BASF’s Circular Economy Program

Dr. Martin Brudermüller
Chairman of the Board of Executive Directors and Chief Technology Officer of BASF SE

The European Green Deal

“Green Deal is Europe’s ‘Man on the Moon’ Moment”

Selected Green Deal objectives

- First climate-neutral continent by 2050
- Lead the way to a circular economy
- Move to a zero-pollution environment
- Accelerate to a sustainable food system
BASF’s Circular Economy Program

- 250,000 metric tons of circular feedstock by 2025
- Double circular sales to €17 billion by 2030
- Prioritize related Capex, M&A, R&D
**Mechanical and chemical recycling**

**Mechanical recycling of plastics**

Mechanical recycling is a polymer-specific process and affects the product properties.

- PE, PP → rePE, rePP
- PVC → rePVC
- PET → rePET
- others → others

**Chemical recycling of plastics**

Chemical recycling can process different polymers and yields virgin-like product properties.

- PE, PP
- PVC
- PET
- others

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**Bio-based products across the portfolio further broaden BASF’s feedstock base**

<table>
<thead>
<tr>
<th>Chemicals</th>
<th>Materials</th>
<th>Industrial Solutions</th>
<th>Surface Technologies</th>
<th>Nutrition &amp; Care</th>
<th>Agricultural Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio PolyTHF</td>
<td>ecovio®</td>
<td>Sovermol® 830</td>
<td>Color Brite</td>
<td>Rambuvital®</td>
<td>Insalis® insecticide</td>
</tr>
<tr>
<td></td>
<td>packaging</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**BASF’s Circular Economy Program: Material Cycles**

- **New Feedstocks**
- **New Material Cycles**
- **New Business Models**

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**Footprint of key battery materials**

<table>
<thead>
<tr>
<th>Material</th>
<th>kg CO₂</th>
<th>kg oil</th>
<th>kg blue water</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kg nickel</td>
<td>7.9</td>
<td>3.6</td>
<td>106</td>
</tr>
<tr>
<td>1 kg lithium</td>
<td>7.4</td>
<td>2.6</td>
<td>271</td>
</tr>
</tbody>
</table>

The considerable footprint of virgin nickel and lithium can be reduced with recycling loops.

Note: “CO₂” means CO₂-equivalents, “oil” means energy demand in oil-equivalents.
Sources: H₂O: Minirvo Ltd, Lithium Hydroxide Monohydrate life cycle assessment study, 2020, ex Salar del Hombre Muerto
Nickel: Nickel Institute, Life Cycle Analysis 2017 for class 1 Nickel (>99%) ex Nickel sulfide
Value chain for electric vehicles

>1.5 million metric tons used battery packs will be available in 2030.

Global production of plastics and generation of plastic waste in 2018

Production of plastics by material

<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage</th>
<th>Total (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyolefins</td>
<td>46%</td>
<td>170</td>
</tr>
<tr>
<td>PUR &amp; Thermo-plastics</td>
<td>13%</td>
<td>48</td>
</tr>
<tr>
<td>PET &amp; Styrenics</td>
<td>12%</td>
<td>43</td>
</tr>
<tr>
<td>PVC</td>
<td>13%</td>
<td>48</td>
</tr>
<tr>
<td>Others</td>
<td>16%</td>
<td>60</td>
</tr>
</tbody>
</table>

In total: 359 million tons

Generation of plastic waste by treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Percentage</th>
<th>Total (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improper disposal and leakage</td>
<td>30%</td>
<td>75</td>
</tr>
<tr>
<td>Managed landfill</td>
<td>30%</td>
<td>75</td>
</tr>
<tr>
<td>Recycling</td>
<td>20%</td>
<td>50</td>
</tr>
<tr>
<td>Energy recovery</td>
<td>20%</td>
<td>50</td>
</tr>
</tbody>
</table>

In 2018, >350 million metric tons of plastics were produced, 40% of the plastic waste were recycled or recovered.
Putting the Green Deal into practice at BASF

Circular Economy Program

Carbon Management Program

Product Carbon Footprints create transparency for customers
Digital application to calculate greenhouse gas emissions of 45,000 sales products

20,000 Raw materials 
SCOPE 3

10 TWh/a Energy 
SCOPE 2

700 Production plants 
SCOPE 1

Product Carbon Footprints of 
~45,000 Sales Products

Cradle-to-gate Product Carbon Footprints for BASF’s portfolio available by end of 2021 based on process emissions, energy demand and upstream emissions.
Circular Economy and Carbon Management Programs: BASF’s way to drive sustainability

We are providing drop-in products with new sustainability characteristics for customers in all industries.