PLASTICS NEUTRALITY MASTERPLAN

Zero Plastics to Landfill

2024-2030

ZERO PLASTICS TO LANDFILL

This document is Malaysia's plastics industry's vision for the role of plastics in the circular economy, so as to achieve zero plastics in landfills.

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FOREWORD

Society's relationship with plastics is complicated.

Malaysia takes very seriously societal concerns about the challenges posed by plastics to climate change, waste management, the challenge of plastics waste, and the need to ensure the safety of plastics.

However, it is also important to recognise that plastics have a vital role to play in enabling sustainability transitions and supporting the competitiveness of many sectors in Malaysia. The reality is that plastics will remain irreplaceable for many applications and sectors that underpin our changing world.

The Plastics Neutrality Masterplan 2024-2030 is designed to inform and guide the Malaysian Government, the plastics industry and all stakeholders for the decades ahead. It reinforces Malaysia's commitment to address concerns related to plastics, by making plastics circular, driving lifecycle emissions to net zero, and fostering the sustainable use of plastics.

It establishes an ambitious but realistic pathway to net zero and circularity, including milestones for 2030, key actions and indicators. It details immediate (2024–2026), short-term (2027–2028) and medium-term (2029–2030) actions and provides a longer-term perspective on the necessary changes.

The progress against the Masterplan's indicators for circularity and GHG emissions will be assessed and transparently reported every two years. The Masterplan is a dynamic process that will be progressively updated based on new insights and changes to the plastics industry environment, the enabling policy framework and value chain input, as well as industry progress.

FOREWORD

Whilst the plastics industry is already undertaking investments and advancing towards circularity and net zero emissions, the government is under no illusions about the scale, complexity, and cost of this transition, and the barriers and bottlenecks that need to be overcome.

This is a generational-scale task. To overcome these challenges, Malaysia needs a harmonised and enforceable policy framework that fully supports the industry's transition. One that helps to create enough high-quality, sustainably sourced feedstock; supports a massive upscaling of collection, sorting and recycling (both chemical and mechanical); and provides access to a diverse mix of abundant and affordable renewable energy.

The industry must acknowledge that without measures to protect the competitiveness of the plastics industry, Malaysia risks growing reliance on imports from overseas, thereby jeopardizing the nation's capacity to invest in the transition towards plastics neutrality.

Doing so, would allow Malaysia to continue to benefit from the critical role of plastics in the supply chain for all sectors, secure the future of the 175,000 people that work in the plastics industry (not inclusive of petrochemicals), and ensure that Malaysia continues to lead the global path to plastics sustainability.

The industry believes the Masterplan will make a very important contribution to informing and promoting dialogue and collaboration with all stakeholders with a shared interest in practical solutions to transform the Malaysian plastics industry. The Malaysian plastics industry has reached a decisive moment in its history. Decisions made in the next couple of years will play a pivotal role in determining the realization and pace of achievement for the ambitious goals outlined in global initiatives like the Net-Zero agenda, as well as local blueprints such as the KPKT Blueprint and various circular economy initiatives like the National Circular Economy Council (NCEC). The window of opportunity is rapidly closing. However, with collective ambition and urgency, we can create a sustainable plastics industry that continues to meet consumer and societal demands, while supporting the transitions of many of the plastics industry supply chain partners and remaining a strategic asset for the Malaysian economy.

EXECUTIVE SUMMARY

This section presents the overarching goal of the Plastics Neutrality Masterplan 2024-2030.

The plastics industry recognises the severity of the climate crisis and challenges of Plastics Neutrality, and believes that faster systemic change is essential to successfully meet Malaysia's net-zero and circularity objectives. In this Masterplan, a roadmap is included to lay out a potential pathway for a circular and net-zero plastics industry in Malaysia. It puts forward a comprehensive set of ambitions covering all aspects of the plastics life cycle.

The roadmap provides a framework, milestones for 2030 and indicators to monitor progress, identify bottlenecks and find solutions to keep moving forward. This reporting should involve close collaboration with multiple stakeholders, including governmental authorities and industry representatives.

The system-wide aspirations and forward-looking indicators show the extent to which the government and the plastics industry can collectively contribute to the circular economy and net-zero ambitions of Malaysia. Under this framework, the strategic pillars will serve as guiding principles for the government, the plastics industry, and the entirety of the waste management sector as they formulate plans tailored to their specific contexts and the market dynamics in which they operate.

This Masterplan is a living document that will be progressively updated based on new insights and changes to the industry environment. It aims to guide, incentivise and accelerate industry action and performance, and provide an evidence base to inform value chain dialogue and policy-making. Additionally, this Masterplan is also intended to support the waste management blueprint for plastics waste in Malaysia.

> The Plastics Neutrality Masterplan provides an independent perspective on transitioning to net-zero carbon emissions and circularity goals by 2050.

PLASTICS INDUSTRY IN MALAYSIA

The plastics value chain in Malaysia, comprising petrochemical producers, converters, recyclers, and materials/machinery suppliers, employ 175,000 people (not inclusive for petrochemicals). These workers are spread across 800 companies, and generated turnover of more than RM89.3 billion.

Plastics is a strategically important material for the Malaysian economy, with applications in almost every sector, including electrical and electronics, automotive, construction, food production, consumer goods, healthcare, medical, and renewable energy. The total manufacturing contribution to Malaysia's economy is 22.3% (2022).

Overview of plastics industry in Malaysia (upstream, midstream, downstream) 2023.

Plastics Resins

RM 22.3 Billion

Plastics Products

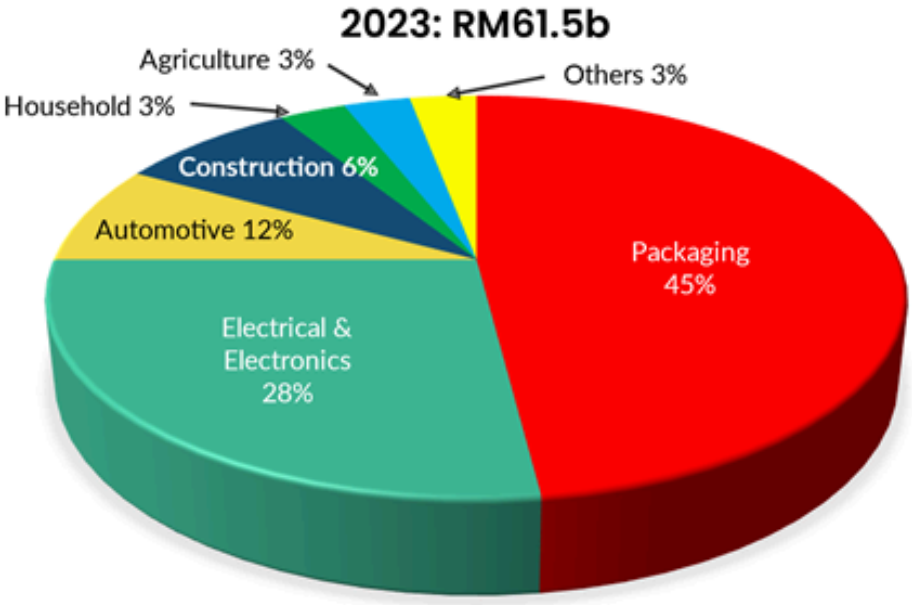
RM 61.5 Billion

Plastics Recycling

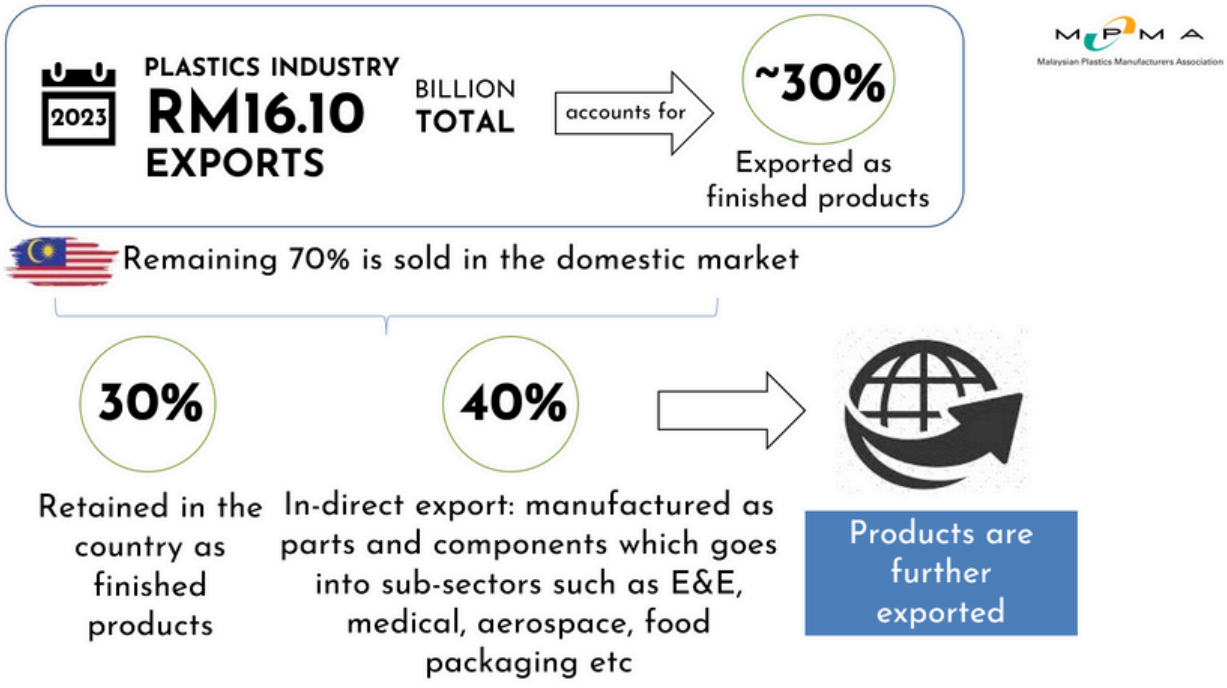
RM 5.5 Billion

PLASTICS INDUSTRY IN MALAYSIA

Major market segments for plastics products 2023 (MPMA Statistics).



The overall landscape of exports in the plastics industry.



PLASTICS INDUSTRY IN MALAYSIA

The plastics supply chain in Malaysia.

The challenges to plastics circularity and neutrality in Malaysia

In Malaysia, achieving plastics circularity and neutrality poses several formidable challenges. Despite growing awareness of environmental issues, inadequate infrastructure and limited technological investments hinder effective plastics recycling and reprocessing. Moreover, the prevalence of single-use plastics exacerbates waste generation, overwhelming existing waste management systems. Additionally, socio-economic factors such as consumer behavior and market demand for cheap plastics perpetuate a linear 'take-make-dispose' approach, undermining efforts towards circularity. Addressing these challenges requires a multifaceted approach, involving policy reforms, investments in infrastructure, public education campaigns, and collaboration among stakeholders across the plastics value chain. By tackling these obstacles head-on, Malaysia can pave the way towards a more sustainable and resilient plastics ecosystem.

Key Indicator	Challenges
Lack of clarity around using recycled content in food grade applications	Uncertainties and unclear policy direction, as well as guidelines around the use of recycled content have limited the usage of locally produced recycled resin in F&B packaging. This also relates to the concern over halal status for food-contact packaging made of recycled resin.
Absence of extended producers responsibility (EPR) scheme	The adoption of EPR schemes in Malaysia has been limited to voluntary efforts from the private sector around packaging. EPR schemes are regarded as useful interventions for reducing plastic pollution, as they help to shift the responsibility of end-of-life treatment to producers or importers who have introduced the products into the market place. Such schemes can promote reducing waste at source, improve product design, and encourage producers to explore circular business models.

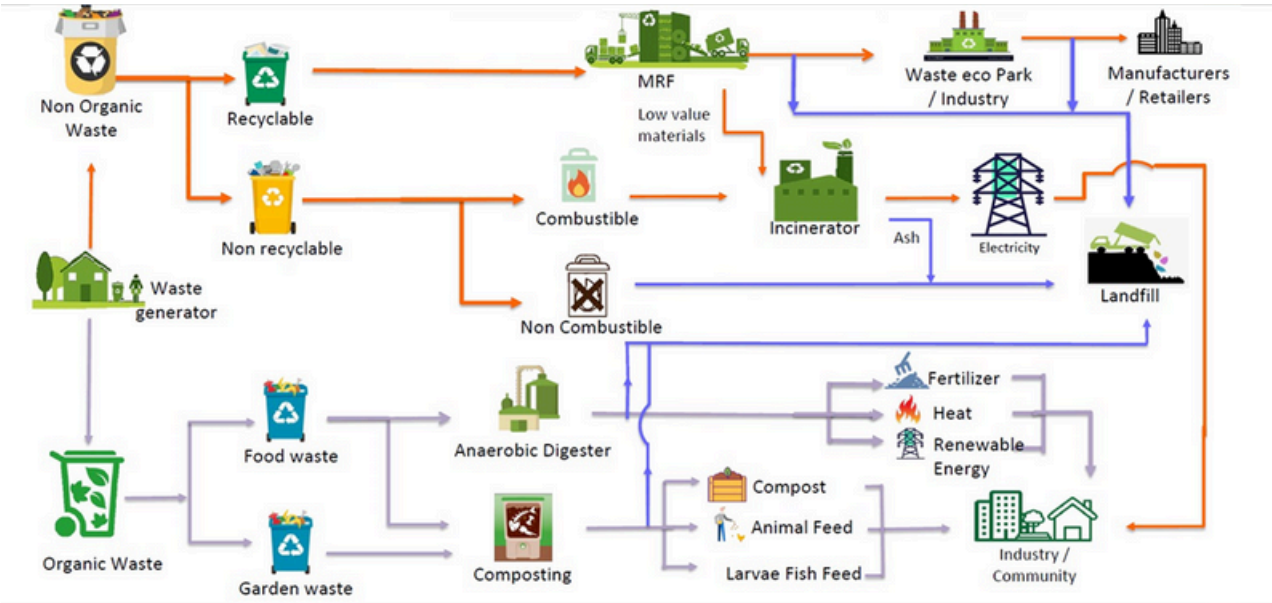
Key Indicator	Challenges
Unsatisfactory quality of local plastics waste (SAS – buy back)	The lack of practicing separation at source (SAS) among households contributes to the low-quality waste stream. Consumers should be incentivised or rewarded through a buy-back program to encourage them to segregate and send their plastics waste to a proper drop-off/recycling centre.
Limited materials recovery (recycling) capacity (CFR, distribution of facilities in the country)	Only 24% of the total plastics waste are being collected for recycling (CFR). The lack of formal recovery activities/processes leads to low-quality waste and uneven distribution of facilities across geographies.
Lack of alternative end-of-life solutions for local plastics waste (recycling technology)	Alternative EOL solutions to mechanical recycling, such as chemical recycling, are non-existent. While mechanical recycling is the best available technology for rigid plastics for rigid, clean flexible and single-material plastics, chemical recycling is suitable to take care of multi-material plastics, especially flexibles.
Absence of macro data to monitor plastics production, consumption, plastics waste collection and materials recovery (including recycling)	Information on production volumes per plastics application is lacking, as is data on plastics consumption, waste collection, and recycling. This lack of national-level data, and independent and authoritative source of information, poses obstacles for various value chains as well as the government.
Unclear plan to phase-out problematic SUPs	While Malaysia does not plan to outright ban any particular plastics product, it is now clear that problematic SUPs need to be phased-out. However, there are no details on the plan. Identification of a list of problematic SUPs is needed at the national level prior to phasing them out.

Key Indicator	Challenges
Lack of circularity integration in corporate decision-making (manufacturing/ production)	Circularity integration is lacking in the steps of product design, procurement and production due to concerns over cost, quality and performance. Low awareness level and knowledge around the circular economy among corporates also hinders the adoption of circular models in their business operations.
Lack of awareness on responsible consumption among consumers (behaviour)	Inadequate education efforts and convenience leads to a lack of awareness of responsible consumption among consumers. Levels of awareness also differs among different segments of consumers, where young, urban consumers are relatively more conscientious in their consumption behaviours than other age and geographical groups.
Consumers' price sensitivity towards alternative products and services (market sentiment)	Malaysian consumers are convenience- and cost driven. The premium price makes a product or service less appealing to consumers, thus discouraging brand owners from widely adopting circular solutions into their product and service portfolios.
Limited responsible investment for innovative SMEs (access to financing from local financial institutions)	The recycling industry and wider circular economy innovation is often misunderstood and not seen as an investable opportunity by local financial institutions. Interventions that allow for more accessible financing can help innovative SMEs grow and contribute towards plastics circularity and sustainability.

Key Indicator	Challenges
Lack of domestic R&D on sustainable design and material innovation for end product (extrusion technology, eco and better performing resins) – industry led – home country.	There is lack of R&D funding for sustainable design and material innovations both from the government and within the private sector. To move forward, more funding needs to be made available to support R&D endeavours in extrusion technology, producing sustainable and better performing resins as well as products.
Inadequate and incoherent policies around plastics consumption and disposal (state vs non-state act).	The solid waste management differs in Act 672 state and non-state. This led into inconsistent implementation at a nationwide scale.

Adopted from Malaysia Plastics Sustainability Roadmap 2021-2030

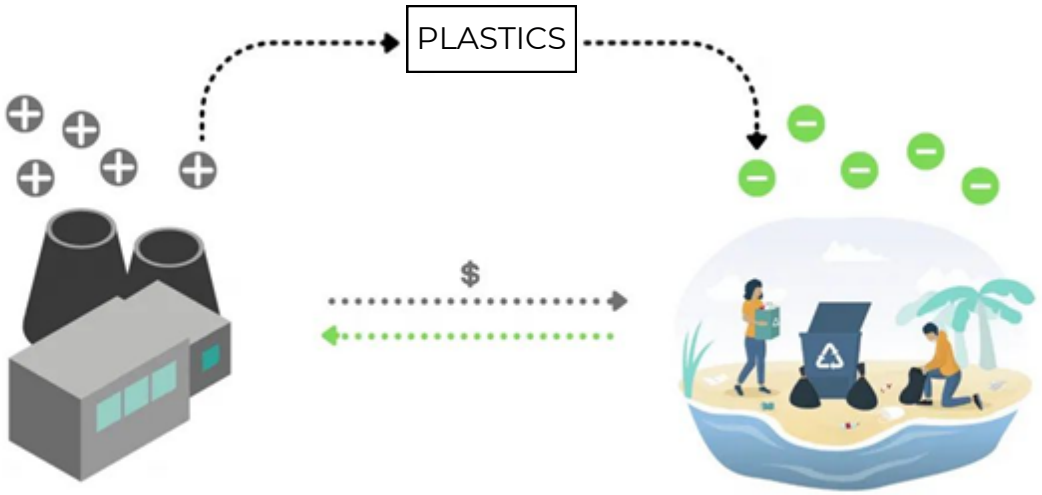
The aspiration for a solid waste management flow after the adoption of Circular Economy in Malaysia.



THE PLASTICS NEUTRALITY MASTERPLAN

What is plastics neutrality?

Plastics neutrality is achieved when plastics is being kept in the loop to achieve plastics net-zero in the environment, and this can be done through the practice of redesign, reuse, repurpose, recycle and recovery. In this manner, plastics neutrality will help mitigate plastics pollution whilst continuing to provide society the benefits of plastics.



PLASTICS PRODUCTION PLASTICS COLLECTION

Why do we need to keep plastics in the loop?

It is important to recognise that because of the unique material characteristics of plastics, there are no functionally suitable alternatives for many applications. Substituting plastics with other materials in existing applications will often increase the GHG emissions. Hence, plastics has continued to be the material of choice for many industries. To avoid plastics waste generation due to the high consumption of plastics, plastics neutrality will ensure these plastics are kept in the loop for as long as possible through recovery and recycling. The pillars of this Masterplan will drive and transform plastics applications and industry into neutrality and circularity to support the national Circular Economy agenda.

OBJECTIVES OF MASTERPLAN

1. To achieve zero plastics to landfill and to be circular and have net-zero emissions by 2050.

2. To sustainably address plastics pollution in Malaysia, ensuring economic development, environmental protection and societal wellbeing.

3. To provide guidance and promote sustainable business practices in ensuring plastics circularity and sustainability through circular economy approach.

4. To harmonise actions along the plastics value chain through adoption of life cycle approach.

Plastics Neutrality Masterplan

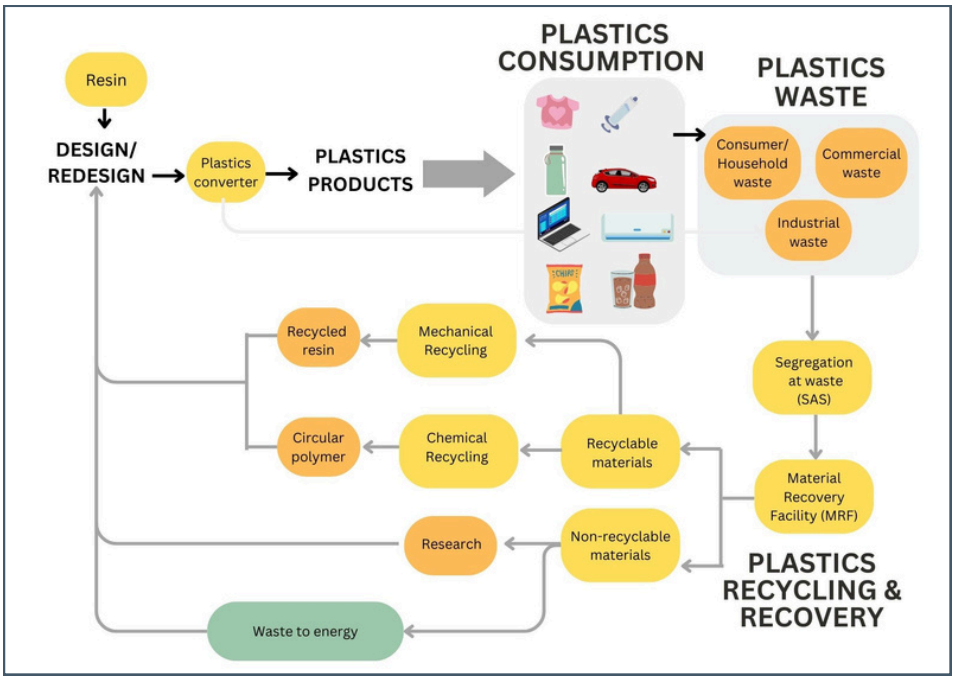
The country's low recycling rate is an indication of gaps and deficiencies in the current waste management system which lacks the resources to develop sustainably. Malaysia must invest more to create an effective waste management infrastructure, from the economical collection of clean plastic streams and other recyclable materials at all levels, to chemical recycling and other options such as research and redesigning for the final processing of unrecyclable plastics waste.

Meanwhile, advances in chemical recycling are showing great promise as another option for plastics waste that is harder to recycle or cannot be recycled by conventional means in Malaysia. Petronas Chemicals Group (PCG) has recently announced an initiative on a chemical recycling plant (https://www.petronas.com/pcg/media/media-release/pcg-construct-asias-largest-advanced-chemical-recycling-plant). This technology breaks plastics down into basic chemicals that can be used to make new products, from low quality, mixed plastics waste otherwise destined for incineration or landfill.

Under current infrastructure, the recovery of recyclables from households and municipal councils is low due to a combination of issues stemming from lack of awareness on proper separation at source (SAS) to societal behaviour. This in turn affects the collection and further separation of clean streams of recyclables, including plastics, by Material Recovery Facilities (MRFs), which are non-existent currently.

A related concern is the consistency of quality and the contamination of recyclables with dirt, food, and a wide range of other materials. Currently, the collected and separated recyclables which are soiled and do not meet the grade for recycling, are sent to be disposed in landfills instead. The mission of plastics neutrality is to achieve zero waste to landfills.

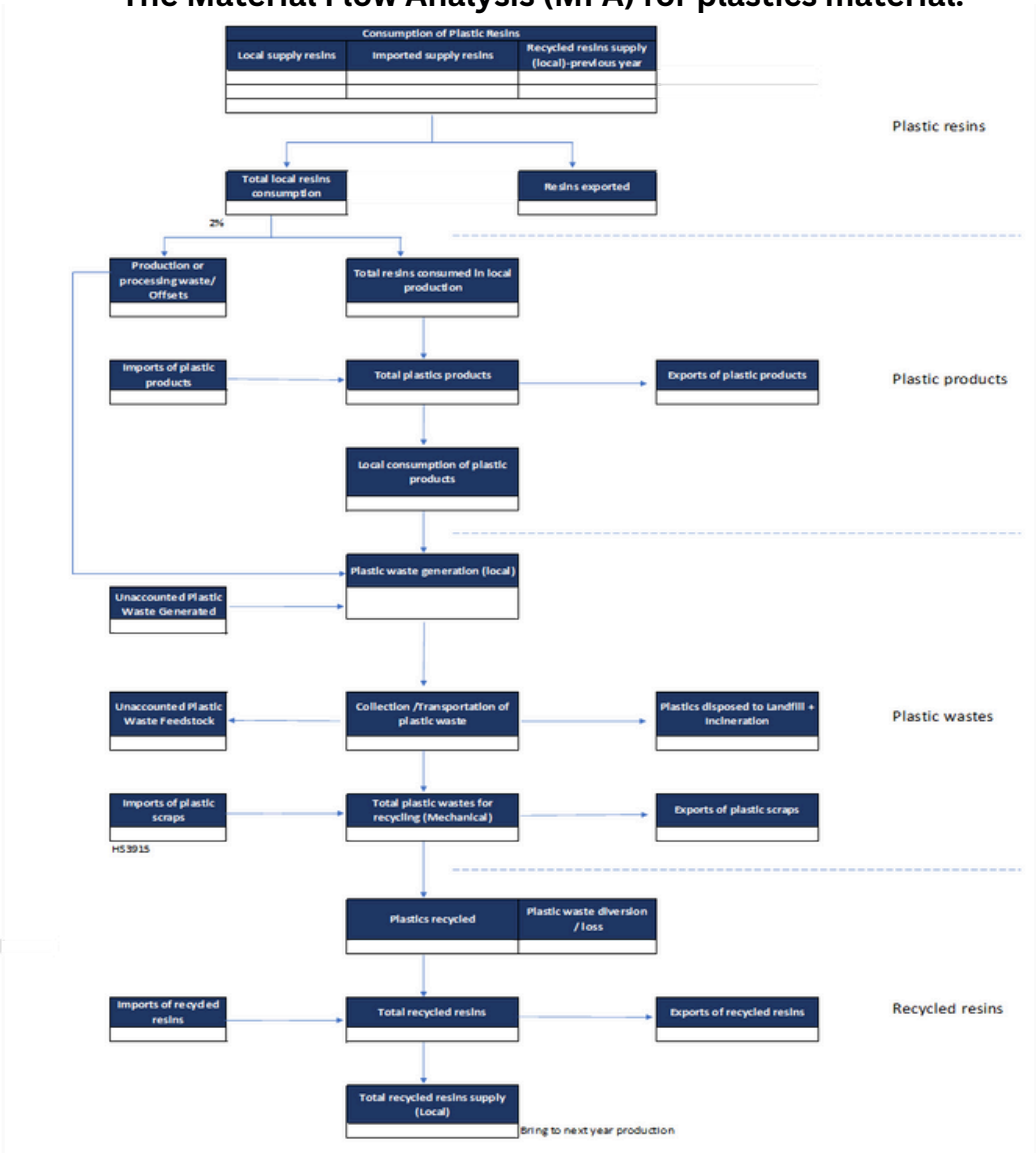
The Plastics Flow for the Plastics Neutrality Masterplan



Without improvement in these areas, the recycling system in Malaysia will remain ad hoc and piecemeal, and difficult to scale in the long-term. Without a viable recycling industry, Malaysia would eventually find itself in the same position as the countries that exported their waste when it runs out of suitable landfill, which it inevitably will in the future. Malaysia must provide the right economic incentives which support an effective and efficient waste management system and economically viable recycling which are core components of the plastics neutrality and circular economy. Additionally, measures to support trade of plastics waste and recycled materials is needed to ensure plastics waste and recycled feedstock can be managed in an environmentally sound manner and be used into production of recycled plastics.

To do this, we need to have meaningful discussion on how to make systemic changes involving many stakeholders, especially in areas where boundaries of responsibility are sometimes unclear. Understanding what the challenges and hurdles are, and where to intervene with the appropriate policies will require a clear picture of plastics flow within the Malaysian economy and the entire plastics value chain. In this regard, a public-private initiative is ongoing to study the overall plastics waste flow.

The Material Flow Analysis (MFA) for plastics material.



PILLARS TOWARDS PLASTICS NEUTRALITY

Plastics neutrality involves fostering innovation and collaboration across sectors to develop sustainable alternatives and improve recycling infrastructure.

1

Making Plastics Circular

Plastics manufacturers are exploring novel circular strategies pertaining to product reuse, design, and business models.

2

Fostering Sustainable Use of Plastics

The sustainable utilisation of plastics entails manufacturing and utilising plastics products in a manner that safeguards both human health and the environment.

Pillar 1: Making Plastics Circular

Plastics producers are developing new circular approaches relating to reuse of products, product design and business models. With the redesign effort, this could help to reduce single-use applications, including packaging. It also holds opportunities for companies in the plastics industry because circular business models generate new revenue streams, and often require the light weight and durability benefits of plastics. This pillar helps increase value of plastics and increase recycling, and ultimately reduce plastics waste generation.

Key levers:

i. Fostering circular design and business models

To foster circular design and business models, the entire plastics value chain would need to work concurrently; starting with the upstream producers producing more circular polymers, enhancement of product design by Brand Owners and manufacturers to redesign plastics products to be reusable and recyclable, and the recyclers to expand and explore new and advanced recycling technologies to recycle the different types of plastics into recycled circular polymers which could be fed into the loop again.

ii. Enhancing mechanical recycling

Mechanical recycling of plastics waste (sorting, grinding, washing, cleaning and reprocessing; or dissolution of the polymer and reprocessing) has a high technological maturity in several polymers and applications. Mechanical recycling will remain the preferred recycling solution for many waste streams, as the technology is cost- and energy-efficient.

The projected growth of mechanical recycling will need:
- stricter regulations ensuring the availability of high-quality waste,
- improvement in SAS and collection activities,
- advancements in technology such as AI improved sorting;
- and incentives to increase demand for recycled plastics products

iii. Unlocking chemical recycling

Despite the advantages of mechanically recycled plastics, their suitability for many high-end uses is limited, and after many cycles the plastics' quality is degraded. However, in Malaysia, poor practice of SAS and ineffective waste collection has resulted in recyclables, including plastics, being mixed with non-recyclables, such as food waste. Mixed plastics waste cannot be mechanically recycled.

This can be overcome through chemical recycling which complements mechanical recycling. It produces premium-quality plastics and provides an effective solution for difficult-to-recycle plastics waste, and for applications such as food-contact packaging or medical use (Material Economics, 2019) (Plastics Europe 2022). A recent JRC study further highlights that chemical recycling can reduce GHG emissions for plastics waste that is not being mechanically recycled (GARCIA-GUTIERREZ, et al., 2023).

Chemical recycling technologies (pyrolysis, depolymerisation, gasification, etc.) are under development and still in the early stages of commercialisation. Once the enabling regulatory, technical and economic conditions are met, the technology can be rapidly deployed and scaled. Chemical recycling, coupled together with mechanical recycling, will boost demand for used plastics, increase value of plastics and drive recovery of used plastics.

Pillar 2: Fostering Sustainable Use of Plastics

Sustainable use of plastics means producing and using plastics applications in a way that is safe for human health and the environment.

Enablers:

i. Assure the safe management of plastics additives

There is already extensive legislation in place to identify and manage potentially hazardous substances. For example, the EU regulation Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) introduced in June 2007.

Despite the existing legal framework, stakeholders want more assurance and transparency on the use of hazardous substances and more specifically plastics additives. Indeed, policy documents such as the EU Chemical Strategy for Sustainability introduced in 2020 put the management of potentially hazardous substances high on the agenda. Also, in the UNEP-driven Intergovernmental Negotiating Committee to develop an internationally legal binding instrument on plastics pollution (UNEP, 2023), banning or phasing out chemicals and polymers of concern, including some plastics additives, are among the options for discussion. Assuring the safety of additives used in production and potentially present in products is therefore important.

ii. Eliminate pellet loss in the production of plastics

Loss of plastics pellets in the supply chain is a key challenge for the plastics industry. To eliminate losses in the supply chain, Operation Clean Sweep® (OCS) has been introduced as part of the industry-led initiative to ensure zero plastics pellet loss throughout the value chain. The programme puts forward best practices for all pellets handling operations along the supply chain (production, conversion, logistics). The government recognizes the Malaysian plastics industry initiative in achieving zero pellet loss through the OCS programme.

iii. Harness tools to share information across the value chain

A sustainable product label is a certification or verification mark that identifies a product as having met certain criteria related to sustainable production or safety. The plastics industry recommends that the product labelling standard, MS 1405:2018, which provides the coding system for plastics products, should be adopted by all Brand Owners and plastics manufacturers. This labelling will help with SAS activities amongst the public.

iv. Communicate pro-actively

Transparent communication contributes to gaining trust of society and end consumers. Moreover, there is a need to feed the public debate with scientific insights, so that decisions by policymakers, brand manufacturers and end-consumers are fact-driven. The plastics industry will commit to strengthen its role as a provider of publicly available and reliable data on plastics neutrality through its reports and publications.

v. Collaborate to overcome knowledge gaps and prevent leakage

Since most plastics leakage occurs in the use and end-of-life stages of plastics products, the direct impact of plastics producers on overall leakage is low. Nonetheless, plastics producers can partner and collaborate with both public and private stakeholders to address current and legacy leakage issues.

ROADMAP

Immediate (2024-2026)

Pillar 1: Making Plastics Circular

- Enforce public actions on non-compliance with SAS
- Harmonize Act 672 throughout Malaysia
- Provide tax incentives for manufacturers to enhance product design/innovation; recyclers to enhance technologies and environmental compliances
- Provide grants for R&D to make circular products
- Harmonise requirements for recycled content measurement and certification
- Impose minimum circular content targets and enforce implementation also for imported plastics
- Encourage adoption of OCS along plastics value chain
- Improve and adopt Material Flow Analysis (MFA)

Pillar 2: Fostering Sustainable Use of Plastics

- Enforce product labelling
- Communication, Educational and Public Awareness (CEPA)

Short-term (2027-2028)

Pillar 1: Making Plastics Circular

- Enforce mandatory EPR
- Green procurement by Government on circular products
- Enhance inter-ministerial and public-private knowledge sharing and cooperation to achieve plastics neutrality
- Formalise informal sector
- Increase MRFs nationwide

Pillar 2: Fostering Sustainable Use of Plastics

- Communication, Educational and Public Awareness (CEPA)

Mid-term (2029-2030)

Pillar 1: Making Plastics Circular

- Improve data collection and reporting structure on waste
- Have chemical recycling operational at scale

Pillar 2: Fostering Sustainable Use of Plastics

- Communication, Educational and Public Awareness (CEPA)

Glossary

Term	Definition
Chemical recycling	The polymerisation of long polymer chains into monomers through a chemical reaction by means of heat and/or chemical agents to produce monomer, chemical raw materials and/or fuels.
Circular economy	As envisioned in cradle-to-cradle thinking, the circular economy is defined as an economic model in which resources like plastics are used more efficiently through the three guiding principles of “reduce, reuse and recycle” where possible, while redesigning materials to return to nature if they escape the loop.
Collected-for-recycling (CFR)	Denotes the tonnage or percentage of a particular resin collected through the informal and formal collection sectors within the country, which is then sold to processors and/or recyclers for recycling purposes, as compared to total plastics waste generation. CFR = Plastics waste collected and accepted for recycling process / total plastics waste generated
Converter	Companies which produce packaging material by converting raw material.
Electrical & electronics	Referring to plastics application in E&E products as well as for its packaging.
Downstream	Refers to actors at the post-consumption stage, including waste management companies, the informal sector, recyclers, and other end-of-life treatment solution providers.
Extended producer responsibility (EPR)	An environmental policy tool that makes producers responsible for the entire life cycle of the products that they introduce on the market, from their design until end-of-life (including waste collection and recycling).

Term	Definition
Feedstock	Raw material or material that is the principal input for an industrial production process
Informal sector	Consist of self-employed individual plastics waste collectors includes scavengers, waste pickers, junk shops, aggregators, scrap dealers that play a significant role in the collection and recovery of reusable or recyclable waste, either directly from the source where no formal collection systems exist, hauler trucks, or landfills and dumpsites, and offered for sale to recyclers directly or through intermediaries to earn a livelihood.
Material flow analysis	An analytical method to quantify flows and stocks of materials or substances in a well-defined system.
Manufacturer	Companies which produce plastics products by converting raw/ recycled material.
Mechanical recycling	The processing of plastics waste into secondary raw material or material products without significantly changing the chemical structure of the – (as defined by Basel Convention).
Plastics	Synthetic or semi-synthetic material made of petroleum.
Plastics waste	Any plastics material or object which the holder discards, or intends or is required to discard.

Term	Definition
Polymers	A substance consisting of molecules characterised by the sequence of one or more types of monomer units. Such molecules must be distributed over a range of molecular weights, wherein differences in the molecular weight are primarily attributable to differences in the number of monomer units.
Recycled plastics	Plastics fully or partially produced from waste via a recycling process. Recycled plastics can be used as feedstock in the manufacture of plastics parts and products. Recycled plastics may be produced either from post-consumer waste or pre-consumer waste.
Recyclable	Characteristic of a product, packaging, or associated component that can be diverted from the waste stream through available processes and programs and can be collected, processed, and returned to use in the form of raw materials or products
Recycling rate (Plastics)	Recycled plastics divided by the total amount of plastics waste generated. Material that is reused and avoided is not included in the recycling rate. Recyling rate = recycled plastics / total amount of plastics waste generated
Resin	Substances which can be organic or inorganic in nature and widely used as raw materials in the manufacturing of plastics products
Separation at source (SAS)	Separation at source (SAS) requires the consumers to sort their waste into categories, to be disposed of and recycled separately

ACKNOWLEDGEMENTS

We acknowledge information taken from or provided by :

- Malaysian Plastics Manufacturers Association (MPMA)
- MPMA Whitepaper on An Advanced Plastics Recycling Industry for Malaysia
- Plastics Europe
- Malaysia Plastics Sustainability Roadmap (MPSR)

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