



# Design for circularity

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Covestro

# Design for a circular economy



90%

of raw materials used in manufacturing in Europe become waste before the product leaves the factory.

SOURCE: Cambridge Judge Business School  
Circular Economy Center

80%

of products made in Europe get thrown away in the first six months of their existence.

SOURCE: Cambridge Judge Business School  
Circular Economy Center

17.4%

of e-waste generated globally in 2019 was recycled

SOURCE: International Telecommunication Union

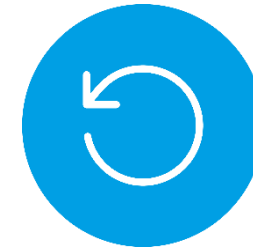
# Design for a circular economy



Design for increased resource efficiency

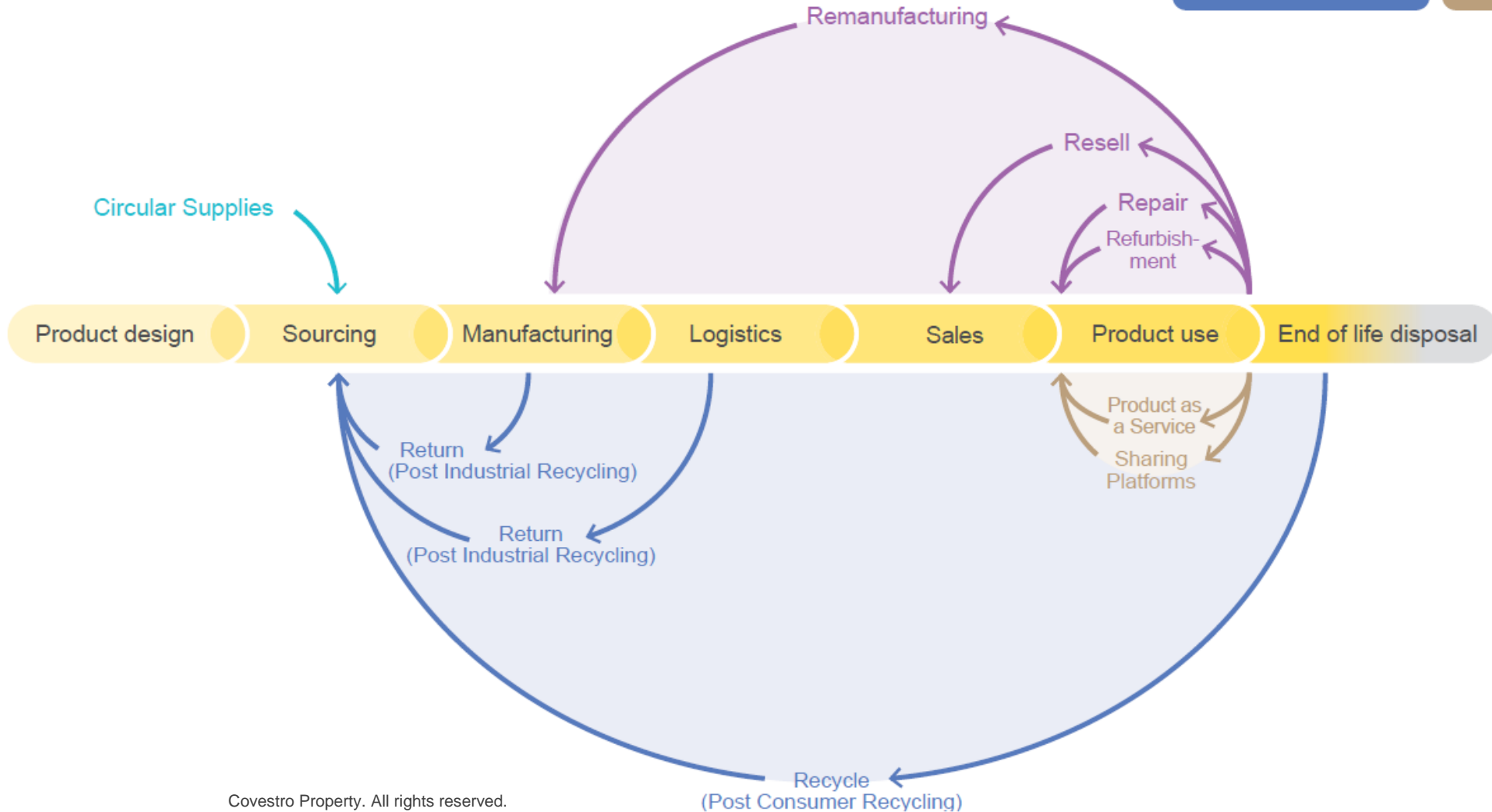
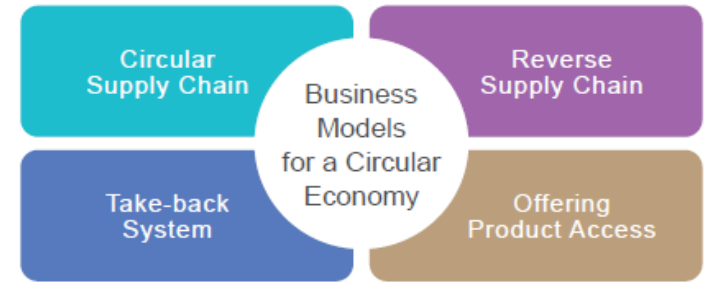


Design for extended product life



Design for recycling

A circular solution is always a combination of an appropriately designed product/service and a specific business model



# Circular solutions

## Case studies



Offering  
Product Access

Take-back system

**Philips** offers a subscription service for its electric toothbrush as well as a recycling program for consumers to return their used dental care products.

Reverse  
Supply Chain

Take-back system

**Fairphone** encourages consumers to reuse, repair and recycle used phones through its reverse logistics and take-back system.

# How do we design a circular solution?

Covestro teams up with REnato lab to introduce the Circular Design Guidebook



renato lab



**Introducing five  
Circular Design  
Strategies based  
on Circular  
Economy  
business models**

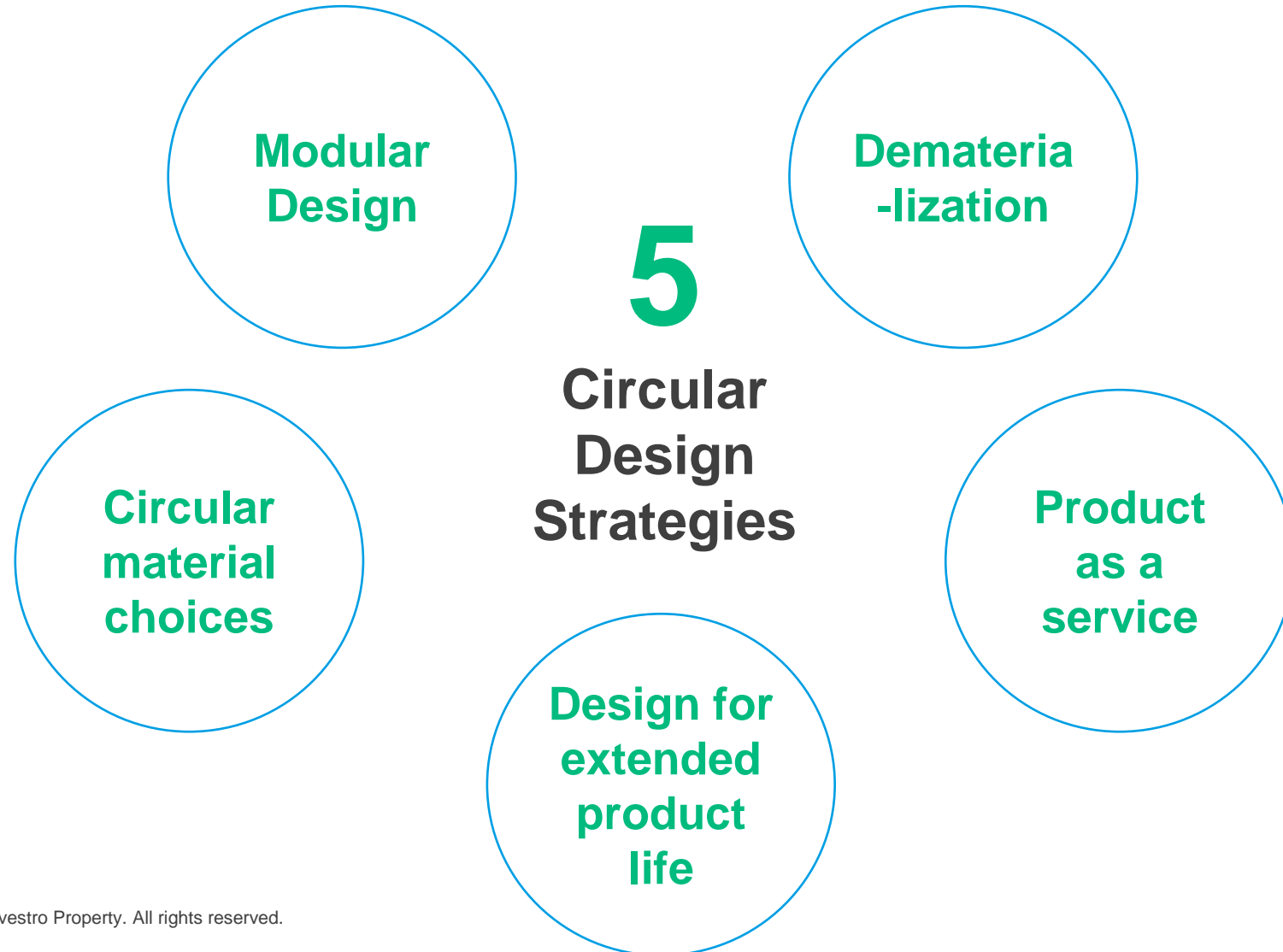
**Taking a systemic  
approach that  
covers all stages  
of production, use  
and end-of-life**

**Providing  
guidance on  
circular material  
selections**

# Five strategies for achieving circular design



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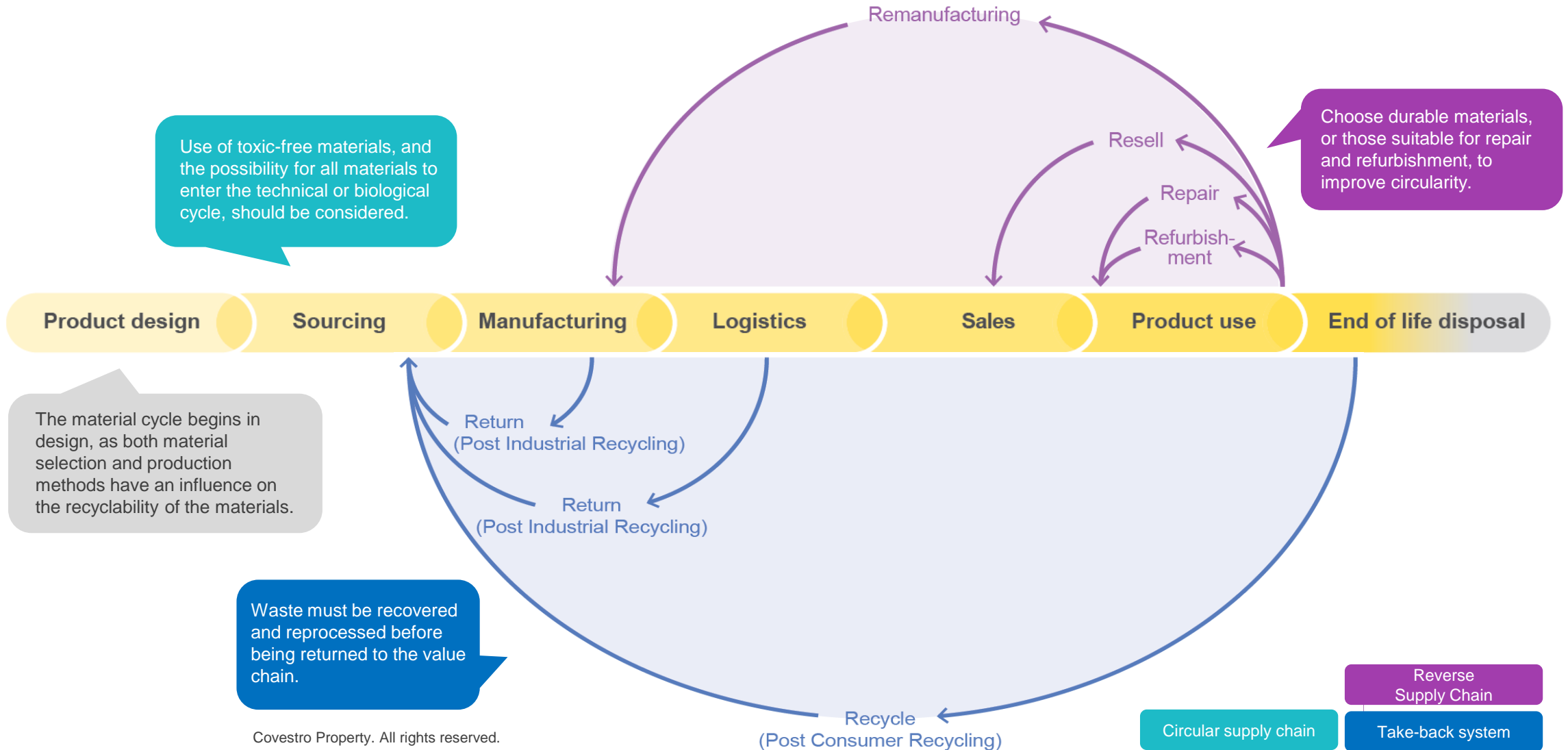




# Circular Design Strategies

## Circular Material Choices

The goal of material selection is to ensure that the material is harmless to the environment and the human body, while at the same time keeping it in the value chain for as long as possible.





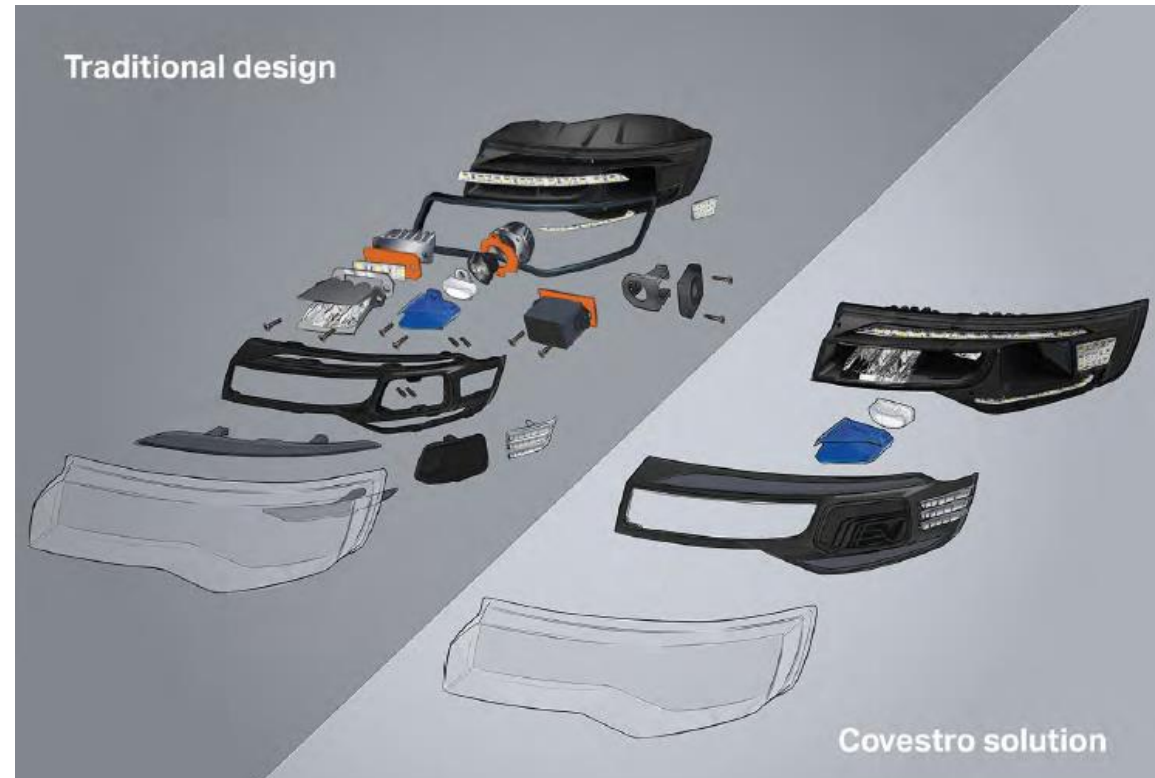
# Mono-material design enabling resource efficiency and circularity

## Covestro design concept for auto headlamps



### Mono-material design provides a clear path to more sustainable solutions and circularity

- Significantly fewer parts: 5 components vs 18 parts and screws
- Approximately 1.8 kg saved per headlamp from elimination of cast aluminum heat sinks
- 2-3 cm thinner from part consolidation: heat sinks, sensor elements
- Mono-material, polycarbonate-based design aids sustainability and recycling



# Mono-material design enabling resource efficiency and circularity

## Covestro design concept for outdoor smart light



### Mono-material design provides a clear path to more sustainable solutions and circularity

- Reduced weight, parts and materials leads to more sustainable design
- Incorporating sensors, displays, antennas, cameras and more – almost any electronic component
- Using Makrolon® polycarbonate for multiple components greatly reduces complexity in the design process and allows for easier end-of-life recycling



# Rethinking sustainability through Color, Material, Finish (CMF)



## Creating an aesthetic identity for sustainable materials

- Covestro has partnered with Tsinghua University to develop CMF solutions for Covestro's more sustainable polycarbonate material portfolio, e.g., recycled materials
- The project aims to integrate aesthetic CMF design into those polycarbonate materials by giving them a unique visual identity based on their sustainability attributes



清华大学艺术与科学研究中心色彩研究所  
Colour&Imaging Institute, Art&Science Research Centre, Tsinghua University

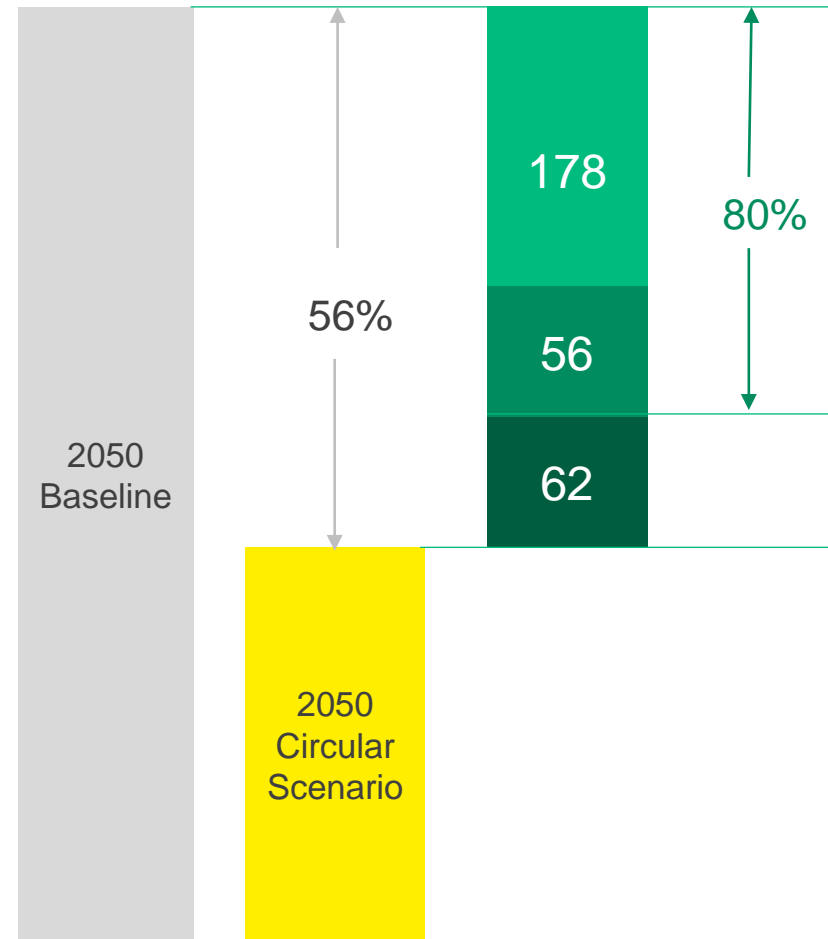
# “Material Selection” as the first step to circular design



Optimized material selection can yield an 80% impact

According to a 2018 joint study by Material Economics and multiple EU climate organizations

- Carbon emissions can be reduced by 56% by 2050, if a circular economy model is introduced in the production of major industrial raw materials
- Nearly 80% of the stated total carbon reduction can be achieved by combining material recirculation and material efficiency



## Material Circulation

Increasing the circular use of materials, and reducing the requirement for new materials. As an example, to avoid using new materials, recycled materials can be selected instead

## Material Efficiency

Reducing the amount of material required per unit during product manufacturing. For instance, selecting materials that are lighter and stronger, or more efficient in the manufacturing process.

## Circular Business Models

Reducing the quantity of a product needed to meet specific demands, through a change in business model. For example, changing the sale of a physical product into a service.

# Forward-looking statements

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