Material Solutions for a Circular Economy

Towards a Circular and Climate-neutral Electrical & Electronics Industry

Gary Zhang and Niklas Meine

UL Webinar, May 18, 2022

Covestro AG

Forward-Looking Statements

This presentation may contain forward-looking statements based on current assumptions and forecasts made by Covestro AG.

Various known and unknown risks, uncertainties and other factors could lead to material differences between the actual future results, financial situation, development or performance of the company and the estimates given here. These factors include those discussed in Covestro's public reports which are available on the Covestro website at www.covestro.com.

Covestro assumes no liability whatsoever to update these forward-looking statements or to conform them to future events or developments

Covestro – Leading in the World of Plastics

Strong

- €15.9 bn in sales
- ~17,900 employees[1]

Useful

- Plastics, pre-products and solutions
- For many industries

Global

- 50 production sites globally
- Close to customers and partners

Innovative

- ~1,500 employees in research and development
- 80 years of ideas and inventions

Information is based on financial results for 2021, except amount of employees and amount of global production sites. Those are as of June 30, 2021. [1]calculated as full-time equivalent (FTE)

Long History of Innovations Inspired by Sustainability

Covestro milestones in sustainability

2007
BMS Energy efficiency program and basis for decision-making on climate relevance: We help with solutions

2008
STRUCTese energy efficiency system introduced and subsequently rolled-out in global production

2011
BMS as part of Bayer is founding member of Together for Sustainability initiative

2013
Introduction of BMS sustainability approach and integration of 3-P principle People-Planet-Profit

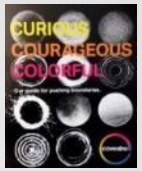
2015
Covestro was founded and signed UN Global Compact

2015
Pledge to 'Operation Clean Sweep' and strive toward zero pellet loss

2016
First Covestro 2015 GRI Supplement published

2016
Covestro non-financial goals for 2025 published

2017
Covestro Policies developed and approved, including a policy on Sustainability



2018

2019
Signatory of EU Circular Plastics Alliance

2019
Founding member of Alliance to End Plastic Waste

2020
New company vision: We will be fully circular

2020
Initiated company transformation centered around new vision of CE

2021
Non-financial KPI introduced to Board of Management long-term incentive plan: absolute CO_2e reduction over four years

2007 2008 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021

2007
Light-weight car sunroof made of BMS polycarbonate enters mass-production at Webasto

2011
Energy-efficient ODC-technology for chlorine production introduced in pilot plant in Uerdingen, Germany

2011
Plant in Shanghai equipped with more sustainable and efficient gas-phase phosgenation technology

2012
Microcellular foam with improved insulating properties launched

2013
Epoxy resins replaced by PU resins in wind turbine rotor blades

2014
INSQIN® technology for a water-based polyurethane textile coating launched

2015
First coating hardener made of renewable raw materials launched

1st PCR grade commercialized

2016
Production start of soft foam components with CO_2 in Dormagen, Germany

2017
Key chemical aniline won from renewable raw materials for the first time

2019
New polycarbonate grades from post-consumer recycled (PCR) content launched

2020
First marketed polycarbonate made of phenol of attributed bio-based origin

2021
Prototype insulation board developed with CO_2 as feedstock for PU rigid foam

Notes: BMS: Bayer MaterialScience, today Covestro
UN SDG: United Nations Sustainable Development Goals
GRI: Global Reporting Initiative

Pioneering with Ambitious Goals

Covestro aims to become climate neutral!

Net zero[1] by 2035

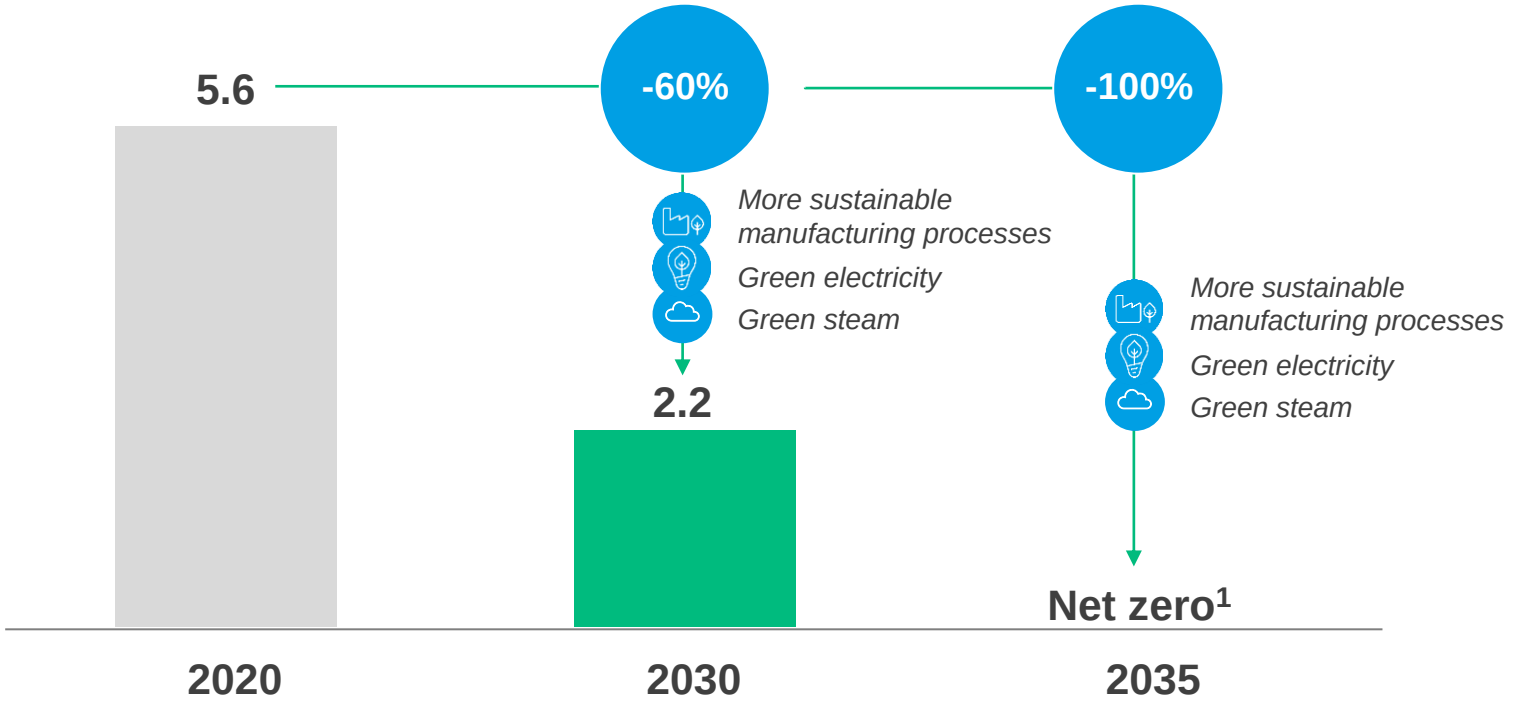
By 2035, Covestro aims for net zero scope 1 and 2 emissions.

As interim target for 2030, Covestro has committed to a 60% reduction in scope 1 and 2 greenhouse gas emissions to 2.2m t.

Clear roadmap with three innovative levers for reduction.

All efforts pay toward the 1.5°C goal of the Paris Climate Agreement

Greenhouse gas emissions in million t, scope 1 and 2



[1] Achieving net zero greenhouse gas emissions is defined as a balance between anthropogenic emissions (from own operations and energy procurement) and anthropogenic removals of greenhouse gases.

The Future of Electronics is Low Carbon

Sustainability is an accelerating trend that matters to consumers and organizations

Companies are setting ambitious goals.

Sustainability has become a priority for boardrooms. **64%** of Fortune 500 companies linked ESG to their strategy in 2021, compared to **49%** in 2020.

Are you helping your customers meet their goals?

Governments are driving change.

44 countries launched carbon reduction initiatives covering **22%** of global emissions, up from **13%** in 2018.

Is regulation an opportunity or a threat for your business?

Consumers and your corporate customer do care!!

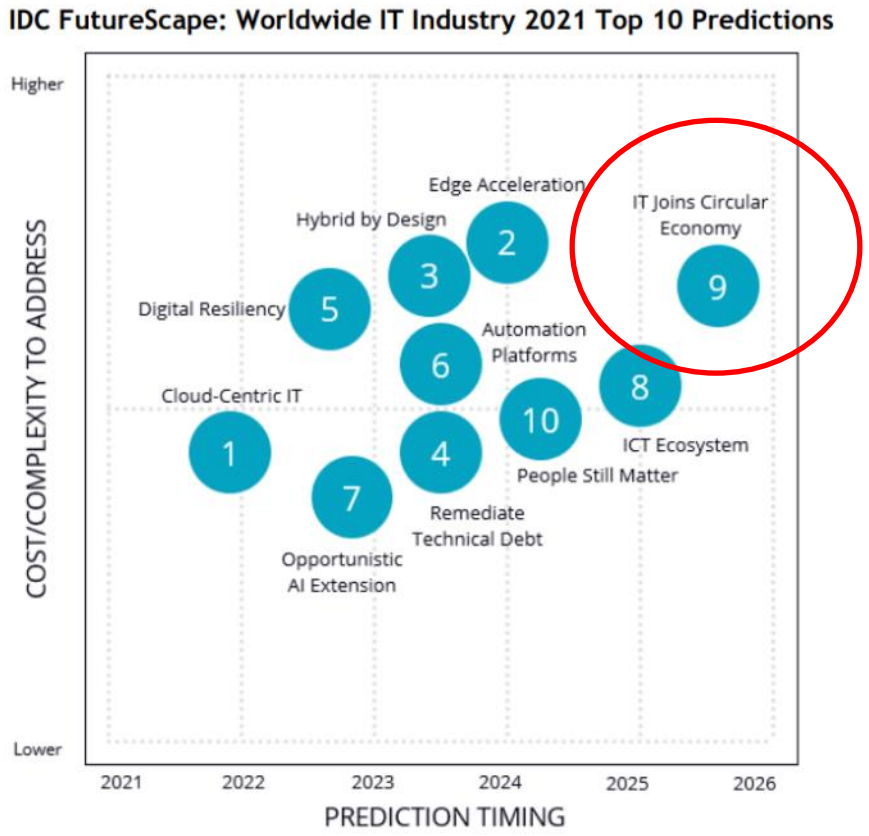
84% of consumers say sustainability matter to them, and **68%** are willing to pay more for sustainable products.

Do consumers/your corporate customer view you as a leader or a follower?

Global Electronics/Electrical Trends

Sustainability becomes key element in IT industry

IDC:2021 Global IT trends outlook



By 2025, 90% of Global 2000 companies will mandate reusable materials in IT hardware supply chains, carbon neutrality targets for providers' facilities, and lower energy use as prerequisites for doing business

- IDC, Oct 2020

Commitment to using recycled materials in all Made by Google products by 2022.

Apple has the goal to "use only recycled and renewable materials" in their "products and packaging"

100 percent of new Cisco products and packaging to incorporate circular design principles by FY25

Schneider Electric has the target to "increase the amount of green material in products to 50% by 2025"

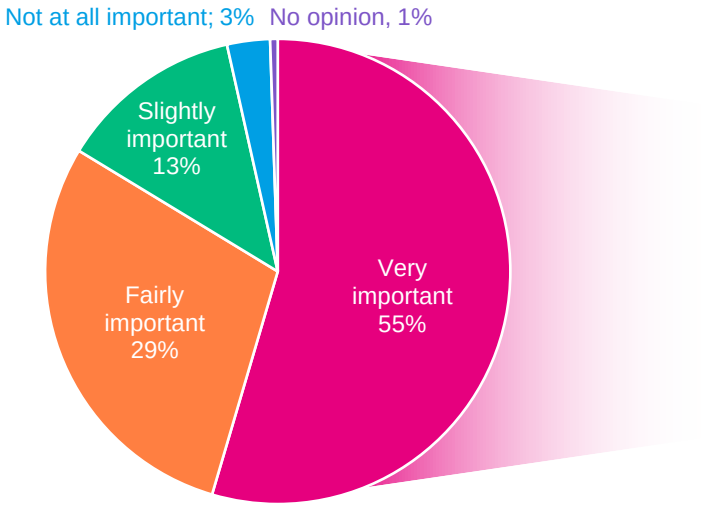
Source: IDC and official websites; Google: Environmental Report 2021; Apple: Environmental Progress Report 2021; Cisco: Website Circular Economy; Schneider: Sustainability Impact Q1 2022 Report

Consumers Care

And the most attractive consumer segments care the most about global warming

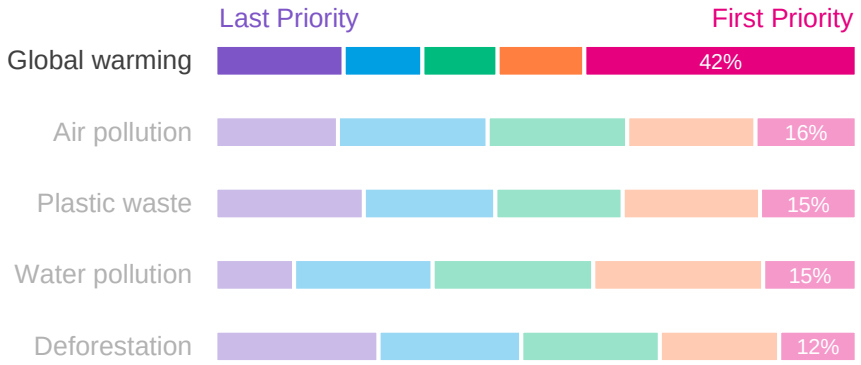
How important is the sustainability of products to you?

*Sustainability is "very important" to 55% of consumers.**



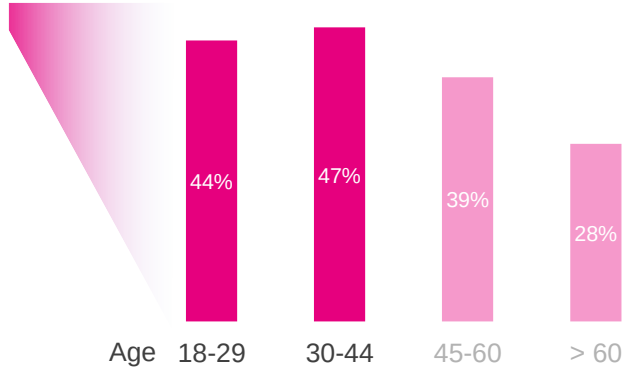
What environmental issues are you most concerned about?

*Global warming is the highest priority sustainability issue. **



Which demographics care the most?

*Gen Y and Gen Z care most about global warming.**



* Survey of 570 consumers in the United States, United Kingdom, Germany, and Sweden commissioned by Covestro (Q1 2022)

Low Carbon is the Next Product Differentiator

Mass markets will accept a modest price premium, and key segments will a high premium

22% of consumers will pay a premium of **11%** or more

77% of consumers will pay **6%** on average for sustainable electronics

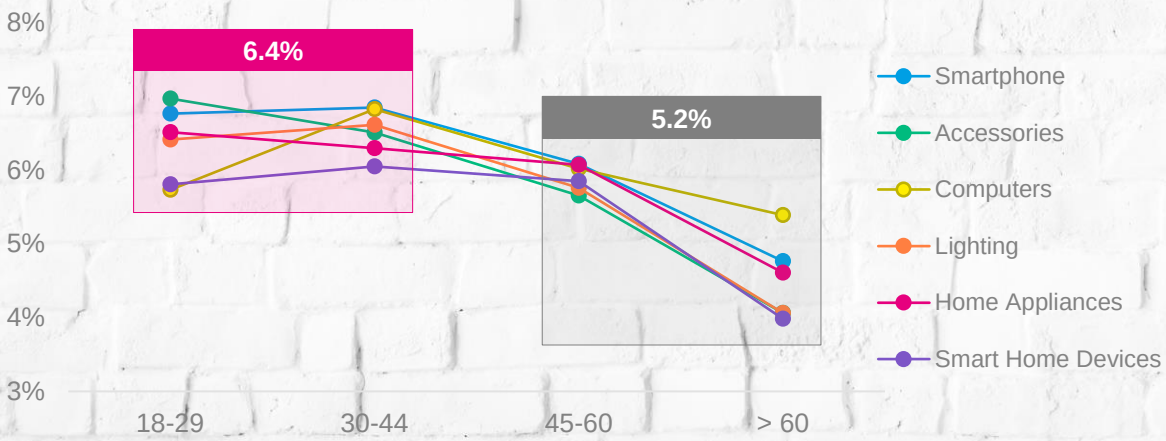
Mass market categories

Segmented categories

Low Carbon is the Next Product Differentiator

Reach the passionate market of sustainable consumers with category segmentation

Gen Y and Gen Z will pay a higher average premium for sustainable electronics. ➤ Between 20% and 26% of these consumers will pay a premium of 11% or more.*



26% 26% 26% 23% 22% 20%

* Survey of 570 consumers in the United States, United Kingdom, Germany, and Sweden commissioned by Covestro (Q1 2022)

Corporate Procurement is Going Towards Low Carbon

Corporate buyers increasingly factor sustainability metrics into RFQ scorecards

91% Of companies consider sustainability in purchasing decisions.

69% Of companies believe emissions reduction is increasingly important. Only **3%** believe it is less important.

51% Of companies have a sustainable purchasing policy in 2021, up from **38%** in 2019.

Johnson & Johnson

Energy Reduction

Introduction
Energy reduction efforts enable companies to simultaneously reduce costs and decrease greenhouse gas (GHG) emissions. It also signals to customers and investors that you are working to reduce your impact on the environment, particularly around climate change. Opportunities exist to reduce both facility- and transportation-related emissions and carbon dioxide (CO_2).

Steps to Consider
- Have you measured your carbon footprint or taken steps to reduce your greenhouse gas emissions?
- Have you set publicly available greenhouse gas reduction targets?
- Have you considered alternative forms of energy?
- Have you reported your greenhouse gas emissions to the Carbon Disclosure Project (CDP)?

Sample Goals
- Reduce energy use by 10% from baseline year
- Reduce total greenhouse gas emissions by 10% from baseline year
- Increase facility energy usage of renewable power by 25%

UNIVERSITY OF CALIFORNIA

Green Spend Criteria

Recognized Certifications and Standards	Required Level (minimum mandatory requirements)	Preferred Level	Examples of Products in this Category
ENERGY STAR ®	ENERGY STAR®	ENERGY STAR®	Data center equipment, dishwashers, refrigerators, heating/cooling appliances, ULT freezers, vending machines
EPEAT®	EPEAT® Bronze	EPEAT® Gold or highest available EPEAT® label for given product category	Computers, monitors, printers, PV modules and inverters, servers

The Supplier should identify, monitor and minimize Greenhouse Gas emissions (GHG) and energy consumption from own operations including CO2 emissions from transportation and travel. Supplier shall do this by making a self-declaration of the Supplier's annual energy consumption and GHG emissions that should be publicly available.

To proactively manage GHG emissions, Supplier is expected to:

a) Have emissions reduction targets
b) Measure and provide emission metrics for GHG emissions
c) Take actions to reduce GHG emissions
d) Publically reporting of GHG emission metrics annually
e) Have a process to engage its sub-suppliers to drive GHG emission reduction within Supplier's operations and that of their suppliers

JAC COOPERATION BEYOND COMPETITION

The Supplier should develop energy efficient products or services throughout the entire life cycle and comply with internationally recognised standards.

Source: HEC Sustainable Procurement Benchmark, 2021 Sustainable Procurement Barometer; Johnson & Johnson: Sustainability Toolkit for Suppliers

Circular Economy & Engineering Plastics

Covestro offers material solutions and design support

Mechanical Recycling

Makrolon® and Bayblend® with post-consumer or post-industry recycled content for different applications

Renewable attributed Polycarbonates

High quality, ISCC PLUS certified*, mass balanced polycarbonates – bio-circular resources replace fossil resources

Design for Sustainability

Circular Design Guidebook for the EE industry for customer product design co-creation to drive “Circular Design”

*ISCC Plus certified (International Sustainability and Carbon Certification)

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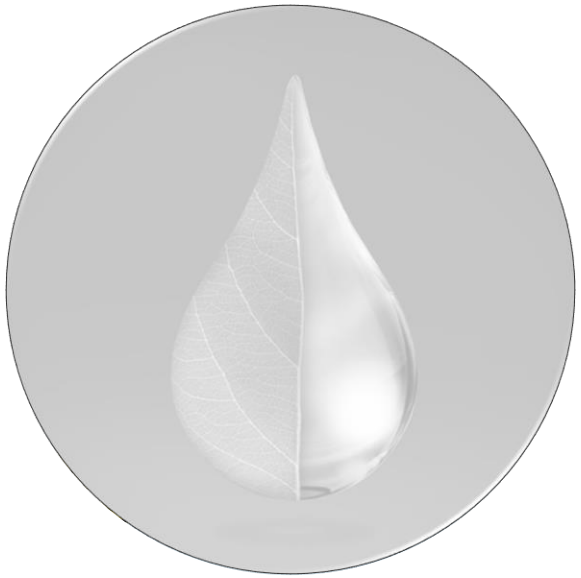

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Strong PCR Polycarbonate Portfolio With Outstanding Features

*Note: PCR refers to “post-consumer recycled”

Strict Supplier Management and Internal Quality Control System

Yearly audits implemented with Code of Conduct and Operations

Supplier Code of Conduct

Commit to **SUSTAINABILITY**:
Yearly audit items from Ethics, Labor, HSEQ to Management System

Recycled Source Certificates

TÜV

UL ECV

(Environmental Claim Validation)

Responsible recycling- **TRACEABILITY**:
Third-party certificates endorsed by TÜV or UL ECV (Environmental Claim Validation)

Chemical Safety Management

Responsible recycling on **SAFETY**:
comply with RoHS Directive EU and EU regulation of REACH

Statement of Recycled Content

Third-Party Certification and Self-Statement

Statement from Product Safety & Regulatory Affairs

Confirmation

page 1 of 1

We hereby confirm:

The term "Post-Consumer" is this confirmation means a material or finished product that has served its intended use and has been discarded for disposal or recovery, have completed its life as consumer item. The average post-consumer content per product is given in the table:

Type	Average %
BAYBLEND FR630GR	30%
MAKROLON T4004 R60	50%

Covestro Polymers (China) Co., Ltd.
25/F, Building 5, Crystal Plaza
No.36 Pingjiaqiao Road,Pudong,
Shanghai, 200126, P.R. China

Date 2020-01-10

Product Safety & Regulatory Affairs

Environmental Claim Validations by UL

UL ECV certification

- **Makrolon® 6485GR**
- **Makrolon® FR6007R20**
- **Bayblend® FR630GR**

…more to add

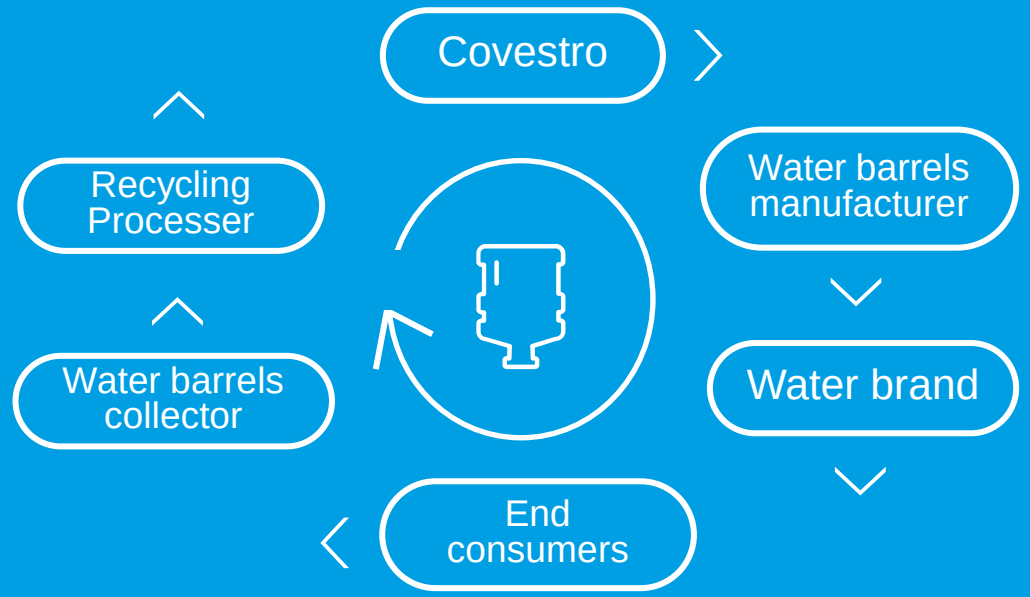
Recycled Content

Validates the post-consumer, pre-consumer (post-industrial) or total recycled content of a product by means of auditing.

Eco-labels usually ask Supplier letter(s) stating percentage of applicable content(s) in plastic(s) supplied to manufacturer or to manufacturer's part supplier.

Collaboration With Customers to Foster Circularity

Covestro, Nongfu Spring and Ausell cooperate on upcycling of polycarbonate water barrels



Achievements:

- Provide materials traceability
- Better control of recyclates quality consistency
- Circular partnership along the value chain

"The three parties collaborations enables high-end applications of recycled plastics, and it is a good example of the closed-loop recycling system in China."

quote by Zhao Kai,
Vice President and Secretary-General of the China Association of Circular Economy

https://solutions.covestro.com/en/highlights/articles/cases/2020/allianc-recycling-value-chain-bottles

More Sustainable Luggage With Recycled Content

Example: Collaboration of Nongfu Spring, Covestro and 90 (Xiaomi eco-system company)

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Drop-in Portfolio Based on ISCC PLUS Certified Feedstock

The suffix allows you to identify the mass balanced drop-in products

Value Proposition 1: No Competition to Human Food Chain

Raw material categories defined by ISCC PLUS standard

Bio: feedstock from virgin biomass

Bio-circular: waste and residues of biological origin (e.g. used cooking oils)

Circular : feedstock from waste / processing residues which are not landfilled or burned

Value Proposition 2: the Drop-in Solution

Identical product performance and process saving ECN* caused cost

Same Product Performance

- Same General properties
- Same Lot-to-lot consistency
- Same Optical performance

Easy Spec-in Process

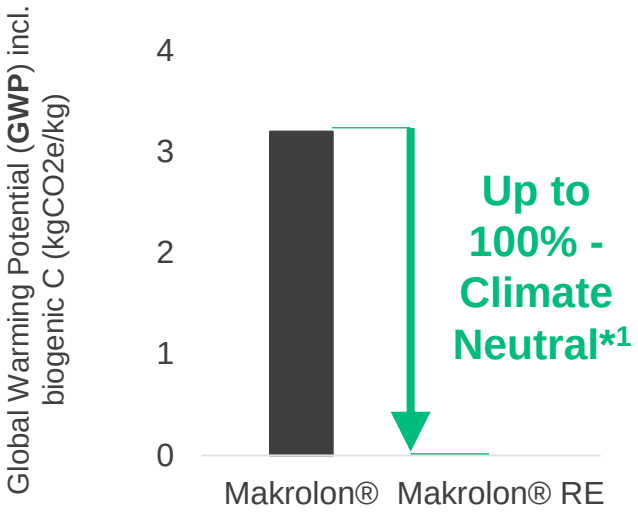
- UL card – Co-listed
- Processing parameters
- Processing window

* ECN = engineering change notice

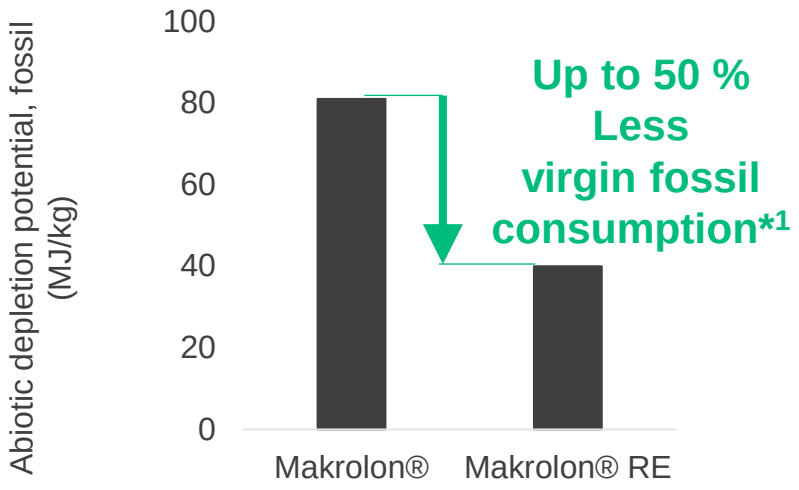
Value Proposition 3: Low CO_2 Footprint / Alternative Feedstock

Polycarbonates with claimable environmental benefits

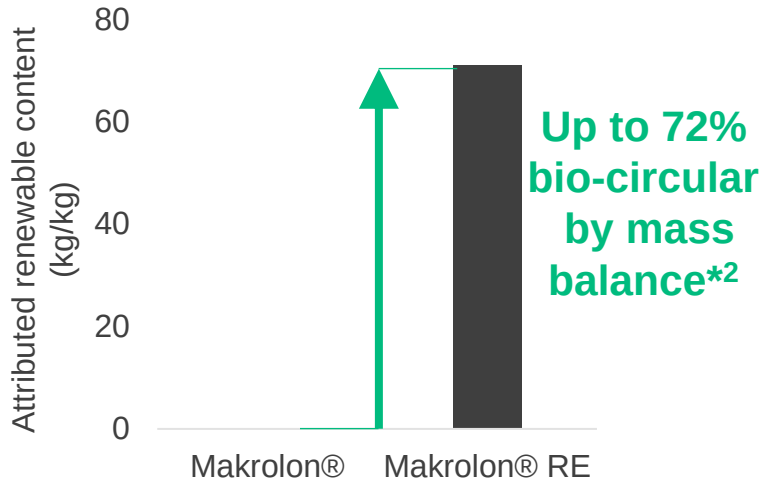
Climate contribution: Lower Carbon Footprint



Preserving resources: Lower fossil resource depletion



Use of alternative raw material



*Specific product savings differ according product properties. Shown values represent planned selected Makrolon® RE grades.
[1] According preliminary reviewed LCA from cradle to gate; [2] According ISCC PLUS Certification.

Reducing the CO_2 Footprint Without Losing Quality

Example: Replace standard polycarbonate with Makrolon® RE for EV charging stations

https://www.covestro.com/press/evbox-group-to-use-polycarbonate-from-covestro-from-mass-balanced-biowaste/

Protecting Robots with Makrolon® RE – Tough & Functionable

Example: Alibaba DAMO XiaoManLu inspection robot

https://solutions.covestro.com/es/highlights/articles/cases/2022/damo-robot

RE Series

the drop-in renewable attributed grades[a, b] as alternative to fossil polycarbonates

1 Same Product Performance

- Same general properties
- Same lot-to-lot consistency
- Same optical performance

2 Easy Spec-in Process

- UL card – Co-listed
- Processing parameters
- Processing window

3 Significant CO_2 Footprint Reduction

- Up to ~ 80 %, some grades even 100 % – climate-neutral [b]

4 Sustainable Share

- Up to 72% ISCC PLUS bio-circular attributed content [a]

5 Secured Supply

[a] Polycarbonates with an attributed share of bio-circular feedstock via mass balance, ISCC PLUS certified;
[b] Some Makrolon® RE grades being produced in Europe are climate-neutral (cradle-to-gate)

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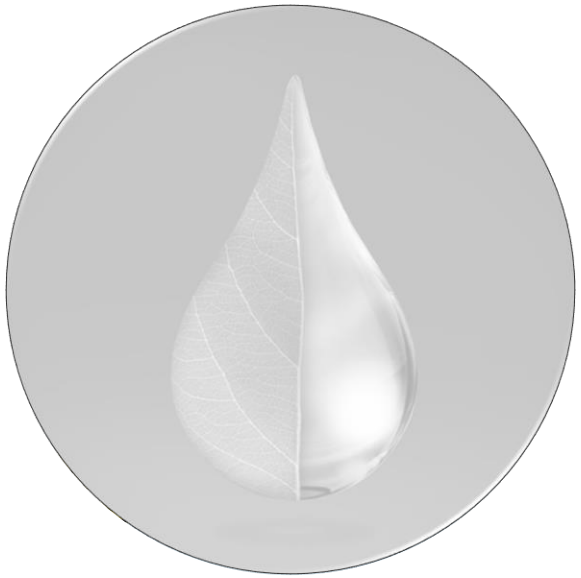

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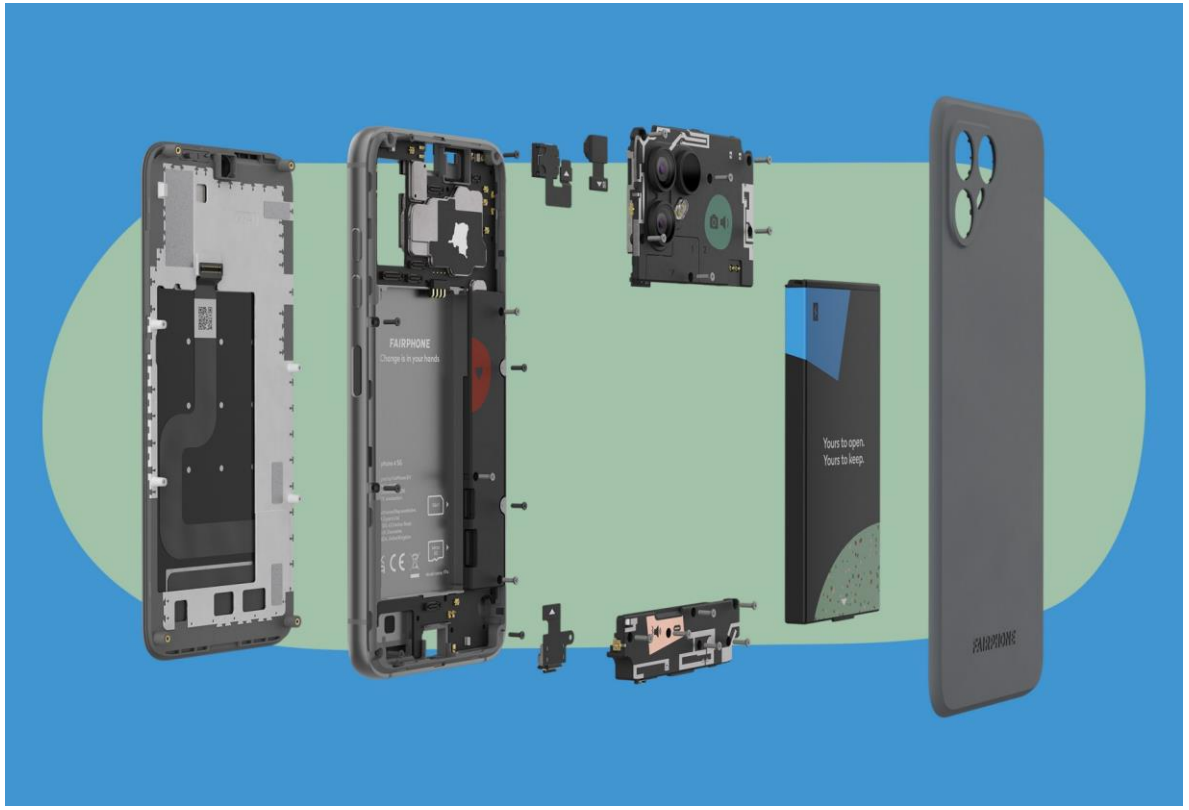
Covestro Supports Circular Material Solutions for Smartphones

Example: Using partially recycled polycarbonates and thermoplastic polyurethanes (TPUs)

Using partially recycled polycarbonates and thermoplastic polyurethanes (TPUs), Covestro is helping smartphone manufacturer Fairphone achieve its sustainability goals. © Fairphone



Partly recycled polycarbonates from Covestro are used in the new Fairphone 4, including a completely recycled TPU in the protective case. © Fairphone

https://www.covestro.com/press/covestro-supports-circular-material-solutions-for-smartphones/

Inspiring Customers' Product Design for Sustainability

Guidebook to circular design for electronics makers

At Covestro, we are actively engaging with customers and external partners to inspire the industries with sustainable design principles, concepts, and solutions combining our multi-disciplinary expertise together

Circular Design Guideline for EE

For customer product design co-creation

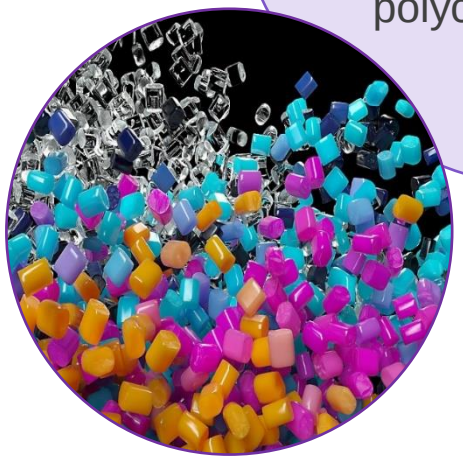
https://solutions.covestro.com/en/highlights/articles/cases/2021/circular-design-guidebook-electronics

Your Go-to Partner for Sustainability

A sustainable product portfolio with innovative services and solutions

Materials for a Circular Economy

- Mechanically recycled (PCR, PIR)
- Renewable attributed polycarbonates



Services

Design for sustainability

- Circular Design Strategies
- CMF design service

Joint Solutions

Enabling new circular business models

- Closed/open loop recycling
- Material tracing

Our global EE team supports you

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