



PLASTICS SUSTAINABLE-BY-DESIGN



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PLASTICS: OPPORTUNITIES AND CHALLENGES

Thanks to their versatility, plastics have become key materials in strategic sectors such as packaging, building and construction, transportation, renewable energy, medical devices and even sport products.

There are about 60 000 European companies in plastics industry, mainly SME's, employing over 1.5 million people and generating a turnover close to €350 billion.

The way plastics are currently made, used and discarded, fails to capture the economic, environmental and societal benefits of a more 'sustainable' approach.

Europe produces 25 million tons of plastic waste annually; less than 30% is recycled¹. Plastic degradation may release hazardous chemicals and is the main source of microplastics.

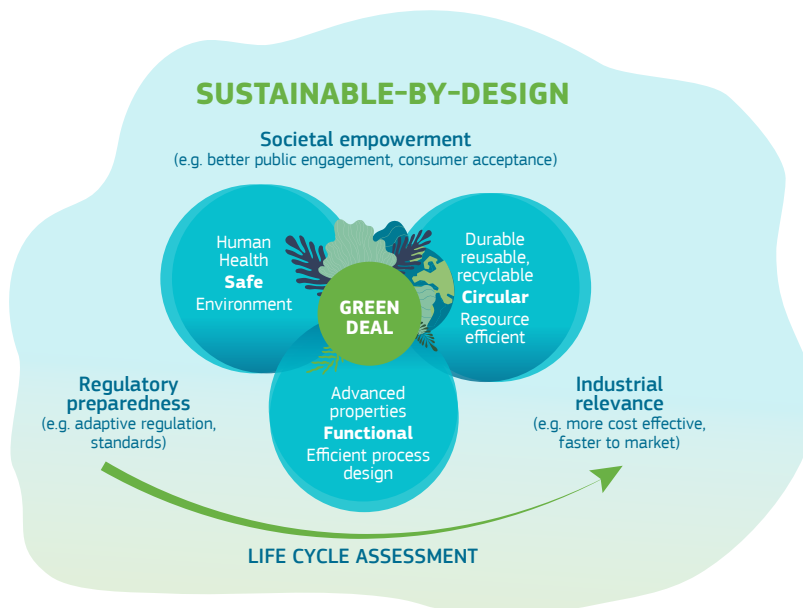
SUSTAINABLE-BY-DESIGN: A COMPASS GUIDING INNOVATION

The ambition of the European Green Deal is to transform the EU's economy and make it ready to lead the transition to a more sustainable future. In line with this, the EU Circular Economy, and Industrial and Chemical Strategies aim to strengthen Europe's capacity to produce and use goods in a more sustainable way while promoting EU's sustainability standards and competitiveness globally.

The Sustainable-by-Design concept aims to integrate safety, circularity and functionality of materials and products. It embraces the economic, environmental and social pillars of sustainability while maximising the opportunities offered by the materials and chemicals industries.

Sustainable-by-Design calls for an innovative systemic approach throughout the full material cycle, from design to end of life.

Industrial relevance, societal empowerment and regulatory preparedness are essential to the successful implementation of the Sustainable-by-Design concept and criteria.



DEVELOPING SUSTAINABLE-BY-DESIGN PLASTICS: KEY COMPONENTS

SAFE-BY-DESIGN

- ✓ Plastics free from hazardous chemicals e.g. safer alternatives to current additives and coating;
- ✓ Microplastic avoidance, detection, and toxicity assessment.

CIRCULAR AND RESOURCE EFFICIENT

- ✓ Durable, reusable and recyclable plastics;
- ✓ Easy to dismantle and with reduced chemical complexity;
- ✓ Plastic waste, residues and waste in general, as well as biomass to be used as a resource.

FUNCTIONAL PRODUCTS AND EFFICIENT PROCESS DESIGN

- ✓ Adequate performance of products e.g. lightweight, mechanical strength, antimicrobial activity;
- ✓ Efficient material design;
- ✓ Efficient upscaling in industrial environment;
- ✓ Sustainable production.

ENABLING FRAMEWORK CONDITIONS

- ✓ Education and awareness;
- ✓ Opening markets: new business models, social innovations, standards;
- ✓ Support decisions on investment for Sustainable-by-Design.





¹ The Circular Plastics Alliance (CPA) an initiative under the European Strategy for Plastics aims to boost the EU market for recycled plastics to 10 million tonnes per year by 2025.

HOW DOES THE EUROPEAN COMMISSION RESEARCH AND INNOVATION FUNDING HELP?


 FP7 and Horizon2020 have provided over **€350 million** to finance research and innovation projects on **Sustainable-by-Design plastics**


 The new R&I funding programme, Horizon Europe, including the European Innovation Council, will devote more than **35%** of its budget to solving climate issues

PROJECT EXAMPLES

 Safe-by-Design		 Circular and resource efficient		
Safer additives <ul style="list-style-type: none"> ▶ Non-toxic additives to make plastic more resistant to fire (POLYFIRE) ▶ Risk assessment of the exposure to plastic additives (ECD-MIXRISK) 	Microplastics <ul style="list-style-type: none"> ▶ Microplastics: detection and toxicity assessment in-water (FRESHWATERMPS) ▶ Helping citizens identify cosmetics that use microplastics (CM) 	Durable and reusable <ul style="list-style-type: none"> ▶ Repairing plastic products without functionality loss (PRS) ▶ Innovative ways to reuse plastics in automotive and building sectors (ECOBULK) 	Recycle <ul style="list-style-type: none"> ▶ Plastic chemical recycling (DEMETO) ▶ Using plastic waste for 3D printing (REPAIR3D) 	Alternative feedstock <ul style="list-style-type: none"> ▶ Turning industrial waste into plastics (Carbon4PUR) ▶ Biodegradable plastic made from biomass residues (VOLATILE)
 Functional products and efficient processes		 Enabling framework conditions		
Functional plastics <ul style="list-style-type: none"> ▶ Antimicrobial plastics for use in hospitals (FLEXPOL) ▶ High-performance plastic foams for construction industry (NANOCORE) 	Material Design <ul style="list-style-type: none"> ▶ “Modelling Council” leading advanced materials efficient design (EMMC) ▶ Smart design for more environmentally friendly polyurethanes (PURESMART) 	Efficient processes <ul style="list-style-type: none"> ▶ Efficient process upscaling via open innovation facilities (FlexFunction2Sustain) ▶ Fostering industrial symbiosis (FISSAC) 	Social empowerment <ul style="list-style-type: none"> ▶ Plastics lifecycle awareness and social innovation (PTwist) ▶ Cities cooperating for circular economy (FORCE) 	Opening markets <ul style="list-style-type: none"> ▶ Circular plastics: supply and new value chains (POLYCE) ▶ R&I into standards, labelling and procurement (OPEN-BIO)

SUSTAINABLE-BY-DESIGN IS INCLUSIVE: ALL ACTORS ARE NEEDED!!!

To tackle all these aspects in a relevant and meaningful way and contribute to boosting Europe’s economic and social recovery, the **participatory engagement of all actors**, from civil society to industry, researchers and policymakers is necessary.



There is a need to establish an EU wide ‘Sustainable-by-Design’ materials (going beyond plastics) community to develop the Sustainable-by-Design detailed concept and criteria; and define its research and innovation agenda.

Find out more and get involved:
Advanced materials

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