



LOMBARD ODIER
I N V E S T M E N T M A N A G E R S

The plastics paradox and the forces driving circular solutions



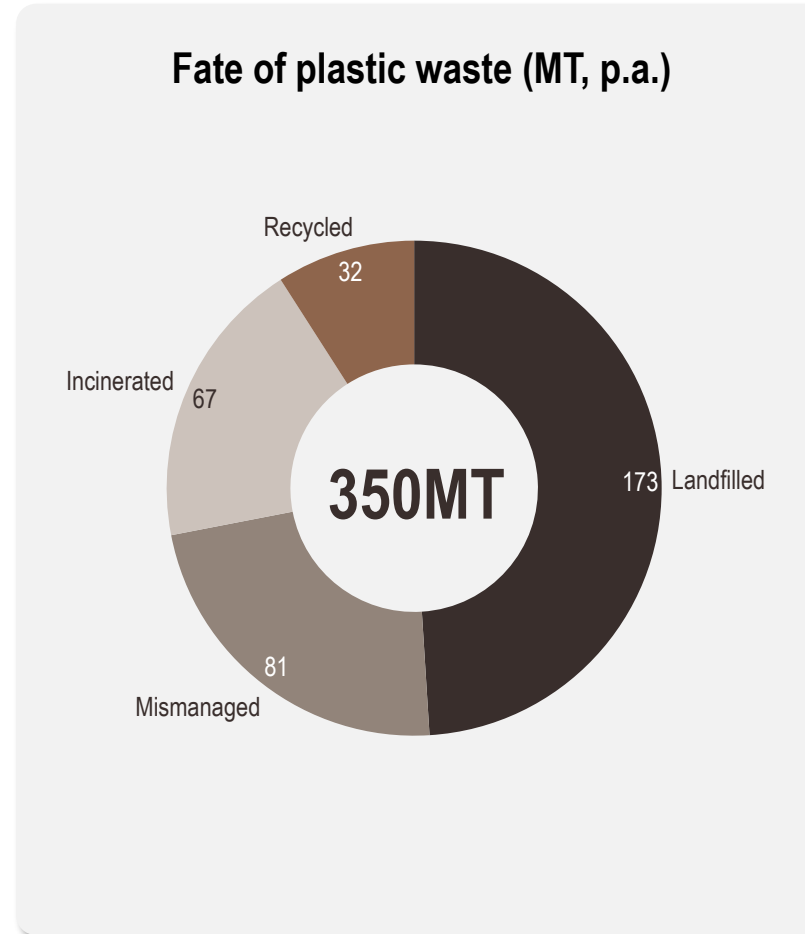
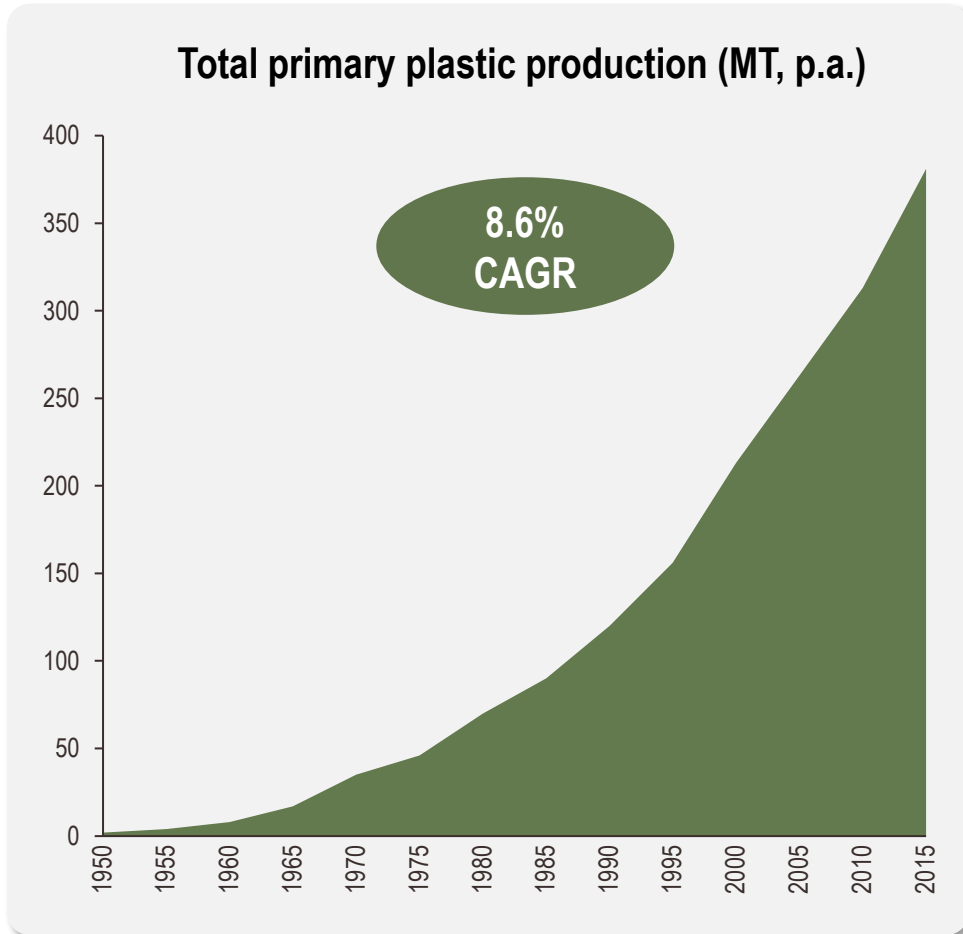
The plastics challenge – and it's solution
Unfolding of a global transition


LOMBARD ODIER
INVESTMENT MANAGERS


PLASTICS – A MODERN MARVEL AND A BUILDING BLOCK FOR EVERYDAY LIFE





PLASTICS ARE THE WORKHORSE OF MODERN SOCIETY – BUT ALSO A CHALLENGE



- 

7,200,000,000
humans
- 

3,100,000
Blue whales
- 

625,000
Airbus A380
- 

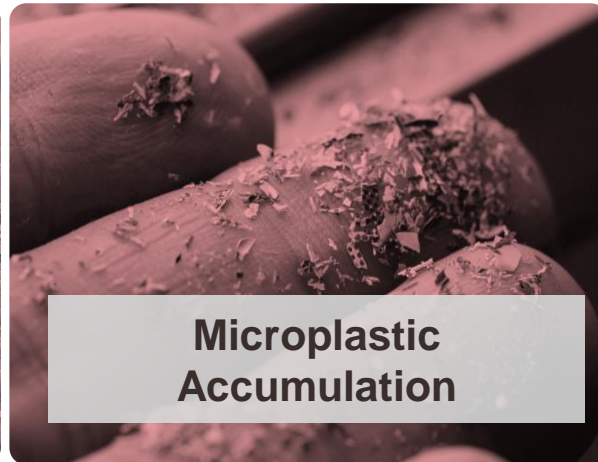
2,175
Opera houses

Source: LHS & MID: Geyer et al (2017), RHS: LOIM analysis

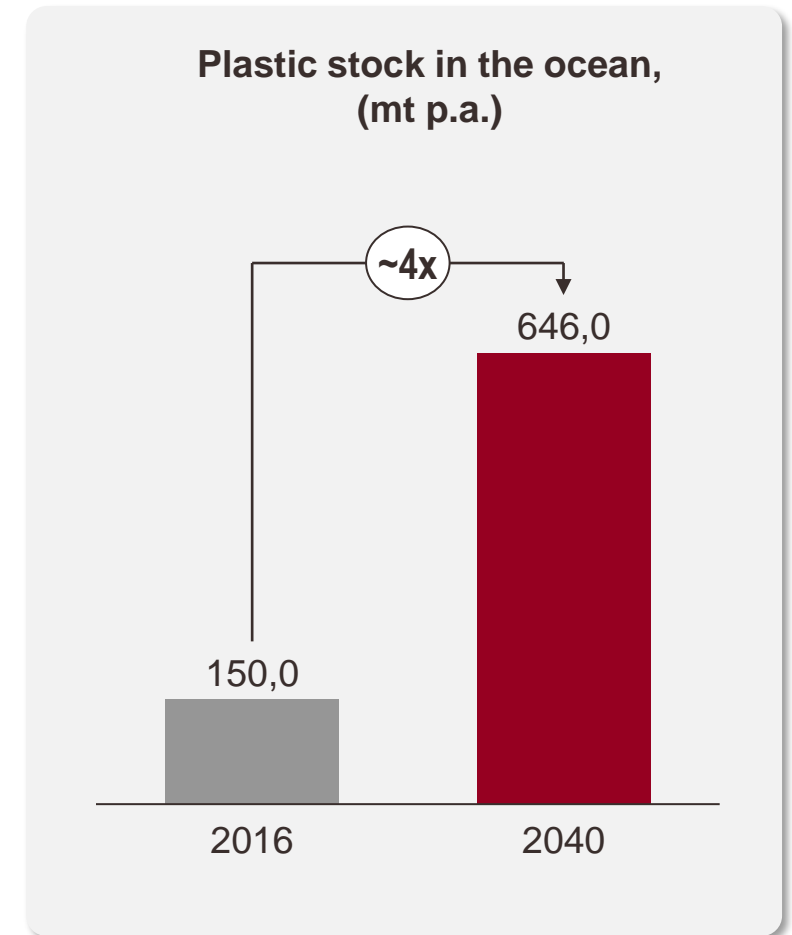
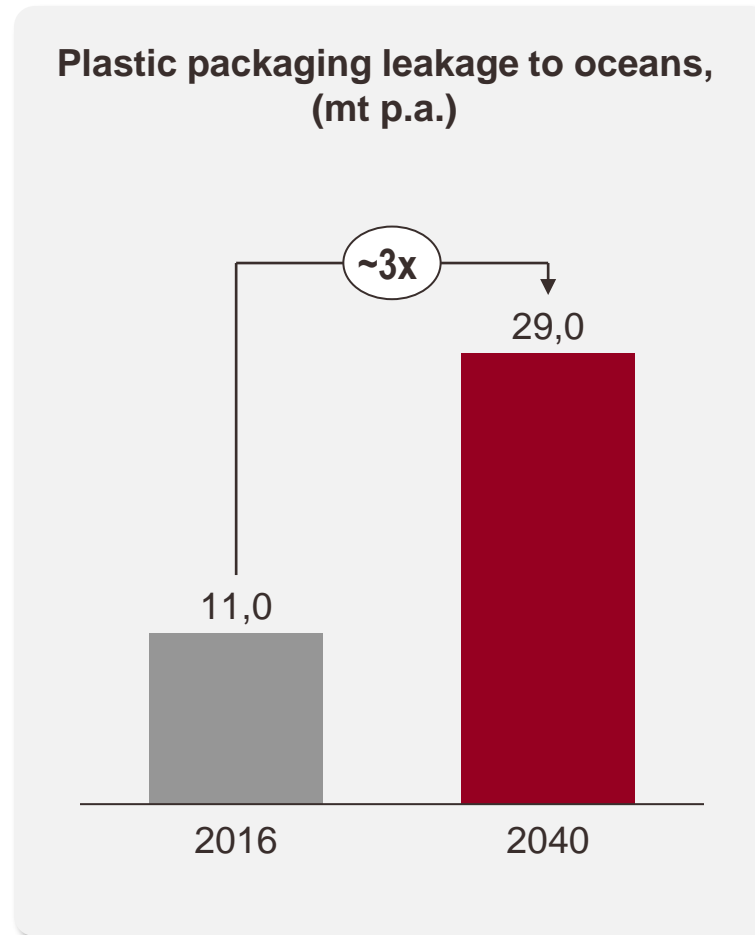
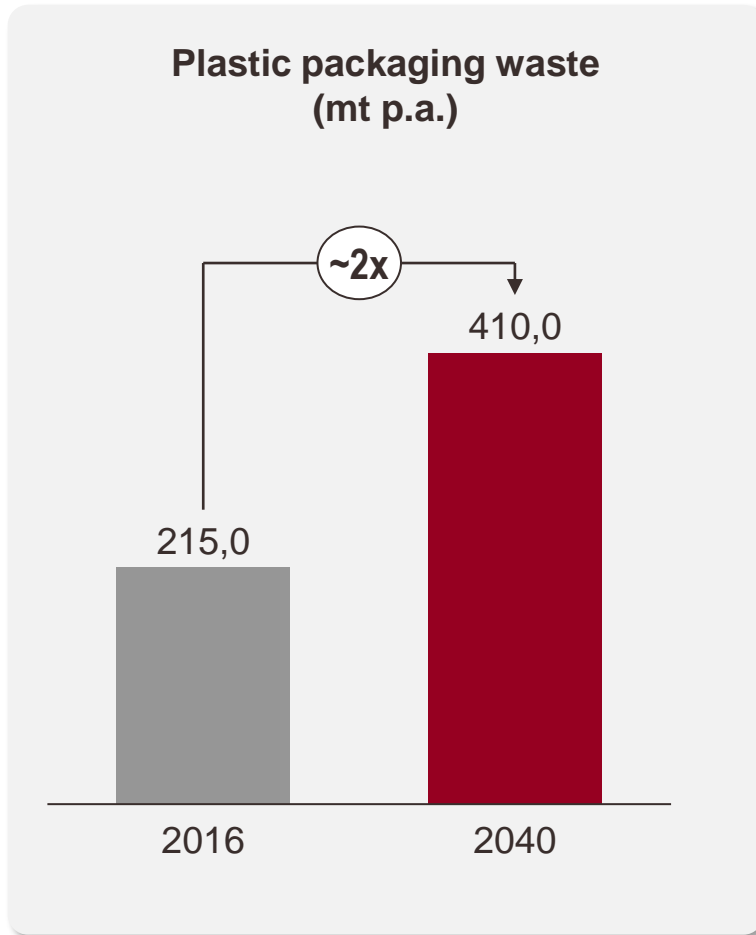
THE PLASTIC PARADOX.....



THE WAY WE MANAGE PLASTIC RESULTS IN SIGNIFICANT EXTERNALITIES



THE CONSEQUENCES OF A BUSINESS-AS-USUAL ARE GRUESOME

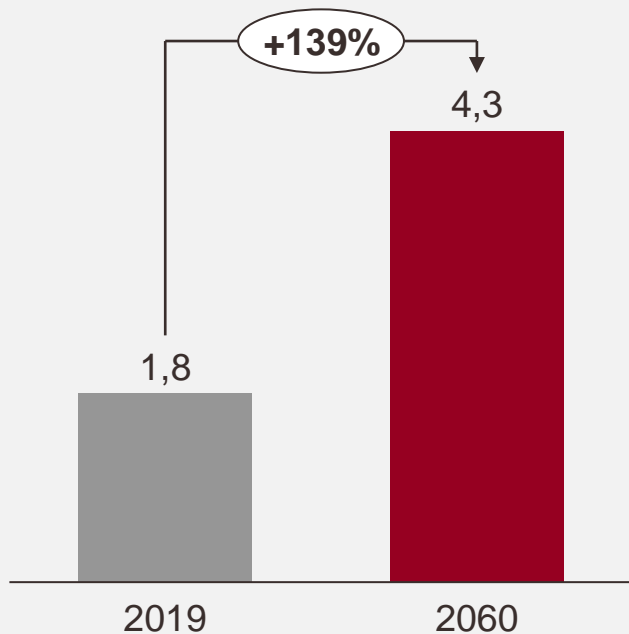


Source: Systemiq (2020): Breaking the plastic wave

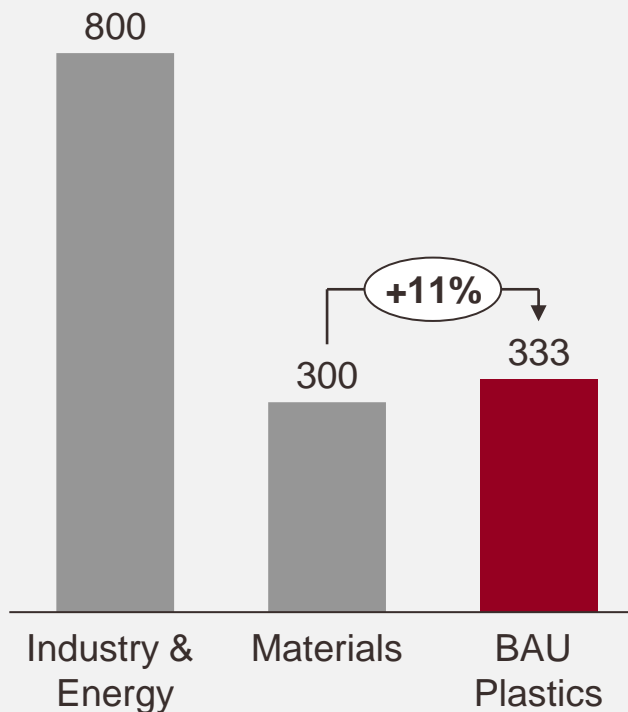
6 - Please read important information at the end of the document.

PLASTIC ARE A KEY DRIVER OF EMISSIONS

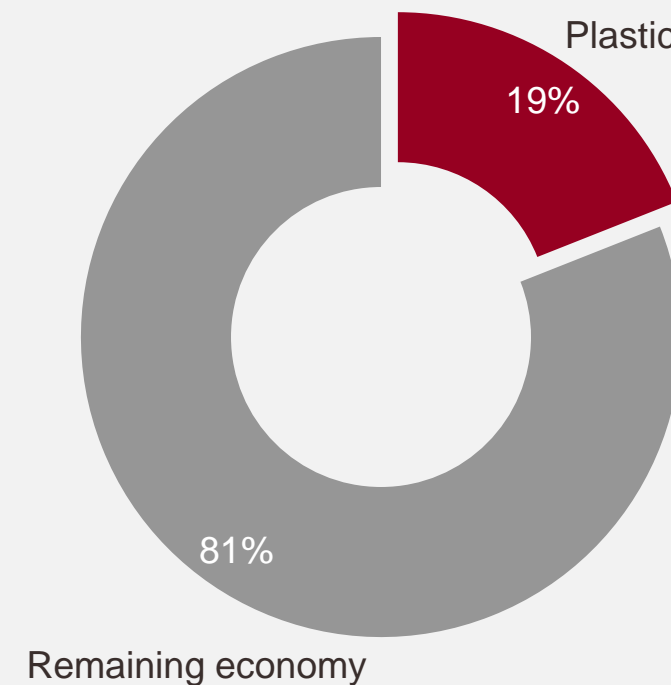
GHG emissions from production & disposal of plastics



GHG budget for different sectors, materials and plastics until 2100 (GT, cum.)

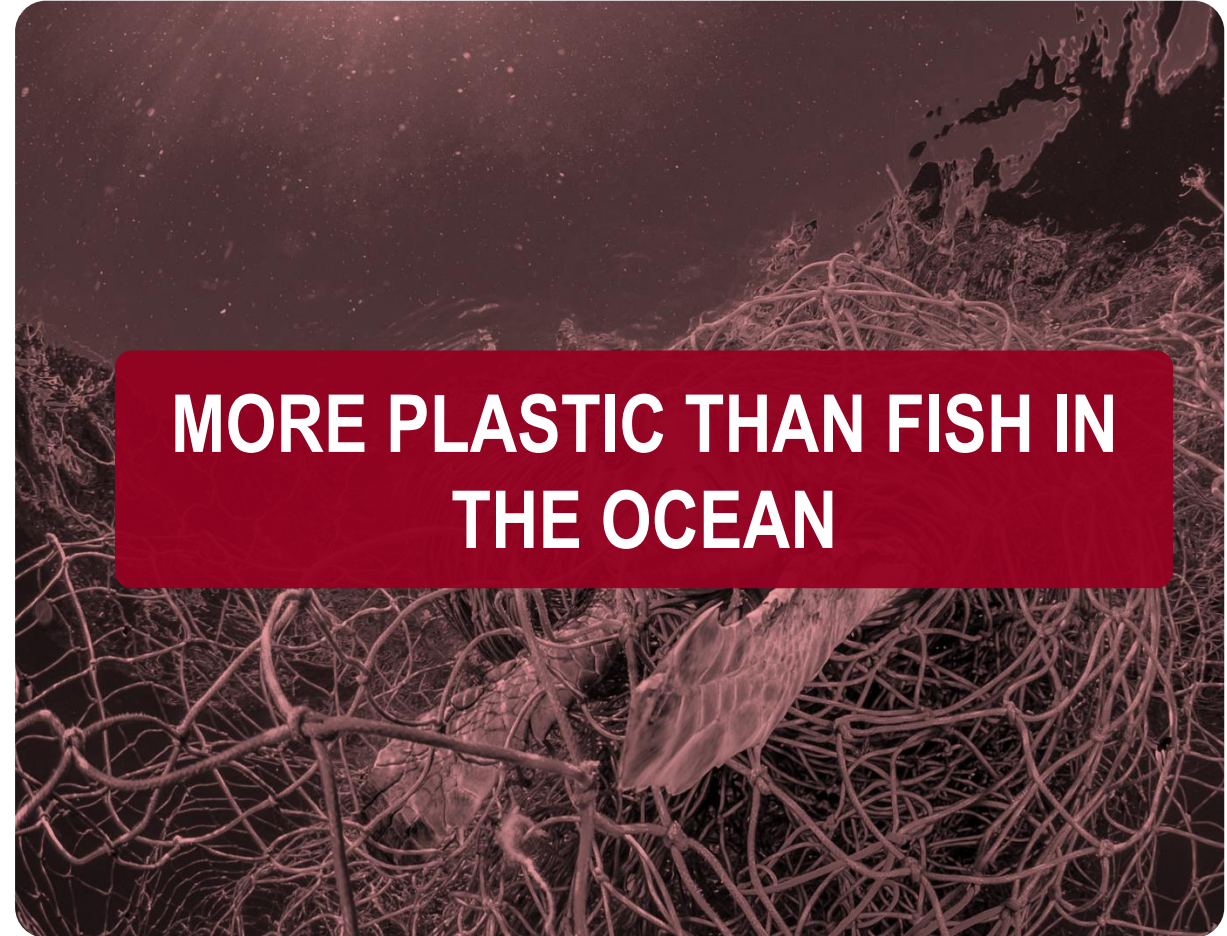


Potential emission from plastics system relative to global GHG budget by 2040 (% cum.)



Source: LHS: OECD (2022): Global Plastics Outlook – MID: Material Economics (2019): Circular Economy – A Powerful Force for Climate Mitigation – RHS: Systemiq (2020): Breaking the Plastic Wave

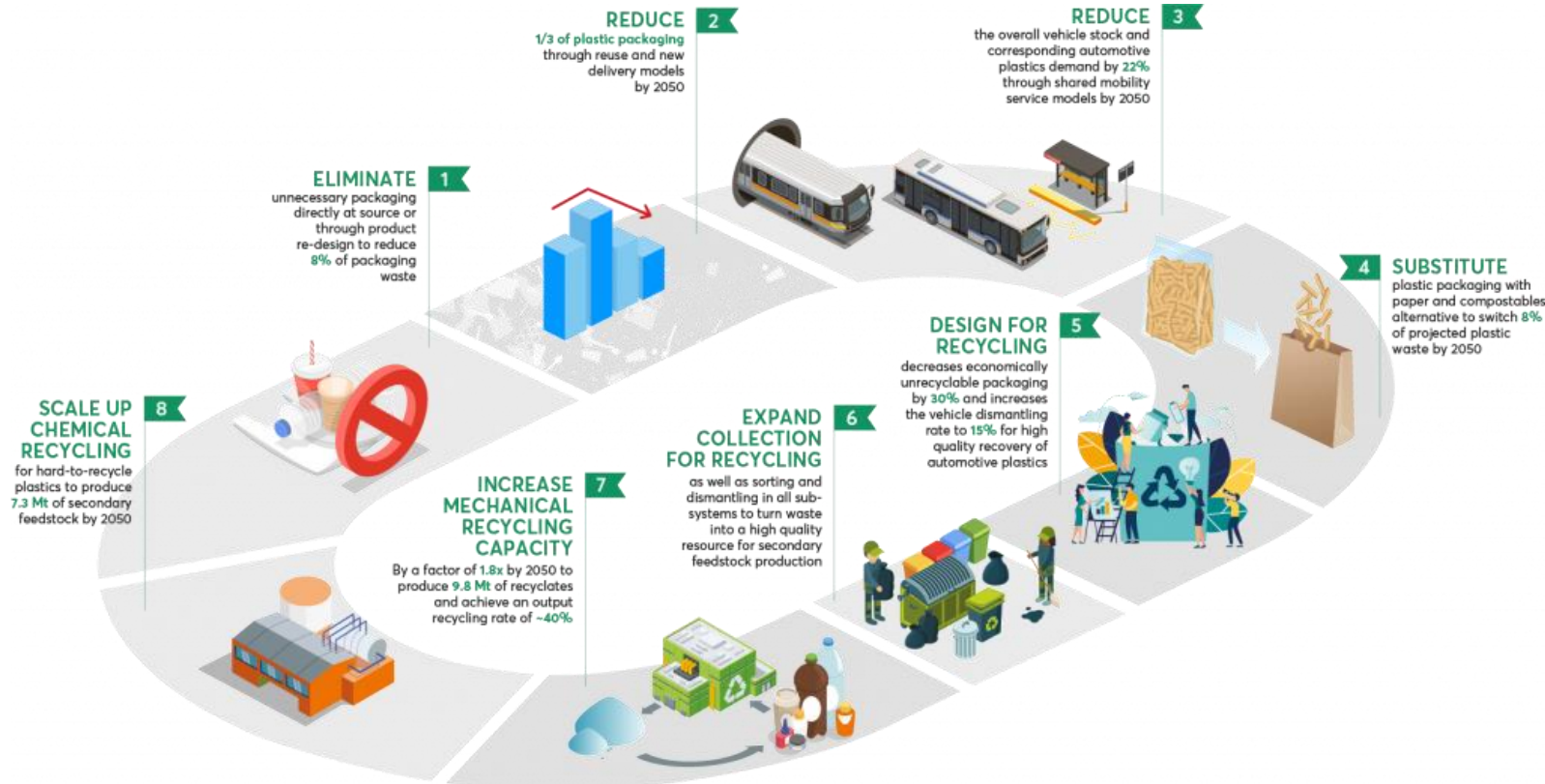
/ - Please read important information at the end of the document.



Source: EMF (2017): *The new plastics economy - Rethinking the future of plastics & catalysing action*

8 - Please read important information at the end of the document.

...BUT IT DOESN'T HAVE TO BE THIS WAY



IMPACT POTENTIAL

60%

of all waste is recycled

85%

reduction of leakage to nature

2.1tn

tons of GHG emissions saved p.a.

0.8%

of global GDP required

Source: LHS: Systemiq (2022): ReShaping Plastics; RHS: OECD (2022): Global Plastics Outlook: Policy Scenarios to 2060 – Global Ambition Scenario

POWERFUL FORCES ARE ACCELERATING MOMENTUM

POLICY AND REGULATION

Single-use plastic bans, extended producer responsibility, virgin plastic taxes, upcoming UN Global Treaty

NEW & STRONGER SUPPORT

Ex. EU taxes on virgin plastic to amount to EUR 6 to 8 bn per year¹



TECHNOLOGICAL INNOVATION

Improving economics, leveraging new technologies incl. AI and synthetic biology

CLEANER BECOMES CHEAPER

Ex. Bioplastic is a USD 15 bn market expected to triple in 5 years by 2028 growing at a 20% CAGR²

CONSUMER DEMAND

Willingness to pay green premia and growing demand for sustainability

RISING AWARENESS

Ex. 74% of consumers are willing to pay green premia³

INVESTORS

Growing conviction on sustainability is improving access and cost of capital

REDEPLOYMENT OF CAPITAL

Ex. Fundraising for private markets ESG funds tripled between 2020 and 2022, from USD 29 bn to USD 92 bn⁴

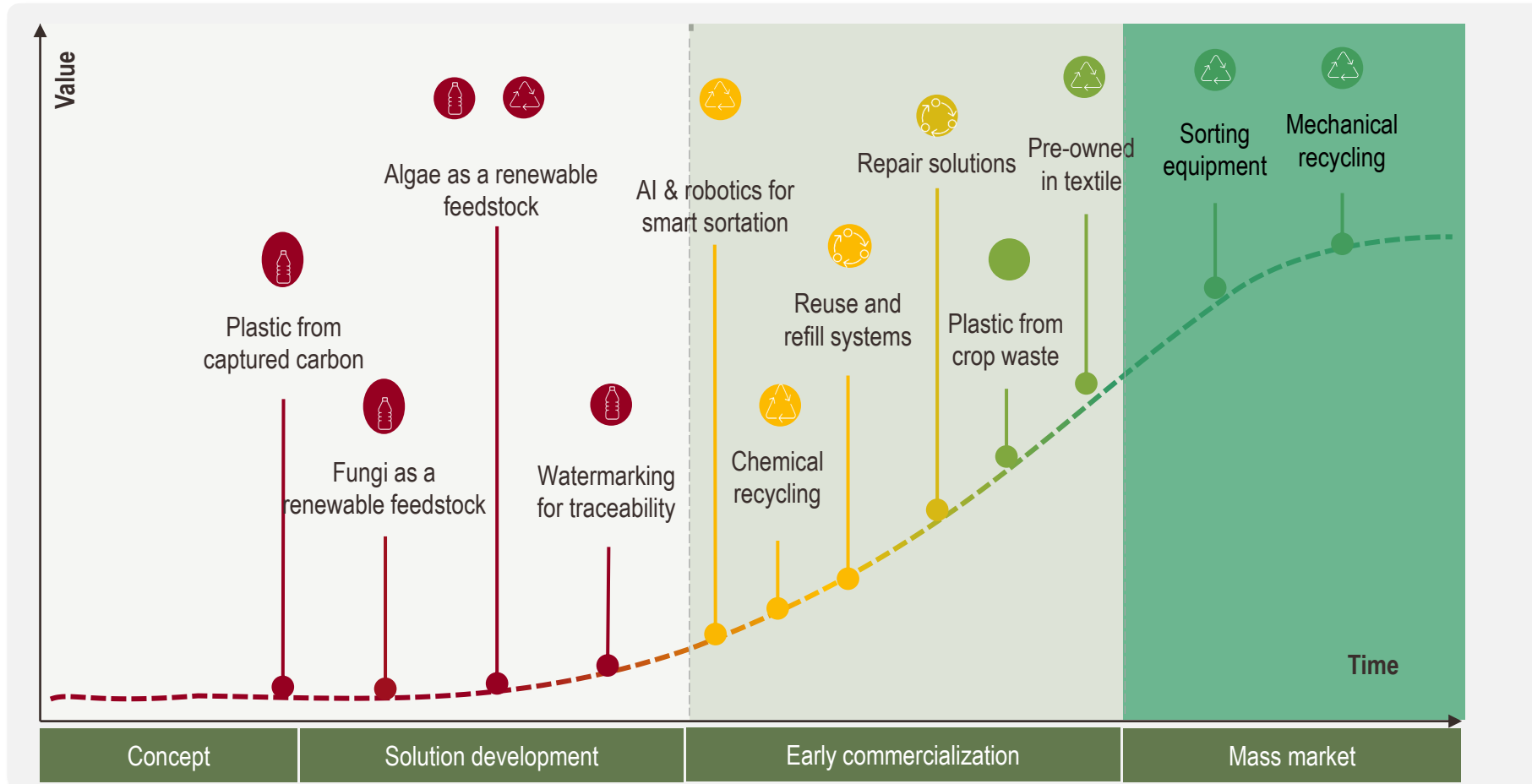
CORPORATE ACTION

Companies making commitments on use of recycled plastic, driving up demand and prices

NEW MARKETS

Ex. The commitment of top 10 consumer brands to use recycled content in their packaging alone represent 2,1 mn T for 2025⁵

DRIVING DEMAND FOR NEW SOLUTIONS, ACCELERATING ADOPTION



The Plastic Technology S-Curve

- Solutions are being accelerated by policy, consumer demand, and technological development
- Adoption typically follows an S-curve – slow to start and rapid ramp up past a 5-10% adoption tipping point

Key criteria for a S-curve adoption:

- Performance
- Cost
- Access & availability

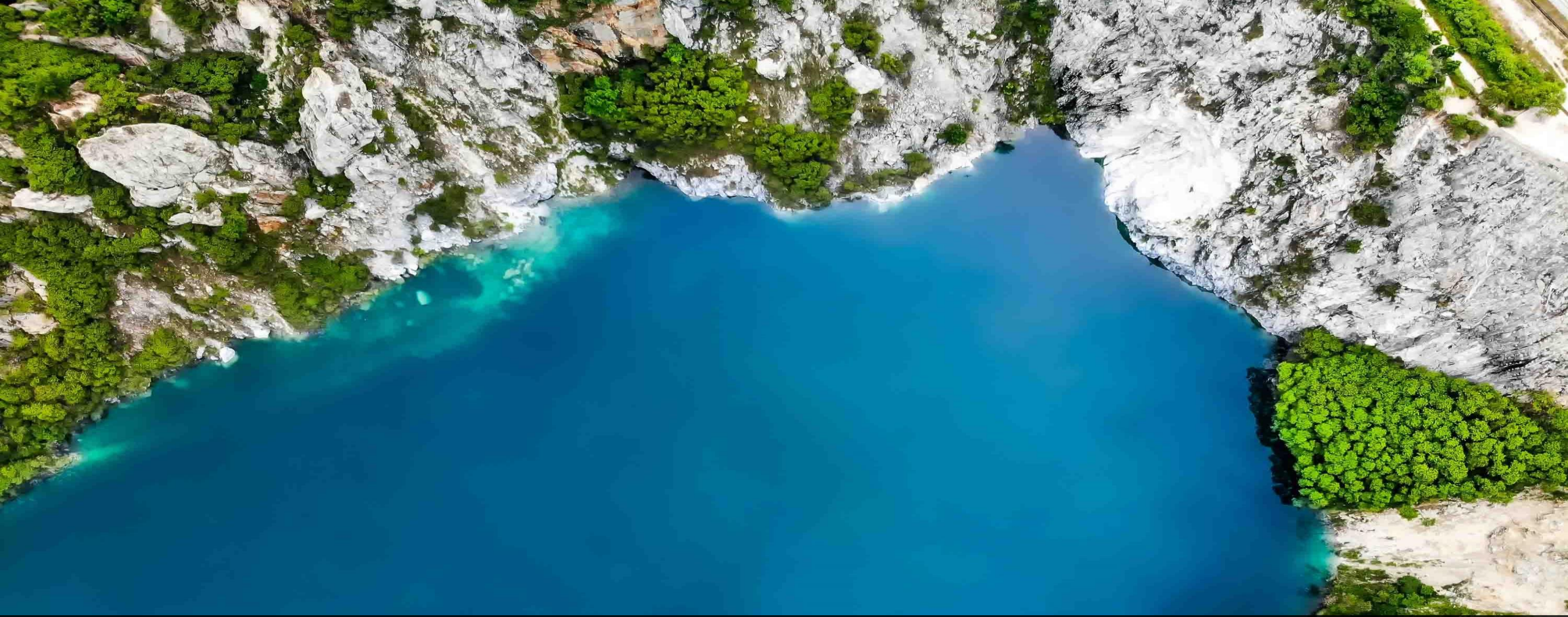
THESE FORCES PROVIDE AN UNPRECEDENTED MOMENTUM FOR PLASTIC CIRCULARITY



WHAT HAPPENED IN ENERGY OVER 20-30 YEARS IS HAPPENING MUCH QUICKER IN PLASTICS

Source: LOIM. For illustrative purposes only

12 - Please read important information at the end of the document.



Investment thesis targeting plastic circularity

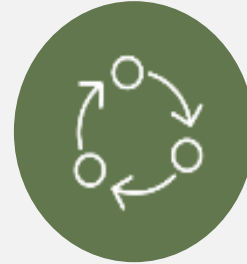
LOMBARD ODIER
INVESTMENT MANAGERS



INNOVATIVE PLASTIC MATERIALS

Sustainable materials: Low carbon, higher recyclability, bio-sourced, biodegradable

Traceability solutions
Additives enabling circularity



NEW USAGE MODELS

Reusable packaging
Reuse and refill systems
Life extension (second-hand resale, repair, remanufacture)
B2B and B2C



IMPROVED COLLECTION, SORTING AND RECYCLING

Operators, technology owners and equipment manufacturers
Digital enablers (marketplaces, Ai-sorting, robotics, ...)
Mechanical and chemical recycling



INNOVATIVE PLASTIC MATERIALS

Sustainable materials: Low carbon, higher recyclability, bio-sourced, biodegradable

Traceability solutions

Additives enabling circularity



NEW USAGE MODELS

Reusable packaging

Reuse and refill systems

Life extension (second-hand resale, repair, remanufacture)

B2B and B2C



IMPROVED COLLECTION, SORTING AND RECYCLING

Operators, technology owners and equipment manufacturers

Digital enablers (marketplaces, Ai-sorting, robotics, ...)

Mechanical and chemical recycling

INNOVATIVE PLASTIC MATERIALS

OPPORTUNITIES

- Alternative sources of carbon will be a significant feedstock by 2040
- Traceability of materials will emerge as a key theme, but requires coordination across the value chain
- Plastic materials with improved end-of-life performance will grow across many categories
- Winning solutions will complement existing **infrastructure** and demonstrate their ability to scale IP while managing technical risks and impacts

OUT OF SCOPE

- Materials with food or land-competition, lacking scientific evidence or unfavourable CO₂ balance
- Materials that result in secondary effects, incl. increased food waste or complex end-of-life collection and management needs

SIZING THE OPPORTUNITY SPACE – EXAMPLES

5MT biomass and **1.7MT** CO₂ feedstock demand in the EU by 2040

\$729mn investments in bioplastics and CO₂ feedstock start-ups globally between 2015-19

\$16bn investment required in biomass and CO₂ feedstock in the EU between 2020-40

50% of mechanical recycling losses in Automotive sector can be avoided via Design-For-Recycling

COMPANIES - EXAMPLES



Develops sustainable and innovative microencapsulation solutions for various industries, with better performance without microplastic pollution



Precise thermal management solutions, optimizing energy efficiency, recyclability and performance in plastic production



Produces plant-based PET, from waste biomass with superior properties compared to fossil PET



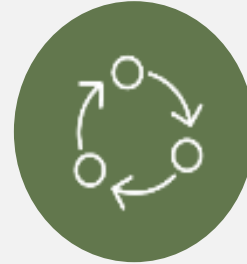
Using starches from biomass and microbial precision fermentation to produce high-performance PLA



INNOVATIVE PLASTIC MATERIALS

Sustainable materials: Low carbon, higher recyclability, bio-sourced, biodegradable

Traceability solutions
Additives enabling circularity



NEW USAGE MODELS

Reusable packaging
Reuse and refill systems
Life extension (second-hand resale, repair, remanufacture)
B2B and B2C



IMPROVED COLLECTION, SORTING AND RECYCLING

Operators, technology owners and equipment manufacturers
Digital enablers (marketplaces, Ai-sorting, robotics, ...)
Mechanical and chemical recycling

NEW USAGE MODELS

OPPORTUNITIES

- Policy shifts in the EU create opportunities for ventures to extend the life of plastic goods and packaging,
- New product delivery models will gain share from single-use packaging, e.g., in food service, packaged food, personal & home care, e-commerce segments
- Scale and innovation will be needed to unlock cost savings and lower GHG emissions,
- Winning solutions demonstrate operational excellence and a positive user experience

OUT OF SCOPE

- Solutions that do not reduce system-level GHG emissions and cannot demonstrate a credible pathway to achieve this over time
- Models that may affect health and safety, e.g. reuse models for medical applications or with food contact

SIZING THE OPPORTUNITY SPACE – EXAMPLES

6MT of single-use plastic utility can be provided through new usage models globally¹

\$78bn investment required to scale new usage models in the EU between 2020-40

\$1bn Investment over the last 5 years in EU and North America

50% of EU population lives in states with dedicated targets, additional policy likely for another **25%**

COMPANIES - EXAMPLES



Offering personal care products on a subscription-based refill-at-home model, reducing plastic waste and GHG

Algramo

In-store refill vending machines allowing users to bring their container and customize the volume bought

Vinted

Online marketplace for buying, selling, and exchanging new or secondhand items, mainly clothing and accessories

Vytal

VYTAL operates a digital reusable packaging system for take-out and delivery food, serving canteen operators, restaurants

Source: LHS: LOIM – MID: Systemiq (2022): ReShaping Plastics – Pathways for a circular and climate neutral plastics in Europe; OECD (2022): Global Plastic Policy Outlook until 2060 – RHS: LOIM



INNOVATIVE PLASTIC MATERIALS

Sustainable materials: Low carbon, higher recyclability, bio-sourced, biodegradable

Traceability solutions
Additives enabling circularity



NEW USAGE MODELS

Reusable packaging
Reuse and refill systems
Life extension (second-hand resale, repair, remanufacture)
B2B and B2C



IMPROVED COLLECTION, SORTING AND RECYCLING

Operators, technology owners and equipment manufacturers
Digital enablers (marketplaces, Ai-sorting, robotics, ...)
Mechanical and chemical recycling

IMPROVED COLLECTION, SORTING & RECYCLING

OPPORTUNITIES

- Mechanical recycling will see continued growth, quality improvements & consolidation
- Chemical recycling (“plastic to plastic”) will scale up in 2025-35 as a solution, e.g., flexible food-grade packaging
- Aggregating and sorting high-quality plastic waste feedstock are opportunities for operators and OEMs
- Winning solutions will need to navigate supply chains that become more integrated and competitive, e.g., through feedstock control, scale and strong partnerships

OUT OF SCOPE

- Solutions that do not reduce system-level GHG emissions and cannot demonstrate a credible pathway to achieve this over time
- Models that may affect health and safety, e.g. reuse models for medical applications or with food contact

SIZING THE OPPORTUNITY SPACE – EXAMPLES

5MT of additional recyclates demand in Europe over the next 5 years

6x mechanical recycling capacity needed in North America, Europe, and Asia by 2040

\$90bn capital investment required to scale chemical recycling technologies globally between 2020-40

44% recycling rate of EU plastic packaging by 2030 requires improved collection & sorting

COMPANIES - EXAMPLES



Modular chemical recycling of digitally-enabled fair-trade waste



Chemical recycling of polyester blend textiles



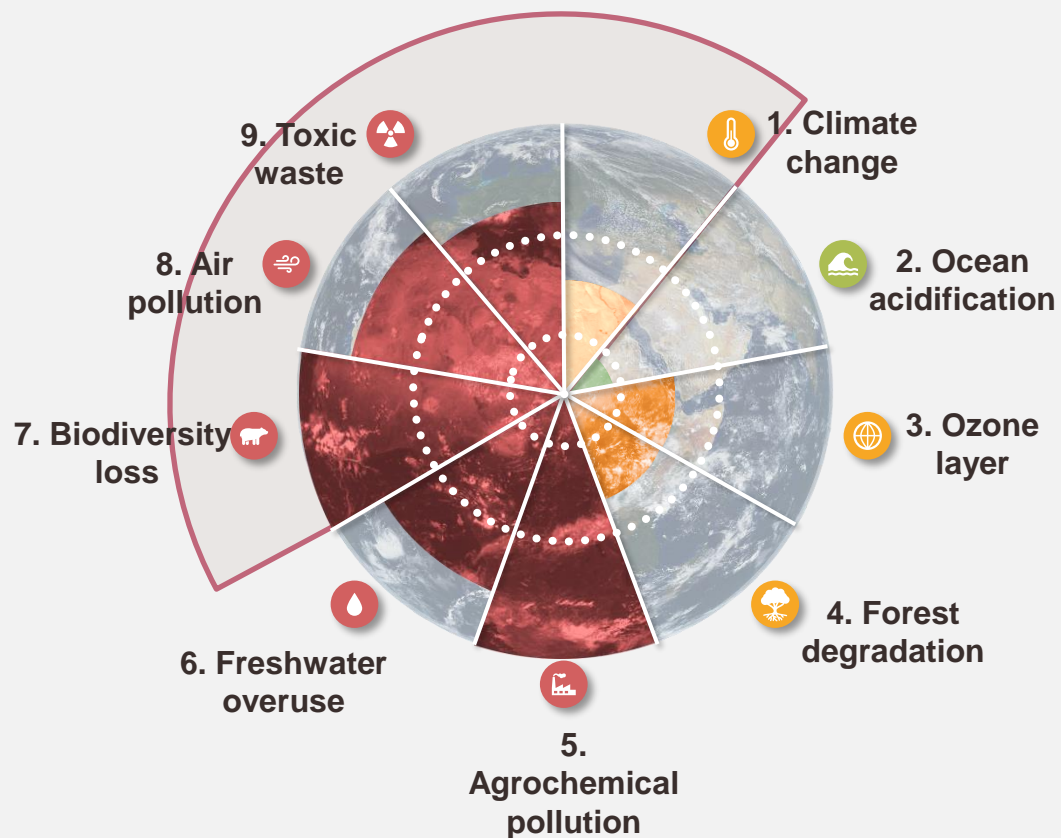
AI-powered software and robotics to improve sortation and data analysis of plastic waste



Pan-European platform that invests and operates recycled LDPE facilities in key European Markets

PLASTIC CIRCULARITY – KEY TO ADDRESS TRANSGRESSION OF PLANETARY BOUNDARIES

Impact of plastics on the planetary boundaries



CONCLUSION

- Materials are a key driver of the triple planetary crisis – pollution, climate change and biodiversity loss
- Plastics are indispensable, the way we manage these is catastrophic
- Plastic circularity is critical to avoid the worst outcomes and address transgression of the planetary boundaries
- The challenge is understood – the solutions are known
- The time is right, the momentum is accelerating
- The opportunities are there to catalyze system-level impact

Source: LHS: Rockstroem et al. (2009): Planetary Boundaries – exploring the safe operating space for humanity.

21 - Please read important information at the end of the document.