

Transitioning the plastics system: a joint journey towards circularity and net zero

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A data-driven approach - three of our flagship initiatives



ReShaping Plastics

The Plastics Transition



The Plastics Transition Roadmap

Our industry's roadmap for plastics
in Europe to be circular and have
net-zero emissions by 2050

Executive Summary



The Circular Economy for Plastics - a European analysis (biannual)

Breaking the Plastic Wave



In 2020, The Pew Charitable Trusts and SYSTEMIQ published the report **“Breaking the plastic wave”** at Davos.



Global reach with focus on plastics **pollution**



“without immediate and sustained action, the annual flow of plastic into the ocean could nearly triple by 2040.” The study **identified solutions** that could cut this volume by more than 80% using technologies that are available today, if key decision-makers are willing to make systemwide changes.



ReShaping Plastics - the focus of the report

WHY

Quantify the economic, environmental and social implications of **different strategies, or pathways,**

WHAT

Focuses on **four** of the most important **plastic-using sectors:**



packaging



household goods



automotive



construction

HOW

Across **six system change scenarios**, outlining which **actions should be prioritised** for different plastics applications in order to **meet circularity and climate mitigation goals.**

Overseen by an independent Steering Committee



Jyrki Katainen

President of the Finnish Innovation Fund Sitra,
Former European Commission Vice-President,
Former Prime Minister of Finland,
Steering Committee Chair



Prof. Kim Ragaert

Chair of Circular Plastics at Maastricht University
Steering Committee Deputy Chair



Stéphane Arditi

Director of Policy Integration
and Circular Economy
European Environmental Bureau (EEB)



Ton Emans

President PRE & Director
Group Recycling Cedo



Sirpa Pietikäinen

Member
European Parliament



Werner Bosmans

Team leader 'Plastics', DG Environment,
European Commission



Virginia Janssens

Managing Director
Plastics Europe



Joan Marc Simon

Executive Director
Zero Waste Europe



Marco Ten Bruggencate

Commercial Vice President
Dow Packaging & Specialty Plastics



Dr. Martin Jung

President, Performance Materials Division
BASF



Prof. Martin Stuchtey

Founder SYSTEMIQ, Professor for Resource
Strategies and Management,
University Innsbruck
Project Principal



Cyrille Durand

Lead, Plastics & Packaging
World Business Council for Sustainable Development (WBCSD)



Rob Opsomer

Executive Lead - Systemic Initiatives
Ellen MacArthur Foundation

Some key statistical take outs

2030



Current industry and policy actions could more than double system circularity **from 14% to 30% by 2030**, leading to a **reduction of 11 million tonnes (Mt) of CO2e emissions** and **4.7 Mt less plastic waste disposed in landfills or incinerators**



Adoption of **circular economy** approaches across the plastics value chain **can drive a 33% reduction in GHG emissions** and a **46% reduction in waste disposal**.

2050



The Circularity scenario shows **78% circularity could be achieved of which 48% from recycling** (combined mechanical and chemical with a projected increase in the latter), and **only 4% substitution with alternative materials**



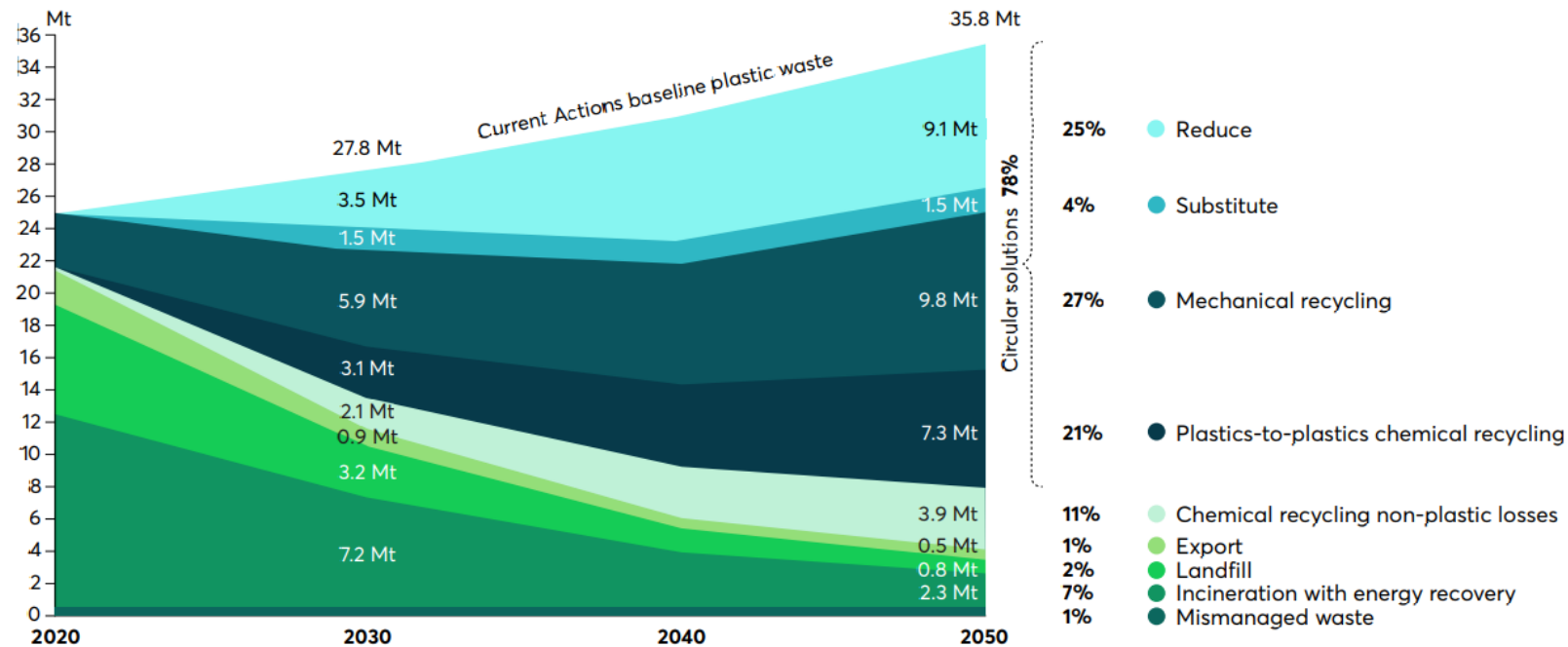
By 2050 **78% of plastic utility supplied by alternatives to fossil fuel** in the Net Zero Systems Change scenario



Substitution of plastics with other materials provides **very limited scope for reaching net zero emissions**, with only **paper or cardboard considered a viable alternative in the case of packaging (criteria dependent)**.

Selected results - Physical fate of plastic waste in a Net Zero System Change Scenario (SCS) *

“By 2050, the Plastics system could achieve 78% circularity with 30% of waste avoided through reduction and substitution and 48% being recycled, leaving 9% in landfills and incinerators.”



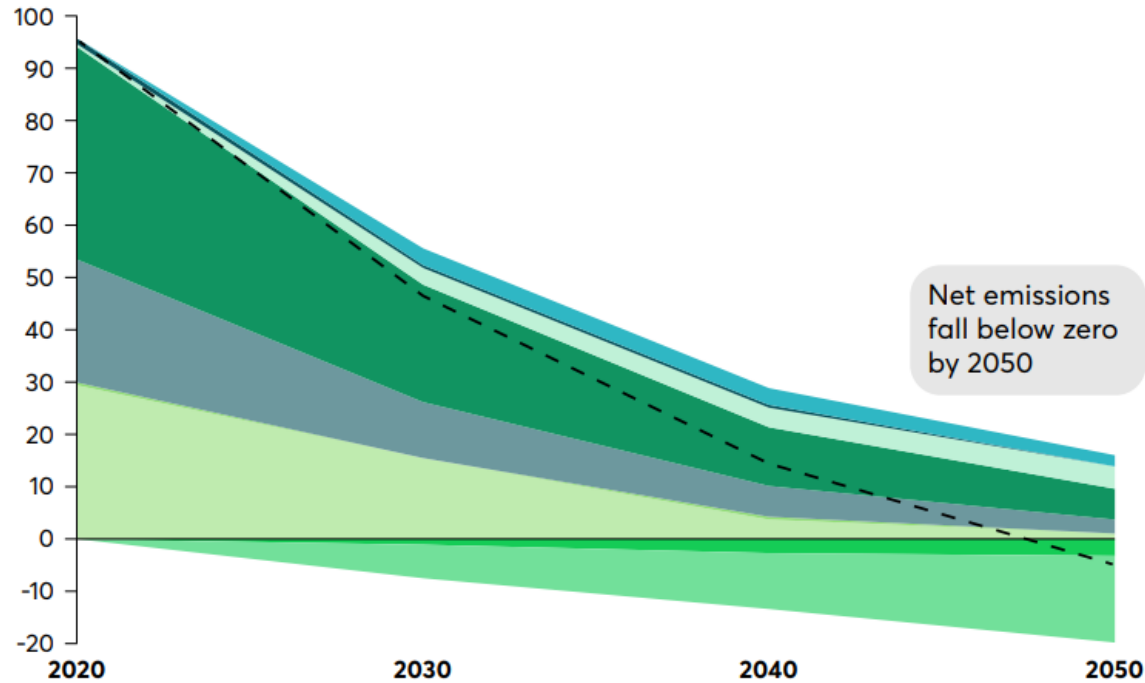
Source: "ReShaping Plastics" model

*waste from packaging, household goods, automotive and construction 2020-2050 (Mt)

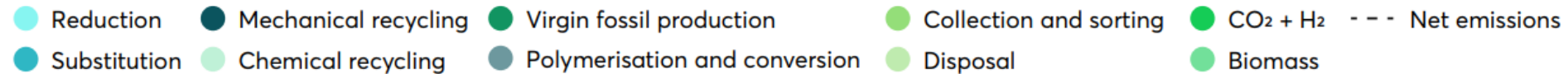
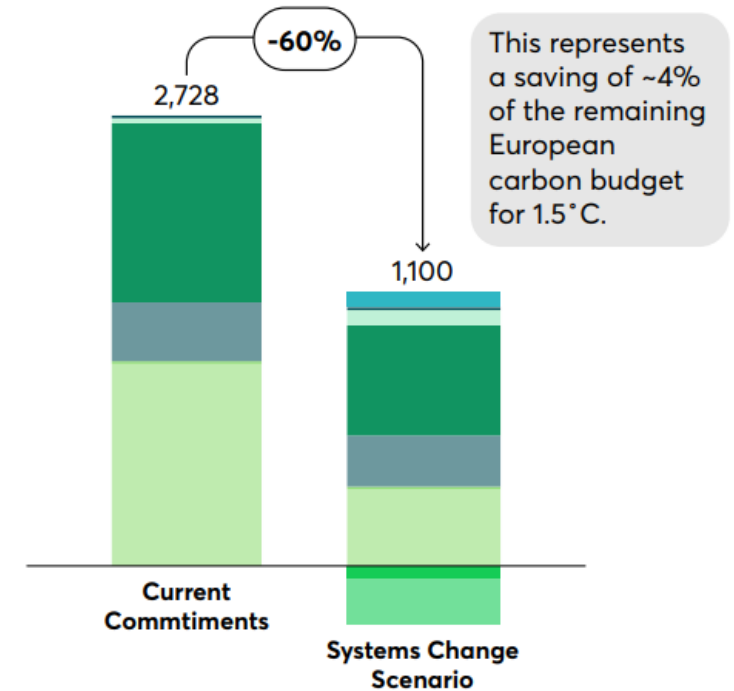
Reshaping plastics

Selected results - Transition of feedstock in a SCS

Net Zero Scenario Annual GHG Emissions (Mt CO₂e/year)



Cumulative emissions 2020-2050 (Mt CO₂e)

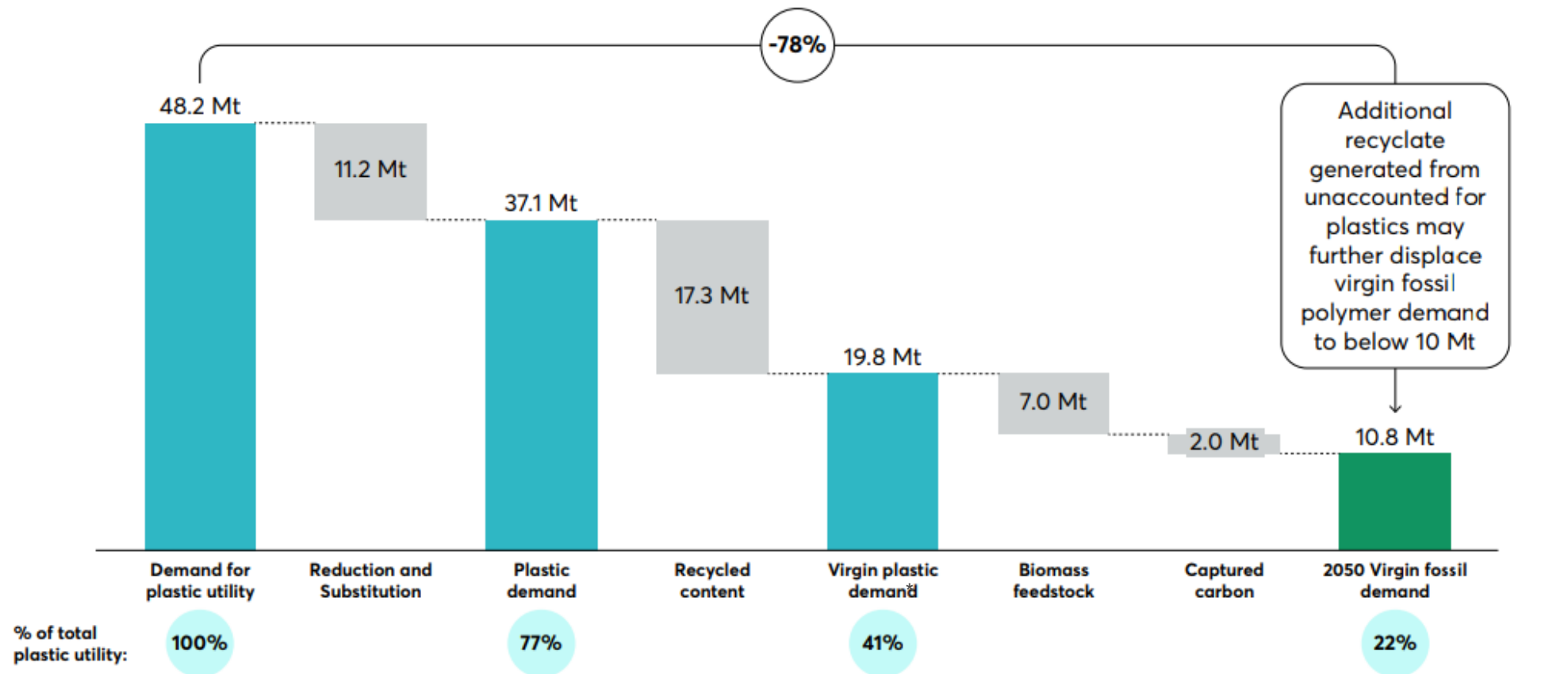


Source: "ReShaping Plastics" model

Reshaping plastics

Selected results - Demand for plastics in a SCS

By 2050, 78% of plastic utility is supplied by alternatives to fossil fuel in the Net Zero Systems Change Scenario (Mt)



Source: "ReShaping Plastics" model

*Plastics produced from chemically recycled feedstock are not accounted for as virgin plastics within the study

ReShaping Plastics in numbers

State of Play
Today

24.5 million tonnes
of plastic waste
generated in 2020

14%
of plastic waste were
recycled, providing 3.5 Mt
of recyclates in 2020

50%
of today's European plastic
waste is **incinerated for
energy recovery**

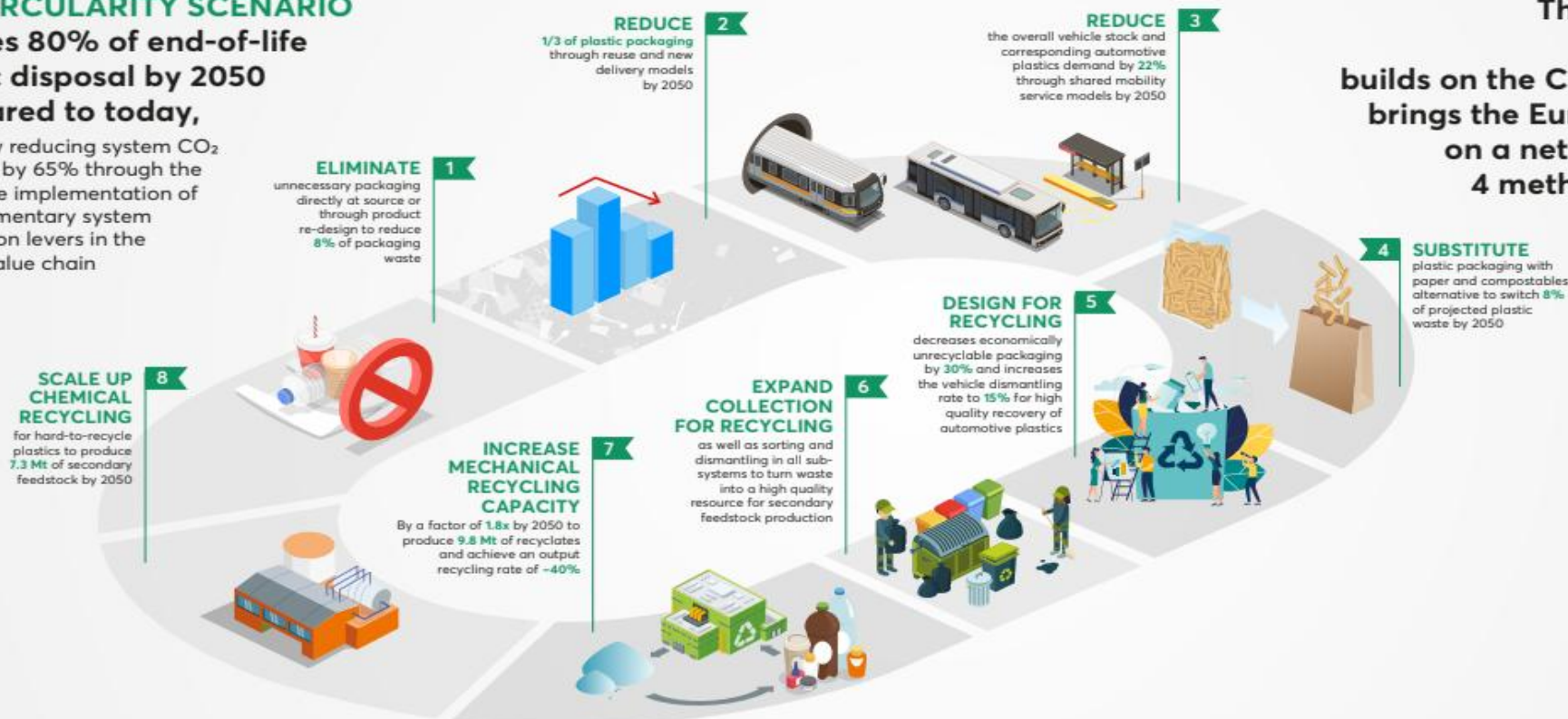
95 million tonnes
of CO₂e are emitted per year
in 2020, one-third is caused
by incineration

8-15 million tonnes
of **unaccounted for plastic** as a
result of gaps in waste data

The CIRCULARITY SCENARIO

reduces 80% of end-of-life
plastic disposal by 2050
compared to today,

effectively reducing system CO₂
emissions by 65% through the
immediate implementation of
8 complementary system
intervention levers in the
plastics value chain



The NET ZERO SYSTEMS CHANGE SCENARIO

builds on the Circularity Scenario and
brings the European Plastics system
on a net zero pathway through
4 methods of GHG reduction:

- A** **CHANGE THE FEEDSTOCK CARBON SOURCE**
to provide 1/4 of feedstock by 2050
via sustainable bio-based materials
or captured carbon and hydrogen
- B** **APPLY BLUE AND GREEN HYDROGEN**
as fuel and feedstock to
reduce production emissions
- C** **ELECTRIFY HEAT SOURCES**
for steam crackers with cumulative production
capacity of 1.5 million tonnes by 2050
- D** **CAPTURE PRODUCTION AND END-OF-LIFE EMISSIONS**
through applying CCS to steam crackers or
CCU/S to waste-to-energy plants

The **NET ZERO SYSTEMS
CHANGE SCENARIO**
achieves environmental
and economic benefits

Target State
2050

-60%
(255 Mt) less waste
incinerated between
2020-2050

>70%
less virgin plastic
produced from
fossil fuels

1.6 Gigatonnes
cumulative CO₂ emissions
saved between 2020-2050

+160,000
jobs from circularity
levers

1 in 4€
to be redeployed to innovative
low carbon technologies and
circular business models

ReShaping Plastics – adapting this model to the European plastics system – overseen by an external Steering Committee



The **European plastic system is adapting** to address the challenges of climate change mitigation and circularity, but **not yet fast enough**.



There is **no “silver bullet”** solution to significantly reduce waste disposal and GHG emissions.



Ambitious adoption of circular economy approaches in the plastics value chain can drive very significant improvements **in the next decade and beyond**



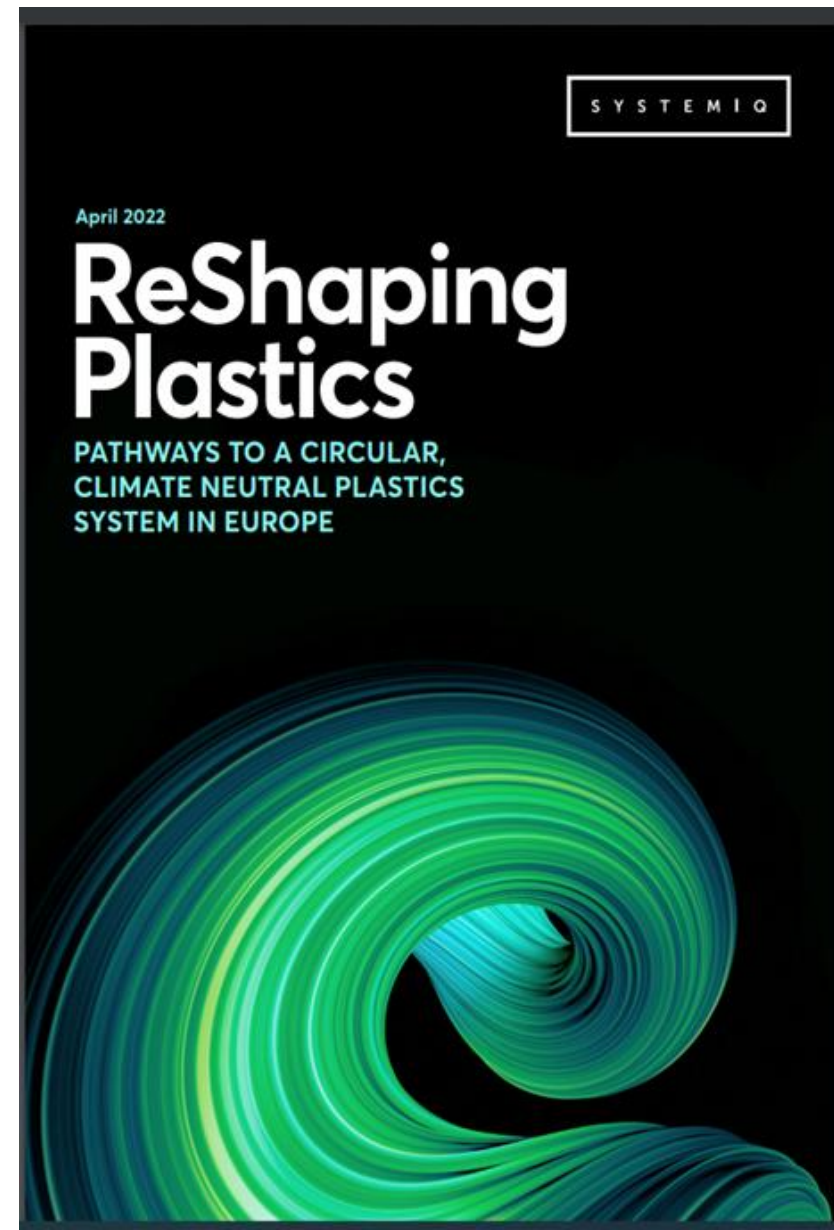
Multiple **less mature pathways** to develop and deploy innovative technologies and approaches to decrease GHG and decouple plastics from fossil feedstocks.



Long technology maturity cycles and capex lock-in - **decisions taken in the 2020s** will determine the possibility to reach waste reduction targets and net zero by 2050.

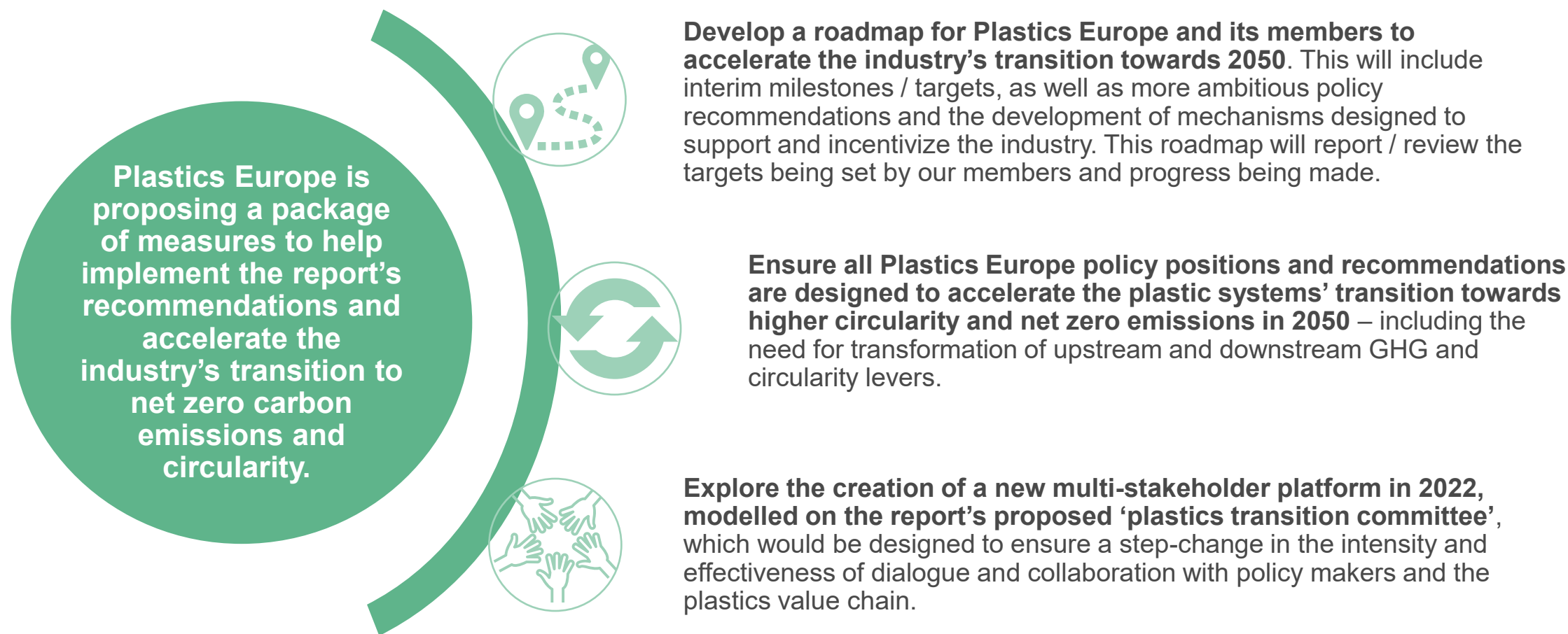


Significant data gaps that will need to be resolved in order to enable a circular economy and mitigate climate and environmental risks.



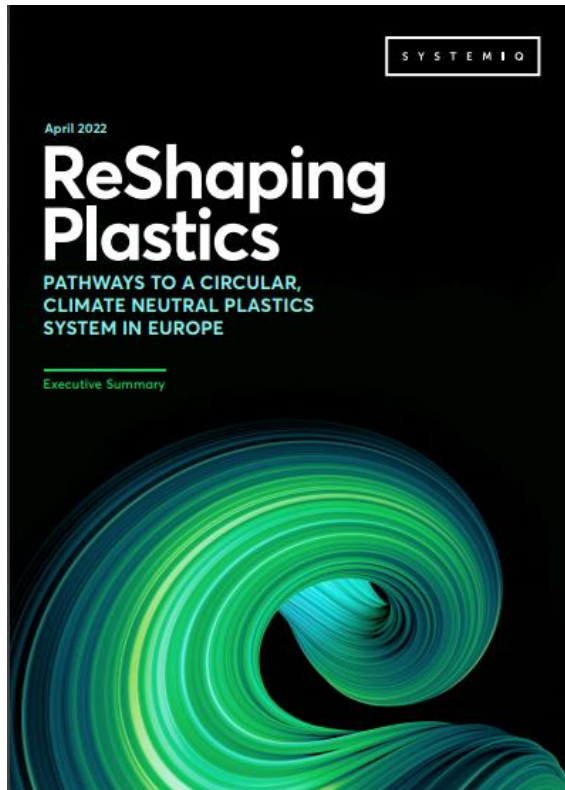
How does the journey continue

Plastics Europe actions in response to the report



An industry united around a common vision – the Plastics Transition Roadmap

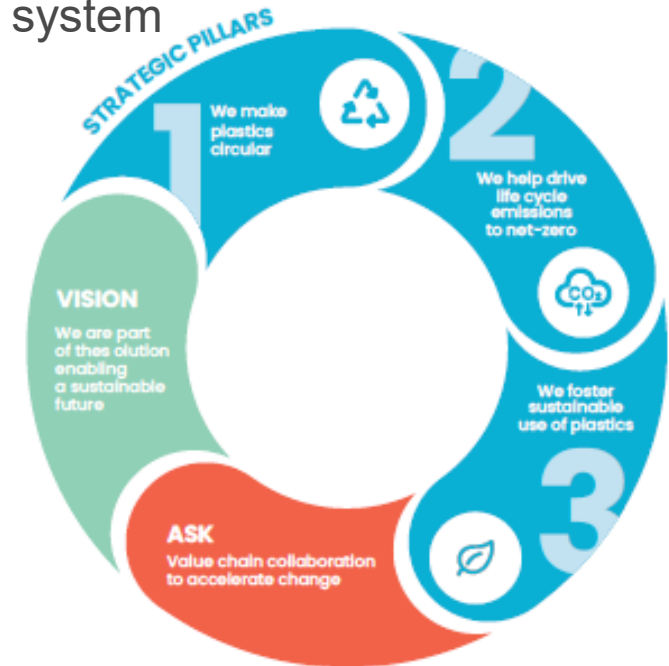
Our starting point



Our North Star and engagement



Plastics Europe has a vision for a sustainable plastics system



What is significant about this roadmap?



Transformation of a complex interconnected system *is possible*



First time we as industry members are united around a common vision and set of ambitions to *benefit all*.



We are committed to the *actions* to make this happen

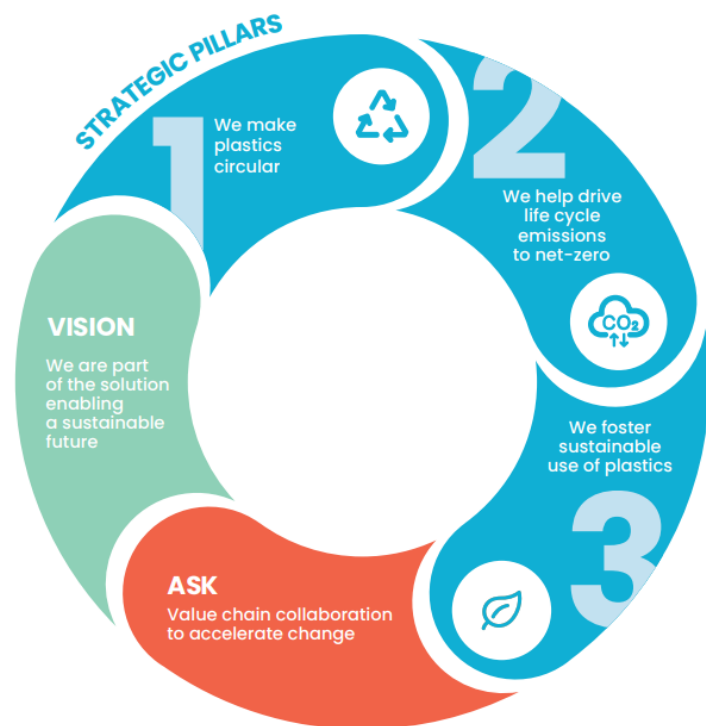


Critical in safeguarding our European competitiveness

The Plastics Transition 2050

Three essential levers built around a core vision

Plastics Europe has a vision for a sustainable plastics system



WE MAKE PLASTICS CIRCULAR BY

- Fostering circular design and business models
- Enhancing mechanical recycling
- Unlocking chemical recycling
- Expanding production from sustainable biomass
- Making plastics from captured carbon



WE HELP DRIVE LIFE CYCLE EMISSIONS TO NET-ZERO BY

- Leveraging the circular transition
- Maximising energy efficiency
- Using low-carbon fuels (hydrogen, biofuels)
- Electrifying production with low-carbon electricity
- Investing in carbon capture & storage



WE FOSTER SUSTAINABLE USE OF PLASTICS BY

- Managing risks in operations
- Providing further transparency to stakeholders
- Collaborating with value chain partners to prevent leakage

Overarching key statistical takeaways



65% or 42 Mt of total plastics used by converters will be made from circular feedstocks by 2050.



43% of the total plastics used by converters **will be recycled plastics**, with **mechanical (24%) and chemical recycling (19%) massively scaling up**.



Plastics from biomass will double every decade, reaching 18% of plastics used by converters in 2050.



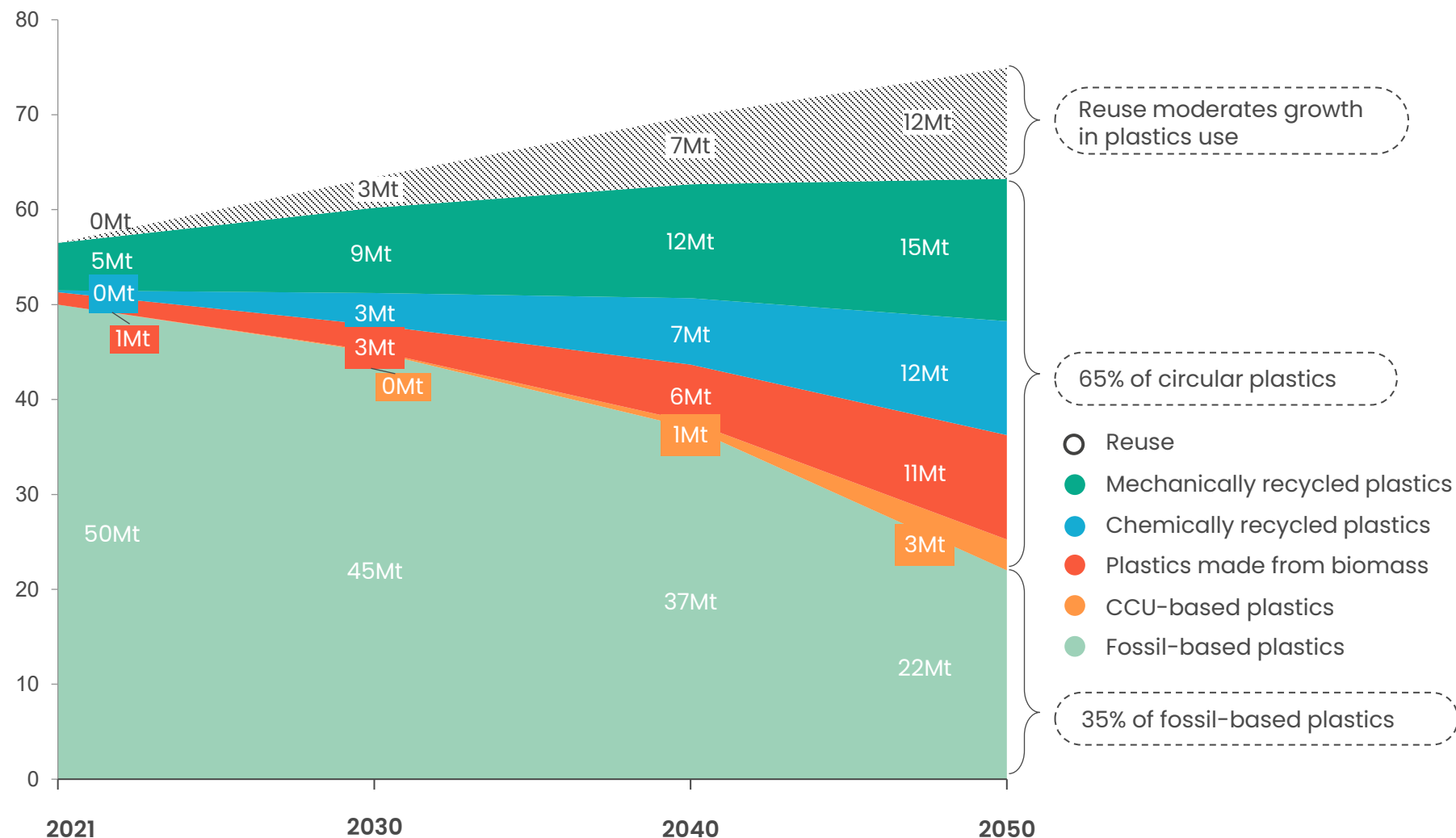
55% Estimated GHG **emissions reductions** (129 Mt CO₂e) **through the shift to circular feedstock and avoided incineration** by 2050.



It will require commitment from all stakeholders to meet the additional investment of at least **€235 billion additional system cost** (CAPEX + OPEX) compared to business as usual.

Circularity – ambitious but achievable

Circular plastics use by European converters and their feedstock
2050, estimates, Mt



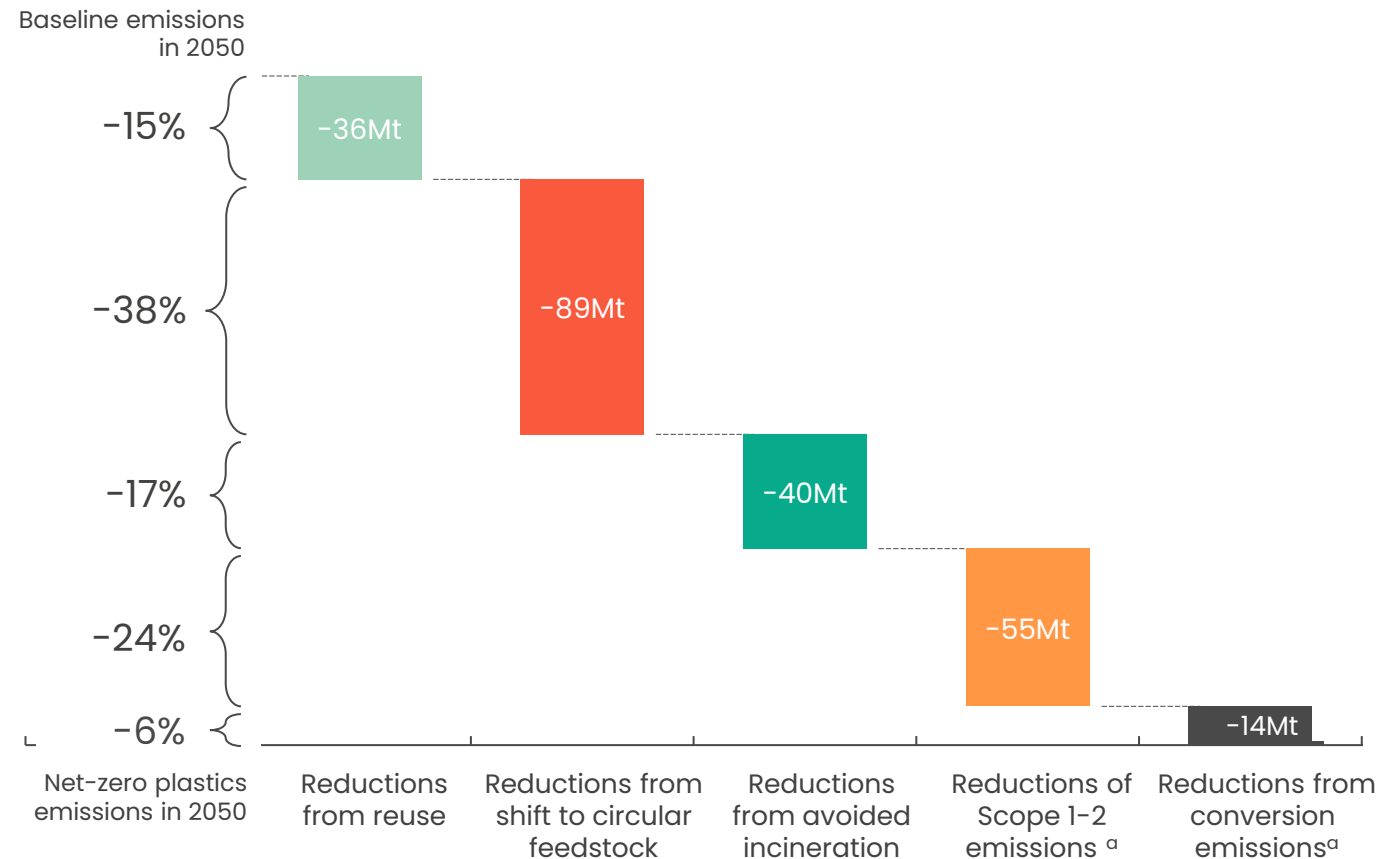
Key takeaways

- Through reuse, **12 Mt of plastics can be reduced by 2050**
- **Mechanical recycling** has the highest **technological maturity** and cost effectiveness, hence we project that it can steadily grow towards 2050
- **Chemical recycling** is expected to have its **breakthrough by 2030**, and grow exponentially from there towards 2050
- **Plastics made from biomass** will grow steadily until 2040 and will play a **key role** onwards
- While **plastics based on CCU and hydrogen** are poised to **grow towards 2050**, the limited maturity of the technologies and the high costs will not enable it to reach significant quantities

Reaching net zero by 2050 requires investment all along the plastics life cycle

Reductions needed to reach net-zero in 2050

In Mt CO₂e, 2050 (Deloitte analysis, 2023)



^aReductions through net zero plastics production levers; maximizing energy efficiency, electrifying production with low-carbon electricity, using low-carbon fuels and investing in carbon capture & storage

Key takeaways

- **Without abatement measures** scope 1-2 and 3 up- and downstream GHG emissions will increase to 233 Mt
- Through **reuse**, 36 Mt of CO₂e emissions are avoided
- **Moving to 65% of circular feedstock** reduces scope 1-2 and 3 upstream emissions by 89 Mt
- 40 Mt of scope 3 downstream emissions are **avoided by plastic waste not going to incineration**
- 55 Mt of scope 1 and 2 emissions are **reduced through energy efficiency, electrification, shifting to low-carbon electricity and fuels and capturing emissions (CCS)**
- 14 Mt of GHG emissions from conversion are avoided by **energy efficiency and shifting to low-carbon electricity**

Industry action will be critical

IMMEDIATE 2023 – 2025	SHORT TERM 2026 – 2027	MEDIUM TERM 2028 – 2030
• Provide stakeholders with aggregated data and insights on the status and solutions to achieve the industry vision • Partner with waste management organisations to secure circular feedstock and manage investment risks • Invest in new technologies and collaborate to speed up technology development • Prevent plastic leakage in the supply chain through compliancy with Operation Clean Sweep® (OCS), and encourage broader value chain adoption • Determine minimum requirements for risk management systems for plastics additives • Experiment with digital product passports and speed up the development of digital tools to share information in the value chain	• Bring plastics to the market that are functional and affordable but also easy to recycle or repurpose at the end of their life cycle • Shift away from linear practices to circular ones, through new circular business models and technologies such as recycling, plastics from biomass and captured carbon • Invest in joint infrastructure for hydrogen, renewable energy and carbon capture and storage (CCS) • Lead by example and cooperate with stakeholders and value chain partners to overcome hurdles and knowledge gaps to address plastic leakage	• Utilise power purchase agreements to accelerate green electricity uptake • Further the cooperation with suppliers of sustainably sourced biomass to scale up plastics from biomass • Have chemical recycling operational at scale by investing in capacity and partnering with technology providers • Maximise energy efficiency and use carbon capture and storage (CCS) to reduce GHG emissions • Implement third-party verified risk management systems for plastics additives

Key takeaways:

- **Partnerships to secure circular feedstock**
- **Explore new technology investments and collaborations**
- **Shift to more circular practices through recycling and better design**
- **Scaling up** chemical recycling, and plastics produced from biomass and carbon capture
- **Investing in capacity and partnering** with technology providers.
- **Maximise energy efficiency and use of carbon capture and storage (CCS)** to reduce GHG emissions.

Along with support from policymakers and our value chain

Immediate policy levers
to unlock and
accelerate investments

Incentivise low-carbon
and circular business
models

Urgently restore
competitiveness of EU
industry

A waste management
system fit for a net-zero
circular economy

Promote greater and
increased collaboration



Overarching aspirational key takeaways



The roadmap is our **North Star**, uniting all our members for the first time **behind a common vision**.



This roadmap is not just for our industry, but a **guide to design and inform our transition as a whole plastics system**.



The transformation of a complex and interconnected plastics system is very ambitious but achievable - **Upstream and downstream solutions are complementary and are most effective when deployed together**.



We will be **reporting back on our progress every two years**.



We will **urgently need to enabling policy and regulatory framework** to ensure success and **safeguard our European competitiveness**.

The Circular Economy for Plastics



Provides the most up-to-date and transparent analysis of the plastics circularity state-of-play at EU and national level (8 national infographics).

Covers production, conversion, consumption, waste management and trade.

Freely available to help make informed decisions about the enabling conditions required to accelerate circularity.

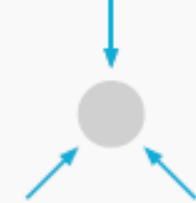
2024 KEY REPORT FIGURES OVERVIEW



Circular plastics production reached
8.7Mt
but growth has **slowed significantly** since 2022.



For the first time,
circular plastics content
in new products is
above 15%
reaching **7.9 Mt** in 2024.



19%
of circular plastics
used in Europe rely
on imports. And **24%**
of the total demand.



Export of sorted plastic
waste increased by
+36.5%
since 2022, reaching 1.5 Mt.



29.6%
(9.7 Mt)
of plastic waste was
recycled.



More than
70%
of plastic waste is still
sent to incineration or
landfill.

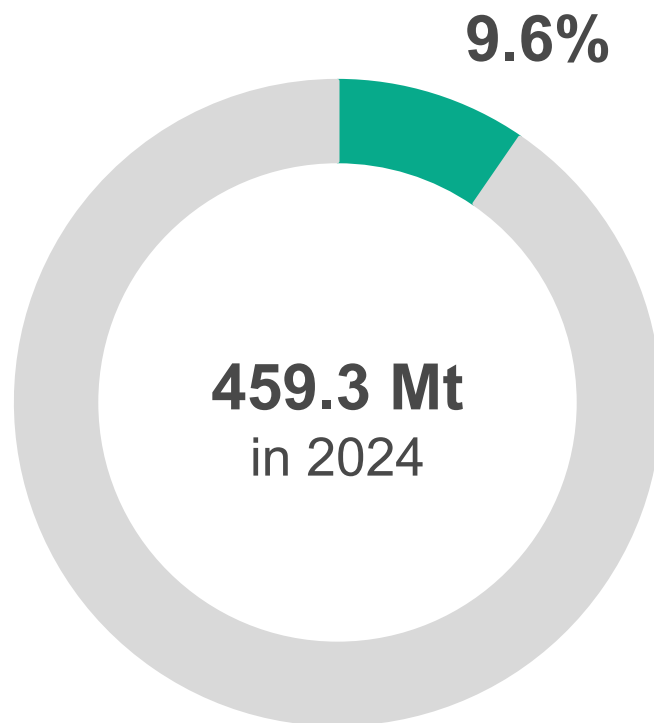
Circular plastics production slows down amidst sharp decline in overall plastics production



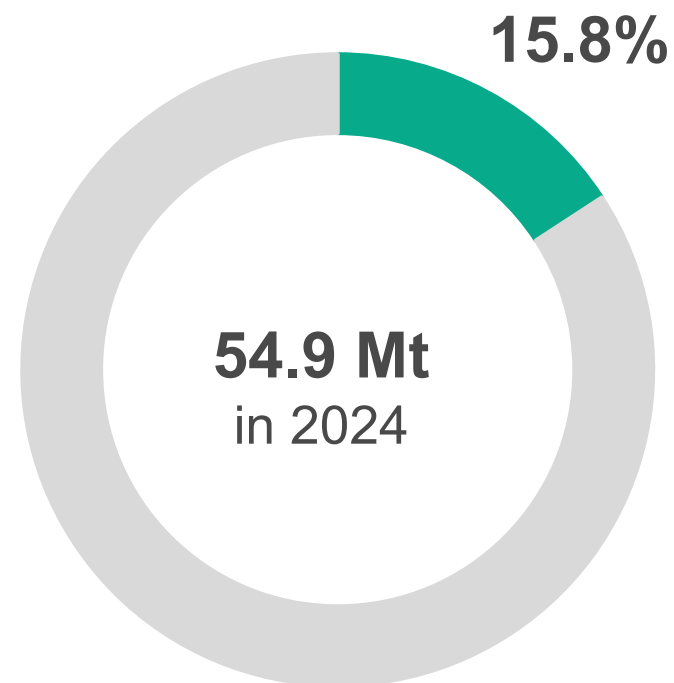
- European plastics **production declined** (-6.8% versus 2022).
- Sharp decline in fossil-based plastics production (-8.3% vs 2022).
- **Circular plastics production:** annual growth declined from 13.6% in 2022 to only 1.2% in 2024.
- By contrast, annual growth in global circular plastics production accelerated from 5% to 7.7%.

Europe still maintains the largest share of circular plastics

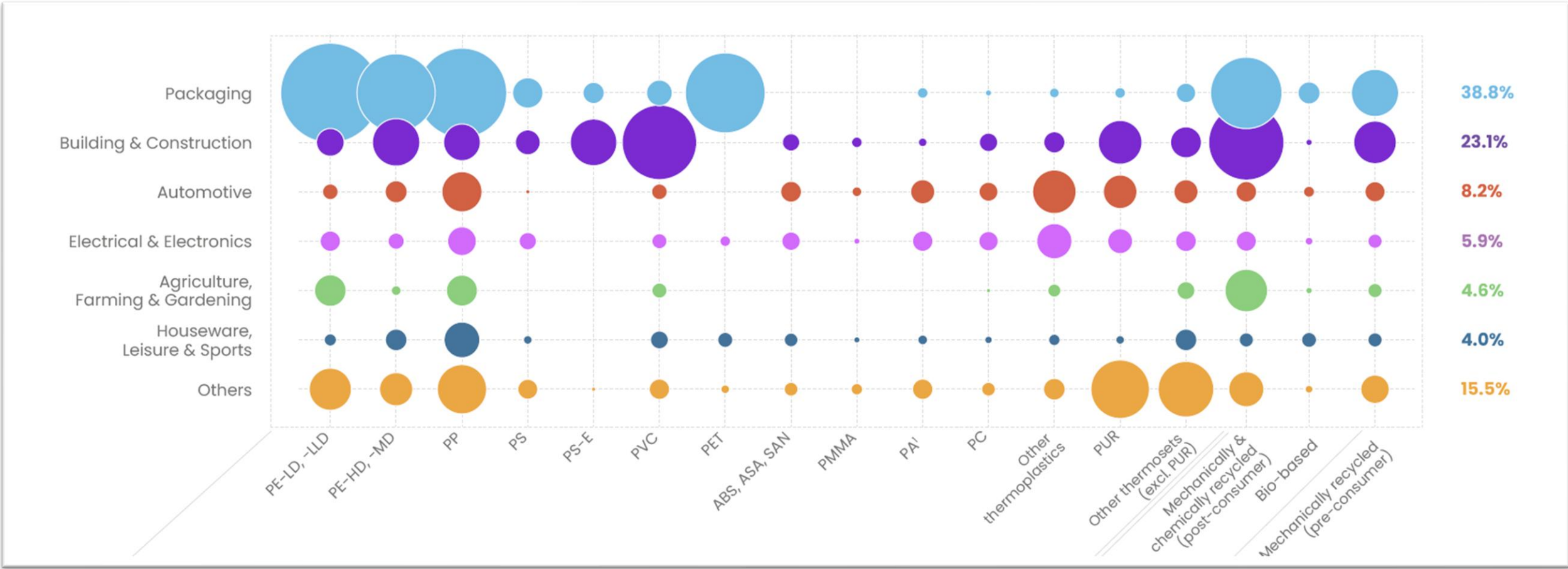
Circular plastics share in global production



Circular plastics share in European production



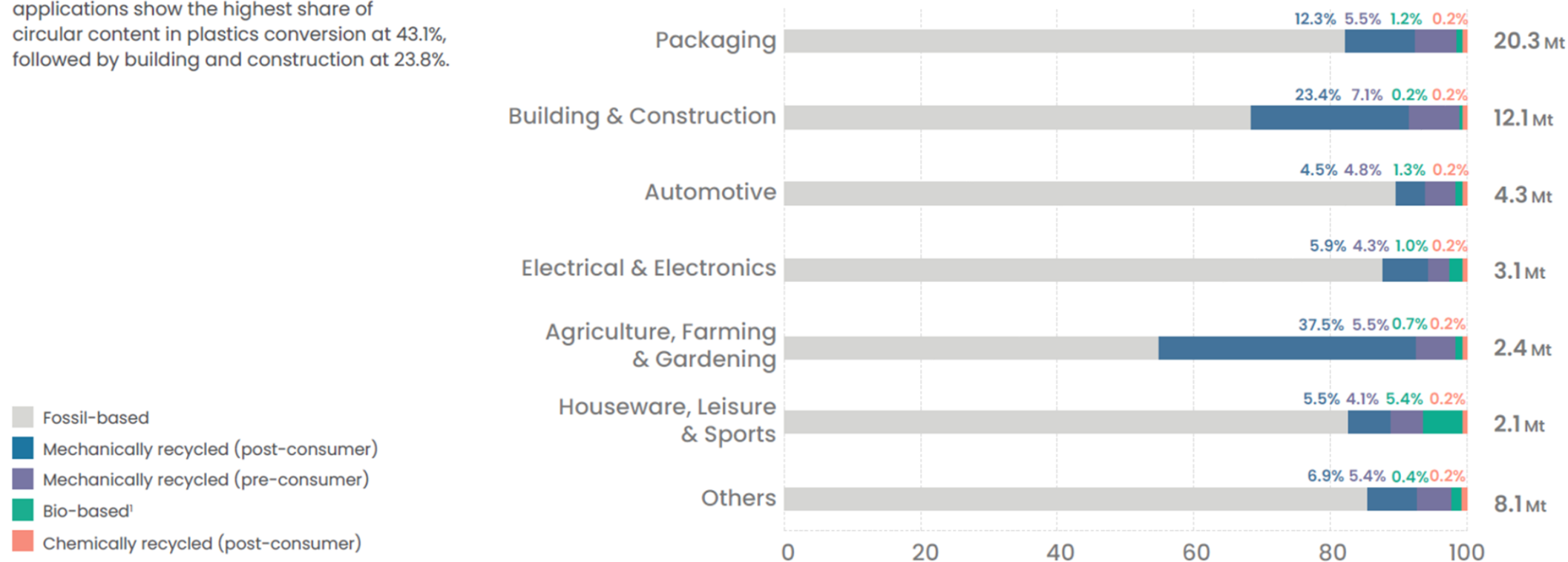
European plastics conversion matrix



Source: “Circular Economy for Plastics – A European Analysis 2026” - © Plastics Europe

Circular plastics in conversion

Agriculture, farming and gardening applications show the highest share of circular content in plastics conversion at 43.1%, followed by building and construction at 23.8%.



Some of the challenges we faced along the way



External partners / suppliers – challenge us vs. write what we ask you to

Ambition & external expectation vs. industrial reality

Data collection (confidentiality, antitrust, definitions, alignment with existing corporate initiatives), reporting on progress

Role of new / emerging technologies & maintaining technology neutrality / openness to all pathways for decarbonisation and circularity

Where industry needs to change vs. where we need to better convince on what we are already doing

Finding consensus & realities of working in a trade association among competitors

Hungry for more data? Check out our brand new data hub





English - EN

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Knowledge hub

13
Infographics

72
Publications

28
Videos

11
Market data entries

98
Total entries

Plastics – the fast Facts 2024 featured data

"Plastics – the fast Facts" 2024 shows 2023 preliminary global and European plastics production. It also provides 2023 European plastics industry's key economic figures, trade balance and to

Plastics production comparison

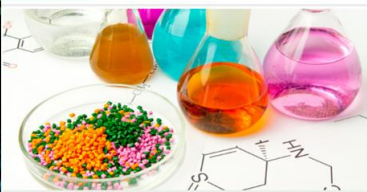
	World plastics production	VS	European plastics production
2019	370.7 Mt		62.3 Mt
2023	379.8 Mt		

Post-consumer recycled plastic increased by 57.1% since 2018

April 2022

ReShaping Plastics

PATHWAYS TO A CIRCULAR, CLIMATE NEUTRAL PLASTICS SYSTEM IN EUROPE



Chemical Recycling and Mass Balance explained

Download



The Circular Economy for Plastics

European Analysis



Designing products so they can be recycled