



We create chemistry

# New Plasticizers based on Alternative Raw Materials

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Bio!TOY 7./8. September, Nürnberg





Our purpose:

We create  
chemistry for a  
sustainable future

# At BASF, sustainability is a top priority given by top management, driving the whole industry towards a sustainable future

## New President of Cefic

Cefic General Assembly welcomes new President at a turning point for Europe and for the chemical sector



BASF CEO Dr. Martin Brudermüller elected new president of Cefic

*“It is my ambition during my presidency that the European Chemical Industry strikes a Future Chemistry Deal in the framework of the Green Deal – where we deliver technologies and solutions and the political framework enables their economic implementation.”*

***Dr. Martin Brudermüller, Cefic’s new President and CEO of BASF***

*October 2020*

# BASF Corporate Commitments

Our Corporate Commitments cover every part of our value chain and operations to deliver long-term business success.



**We source responsibly**



**We produce safely for people and the environment**



**We produce efficiently**



**We drive sustainable solutions**



**We value people and treat them with respect**



# BASF – Plasticizers – Toys

A long-standing and fruitful relationship

- Plasticizers are used to make plastic softer and more flexible.
- There has been a need for plasticizers ever since PVC (polyvinyl chloride) was patented in 1913. In its unmodified state, PVC is rigid and brittle. Plasticizers are used to make the material soft and flexible.
- Dolls, inflatables, balls or figurines are examples of toys that are often made with soft-PVC, a very well-researched plastic which is suitable for toy manufacturing because of its printability, color stability, compatibility and ease of processing among other properties.



# BASF – Plasticizers – Toys

A long-standing and fruitful relationship

- Already in 1998, BASF started a research project for an alternative plasticizer with a better toxicological profile than the then common phthalates.
- The target was making it suitable for use in products that come into close contact with humans.
- BASF developed a non-phthalate named **Hexamoll® DINCH** - a plasticizer that has an excellent toxicological profile and offers a well-balanced set of properties.
- Evaluations of toxicological studies and risk assessments by competent authorities conclude that there is no risk associated to exposure from toys made with **Hexamoll® DINCH**.
- Products made with **Hexamoll® DINCH** can fulfill requirements of the EU Toy Safety Directive 2009/48/EC and the relevant European Toy Safety Standards\*.



\* especially EN 71-3 (Migration of certain elements), 71-5 (Chemical toys other than experimental sets), 71-9 (Requirements concerning organic chemical compounds).

# Drivers for plasticizer development

## Performance

A photograph of laboratory glassware, including several test tubes and a pipette, arranged on a surface. The lighting is soft, highlighting the glass textures.

## Regulatory

A photograph showing a wooden gavel resting on a wooden block, symbolizing regulation or law. In the background, there is a white tray with small containers and a pipette.

## Sustainability

A photograph of a large white industrial storage tank with the BASF logo on its side. Two people are visible on a walkway at the top of the tank. The scene is outdoors with green grass and a blue sky with clouds.

# Sustainability

## THE future driver



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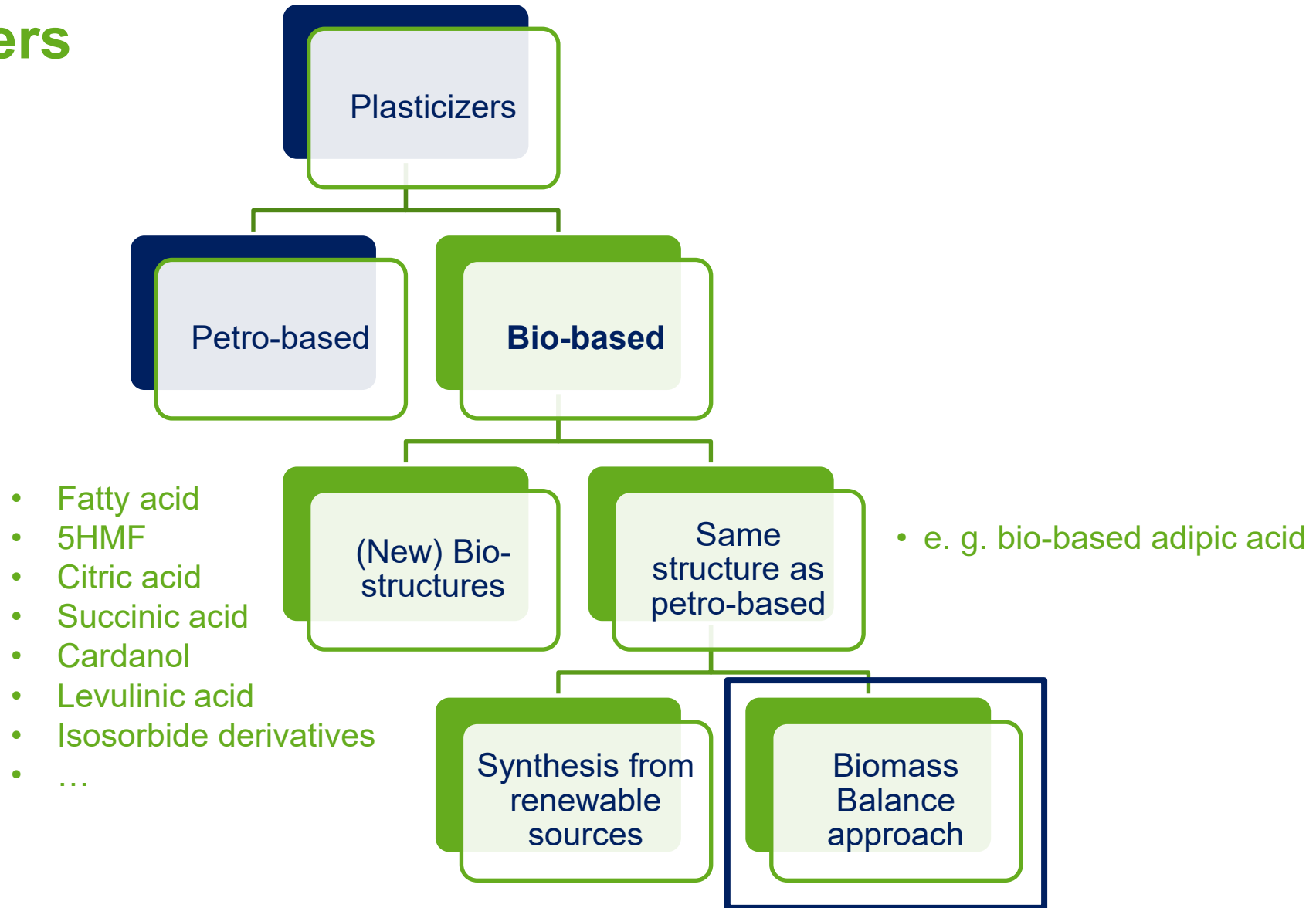
- Be a leader in the area of sustainability and increase the role of sustainability in our business decisions.
- Decouple our CO<sub>2</sub> emissions from organic growth through a **Carbon Management** program.
- Invest in cutting-edge technologies to speed up the transition to a **Circular Economy**\*

\* An overview about Circular Economy activities at BASF you can find here

<https://www.basf.com/global/en/who-we-are/sustainability/we-drive-sustainable-solutions/circular-economy.html>



# Bio plasticizers



# BASF's Biomass Balance approach

- Requires **no reformulation** – identical product performance
- Saves fossil resources and **reduces greenhouse gas emissions**
- Drives the use of sustainable **renewable feedstock**



**Available** easily and fast for nearly all our products



# The Biomass Balance approach: Replacing fossil resources in the current Production Verbund

## Feedstock

Fossil



Renewable

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

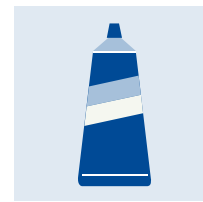
## BASF Production Verbund



Utilization of existing Production Verbund for all production steps

## Products

Conventional product

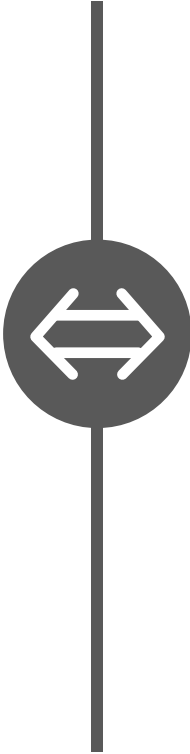
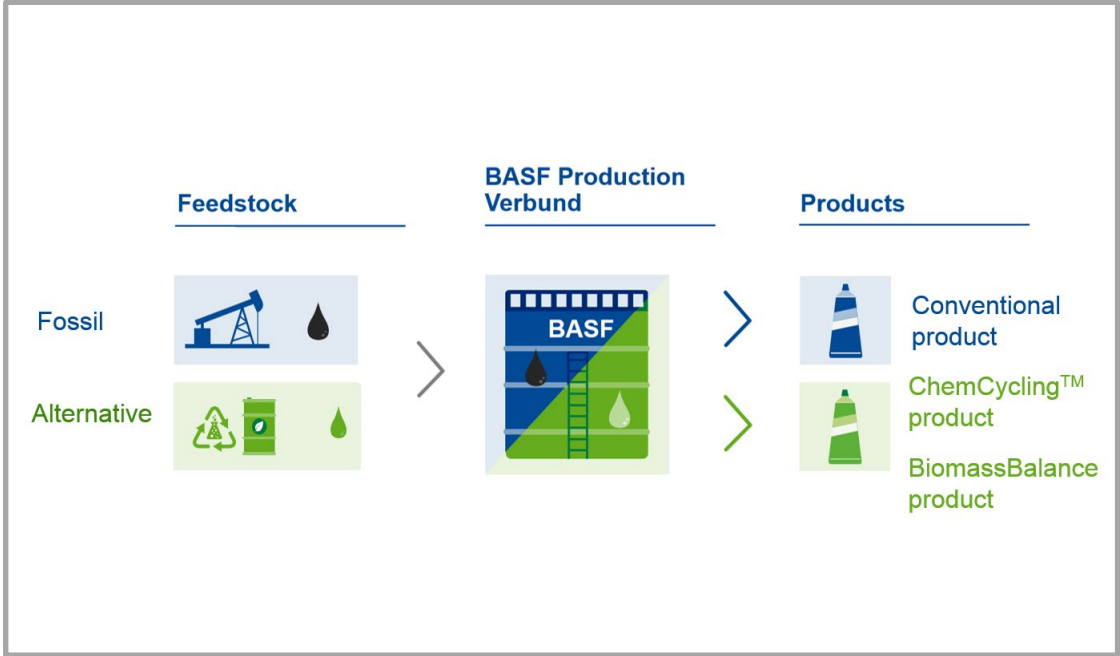


Biomass Balance product

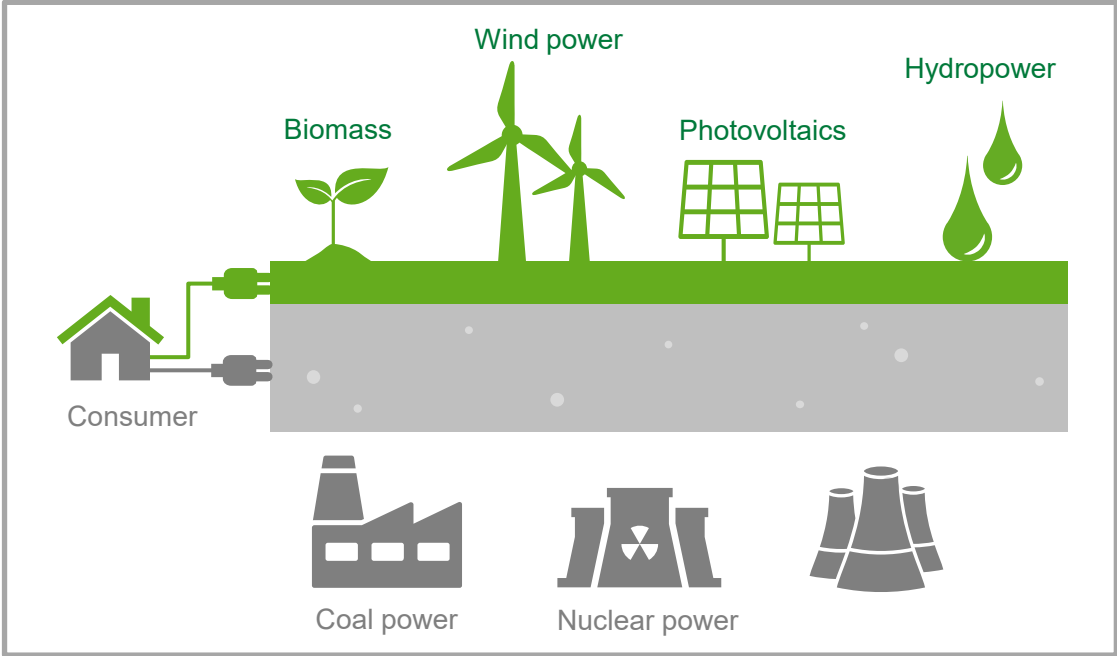
Allocation of renewable feedstock to selected products

# “Mass Balance” approaches – comparable to green electricity

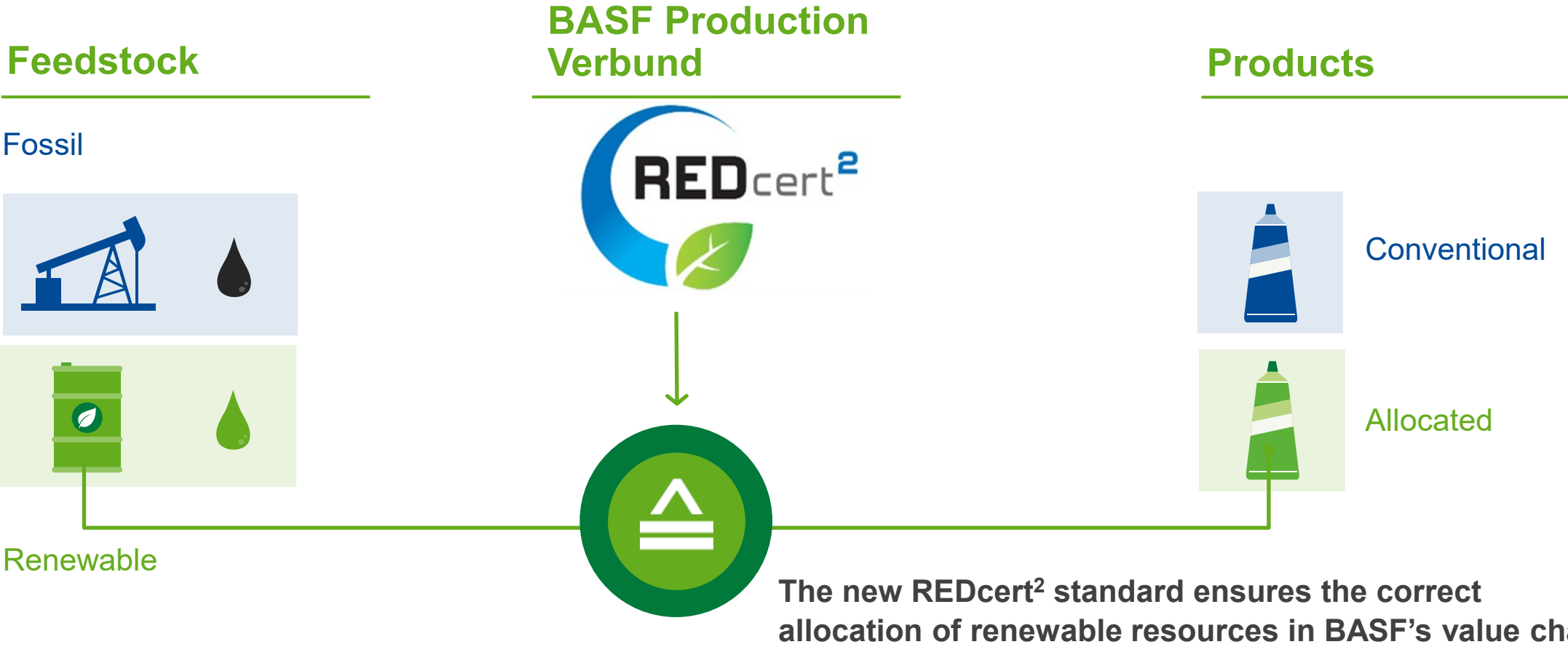
## Mass Balance Approaches at BASF



## Green electricity



# Our solution: Certification and standardization





# Biomass Balanced Plasticizers

## Sustainably sourced renewable feedstock

### Use certified renewable raw materials

- Waste/residues are preferred renewable raw materials
- Independent sustainability certification from recognized schemes, e.g. REDcert<sup>2</sup> 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



# The Biomass Balance approach: All the plasticizer characteristics you love + some more!

## Hexamoll® DINCH BMB

The non-phthalate plasticizer for applications with close human contact

- Meets technical requirements for a broad range of products
- Excellent toxicological profile
- Approved and certified worldwide for many applications



## Palatinol® 10-P BMB

BASF's industrial standard plasticizer

- Extraordinary weathering resistance and outstanding UV stability for outdoor applications
- Suitable for wire, cable, artificial leather, roofing membranes, pool liners



## Palatinol® N BMB

BASF's general purpose plasticizer

- General purpose plasticizer for all kind of industrial applications
- Good low temperature performance
- Low volatility




## Plastomoll® DOA BMB


BASF's specialty plasticizer

- Adipic acid based monomeric plasticizer
- Good low temperature properties
- Suitable for flexible PVC colorants, coatings and films for food contact (cling film)



 Sustainably sourced renewable feedstock



 Saving fossil resources & reducing CO<sub>2</sub> footprint



 Third party certified



**BASF**  
We create chemistry

# ChemCycling™

From plastic waste to  
virgin-grade products



# Plastic waste is a major global challenge

We must address end-of-life challenges to make full use of plastics' benefits



# BASF's ChemCycling™ project

An innovative way to use recycled raw materials for demanding applications



# ChemCycling™ is a complementary approach to existing recycling methods

- We focus on **plastic waste that is not recycled mechanically** for technological, economic or ecological reasons
- Examples include:
  - ▶ Uncleaned plastics
  - ▶ Plastics with special material compositions, e.g., automotive plastics
  - ▶ Mixed waste fractions, consisting of various plastic types, which are not sorted further due to economic reasons
  - ▶ Used tires

Overall recycling rates of plastic waste can be increased, and a more circular economy established



# Our solution: Certification and standardization

## Feedstock

### Fossil



### Recycled

## BASF Production Verbund



## Products



Conventional



Allocated

Ecloop ensures the correct allocation of recycled resources in BASF's value chain. A switch to REDcert2 in analogy to BMB is currently under preparation

# ChemCycling™:

All the plasticizer characteristics you love + some more!

## Hexamol® DINCH – Ccycled™

The non-phthalate plasticizer for applications with close human contact

- Meets technical requirements for a broad range of products
- Excellent toxicological profile
- Approved and certified worldwide for many applications



Chemically recycled material as feedstock



Saving fossil resources & increasing plastic waste recycling



Third party certified



How *Biomass Balance* and *ChemCycling™* contribute to the manufacturing of more sustainable products



# Key trends in sustainability



Plasticizer industry



increased safety & sustainability awareness



Plastics



pressure regarding reduction of plastic waste



Political developments



- European Green Deal and CSS (Chemical Strategy for Sustainability)
- European Commission Action Plan for Circular Economy
- UN Sustainable Development Goals (SDGs) as part of the 2030 Agenda for Sustainable Development

These developments can be addressed  
with our ChemCycling™ project and our Biomass Balance approach.

# Both concepts compared

## Technical Approach / Tool

### Biomass Balance

- Renewable feedstocks used
- Co-processing with primary fossil feedstock
- Allocation to products via biomass balance (3<sup>rd</sup> party certified according to REDcert<sup>2</sup>)

### ChemCycling™

- Recycled feedstocks used
- Co-processing with primary fossil feedstock
- Allocation to products via mass balance (3<sup>rd</sup> party certified according to Ecoloop (soon REDcert<sup>2</sup>))

...for converters that seek....

CO<sub>2</sub>  
emission  
reduction

Identical  
chemical  
and  
physical  
properties

Fossil  
resource  
savings

Waste  
reduction

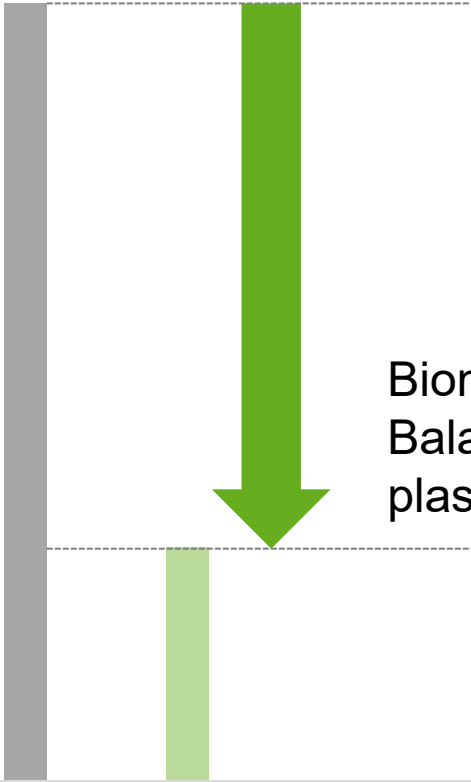


# Biomass Balanced plasticizers: Saving fossil resources and reducing CO<sub>2</sub> footprint

**Biomass Balanced plasticizers benefit from a CO<sub>2</sub> emissions reduction of more than 60%\***



Standard plasticizer



Biomass  
Balanced  
plasticizer

\* specific emissions reduction depends on individual plasticizer

# You can easily use the alternative plasticizer in your regular production or even launch special editions – without switching cost or separate warehousing!

## Easy

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There is no difference between the conventional plasticizer and the sustainable alternatives in:

Processing

Performance in the application



## Fast

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No time needed to develop a new formulation

No production time wasted to change from one plasticizer to the alternative



## Flexible

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Purchasing can be done in combination with the conventional plasticizer

In the same delivery

In the same tank

Your production can be ramped up according to market success



## Cost-efficient

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No investments for new tank capacities

No development cost

No production time lost for switch



# With the Mass Balance approach all the current Certificates maintain their validity ...

- BASF has invested more than 7 million Euro in toxicological testing for **Hexamoll® DINCH**. The results of the studies have been evaluated by competent authorities worldwide, confirming that **Hexamoll® DINCH** is safe for its intended use, including highly sensitive applications like food contact, medical devices or **toys**.
- Same as **Hexamoll® DINCH** based on petrochemical sources, the **BMB** as well as the **Ccycled™** version enable products made from them to fulfill requirements of:



- **EU Toy Safety Directive 2009/48/EC**
- **European Toys Standards DIN EN 71-3, EN 71-5, DIN EN 71-9**
- **US-CPSC toy safety specification ASTM F963**
- **GB 6675-2014 Chinese Toy Safety Standard**

# Questions ... ?

Find all information bundled on our website

**Biomass Balance**



<https://www.basf.com/global/en/who-we-are/sustainability/we-drive-sustainable-solutions/circular-economy/mass-balance-approach/biomass-balance-bak-26-08-2020.html>

**ChemCycling**

## Video: ChemCycling – first prototypes



<https://www.basf.com/global/en/who-we-are/sustainability/we-drive-sustainable-solutions/circular-economy/mass-balance-approach/chemcycling.html>

**Plasticizer Portfolio**



## Plasticizer Product Portfolio

Thanks to this future oriented approach, BASF is one of the leading manufacturers of plasticizers and manufactures a broad portfolio covering phthalates, such as Palatino® N (DINP) and Palatino® 10-P (DHP-P) as well as alternative plasticizers, such as Hexamol® DINCH, adipates and polymeric plasticizers. These are used in a variety of products.

**Hexamol® DINCH – Cycyled™**

The trusted non-phthalate plasticizer for applications with close human contact

- Meets technical requirements for a broad range of products
- Excellent toxicological profile with low migration rate
- Approved and certified worldwide for many applications

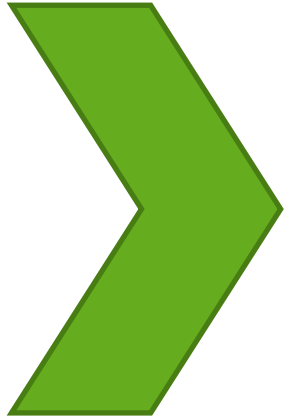
## All the plasticizer characteristics you love + some more!

<p><b>Hexamol® DINCH BMB</b></p> <p>The trusted non-phthalate plasticizer for applications with close human contact</p> <ul style="list-style-type: none"> <li>Meets technical requirements for a broad range of products</li> <li>Excellent toxicological profile with low migration rate</li> <li>Approved and certified worldwide for many applications</li> </ul>	<p><b>Palatino® 10-P BMB</b></p> <p>BASF's industrial standard plasticizer</p> <ul style="list-style-type: none"> <li>Extraordinary weathering resistance for outdoor applications</li> <li>Outstanding UV stability</li> <li>Low odor and low volatility</li> <li>Ideal for high temperature applications</li> <li>Complying with VDE German and UL standards for wire and cable</li> <li>Suitable for wire, cable, artificial leather, roofing membranes, pool liners</li> </ul>	<p><b>Palatino® N BMB</b></p> <p>BASF's general purpose plasticizer</p> <ul style="list-style-type: none"> <li>Versatile with low viscosity</li> <li>Good low temperature performance</li> <li>Low volatility</li> <li>Suitable for films and coatings</li> </ul>	<p><b>Plastomol® DOA BMB</b></p> <p>BASF's specialty plasticizer</p> <ul style="list-style-type: none"> <li>Adipic acid based monomeric plasticizer</li> <li>Good low temperature properties</li> <li>Suitable for flexible PVC, colorants, coatings and films for food contact (cling film)</li> </ul>
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- + Sustainably sourced renewable feedstock
- + Saving fossil resources & reducing CO<sub>2</sub> footprint
- + Third party certified

<https://chemicals.basf.com/global/en/Petrochemicals/Plasticizers/europe/products.html>

# Or turn to us directly...



...to get more detailed information on sustainable plasticizer solutions by BASF

**Herbert Morgenstern**

Email: [herbert.morgenstern@basf.com](mailto:herbert.morgenstern@basf.com)





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