



**IEA Bioenergy**  
Technology Collaboration Programme

Task 42  
Biorefining in a circular economy



## The Netherlands - update

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Teams, 11 November 2024

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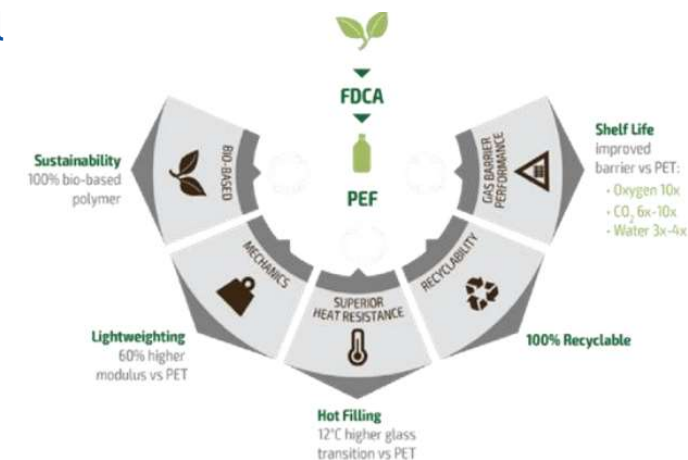
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# FDCA Flagship plant - Delfzijl (1)



- Avantium's YXY® plant-to-plastics technology catalytically converts plant-based sugars into a wide range of chemicals and plastics, such as the 100% plant-based, recyclable polymer PEF (polyethylene furanoate)
- Avantium has successfully demonstrated the YXY® Technology at their YXY pilot plant in Geleen
- In 2022 Avantium started the construction of the world's first commercial plant for FDCA (furanic dicarboxylic acid), and the official opening ceremony for Avantium's FDCA Flagship Plant was on **22 October 2024**
- The FDCA Flagship plant will produce 5 kilotons of FDCA per year
- The total investment in the FDCA-plant amounts to more than € 255 million
- The FDCA Flagship plant is part of the PEFerence project



## FDCA Flagship plant - Delfzijl (2)

- On 22 October 2024 the Official Opening Ceremony of FDCA Flagship Plant in Delfzijl, by Her Majesty Queen Máxima
- In the world's first commercial plant, Avantium will produce 5 kilotons of FDCA (furandicarboxylic acid), the essential building block for 100% plant-based and circular plastic PEF (polyethylene furanoate), known under the brand name Releaf
- Avantium will now commence the start-up of the FDCA Flagship Plant, introduce Releaf products to the market, and expedite the rollout of their FDCA/PEF licensing strategy



# BioBased Circular Growth Fund program (1)



- The BioBased Circular Growth Fund program paves the way for the Netherlands to switch to the use of climate-neutral materials
- The program is developing a new industry that produces, among other things, plastics, plastics and building materials that can compete with the current ones in terms of properties, attractiveness and price; with one big difference: they exchange fossil carbon compounds for plant-based ones
- BioBased Circular not only stimulates circular design, but also organizes collaboration between companies to realize value circles on an industrial scale
- The BioBased Circular programme aims to set up a sustainable sugar-based chemical and materials manufacturing industry in the Netherlands
- The programme, which runs until 2032, will link up the agricultural sector with the chemical and plastics industry
- It is conditionally awarded 338 million € in total, 102 million € already committed



BBC national growth fund 8.5-year program granted in two phases

Total program budget € 850M Euro of which € 338M Euro NGF subsidy

- BBC phase 1: 2024-2026 € 102M granted
- BBC phase 2: 2027-2032 € 236M reserved





## What is BBC working on?

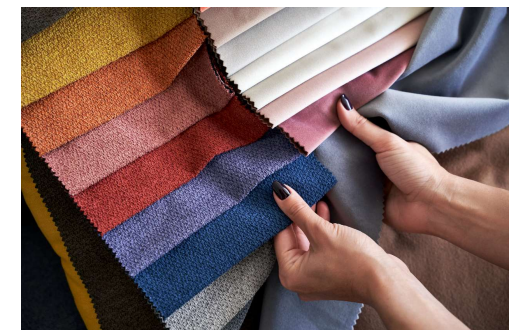
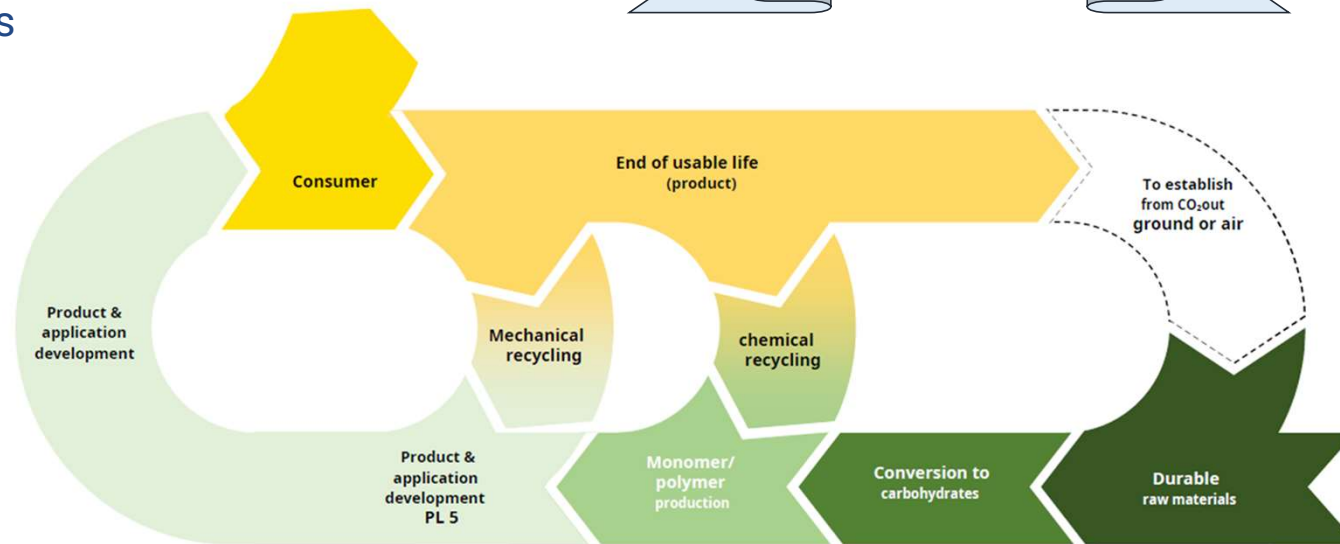
- A. Realization of approx. 5 **value circles** based on 'circular and safe by design' products and applications
- B. Sustainable **sourcing** of biomass
- C. Developing new biobased **building blocks** and polyester polymers
- D. Successful **implementation** and production at demonstrator (5-50 kta) and flagship (20-200 kta) scale.
- E. Facilitate and stimulate **non-technical aspects**

R&D - Implementation – Scale-up  
2032 - 2050

BioBased Circular – BBC - focusses on biobased polyester value circles from carbohydrates for applications with impact such as:

- Packaging
- Building & construction and interior
- Textiles
- Coatings

*Circular by design*  
*Biodegradable*



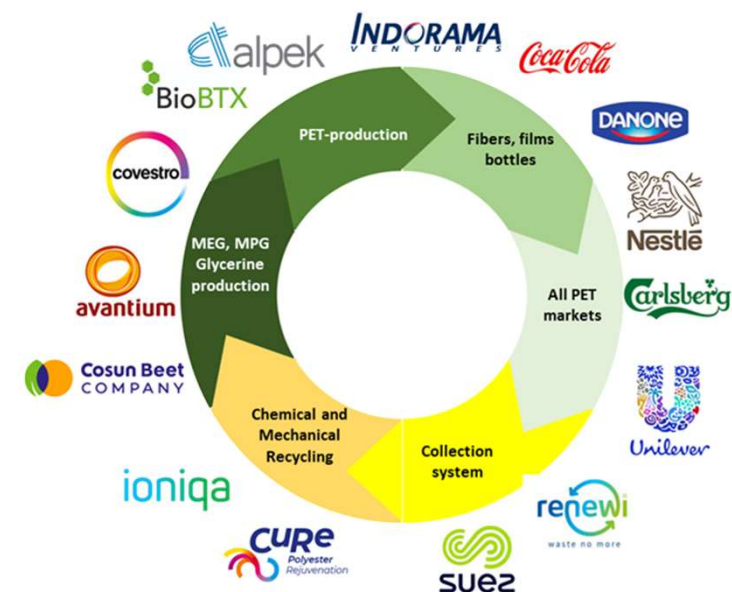
## BioBased Circular Growth Fund program (2)



### Focus on five value circles

1. PLA - Lactic acid as feedstock for both the food industry and sustainable biobased plastic production
2. PET/PEF - Biobased mono-ethylene glycol (MEG) from sugar beet, to make the polyester industry more sustainable
3. Polyester resins - Production of biobased resins from citric acid and glycol, e.g., for the furniture industry or building materials
4. Polyester coatings - Bio-aromatics from plant waste streams for paints, coatings and insulation materials
5. PHA - The production of PHAs (polyhydroxyalkanoates), degradable biopolymers from wastewater

2050 – circular PET/PEF chain





# How will BBC do this (1)

1. Subsidies for 5 **demonstrators and flagship**
2. Subsidy instruments for **R&D**
  - Large projects: MOOI max. 4 MEuro subsidy – opened 19 March
  - R&D&I cooperation 100-300 kEuro subsidy – expected opening Q4 2024
  - Experiments, feasibility, vouchers < 50 kEuro subsidy– expected opening Q4 2024
3. Strengthen, extend and make available **R&D infrastructure**



## How will BBC do this (2)

### 4. Execute **supporting studies and activities**

- 1.1 System analysis, hurdles and opportunities, rules & regulations
- 1.2 Support value circle development, business approach and scale-up
- 1.4 Financing facilitation
- 1.5 Human Capital agenda (HCA) and learning communities
- 1.6 Logistical implications
- 2.5 Biodegradability and Circular by Design
- 6.1 Scoping study biomass sourcing
- 8.1 Technical Economic Evaluation methods
- 8.2 LCA and Level Playing Field (biogenic CO<sub>2</sub>)

- By knowledge institutes in consortia, input from companies and stakeholders
- BBC Governance ensuring integral approach and collaboration

Thank you for your attention

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