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We create chemistry

Collaborating for a sustainable future

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Leading the way in enabling a circular economy

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The era of the linear economy is ending because we simply cannot afford it anymore.

1 million

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

only

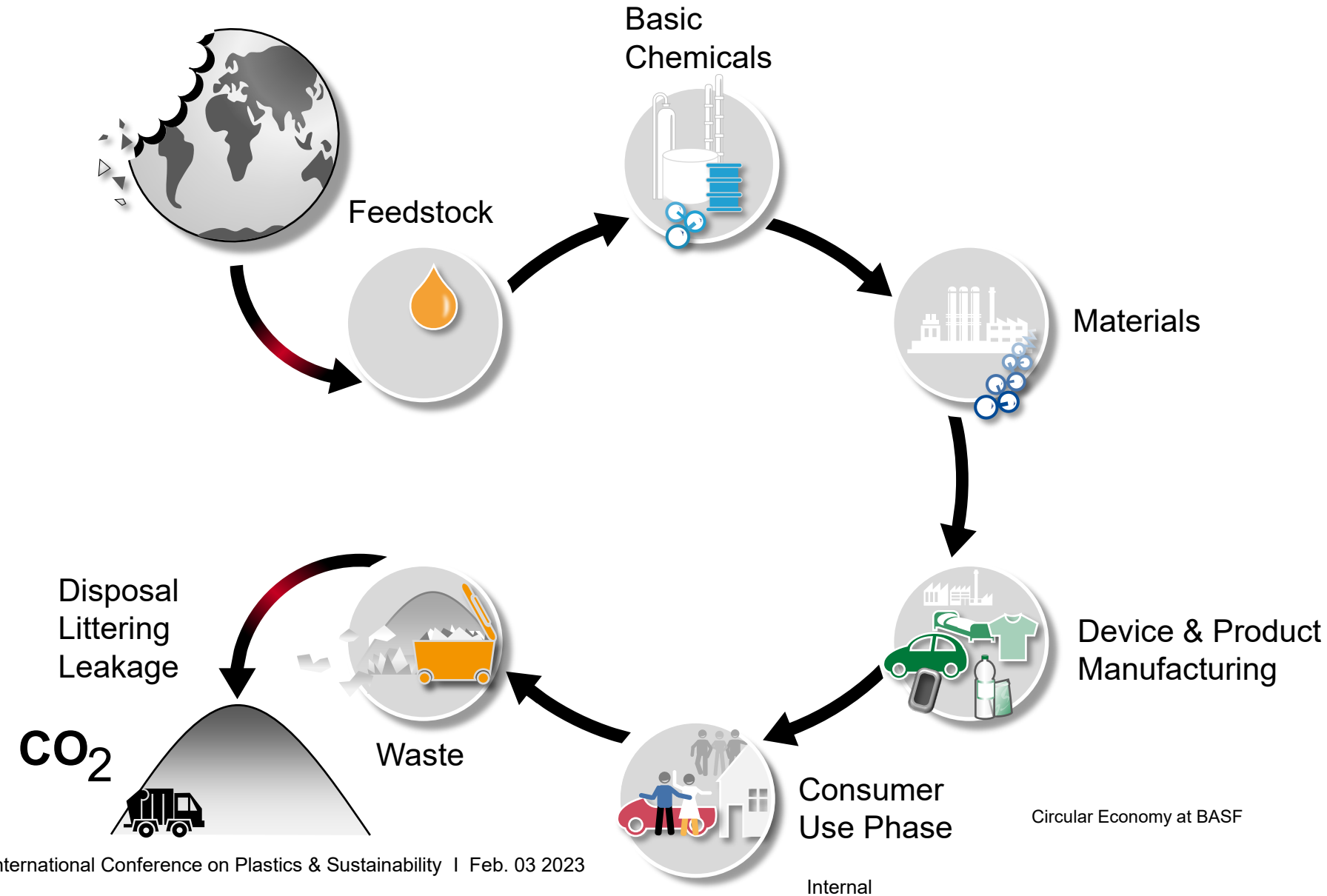
18%

of global plastic waste is recycled[2]

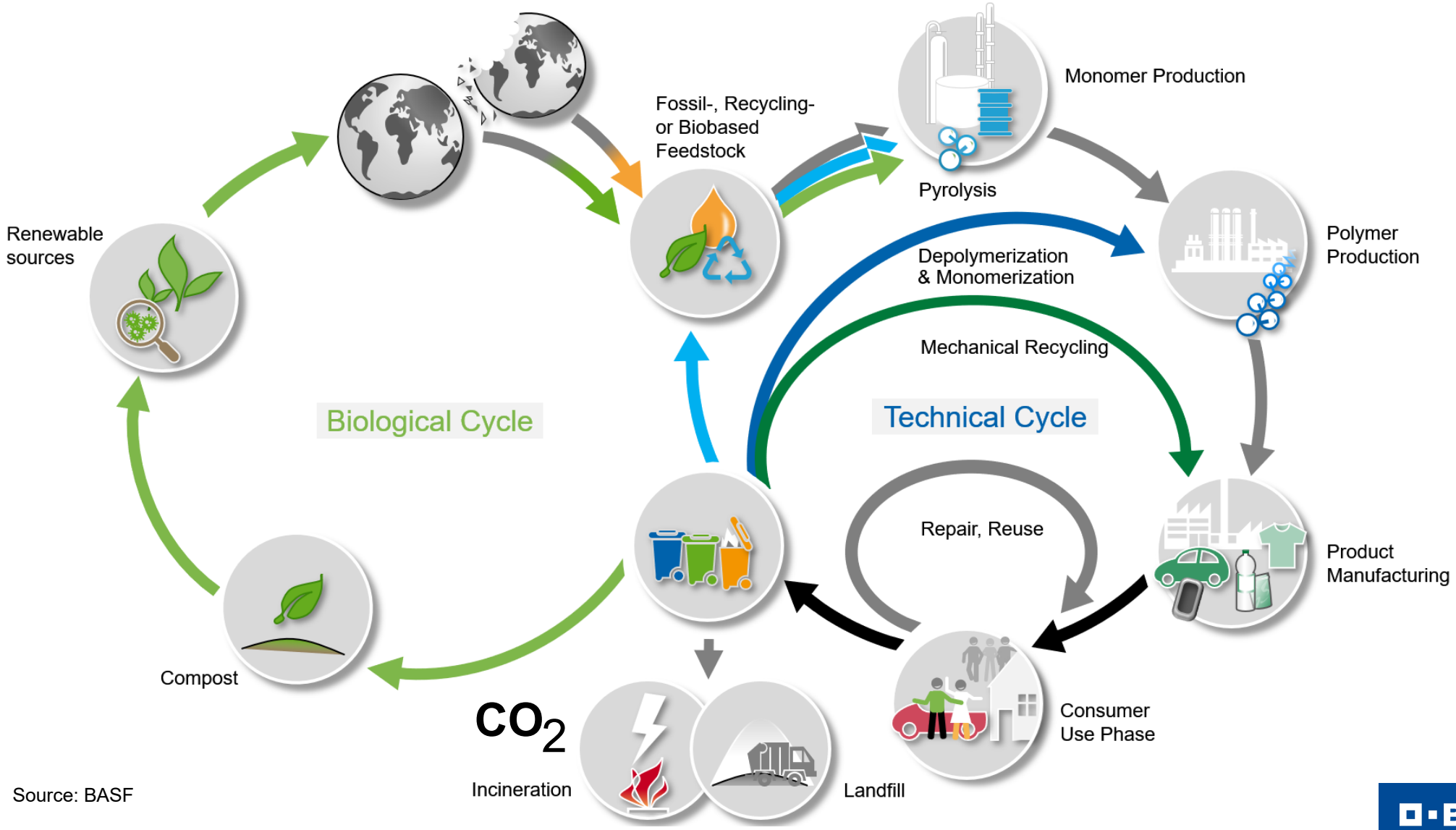
8 million

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

The linear economy: Take – make – dispose



The circular economy: Make – Use – Recycle



- Rethink
- Reduce
- Reuse
- Recycle

Source: BASF

Stakeholders are already driving the transformation to a Circular Economy

Markets

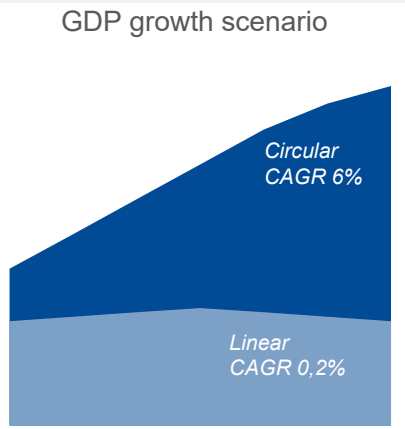
Various players across **all markets** have set **ambitious Circular Economy targets**

Legislators

Incoming EU **levy effective** as of January 2021: **€800 per ton for non-recycled** plastic packaging **waste**

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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Net sales
in 2021
€ 78.5 bn

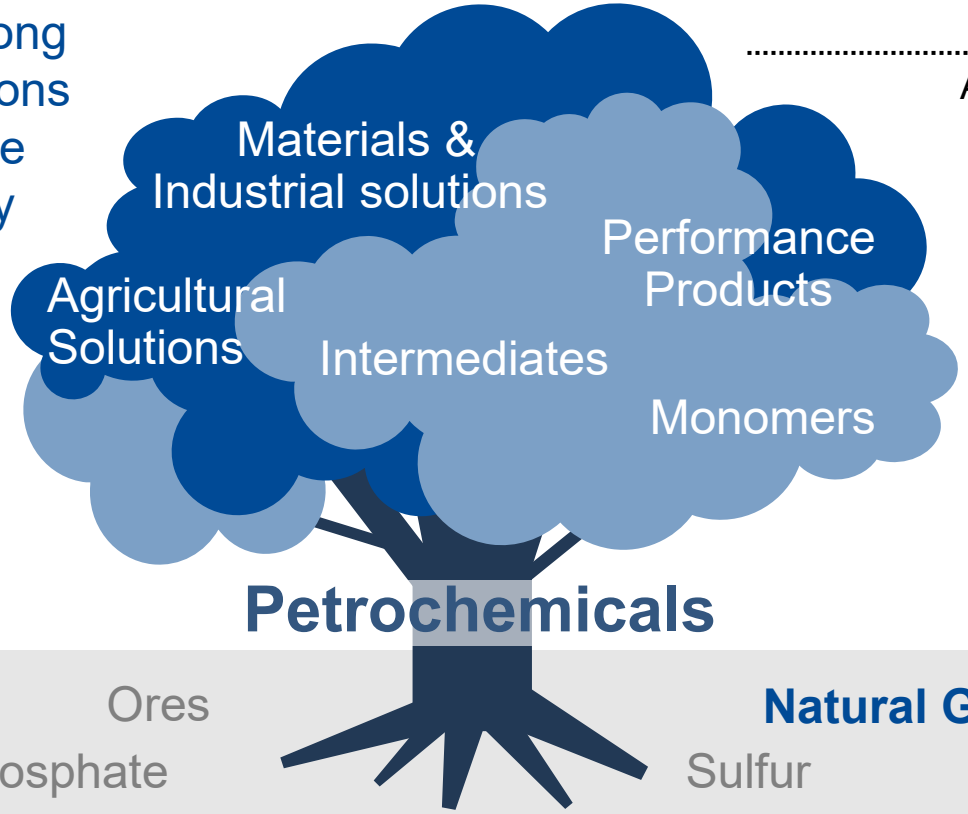
Global R&D
expenditure
> € 2.2 bn

Employees Globally
111,047
as of 31 Dec 2021

New Patents filed in 2021
~850

Sustainability

We are successful in the long term if our products, solutions and technologies add value to the environment, society and the economy.



About 8.000 commercial products

200 basic products and intermediates

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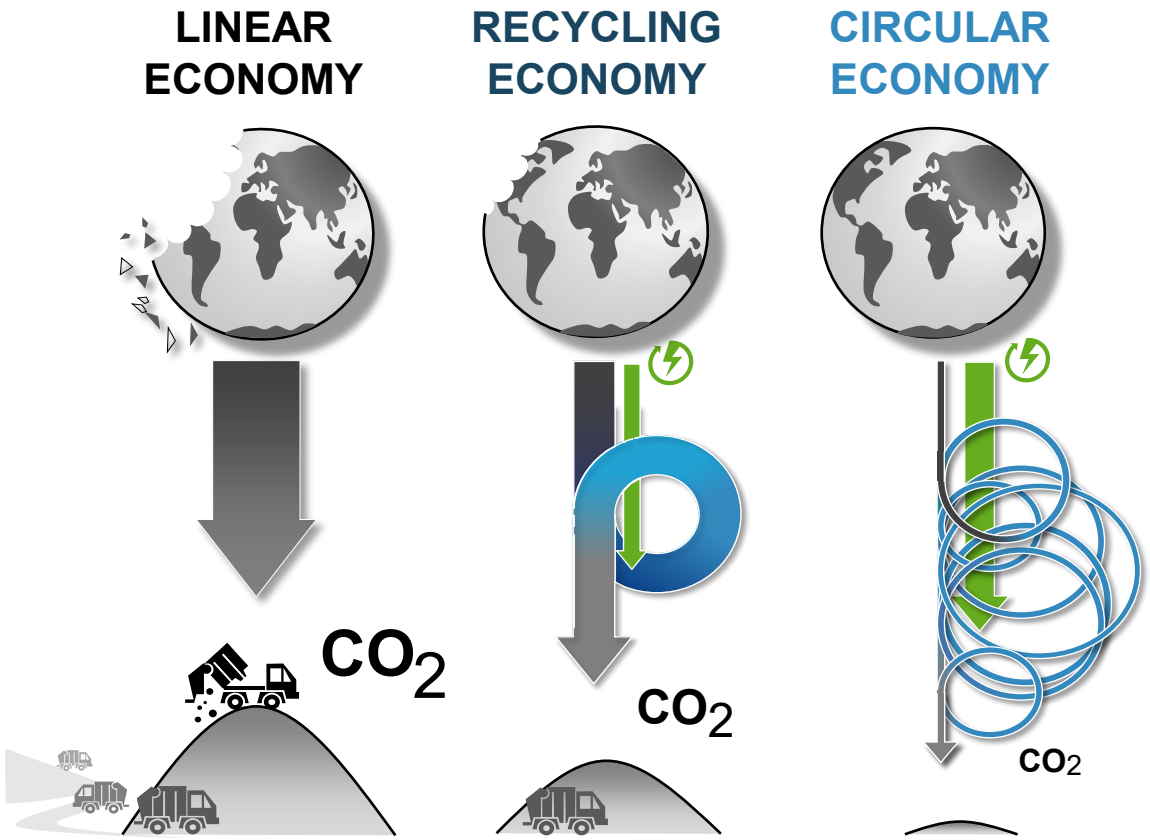
How chemistry can enable Circular Economy

- Keep **resources in use** for as long as possible
- Extract the **maximum value** from products
- **Recover and regenerate** products and materials
- **Minimize** residual **waste and carbon footprint**

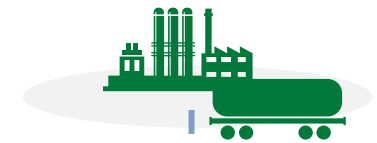


Product Carbon Footprints create transparency for customers

Digital application to calculate greenhouse gas emissions of 45,000 sales products

Scope 3

Emissions caused by suppliers and generation of raw materials



Scope 1 + 2

Emissions caused by own operations[1]

- TÜV-certified[2]
- Meets ISO standards[3]
- Calculates product carbon footprints cradle-to-gate
- Certified software

CO_2

Product carbon footprints of sales products

Customer benefits

- **Transparency on CO_2 emissions**
- **Identification of main reduction levers**
- **Transparent documentation**

[1] Energy generation and chemical processes
[2] ISO 14067:2018
[3] ISO 14040:2006, 14044:2006, 14067:2018, GHG Protocol Product Standard

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How does BASF drive Circular Economy?

We aim at **doubling** our **circular 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.

We aim to achieve our circular sales target based on two portfolio concepts

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

Close the loops

Products which enable the closing of the recycling loop and/or are based on recycled or renewable feedstocks

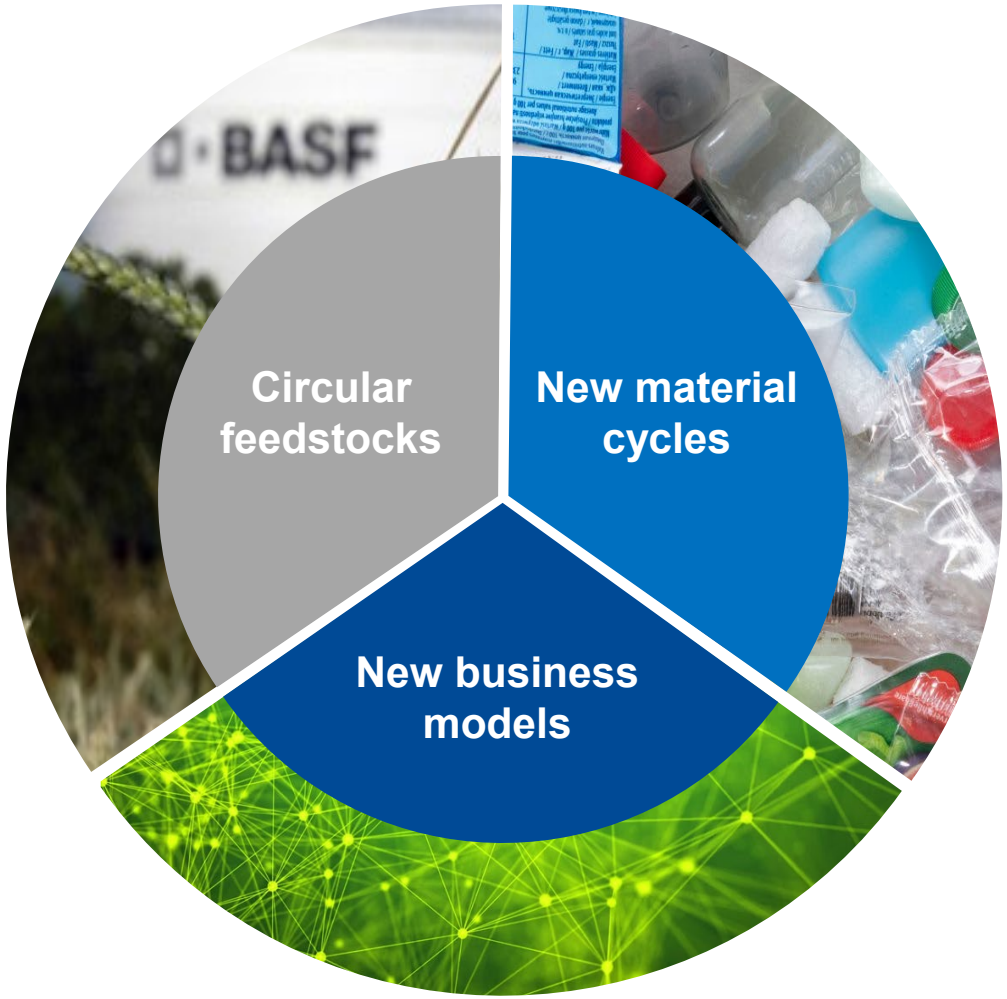
- Renewable-based feedstocks
- Recycled-based feedstocks
- Enable recyclability and/or biodegradability

Extend the loops

Products that perform best with less, and thus help to decouple growth from material consumption

- Save resources and reduce waste along the value chain
- Higher durability to enable product sharing and reduce maintenance

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.

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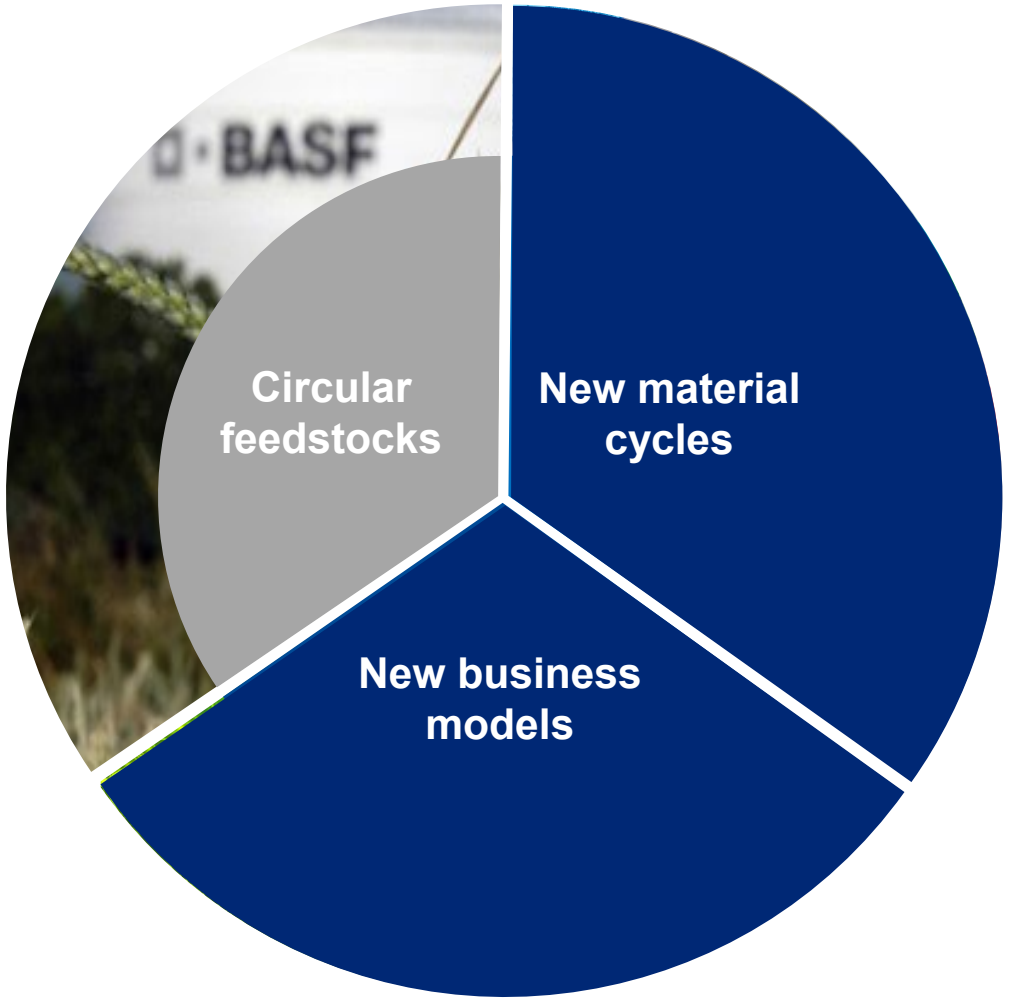

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By using alternative raw materials, we can manufacture the same products in a more sustainable way

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

ChemCycling™ 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 waste plastics which are difficult to recycle mechanically or which are incinerated include:
  - Plastics with adhering food residues
  - Multi-layer food packaging
  - Tires

With ChemCycling™ overall recycling rates of plastic waste will be increased however technical and regulatory challenges need to be overcome

The Mass Balance Approach: Replacing fossil resources in the current Production Verbund, with certified renewable and/or recycled feedstocks

Feedstock

Fossil

Renewable / Recycled

Use of renewable feed-stock in very first steps of chemical production (e.g., steam cracker)

BASF Production Verbund

Utilization of existing Production Verbund for all production steps

Products

Conventional product

Biomass Balance product

Allocation of renewable feedstock to selected products with certifications with RedCert2, ISCC+, etc.

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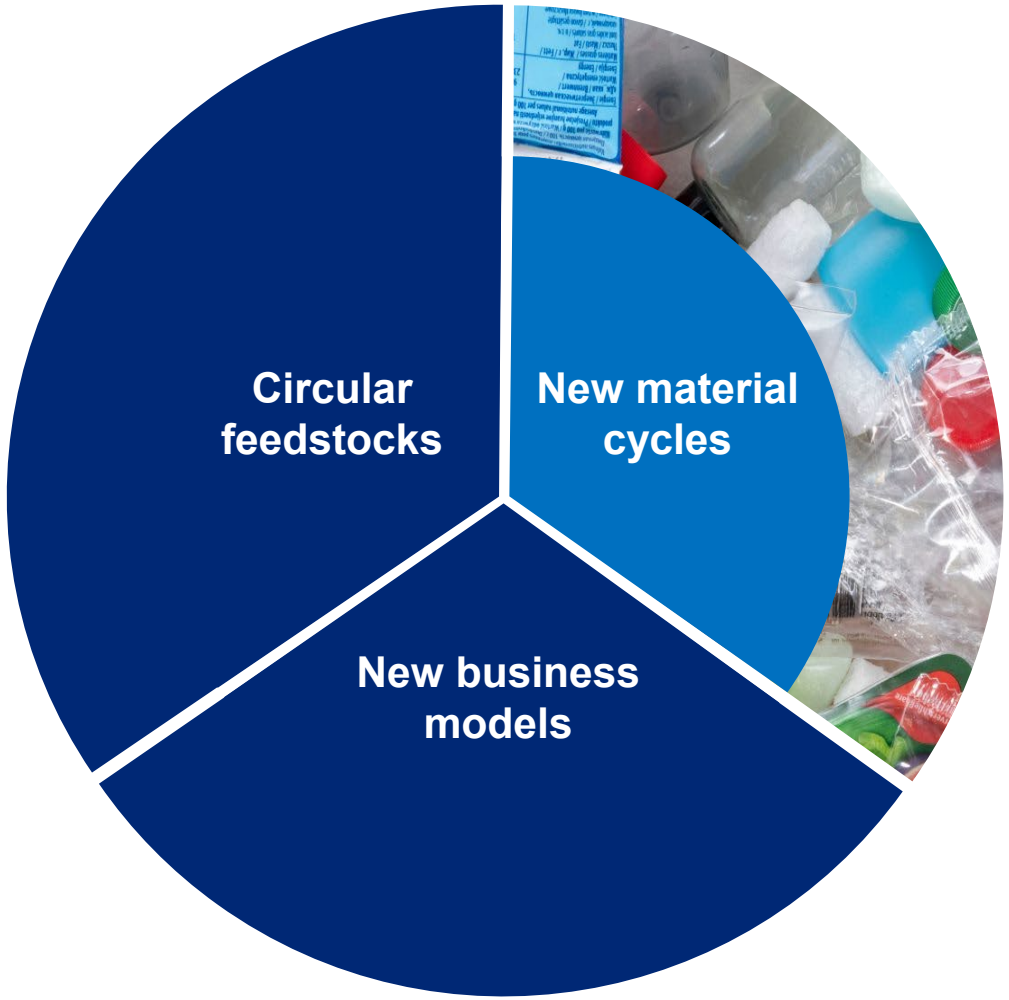

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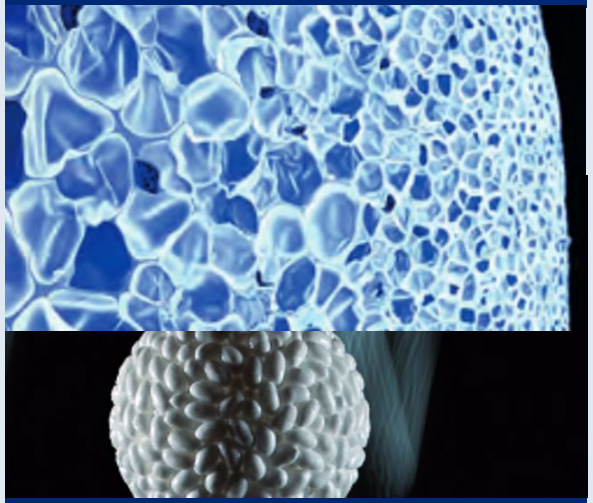
New material cycles in our product portfolio add value for our customers and industry partners

High-tech thermoplastics materials



- Simplified **design and production process**
- **Options** for a recycling concept of sportswear (one-material-products)

Battery Recycling

- Using **metals** from **recycled batteries** to make new materials
- **Battery recycling cluster** in Finland planned

Certified compostable plastics

- Biodegradable and bio-based plastics through **ecovio®** and **ecoflex®** brands

Recycling Based PET

- Petra® grades based on **100% post-consumer** PET bottles
- High heat applications: electrical connectors, power tools

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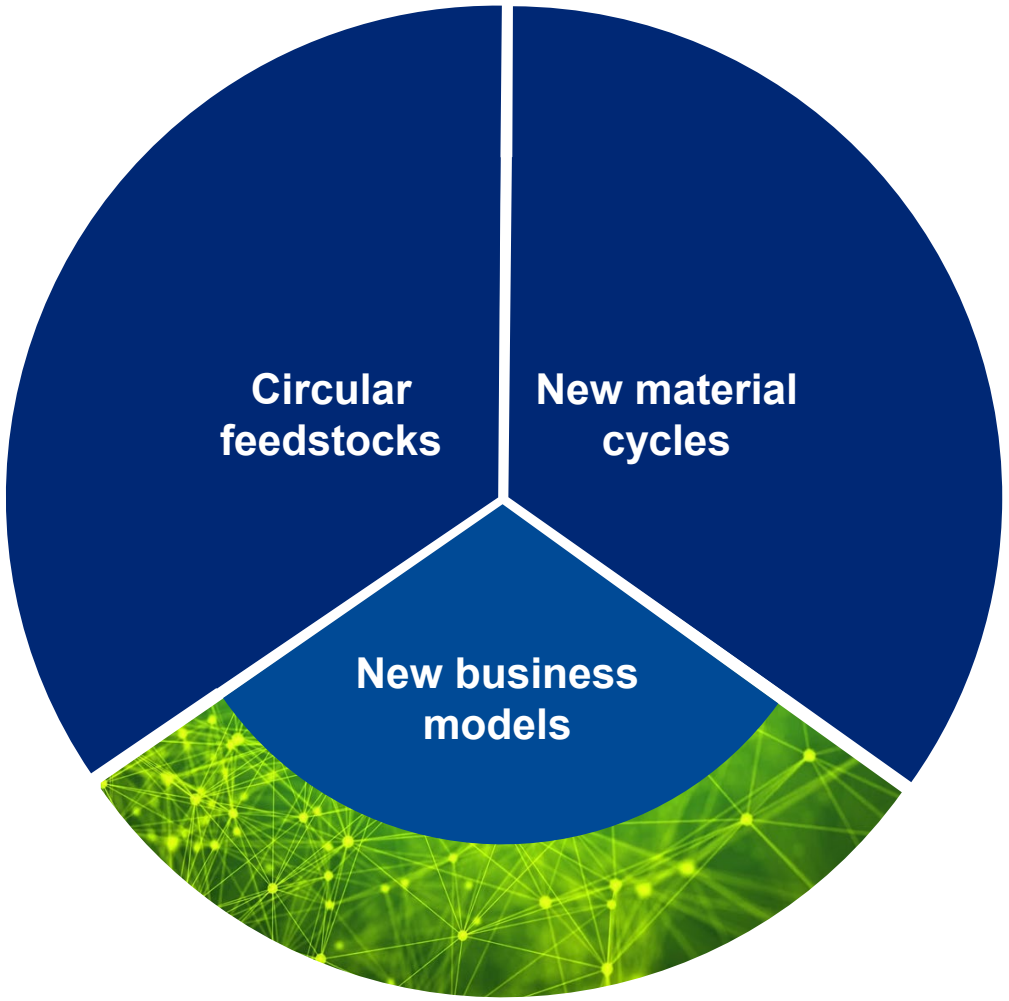

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New business models motivated by our desire to lead the way for sustainability in the chemical industry

Plastics Recycling Innovation

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

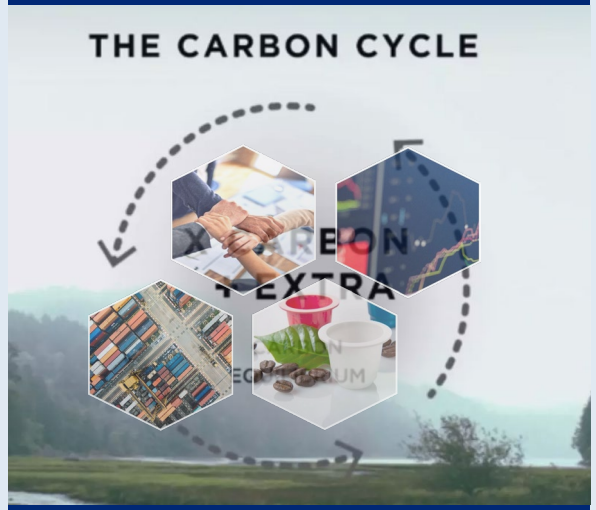
Digital Farming Solutions

- **xarvio™** offers digital products that deliver independent **field-zonespecific agronomic advice** enabling farmers to produce their crops

Plastics Traceability

- BASF and Security Matters are jointly developing solutions to **authenticate sustainability claims** made by plastics manufacturers

Collaborating for a sustainable future



- **Cross value chain collaboration** for new partnerships

Picture source: The Carbon Cycle, Elon Musk CEO of Tesla at Sarbonne, Paris, COP21 on the 3rd of December, 2015.

On the way to a circular economy, we are tackling several challenges

Collaboration

Cross value chain collaboration for **new partnerships**

Mindset

Shift mindset from “take – make – dispose” to circular models

Technological

Development of **recycling techniques** and insuring **purity of materials** to be recycled

Certification / Regulations

Use of accepted claims, etc.

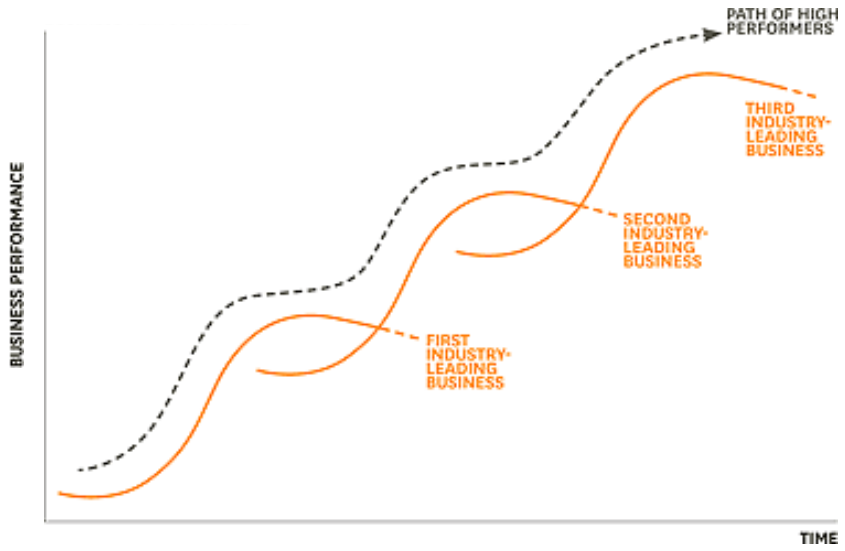
Waste as Raw Materials

Sourcing **waste with suitable quality, price** and **volume** and **overcoming regulatory challenges**

Infrastructure

Develop suitable **systems** for end-of-life waste streams

Circular Economy business models



Most Circular Economy business models on the chemical value chains are “disruptive”

It is about getting on a new S-Curve(s)

Shifting to new S-Curves is difficult:

- Moving too late, or too early will fail
- Preparation incl. regular follow-up is key, as transformations come gradually then suddenly
- The strength of a warning signal (trend) is inversely related to own degrees of freedom

Picture Source: HBR_Jan-Feb 2011 issue, Competitive Strategy – Reinvent Your Business Before Its Too Late by Paul Nunes and Tim Breene

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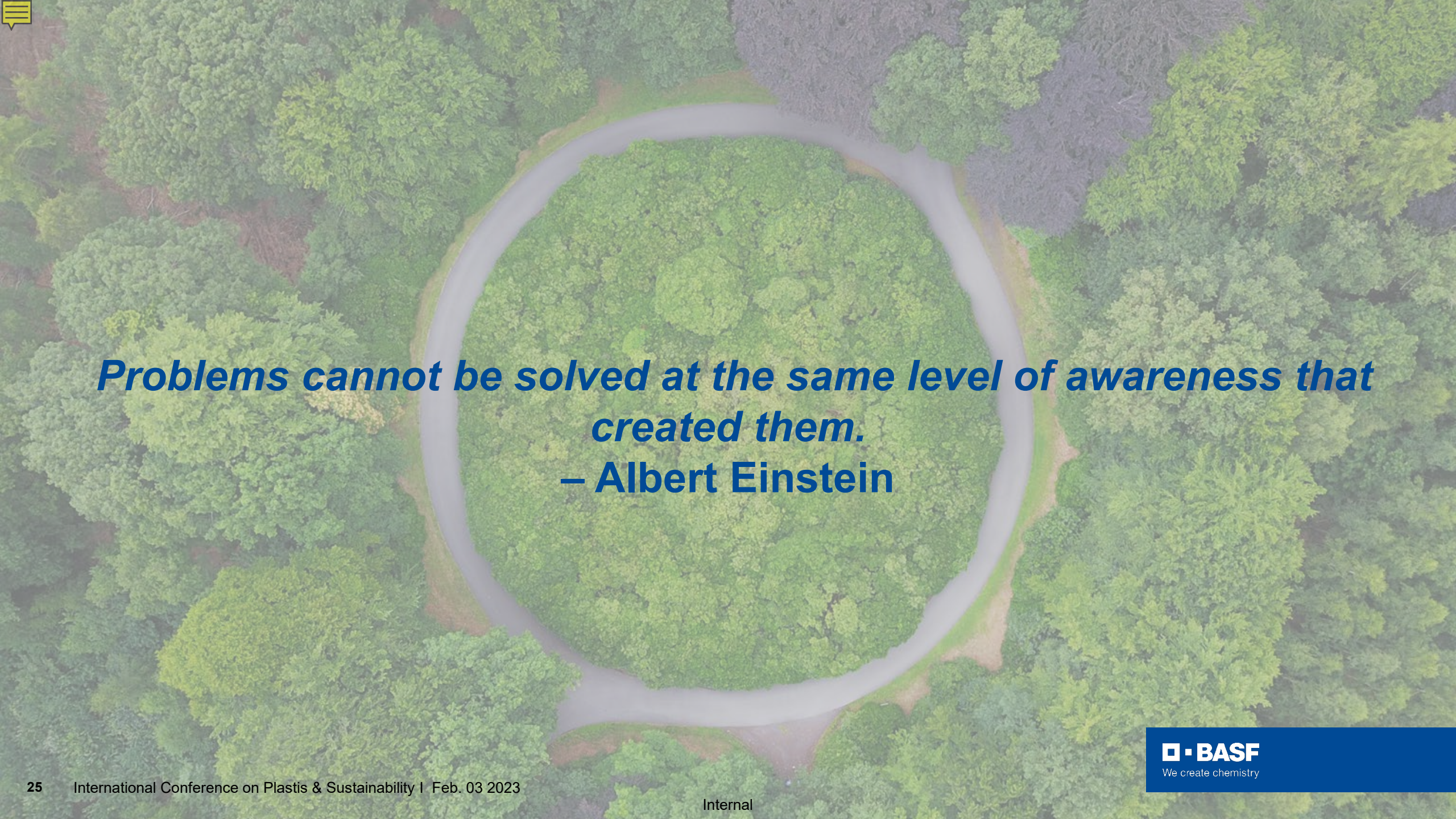
Successful innovation along our sustainability journey requires:

- Understanding of *The Carbon Cycle*, the effects on the environments & society and customer needs & demand
- Identification of levers for change, with CO_2 emission measurements
- Ambitious corporate targets
- Collaboration and Partnerships along the value chain(s) and cross-industries
- Fitting regulatory framework supporting sustainability innovations



Problems cannot be solved at the same level of awareness that created them.

– Albert Einstein

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