

AN ADVANCED PLASTICS RECYCLING INDUSTRY FOR MALAYSIA

A WHITE PAPER BY



MALAYSIAN PLASTICS MANUFACTURERS ASSOCIATION



IN COLLABORATION WITH



MONASH
University
MALAYSIA

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The purpose of this document is to provide information that is publicly available so that readers can make informed independent decisions on any actions they may choose to undertake. The conclusions and views expressed in this report do not necessarily reflect the views of every member of the MPMA or MPRA.

ABOUT US

Malaysian Plastics Manufacturers Association (MPMA)

The Malaysian Plastics Manufacturers Association (MPMA), established in 1967, is a progressive trade association providing leadership and quality service to its members and the plastics industry with due care to the environment. MPMA is the official voice of the Malaysian plastics industry, representing its members and the industry in Government interaction, spearheading the plastics industry's growth and providing the platforms to assist members to be globally competitive. One of MPMA's current focus is on plastics and sustainability whereby activities involve communication, education and public awareness.

In 2011, MPMA signed the Declaration of the Global Plastics Associations for Solutions on Marine Litter which operates as the Global Plastics Alliance (GPA). The GPA is committed to take action and make measurable progress to contribute and execute sustainable solutions locally and regionally to address the issue of marine debris.

As part of the GPA, MPMA will be participating in the Operation Clean Sweep (OCS) Programme starting 2020 in Malaysia. The OCS is an international programme to prevent plastics raw material, such as resin pellets, flakes and powder, from being lost and leaked into the marine environment. MPMA aims to educate its members on the best management practices to be implemented in their premises to achieve zero plastics pellets, flakes, and powder loss.

MPMA has about 750 members, representing about 60 percent of plastics manufacturers in the country, and accounting for 80 percent of the country's total production of plastics products.

- For more information on MPMA, visit <http://mpma.org.my/>
- For information on The Declaration of the Global Plastics Associations for Solutions on Marine Litter, visit <https://www.marinelittersolutions.com/>
- To find out about the Operation Clean Sweep (OCS) Programme, visit <https://www.opcleansweep.org/>

Malaysian Plastics Recyclers Association (MPRA)

The Malaysian Plastics Recyclers Association (MPRA) was formed in 2014 to spur the growth of the plastics recycling industry, enhance integrity and to engage with Government and regulators.

The MPRA aims to keep members informed of industry developments in order to stay globally competitive, amid the recent growth of the plastics recycling industry and the increasingly sophisticated operating environment. MPRA plays a key role in building a sustainable platform for the plastics recycling industry and supports sustainable practices and education.

For more information, visit <http://www.mpra.com.my>

OUR COLLABORATIVE PARTNER

Monash University Malaysia (MUM)

Established in 1998, Monash University Malaysia is the third-largest campus of Australia's largest university. As a self-accrediting institution of higher learning, it offers a distinctly international and culturally rich environment with approximately 8,400 students from 78 different countries.

Monash University Malaysia has established strong links with industry and government, and serves as a platform for research and education engagement with Southeast Asia and beyond. From collaborating with industry partners to discovering cutting edge research and development products and solutions, to providing students internship opportunities with top industry players, we are at the forefront of research and education which seeks real-world solutions to address national and international priorities.

Monash University Malaysia obtained an Outstanding (6-Star) University in the Malaysia Rating for University and University College Excellence (SETARA) 2017.

For more information, visit <http://www.monash.edu.my>

EXECUTIVE SUMMARY

This white paper is the plastics recycling industry's first steps in articulating our views as part of a programme to engage all our relevant stakeholders.

The recent onslaught of *sampah plastik* that hit Malaysia is a symptom of mismanaged foreign waste smuggled in by unlicensed recycling operators, and serves as a timely reminder that Malaysia also needs to address its own plastics waste. Recycling is a core component of efficient and effective waste management systems, and an advanced plastics recycling industry will support an effective and sustainable waste management system.

In this white paper, we highlight three key areas needing further discussion and consultation with all stakeholders in order to quickly advance and modernise Malaysia's plastics recycling industry.

1. Malaysia is in critical need of wider collaboration, as managing the flows of plastics from cradle to the grave is a multi-stakeholder undertaking.

It is critical to have shared responsibility for plastics' environmental impact among all parties involved in the life cycle of plastics, either under government-led or industry-led or voluntary product stewardship, to achieve an advanced plastics recycling industry. However, 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.

There is a complex array of regulators enforcing various laws and policies, from raw material to consumption to waste which we have to navigate, in order to accurately identify the right quarters to engage with for suggestions on policy changes.

Establishing an advanced plastics recycling industry will require significant organisational and collaborative effort across all agencies overseeing and regulating the plastics industry value chain. The creation of cross-functional collaborative groups across industrial sectors and agencies will help support Malaysia's position as a thriving manufacturing and trading economy, while transitioning to a sustainable recycling nation.

2. The importance of properly managing plastics streams and waste management infrastructure in order to develop a viable and successful circular economy.

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. Understanding what are the challenges and hurdles, 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.

This means studying the structure and data flow of the generation and treatment for each plastics waste input streams (i.e. post-industrial, post-commercial and post-consumer/household) within Malaysia. With more accurate and timely data, we can identify where the most important or urgent changes are needed in order to achieve better efficiencies and efficacy in managing and recycling plastics wastes.

A successful transition to the circular economy will also require the appropriate policies and regulations to identify, understand and remove bottlenecks and hurdles, and to facilitate and encourage partnerships between and within industry, government and society.

EXECUTIVE SUMMARY

(CONTINUED)

3. The potential of plastics recycling as a contributor to Malaysia's economy.

Plastics are valuable resources that can be transformed into new feedstock or into energy instead of being buried in landfills. To advance up the value chain, it is not just the plastics recyclers who need to upgrade their equipment and technology to produce higher value recycled feedstock. Malaysia as a country must encourage higher quality investments in the recycling of all materials, from plastics to construction waste.

Opaque regulations and fluid policy directions have not been encouraging to investors who need assurance that the recycling industry has a long-term future and economic viability.

To turn waste into wealth, Malaysia must set in place the right economic incentives, regulatory and investment frameworks. These will support an effective and efficient waste management system and encourage increased investments to harness new technological solutions in order to maximise the plastics value chain and transition successfully to a circular economy.

With increased investments in better technology, infrastructure and upgraded capacity, MPMA and MPRA estimates that plastic recyclers could potentially grow their contributions to the Malaysian economy by three to four times, to RM15 billion to RM20 billion annually. A clean, vibrant and healthy plastics recycling industry would create a new engine of growth for employment, and a dynamic export sector.

Malaysian Plastics Manufacturers Association (MPMA) and Malaysian Plastics Recyclers Association (MPRA), in collaboration with Monash University Malaysia (MUM) wish to contribute in these three key areas by being involved in collaborative efforts to drive long-lasting, and meaningful change in Malaysia's journey to developing a circular economy and keeping our nation clean and green.

This white paper is intended as a call to action for all stakeholders to work together to find a way forward that can address the urgent need to propel the development of Malaysia's plastics recycling industry into an advanced and modern industry.

I. INTRODUCTION

We are pleased to present our white paper on *An Advanced Plastics Recycling Industry for Malaysia*. This white paper is the plastics recycling industry's first step in articulating the industry's views as part of a programme to engage all our relevant stakeholders. This publication is also a call to action for stakeholders to find a way forward together that can address the urgent need to enhance Malaysia's plastics recycling industry and develop an advanced and modern industry. Establishing and nurturing a vibrant plastics recycling industry will not only benefit the country's economy, but also enhance the government's efforts to advance its sustainability agenda with due care to the environment. The plastics recycling industry is a key component in the country's efforts to embrace a circular economy. Our hope is to create a structured, collaborative process in order to address Malaysia's piecemeal approach to waste management, plastics pollution and recycling.

Malaysia must not become a dumping ground for other countries' rubbish. The onslaught of *sampah plastik* that hit Malaysia is a symptom of mismanaged waste, which was smuggled in by unlicensed recycling operators (Mok, 2019). This *sampah plastik* exported by high-income countries is a timely reminder that Malaysia also needs to address its own plastics waste. Bans and clean-ups alone will not stop pollution if waste, of any kind whether paper, plastics, metal or glass, continues to be mismanaged and littered, in countries which export their recyclables and waste, and in Malaysia.

We believe that effective plastics waste management efforts first begins at home. Malaysia needs more comprehensive solutions to address plastics throughout its lifecycle, from design to waste reduction, recycling to proper disposal at the end of life. Recycling is a core component of efficient and effective waste management systems. An advanced plastics recycling industry will support an effective and sustainable waste management system. This is what the Malaysian Plastics Manufacturers Association (MPMA) and the Malaysian Plastics Recyclers Association (MPRA) in conjunction with Monash University Malaysia (MUM) wish to contribute in Malaysia's journey to developing a circular economy and keeping our nation clean and green.

We alone cannot solve the issue of plastics pollution, but we will contribute by being involved in collaborative efforts with industry players, government agencies and research institutions to drive long-lasting, and meaningful change. With this white paper, we have identified a number of areas to explore, where we can set in motion practical and productive efforts in Malaysia to address the challenge of managing plastics waste.

II. THE GOALS OF MPMA AND MPRA'S JOINT WHITE PAPER

Our goals in this white paper are to highlight the following:



The critical need for wider collaboration, as managing the flows of plastics from cradle to the grave is a multi-stakeholder undertaking

The importance of properly managing plastics streams and waste management infrastructure in order to develop a viable and successful circular economy

The potential of plastics recycling as a contributor to Malaysia's economy

Ultimately, we aim to create cross-functional groups to work in collaboration on the objectives below, which will support Malaysia's position as a thriving manufacturing and trading economy, while transitioning to a sustainable recycling nation:



As always, we stand ready to support the Government and regulatory and enforcement agencies in any way we can.

III. *SAMPAH PLASTIK*

Malaysia is in the process of recovering from the crisis caused by *sampah plastik*, or dirty and contaminated, unsorted, plastic household waste from high-income countries, after China stopped taking 24 categories of paper and plastics waste in 2018 (Lee, 2018). The global recycling system essentially broke down because China had propped up the world's recycling system for more than 20 years as the world's largest importer of recyclables. China's ban diverted *sampah plastik* elsewhere and to South East Asia in particular.

In Malaysia, illegal recyclers smuggled in *sampah plastik* from the United States (US), Canada, United Kingdom (UK), Australia and the European Union (EU), among others. Unlicensed and unregulated factories mushroomed in places like Jenjarom and Teluk Gong, Selangor and Sungai Petani, Kedah. Numerous unlicensed operators were operating in makeshift factories without environmental safeguards and processes. Their emissions and effluents, as well as tonnes of improperly stored *sampah plastik*, caused pollution and health hazards to local communities.

In the space of six months, local authorities shut down more than 150 of these unlicensed factories (Babulal, 2019). To escape the clampdown, many, if not all, of these illegal operators fled and abandoned the mounds of *sampah plastik*. It is highly likely that many more abandoned dumps remain to be found, especially those well-hidden in the Malaysian countryside. These abandoned dumps now pose a pollution risk and are likely to be secretly and illegally dispersed, in illegal landfills, instead of being properly disposed.

The worst impact has been on communities living near these illegal factories, many of which were reported to be burning unrecyclable wastes in the open under the cover of the night, causing health and environmental hazards. Understandably, those living in the vicinity are angry and concerned about their wellbeing and that of their families, neighbours and friends.

The plastics pollution issue is also further aggravated by irresponsible people who litter indiscriminately and cause plastics waste to pollute our environment. Malaysia will need to take drastic measures such as government campaigns to educate the public on separating recyclables from rubbish, as well as heavier anti-littering penalties to prevent the pollution of our rivers, oceans and forests.

Poor regulation and enforcement have in the past failed to stem this flood of *sampah plastik*, and the pollution and harm caused have marred the perception of the legitimate plastics recycling industry. We do not condone any illegal activities and support the clamp down against unlicensed recycling operators who break the law and pollute the environment. We support stronger enforcement and higher penalties against both smuggling and illegal recycling activities to ensure illegal recycling factories and smuggled *sampah plastik* do not return.

IV. REGULATION OF PLASTICS WASTE IN MALAYSIA

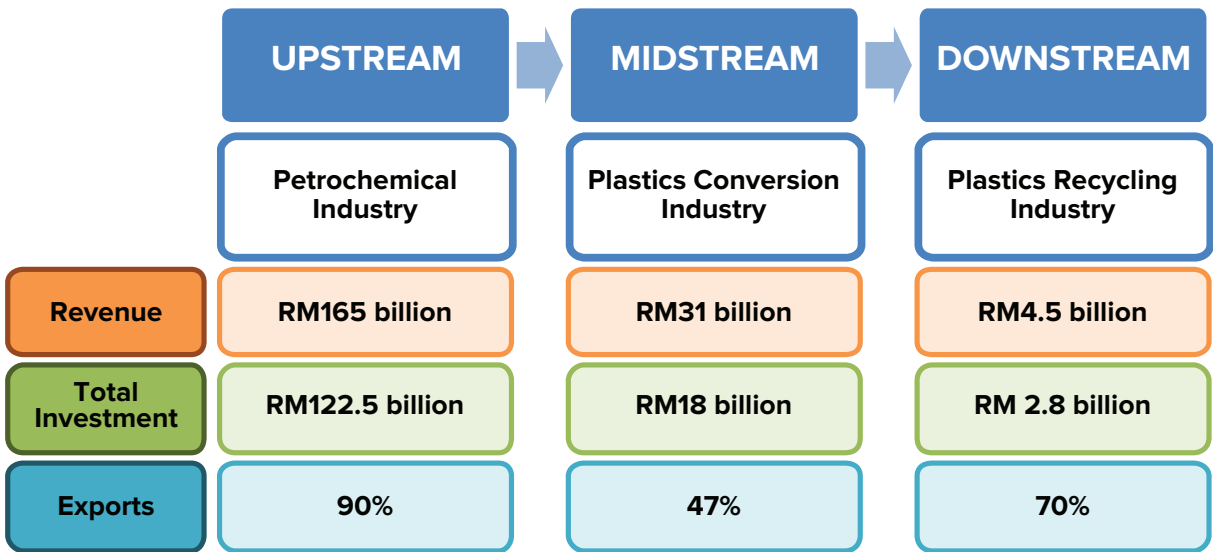
This is the second time that contaminated, mixed plastics waste from foreign households became a problem for Malaysia. In 2007, the Ministry of Trade and Industry (MITI) banned the import of *sampah plastik*, citing environmental as well as bio-security concerns (MITI, 2007). Imports of clean homogenous plastics scrap were then regulated under the system of Approved Permits (AP), as the Government recognised the need to nurture and grow a legitimate and viable plastics recycling industry here.

In 2015, the National Solid Waste Management Department, or Jabatan Pengurusan Sisa Pepejal Negara (JPSPN), took over the regulation of imports of clean plastics scrap and the issue of APs (MITI, 2015). This is in keeping with the Government’s recognition, that the plastics recycling industry

plays a crucial role in any country’s waste management system. Recycling alleviates the immense pressure on landfills while reducing the amount of recyclable material which would be permanently lost. Recycling also prevents pollution as part of an effective waste management system.

MPMA estimates that the plastics recycling industry produces 1.5 million tonnes of recycled resins a year worth approximately RM4.5 billion in revenue, and exports roughly 70 percent of its production, generating foreign exchange earnings for the country. From this estimation, the plastics recycling industry also supports the RM31 billion local plastics industry which is a key supply chain to the local electrical and electronics and automotive industry.

Figure 1: The Plastics Industry’s Value Chain from Upstream to Downstream



Source: MPMA

Note: According to the United Nations Environment Programme or UN Environment (2018), plastics conversion refers to the process of converting recycled plastics resins into a wide range of resources or finished products such as insulation, pallets, packaging, pipes, car dashboards, bottles and other recyclable plastics items.

Being an export-oriented economy, Malaysia generates plastics waste along the entire value chain of the manufacturing sector. With manufactured goods comprising 55% of exports, and electronic and electrical products making up 34% of total exports, the support provided by the petrochemical industry plays a huge role in the economy and across a broad range of sectors including the packaging, construction, agriculture, household, transportation, food & beverage (F&B), healthcare and technology sectors.

Licensed plastics recyclers need to buy clean scrap generated by overseas manufacturers and factories, to supplement the relatively small volume of local industrial plastics waste. Imported clean scrap is essential to achieve the economies of

scale dictated by the machinery and technology which they invested in.

MPMA and MPRA estimates the total value of manufactured plastics goods, or goods containing plastics parts, across sectors in the economy amounts to approximately RM320 billion per annum. Of this, the electronic and electrical sector produces RM290 billion of end-products which contain plastics, while the automotive sector produces RM25 billion and the F&B sector, RM3 billion.

In order to achieve better efficiencies and efficacy in recycling plastics wastes, we need to understand the entire value chain of the plastics industry. The first step will be to map the plastics industry

Figure 2: Key Data of Malaysia's Plastics Industry

	2014	2015	2016	2017	2018
Malaysia's Gross Domestic Product (GDP) Growth	6.0%	5.0%	4.2%	5.9%	4.7%
Number of Plastic Manufacturers	1,300	1,300	1,300	1,300	1,300
Employment	82,000	80,000	79,000	84,000	81,500
Turnover (RM Billion)	RM19.46 b (+7.3%)	RM24.77 b (+27.3%)	RM27.32 b (+10.3%)	RM29.80 b (+9.1%)	RM30.98 b (+4%)
Export (RM Billion)	RM11.94 b (+11.5%)	RM12.96 b (+8.5%)	RM13.11 b (+1.2%)	RM14.58 b (+11.2%)	RM14.60 b (+0.14%)
% of export against turnover	62%	52%	48%	49%	47%
Resin consumption (Metric Tonne)	2.15m MT (+2.5%)	2.22 MT (+3%)	2.26 MT (+2%)	2.35 MT (+5%)	2.45 MT (+3%)
Per capita consumption of resin (Kilograms)	71 kgs	72 kgs	72 kgs	73 kgs	76 kgs

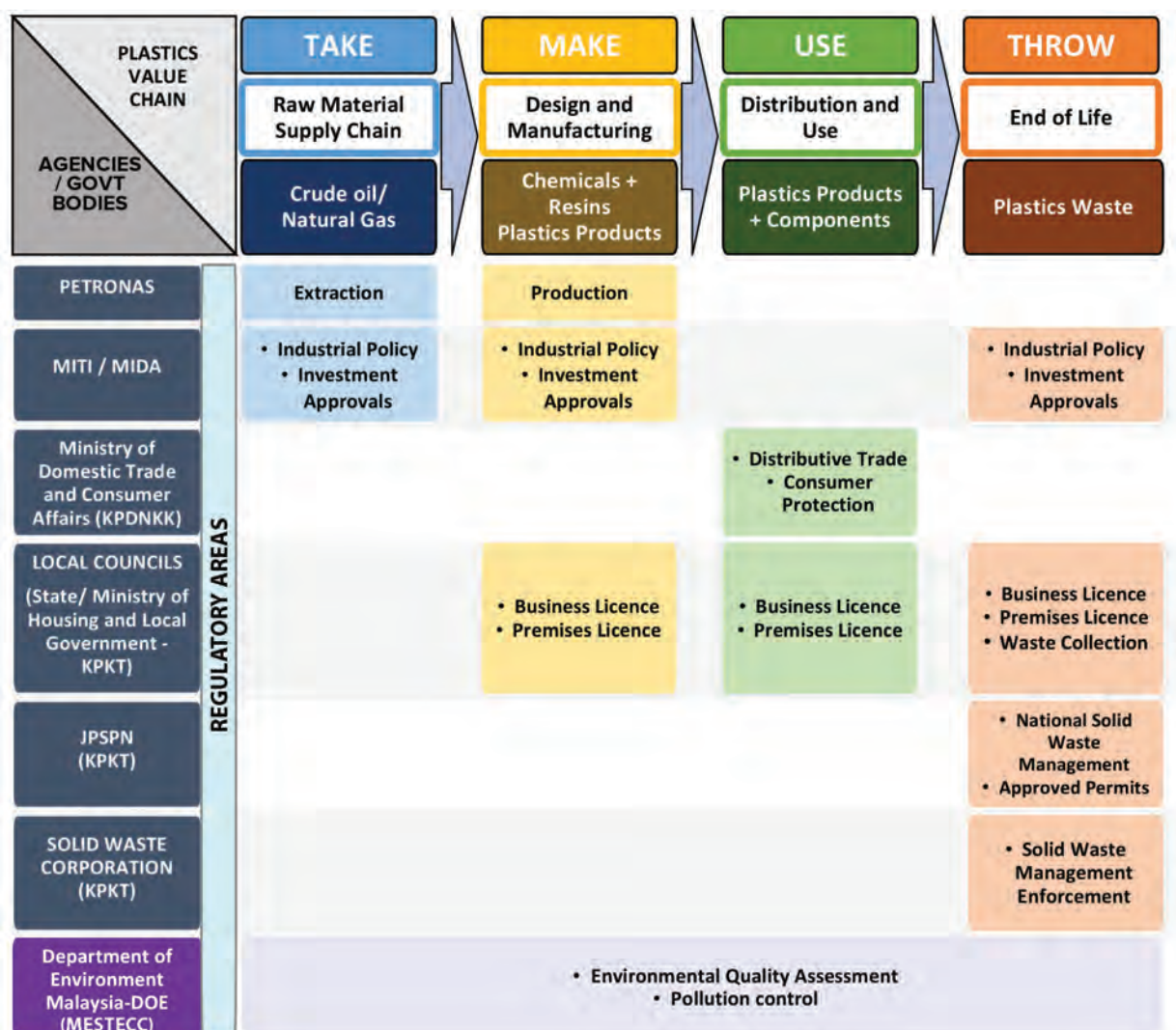
Source: MPMA; Figures are based on revised basis of data compilation by the Department of Statistics Malaysia (DOSM) and collected from Malaysian Petrochemicals Association (MPA) Plastics Resins Producers Group (PRPG)

IV. REGULATION OF PLASTICS WASTE IN MALAYSIA (CONTINUED)

regulatory landscape in detail. A detailed regulatory map of the plastics value chain will be invaluable in accurately identifying the right quarters to engage with for suggestions on policy changes.

In producing this white paper, we have produced a simple outline (below) which shows there is a complex array of regulators enforcing various laws and policies, from raw material to consumption to waste.

Figure 3: Map of Regulatory Areas and Agencies Along the Plastics Industry's Value Chain



Source: This map is based on MPMA and MPRA's analysis of Malaysia's plastics industry's value chain regulatory landscape

It is critical to have shared responsibility for plastics' environmental impact among all parties involved in the life cycle of plastics, either under government-led or industry-led or voluntary product stewardship, to achieve an advanced plastics recycling industry.

Establishing an advanced plastics recycling industry will require significant organisational and collaborative effort across all agencies within the plastics industry value chain. MPMA and MPRA estimates that roughly RM2.8 billion has been invested by the plastics recycling industry thus far, but this needs to be bolstered by more cohesive action and support in developing and promoting plastic recycling policies and programmes.

Governments should use policies or regulations to help stimulate the development of plastics recycling industry, from restrictions on landfills to lowering taxes for recycled materials relative to virgin materials. Governments also have the capacity to direct public or private investments in plastics recycling facilities and technologies, as well as drive demand through public procurement.

The Ellen MacArthur Foundation, 2017,
'Scaling Recycled Plastics across Industries'

Government efforts are also needed to promote the adoption of the Extended Producers Responsibility (EPR) schemes in Malaysia, in order to better connect regulation with the circular economy. Introducing EPR schemes can push producers' incentive to change product designs in environmentally benign ways, such as making products that are easily

recyclable or reusable (Organisation for Economic Co-operation and Development, n.d).

EPR schemes are based on the concept of shared responsibilities, with manufacturers and importers shouldering part of the cost of collecting and recycling plastics waste, as part of their continuing responsibility through their products' lifecycle until final disposal.

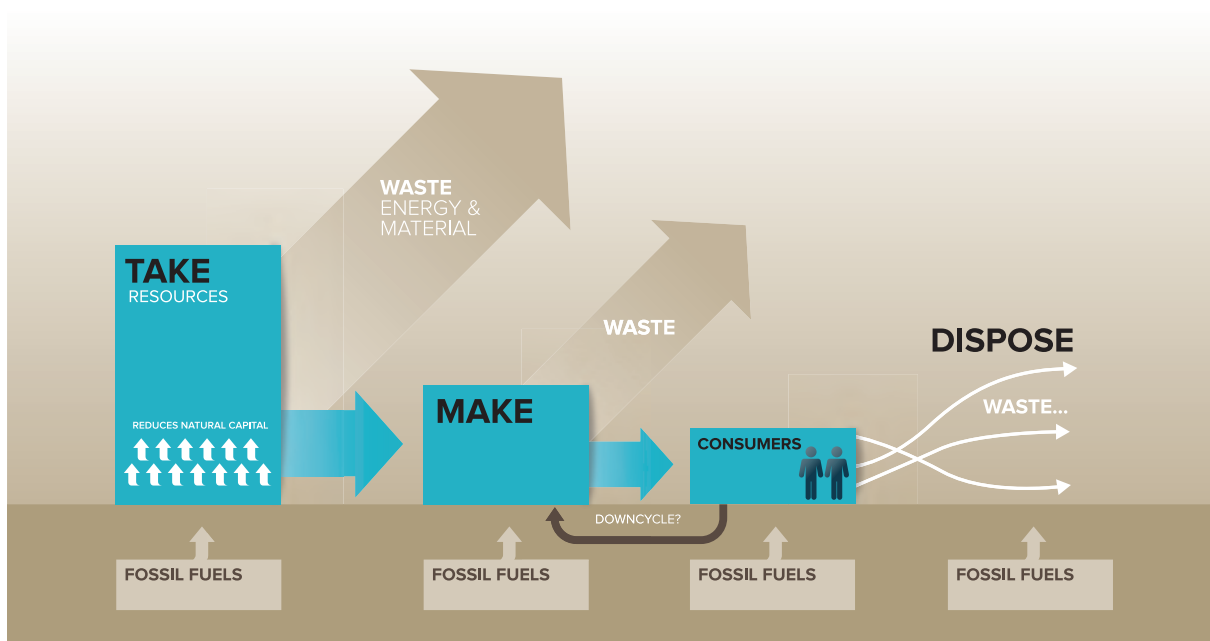
Brand owners will also need to take on a new role as coordinators of a complex value chain, driving demand to develop markets for recyclates, or recycled material, by establishing their targets for the use of recycled resins.

For example, Dell Technologies has committed to recover more than 2 billion pounds of used electronics and use more than 100 million pounds of recycled materials in by 2020, of which plastics are an important component in its products (Dell Technologies, 2019). This commitment is made possible via close collaboration with the U.S. non-profit organisation, Goodwill, through its Dell Reconnect Programme, which offers consumers free recycling of computers, monitors and computer accessories (The Ellen MacArthur Foundation, 2017) along with Dell's other recycling initiatives. At the end of 2018, Dell Technologies had used 94 million pounds of recycled-content plastic and other sustainable materials in its products, of which 7.6 million pounds came from post-consumer recycled content (Dell Technologies, 2019).

This example shows that close collaborations between value chain partners helps ensure that the interests are aligned and safeguards the quality of the process along the entire plastics value chain, starting from material supply chain up to end of life (The Ellen MacArthur Foundation, 2017).

V. PLASTICS, WASTE MANAGEMENT AND THE CIRCULAR ECONOMY

Figure 4: Linear Economy



Source: The Ellen MacArthur Foundation

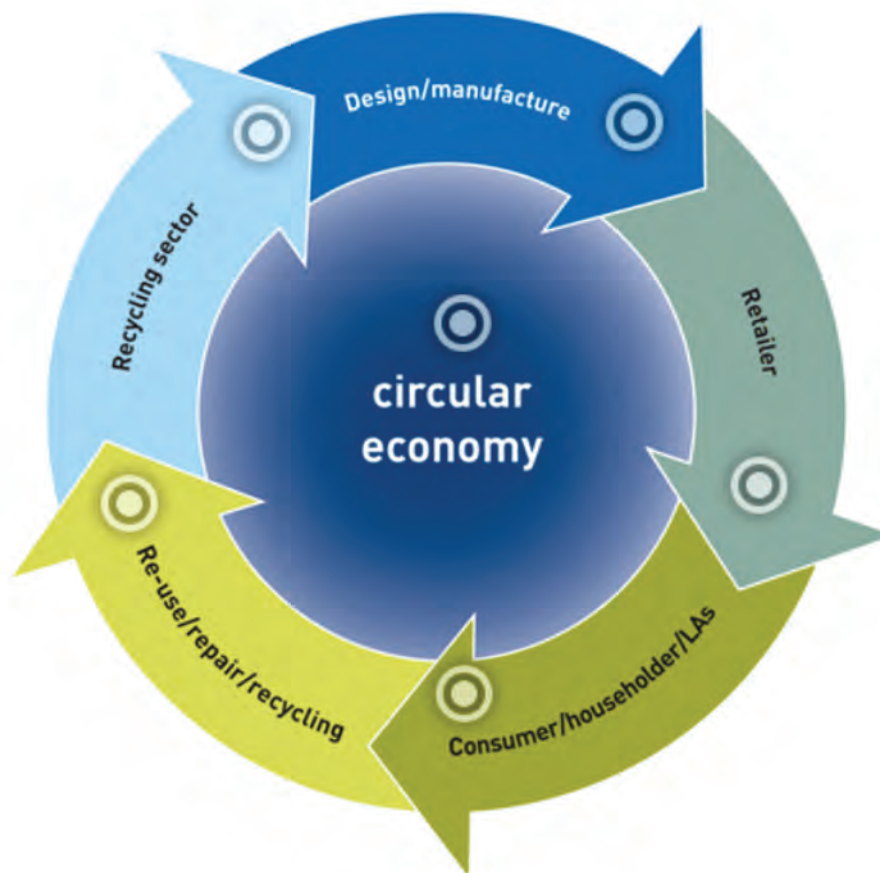
“Plastics pollution is the result of a broken take, make, and dispose system. We need to change that system and to do that we need businesses, governments, organisations, and citizens around the world to work together.”

The Ellen MacArthur Foundation, 2019, ‘Chile joins Plastics Pact network’

Malaysia is now preparing to take the next step towards sustainability and in the process of developing a circular economy. In a linear economy, natural resources are extracted, used and consumed and then discarded as waste, in a “take-make-use throw” progression.

In a circular economy, the waste becomes a valuable resource, to be recycled as raw material and made into new products and not thrown away. This reduces the need to extract more natural resources

and the impact on the environment. Redeploying waste as a resource to be used over and over is the organising principle of circular economies, which is why recycling plays an important role. The benefits could be substantial, from lowering manufacturing cost by replacing virgin feedstock, reducing single-use plastics (SUPs) to reusable plastics, to new and more job opportunities and ultimately a cleaner environment. The potential for the circular economy and recycling are huge, and Malaysia must not miss out.

Figure 5: Circular Economy

Source: Global Waste and Resources Action Programme (WRAP)

Note: LAs refers to Legal Authorities

Waste management systems, not just in Malaysia but around the world, have not kept up with the rapid rise in plastics use. Plastics are indispensable and used in almost every aspect of life. Plastics have helped increase energy efficiency by saving fuel, reducing transport cost and CO₂ emissions, by reducing the weight of manufactured products

by replacing heavier materials such as metal, wood or glass. To transition successfully to a circular economy, the waste management system must incorporate the systematic separation of recyclables, or Separation At Source (SAS), as well as the collection and sortation of plastics recyclables.

V. PLASTICS, WASTE MANAGEMENT AND THE CIRCULAR ECONOMY

(CONTINUED)

“Scaling up their implementation, however, is inhibited by a number of operational and strategic bottlenecks. These bottlenecks occur in each of the three main steps in the process; collection of used plastics, processing the collected plastics and manufacturing with recycled plastics. First of all, cost effective collection of sufficient volumes of end of life materials for recycling is hindered by the widely dispersed and small-scale nature of collection networks and the limited development of global recycling infrastructure. Second, reprocessing is subject to a number of challenges ranging from technological limitations to the underdeveloped market for recyclates. Finally, the mechanical and aesthetic properties of recycled plastics should be taken into account in the manufacturing process and in its results, which can limit the possibilities for their application.”

The Ellen MacArthur Foundation, 2017, ‘Scaling Recycled Plastics Across Industries’

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 Waste-to-Energy (WTE) options for the final processing of unrecyclable plastic waste.

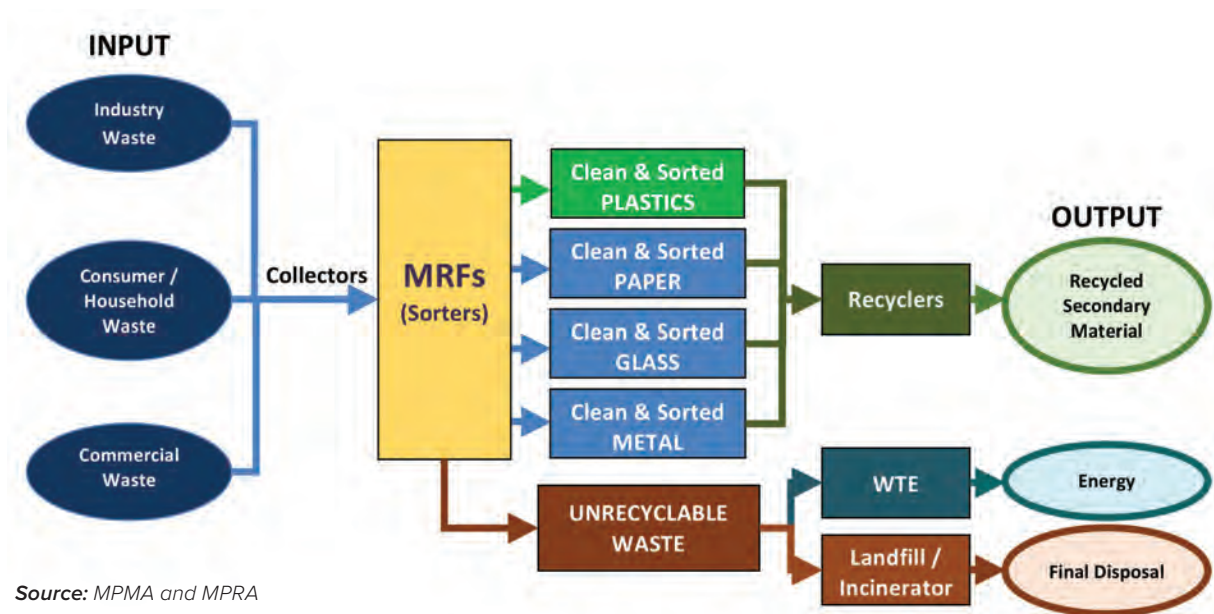
The Ministry of Housing and Local Government or Kementerian Perumahan dan Kerajaan Tempatan (KPKT) has already begun a public-private partnership project with Cypark Resources Bhd to develop Malaysia’s first WTE plant in Port Dickson, Negri Sembilan, for the final processing of unrecyclable plastic waste and other types wastes. Known as SMART, or Solid Waste Modular Advanced Recovery and Treatment WTE, the plant would be able to undertake 600 tonnes of mechanically segregated and processed municipal solid waste a day, producing 20MW to 25MW of green energy which is enough to power about 25,000 households within its vicinity (Aziz, 2019).

Set to be fully operational in early 2020, this first WTE facility should be the impetus for other states to develop their own WTE facilities in line with KPKT’s vision to construct at least one WTE facility in each state within two years and a WTE policy to tackle

unrecyclable wastes (Aziz, 2019).

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 Chemical Group (PCG) and Plastic Energy Ltd, a chemical recycling company, are collaborating to study the feasibility of a facility to convert plastic waste into feedstock. Chemical recycling breaks plastics down into basic chemicals that can be used to make new products, from low quality, mixed plastic waste otherwise destined for incineration or landfill (*‘Petronas Chemicals to collaborate on circular economy for plastics’*, 2019).

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 of recyclables at source 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. A related concern is the consistency of quality and the contamination of recyclables with dirt, food, and a wide range of other materials. Collected and separated recyclables which are soiled do not meet the grade for recycling and will be sent to be disposed in landfills instead.

Figure 6: MPMA & MPRA's Vision of an Effective Waste Management System

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 *sampah plastik* when it runs out of suitable landfill, which it inevitably will in the future.

In addition, KPKT has started taking steps to consolidate its regulation of ad hoc and piecemeal plastics waste recycling projects through plans for centralised waste parks in every state (Kumar, 2019). Discussions on the construction of waste parks in Selangor, Kedah, Penang, Perak and Johor have already started, with an ambitious target to centralise recycling factories into these designated areas in two years.

Careful consideration must be given to how this target can be achieved. Relocating existing recycling factories will have cost and logistical implications, not just for the operators themselves but for the plastics industry as a whole. MPMA and

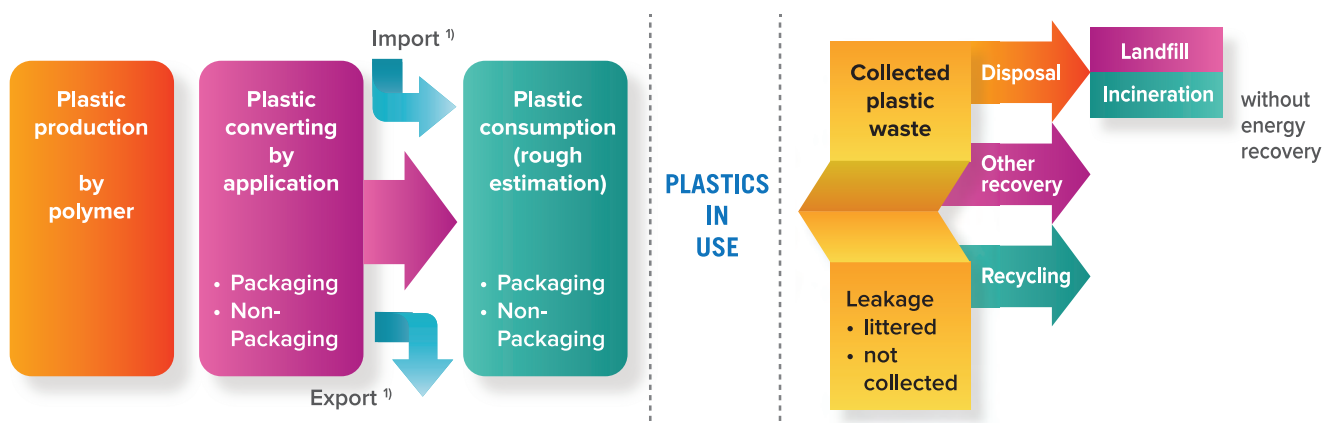
MPRA are ready to support and facilitate dialogue between plastics recycling industry players and KPKT, and to identify challenges and solutions to make centralised waste parks a success.

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 circular economy. 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. Taking the Global Plastics Alliance's (GPA) Roadmap as an example, Malaysia can consider adopting a similar roadmap in order to define, describe and capture key essential data.

V. PLASTICS, WASTE MANAGEMENT AND THE CIRCULAR ECONOMY (CONTINUED)

Figure 7: Structure and Data Flow of Global Post-Consumer Plastic Flow



Source: The Global Plastics Alliance (GPA)

Gaining a clear picture of Malaysia's plastics flow will require studying the structure and data flow for the generation and treatment of each plastics waste input streams (i.e. post-industrial, post-commercial and post-consumer/ household).

With this goal in mind, MPMA and MPRA, together with the government, have engaged with the Japan International Cooperation Agency (JICA) to participate in their Program on Improvement of Plastic Waste Management, at the start of next year.

Aimed at improving plastics waste management in Asian emerging countries through sharing the knowledge and experience of Japan, participants will be able to deepen their understanding of plastics waste management. The programme will involve the six other plastics industry associations from across Southeast Asia who will also be contributing towards this knowledge sharing. Post programme, participants will be required to report policy proposals for their respective country.

Furthermore, the plastics industry is participating in the establishment of a Malaysian Plastics Pact, with

representatives in the Steering Group set up for this national initiative. The Malaysian Plastics Pact will be a part of The Global Plastics Pact network – an international initiative led by the Ellen MacArthur Foundation – which aims to drive collaboration within countries and regions to achieve the shared vision of a circular economy for plastics.

“A circular economy where plastic is valued and doesn't pollute the environment.”

The UK Plastics Pact, 2018,
'New initiative to transform UK plastics system and tackle plastic pollution'

The Malaysian Plastics Pact, with the aid of the Global Waste and Resources Action Programme (WRAP UK), will create a constructive platform for dialogue, bringing together local businesses, government, policy-makers, Non-Governmental Organisations (NGOs), citizens and other stakeholders, to reach a concrete set of local targets.

WHAT WILL A PLASTICS PACT DELIVER FOR MALAYSIA?

- **Environmental benefits: less virgin, increased recycled content**
- **A step change in reuse and recycling rates for all formats**
- **Convergence of polymers and eradication of problematic materials**
- **Reduced leakage from the system: less litter, less waste**
- **Positive citizen participation and awareness**
- **A constructive platform for dialogue with customers, suppliers, competitors and government**
- **Support for domestic recycling sector: delivering jobs, skills and value**
- **Clear regional leadership**

WRAP UK, 2019,
Presentation to Malaysian Plastics Pact
Steering Group

Through increased collaborative efforts, knowledge sharing and more accurate and timely data, we can build a common understanding of the potential and challenges ahead, and where the most important or urgent changes are needed.

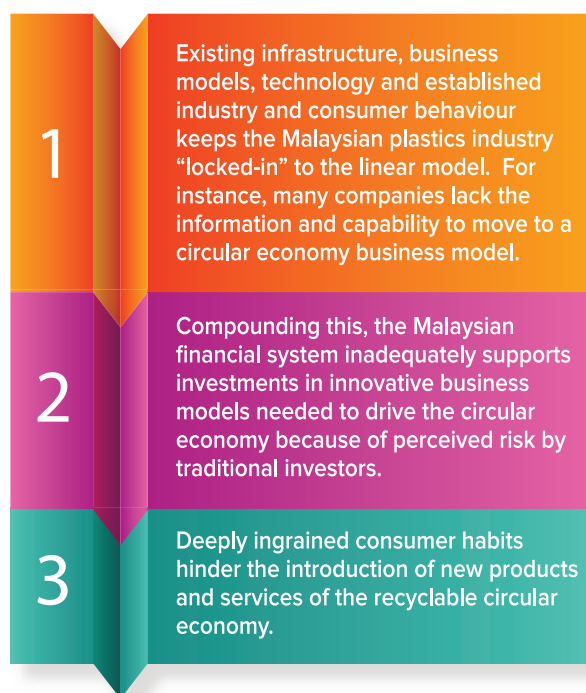
As Malaysia transitions to a circular economy, it will be able to make significant gains in resource efficiency gains, have positive impact on job creation and growth of GDP. For example, estimates based on Eurostat Efficiency Scoreboard for European countries suggest approximately 15 percent to 30 percent increase in resource productivity through the development of smart policies to promote the transition to a circular economy (EU COM, 2014).

Malaysian businesses would benefit from the implementation of a plastics circular economy through improved cost structures resulting in

immediate financial gains, as well as longer term strategic gain as a vibrant plastics industry circular ecosystem becomes fully embedded.

Markets are important drivers of circular economy, as materials and energy costs are a major cost for companies, but they are hampered by a number of barriers and challenges in the efficient and effective management of resources within a plastics circular economy. Waste prevention, eco-design, reuse and other initiatives can bring about significant gains, but they can only materialise if barriers that prevent these opportunities from being realised are removed.

Some of the key barriers are:



Such barriers will persist unless there is sufficient policy-led push transition towards a circular economy.

As such, it is imperative that multiple stakeholders come together to develop an enabling roadmap of transition to a circular economy for plastics. A plastics circular economy roadmap should comprise of: smart regulation, market-based instruments, research and

V. PLASTICS, WASTE MANAGEMENT AND THE CIRCULAR ECONOMY (CONTINUED)

innovation, information exchange and support of voluntary engagement of key contributors such as industry large and small firms, consumers, research institutions, NGOs and government agencies).

Turning waste into a resource is a fundamental cornerstone of 'closing-the-loop' in a circular economy. This can be done through the implementation of a plastics circular economy roadmap to drive improved

waste management, stimulate innovation in plastics recycling and reuses, limit landfilling, reduce losses of resources and devise incentives for behaviour change.

A plastics circular economy roadmap must tackle a range of issues that are pertinent to the development of a vibrant flourishing plastics plastic circular economy. From among the many, key ones are set out below:



Setting recycling targets to the period 2030 within a plastics circular economy roadmap will help provide the much-needed stability and certainty for the industry to take off and flourish. This necessitates the multiple stakeholders to come together and act in concert. Successful development and implementation of a plastics circular economy roadmap initiative will not only help create direct jobs in the industry, but will simultaneously help reduce the greenhouse gas footprint of the country.

Moving to a plastics circular economy holds strong promise for the Malaysian economy. Ensuring that resources are pumped back into productive use, cutting waste and reducing the level of ever-increasing extraction of finite resources will contribute to Malaysia's economic resilience and competitiveness. By decoupling economic growth from resources use and impact, a plastics circular economy roadmap initiative provides Malaysia an opportunity for economic growth that is both sustainable and enduring over time.

VI. CONCLUSION – THE FUTURE OF PLASTICS WASTE MANAGEMENT

Much of the conversation surrounding the benefits of the circular economy has been focussed on the benefit to the environment, arising from a desired reduction in the extraction of natural resources and the prevention of pollution. However, a successful transition will also require the appropriate policies and regulations to identify, understand and remove bottlenecks and hurdles, and to facilitate and encourage partnerships between and within industry, government and society.

Designing effective policies and regulations requires rigorous examinations of factors such as feasibility and viability, investment and economies of scale. Transforming waste to wealth will entail creating, encouraging and supporting markets, investments, and financial returns as well as standards and benchmarks that apply in order to ensure recyclates are productively and effectively re-used in the circular economy.

For plastics recycling to succeed, policies are needed to:

- 1. Promote plastics collection and markets**
- 2. Increase the quality and quantity and reduce costs**
- 3. Improve processing quality standards**
- 4. Share the cost of recycling plastics fairly among all parties involved in the product life cycle, under industry-led, voluntary product stewardship**

“The key to collection is not just obtaining as much material as possible but obtaining material of a sufficient quality and quantity. The costs of collecting and sorting plastics are high, especially relative to the value of the material.”

California Integrated Waste Management Board, 2003, ‘Optimising Plastics Use, Recycling, and Disposal in California’

“There is often a disconnect between supply and demand of recycled plastics. If a plastic material is to be collected for recycling, viable markets must be present. If viable markets are to exist, a sufficient quantity and quality of recycled material must be available for purchase at a reasonable price. Again, this often leaves a gap. As a result, some plastics that are collected for recycling may end up in the landfill. Recyclers complain of inadequate markets for some of the plastic materials they are collecting, and manufacturers complain of insufficient high-quality recycled plastics to meet their needs.”

California Integrated Waste Management Board, 2003, ‘Optimising Plastics Use, Recycling, and Disposal in California’

Plastics are valuable resources that can be transformed into new feedstock or into energy instead of being buried in landfills. The plastics recycling industry in Malaysia currently relies on lower value and lower technology mechanical recycling, or primary recycling, to produce resin pellets.

To escape the lower end of the market, plastics recyclers need to upgrade their equipment and technology to produce higher value recycled

feedstock. With better technology and increased capacity, MPMA and MPRA estimate that plastic recyclers could potentially grow their contributions to the Malaysian economy by three to four times, to RM15 billion to RM20 billion annually.

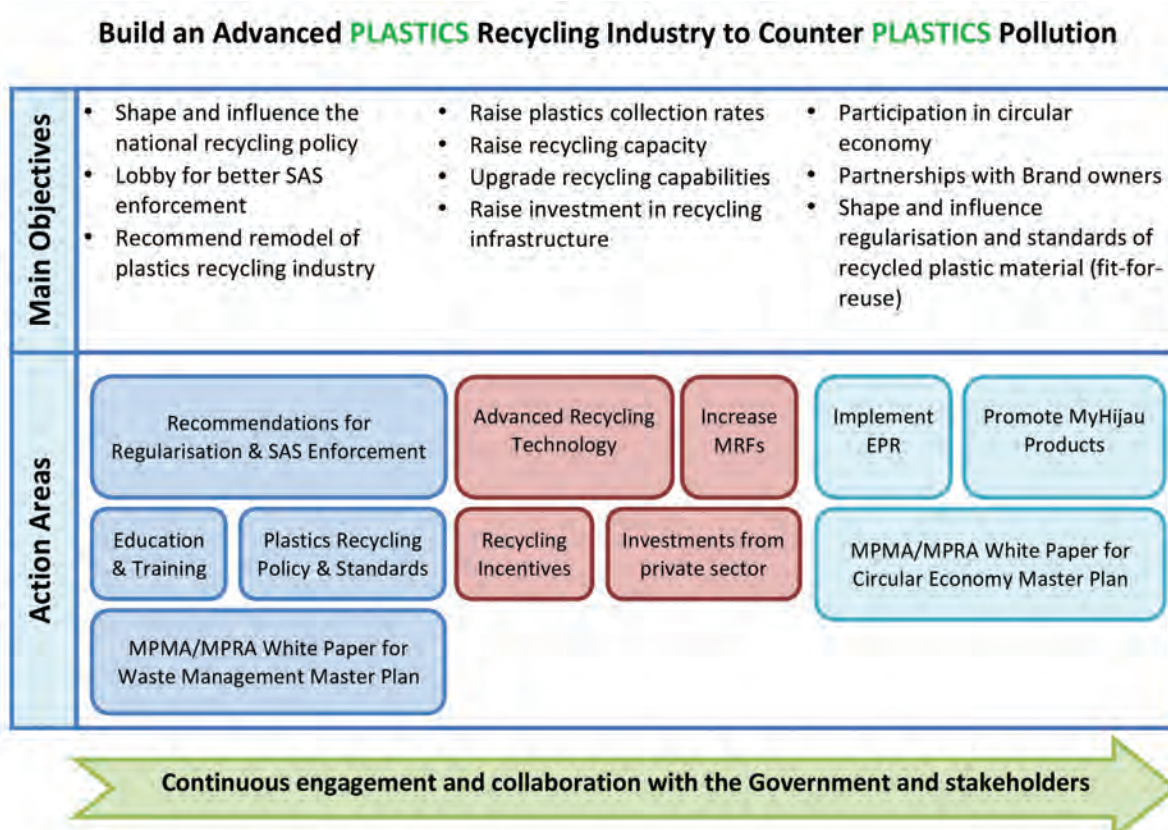
Malaysia needs a sustainable and viable plastics recycling industry to support its industrial and manufacturing sectors, and to recycle domestic household plastic waste. A clean, vibrant and healthy plastics recycling industry would be a new engine of growth for employment, and a dynamic export sector. To turn waste into wealth, the right policies and investment framework must be put in place.

To advance up the value chain, Malaysia needs to encourage higher quality investment in the recycling

of all materials, from plastics to paper, metal and glass, and even construction waste. However, opaque regulations and fluid policy directions discourage the necessary investments. Investors desire clear regulatory and investment frameworks which provide assurance that the recycling industry has a long-term future and economic viability.

An effective circular economy and a vibrant, healthy recycling industry will improve the quality of life for all Malaysians, provide a clean and safe environment for future generations and generate employment opportunities. Nurturing a high value, advanced, automated, clean and compliant recycling industry will build Malaysia's reputation as a clean, sustainable and green country and make it a part of the global circular economy.

Figure 8: Roadmap to MPMA and MPRA's Mission to Help Build an Advanced Plastics Recycling Industry to Counter Plastics Pollution



Source: MPMA and MPRA

VII. GLOSSARY OF TERMS

Approved Permit (AP)	Approved Permit (AP) is an import and export license issued by agencies of the Government of Malaysia under the Customs Act 1967. In 2015, the National Solid Waste Management Department, or Jabatan Pengurusan Sisa Pepejal Negara (JPSPN), took over the regulation of imports of clean plastics scrap and the issue of APs from Ministry of International Trade and Industry (MITI).
Chemical Recycling	The process of transforming plastics chemically back to its original monomer form, through methods including pyrolysis and gasification, with the resulting chemicals able to be remade into new plastic materials
Circular Economy	An economic system that is aimed at eliminating waste and the continual use of resources based on key principles: <ul style="list-style-type: none"> • Design out waste and pollution • Keep products and materials in use • Regenerate natural systems
Clean homogenous plastics scrap	Clean and uncontaminated, sorted and recyclable plastics materials
Cypark Resources Berhad	Cypark Resources Berhad is a public listed company on the Main Board of Bursa Malaysia since 2009. The company is Malaysia's pioneering developer and provider in integrated renewable energy, green technology, environmental engineering solutions, and construction engineering.
Department of Environment Malaysia (DoE) or Jabatan Alam Sekitar (JAS)	Established in 1975, the DoE is the government's principal agency under the Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC) that is responsible for the prevention, control and abatement of pollution in the country through the enforcement of the Environmental Quality Act of 1974 and its subsidiary legislation. The DoE is the federal authority in Malaysia that also monitors air and water quality and noise, manages toxic and hazardous wastes based on the "cradle-to-grave" principle and implements the Environmental Impact Assessment system.
Department of Statistics Malaysia (DOSM)	Established in 1949, DOSM is the government's principal agency under the Ministry of Economic Affairs Malaysia that is responsible in collecting, interpreting and disseminating the latest and real time statistics in monitoring the national economic performance and social development, under the provisions of Statistics Act 1965.
Ellen MacArthur Foundation	A UK registered charity founded in 2009 which aims to inspire a generation to re-think, re-design & build a positive future through the framework of a circular economy. It is a founding member and knowledge partner of the Platform for Accelerating the Circular Economy (PACE), which is a public-private collaboration platform and project accelerator launched out of the World Economic Forum focusing on the circular economy.
Plastics End of Life	The design life of a plastic component or product is defined as the period of time it's expected to work within specified parameters. After this, the product becomes waste.

Extended Producers Responsibility (EPR)	A concept where manufacturers, importers, brand owners and consumers of products bear a significant degree of responsibility for the environmental impacts of their products throughout the product lifecycle. As a strategy it functions by adding all of the environmental costs associated with a product throughout the product life cycle to the market price of that product.
Global Plastics Alliance (GPA)	A collaboration among plastics industry associations and allied industry associations. As at today, the alliance has grown to 75 plastics organisations and allied industry association in 40 countries worldwide. The GPA meets annually and a progress report is published biennially.
Global Waste and Resources Action Programme (WRAP)	Established in 2000, WRAP UK is a registered charity in the United Kingdom who helps businesses, individuals and communities worldwide to achieve a circular economy through helping them reduce waste, develop sustainable products and use resources in an efficient way. It has partnered with 26 countries to drive change in the areas of Plastics, Clothing & Textiles and Food & Drink.
Japan International Cooperation Agency (JICA)	An agency under the Government of Japan that coordinates Official Development Assistance (ODA) for its government. Its mandates include to assist economic and social growth in developing countries, and the promotion of international cooperation.
Linear economy	An economic system that allows natural resources to be extracted, used and consumed and then discarded as waste, in a “take-make-consume-discard” progression.
Malaysian Investment Development Authority (MIDA) or Lembaga Pembangunan Pelaburan Malaysia	Established in 1967, MIDA is the government’s principal agency that functions to oversee and drive investment into the manufacturing and services sectors in Malaysia. Part of its mandate is to promote investments in the manufacturing and services sectors; and to advise the Ministry of International Trade and Industry (MITI) on industry matters including the formulation of related policies.
Malaysian Plastics Manufacturers Association (MPMA)	Established in 1967, MPMA is the official voice of the Malaysian plastics industry. The association represents its members and the industry in Government interaction, spearheading the plastics industry’s growth and providing platforms to assist members to be globally competitive. MPMA currently has about 750 members comprising Ordinary members, which represent about 60 percent of plastics manufacturers in the country and account for 80 percent of the country’s total production of plastics products.
Malaysian Plastics Recyclers Association (MPRA)	Established in 2014, MPRA is the official voice of the Malaysian plastics recycling industry which aims to spur the growth of the plastics recycling industry, enhance industry integrity and deliver engagement with Government and regulators.
Material Recovery Facilities (MRFs)	A specialised plant that receives, separates and prepares recyclable materials for marketing to end-user manufacturers.

VII. GLOSSARY OF TERMS

(CONTINUED)

Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC) or Kementerian Tenaga, Sains, Teknologi, Alam Sekitar & Perubahan Iklim	Malaysia's governmental ministry responsible for sustainable energy, green technology, water supply, sewerage treatment, renewable energy, water purification, air purification, environmental remediation, solid waste management, energy conservation and sustainable engineering.
Ministry of Housing and Local Government or Kementerian Perumahan dan Kerajaan Tempatan (KPKT)	Malaysia's governmental ministry responsible for urban well-being, housing, local government, town planning, country planning, fire and rescue authority, landscape, solid waste management, strata management, moneylenders and pawnbrokers.
Ministry of International Trade and Industry (MITI) or Kementerian Perdagangan Antarabangsa dan Industri	Malaysia's governmental ministry responsible for international trade, industry, investment, productivity, small and medium enterprise, development finance institution, halal industry, automotive, steel and strategic trade.
Monash University Malaysia (MUM)	Established in 1998, MUM is the third-largest campus of Australia's largest university with strong links with industry and government and serves as a platform for research and education engagement with Southeast Asia and beyond especially in areas concerning sustainability.
National recycling rate (by SW Corp)	$\frac{\text{Total recycled waste}}{\text{Total waste produced per annum}} \times 100\%$
National Solid Waste Management Department or Jabatan Pengurusan Sisa Pepejal negara (JPSPN)	Established in 2007, JPSPN is a department under the Ministry of Housing and Local Government or Kementerian Perumahan dan Kerajaan Tempatan (KPKT) that provides the overall strategic and regulation of national solid waste in Malaysia. The department is entrusted to formulate policies, strategies, action plans, prepare regulations and agreements as well as implement the Solid Waste and Public Cleansing Management Act 2007.
Operation Clean Sweep (OCS)	An international programme launched in the United States in 1991 with an aim to prevent resin, pellets, flakes and powder loss and leakage into the marine environment. The programme's goal is to help every plastic resin handling operation implement good housekeeping and pellet, flake, and powder containment practices to work towards achieving zero pellet, flake, and powder loss, protecting the environment and saving valuable resources.
Petronas Chemical Group (PCG)	Petronas Chemicals Group Bhd is an integrated chemicals producer in Malaysia and one of the largest in Southeast Asia. It is involved primarily in manufacturing, marketing and selling a diversified range of chemical products, including olefins, polymers, fertilisers, methanol and other basic chemicals and derivative products.

Plastic Energy Ltd	Plastic Energy Limited is an international chemical recycling company based in London, UK. The company recycles plastic waste into alternative fuels and oil, that can be used either as a feedstock to create clean recycled plastics or as an alternative fuel with a low-carbon footprint. Plastic Energy has industrial plants in Seville and Almeria, Spain.
Plastic pollution	The accumulation of littered and mismanaged plastics objects and particles in the Earth's environment (land, waterways and oceans) that adversely affects wildlife, wildlife habitat, and humans.
Plastics lifecycle	The process of managing the entire lifecycle of plastics product from inception, through engineering design and manufacture, to service and disposal of manufactured products, where recycling takes place.
Post-commercial plastics waste	Plastics waste by-products from premises used mainly for the purposes of a trade or business or for the purpose of sport, recreation, education or entertainment. This does not include household, agricultural or industrial waste.
Post-consumer household plastics waste	Plastics waste by the end consumer of a household material stream; that is, where the plastics-waste-producing use did not involve the production of another product.
Post-industrial plastics waste	Plastics waste by-products after the completion of a manufacturing process, which would otherwise go to disposal or recycling. This does not include internally generated plastics scrap commonly returned to industrial or manufacturing processes.
Recyclates	Raw materials sent to, and processed in a waste recycling plant or materials recovery facility.
Resin pellets	Small granules of raw plastic, before it has been made into an end-use item such as a plastic bag, bottle or toy, generally, in a shape of a disk with a diameter of a few millimeters.
<i>Sampah plastik</i>	<i>Sampah plastik</i> is dirty and contaminated, unsorted and unrecyclable foreign household plastic waste smuggled in by illegal operators.
Recycled Secondary Material	Secondary materials are waste materials that have been used, collected, recycled and sold for use in manufacturing instead of or alongside virgin raw materials which allow for less reliance on the search for new raw resources for items such as paper, aluminum and plastic. It is advantageous in the sustainable use of resources so that these materials can be maintained for longer periods.

VII. GLOSSARY OF TERMS

(CONTINUED)

Separation at Source (SAS)	Source separation is the segregation of different types of solid waste (based on recycling streams / types) at the location where they are generated (a household or business). Effective 1st September 2015, the government of Malaysia has made it compulsory for several states (under the federal administration) to separate their waste at source – regulated by Solid Waste Management, under the Solid Waste and Public Cleansing Management Act 2007 (Act 672).
Single-use-plastics (SUP)	Disposable plastics that are used only once before they are thrown away or recycled. These items are things like plastic bags, straws, coffee stirrers, soda and water bottles and most food packaging.
Solid Waste Management and Public Cleansing Corporation (SW Corp)	A private entity under the purview of KPKT that manages all operational matters with regards to waste management and public cleansing services at the Federal, State and Local level.
The Declaration of the Global Plastics Associations for Solutions on Marine Litter	A public commitment by a global industry signed in March 2011 by leaders from 47 plastics associations across the globe to combat plastic litter in the coastal or marine environment
The Global Plastics Pact network	Supported by the Ellen MacArthur Foundation, the global pact was created following the launch of the UK Plastic Pact in 2018. Since then, the network is becoming increasingly international and expanding with the arrival of other initiatives in Europe and around the globe, including Malaysia.
United Nations Environment Programme (UN Environment)	The United Nations Environment Programme (UN Environment) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment.
Unlicensed Factories	Recycling factories (plastics) which are operating without obtaining the required business or operating licences. These unlicensed factories are unregulated, do not comply with environmental requirements and involved in illegal activities such as the smuggling of <i>sampah plastik</i> into Malaysia.
Waste-To-Energy (WTE)	A form of energy recovery by generating energy in the form of electricity and/or heat from the processing of waste into a fuel source. Most WTE processes generate electricity and/or heat directly through combustion, or produce a combustible fuel commodity, such as methane, methanol, ethanol or synthetic fuels.

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