Plastics Sustainability Conference

SAFRIPOL'S SUSTANABILITY CONFERENCE 2024

COLLABORATION FOR A SUSTAINABLE FUTURE

11TH AND 12TH SEPTEMBER 2024

AGENDA

Global perspective

Recycling perspective for Africa

We expect four key forces to influence the development of recycled plastics markets

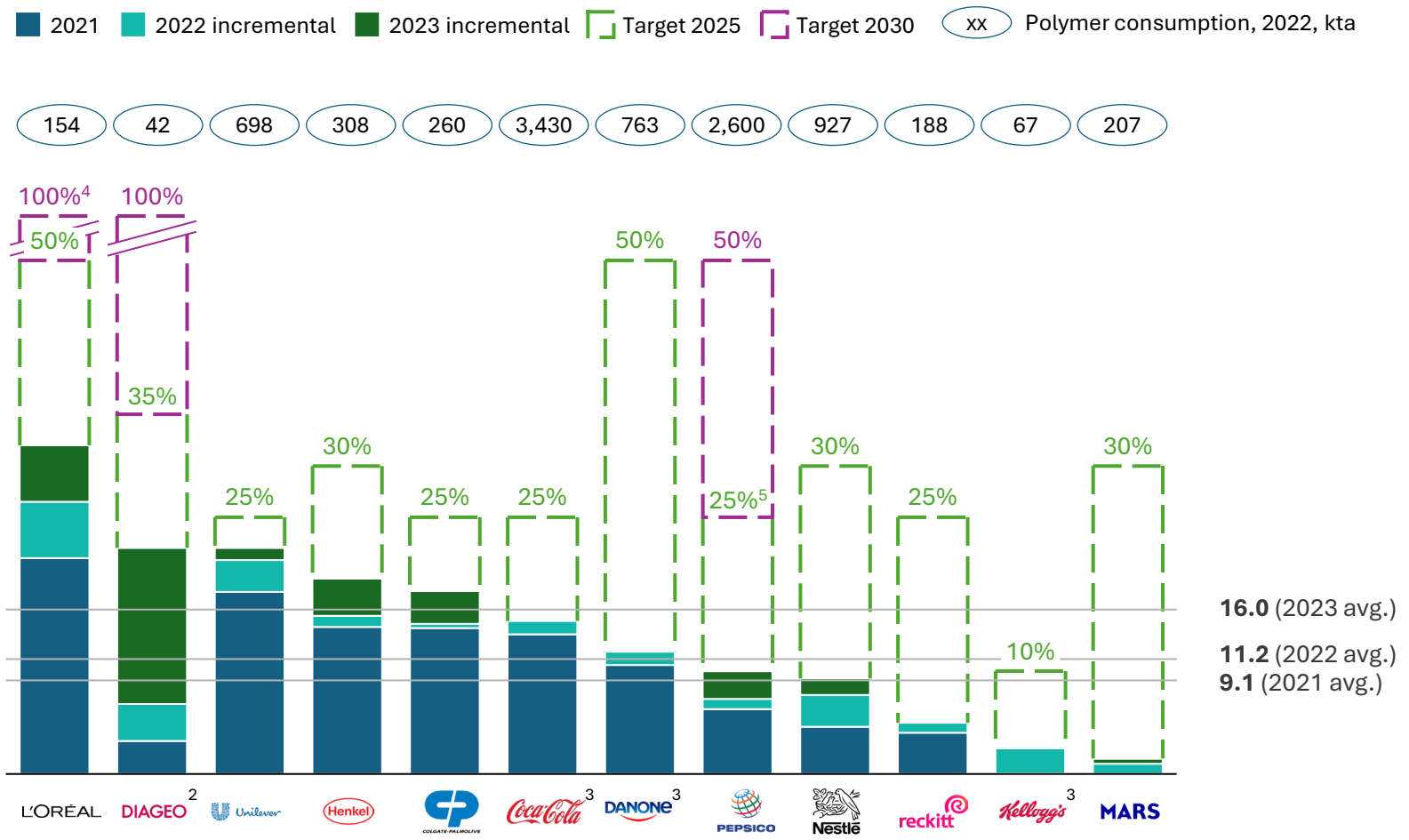
Impact on profitability: High negative · Neutral · High positive **Trend of driver:** ↑ Accelerating · ↔ No change · ↓ Decelerating

Forces	Effect on market	Trend	Rationale	
1 Brand owner action	High positive	↑	**Brand owners have made circular plastics commitments** in response to consumer pressure and are making material progress on delivering (e.g., recycled content up 3x 2018-2021)	*Most brand owners feel obliged to have a sustainability agenda […] Recyclability and waste management are the main themes at the moment […]* **Sustainability expert**
2 Regulation	High positive	↑	**Countries implementing recycling targets**, e.g., EU wanting to achieve a 65% recycling rate by 2030, and restricting/banning landfill option	*One of the key drivers in developed markets will be quotas (…), EU put forth a 65% recycling target by 2030, up from 20% today* **Expert on recycling**
3 Feedstock quality and availability	Neutral	↔	**Waste generation exceeds volume being recycled**, but the challenge to source high quality feedstock remains; sorting and collection technologies are in the process of being developed globally	*Plastic waste feedstock appears to be the constraint for growth in recycling as both mechanical and advanced recyclers compete for material* **Expert on recycling**
4 Technology	High positive	↑	**Introduction of new advanced recycling technologies** can enable new streams of plastic waste being recycled at scale and higher quality of output	*We are seeing gradual improvements in sorting technology, which is a key enabler for improving recycling economics* **Packaging expert**

Source: Expert interview and analyst reports

Major CPG brands have made ambitious circular plastics commitments

Recycled content target and progress status[1]



16.0 (2023 avg.)

11.2 (2022 avg.)
9.1 (2021 avg.)

Key takeaways

- Average circular plastic adoption among major CPG brands was **16% in 2023, up from 11.2% in 2022**
- Of the twelve major CPG brands listed, **only Unilever is on track** to meet their 2025 targets for circular plastics.
- Other companies started **shifting goals to 2030** (L'Oréal, Diageo, PepsiCo) and **lowering targets** (Diageo, from 40% to 35%)
- **Significant scale-up is necessary** to meet commitments

1. For selected 12 companies; 2. Data on plastic bottles; 3. Numbers for 2023 are not reported; 4. 100% of the plastic used in packaging to be either from recycled or biobased sources;
5. 2025 target is not mentioned in the latest ESG Performance Metrics reports
Source: Ellen MacArthur Foundation "The Global Commitment 2023: Progress Report", annual reports, team analysis

Additionally, circular plastic is supported by governments pushing on waste and introducing recycled content quotas

Regulatory policies

Recycled content | EPR systems | Single use ban | Recycling targets

Sustainability awareness

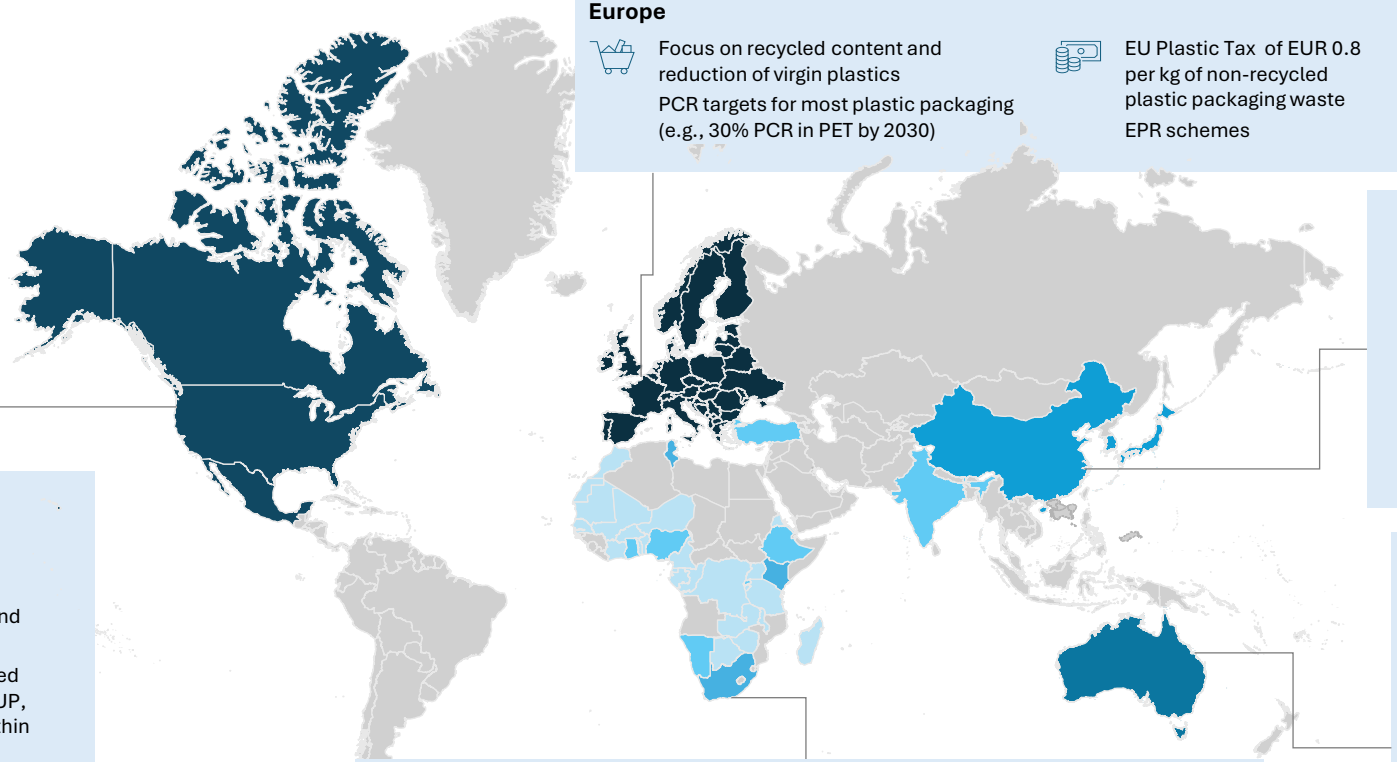
Low — High

North America

- Voluntary commitment focused on packaging recyclability and recycled content
- CA: Province-level EPR schemes
  US: State-level EPR schemes in legislative process (ME, OR)
- CA: 2022 SUP ban
  US: 8 states banned single-use plastic bags
- CA: 100% recyclable plastics by 2030
  US: selective regulation varies by state

Europe

- Focus on recycled content and reduction of virgin plastics
  PCR targets for most plastic packaging (e.g., 30% PCR in PET by 2030)
- EU Plastic Tax of EUR 0.8 per kg of non-recycled plastic packaging waste
  EPR schemes
- SUP ban on 10 items
- Recycling Rate: 50% of plastic packaging by 2025
  100% plastic packaging recyclability by 2030



China

- Generic targets on recycled content
- EPR legislation in implementation (2020 Solid Waste Law)
- Biodegradable food service and bags
  Focus on reducing excessive packaging with penalties
- Plans to scale plastic recycling and banned all imports on waste

RoW

- Multiple EPR schemes
  India: producers, importers, and brand owners mandatory licensing
- India: Over half of states implemented bans and regulations to eliminate SUP, disposable food service items, and thin shopping bags
- Turkey, Russia: Recycling targets
  Indonesia: 70% reduction in marine plastic waste by 2025
  India: Recycled Content: 25% by 2030; Recycling Rate: 50% by 2030; Recyclability: 100% packaging by 2030

Developed Asia & Australia

- Focus on PET bottles and Waste reduction
- EPR: JP collection; AU voluntary; KR recycling; TW financial
- JP/AU: Singlewise plastic bag ban
  TViLIP: SUP ban proposals
- KR: Increase Recycling rate
  AU Plastic Packaging:
  Recycled Content: 20% by 2025
  Recycling Rate: 70% by 2025
  Recyclability: 100% packaging by 2025

Africa

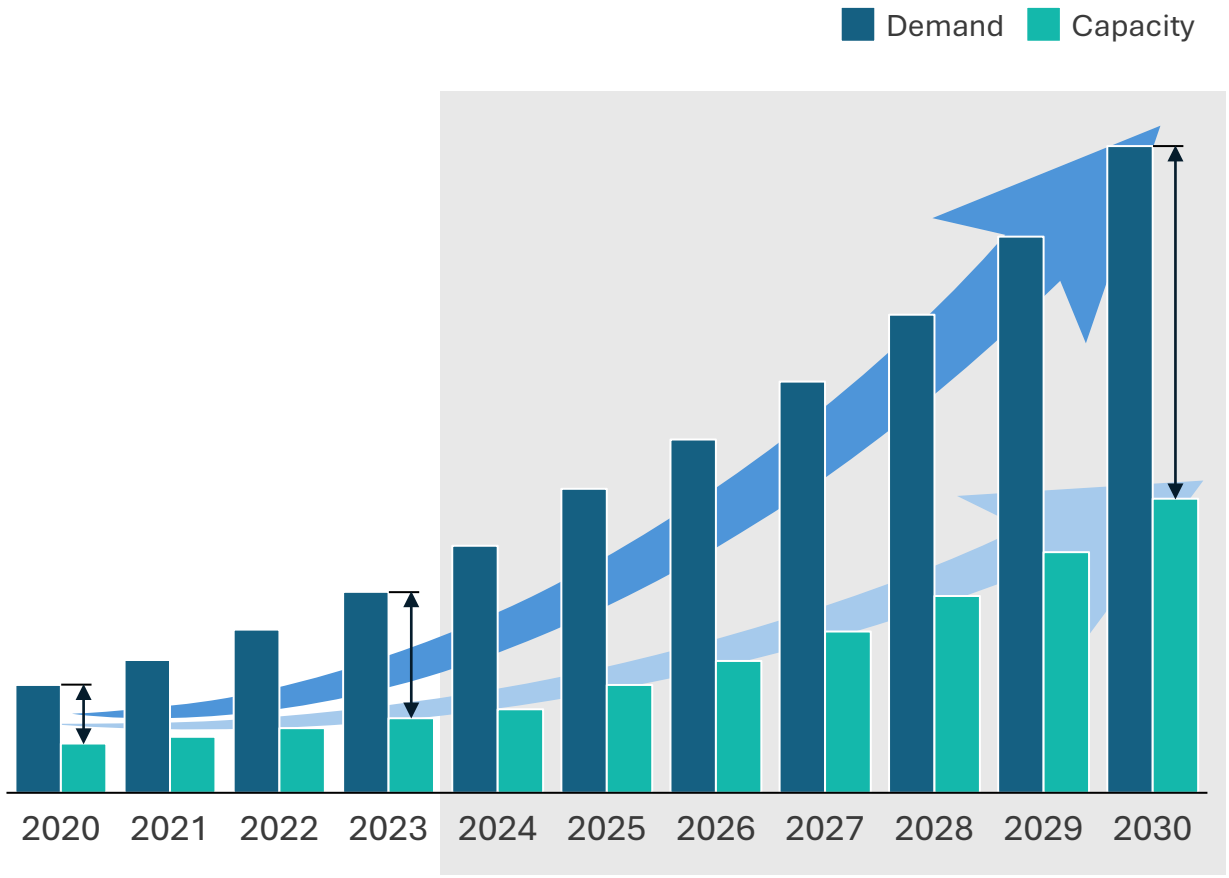
- South Africa: 50% recycled content in plastic bags since 2023, to be increased to 100% by 2027
- South Africa: Mandatory EPR
  Kenya: Voluntary EPR for packaging with price subsidies
  EPR schemes being developed in Namibia, Ghana, Nigeria, Ethiopia, Rwanda, etc.
- Measures implemented in 34 out of 54 countries (e.g., Senegal, Rwanda, Tunisia)
  South Africa: levy on plastic bags (25 cents), ban on thin plastic bags
  Kenya: ban on SUP
- South Africa: Recycling Rate: 70% by 2025
  Kenya: Recycled Content: 25% by 2025

Source: press search

As a result, recycled demand will increase, but supply will lack behind

Expected global demand and supply development of same-cycled recycled plastic[1], MTA

HIGH-LEVEL ESTIMATION



6x growth of supply gap over time due to shortage of supply

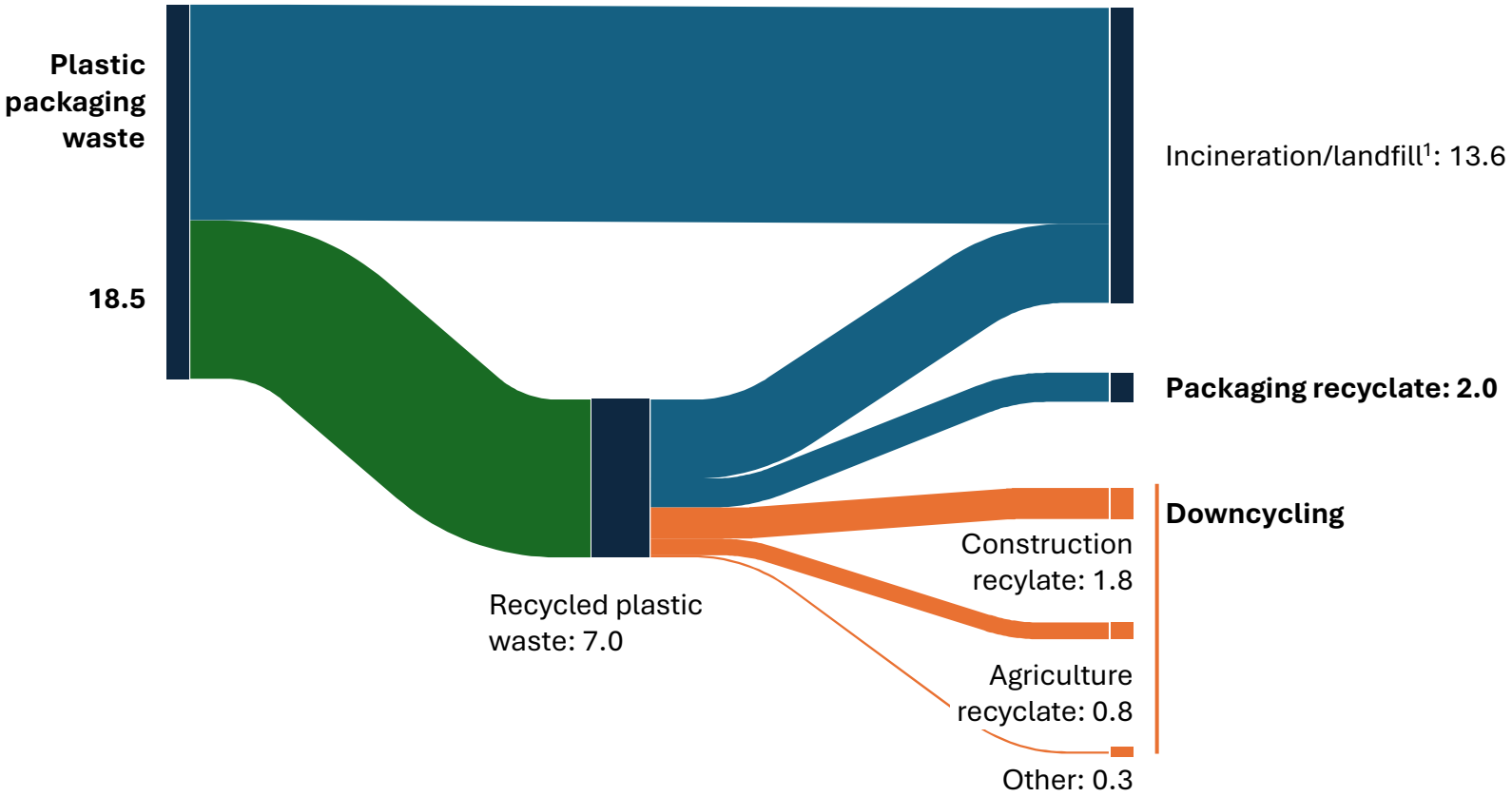
By 2030, demand for recycled plastic will be **twice as high** as the supply – creating a shortage of **36M metric tons/year**

As a result, **prices** are expected to rise even more significantly

1. High-quality recycled material that can be used across many applications

Feedstock quality and value chain challenges results in no real at-scale recycling loop

Packaging example: Plastic volumes from waste to recycled output in Europe (2022), MTA



Recycling challenges

- Product design
- Systematic challenge: collecting, sorting, high-quality recycling
- Value chain coordination

1. Including direct packaging waste allocation to landfill/incineration (11 MTA) and additionally losses from recycling (~2.1 MTA)

Source: McKinsey CI Circular

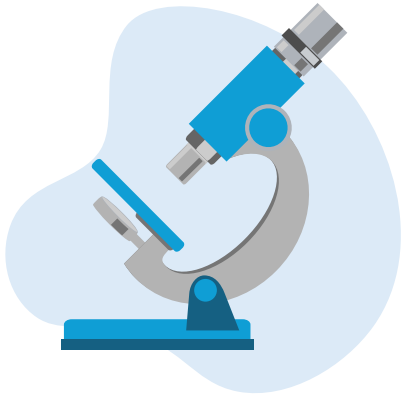
Challenges exist across the whole circular value chain

Feedstock

- “Inefficient” and fragmented markets, quality variance
- Shortage

Recycling technology

- No “winner-takes-all” technology
- Scale-up



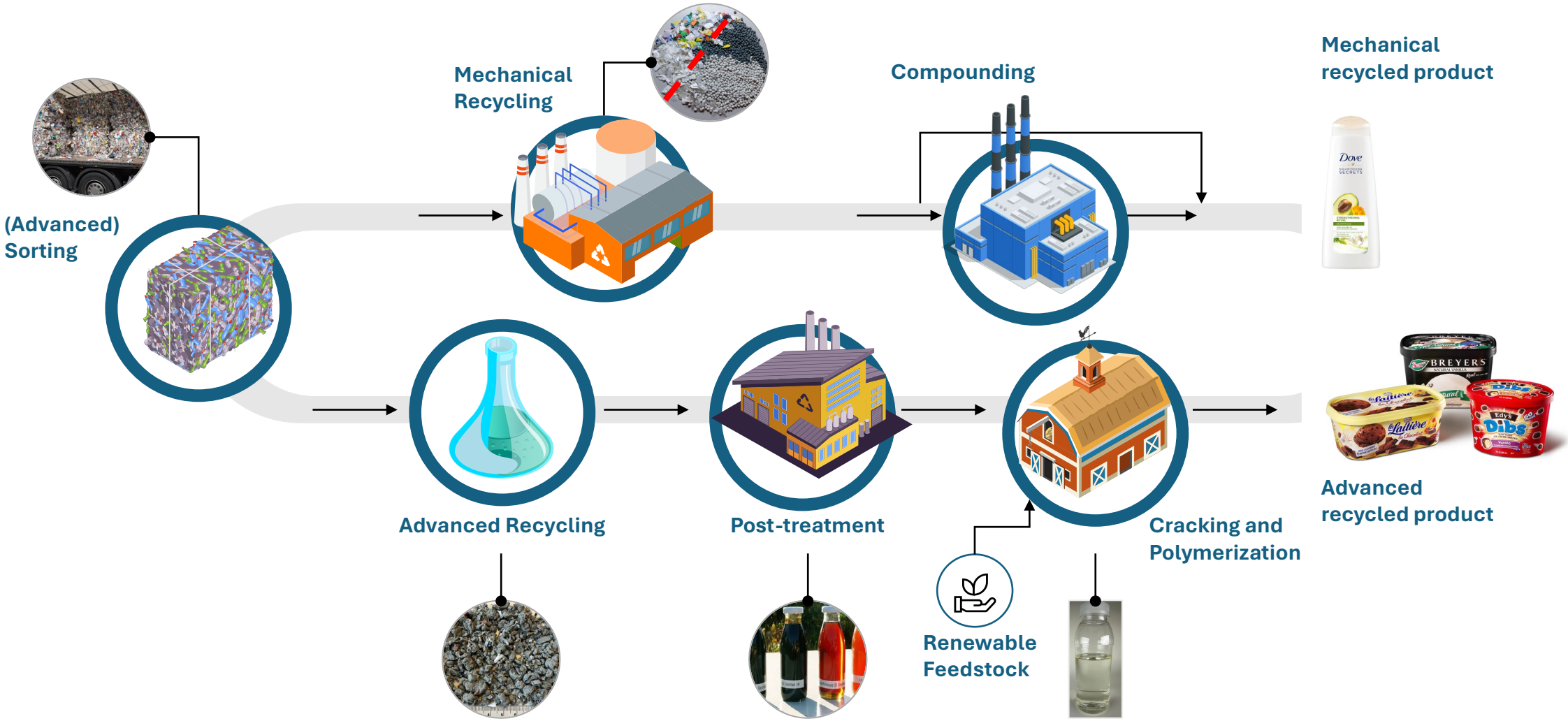
Chemical conversion / treatment

- Integration into established process
- Quality challenge

Plastics customers (conversion/ use)

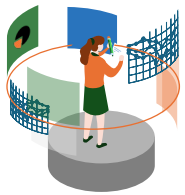
- Funding more complex chain
- Sourcing approach vs. long-term commitments

Technology deep-dive: Mechanical Recycling and Advanced Recycling should complement each other in circular plastics value chain



Plastics recycling is now near the conviction point, ready to scale

Sweet spot for play: Right time to invest and scale up to unlock supply and attractive risk adjusted returns



Technology	Market characteristics	Risk vs. return	Examples
At conviction	• Highly mature, commercialized • Rapidly scaling globally • Established business cases • High market competition	↑ No technology risk ↓ Depressed IRRs	Renewables (wind and solar), Gas & LNG, Waste systems, Biomethane
Near conviction	• Proven technology ready to be applied at scale • Lower competition in emerging market • Lacking resources and skills to unlock growth potential (e.g., GtM strategy, funding, network)	↑ Limited technology/ commercial risk ↑ High IRR and market growth with 20-30% CAGR	**Plastics recycling**, sustainable foods (e.g., alternative proteins), green building materials, green steel
Early conviction	• Yet unproven or to become cost-competitive innovations • Low competition • High return potential, but very uncertain outcomes	↓ Significant technology risk ↑ Potential huge IRR (long-term horizon)	Direct air capture, fusion energy, hyperloops, power to liquid

Already today, economics start to work with minimal cost increase for end user

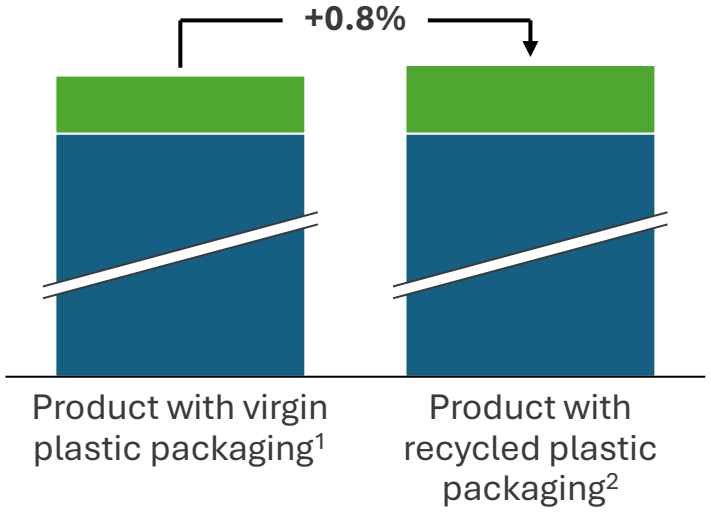
Product cost (excl. plastic) Plastic cost

Milk

Shelf price: 1.39 EUR

Milk: 1 liter

Plastic: ~30-35 g

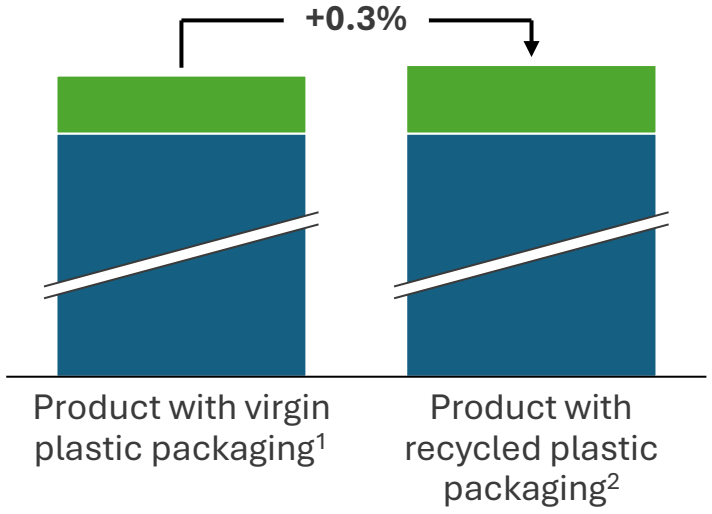


Cheese

Shelf price: 2.49 EUR

Cheese: 300 g

Plastic: ~18-23 g

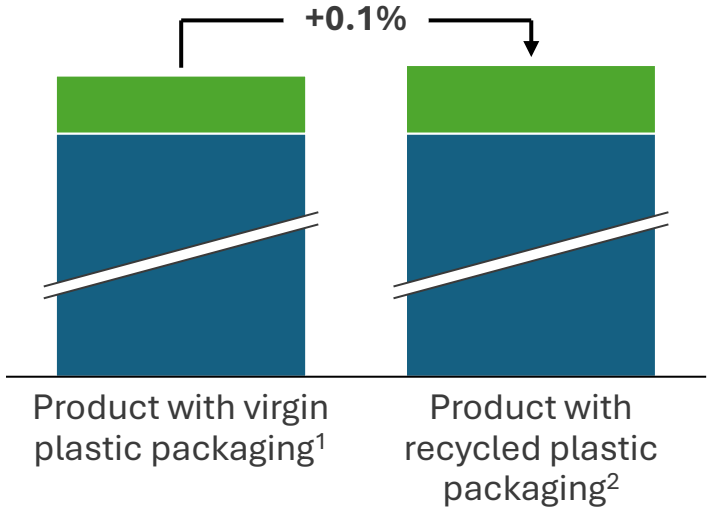


Bread

Shelf price: 1.29 EUR

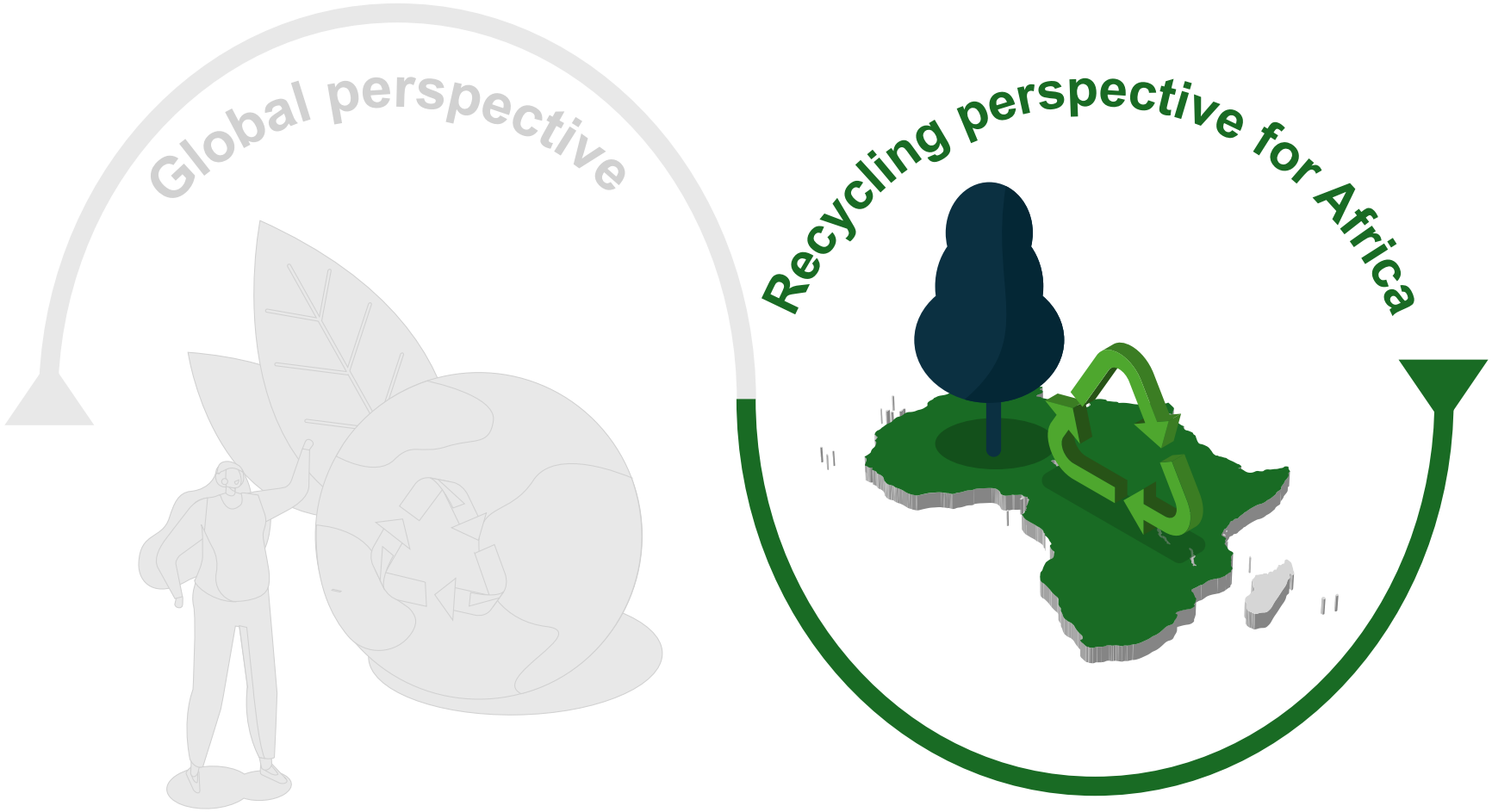
Bread: 750 g

Plastic: ~4-6 g LDPE



1. Virgin polymer price at 1,800 EUR/t based on 2021-2022 average for PE
2. Accounts for: 1) Additional cost for circular polymer; 2) Cost savings on plastic taxes; 3) Cost savings on scope 3 carbon emissions (indirect benefit).
   Plastic tax on full packaging mass not containing 30% recycled content, using UK tax rules as an example, this is 200 GBP/t plastic (~240 EUR/t).
   LCA carbon saving from consumer goods forum for circular polymer 2.3 tCO2/t polymer (driven by avoided burden in end-of-life from incineration), carbon price of 100 EUR/t CO2

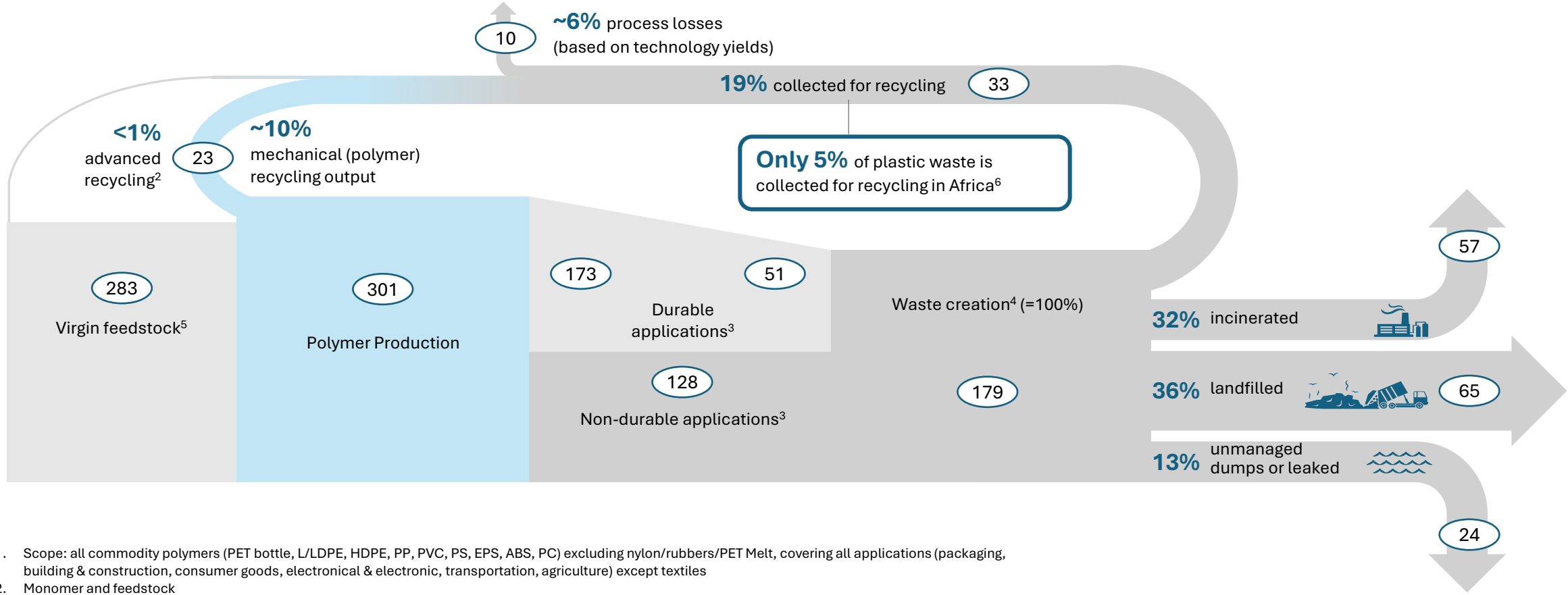
AGENDA



Only 19% of global plastic waste is collected for recycling – share of recycling is even lower in Africa

Global commodity polymer flows 2020[1], MTA

XX% Percentage of total waste (XX) Global polymer flows, 2018, annual MT



1. Scope: all commodity polymers (PET bottle, L/LDPE, HDPE, PP, PVC, PS, EPS, ABS, PC) excluding nylon/rubbers/PET Melt, covering all applications (packaging, building & construction, consumer goods, electronical & electronic, transportation, agriculture) except textiles
2. Monomer and feedstock
3. Durable applications with an average lifetime >1year will end up as waste only in later years, non-durable applications go straight to waste
4. MT mixed plastic waste from nondurable applications that end up as waste in same year plus 51 MT of mixed plastic waste from production in previous years
5. Includes ~0.4 MTA of advanced recycled plastic
6. Benchmarked with Kenya market

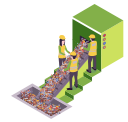
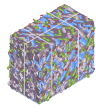
Source: CI Circular

There are three key challenges to the plastic recycling value chain in Africa

Value chain

Upstream		Midstream		Downstream
Generation	Collection	Sorting and aggregation	Treatment	Commercialisation



Key challenges

1 Low quantity and quality of feedstock

Dirty waste (i.e., contaminated, mixed) collected from waste holders given limited practice of source separation

Low overall collection levels with only 55%[1] of overall waste collected across Africa (range of 20%-80%) – this is driven by lack of collection infrastructure, inefficient execution by municipalities, and insufficient coverage by private and informal players[2]

2 Formal businesses across the value chain have structurally unfavourable unit economics

>90% of collected waste has high contamination due to disposure to dumpsites given low dumping fees

'Dirty' waste from dumpsites needs additional sorting – either by informal pickers or recyclers who purchase 'dirty' waste in bulk and have to invest in their own sorting processes to recover recyclable material

Limited penetration of MRFs (i.e., mechanised sorting) in African markets given unfavourable unit economics driven by high dumping, logistics and land costs

Poor unit economics is observed for most recyclers due to:

- Low throughput of waste
- Poor quality of feedstock which requires labour / machine intensive re-sorting
- Working capital pressures from high spend on feedstock, electricity, labour and logistics

3 Weak local and export market demand

In the local market, recyclates have lower perceived quality and lack of regulation mandating use of recycled content

For export market, there are limited purchase commitments from buyers for recycled material due to lack of scale and stability in recyclate supply

Expert quotes

*This is where our waste challenge starts – there is **inadequate collection infrastructure** and what comes into the system is **mixed and contaminated waste** that costs more to recycle*

– Africa recycling expert

*The **build-up of costs makes the whole effort unviable** – we pay for waste from landfills, have to 'resort' this dirty waste and often can only recover 60-70% feedstock from this. This is before our own processing costs which are significant due to the high cost of electricity*

– Kenyan plastic recycler

*Manufacturers are always **squeezing us on price and payment terms** to buy flakes. There isn't much appreciation for recycled material here*

– Kenyan plastic recycler

1. Compared to 80%+ in emerging markets like India, 100% in Europe
2. There is some "enroute" separation of high value items by collectors that goes straight to recyclers/ secondary markets (e.g., "jua-kali") before collected waste reaches dumpsites

Source: Africa Waste Management Outlook Report (2018), Plastic Waste Management In Africa– An Overview (2023), Expert interviews, press search

African countries face various degrees of problems in feedstock quantity and quality

Comparative intensity of challenge based on expert input — High — Low

Country	Intensity of quantity challenge	Intensity of quality challenge
Kenya	**Relatively low collection rate** (55%[1]) driven by fragmented channels (small-scale enterprises and informal sector) resulting in inadequate feedstock available for downstream players	**High contamination** given no separation at source and improper waste disposal (i.e., waste primarily disposed in open dumpsites) **No active MRFs** operating in the country
South Africa	**Relatively high collection rate** (70%[1]) in cities providing high feedstock levels for recycling. High collection rates (62%) for recyclable plastic (e.g., PET)	**High contamination** given no separation at source and improper waste disposal (i.e., waste primarily disposed in open dumpsites) **Presence of operating MRFs** (>50), however, aggregated capacity does not meet feedstock demand
Egypt	**High collection rate** (80% for MSW[1]) in cities providing high feedstock levels for recycling. However, there is high informalisation in collections resulting in informal diversion of recyclable material to secondary markets	**High contamination** given no separation at source and improper waste disposal (i.e., waste primarily disposed in open dumpsites) **Presence of operating MRFs** (>150), however, aggregated capacity does not meet feedstock demand
Nigeria	**Relatively low collection rate** (60%[1]) driven by fragmented channels (small-scale enterprises and informal sector) resulting in inadequate feedstock available for downstream players	**High contamination** given no separation at source and improper waste disposal (i.e., waste primarily disposed in open dumpsites) **Presence of operating MRFs** (>10), however, aggregated capacity does not meet feedstock demand
Ghana	**High collection rate** (80% for MSW[1]) in cities providing high feedstock levels for recycling. However, plastic waste collection rate is lower (<50%)	**High contamination** given no separation at source and improper waste disposal (i.e., waste primarily disposed in open dumpsites) **Some active MRFs** (<5) operating in the country, however, aggregated capacity does not meet feedstock demand

1. Projected (2025) MSW (Municipal Solid Waste) collection rate used to assess collection maturity

Source: Africa Waste Management Outlook Report (2018), Plastic Waste Management In Africa– An Overview (2023), Expert interviews, press search

55% of solid waste is collected in Kenya, and only 5% of plastic waste is recycled

Overview of waste collection and recycling in Kenya, % of total waste generated




Mn tonnes of waste produced per year[4]

Recycled waste as a share of total waste generated by type, %

Generation | **Collection** | **Disposal** | **Sorting & Recycling**

~8	~3.6	~4.4	~1.9	~2.2	~0.16	~0.08	~0.08	<0.08
100	45	55	24	27	2	1	1	<1
Total waste generated	Uncollected waste[3]	Collected waste	Improperly disposed[1]	Properly disposed[2]	Reusable scrap metal	Paper	Plastic	Organic
					~100	8	5	<1

As plastic consumption grows in SSA countries e.g., Kenya, **waste management will become critical** as such as small fraction of plastic waste is recycled

Unrecycled waste | **Recycled waste (~4% of total waste)**

1. Waste that was not disposed at a designated disposal zone e.g., garbage tossed by the roadside, in rivers, etc.
2. Waste disposed at the appropriate disposal location and in the right manner (e.g., in a garbage bag) but was not recycled e.g., ended up in a landfill
3. Uncollected waste often in poor communities because of unaffordability of waste collection. Waste is unofficially disposed of or burnt
4. Total waste generated in this analysis is the sum of Nairobi, Mombasa, Kisumu and Nakuru solid waste figures from JICA report. Values may not add due to rounding

Source: Summary of waste sources and sinks, SWM in Nairobi, Africa Waste Management Outlook, press search, JICA – Africa Waste Management data book (2019)

But there are positive trends across regulation, brand commitment, and technology adoption to address those challenges!

SELECTIVE EXAMPLES

Regulation

Extended Producer Responsibility (EPR)[1] implementation:

- Mandatory EPR in South Africa
- EPR schemes being developed in Kenya, Namibia, Ghana, Nigeria, Ethiopia, etc.

Recycled content regulation:

- South Africa requires 50% recycled content in plastic bags since 2023, to be increased to 100% by 2027

Single-use plastic (SUP) bans:

- Implemented in 34 out of 54 countries (e.g., Senegal, Rwanda, Kenya, SA)

Brand commitment

Plastic recycling commitment: MNCs and domestic companies committing to recycled plastic in packaging

Kenya: Partnership between Mr. Green and Unilever to achieve 25% recycled plastics in Unilever packaging by 2025

South Africa: Member companies of South African Plastics Pact pledged to work towards reaching a 70% input recycling rate for plastic packaging by 2025[3]

PRO[2] establishment: MNCs setting up PROs to drive packaging waste recycling (e.g., Coca-Cola forming FBRA in Nigeria)

Rise of nascent technology and start-ups

Waste collection: Digital solutions to facilitate waste collecting and capture waste management data in South Africa

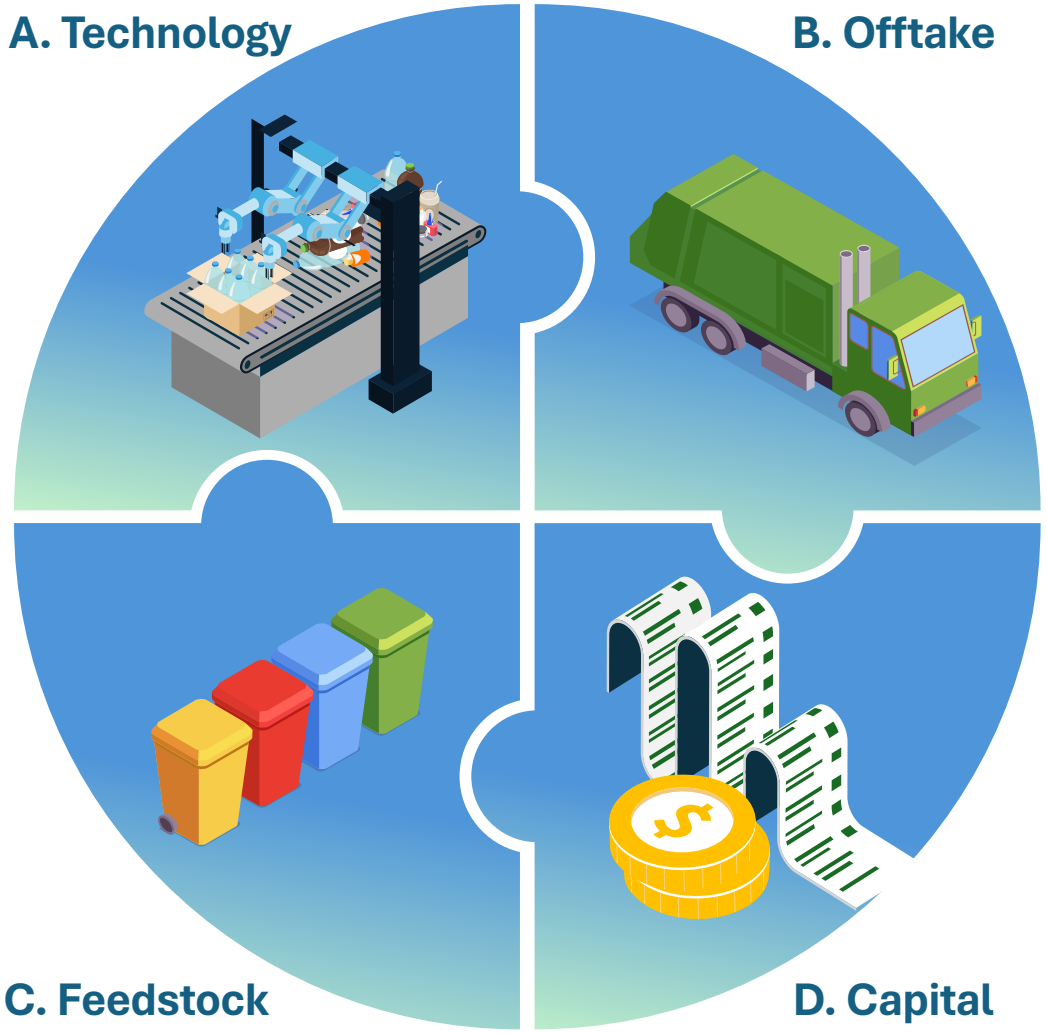
Sorting technology: Increasing use of automated sorting machines for better efficiency and reduced contamination

Treatment technology: Emerging application of recycled/downcycled plastics (e.g., Gjenge Makers developing technology to make lightweight and low-cost bricks from recycled plastics in Kenya)

1. EPR regulations place the primary responsibility on producers to be accountable/ manage the entire life cycle of their products and packaging
2. Producer responsibility organisation - PROs assume legal obligation to implement EPR by providing monetary subsidies to waste management organisations
3. Requires collaboration by members as well as the broader value chain

Source: Press search

We can make the circular plastics ecosystem work – but we need to orchestrate



Scale up not constrained by technology, but by the ability to orchestrate a new ecosystem

- **Technology** is important, but **less critical** than you think – already available and no silver bullet exists
- Investable plays require **hedging supply and demand** risk to ensure offtake at the right price
- **Feedstock supply is challenging** due to fragmentation, logistics and managing consistent reliable supply at scale
- **Large scale capital deployment required** with innovative financing to start capital intense plays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