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A joined-up approach to sustainable packaging

Our series of web seminars covers every key topic you need to know about. Taking place from March 15 to 25.

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Circular economy at BASF

Webinar on March 15 with
Andreas Kicherer and Victoria Wessolowski

Your hosts for today

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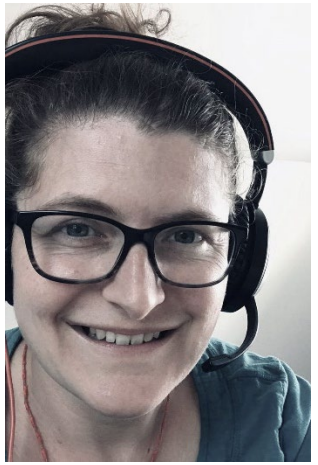

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Welcome to our session!
Before we start… Webex housekeeping

- Please **provide your full name**: Do not appear as a “Dial-in User”
- We’ll put you all on **mute** 
- Ask a question **via the chat or Q&A function (to everyone)** or **“raise a hand,”** so we can unmute you 
- All questions will be answered **after** the session
- Please **turn off** your video
- We recommend to use **VoIP** audio connection **(“call using computer function”)**
- Please note that this session is going to be **recorded**  (will be stopped for the Q&A)

Our purpose:

We create chemistry for a sustainable future

Key measures and targets

Decouple our CO_2 emissions from organic growth through a Carbon Management program.

- Grow CO_2-neutrally until 2030

Further increase our sales from Accelerator products, which make a substantial sustainability contribution in the value chain.

- Achieve €22 bn in Accelerator sales by 2025

Speed up the transition to a circular economy through a Circular Economy program

- Use of 250kt of recycled feedstock in 2025
- Double the sales of circular products (€17 bn)

Why to engage in circularity?

Photo: BASF Project reciChain Brazil

1 million

tons of batteries of electric vehicles will reach their end of life in 2030[1]

only

18%

of global plastic waste is recycled[2]

8 million

tons of plastic waste ends up in the oceans per annum[3]

Stakeholders are already driving the transformation to a circular economy

Markets

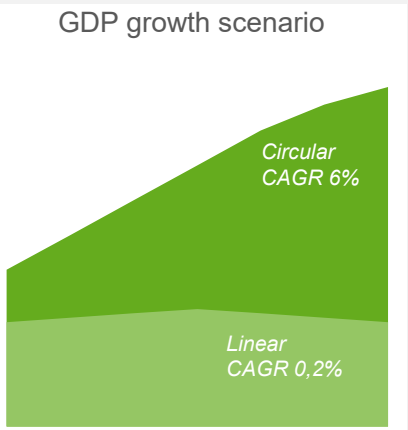
Various players across **all markets** have set **ambitious circular economy targets**

Legislators

EU drives an ambitious **circular economy agenda** with high recycling targets

Investors

The BlackRock **Circular Economy Fund** has raised **€900 million** in its first year.



Circular economy business models grow significantly stronger than linear ones.

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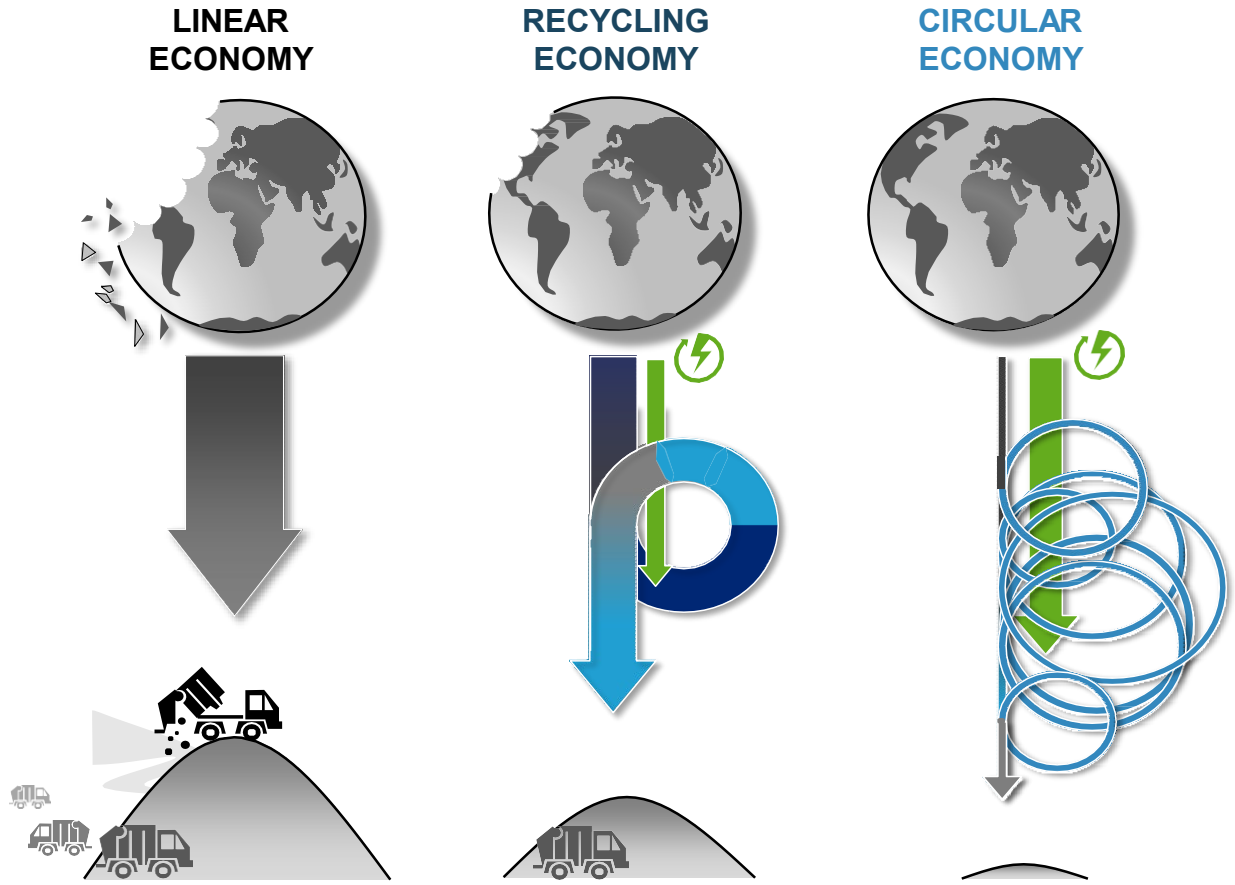
A circular economy aims to decouple growth from resource consumption and is regenerative by design

- **Rethink design** and use of resources and **keep** them in **use as long as possible**
- **Recover and recycle** products and materials
- **Avoid waste** and **pollution** and **protect natural systems**



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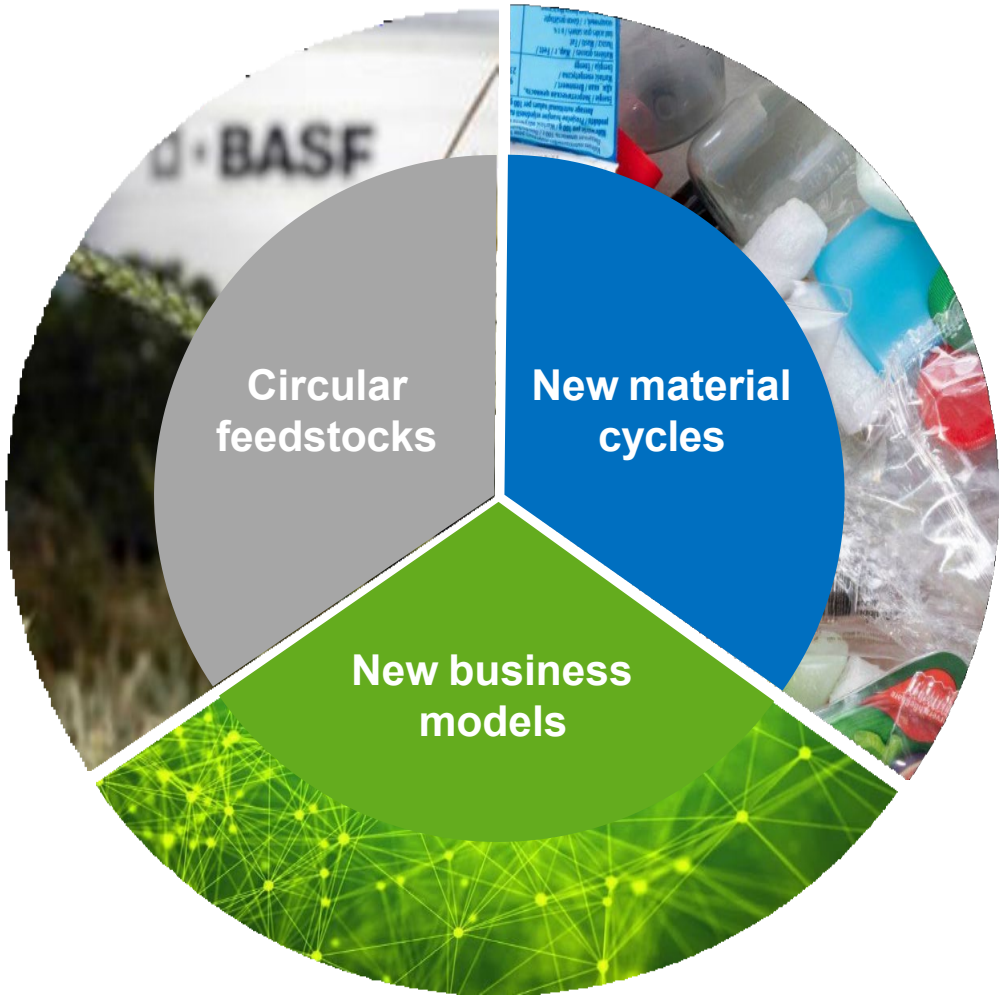
BASF Circular Economy Program

We have three areas of focus: circular feedstocks, new material cycles and new business models



Circular feedstocks

We will increase the volume of renewable and recycled feedstocks from sustainable sources, also via the certified mass-balance approach.

New material cycles

We design materials for circularity, develop solutions which improve or enable recycling and establish product-specific recycling loops.

New business models

We enter new markets, create smart digital solutions and offer new services which allow a decoupling of growth from resource consumption.

How do we drive circular economy?

We aim at **doubling** our **circular economy sales to reach €17 billion** by 2030.

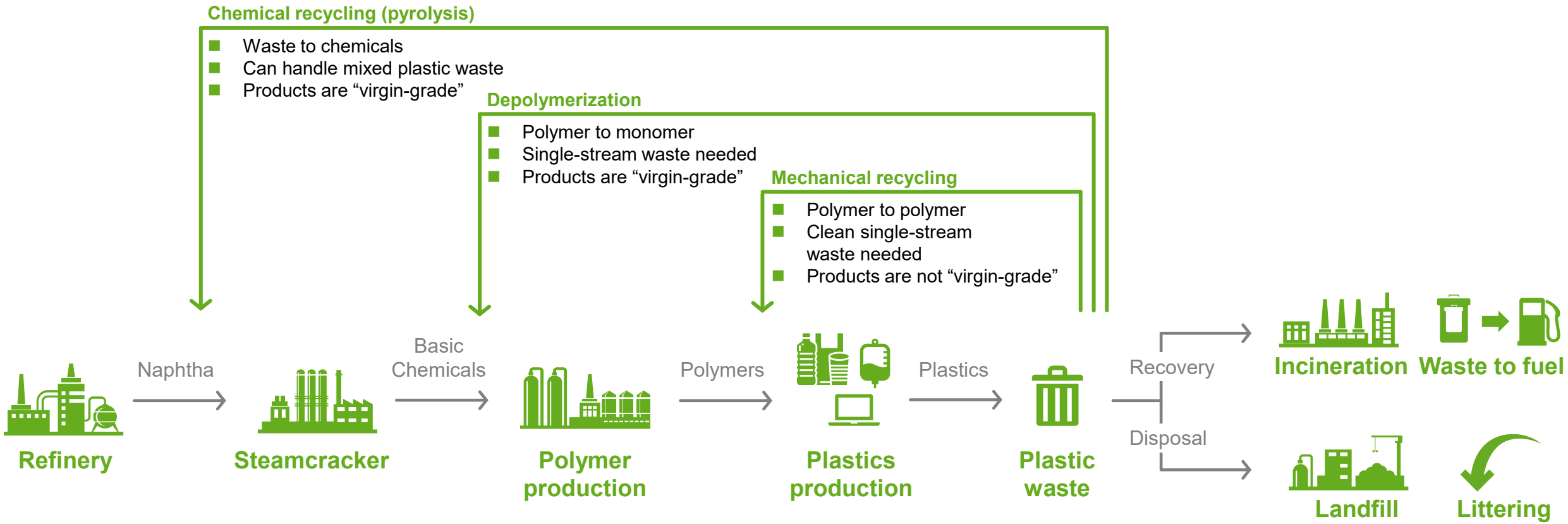
We commit to use **250,000 metric tons of recycled feedstock by 2025** globally.

We run a **Circular Economy Program** to accelerate the transition.

New Material Cycles

Different wastes need different recycling technologies

Different loops are necessary for a successful transition towards circularity



Chemical recycling is complementary to mechanical recycling

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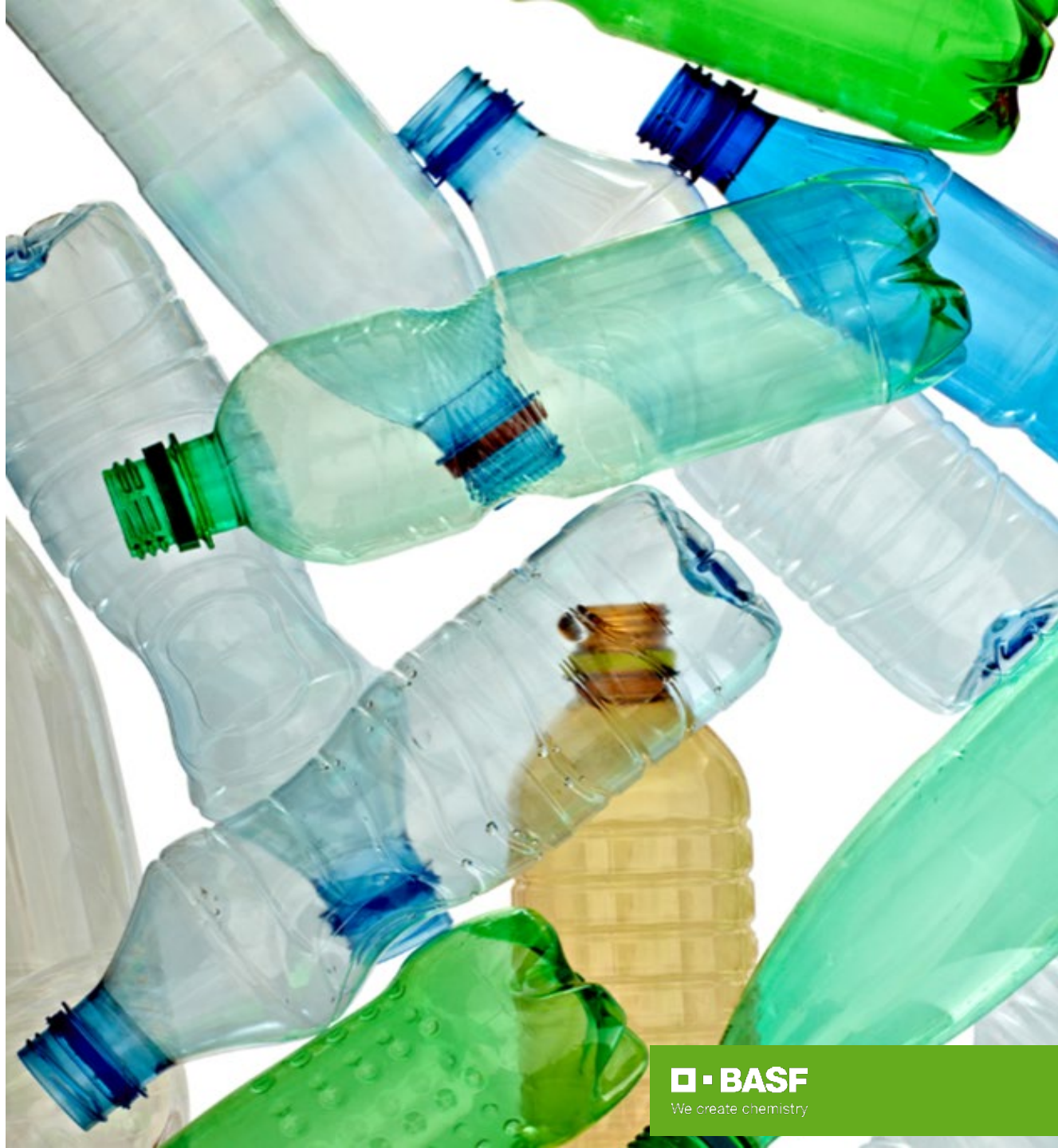
Petra®
Recycling-based PET

- Petra® grades are based on 100% post-consumer PET bottles
- Performance advantages through high-temperature performance, chemical resistance, good electrical properties and ease of processing
- Applications:
  - Appliance electrical connectors
  - Power tool motor components / housings
  - Appliance handles



Putting the mattress waste problem to bed

- Every year in Europe, **30 million used mattresses are thrown away**
- BASF aims to **recover high-quality polyols** from old mattresses
- How? With a **chemical recycling process** that breaks down the flexible polyurethane foams and enables a closed loop

Circular feedstocks:

Renewable

Recycled

By using alternative raw materials, we can manufacture the same products in a more sustainable way

Renewable feedstock

Biomass Balance portfolio

Derived from biomass waste of agricultural production, crop or food processing, or residues

Dedicated bio-based portfolio

Sustainably sourced resources, e.g., RSPO certified

Recycled feedstock

e.g., ChemCycling™

Derived from post-consumer plastic waste or tires

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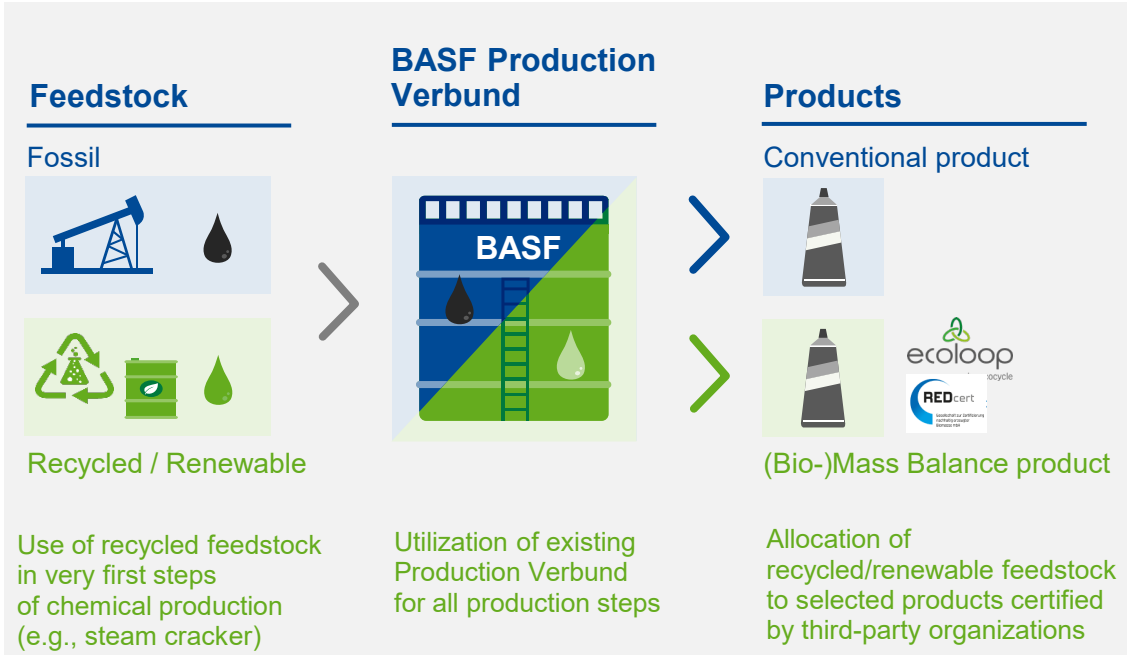
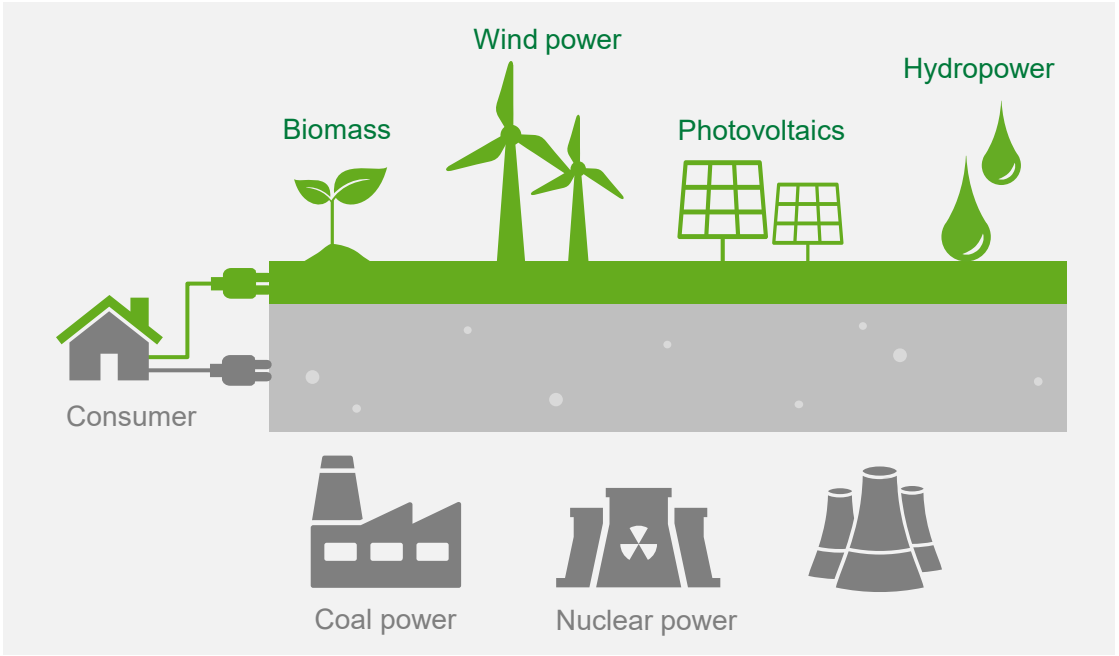
Allocation of renewable/recycled feedstock with the mass balance approach

How it works

Mass Balance approach



Green electricity



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BASF's Biomass Balance Approach

- Requires **no reformulation** – identical product performance
- **Available** easy and fast for nearly all our products
- **Saves fossil resources** and **reduces greenhouse gas** emissions
- Drives the use of sustainable **renewable feedstock**

Renewable raw materials for BMB need to be sourced sustainably

Use certified renewable raw materials

- Waste/residues are preferred, e.g. from paper and wood industry, biogas
- Independent sustainability certification from recognized schemes, e.g., REDcert and ISCC

Apply standardized sustainability criteria

- Minimum sustainability criteria as in EU RED*
- Greenhouse gas emissions savings
- Responsible biomass production
- Protection of areas with high biodiversity and large carbon stocks

* Renewable Energy Directive of EU Commission

Chemical recycling is a complementary approach to existing recycling methods

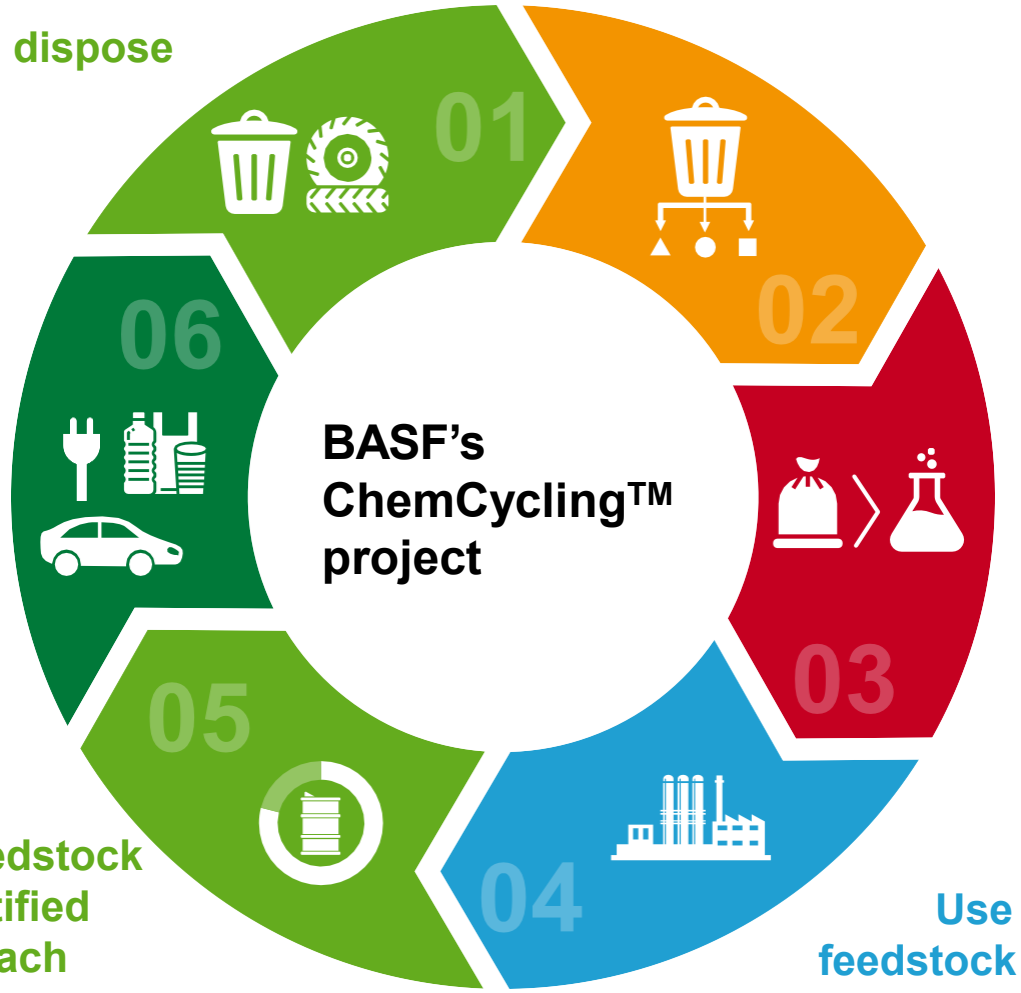
- We contribute to the recycling of **plastic waste for which no high-value recycling processes are established** yet.

- Examples of plastic waste which are difficult to recycle mechanically or which are incinerated include:
  - Packaging with adhering food residues
  - Some multi-material packaging
  - Tires

With chemical recycling, overall recycling rates of plastic waste will be increased.

BASF's ChemCycling™ project

Breaking new ground in plastics waste recycling



01 Consumers use and dispose plastic products

02 Collect and sort plastic waste

03 Convert plastic waste into pyrolysis oil

04 Use purified pyrolysis oil as feedstock for Verbund production

05 Allocate recycled feedstock to chemicals via certified mass balance approach

06 Customers use chemicals for their own products

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ChemCycling™ is attractive in terms of CO_2 emissions

Conclusions of an external, critically-reviewed life-cycle assessment (LCA) for ChemCycling™:

- Pyrolysis of mixed plastic waste emits **50 percent less CO_2 than incineration** of mixed plastic waste
- **CO_2 emissions** are **saved** when manufacturing **plastics based on pyrolysis oil** under a mass balance approach instead of naphtha.
- Manufacturing of plastics via either **chemical recycling (pyrolysis) or mechanical recycling** of mixed plastic waste results in **comparable CO_2 emissions.**

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New Business Models

Infrared Spectroscopy

- trinamiX GmbH was founded in 2015 as a wholly owned subsidiary of BASF SE

- trinamiX has developed a mobile Near-Infrared (NIR) Spectroscopy Solution to identify plastics for easier sorting

- trinamiX technology can
  - precisely determine diverse compositions of different plastics
  - distinguish via the simple use of a portable handheld device that combines trinamiX data analysis with a mobile app

- Recycling and recyclability are improved, paying off for both the environment and businesses alike

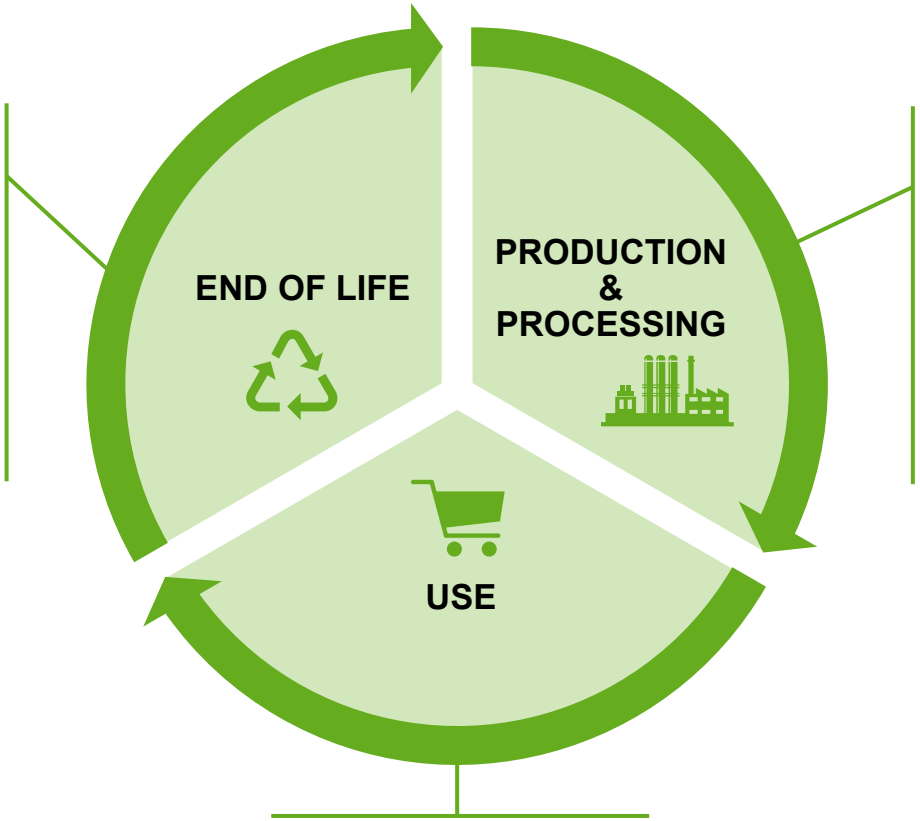
Smart Solutions in Development by BASF and Security Matters Limited

- BASF Plastic Additives supports customers in overcoming the challenges that come with increasing amounts of recycled plastics
- BASF and Security Matters Limited are jointly developing solutions for plastics traceability and circularity to tackle this global challenge
- Security Matters contributes its technology to enable physical and digital tracking of closed loop recycling and to authenticate sustainability claims

BASF solutions along the packaging life cycle

Enabling circularity

- Sorting
- Mechanical recycling
- Chemical recycling
- Organic recycling



Increasing resource efficiency & reducing emissions

- Using fossil & alternative (segregated bio-based, biomass-balanced & recycled) feedstock efficiently
- Offering water-based content
- Improving product design
- Optimizing raw-materials' use in processing
- Calculating Carbon Footprint

Providing benefits

- Food safety
- Extended shelf life of packed goods
- Weight reduction / Light weighting
- Waste reduction of packed goods

Thank you for listening!

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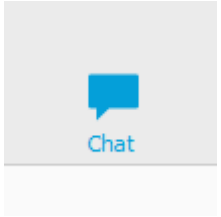
REGISTER NOW!
A JOINED-UP APPROACH TO SUSTAINABLE PACKAGING

Our series of web seminars covers every key topic you need to know about:

March 15	*Circular economy at BASF*
March 18	*Mechanical recycling of polyamides in multilayer film structures*
March 19	*Ultramid®: Introduction to a family of polyamide 6 extrusion granulates*
March 22	*BASF calculates the CO_2 footprint of its products*
March 23	*New Ultradur® grades for thermoforming and injection-molding applications with tailor-made property profiles*
March 24	*Water-based ink technology: a more sustainable solution for flexible packaging*
March 25	*Pharmaboxes made from Styropor® Ccycled™ go around the world*

Questions

- But please, feel free to ask questions using the **chat**



- Please **raise your hand**, we will call you, unmute yourself and ask your question

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