEF: a novel, first-in-class plant-based polyester targeting \$200+ billion markets; entering commercial manufacturing
 - PlantMEG™: sustainable and cost-effective plant-based alternative for fossil-MEG, a key ingredient for PET and PEF; in pilot phase
- A pipeline of chemical technology programmes:
 - Biorefinery process for industrial sugars from non-food biomass
 - Conversion of CO₂ to chemicals via electrochemistry
- Supported by a revenue generating Catalysis Business
- 3 operational pilot plants in Geleen (FDCA) & Delfzijl (plantMEG™, biorefinery), NL
- Extensive R&D laboratories and partnerships with industry leaders
- 20+ years experience in renewable polymers, chemical process development and catalysis
- Cash position (unaudited) at circa €26 million on 31 December 2020, annual cash outflow of less than €25 million
- HQ in Amsterdam - listed on Euronext Amsterdam, Brussels (AVTX)



PEF = polyethylene furanoate
PET = polyethylene terephthalate
FDCA = furandicarboxylic acid
MEG = mono-ethylene glycol



Investment highlights

Avantium offers solutions for consumer driven renewable trends of plastic waste and CO₂ reduction



Renewable feedstock



packaging



textiles



film



Leading innovative products FDCA and plantMEG™ are the key ingredients for novel polymer PEF: 100% plant-based, recyclable and degradable with superior performance



Addressing \$200B+ end-markets with consumers demanding change



Pipeline of innovative chemical technologies at various stages of commercialisation



Partnerships with industry leaders and brand owners to make innovations global successes



Scalable licensing business model with clear growth path to profitability, balancing risk and reward



Proven ability to scale with 3 operational pilot plants, state of the art R&D lab and robust portfolio of >145 patent families



Strong management, board and technical & commercial team and a proven revenue generating track record with the Catalysis business



ESG is built into Avantium's DNA and drives the company's business model



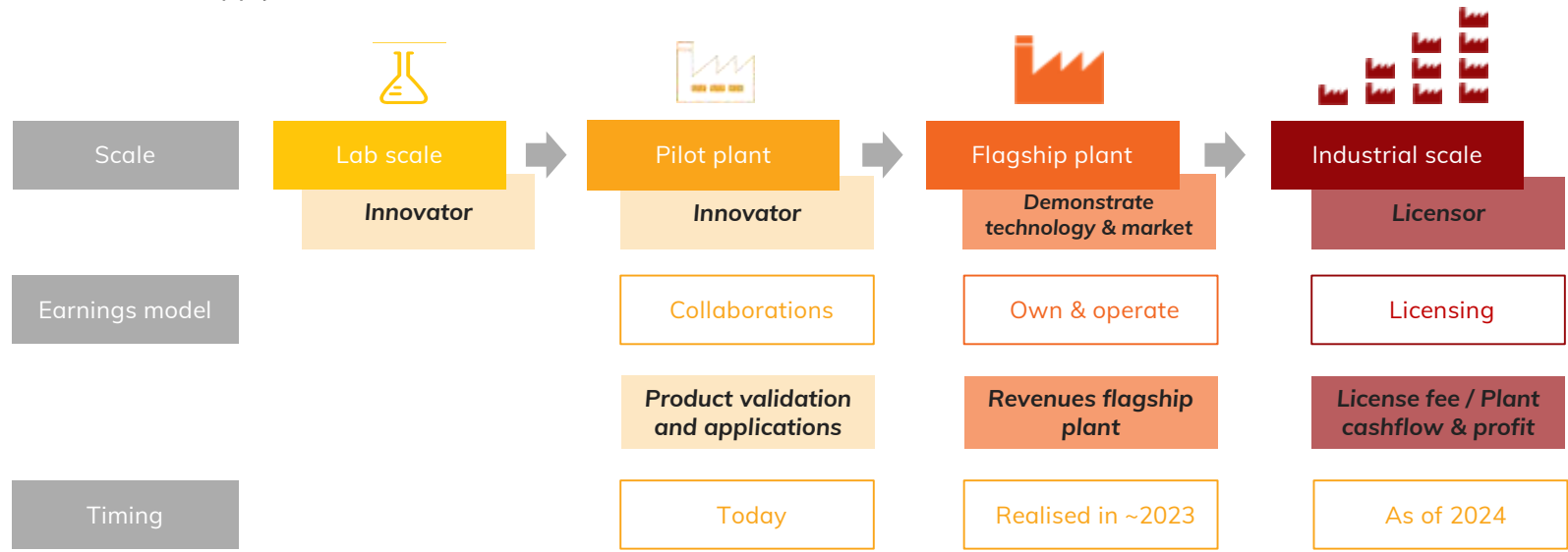


A business model delivering growth and margins

Multiple routes to monetise our innovations

Multiple partners:

- To share scale-up requirements and cost-of-capital
- To provide validation of the product applications
- To form the supply chain from feedstock to end-market



1. THE PROBLEM

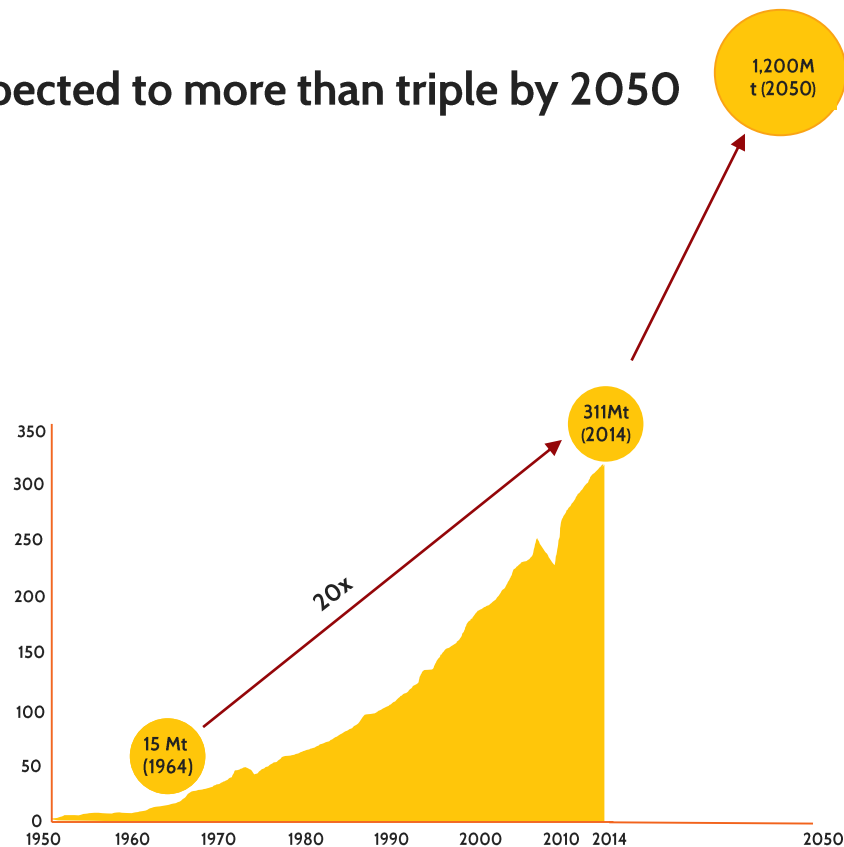
Global warming stripes by climate scientist Ed Hawkins





Plastic is a 'success' story

20x increase over the last 50 years - expected to more than triple by 2050





Production, use and waste cause major environmental problems

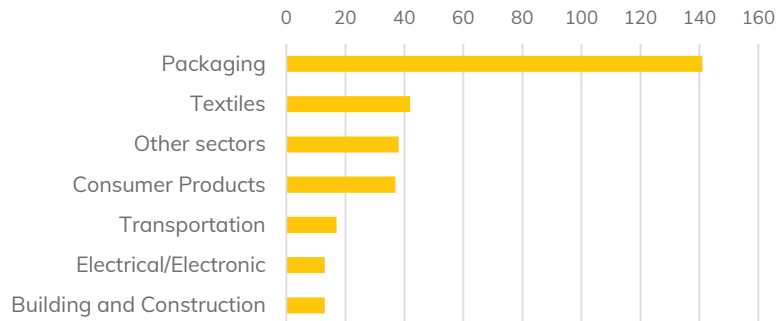


>90% of conventional plastic is not recycled (1950 - 2015):

- Many plastic applications, such as small sized bottles are not recyclable, as they include other materials (e.g. nylon) for barrier properties

Source: OECD, background report G7 (2018)

Global unrecycled plastic waste by industrial sector, measured in million tonnes per year, 2015



Source: Our World in Data: Geyer et al.

Conventional plastics production

2014



311 Million Tonnes

2050



1,200 Million Tonnes

Plastics' share of global oil consumption



6%



20%

Plastics' share of carbon budget



1%



15%

Ratio of plastics to fish in the ocean (weight)



1:5



>1:1

Source: Ellen MacArthur Foundation, Plastics Europe; World Economic Forum; Nova Institute 2020

2. OUR SOLUTIONS





Avantium to revolutionise the plastics industry

Picked up by numerous global media outlets and on social media

The Guardian

16 May 2020

The end of plastic? New plant-based bottles will degrade in a year

Carlsberg and Coca-Cola back pioneering project to make 'all-plant' drinks bottles



▲ A forest of plastic bottles at a recycling plant near Bangkok in Thailand. Around 300 million tonnes of plastic is made every year and most of it is not recycled. Photograph: (Daga Adhewi)/IPA

Beer and soft drinks could soon be sipped from "all-plant" bottles under new plans to turn sustainably grown crops into plastic in partnership with major beverage makers.

A biochemicals company in the Netherlands hopes to kickstart investment in a pioneering project that hopes to make plastics from plant sugars rather than fossil fuels.

Daily Mail MORE STORIES

The end of plastic bottles? Coca-Cola and Carlsberg back new all-plant drinks containers that will rot away to nothing within a year

By Sam Baker For Mailonline
13:21 17 May 2020, updated 16:21 19 May 2020



The Weather Channel

A New Plant-Based Plastic Will Degrade in a Year

By Rachel Della Benina 3 days ago



Plastic waste and debris carried by the storm of the last days at sea in the Gulf of Naples, Italy on December 22, 2019.

(Photo by Salvatore Laporta/KONTROLABU/lightRocket/Getty Images)

At a Glance

- Dutch company Avantium developed a fully plant-based plastic made from corn, wheat and beet sugars.

L'EXPRESS

ENVIRONNEMENT

Plastique : de nouvelles bouteilles d'origine végétale dégradables en un an

Par L'EXPRESS.fr
publié le 18/05/2020 à 18:33



Une entreprise hollandaise souhaite remédier au fléau des bouteilles en plastique en se lançant dans une production à

GreenBiz

This startup's plant-based plastics promise circularity. Can it deliver?

By Jesse Klein

July 22, 2020

"You don't need one drop of petroleum. It's all plant-based. The carbon footprint is less than 50 percent of petroleum-based plastics. And it's fully recyclable, so it's really circular."

That's the promise Avantium CEO Tom Van Aken makes about his company's new plastic material.

Evening Standard

Coca Cola and Carlsberg to introduce new plant-based bottles

Developers hope to deliver by 2023 18 May 2020

LAD BIBLE

New Plant-Based Bottles Backed By Coca-Cola And Carlsberg Will Degrade In Just A Year

UNILAD

17 May 2020

NEW YORK POST

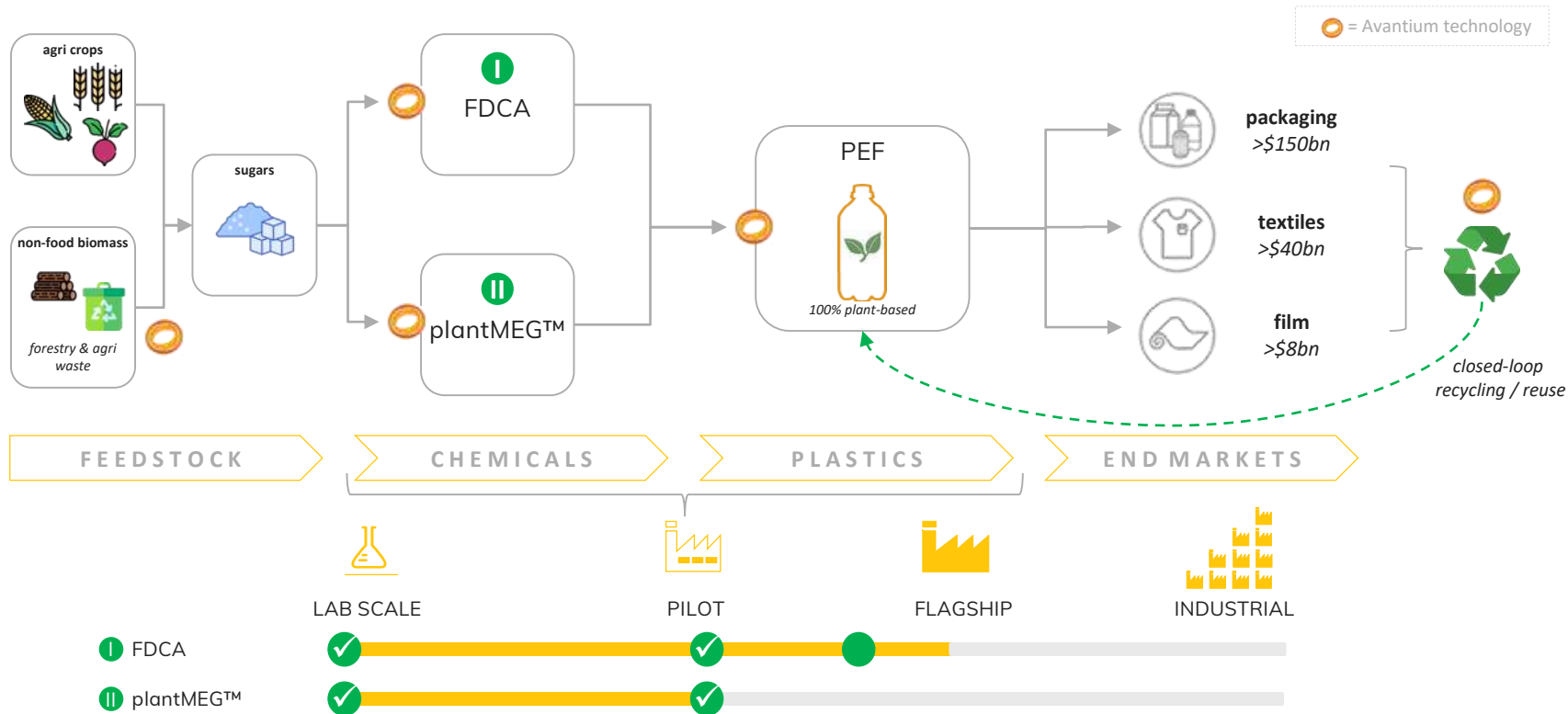
22 May 2020

New plastic-like product made from plant sugars only takes a year to degrade



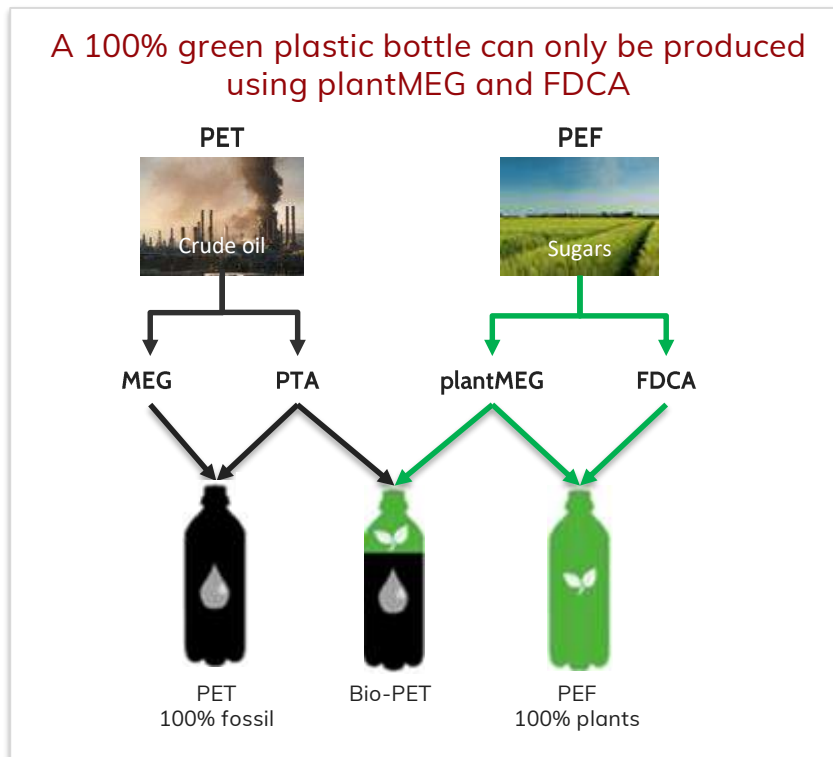
A coherent portfolio of renewable products

Focused on plant-based plastics, advancing towards commercialisation





FDCA and plantMEG together make a 100% plant-bottle

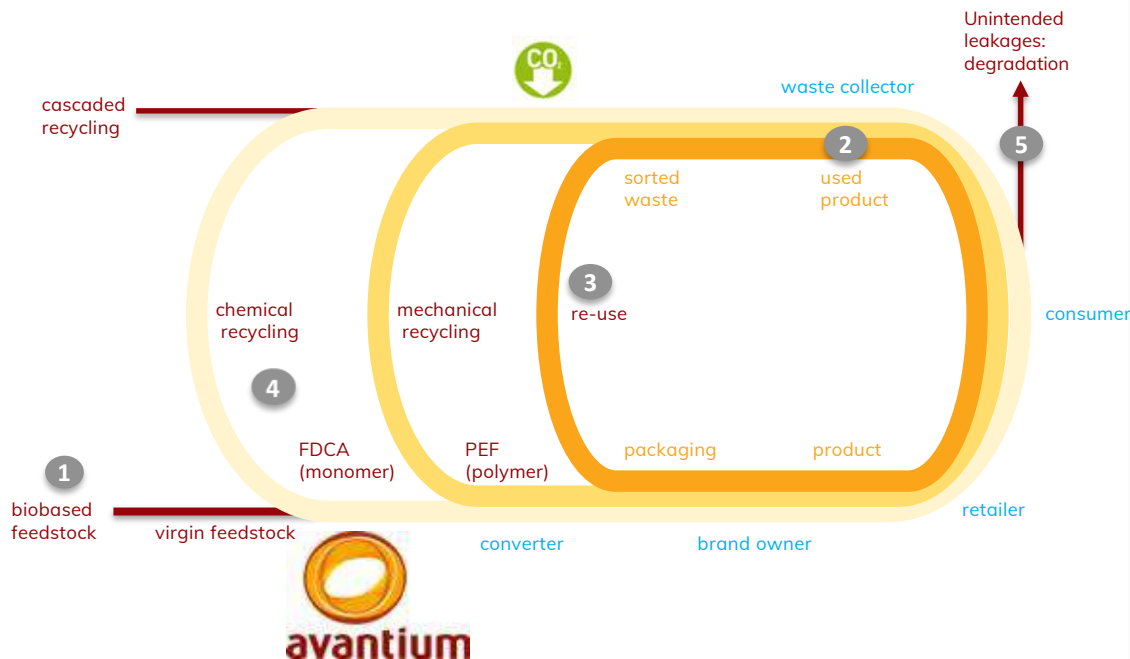


FDCA = furandicarboxylic acid PEF = polyethylene furanoate PET = polyethylene terephthalate
MEG = mono-ethylene glycol PTA = purified terephthalic acid



PEF addresses the need for a circular new plastics economy

ESG impact of PEF: 50-70% lower carbon footprint and fully circular



PEF can solve very specific issues

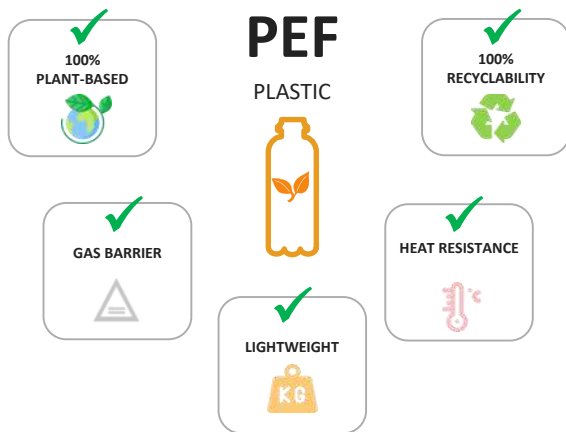
- 1. Renewable:** PEF is plant-based instead of fossil-based.
- 2. Reduce:** PEF is superior allowing thinner applications and reducing weight by more than 20% in line with European legislation.
- 3. Reuse:** PEF in combination with PET allows PET bottles to be reused by up to 5x more.
- 4. Recycle:**
 - PEF has a proven fit with existing sorting and recycling facilities
 - PEF can substitute small and multi-layer packaging that cannot be recycled
- 5. Degradable:** when PEF unintentionally ends up in nature, tests show that PEF degrades
 - Degradation tests show that PEF degrades much faster than PET under industrial composting conditions (250-400 days with air / oxygen @ 58°C in soil)*
 - Initial results from ongoing 10-year degradability field trial demonstrate that PEF degrades under ambient conditions**



FDCA, the building block for PEF, *the* plastic of the future

Superior performance, sustainable and well positioned for (high-) value applications

Highly differentiated performance plastic



High-value PEF applications



Multi layer bottles

PEF as barrier layer providing performance and enabling recycling



Single layer bottles

Single layer PEF in small bottles for soft drinks, beer and juice; replacing glass bottles, aluminum cans and multilayer bottles, enabling closed-loop recycling



Film

PEF film in recyclable flexible packaging or as film used in electronics applications (e.g. displays)



Example: partnership with Paboco®

Industry consortium developing the 'Paper Bottle'



- Paboco®, Paper Bottle Project, an innovation community joining leading brands



- Carlsberg presented the first prototypes of the Paper Bottle in October 2019, testing in 2020

PEF will provide the Paper Bottle with the high barrier properties needed for beverages such as beer and carbonated soft drinks





PlantMEG™, a key ingredient for plastics and textiles

Meeting the needs of consumers

Consumers are increasingly making environmentally conscious choices:

Brands must adapt to their consumers:

Large end-markets:

I choose...

→ ...the way I dress



Textiles

→ ...the way I eat



Packaging

→ ...the way I move



Automotive

→ ...the way I live



Furniture

Value proposition:

The use of plantMEG™ will provide brands with a sustainable, recyclable, and innovative ingredient capable of attracting environmentally conscious consumers.



Favourable global MEG market dynamics: Projected to grow from 28 million tonnes to 35 million tonnes in 2035 with a CAGR of 3.5%



Impact: Significant CO₂ reduction compared to fossil-MEG and independent from fossil feedstock



Cost competitive: Best-in-class single step catalytic process making plantMEG™ cost competitive with chemical equivalence



Scalable: Demonstration plant opened in 2019 with a clear path to scale-up and commercialisation



Strong IP position and know how (10 patent families)

3. MONETISE FDCA, THE KEY BUILDING BLOCK FOR PEF





Scaling-up FDCA/PEF: first-to-market advantages

Achievements and next steps



LABORATORY

- 2008
- Amsterdam
- Kilogrammes/annum
- Innovative research



PILOT

- 2011 - today
- Geleen
- Tonnes/annum
- Technology development



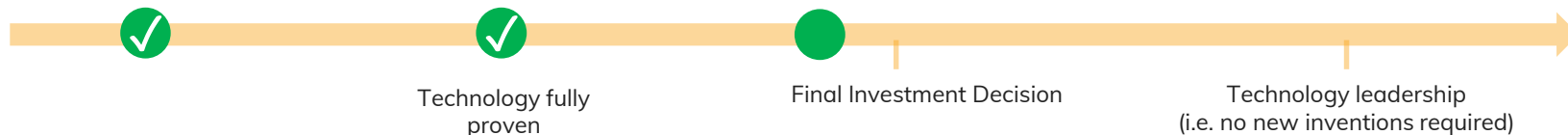
FLAGSHIP

- 2023 onwards
- Delfzijl
- 5 kilotonnes/annum
- Commercial launch



INDUSTRIAL

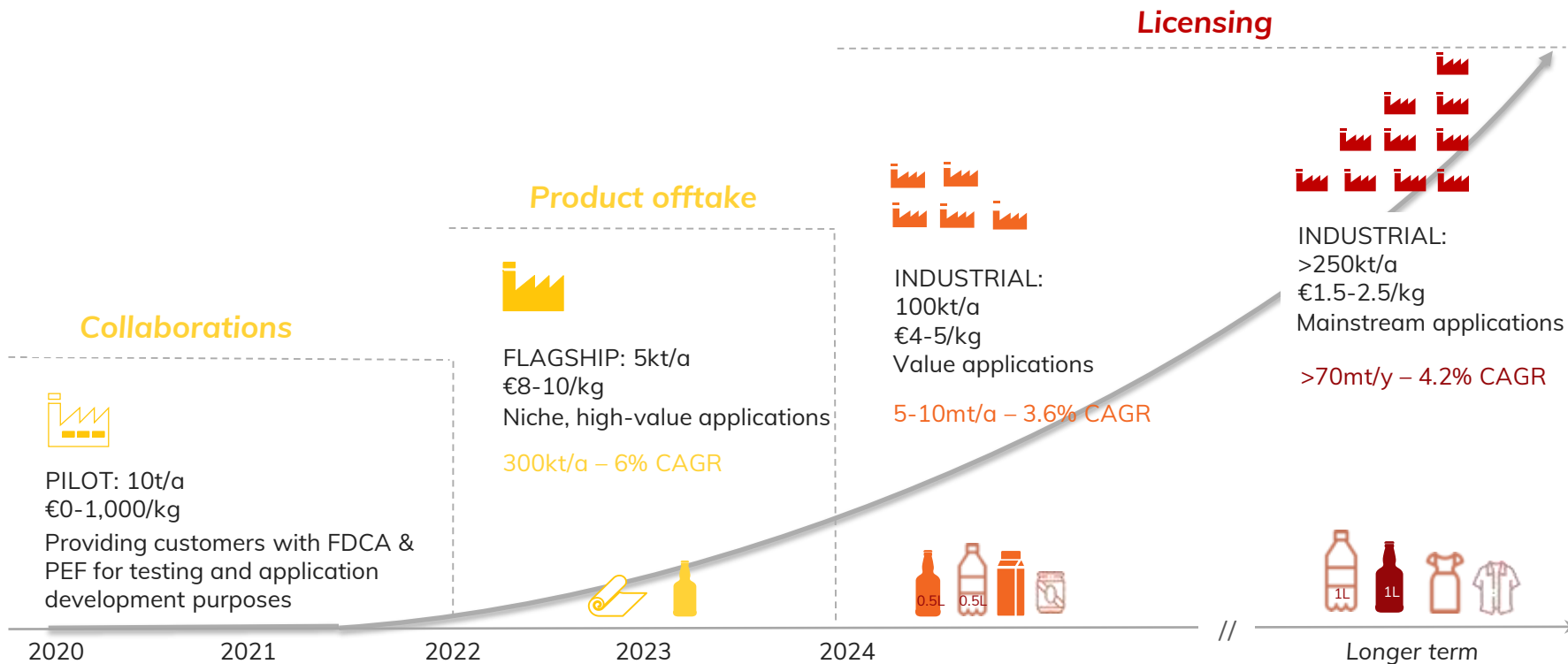
- 2024 and beyond
- Global
- >100 kilotonnes/annum/plant
- Licensing: cashflow and profit growth driver





Addressing \$200B+ markets

FDCA/PEF: focus on (high-)value applications





Partnerships throughout the PEF value chain

Validating the commercial production and driving commercialisation

Some examples:

Feedstock



Engineering



Polymerisation



Converters



Brand owners



Consumers



Funding partners (grants):



Funding partners (equity):



Groningen Consortium



FDCA flagship plant: expected start-up in 2023

Flagship plant: validate marketed products and production



Scale

5 kilotonnes of FDCA/annum



Location

Chemie Park Delfzijl



Market focus

High-value applications



Timing

Operational in 2023



Objective

Market launch



Partners

Committed partners throughout the value chain



Earnings model

Unlocking licensing business in high-volume markets



Funding

€150 million
(excl. +/-20% contingency on capex)

Rendered image of the Flagship Plant design
Greenfield plot @ Chemie Park Delfzijl



Update on the Final Investment Decision process

- Avantium will take the Final Investment Decision (FID) concerning the construction of the FDCA flagship plant when the following Key Conditions are satisfied:



1. Securing €150m financing



2. Obtaining sufficient offtake agreements



3. Engineering & supply chain

- Due to the global COVID-19 crisis, negotiations with financial, commercial and other strategic partners have taken longer than previously foreseen
- Avantium will therefore take additional time to meet all Key Conditions required for a positive FID
- Further announcements regarding the FID will be made on 24 March 2021, the publication date of the 2020 Annual Results

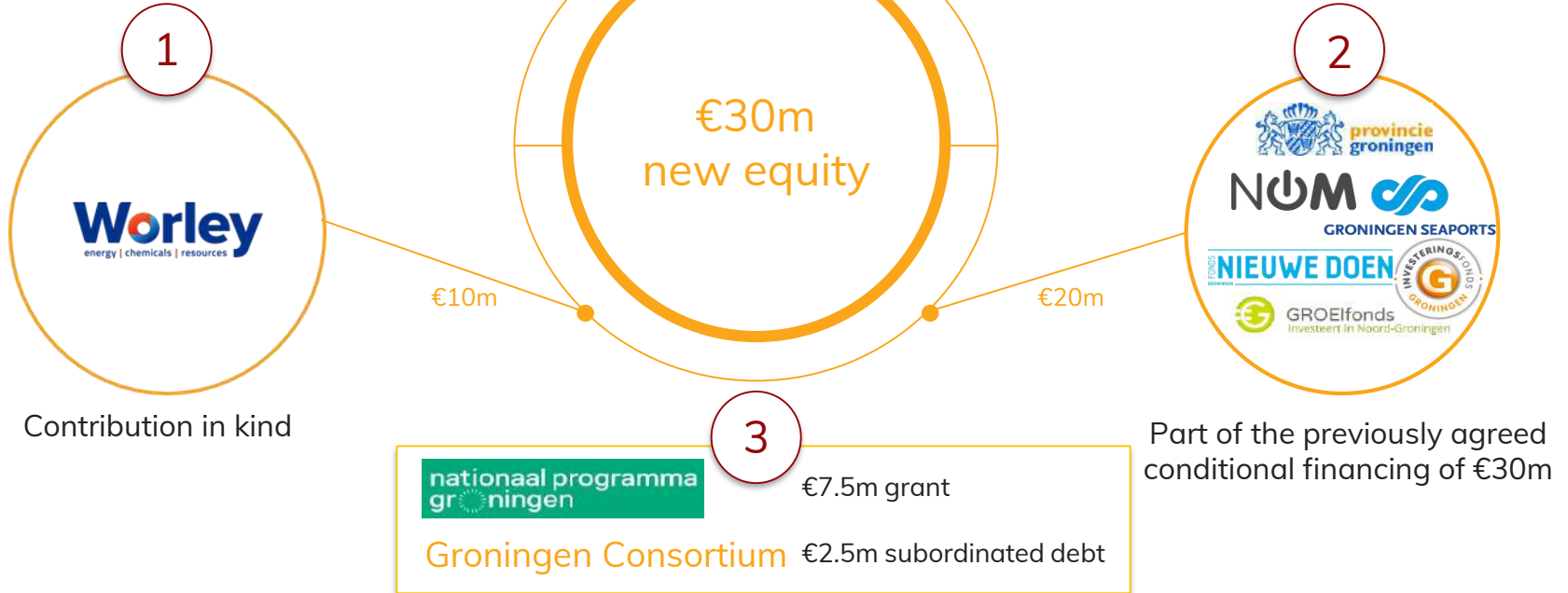


Term sheets signed with Worley and Groningen Consortium

Subject to multiple conditions

Avantium Renewable Polymers (“RNP”)

Groningen Consortium





Update funding FDCA flagship plant (Avantium subsidiary)

Estimates
in €m



- 1: Avantium has committed €35m equity to cover operating expenses 2019 -2023 (of which €22m has been invested at year-end 2020); with a cash position at year-end 2020 of ca. €26m, Avantium is exploring multiple financing options to provide for investment commitments to Avantium RNP.
- 2: Avantium is discussing debt and equity financing with banks and other parties. Additionally, Avantium RNP has applied for support from national and EU instruments such as the EU Innovation Fund.

Two conditional offtake agreements signed

Subject to a positive FID and financial closing, other approvals and party-specific conditions

- First two conditional offtake agreements signed for the supply of PEF resin to manufacture food packaging for bottles and films
- This represents approximately 20% of the flagship plant FDCA production capacity
- Avantium RNP is proceeding negotiations with multiple potential partners for additional offtake commitments



Progress update on engineering & supply chain

- **Engineering:**
 - Front-End-Engineering and Design (FEED) phase of the flagship plant is in the final stages
 - Heads of terms of the execution contract for the FDCA flagship plant established with Worley
 - Avantium and Worley foresee to collaborate in the execution phase of Avantium's licensing strategy
- **Supply chain:**
 - Agreement on the principal terms for a multi-year commercial polymerisation agreement with Selenis



**3. MONETISE
plantMEG™, A KEY
INGREDIENT FOR
PET AND PEF**





Scaling-up and commercialising plantMEG™

PlantMEG™ has potential in existing markets and applications



LABORATORY

- 2010
- Amsterdam
- Kilogrammes
- Innovative research



PILOT

- 2020 start-up
- Delfzijl
- 10 tonnes
- Develop technology & economic feasibility



FLAGSHIP

- 2024 - 2025
- Location TBD
- Scale TBD
- Commercial launch plantMEG™



INDUSTRIAL

- TBD
- Global
- Industrial scale
- Licensing: cashflow and profit growth driver



Validation of technology and data: ~1 year after pilot plant is fully operational

Estimated timelines:

- ✓ Process Design Package 6 – 12 months
- ✓ Front-End Engineering Design 6 – 12 months
- ✓ Construction ~2 years

Technology leadership (i.e. no new inventions required)

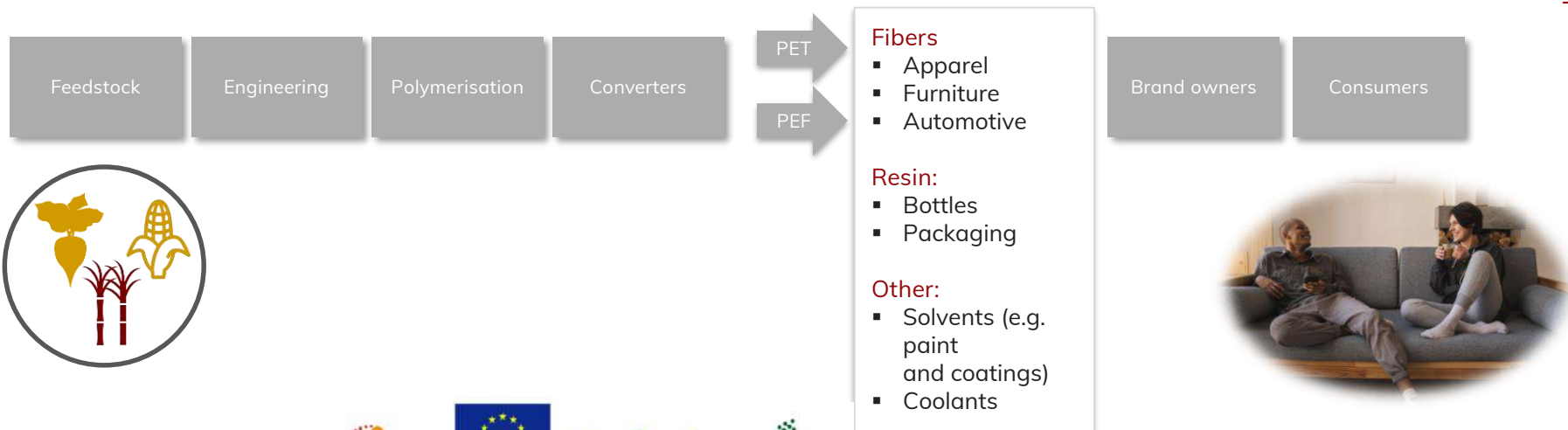


Partnerships throughout the plantMEG™ value chain

Driving commercialisation in existing MEG-markets

Multiple partners possible:

- Feedstock providers who wish to diversify their markets
- Chemical companies with the aspiration to transition to fossil-free chemicals
- Consumer brands who are looking for plant-based solutions for textiles and packaging



Funding partners (grants):



4. KEY TAKEAWAYS





Evolution of Avantium since IPO

Accelerating the transition towards a circular economy

THEME	📅 2017 (@IPO)	📅 TODAY
1	Who is driving change?	Industry & Governments
2	Business model (Avantium Renewable Polymers)	Joint venture (Synvina) 49% ownership Avantium
3	Industrial partners (Avantium Renewable Polymers)	BASF
4	Offtake partners	None
5	Timing start-up flagship plant	2021 (delayed to 2023 in 2018)
6	Scale flagship plant	25-50 kt/a Antwerp
7	Market focus (Avantium Renewable Polymers)	Commodity applications
8	Technology (Avantium Renewable Polymers)	Mostly developed
9	Sustainability focus	Renewable source
10	Development programmes (Avantium Renewable Chemistries)	<ul style="list-style-type: none"> PlantMEG™: laboratory (AMS) Biorefinery: laboratory (AMS) Electrochemistry: laboratory (AMS)

Consumers
Avantium with minority partners >50% ownership Avantium, master of own destiny
Term sheets signed with Worley and Groningen consortium
First two offtake partners signed
2023
5 kt/a Delfzijl
High-value applications
Fully proven & de-risked
Fully circular (reusable, recyclable and degradable)
<ul style="list-style-type: none"> PlantMEG™: pilot plant (Delfzijl) Biorefinery: pilot plant (Delfzijl) Electrochemistry: Pre-pilot units (AMS)



Value drivers

Summary of milestones reached and key upcoming potential milestones

	2020	2021-2023
FDCA / PEF	<ul style="list-style-type: none"> ✓ €25M PEference grant and €30M conditional funding for flagship FDCA/PEF plant ✓ Joined the Paboco® Paper Bottle Project 	<ul style="list-style-type: none"> • Meet all Key Conditions to take a positive FID • Start construction PEF flagship plant • Commercial roll-out PEF – licensing agreements in place
PlantMEG™	<ul style="list-style-type: none"> • Establish proof-of-technology for plantMEG™ demonstration plant 	<ul style="list-style-type: none"> • Engineering of commercial plantMEG™ plant • Commercial validation plantMEG™ • Financing and partnerships plantMEG™
Other	<ul style="list-style-type: none"> ✓ Established Sustainability Manifesto ✓ Proven revenue stream Catalysis Business • Explore partnerships to further develop and scale-up other pipeline programmes 	<ul style="list-style-type: none"> • Financing and partnerships for other programmes in the pipeline • Scale-up other programmes in the pipeline



Investment highlights

Avantium offers solutions for consumer driven renewable trends of plastic waste and CO₂ reduction



Renewable feedstock



packaging



textiles



film



Leading innovative products FDCA and plantMEG™ are the key ingredients for novel polymer PEF: 100% plant-based, recyclable and degradable with superior performance



Addressing \$200B+ end-markets with consumers demanding change



Pipeline of innovative chemical technologies at various stages of commercialisation



Partnerships with industry leaders and brand owners to make innovations global successes



Scalable licensing business model with clear growth path to profitability, balancing risk and reward



Proven ability to scale with 3 operational pilot plants, state of the art R&D lab and robust portfolio of >145 patent families



Strong management, board and technical & commercial team and a proven revenue generating track record with the Catalysis business



ESG is built into Avantium's DNA and drives the company's business model

5. ADDENDUM



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- Other (44 – 46):
 - ESG (44)
The new plastics economy; change driven by consumers (45)
 - The Guardian article 16 May 2020 (46)





Consolidated statement of comprehensive income

Strong growth of grant income in H1 2020 supported net loss reduction versus H1 2019

in Euro x 1,000

	Half year 30 June 2020	Half year 30 June 2019	Year ended 31 December 2019	2018
Continuing operations				
Revenues	4,294	5,219	13,821	11,283
Other income	4,474	1,903	4,217	3,637
Expenses				
Raw materials and contract costs	(791)	(1,426)	(3,666)	(3,065)
Employee benefit expenses	(9,673)	(9,939)	(19,747)	(13,731)
Depreciation, amortisation and impairment charge	(3,875)	(2,914)	(5,948)	(1,799)
Office and housing expenses	(903)	(463)	(1,800)	(2,208)
Patent, license, legal and advisory expenses	(1,613)	(1,458)	(3,185)	(1,897)
Laboratory expenses	(1,837)	(1,469)	(3,606)	(1,737)
Advertising and representation expenses	(449)	(644)	(1,438)	(1,311)
Expense due for onerous contract	-	(724)	(724)	(13,088)
Other operating expenses	(440)	(265)	(890)	(447)
Operating loss	(10,812)	(12,181)	(22,966)	(24,362)
Net finance cost	(140)	(166)	(319)	(68)
Share in loss of joint ventures	-	(259)	(259)	(43,948)
Loss before income tax	(10,952)	(12,607)	(23,544)	(68,378)
Income tax expense	-	-	-	-
Loss for the period	(10,952)	(12,607)	(23,544)	(68,378)
Other comprehensive income				
Share of other comprehensive income of joint ventures accounted for using the equity method	-	-	-	-
Total comprehensive income / (expense) for the year	(10,952)	(12,607)	(23,544)	(68,378)
Profit / (Loss) attributable to:				
Owners of the parent	(10,952)	(12,607)	(23,544)	(68,378)
Total comprehensive income / (expense) attributable to:				
Owners of the parent	(10,952)	(12,607)	(23,544)	(68,378)
	(10,952)	(12,607)	(23,544)	(68,378)



Consolidated balance sheet

Cash at €34.7m on 30 June 2020

in Euro x 1,000

	As at 30 June 2020	As at 30 June 2019	As at 31 December 2019	2018
Assets				
Non-current assets				
Property, plant and equipment	25,992	25,671	27,677	15,186
Intangible assets	638	718	684	722
Right-of-use assets	9,099	10,996	9,732	-
Investments in joint ventures and associates	-	-	-	4,249
Total non-current assets	35,729	37,385	38,092	20,157
Current assets				
Inventories	1,334	1,142	1,440	1,160
Trade and other receivables	7,590	9,645	11,541	9,307
Cash and cash equivalents	34,697	53,127	45,443	83,302
Total current assets	43,621	63,914	58,425	93,769
Total assets	79,350	101,299	96,517	113,926
Liabilities				
Non-current liabilities				
Lease liabilities	8,655	9,694	9,264	-
Total non-current liabilities	8,655	9,694	9,264	-
Current liabilities				
Lease liabilities	1,645	1,458	1,534	-
Trade and other payables	11,357	11,083	17,367	9,525
Provisions for other liabilities and charges	145	165	137	13,244
Total current liabilities	13,147	12,706	19,038	22,769
Total liabilities	21,803	22,400	28,303	22,769
Equity				
Equity attributable to owners of the parent				
Ordinary shares	2,583	2,584	2,583	2,583
Share premium	204,296	204,296	204,296	204,296
Other reserves	10,068	9,662	9,862	9,331
Accumulated losses	(159,400)	(137,643)	(148,527)	(125,053)
Total equity attributable to the owners of the parent	57,547	78,899	68,215	91,157
Total equity and liabilities	79,350	101,299	96,517	113,926



Consolidated cash flow statement

Cash flow H1 2020 at €-10.7m, improved by €2m versus H1 2019 (excluding the one-off exit payment to BASF)

in Euro x 1,000

	Half year ended 30 June 2020	Half year ended 30 June 2019	Year ended 31 December	
			2019	2018
Cash flows from operating activities				
Loss for the year from continuing operations	(10,952)	(12,607)	(23,544)	(68,378)
Adjustments for:				
- Depreciation of property, plant and equipment	2,938	1,965	4,130	1,550
- Amortisation	73	97	183	249
- Depreciation of right of use assets	826	851	1,635	-
- Share in loss of joint ventures	-	259	259	43,948
- Share-based payment	280	347	599	1,169
- Finance costs - net	140	166	319	68
- Non cash portion of onerous contract expense	-	724	492	-
- Impairment of PPE	57	-	-	-
Changes in working capital (excluding exchange differences on consolidation):				
- (Increase)/decrease in inventories	106	18	(280)	95
- (Increase)/decrease in trade and other receivables	3,951	(338)	(2,192)	171
- (Increase)/decrease in trade and other payables	(5,764)	1,558	8,442	(789)
- (Decrease)/increase in provisions	8	(13,079)	(13,107)	13,107
	(8,337)	(20,038)	(23,064)	(8,810)
Interest (paid) on current accounts	(74)	(50)	(17)	(24)
Net cash used in operating activities	(8,411)	(20,088)	(23,080)	(8,834)
Cash flows from investing activities				
Purchases of property, plant and equipment (PPE)	(1,198)	(4,191)	(8,458)	(7,958)
Purchases of intangible assets	(27)	(99)	(86)	(120)
Acquisition of Subsidiary	-	(4,188)	(4,189)	-
Net cash used in investing activities	(1,225)	(8,478)	(12,734)	(8,078)
Cash flow from financing activities				
Interest received from current accounts	40	79	27	19
Principal elements of lease payments	(1,149)	(1,681)	(2,021)	-
Other interest received	-	-	56	43
Other interest paid and financing costs	-	-	(94)	(80)
Net cash generated from financing activities	(1,109)	(1,602)	(2,032)	(18)
Net decrease in cash and cash equivalents	(10,745)	(30,168)	(37,846)	(16,930)
Cash and cash equivalents at beginning of the year	45,443	83,302	83,302	100,237
Effect of exchange rate changes	(1)	(8)	(12)	(5)
Cash and cash equivalents from continuing operations at end of financial year	34,697	53,127	45,443	83,302
Cash and cash equivalents at end of financial year	34,697	53,127	45,443	83,302



Shareholder Structure

- Ticker: AVTX – Euronext Amsterdam & Brussels
- # of outstanding shares: 25,831,817
- Analyst coverage:



Reg Watson



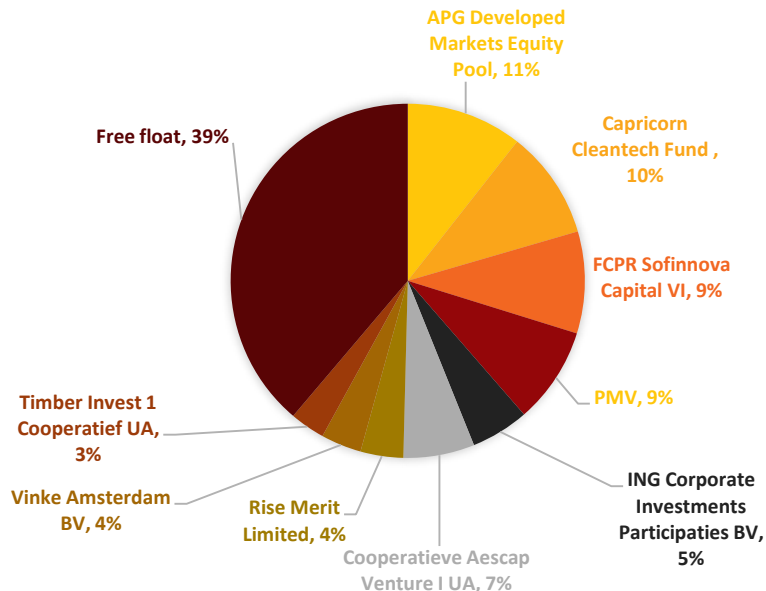
Patrick Roquas



Wim Hoste



Fernand de Boer

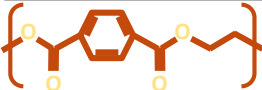
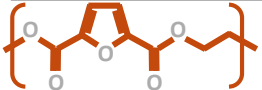


Source: Register substantial holdings and gross short positions of the Dutch Authority for the Financial Markets (AFM)



PEF versus PET

The influence of a small change in chemical structure

Property	PET (Amorphous)	PEF (Amorphous)
Molecule		
Density	1.36 g/cm ³	1.43 g/cm ³
T _m	250-270°C	210-230°C
T _g	~76°C**	~88°C**
Crystallization time	2-3 min**	20-30 min**
E-modulus	2.1-2.2 GPa	3.1-3.3 GPa
Yield strength	50-60 MPa	90-100 MPa
O ₂ permeability	0.114 barrer*	0.0107 barrer*
CO ₂ permeability	0.46 barrer*	0.026 barrer*

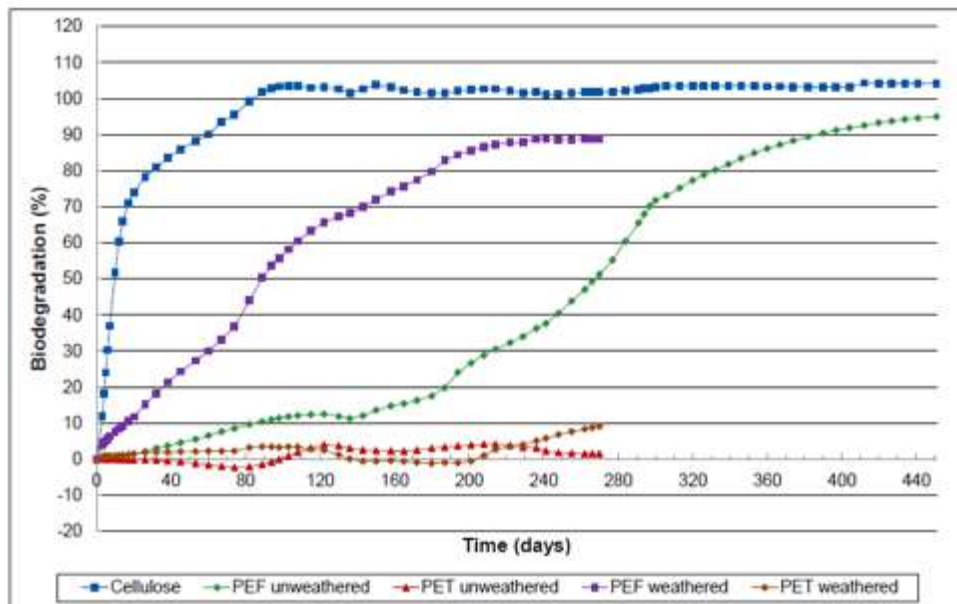
*S. Burgess et. al. (PhD project Georgia Tech, funded by The Coca-Cola Company), a.o. Macromol. 2014, Polymer 2014, J. Polym. Sci. 2014

**A. Codou / L. Martino et al., (Part of EU Project BIOFUR between Avantium and Nice University) a.o. Macromol. Chem. Phys. 2014, Phys.Chem.Chem.Phys. 2016



Biodegradation of PEF: initial results

In industrial composting conditions (58 °C in soil)

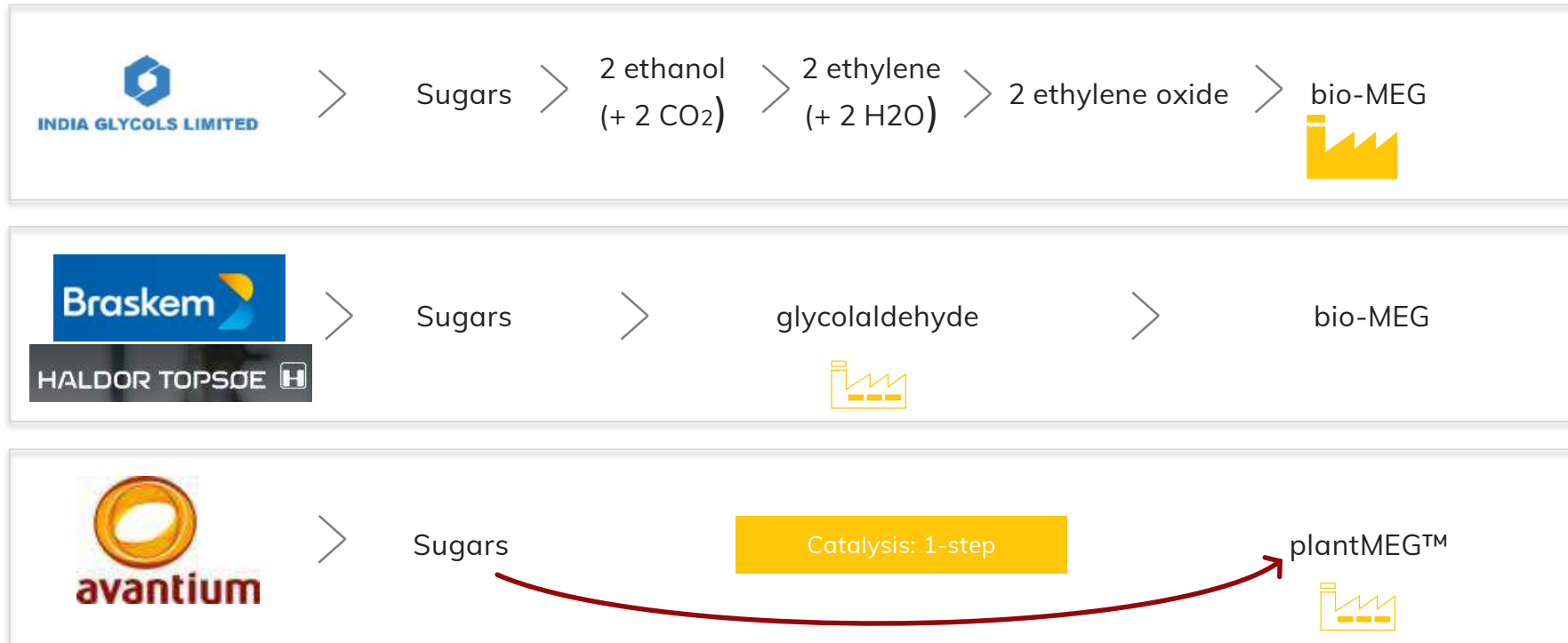


Biodegradation (%) = amount of polymer converted to CO₂

- Cellulose reference: 60 days to 90% biodegradation
- PEF (weathered): 240 days to 90% biodegradation
- PEF (unweathered): 385 days to 90% biodegradation



Unique single-step process Avantium's plantMEG™





Profitable Catalysis business

Extensive experience as chemicals innovation provider in advanced catalysis R&D

Business description

- Avantium Catalysis provides advanced catalysis R&D Services & Systems to international blue-chip players
- Avantium Catalysis has provided the technological basis on which many of our innovative technologies have been developed

Services & Systems

- Services: Sustainable solutions to develop innovative and improved chemical processes
- Systems: Capability to rapidly develop unique new hardware for chemical R&D

Financials

- Revenue (2019): EUR 12.5m

Selection of clients





Biorefinery: sugars and lignin from non-food biomass

Producing chemicals and materials from non-food biomass



Benefits sugars from residual forestry and agricultural streams

- Proven technology with the increasing need of the chemical industry to reduce the reliance on oil
- Extracts the remaining valuable sugars from non-food sources
- Suitable for locally sourced biomass

Market for industrial sugars (glucose) in chemical production

- The chemical industry consumed \$16 billion worth of glucose from starch and sugars in 2019

Source: Sugar Year Book 2019; Corn Refiners Association, "Biorenewable Insights: Conventional Sugars", Nexant (2016)

Current status

- Strong IP position and know how (13 patent families)
- Our pilot biorefinery is operational in Delfzijl, the Netherlands focused on improving efficiency and unit operations
- We will work with partners on technology scale-up in line with timing of market demand



Converting CO₂ to chemicals via electrochemistry

Unlocking a new renewable feedstock for the chemical industry



Benefits electrochemical CO₂ conversion

- Preventing CO₂ emissions of industrial parties
- Enabling cleaner chemical processes
- Turning waste into valuable products

Current status

- Strong IP position and know how (34 patent families)
- Pre-pilot test units opened in 2019 in the Port of Amsterdam
- Leading patent portfolio: global top-5 in electrochemical CO₂ conversions
- Cooperation with >35 partners in European grant consortia, also providing >€5M of grants
- Founding member of CO₂ Value Europe



ESG: our sustainability priorities

- At Avantium, sustainability is built into our very purpose. It drives our employees, informs our technology development and excites our commercial partners
- Every technology we develop affirms our commitment to helping create a fossil-free future for the planet
- In February 2021 Avantium published its Sustainability Plan 'Chain Reaction 2030' a pioneering roadmap to achieve a fossil-free chemical industry by 2050.





Chain Reaction 2030 – At a glance

Our Technologies

We will accelerate innovation to deliver products that use renewable carbon and support the circular economy.

Targets



By 2030, our technologies will deliver 1.5 million tonnes of CO₂ savings across the chemical industry.



By 2030, we will become a circular business.



By 2030, 100% of our plant-based feedstock for Renewable Polymers and Renewable Chemistries will come from sustainable sources.

Our Leadership

We will be the leading advocate for greater action by the chemical industry to address the climate emergency.

Targets



By 2030, 100% of our advocacy will focus on transforming the chemical industry to becoming circular and fossil-free.



Our Operations

We will minimise the impact of our own operations and have net-zero carbon emissions.

Targets



By 2030, our own operations will achieve net-zero carbon emissions.



By 2025, we will send zero non-hazardous waste to incineration and landfill.



By 2023, all our plants will achieve an ISO45001 certification (healthy and safe working environment).

Our People

We will mobilise our colleagues and the next generation of scientists to help solve the climate's most pressing problems.

Targets



By 2030, Avantium will be one of the 10 best companies to work for in the Netherlands.



By 2030, we will have engaged 100,000 students about using chemistry to create a fossil-free world.

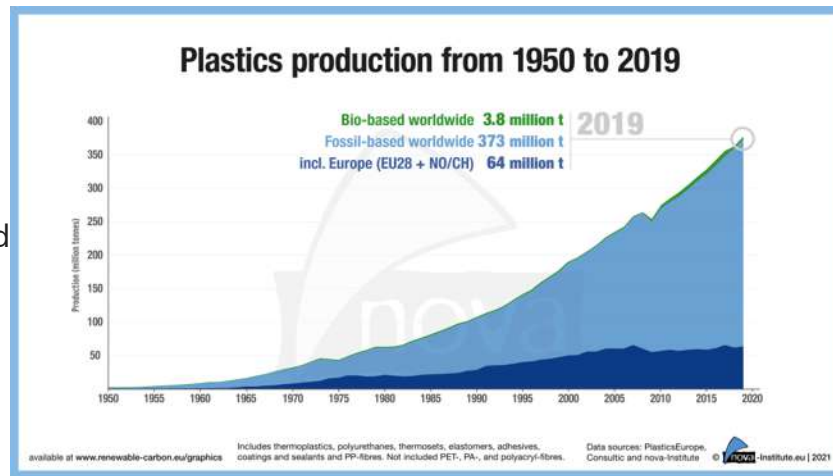


By 2025, we will improve upon our baseline of being an inclusive and diverse company, ensuring that we are representative of the societies and communities we operate within.



2020 was a promising year for bio-based polymers

- In 2020, the total production volume of bio-based polymers was 4.2 million tonnes (1 % of the total production volume of fossil-based polymers)
- The CAGR is, with 8 %, significantly higher than the overall growth of polymers (3–4 %) – this is expected to continue until 2025
- Overall, the global land requirement for bio-based polymers is only 0.006 % of the global agricultural land





The new plastics economy; change driven by consumers



"PERU RESTRICTS SINGLE-USE PLASTIC"
NATIONAL GEOGRAPHIC

"D.C. PLASTIC STRAW BAN BEGINS"
NATIONAL GEOGRAPHIC

"CANADA AIMS TO BAN SINGLE-USE PLASTICS BY 2021."
NATIONAL GEOGRAPHIC



Circular Economy facilitating SUSTAINABLE DEVELOPMENT GOALS



Big consumer brands aim to use 100% reusable, recyclable or compostable packaging by 2025





The Guardian – The End of Plastic (16 May 2020)

The Guardian

The end of plastic? New plant-based bottles will degrade in a year

Carlsberg and Coca-Cola back pioneering project to make 'all-plant' drinks bottles



▲ A mound of plastic bottles at a recycling plant near Bangkok in Thailand. Around 300 million tonnes of plastic is made every year and most of it is not recycled. Photograph: Diego Azubel/EPA

Beer and soft drinks could soon be sipped from “all-plant” bottles under new plans to turn sustainably grown crops into plastic in partnership with major beverage makers.

A biochemicals company in the Netherlands hopes to kickstart investment in a pioneering project that hopes to make plastics from plant sugars rather than fossil fuels.

The plans, devised by renewable chemicals company Avantium, have already won the support of beer-maker Carlsberg, which hopes to sell its pilsner in a cardboard bottle lined with an inner layer of plant plastic.

Avantium’s chief executive, Tom van Aken, says he hopes to greenlight a major investment in the world-leading bioplastics plant in the Netherlands by the end of the year.

The project, which remains on track despite the coronavirus lockdown, is set to reveal partnerships with other food and drink companies later in the summer.

The project has the backing of Coca-Cola and Danone, which hope to secure the future of their bottled products by tackling the environmental damage caused by plastic pollution and a reliance on fossil fuels.

Globally around 300 million tonnes of plastic is made from fossil fuels every year, which is a major contributor to the climate crisis. Most of this is not recycled and contributes to the scourge of microplastics in the world’s oceans. Microplastics can take hundreds of years to decompose completely.

“This plastic has very attractive sustainability credentials because it uses no fossil fuels, and can be recycled – but would also degrade in nature much faster than normal plastics do,” says Van Aken.

Avantium’s plant plastic is designed to be resilient enough to contain carbonate drinks. Trials have shown that the plant plastic would decompose in one year using a composter, and a few years longer if left in normal outdoor conditions. But ideally, it should be recycled, said Van Aken.

The bio-refinery plans to break down sustainable plant sugars into simple chemical structures that can then be rearranged to form a new plant-based plastic – which could appear on supermarket shelves by 2023.

The path-finder project will initially make a modest 5,000 tonnes of plastic every year using sugars from corn, wheat or beets. However, Avantium expects its production to grow as demand for renewable plastics climbs.

In time, Avantium plans to use plant sugars from sustainable sourced biowaste so that the rise of plant plastic does not affect the global food supply chain.



Thank You

ir@avantium.com