Avantium's PEF for Textiles

100% Plant-based

Helping to create a fossil-free future

Faster degradation*

Leading to less plastic accumulation
Potential solution to micro-plastics

Circular

Can be recycled in existing PET recycling assets
Contributes to a sustainable supply chain
Provides LCA advantages

Superior properties

Higher T_g and Lower melting point*
Processability in the existing PET lines
Superior O_2 and CO_2 barrier properties

* Compared to PET

Company snapshot

Avantium is an innovation-driven company, dedicated to developing and commercialising breakthrough chemical technologies for the production of plastic building blocks from renewable sources (plant-based sugars and CO2) instead of from fossil resources.

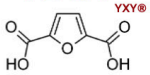
Headquartered in Amsterdam, Avantium employs approximately 220 people, has extensive R&D laboratories and operates three pilot plants in Geleen and Delfzijl, the Netherlands. Together with a selection of its partners, Avantium is constructing the world's first commercial FDCA factory based in the Netherlands, which is expected to be completed at the end of 2023. The plant is set to produce 5 kilotons of FDCA (furandicarboxylicacid) per annum - the key building block for the 100% plant-based, recyclable plastic material PEF (polyethylene furanoate).

Today | **Tomorrow**

PEF Building blocks

FDCA

YXY® Technology



Catalytic conversion of plant-based sugars into FDCA

plantMEG™

Ray Technology™

Conversion of sugars into plantMEG

CO_2 based polymers

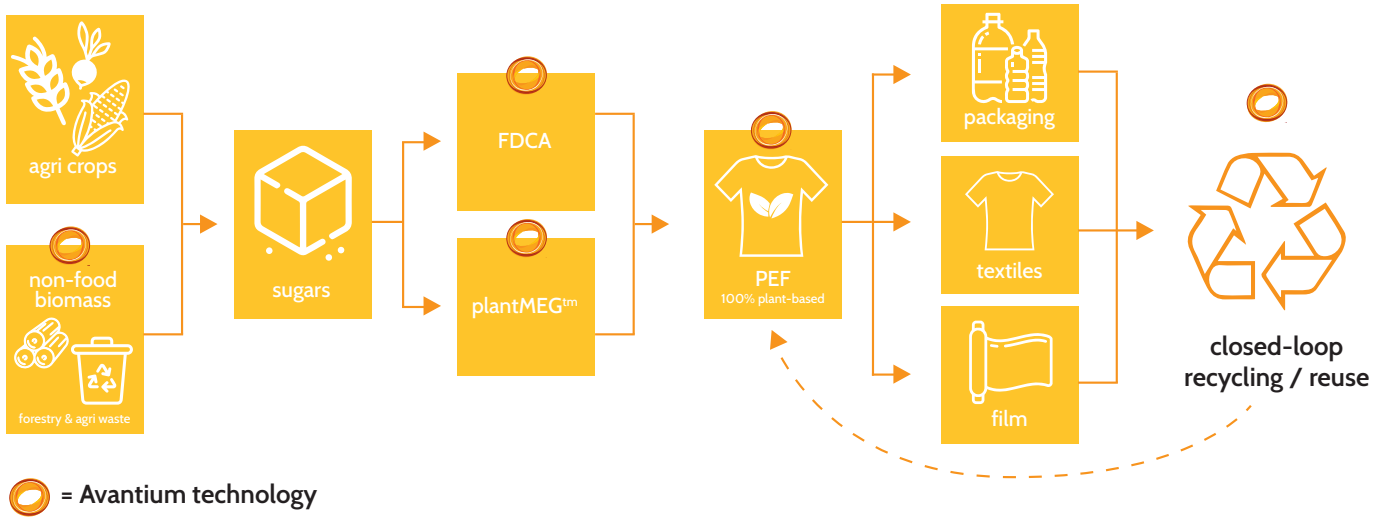
Volta technology

Conversion of CO_2 into high-value chemicals & polymers

Biorefinery

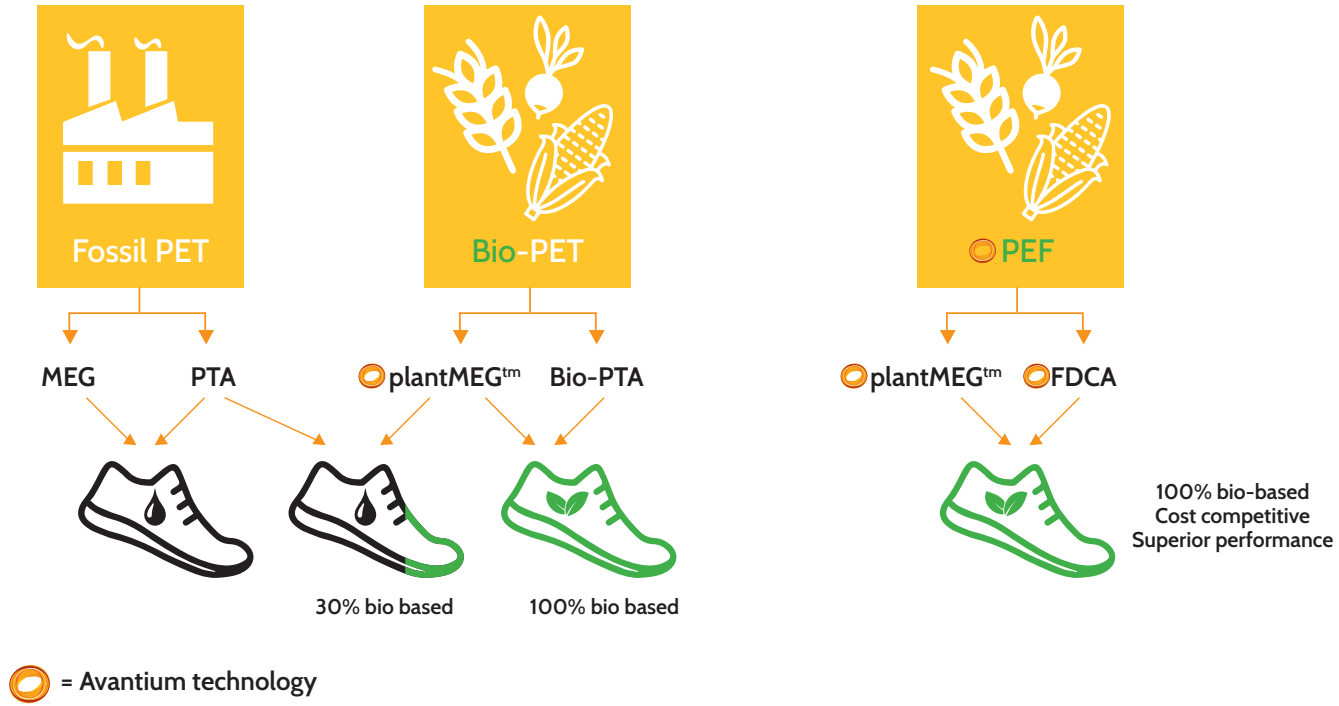
Dawn Technology™

Conversion of biomass via a biorefinery into industrial sugars



Avantium's coherent portfolio of technologies

Avantium's goal is to be the world leader in renewable and sustainable chemistry technology solutions, commercialising them through partnerships and licensing. With a mission to move towards a fossil-free world, Avantium has developed multiple game-changing technologies at various stages of commercial development. It covers a value chain from plant-based feedstock towards multiple end-applications such as packaging, textiles, film and more. Everyday items fit for today's world, which address growing end-markets worth over $200 billion.



Material supply chain of polyesters

Replacing fossil-based materials with bio-based alternatives is an important step towards a sustainable future. Avantium's PEF is 100% plantMEG and made from two building blocks; FDCA and bio-MEG. PEF is a polyester, like PET, and can be applied to a broad range of applications. Furthermore, PEF is fully recyclable, has performance benefits and produces a lower carbon footprint than fossil-based plastics.Avantium has successfully demonstrated the FDCA Technology at its pilot plant in Geleen, the Netherlands, and has started construction of the world's first commercial plant in 2022, with planned large-scale production of PEF in 2024.

PEF For Textiles

Besides being 100% bio-based, Avantium's PEF is also 100% recyclable to rPEF and it can be processed using existing mechanical recycling systems. Furthermore, Avantium has proven that PEF can be recycled using chemical recycling technologies that are currently in development. It is also easy to distinguish from other materials by using existing sorting equipment.

The potential of PEF in textiles has been successfully proven, it's already fully spinnable in textile spinning lines without the need for further investment. Previous studies show the suitability of PEF in a variety of applications, such as apparel, technical textiles, interior textiles, flooring and automotive applications.
Avantium has conducted several studies in various textile application and has a strong IP position.

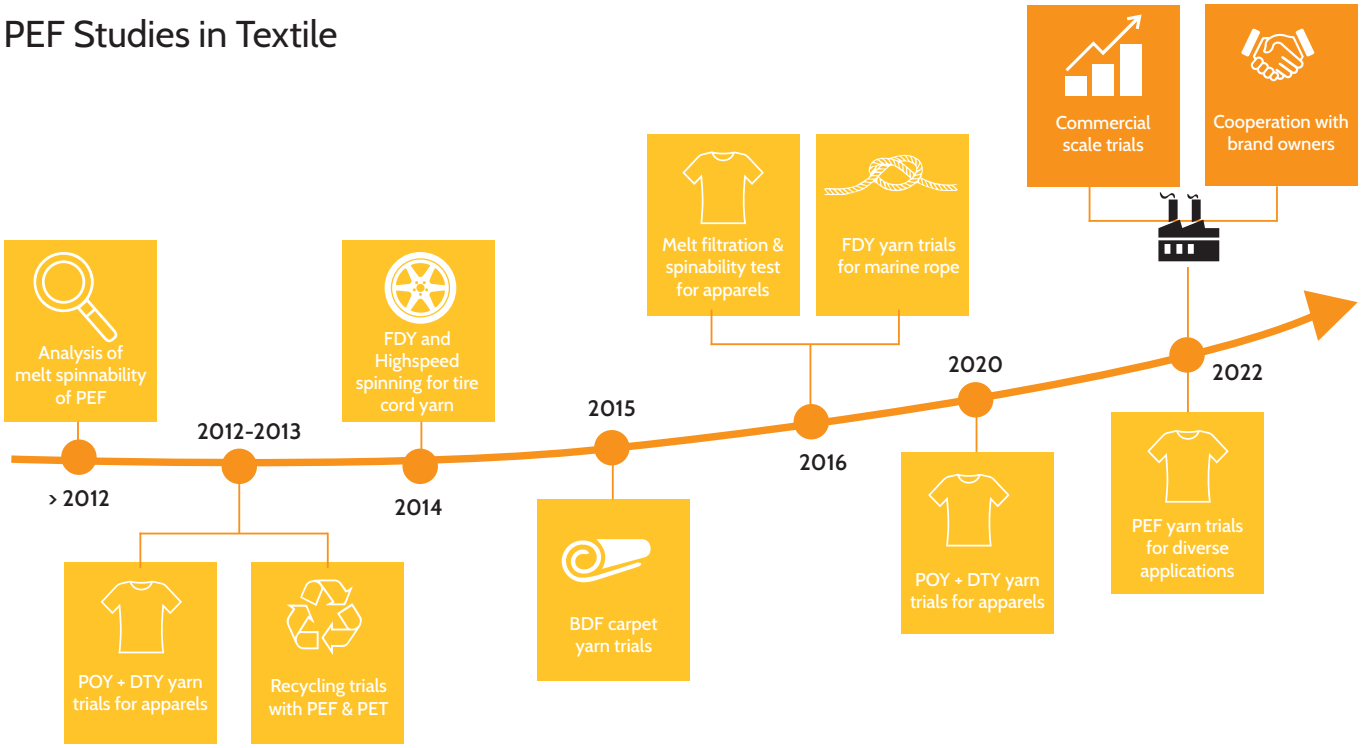
Avantium's PEF

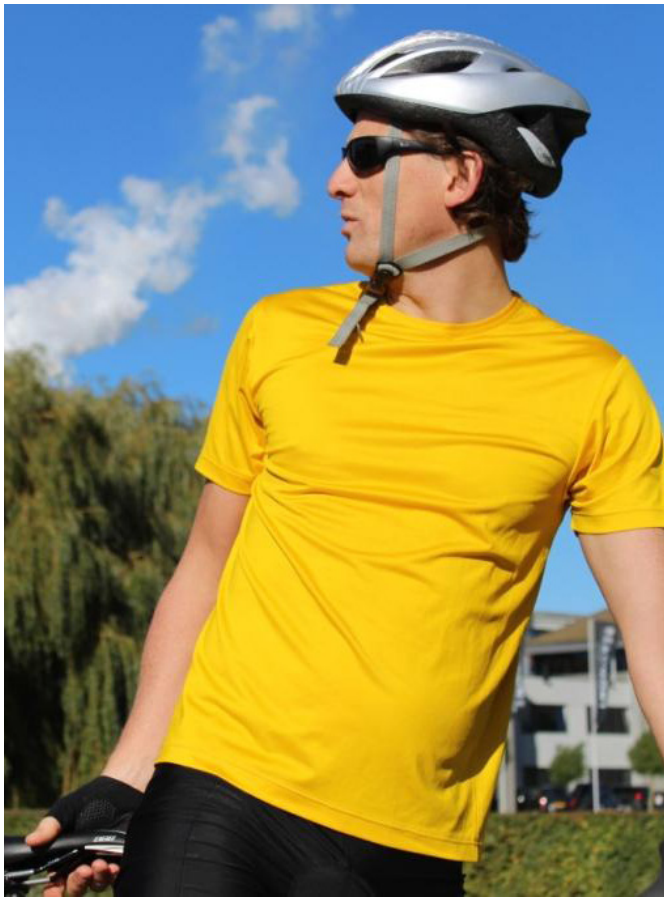
- 100% bio-based
- Circular
- Faster degradation*

Benefits to you

- Maximising sustainable resource usage
  Enables a fossil-free world
- Less dependency on fossil resources
  Can be recycled in the existing PET recycling assets
  LCA advantages
- Less plastic accumulation
  Potential solution to micro-plastics

PEF Studies in Textile





** Compared to PET*

Avantium's PEF

10-20°C higher glass transition temperature and 20-40°C lower melting point

High modulus and strength

Superior barrier properties (O_2-CO_2)

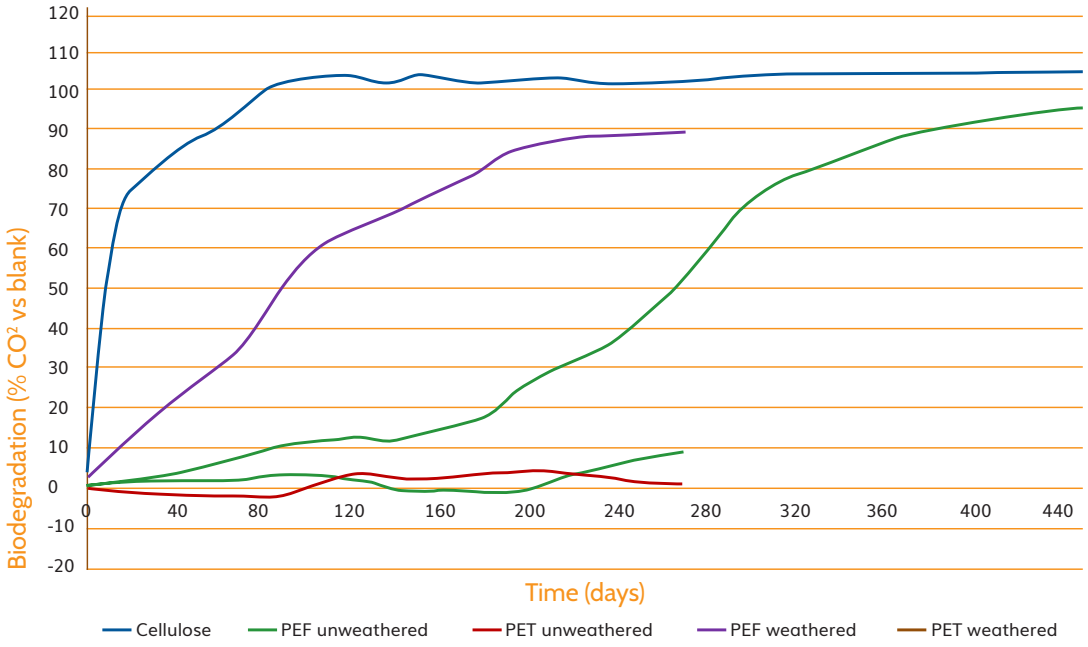
Benefits for textiles

Low energy cost during fiber production
Less degradation
Improved form stability during thermal treatment

Less material usage with the same tenacity or Higher tenacity levels with the same amount of PEF

Product protection and reduced material use advantages in food & beverage packaging.

PEF degrades to 90% in 240-380 days

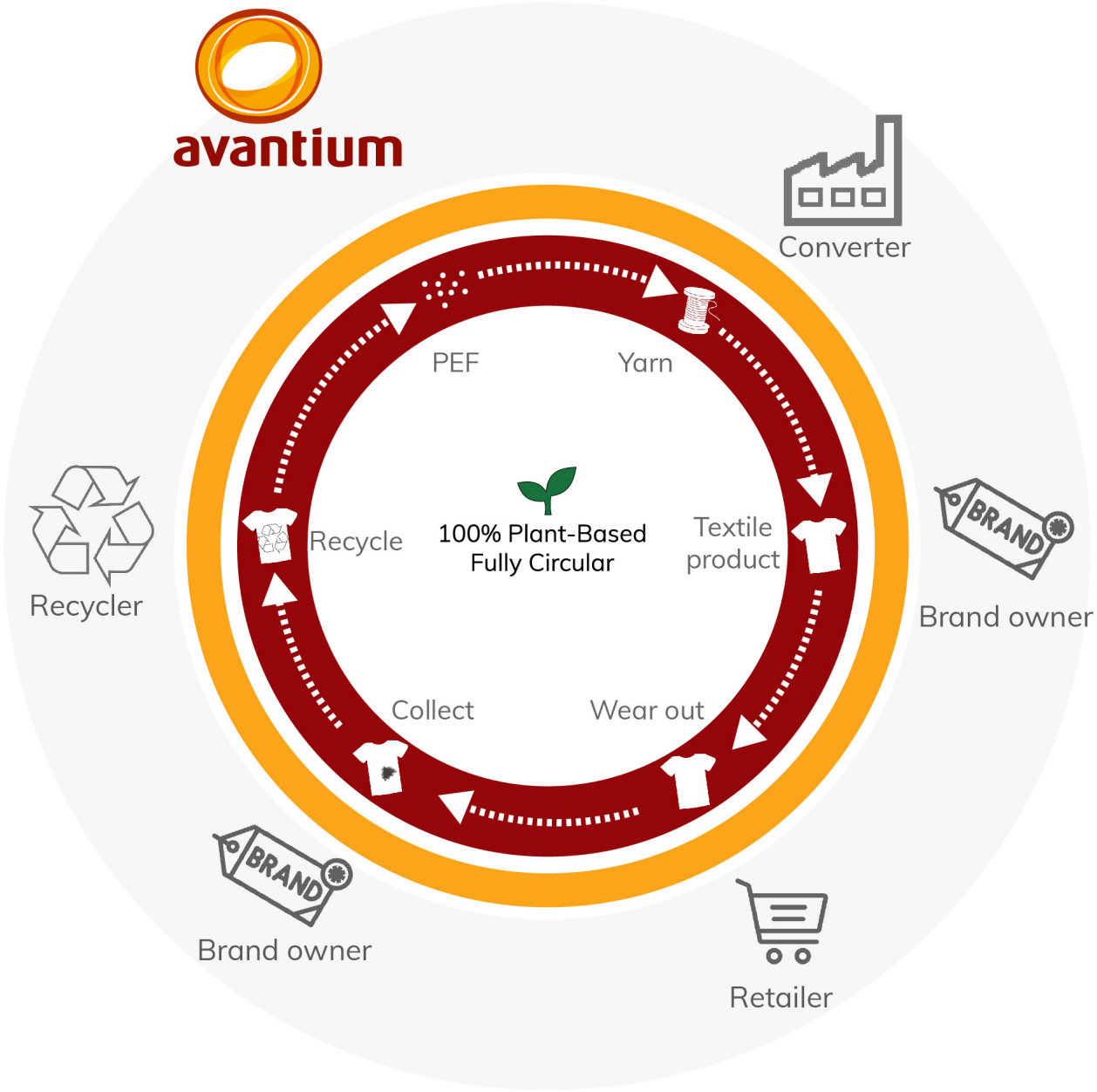


Weathered PEF: **240 days** Unweathered PEF: **380 days**

PEF enables degradable solutions

Another feature of PEF is that it degrades much faster than conventional fossil-based polyesters do. PEF has the favorable combination of durability in use and inherent capability of degradation under compostable conditions. Previous accelerated degradation studies have shown that PEF degrades within 240 days when exposed to fungi and bacteria in industrial composting conditions. Avantium is intensively studying the degradation behavior of PEF as a potential solution for micro-plastics.

Avantium works with partners in the value chain to create closed-loop PEF to PEF recycling solutions



Fossil-free future

Over the years, PEF has attracted the enthusiasm and support of many partners across the value chain. With the support of those important partners, Avantium is now ready to complete and operate the world's first FDCA Flagship Plant, meeting the growing global demand for sustainable materials across a range of end-product markets.

If you have any questions, please email us at:
rnp@avantium.com

Join Strategic Partnership with Avantium to drive Innovation and Sustainability!


We believe in a fossil free world
Let's go!