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Plastics Europe's Roadmap “The Plastics Transition”

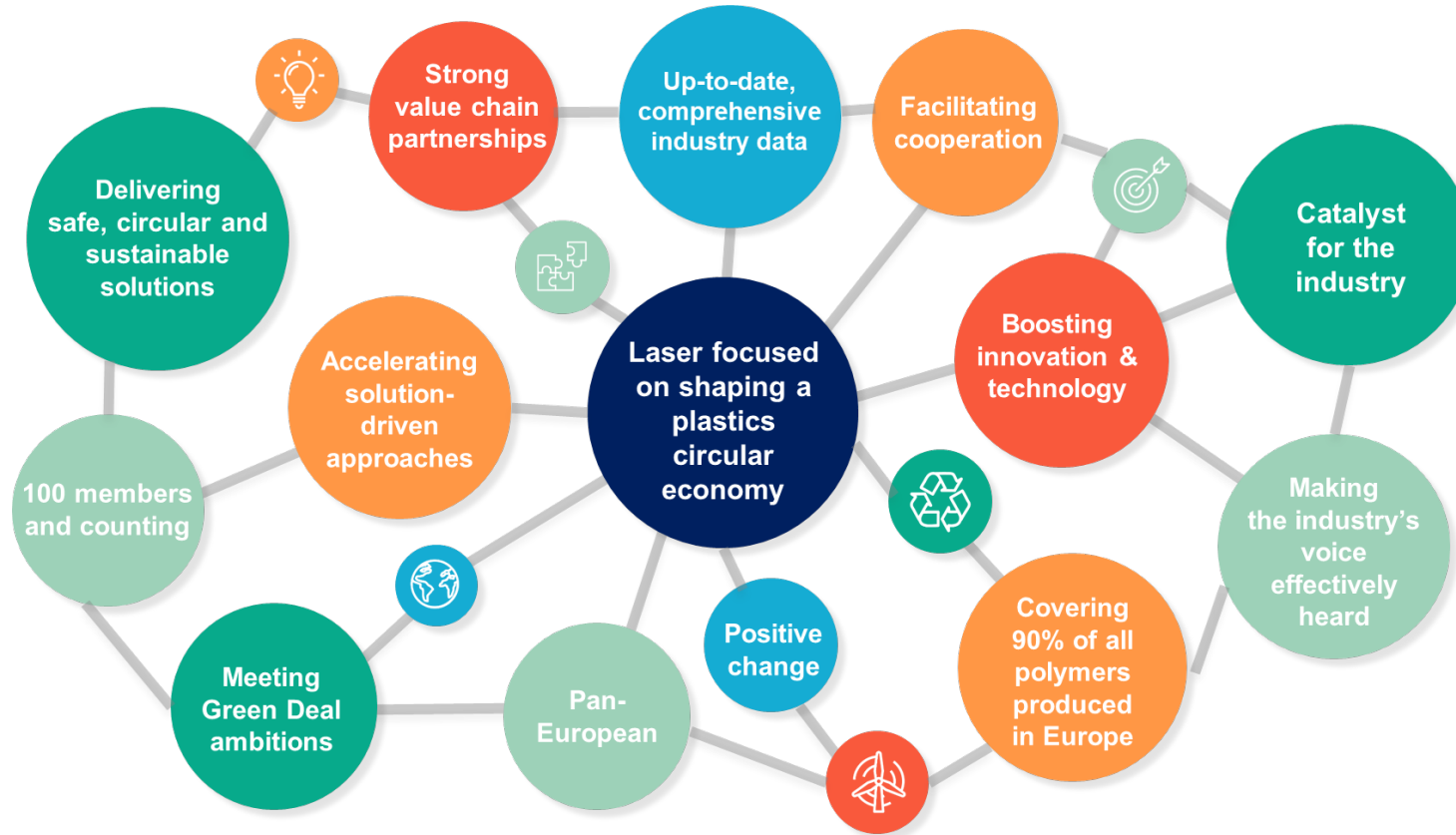
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- European & international environmental policy expert.
- Policy specialisms: Chemical control, plastics and microplastics.
- Previous experience: Fast moving consumer goods, regulatory & scientific consultancy & European civil service.
- Education: Bachelor's Degree in Chemistry, Master's Degree in Political Science.



Who Are We?

- Plastics Europe is lots of things!
- But in summary, Plastics Europe is the pan-European association of plastics manufacturers.
- We represent over 90% of all polymers production across the EU27 member states plus Norway, Switzerland, Turkey and the UK.
- And our members make “plastic pellets”.

An industry rich association: Full members



Representing over 90% of all polymers production across the EU27 member states plus Norway, Switzerland, Turkey and the UK.

Status: September 2022



An industry united around a common vision

Our starting point



Our North Star





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

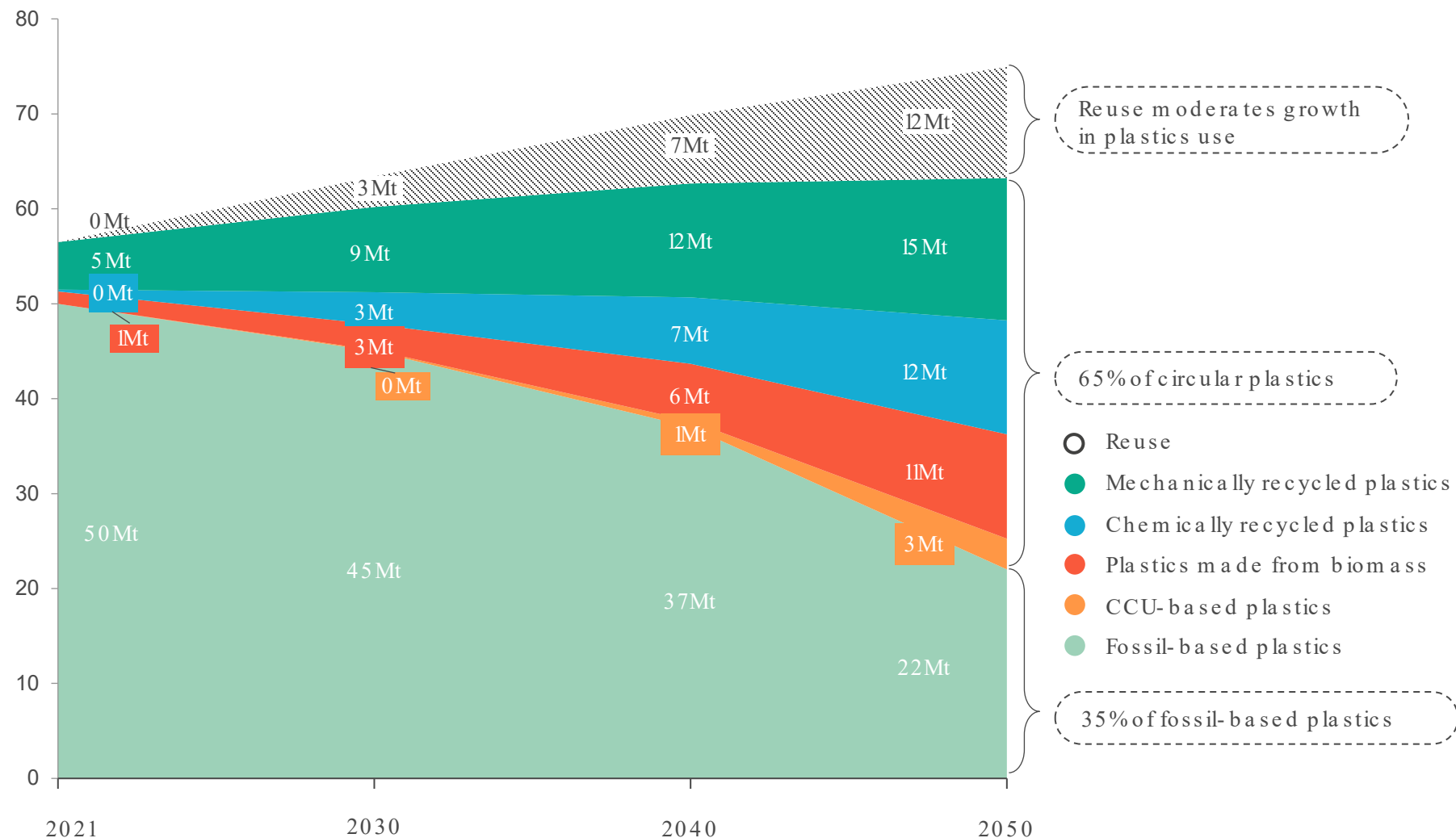


WE FOSTER SUSTAINABLE USE OF PLASTICS BY

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

Circularity – ambitious but achievable

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

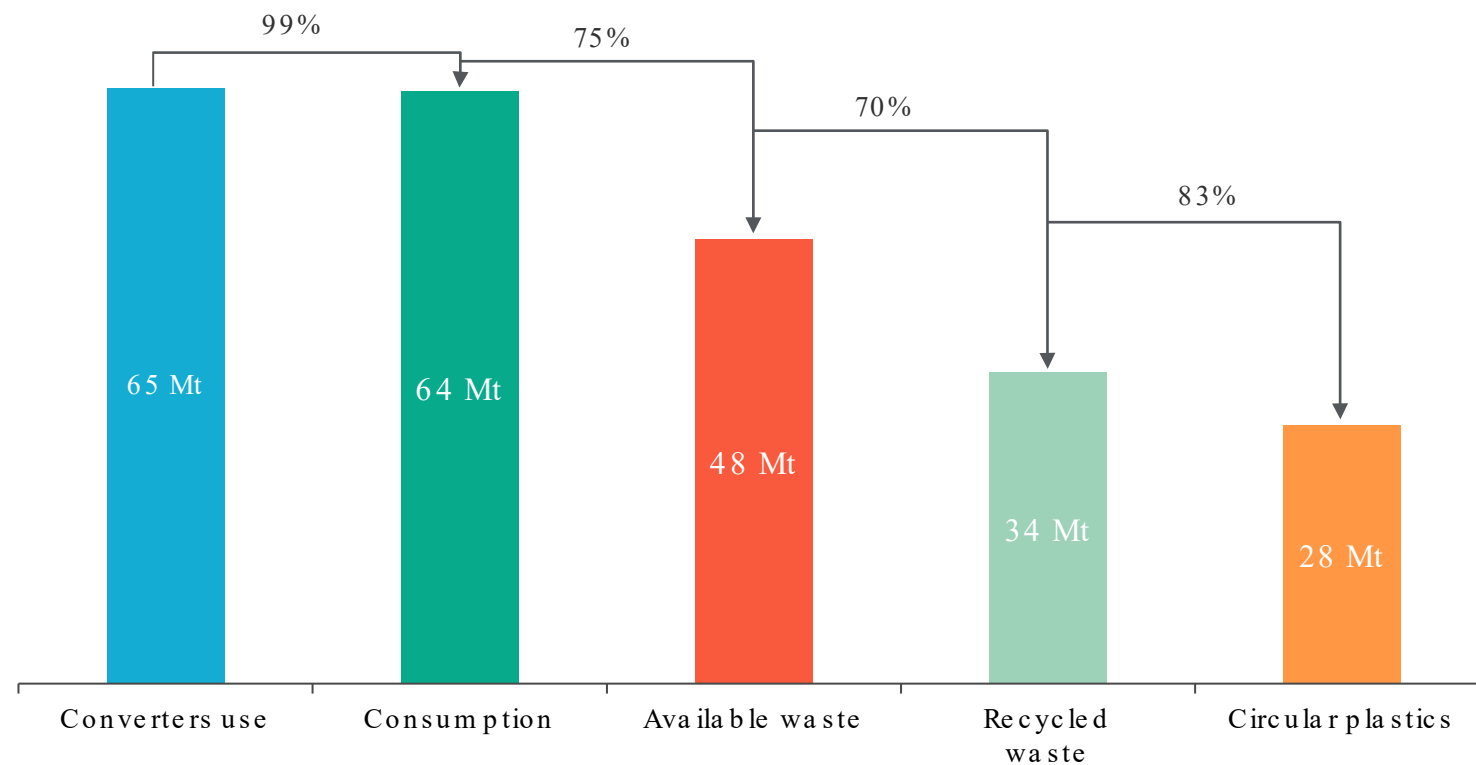


Key takeaways

- 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

Improving waste collection and innovation in recycling are key for circularity

Projected flow of recycled plastic waste
In Mt, 2050 estimates (Deloitte analysis, 2023)



Key takeaways

- The elements projected in this **figure drive the flow of recycled plastics waste** and constrain the availability of recycled feedstock for circular plastics
- Current converter use is slightly larger than consumption of plastics (factor 1.01), which is **assumed to remain constant over time**¹
- The **identified streams of plastic waste are probably an underestimation of real amounts**. To account for these 'missing plastics', a waste arising rate of 75% is assumed²
- European recycling rates are assumed to rise to 70% in 2050, **more than doubling the current average rate in the EU**, leading to 35 Mt of recycled plastic waste³
- Due to **technology improvements, development of more efficient solutions and efficiency gains**, process losses in recycling are estimated to improve to 17%, leading to 28 Mt of recycled content⁴
- Achieving this ambitious projected recycled content goal requires the **combined efforts of many stakeholders**, from partners throughout the value chain to policymakers⁵

¹Plastics Europe (2021)

²Average of ReShaping Plastics (2022) Material Economics (2021), SystemIQ (2022) and OECD (2022),

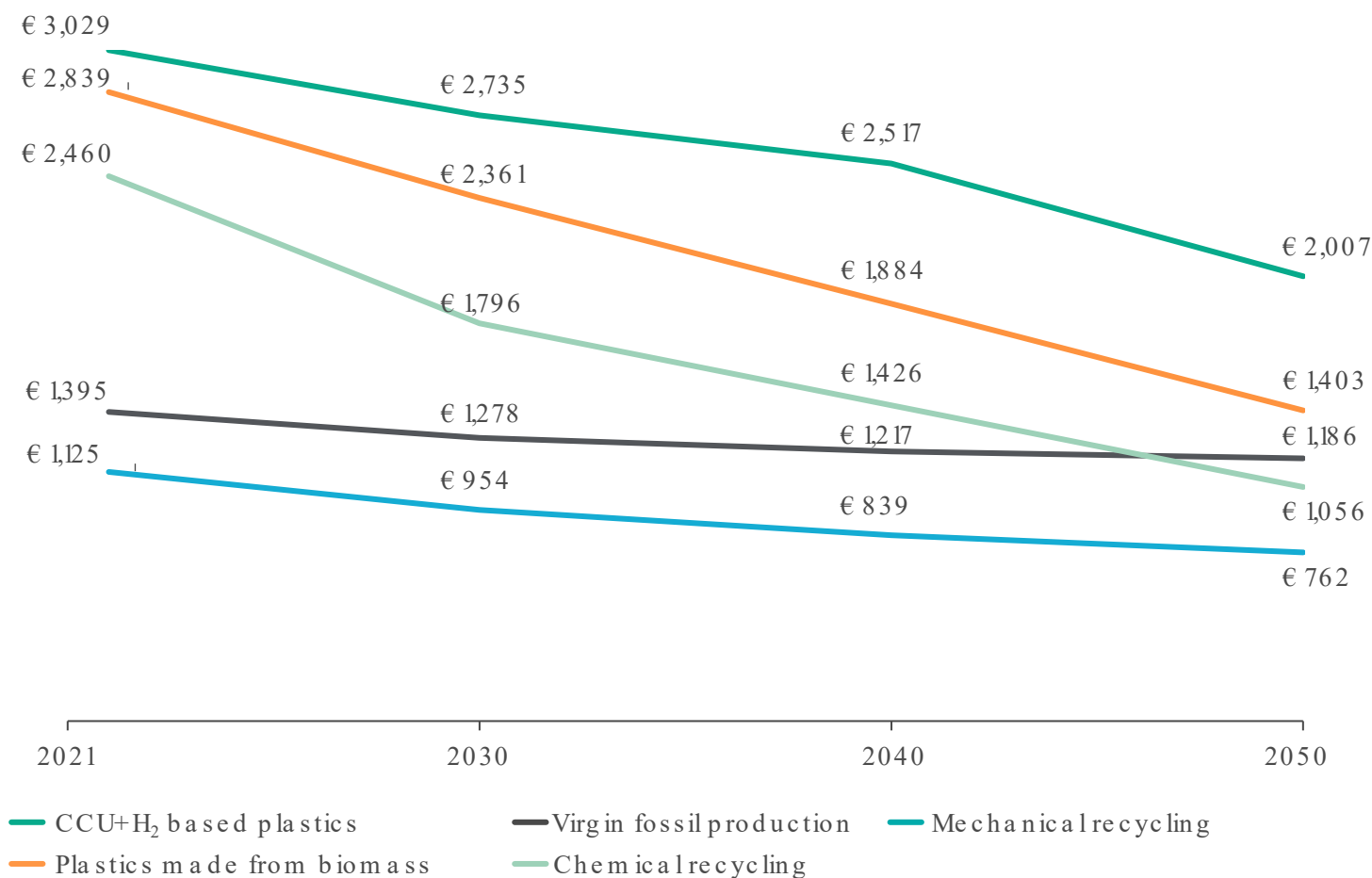
³OECD (2022) and ReShaping Plastics (2022),

⁴European Commission, TU Denmark (2021), European Commission (2021)

Benefits of scale and learning effects lead to cost efficiency improvements

OPEX evolution of production technologies²

In € per tonne produced, 2021-2050 estimates (Deloitte analysis)



Key takeaways

- The OPEX spread between fossil-based and mechanically recycled plastics is expected to increase, with a steady expected cost decline for mechanical recycling of 32% towards 2050
- The operational cost of chemical recycling and plastics made from biomass is expected to become **cost competitive with virgin fossil production by 2050**
- **Plastics from captured carbon are estimated to remain the most expensive technology** in 2050 (with an additional cost of 821 EUR/tonne compared to virgin fossil production)
- **Significant short- and medium-term investments are required to achieve this cost decline**, flagging the need for policy support in transforming the industry and infrastructure

¹The experience curve states there is a consistent relationship between the cumulative production quantity and the cost of production

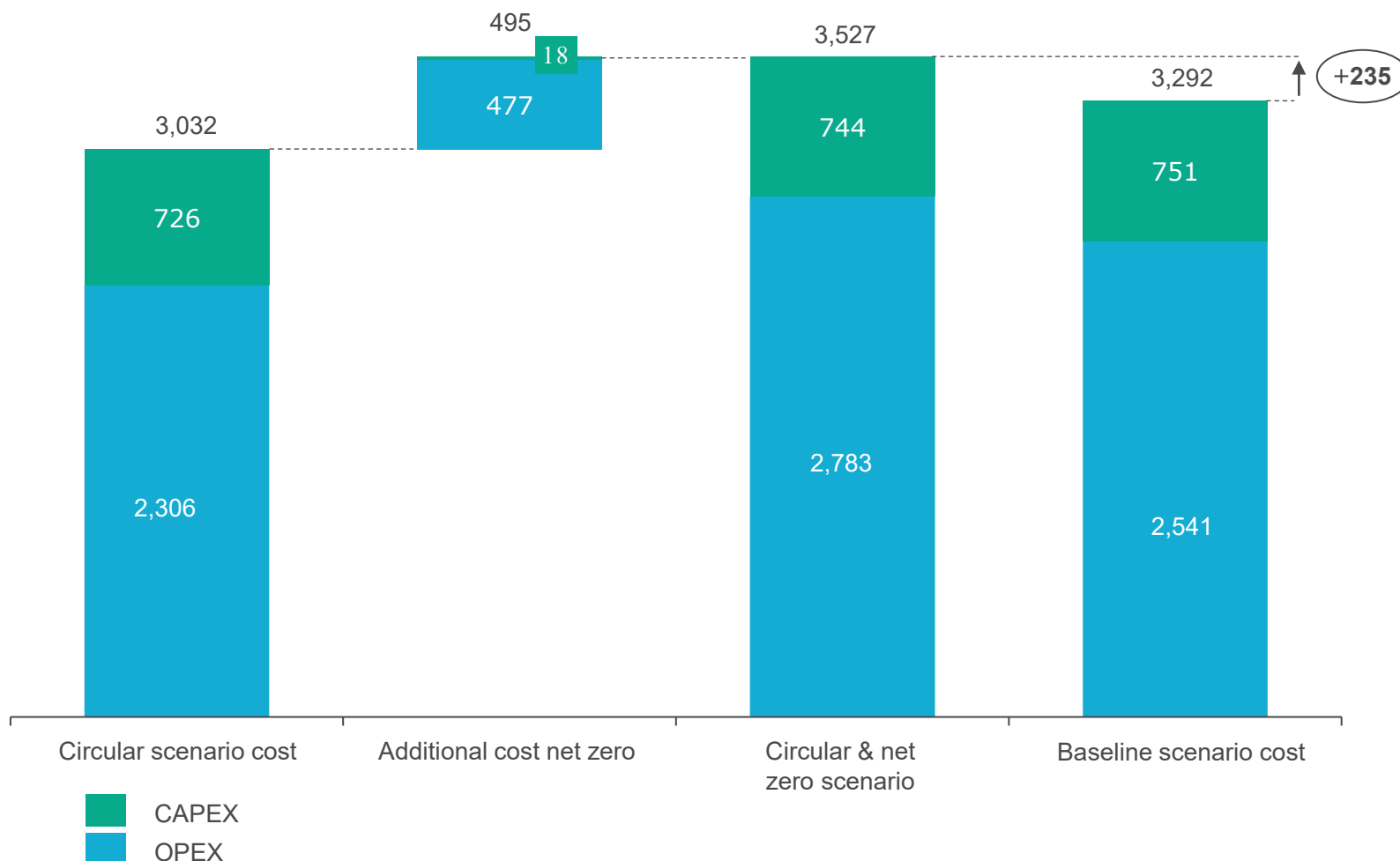
²Deloitte analysis based on Reshaping Plastics (2022). Includes monomer production, polymerisation and conversion



Transitioning the plastics system requires an estimated additional system cost of €235 billion

Additional CAPEX and OPEX of a circular and net-zero plastics scenario compared to baseline

In billion € (Deloitte analysis based on Reshaping Plastics, 2022)



Key takeaways

- The total cumulated system cost to reach 65% circularity and a net zero plastics lifecycle of **€ 3,527 billion**
- An additional system cost of € 235 billion, **driven by higher operational costs from alternative production technologies**
- The CAPEX of a circular and net zero system roughly equals the one from the baseline scenario, highlighting **the need to repurpose investments towards circular and clean technologies**
- **The projected, additional average system cost-per-tonne of plastics is € 290**, stressing the need to support European plastics producers to remain competitive in a global market while pursuing the net-zero vision.

¹Includes the additional cost of alternative monomer production technologies (steam crackers powered by renewable fuels, electric crackers and steam crackers with CCS capacity installed) compared to steam cracker



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 compliance 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 for circularity:

- **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.

Key Policy Drivers for Circularity



- Initiate a **Clean Transition Dialogue** with the plastics industry.
- Support **development** of all recycling technologies.
- Urgently define mandatory minimum **circular plastic content targets**.
- Impose **legal requirements** to develop recyclable plastics products for all sectors.
- **Funding** a European circular plastics economy/transition.
- Phase out **landfilling and incineration** of recyclable plastics waste.
- **Easier shipping of sorted waste & recycled feedstock** between EU Member States.
- Leverage the **EU Single Market**.
- Circularity as a key policy driver in the **Global Instrument to End Plastic Pollution**.



Asks to policymakers and the value chain

IMMEDIATE 2023 – 2025	SHORT TERM 2026 – 2027	MEDIUM TERM 2028 – 2030
• Develop an EU equivalent to the US Inflation Reduction Act to make circular plastics production in Europe competitive • Have a material-agnostic view when addressing single-use applications • Codify the fuels-exempt mass balance approach for chemical recycling • Harmonise requirements for recycled content measurement and certification • Impose minimum circular content targets and enforce implementation also for imported plastics • Improve waste collection and sorting and incentivise investments in recycling infrastructure by Extended Producer Responsibility (EPR) and other instruments • Phase out landfilling and incineration of recyclable plastic waste by harnessing instruments such as EU ETS and disposal taxes • Simplify and speed up permitting processes for circular and net-zero infrastructure • Make OCS-like requirements and certification legally binding for all plastics pellets handling actors in the EU	• Promote and enforce design for recycling to improve quality of collected waste • Make shipping of recyclable waste easier within Europe and treat recyclable plastic waste as a secondary raw material destined for recycling, which should be covered by product legislation • Harmonise definitions and improve statistics for plastic waste management • Provide economic incentives to use sustainable biomass as feedstock for plastics and endorse the mass balance approach for bio-attributed plastics • Endorse trustworthy certification systems and standards for the sustainable sourcing of biomass feedstocks • Increase citizens' awareness and leverage public procurement for circularity to create a market pull for circular products • Step up the research for CCU • Include the industry in the impact assessment of the Carbon Border Adjustment Mechanism (CBAM) • Increase renewable energy capacity drastically	• Enhance the quality and quantity of collected biowaste suitable as feedstock for plastics • Provide funding for low-carbon hydrogen production and transportation infrastructure • Create incentives and a legal framework to valorise CO₂ emission savings via CCU • Secure long-term contracts for production of basic chemicals from captured CO₂ • Make risk management systems for plastics systems obligatory for the whole plastics sector • Enable the free flow of electricity between EU countries and ensure competitive renewable electricity prices for industry • Reduce CO₂ emissions in plastics conversion

We need value chain support to:

- **Build on existing initiatives** with our value chain partners
- Use as a tool to **explore and establish shared positions** and partnership opportunities
- Ensure that it is seen by value chain as an **action plan towards policy makers to support them**
- Develop a **waste management system fit for a net-zero and circular economy**



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**.

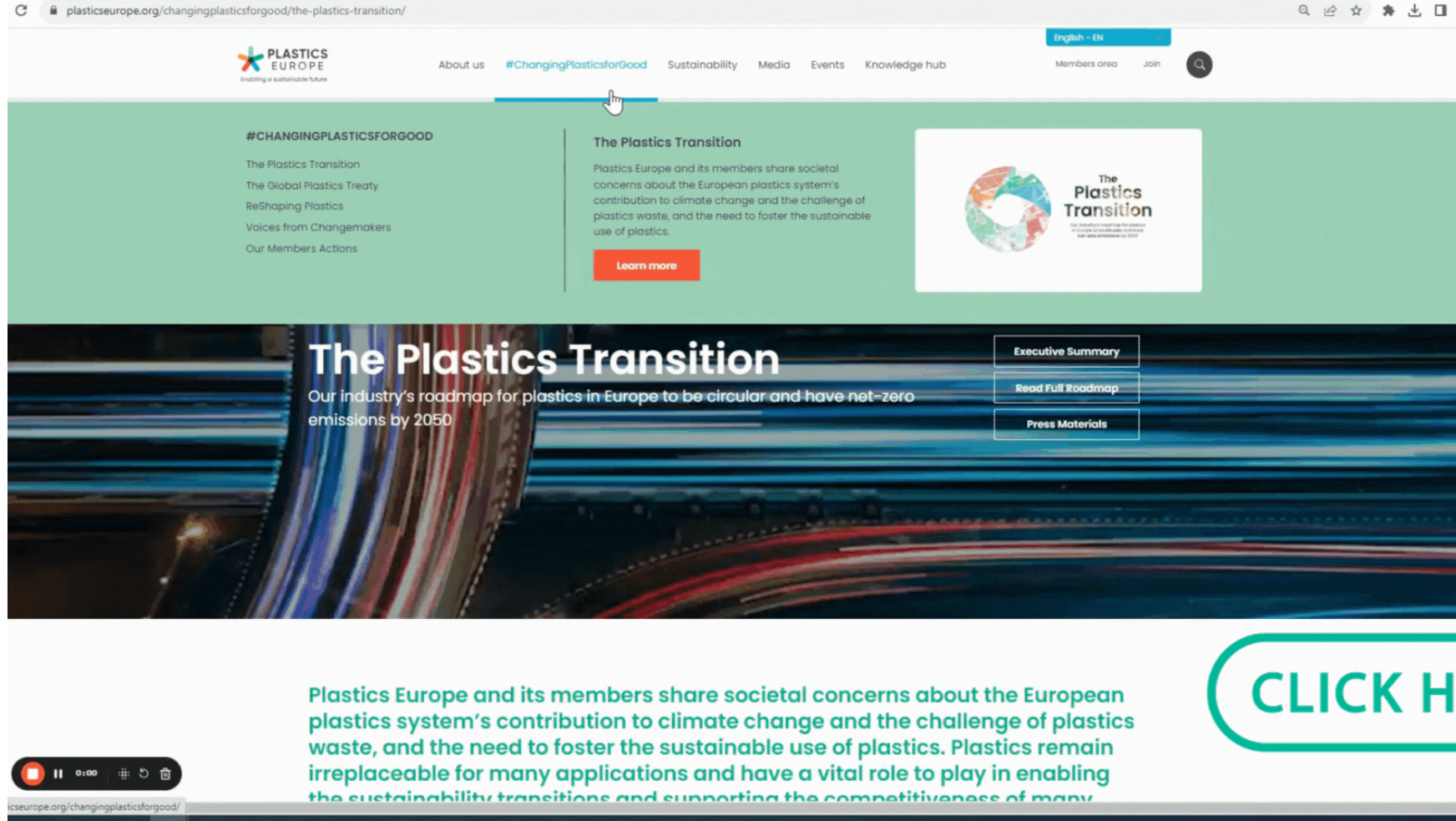


We will be **reporting back on our progress every two years**.



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

Find out more



The screenshot shows the website plasticseurope.org/changingplasticsforgood/the-plastics-transition/. The page has a green header with the PLASTICS EUROPE logo and navigation links: About us, #ChangingPlasticsforGood, Sustainability, Media, Events, Knowledge hub, Members area, and Join. A search icon is also present. The main content area is divided into two columns. The left column is titled '#CHANGINGPLASTICSFORGOOD' and lists links: The Plastics Transition, The Global Plastics Treaty, ReShaping Plastics, Voices from Changemakers, and Our Members Actions. The right column is titled 'The Plastics Transition' and contains a paragraph: 'Plastics Europe and its members share societal concerns about the European plastics system's contribution to climate change and the challenge of plastics waste, and the need to foster the sustainable use of plastics.' Below this paragraph is a red 'Learn more' button. To the right of the paragraph is a circular graphic with the text 'The Plastics Transition'. Below the main content area is a large video player with the title 'The Plastics Transition' and the subtitle 'Our industry's roadmap for plastics in Europe to be circular and have net-zero emissions by 2050'. The video player has a play button and a progress bar. To the right of the video player are three buttons: 'Executive Summary', 'Read Full Roadmap', and 'Press Materials'. Below the video player is a text block: 'Plastics Europe and its members share societal concerns about the European plastics system's contribution to climate change and the challenge of plastics waste, and the need to foster the sustainable use of plastics. Plastics remain irreplaceable for many applications and have a vital role to play in enabling the sustainability transitions and supporting the competitiveness of many...'. A large green button with the text 'CLICK HERE' and a cursor icon is overlaid on the bottom right of the video player.

<https://plasticseurope.org/changingplasticsforgood/the-plastics-transition/>

Thank you

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