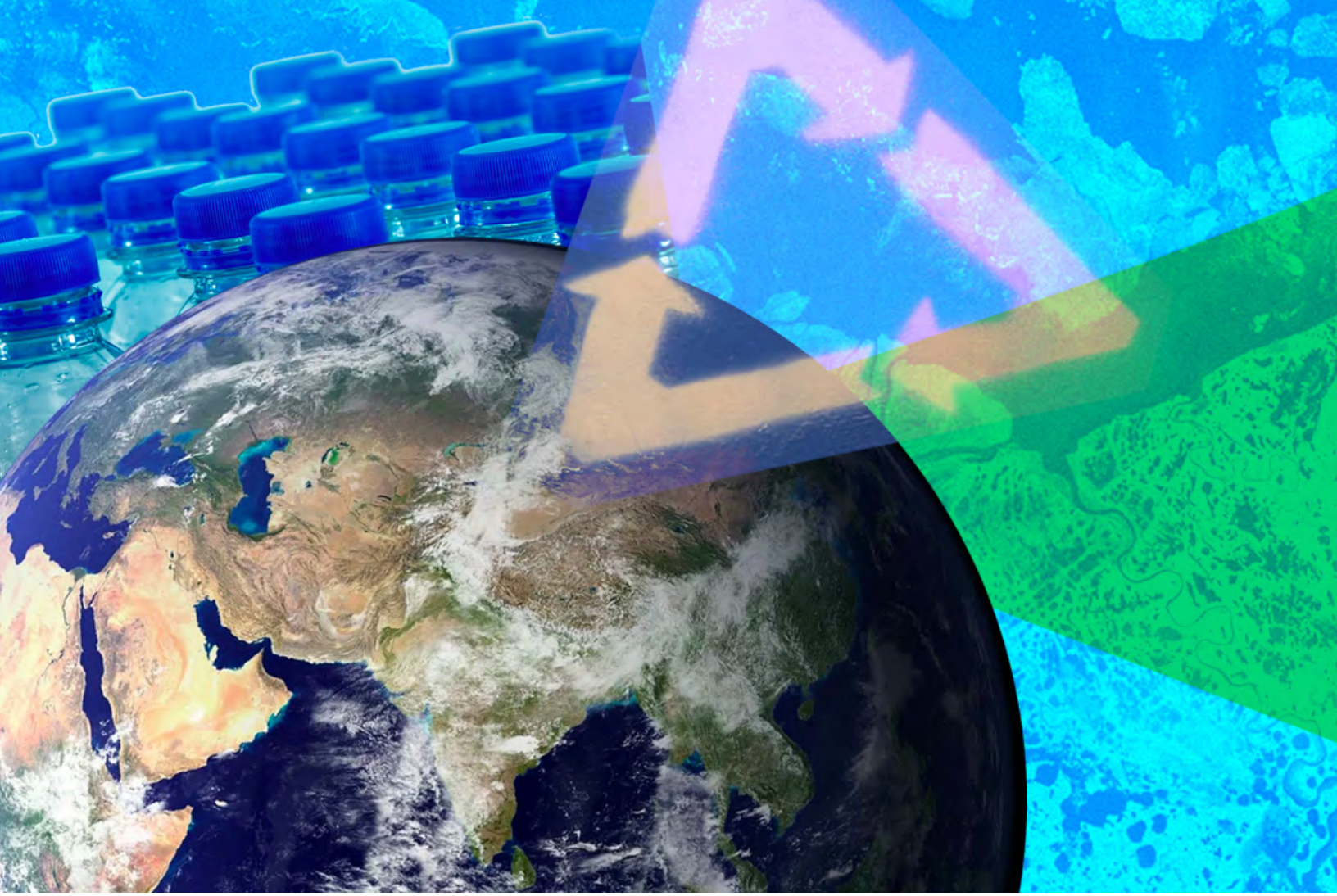

Unlocking Sustainable Plastics in Asia

PREPARED BY EURASIA GROUP

OCTOBER 2021

SUNTORY

eurasia group politics first

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Executive summary

The problem of poorly managed plastic waste is not new. Solutions exist, but the scale and breadth of the problem is such that progress has been elusive, with the short-term benefits of plastic often pushing out considerations about longer-term disposal. Nowhere is this mismatch more evident than in the area of packaging.

Plastic packaging is cost-effective and convenient. It extends the life of food and prevents disease. However, the upsides of plastic packaging are accompanied by environmental impacts. Plastic packaging accounts for around half of global plastics production and a very large proportion of the litter that we see around us every day. In addition, the climate implications of plastics production and disposal are considerable and are now drawing attention in a world striving to reach net zero greenhouse gas (GHG) emissions within 30 years.

The challenge before us is to make real progress on both these problems, while respecting the fact that plastics remain critical in every part of our lives and in many cases have a smaller environmental impact than non-plastic substitutes. They are also typically less expensive than their alternatives, which means that substitutions may adversely affect poorer populations.

The way forward

The way forward must be to change the way we create, use, and dispose of plastics so that we can retain their myriad benefits while limiting the harms that have typically been associated with their use.

This report proposes two pathways. The first is to change the trajectory of plastic packaging use so that the size of the challenge does not overwhelm the possible solutions. Here, establishing clear timelines, scopes, and targets is critical. The second is to break the link between plastic use and the waste and emissions challenges of single-use, linear plastics models. The way to do this is through massively increased recycling—which itself must build on much better waste collection and sorting systems—while also pushing technical boundaries to extend and decarbonize the processes employed. These are the two sides of the circular economy for plastic packaging.

Across the range of plastics applications, the relative priorities for action will vary. For those types of plastic packaging that are readily recycled, such as polyethylene terephthalate (PET) and rigid high-density polyethylene (HDPE), the imperative is to increase *actual* recycling rates and to decarbonize production wherever possible. For other polymers there must be a greater emphasis on either reduction—through substituting in more recyclable plastic types/alternative materials, through reuse, and through absolute reductions in packaging volume—or on technological innovation to identify new recycling possibilities.

To flourish, a circular economy requires a policy environment that creates the right opportunities and incentives. It also requires the active engagement of all segments of society from consumers, through small-scale collection businesses, right up to the large multinational corporations that form the backbone of the plastics manufacturing industry and dominate in food and beverages. Finance is key and has sometimes been a stumbling block for sustainable plastic packaging ecosystems in the past, but as the circular economy takes shape and companies proactively seek investments that benefit the environment, we are seeing this begin to change. Stakeholders must work together to create a system that inspires trust, calls out bad behavior, and strives toward collective circular goals—including furthering the cause of environmental justice.

Revitalized material collection systems and new recycling facilities can create jobs and other benefits for communities. Eliminating plastic waste disproportionately benefits poorer groups, as it is typically in their backyards that waste accumulates and, in the longer term, it is they who are most vulnerable to the effects of climate change. Enhancing the sustainability of plastics systems can also improve conditions for domestic industries including agriculture, tourism, and shipping.

Time for Asia to lead

Asia lies at the heart of the global plastics economy. Plastic use and waste management systems vary enormously among Asian countries but, in aggregate, the continent has up until now been considered a driver of problems rather than solutions. There are indeed deeply embedded challenges in how many Asian countries have used and managed plastic packaging, although there are also examples of innovative and scalable solutions in the region.

This report demonstrates that it is time for Asian governments, companies, and populations to change their approach to the use, production, and management of plastic packaging. As this begins to happen, so the narrative itself will shift, turning a long-established problem into an advantage. In a G-Zero world where global leadership is absent, there is an even larger opening for Asia to become the global authority on plastics. If more Asian countries can overcome the problems associated with plastic packaging use and poor end-of-life management, other countries can follow their lead, establishing a global pathway forward. Conversely, there can be no solution on global plastics that does not prioritize Asia.

Now is an opportune time for the continent to move forward to establish its leadership potential. The global fragmentation that we see around us today creates opportunities for different countries—or groups of countries from the region acting together—to move ahead. The scope for Asian countries to work together to build either a pan-Asian approach on plastics, or to be the driver of a global treaty on plastics, is growing.

Asian consumers may not yet be as environmentally motivated as their counterparts in the West, but Asian companies and multinational corporations that sell their goods in Asia have an opportunity to move ahead, driving a race to the top ahead of local consumer pressure. We are already seeing this impetus in multiple Asian corporate commitments around sustainability in general, and plastic use in particular. Whether driven by the demands of the finance sector or companies' own recognition of the need to change the way they operate, such commitments are an important starting point.

The challenges are known, and the building blocks are in place. Now is the time for real action, both individual and collective, to unleash the potential for a sustainable plastics economy in Asia and the world.

Tak Niinami

Ian Bremmer

Introduction

We invite you to take a moment to look around you. Chances are you are surrounded by plastics, and likely reading this on a plastic screen. Society has been enjoying the myriad benefits of plastics for decades. Plastic is lightweight and durable. It bends to form many different shapes and can take on a wide range of textures, making it airtight and waterproof, when needed. It has helped us reduce gas mileage on cars, keep our houses warm, transport our beverages, and reduce food loss and recently helped to protect us from the pandemic.

However, decades of plastics use without sufficient corresponding waste management has led to plastics clogging urban water systems, polluting beaches, and entering our oceans. Over 150 million tonnes of plastics have already leaked into the world's oceans and waterways, and if left unaddressed, annual plastic leakage could triple by 2040. The question we face is: How can we retain the benefits while reducing unintended downsides?

The world does not need another paper on plastics. This volume is therefore not the end, but the beginning of a process. Eurasia Group and Suntory, along with partners Indorama Ventures and the Japan Bank for International Cooperation have formed the Sustainability Leaders Council, a multi-year effort to address sustainability from a corporate perspective. Each company has been developing sustainability solutions for years, some discussed in this paper. The Sustainability Leaders Council builds upon this expertise to jointly identify and scale solutions, with a particular focus on Asia.

For this paper—the first in a series on sustainability—we focus on plastic packaging. In the pages that follow, we present a picture of Asia's complex web of plastics production, disposal and recycling and place this in the context of key geopolitical, financial, and cultural trends. We identify the pain points where more action and resources are needed. And finally, we identify what all actors can do. Plastics' production, use, and end-of-life management includes all of us—producers, corporate packagers, governments, financiers, and consumers. Everyone has a part to play.

We hope that you will not only read this report but join us. You can find our public events surrounding this initiative here. Thank you for reading and we look forward to working together.

Sincerely,

Ian Bremmer and Tak Niinami

A note about methodology and sources

This paper seeks to identify a pathway to reduce plastic packaging pollution in Asia. We identify the main obstacles that have slowed progress, and point to solutions and opportunities for action. Some of these are already underway. Nevertheless, we still have a long way to travel.

We thank founding partner Suntory, and sponsoring partners, Indorama Ventures, and the Japan Bank for International Cooperation, as well as the individual members of the Steering Committee—Tak Niinami, Ian Bremmer, Kevin Rudd, Colm Jordan, Tadashi Maeda, and Gerald Butts—for their support and dedication to finding solutions.

Many papers have been written on this subject and we have gratefully absorbed and drawn upon this vast wealth of knowledge. To add depth, we included over 11 interviews with experts in the field. Our goal was to gather a wide variety of perspectives across producers, packagers, consumers, activists, scientists, investors, governments, and international development groups.

During these interviews, we talked about both problems and solutions: why things work and why they are not working as well as might be expected. We encouraged these experts to discuss their hopes for the future and to describe the pathway to get us there.

You will find quotes from these experts throughout the paper. These quotes do not necessarily reflect our end conclusions, but they do provide the reader with insights and an impression of the diversity and depth of opinions in this space. An edited compilation of the interviews will be available online and we hope you will stop by to hear more.

The statistics referenced in this report are not the direct product of quantitative research or analysis performed by Eurasia Group or any Sponsor. This report contains metrics and data points from a wide variety of sources. Individual data points may differ from other sources depending on how those sources set the parameters of their research.

Finally, this thought leadership report represents primarily the views of Eurasia Group and not necessarily the views of Sponsors or individual members of the Steering Committee.

Chapter 1: The push and pull of plastics use—trendlines and the Asian imperative

Introduction

Few materials fulfill a wider range of economic and technological functions today than plastics: across packaging, transportation, textiles, construction, and electronics, plastics are ubiquitous. It is no exaggeration to say that plastics have transformed our world, improving human wellbeing in ways as disparate as enabling better access to affordable and clean drinking water to slowing the Covid-19 outbreak and providing the backbone of almost all consumer electronics.

However, alongside the social and health benefits of plastics, lie serious environmental challenges. Because of the longevity of plastics, poor waste management is a particular concern. Unmanaged plastic waste, especially from single-use plastics, can end up clogging urban water systems, cluttering pristine beaches, and causing irreparable damage to biodiversity. Beyond plastic pollution, the GHG impact of plastics is also attracting increasing attention. Both these issues are complex; for example, the emissions profile of plastics must be considered relative to other materials, and plastic waste is just one component of solid waste. Yet the size and rapid growth of the plastics economy makes change essential. It is important to note at the outset that solutions exist: certainly, there is a long way to travel, but with the right actions and intentions, both of the major concerns around plastic use can be mitigated.

The challenges associated with plastic waste are particularly evident in Asia, the continent that sits at the heart of global plastics production, consumption, and leakage. Images abound of single-use packaging being ingested by sea creatures and of plastic waste clogging Asian waterways and beaches. Further economic and population growth in Asian megacities will only exacerbate this issue, while left-behind rural areas with inadequate waste collection infrastructure threaten to compound the problem.

If we are to find a way to reconcile the environmental footprint of the plastics industry with the social utility of plastics and the business realities of a net-zero world, Asia must lead. Today, Asian countries and companies have the opportunity to harness the energy generated by heightened government, public, and corporate environmental awareness to shift toward a genuinely new approach to the use and management of plastics in general and plastic packaging in particular. Such a shift will require new policies, commitments, and actions. It has the potential to change the public's understanding of Asia's role in the plastics economy and to generate examples of best practices that can influence action globally.

> "In many ways, countries that are the largest contributors to the problem have a really exciting opportunity to be the most significant leaders in creating solutions. And that's I think how we need to pivot to be thinking about this issue. I think that there's a lot of global recognition that is deserved for countries that are stepping forward with that kind of leadership."
>
> *– Douglas McCauley, professor of ocean science, UCSB, and director, Benioff Ocean Initiative*

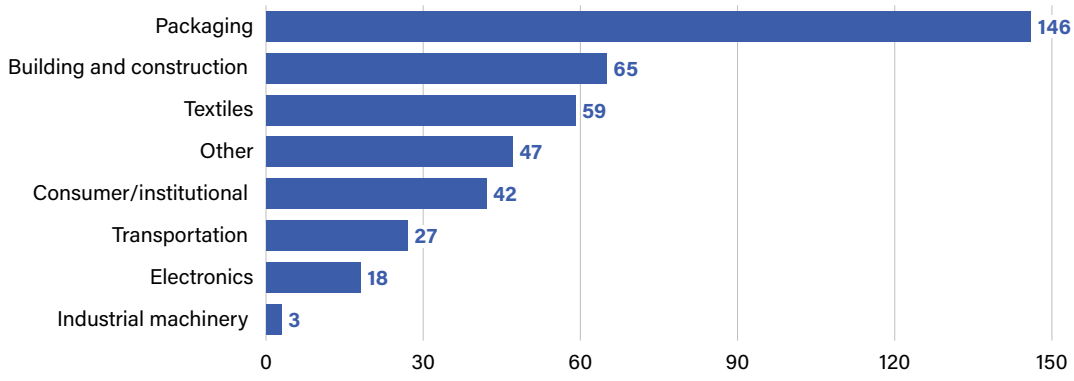
Section 1.1: Packaging as a focus

Plastics span the entire economy and have a wide-ranging environmental footprint. Within the universe of plastics, this report is mainly concerned with single-use plastic packaging. While packaging accounts for less than half of total annual global plastics production, it is the largest

end-use category and requires the most urgent action because: (a) its brief use is disproportional to its ecological lifetime, which is essentially permanent; (b) it accounts for a large proportion of mismanaged plastic waste; (c) it is a very visible and emotive issue, providing scope for widespread behavior change; and (d) with appropriate regulatory systems, technically and economically viable recycling systems for most forms of plastic packaging already exist.

Figure 1: 2015 primary plastic production by sector

Annual plastic production, million tonnes



Source: Geyer et al (2017), Eurasia Group

Within the world of plastic packaging, we highlight PET containers because of their absolute importance (over 20% of global plastics packaging) and their relative ease of recycling. Other prominent polymers for packaging include HDPE, low-density polyethylene, and polypropylene (PP), all of which—with the exception of rigid HDPE containers—are notably more challenging to recycle than PET (figure 2).[1] An important route to the better management of plastic waste is to move away from these non-recyclable or less-recyclable plastics into PET/rigid HDPE; overcoming the barriers to recycling, whether at a technical or a social/infrastructural level, is a key theme of this report.

Finally, we note at the outset that in most countries plastics make up less than 20% of municipal solid waste (by weight). There are numerous waste concerns beyond plastics, notably the GHG impact of food waste and toxicity issues around mismanaged materials. However, the combined volume and longevity of most plastics makes the effective management of plastic waste a particularly urgent matter.

Figure 2: Different plastic polymers by use, recycling rates

Common single-use applications	Beverage bottles Food trays	Rigid: milk jugs Flexible: grocery bags	Rigid: blister packs Flexible: food films	Shrink films Container lids	Yogurt containers Bottle caps	Foam containers Cutlery
Resin Symbol	1 PETE	2 HDPE	3 PVC	4 LDPE	5 PP	6 PS
Frequency of recycling	**Commonly**	**Commonly** *(for rigid containers)* **Almost never** *(for grocery bags)*	**Almost never**	**Sometimes** *(mostly downcycled)*	**Almost never** *(downcycled for bottle caps)*	**Almost never**
Recycling rates *(global)*	**~55%** *(for PET bottles)*	**~30%** *(for rigid HDPE containers)*	**<3%**	**~8%**[2]	**<2%**	**~1%**

Source: Indorama Ventures, Eurasia Group

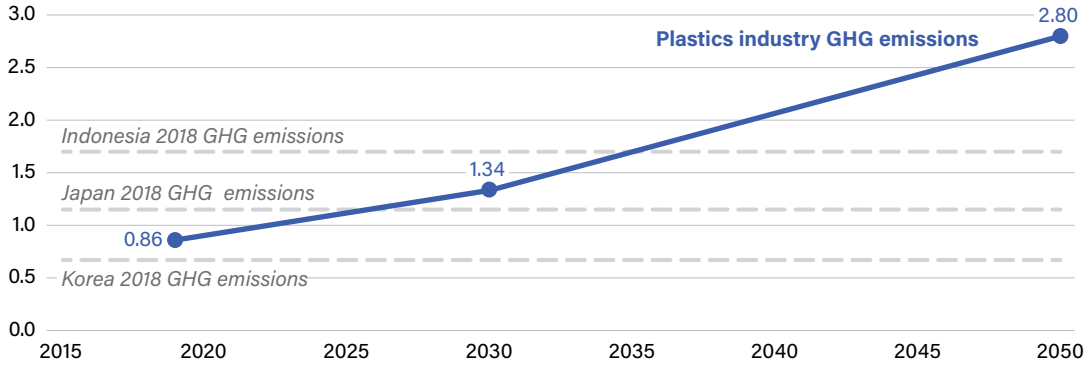
Section 1.2: The environmental profile of plastics

GHG emissions

As the world embarks on its transition to net-zero GHGs, the emissions profile of plastics production—and indeed all manufacturing processes—will come under ever closer international scrutiny. Estimates of the total global GHG emissions of plastics range from just under 1 to just under 2 gigatons of carbon dioxide (CO_2), already higher than the GHG emissions of South Korea at the lower bound of the range and potentially higher than the emissions of Japan and Indonesia at the upper end (figure 3).[2] At such levels, plastics emissions account for 2%-4% of annual global GHG emissions. With packaging applications accounting for just under half of plastic demand and emissions by most estimates, this would imply that plastic packaging production is responsible for 1%-2% of total global GHG emissions.

Figure 3: Growth in annual GHG emissions from plastics to 2050 may surpass current GHG emissions of large Asian countries

Total plastics-related GHG emissions, gigatons CO_2e



Source: CIEL, Climate Watch, Eurasia Group

This figure certainly needs to be considered in the context of the availability/GHG implications of alternative materials (many of which have a larger GHG footprint, as we describe below). Some types of plastic use can be net GHG positive, when avoided emissions are taken into consideration.[3] Typical examples of this are: when lightweight plastics displace heavier materials, in transport applications; when plastic insulation helps reduce heating/cooling needs; and, in the packaging space, when plastic film and lightweight containers protect against food decay and waste.

Yet in the context of global climate goals, we have reached the point at which every sector needs to have a plan to reach net-zero GHGs. In the area of plastic packaging, this will require a fundamental restructuring of waste management systems and new ways of powering both production and distribution. As population and demand grow, it will become ever harder to meet this challenge, especially given how much needs to be done. If no action is taken, global per capita plastics consumption is expected to grow by almost 60% by 2040—a figure that is actually low relative to past growth rates (plastic waste in the US grew by a factor of nearly 9 between 1970 and 2000)—and overall GHG emissions will increase accordingly.[4]

> "Back in 2017, 2018, it was really all about ocean plastic. And that conversation has evolved a lot to be more about consumption and plastics in general, not just about the particular plastics that are entering the ocean … we've also seen the climate topic exponentially increase in interest as more governments have taken that on as a priority."
>
> *– Rob Kaplan, founder and CEO, Circulate Capital*

The bulk of emissions within today's plastics value chain trace to dependence on fossil fuels, both for use as a feedstock—the molecules needed for plastics are typically made using a steam cracker in petrochemical facilities—and to power production. Disposal through incineration is also a significant, and growing, source of GHGs.

The worst disposal option for plastics is open burning, a practice that is common in South and Southeast Asia, given the region's poor collection infrastructure (please see section 3.2). Other, better managed incineration efforts, including waste-to-energy operations, can still have very high associated GHGs, with the absolute impact varying depending upon pre-waste separation levels and technical expertise.[5] A Beijing study of a high pre-incineration waste sorting scenario with good removal of recyclable plastics, for example, estimated possible GHG emissions reductions of 70% relative to current practices of unfettered waste-to-energy burning.[6]

Among the traditional disposal options for plastics, landfilling waste is the least GHG-intensive, but smaller Asian countries often struggle with the availability of landfill space and ensuring adequate access to landfill sites (the worse the roads, the higher chance of spillage). In addition, both sanctioned landfills and especially unsanctioned, informal dumping, pose separate challenges in terms human health harms.

> "In developing Asian countries, they don't have enough disposal facilities like sanitary landfill sites, waste-to-energy plants, or waste treatment facilities … sometimes they need [basic] infrastructure for transportation also. I visited several kinds of landfill sites in Asian countries, and sometimes the road conditions for access to the landfill is not good."
>
> *–Michikazu Kojima, Economic Research Institute for ASEAN and East Asia*

Uncollected plastic waste—including but not limited to plastic packaging—may also create emissions. Plastics that are exposed to direct sunlight on land or floating on the ocean surface can emit GHGs, including methane and ethylene.[7] Sunlight also speeds degradation of plastics into smaller pieces (microplastics), which are harder to remove from the environment.

There is, though, significant potential to reduce the GHG impact of plastic packaging, especially through greater recycling. Recycled PET (r-PET) emissions can be up to two-thirds lower than those of virgin PET.[8] For other common packaging plastics, such as PP and HDPE, the recycled advantage can be even higher, although, as we have noted, their current recycling rates are significantly lower than that of PET.

Plastics relative to alternatives

One reason for the ubiquity of plastic packaging is that it is economic and highly functional. Surprisingly, despite the challenges outlined above, plastics can also outperform other alternatives on environmental criteria, especially on GHGs (though also on other criteria such as water usage for manufacture and landscape impact relative to some metals, for example). PET water bottles stand out as having a particularly low GHG-profile relative to the alternatives, especially when they contain recycled content.

Today, glass packaging typically tends to contain around 20% recycled content, but because glass bottles weigh up to 40 times more than PET bottles, and have more fossil fuel-intensive initial production, lifecycle emissions remain far higher.[9] Glass production also consumes as much as six times more water than PET production, a growing concern for resource-constrained economies in Asia.[10] This is one reason why glass is less frequently employed for single-use applications. Broadly speaking, the best way to reduce the environmental impact of glass is through reuse, not recycling (box 1).

Box 1: The GHG impact of reusing glass bottles

A 2013 study showed that reusing a glass bottle just once reduces its GHG impact by 40%, and that if a bottle is reused three times, it has a GHG impact similar to that of aluminum cans or 0.5-liter PET bottles.

From a material perspective, glass bottles can be reused 25-30 times, though GHG benefits flatten at about eight uses as production emissions become insignificant relative to those associated with transport and sanitization. At such high levels of reuse—which it should be noted are quite infrequent in today's world—the overall GHG profile of glass can fall by up to 85% relative to single-use glass and by up to 70% relative to single-use virgin PET.

Aluminum cans have many benefits and can be a good option for certain use cases. While the GHG intensity of virgin or low recycled-content aluminum can be almost four times higher even than virgin PET (and therefore more than ten times higher than 100% recycled PET), high aluminum recycling rates of close to 70% globally—98% in Brazil, 77% in Japan, and 55% in the US in 2017—can level the playing field.[11] High existing recycling rates for aluminum do, however pose a challenge to future reliance on aluminum packaging; any large-scale expansion in aluminum packaging would require a significant increase in GHG-intensive initial production.

Plastic waste

Plastics of different types constitute the majority of all marine debris, with most of this waste tracing back to land-based consumption.[12] The PEW Charitable Trust and Systemiq estimate that

over 150 million tonnes of plastics have already leaked into the world's oceans and waterways with mismanaged plastic packaging making up the lion's share of this total.[13] Another important component of waste is so-called "ghost" fishing gear (nets cut loose, etcetera). This is estimated to make up 10% of annual marine litter and account for nearly half of the plastic in the North Pacific Plastic Gyre.[14]

Unaddressed, annual plastic leakage could triple,leading to an estimated 30 million tonnes being added every year.[15] Shockingly, visible marine pollution represents just a tiny fraction of the overall total. Almost 95% of plastic pollution ends up on the ocean floor—70 kilograms (kg) of plastics for every square kilometer of seabed at present.[16]

We see the consequences of such large volumes of mismanaged waste in harms to ocean ecosystems, threats to industries such as fishing and tourism (including elevated costs associated with constant litter clearing at tourist destinations) and possible human health impacts as microplastics enter the food chain from multiple sources.[17]

> "This issue of plastic pollution is central to thinking about ocean health and then also central for us to be thinking about our own well-being, as that connects to ocean health itself … when animals eat plastic, instead of eating their normal food, it could be occlusions or blocking that create direct impacts on the animals. Second, plastic pollution happens to be a really good media for sponging up toxins in the oceans. So, when they eat that plastic pollution, they can actually absorb and have those toxins … released into their own bodies, creating a secondary set of impacts."
>
> *–Douglas McCauley*

While ocean plastic leakage attracts the most attention, the non-ocean impact of mismanaged plastics is also acute: By one estimate, the concentration of land-based microplastics can be up to 20 times more than ocean-based microplastics.[18] Land-based plastic waste can affect ecosystem-dependent industries such as agriculture.[19]

Finally, uncollected plastics and other waste items can clog urban drain systems, making flooding events even more potent.

Recycling and circularity

Already it is apparent that one of the biggest opportunities to reduce the environmental impact of plastics is to drastically increase recycling. Recycled PET has a GHG footprint that can be up to two-thirds lower than virgin PET—depending upon the energy source used to power the recycling process—while bottles that are collected for recycling do not end up littering beaches and waterbodies and breaking down into fragments that are ingested by marine creatures.

There are two major opportunities around recycling: (i) increase overall recycling rates and (ii) switch from hard-to-recycle plastics to easily recycled forms, such as PET. As we discuss later in this report, however, the magnitude, growth, and fragmentation of the global plastics challenge is such that focusing on *recycling alone is unlikely to get us where we need to be;* volumes are simply too high and too misaligned with global—and especially regional—recycling infrastructure.

Recycling does, though, stand as a key pillar of *circularity,* the broad solution laid out in this report (please see section 3). A circular plastics system seeks to manage the volume of plastics in use and keep as much plastic in the value chain for as long as possible. Such a system would combine the GHG benefits of recycling and reuse with the business opportunities of sustainable growth paths.

> "Plastic circularity means managing used plastic as a valuable resource, rather than as a waste which needs to be discarded as cheaply as possible."
>
> *–Navneet Chadha, regional circular economy lead, International Finance Corporation*

Circularity is not a new idea, nor is it specific to the plastics economy. Today, there are real opportunities to accelerate the pace and scale of change in this space. These could and should significantly reduce the environmental profile of plastic packaging globally.

> "In the 90s, the plastic industry said, this is not waste, this is raw materials, it's valuable raw material. Not much happened in terms of recycling … when oil prices have gone down, and this recycling thing is not viable anymore … but now the stars are better aligned for increased recycling with the consumer sentiment changing tremendously, legislation and the pledges from companies, climate change, marine litter. So now there is a much better opportunity and momentum to make this happen."
>
> *–Samu Salo, senior industry specialist, International Finance Corporation*

Several companies are already moving in this direction as we discuss throughout this report.

Section 1.3: Asia sits at the center of the plastics economy

Asia produces around half and consumes around 40% of the world's plastics, but it is estimated to be responsible for a far higher proportion of marine plastic leakage. This problem is particularly acute in countries with large ocean-bound rivers, long coastlines, and poor collection infrastructure, including the Philippines, India, and Malaysia (Figure 4).[20] The Philippines stands out for a number of reasons (figure 4). Though waste collection in that country is quite effective (relative to other similar countries in the region), collected waste is often dumped illegally. Further, much of the plastic used in the country is not recyclable. It is estimated that plastic sachets, which comprise many layers and are thus effectively non-recyclable, make up 52% of the plastic waste generated. Every day 164 million of such sachets are used for an annual total of nearly 60 billion sachets (box 2).

Box 2: The problem with single-use, single-serving sachet packaging

Sachets are among the most emblematic problems for sustainable plastic management in developing Asian countries. Sachets are multilayer laminates packaging used for wrappers, chips bags, and small servings of goods like medicine or personal hygiene. Sachets are widely used, especially in low-income areas, to enable people to purchase products such as food and laundry detergent in small quantities, at low cost. However, in the absence of adequate waste or recycling systems, these multi-layer plastic items are responsible for a major part of the waste and litter problem.

The Global Alliance for Incinerator Alternatives (GAIA) estimated in 2019 that the Philippines consumes almost 60 billion sachets every year. One study in Manila estimated that as much as 50% of residential plastic waste was made up of sachets. The sachets are made of multi-laminate plastics and foils that are almost impossible to recycle.

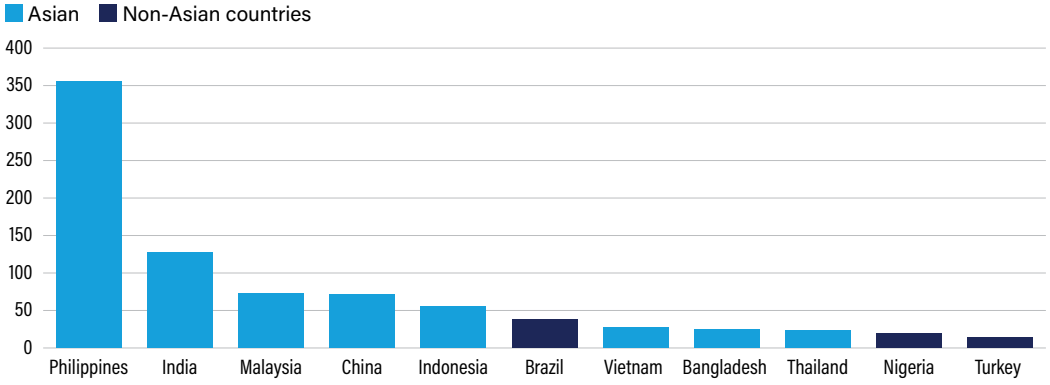
There is no simple answer to the sachet problem. At a minimum, sachets need to be redesigned with new materials to improve their recyclability. Producers and brand owners

of products sold in sachets have a major role to play in addressing the waste problem they have helped to create by taking responsibility for the packaging and products they put on the market and seeking alternatives. The higher concentration of sachet consumption in low-income areas also creates an opportunity for producing companies to find ways to support the expansion of the waste collection infrastructure in such areas.

Within Asia, per capita plastic use and waste varies significantly. Hong Kong and South Korea have among the highest single-use plastics consumption and waste rates in the world (more than 40 kg of annual plastics waste per capita, compared to 53 kg per capita in the US, the global leader in waste per capita). Countries such as Indonesia and India remain toward the lower end (less than 10 kg of single-use plastics waste per capita), but they still produce large overall volumes of plastic waste because of their large populations and inadequate collection systems (effective collection systems are an essential component of circularity).[21] Table 1 shows reference points on plastics consumption and leakage in East and Southeast Asian countries.

Figure 4: Asian countries are among the largest sources of ocean plastic leakage

Annual mismanaged plastic waste entering the ocean, thousand tonnes



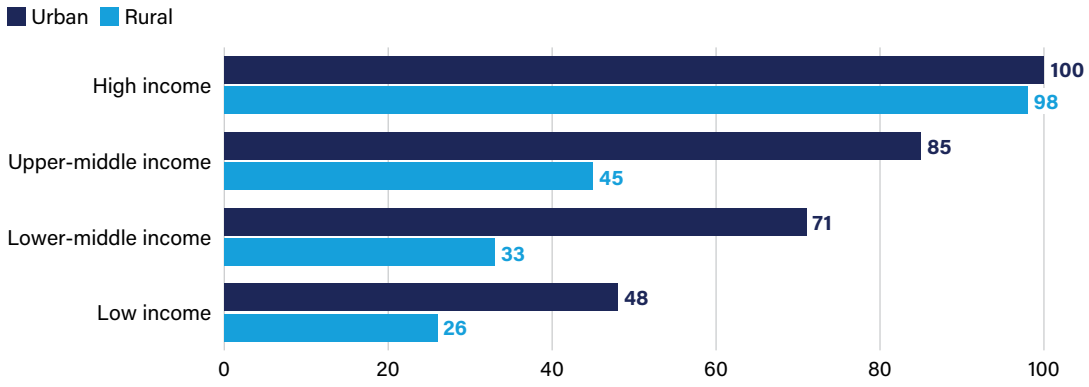
Source: Meijer et al (2021), Eurasia Group

Asia's waste collection rates are typically well below those in North America and Europe, and even those of regions with comparable income levels such as Latin America and the Caribbean—all of which tend to be above 80%, while East Asia is around 70% and South Asia closer to 40%.[22] There are, however, notable outliers, such as Japan, Korea, and Singapore, whose collection rates are among the highest globally.

Collection structures in the region vary hugely, from highly formal and complex systems in richer countries (box 3) to the largely informal systems in lower-income countries (where leakage risks are most acute owing to indiscriminate disposal and open burning). Rural areas struggle particularly (figure 5). It should also be noted that collection rates are by no means always aligned with recycling rates. For example, even with high collection in the US, recycling rates are low (under 30% for PET bottles in 2018), while certain Asian countries, including Myanmar, have lower collection rates but recycling rates of over 60% for PET bottles.[23]

Figure 5: Waste collection rates vary by income, rural/urban divide

% of total waste collected



Source: World Bank, Eurasia Group

Table 1: Plastics waste volume and policy

Country	Net-zero goal?	Signatory to Osaka Blue Ocean Vision?	Circular economy/plastics framework in place?	Waste collection coverage *(% of municipal solid waste collected)*	Domestic polymer production *(million metric tonnes)*	Single-use plastic waste per capita *(kg)*	Imports of plastics waste *(1H 2018, thousand tonnes)*	Annual marine plastic leakage *(thousand tonnes)*
Japan	Yes (2050)	Yes	Yes *(Basic Act on Establishing a Circular Society)*	100	5.3	3.7	—	—
Korea	Yes (2050)	Yes	Yes *(Framework Act on Resource Circulation)*	99	10.4	44	—	—
China	Yes (2060)	Yes	Yes *(14th Five-Year Plan, 2021-2025, for Circular Economy Development)*	49	51.4	18	70	71
Indonesia *(ASEAN member)*	Yes (2060)	Yes	Under development *(Indonesia Circular Economy Action Plan)*	69	1.9	9	70	56
Malaysia *(ASEAN member)*	No	No	Yes *(Roadmap towards Zero Single-Use Plastics, 2018-2030)*	80	1.7	16	461	73
Thailand *(ASEAN member)*	No	Yes	Under development*	50	7.0	18	253	23
Vietnam *(ASEAN member)*	No	No	Yes *(National Action Plan on Sustainable Consumption and Production, 2021-2030)*	—	0.9	20	254	28
Philippines *(ASEAN member)*	No	Yes	Yes *(Action Plan for Sustainable Consumption and Production)*	69	0.6	9	—	356

Source: Eurasia Group

Looking forward, expected population and income growth in South and Southeast Asia threaten to significantly increase Asia's share of global plastics production and consumption and further overburden inadequate existing waste management systems. This underscores the importance of shifting the region's plastics ecosystem to maintain the benefits that plastics bring while minimizing the harms that are associated with poor waste management and high-GHG manufacturing processes (especially those that use virgin materials). By most metrics, Asia is the region of the world most vulnerable to physical climate impacts; mismanaged plastic waste can exacerbate these problems as already noted, making countries such as the Philippines stand out for risk.

Importantly, though, things are by no means all bad: Asia has a number of existing examples of best practices (boxes 3 & 4), suggesting there are unrealized opportunities for the region to move to the front of the pack in plastics sustainability.

Box 3: Examples of best practices and promising initiatives in Asia

In **Japan,** coordination and planning among central and local governments is very highly developed. Local governments are required to disclose uniform annual data, which is then aggregated/published by the central government. They must also publish longer-term local solid waste management plans on the basis of which they receive financing for new waste management facilities and initiatives.

Korea has been a global leader in pre-collection sorting since the early 2000s. Individual household food waste is tracked using radio frequency identification codes when food disposal bins are opened, enabling the country to effectively measure the success of food waste-reduction efforts. Korea has also instituted a centralized system to match buyers and sellers of recycled materials, encouraging easy and transparent bidding processes (please see section 3.2 for problems with recycled materials markets).

Indonesia is host to a number of successful non-governmental initiatives to improve pre-waste sorting and limit marine leakage. Project STOP, a collaboration between Systemiq and chemicals producer Borealis, has worked with the most challenging marine plastic leakage cities in Indonesia to expand formal collection services to over 130,000 people. To improve pre-collection sorting, Indonesian company Waste4Change offers specific collection services for sorted waste as well as collection boxes in major cities for sorted waste.

Box 4: Japan's public-private recycling leadership

Japan's system of end-of-life recycling for plastics and other packaging materials was adopted in 1995. Responsibility is divided among individual consumers, the private sector, and local governments: consumers are responsible for pre-collection sorting and municipalities are responsible for ensuring efficient collection systems. Private sector companies finance recycling costs—through an extended producer responsibility scheme (EPR), as described in section 3.2—and must meet requirements to reduce the thickness and weight of their packaging on a regular basis. They also must follow guidelines like charging for plastic bags in retail stores in order to reduce packaging waste.

This comprehensive system helped Japan raise its amount of recycled plastic bottles by almost ten times in just over ten years, from 30,000 tonnes in 1997 to almost 300,000 tonnes in 2010. Its collection rate of used plastic bottles surpassed 90% in 2019.

In June 2021, Japan passed a new circular plastics law that will take effect in 2022. The new Act on Promotion of Resource Circulation for Plastics is intended to enhance efforts to achieve plastic circularity by engaging parties involved in the entire lifecycle of plastic products across design, manufacturing, disposal, collection, and recycling. The act will promote, among other things, reduction of the use of plastic, design for recyclability, sorted plastic collection by municipalities, and further involvement by plastics producers in collection.

Chapter 1: Key takeaways

- The embeddedness and value of plastics in modern society make it imperative to identify and significantly scale solutions that eliminate the environmental damage associated with their production and disposal. Waste management and GHG considerations are both critical.
- The GHG emissions of plastics vary widely according to how they are produced, consumed, and disposed of. Encouraging energy efficient production and responsible end-of-life management that supports a circular economy are essential components of a sustainable plastics system. There is huge upside potential in this space for plastic packaging, in particular.
- All potential plastics substitutes have their own challenges and advantages; there is no "one size fits all" solution, but there is potential headway to be made in all areas.
- **Asian country and corporate leadership in the plastics space can unleash the momentum around** identifying and implementing global solutions**.** Asia is a key player in the global plastics economy and, as such, stands to benefit greatly from effective action. **Asian countries already have some world-leading waste management practices in place, but these are not widespread across this very diverse region.**

Chapter 2: Compounding momentum—global trends affecting plastics

Action around plastics in Asia will take place against the backdrop of the shifting political, social, and environmental trends outlined in this chapter. As geopolitical tensions rise and competition spills into areas including climate, the lack of existing global leadership on a number of issues such as plastics will create significant opportunities for Asian countries to lead (box 5).

Box 5: The G-Zero world: A word from Eurasia Group President and Founder Ian Bremmer

In 2017, I put forth my theory of contemporary geopolitics: We have entered a geopolitical recession, with international institutions unaligned with the geopolitical balance of power … to the extent that the institutions themselves are starting to malfunction. These are long cycles (especially in comparison to economic recessions). And since then, this recession has only deepened.

Looking toward the future, this state of play presents several geopolitical risks including US-China tensions, inadequate political action on climate change, and long Covid. We warned in last year's *Top Risks* that the geopolitical order was fractious and weak. The result is a leaderless geopolitical order with a greater degree of volatility and conflict. As the world turns toward sustainability and, more specifically, reducing plastic waste, these issues will complicate how solutions are developed and executed.

Section 2.1: Multilateral and regional agreements

Even with the international movement away from multilateralism, there are several global efforts to collaborate on plastic waste reduction. Over 100 countries and large players from private industry have now signaled support for a **global plastics treaty**, an idea that even just a few years ago seemed farfetched. As currently envisioned, such a treaty would aim to establish common definitions of plastics products and shared reporting guidelines, as well as to facilitate investment in better waste management infrastructure (similar mechanisms as those that exist within the UN-backed global climate process). In Asia, Japan, Korea, Vietnam, the Philippines, and Singapore have all expressed support for a treaty (the US and China are conspicuously absent).[24] It is anticipated that the next opportunity to move discussion forward formally will be the UN Environmental Assembly to be held in Nairobi in February 2022.

> "I think the reason why we need to have a global plastic treaty is that plastic pollution has become a global problem. It's not limited to a specific geography. It's not limited to a particular stage in the lifecycle of plastic. And the impacts are just enormous. They're not just transboundary in nature, but they're intergenerational. And there are a lot of plastics that have forever effects."
>
> *–Satyarupa Shekhar, Asia-Pacific coordinator, Break Free from Plastics*

In addition to the global plastics treaty, other emerging multilateral initiatives on plastics include:

- The **G7 Ocean Plastics Charter** was initially adopted by Canada, France, Germany, Italy, the UK, and the EU in June 2018. It aims to make all plastics reusable, recyclable, or recoverable by 2030, to strive toward recycled content levels of 50% by 2030, and to ensure that 100% of plastics are recycled or reused by 2040.
- In Asia, Japan has taken **the G20 leadership of the Osaka Blue Ocean Vision**, which aims to eliminate marine plastic waste by 2050.
- Further regional coordination on plastics is also emerging in Asia, most notably through the **ASEAN Regional Action Plan for Combatting Marine Debris** in the ASEAN Member States (2021-2025), adopted in May 2021. Table 1 shows how key Asian countries currently align with these initiatives.

It is possible that given the state of international cooperation and tensions between industrialized and developing countries, regional efforts might have a better chance of advancing. (Box 8 in section 3 outlines the efforts that the EU is making to reshape the plastics economy in that region.)

The global plastics industry is also influenced by other multilateral efforts, specifically those related to climate change and biodiversity. Since 1995, multilateral climate negotiations have been occurring annually under the UN Framework Convention on Climate Change Conference of the Parties (COP). The COP has established international agreements such as the Kyoto Protocol, and more recently, the Paris Agreement. The COP26 meeting, which will take place in Glasgow in November, will continue these efforts.

At the time of writing, the outcome of the Glasgow meeting is unknown. Perceived success, especially around the process of ratcheting up national GHG reduction commitments—known as Nationally Determined Contributions (NDCs)—would add momentum to decarbonization pressures across industry. A less successful COP outcome—one that fails to resolve the finance issues for developing countries or structural issues about cross-border carbon—may dampen enthusiasm for change in the short term, but in our view will not affect the overall direction of travel around emissions and environmental action more broadly. Already in the run-up to COP26 we have seen unprecedented action and commitments to reach net-zero GHGs from the corporate and financial sectors, in alignment with the idea of this being the "Net-Zero COP." That said, any disappointment around the COP process itself, or any heightened disagreements between industrialized and developing countries, could spill over into further discussions around a global plastics treaty.

Scrutiny of plastic waste is also tightening in the context of biodiversity, a space in which images of ocean plastic pollution bite hardest. The preeminent multilateral forum for biodiversity is the UN's Convention on Biological Diversity, which was scheduled to hold an already delayed summit in China in 2021, since pushed back to early 2022. In the draft framework for the summit, reducing plastics pollution is specifically mentioned as a priority.

Section 2.2: Accelerating pressures for action on plastics

We expect pressure around the environmental footprint of plastic packaging in general (both GHG and waste issues across all types of plastics end use) to continue to grow based on four interrelated global issues: unilateral national and sub-national action; corporate and financial action; consumer action and pressure; and development and equity concerns.

National climate commitments

Finding ways to reduce the GHG emissions from plastic packaging production is expected to be a growing driver of action on plastics.[25] A total of 191 country parties to the Paris climate agreement have committed to reducing GHG emissions. As of August 2021, over 60 countries, accounting for over half of global GHG emissions, have committed to net-zero targets.[26] As shown in figure 6, Asian countries that have made such pledges include China (2060), Indonesia (2060), Kazakhstan (2060), Japan (2050), South Korea (2050), Laos (2050), and Nepal (2050).

Figure 6: Asia net-zero commitments before 2060

Source: Climate Watch Net Zero Tracker, Eurasia Group

Other Asian countries, including the South and Southeast Asian countries where plastic demand is growing fastest, are under pressure to commit to similar net-zero goals.

With not all countries coming to the climate table, trade policy is the new tool that is being deployed in the fight against climate change. The European Commission's proposed carbon border adjustment mechanism (CBAM) is the first prominent example of explicitly climate-driven trade policy tool. CBAMs place duties on energy-intensive imports according to their production of GHG emissions to bring these into line with the country's GHG production standards. While plastic packaging/petrochemicals do not appear on the initial list of sectors to be covered by the EU's CBAM, further sectoral extensions are likely if the CBAM is implemented.

> "I'd say that the driving force right now [for corporate investments in circular plastics] is their climate goals. So almost all the conversations we're having are because of commitments around climate, although there [are] some commitments around oceans as well—many of them have both. We also see an increasing interest from private investors and DFIs."
>
> *–Rob Kaplan*

Plastics production in the EU is already covered by Europe's Emissions Trading System (ETS), though until now member states have been permitted to grant state aid to compensate for the cost of indirect CO_2 emissions to petrochemicals (presently under review for the forthcoming ETS period). China's new ETS was initially intended to cover petrochemicals but has now been scaled back in its initial form to cover only the power and heat generation sector. In general, emissions trading systems and carbon pricing schemes are gathering pace around the world. Singapore was the first Southeast Asian economy to announce a carbon tax at $5/tonne for the period 2019-2023 and with a pricing review to take place next year. Other Asian countries with nascent ETSs include Indonesia, the Philippines, Korea, Thailand, and Vietnam.[27]

Corporate action

Corporate action in the climate space is also gathering pace, alongside broader action on environmental, social, and governance (ESG) issues. At the time of writing, over 3,000 companies globally have joined the UN's Race to Zero coalition. Over 1,000 businesses have joined the Science Based Targets Initiative to reduce their emissions in line with climate science, including 50 of the world's largest chemical companies and 28 food and staple retailers. Many of these commitments include a company's full supply chain, which would include packaging.

Within the plastics value chain, some of the largest producers—Dow Chemical, BASF, INEOS, and even oil/gas supermajors including Eni and Shell—have committed to midcentury net-zero goals. Large plastics users that have already declared 2050 net-zero targets include Coca Cola, Nestle, and Suntory Group, while Unilever has committed to net-zero emissions across all products by 2039 and Procter & Gamble has targeted net zero in its own operations by 2030. Bloomberg NEF has highlighted the importance of plastics recycling in meeting these targets, projecting that three-quarters of the emissions abatement that is required by 2030 in order to put the petrochemicals industry on a 2050 net-zero path will come from greater plastics recycling.

Companies are also moving proactively to create alliances around plastics. The New Plastics Economy Global Initiative—a group of over 200 companies making up 20% of global plastics production—has committed to eliminate unnecessary plastic items, ensure reusability/recyclability/composability in plastics, and to pursue circularity. Similarly, the Consumer Goods Forum, which comprises leaders from 400 companies with sales totaling €3.5 trillion has initiated a range of coalitions, including one on plastic waste that focuses on product design, EPR, and aligning around the role chemical recycling will play in a circular plastics economy.

Such coalitions often operate alongside more granular plastics commitments at an individual company level. For example, Suntory Group will aim for 100% sustainable plastic bottles used globally by 2030, by transitioning to recycled or plant-based materials in all PET bottles. Walmart is targeting at least 20% post-consumer recycled content in its packaging by 2025. Bangkok-headquartered plastics producer, Indorama Ventures, has committed to use 750 kilotons of post-consumer PET as feedstock for recycled bottle production by 2025, an almost seven-fold increase from 2019 that will require the company to recycle 50 billion bottles per year. Procter & Gamble has pledged to cut in half its global use of virgin petroleum plastic by 2030.

Much of this corporate action flows from companies' efforts to deepen their own sense of purpose and to strengthen their relationships with multiple stakeholders as well as to identify opportunities associated with moving ahead of the competition in the sustainability space. There are also signals and pressures coming from the finance sector, itself driven by a heightened understanding of climate-related risk. Funds with explicit ESG objectives attracted over $50 billion in direct investment in 2020, more than a doubling of 2019's total of $21 billion and marking the fifth straight year of growth for ESG investment.[28] Even more consequential is the fact that institutions that together manage over $80 trillion assets are now signed up to the Glasgow Financial Alliance for Net Zero. The investors in this coalition have placed themselves on the pathway to reaching net zero GHG emissions within their investments/portfolios and will be setting interim 2030 targets. They have also committed to transparent reporting and accounting in line with the UN Race to Zero criteria.

ESG non-compliance—particularly around climate, but also, potentially around plastic sources, types, use, and disposal—is now considered a serious business risk affecting companies' ability to raise capital and has therefore become a driver of the shift to better alternatives (renewable energy, recycled plastics, etcetera).[29] Over 100 significant financial institutions have announced their divestment from thermal coal. Litigation and shareholder activism are also growing concerns for corporates. Meanwhile, Exxon and Chevron (both of which are involved in the

petrochemical business), have been the subject of high-profile activist investor campaigns related to their limited climate ambition.

Consumers

Consumer sentiment can underlie and amplify these shifts. Outside Asia, significant majorities of consumers in the UK, France, and Germany express doubts about current disposable packaging systems and avoid excess plastic when shopping.[30] While it is unlikely that such sentiment is fully replicated in Asia at this point, especially among lower income consumers for whom price is the foremost concern, we do expect this trend to increase globally over time. As more environmentally sound alternatives become available (which is already happening in some Asian countries), consumers are better able to express their preferences through their purchasing decisions—though price will remain a key consideration. Achieving low/no price premiums for "greener" products, perhaps through regulatory initiatives that level the playing field, is especially important.

> "I think the customers see us as an action-oriented company that is very willing and serious about this plastic reduction [challenge]. This elevates our corporate brand perception, urging customers to choose [our] products all the more. To [maintain this trust], I believe it's important for us to ensure that we make every effort to ensure that the inevitable cost increase related to taking on such challenges is not passed on to our customers."
>
> *–Seiji Morihara, senior general manager, Corporate Sustainability Division, Suntory Holdings Limited*

Plastics, economic growth, and equity

One of the imperatives in the transition away from the current linear plastics economy is to preserve the benefits of plastics while minimizing any associated negative impacts. As noted at the start of this report, plastics create enormous benefits for society. This is especially true in developing countries. While per capita usage may be lower, people may require plastics to fulfil critical functions, such as the provision of clean drinking water, and may not have the resources to shift to alternatives.

Yet poorer groups also suffer disproportionately from the impacts of producing plastics and the mismanagement of plastic waste. At a macro level, some developed countries still export a portion of their waste to developing countries. The British Plastics Foundation estimates that over 60% of 2019 UK plastic packaging was exported for recycling, while the US has still not signed onto the Basel Convention to limit the trade of hard-to-recycle waste.[31] Although this practice has fallen off in recent years—partly because of bans on waste importation, notably by China—in cases where waste exports continue in defiance of domestic/international guidelines, the waste can often end up in poorer communities, leaking into the environment and creating adverse local impacts. Typically, domestic end of life facilities—dumps, landfill sites, and incineration plants—are also situated in disadvantaged areas.

> "We are shipping so much of our plastic trash to other countries for them to deal with. It's polluting their river ways and the food sources that they rely on, so plastic is an environmental justice issue, a human rights issue, as well an animal rights issue. So, the issue of plastic pollution is very broad, it covers many different topics, and that's why it's important to talk about these intersections."
>
> *–Hannah Testa, Hannah4Change*

Efforts to support the transition away from some types of plastics are already emphasizing the impact of change on disadvantaged groups, both the positive and the potentially negative impacts for displaced workers and those that struggle to afford new products and services. Identifying opportunities to ensure that the shift toward plastics circularity actively benefits poorer communities and does not exacerbate inequality is a priority as part of a broader movement toward environmental justice.

Table 2 lists the global Sustainable Development Goals (SDGs) that all 193 member states of the UN committed in 2015 to achieving by 2030. Unsurprisingly, plastics have an important role in meeting the SDGs, though poor management of plastic waste also has numerous negative consequences. In the table we highlight opportunities to advance environmental justice through the circular transition that we describe in chapter 3.

Table 2: Plastics and the SDGs

Relevant SDG	Positive impact of plastics	Challenges of current linear plastics economy	Environmental justice opportunities of circularity
SDG 2: zero hunger	▪ Contribution to food transport and storage	▪ Negative impact of microplastics on agricultural soil, marine ecosystems	▪ Reducing GHG growth reduces climate impacts on developing country agriculture; fewer impacts of plastic leakage on marine-based food sources (important especially in Southeast Asia)
SDG 3: good health and well-being	▪ Huge contribution to medical/ health systems (especially evident during Covid-19)	▪ Toxins/health drawbacks from multiple parts of the plastics value chain	▪ Reduce toxicity effects on most vulnerable communities living near high-leakage or plastic production
SDG 6: clean water and sanitation	▪ Safe bottled water ▪ Plastic pipes for potable water		▪ Opportunities to reduce plastic use through improving piped water availability/quality
SDG 7: access to energy	▪ Waste to energy processes for plastics	▪ Potential emissions from waste-to-energy processes	▪ Enhanced pre-collection sorting promotes cleaner, higher efficiency waste-to-energy processes in developing contexts
SDG 8: decent work and economic growth	▪ Up to 1% of the global urban population is estimated to be engaged in informal plastic waste management and up to 20 million in formal waste management	▪ Possible damage to related industries (tourism, fishing) ▪ Broad ecosystem costs	▪ Higher employment intensity of circularity versus linear plastics ecosystems, especially in disadvantaged communities ▪ Raise the status and economic returns of informal sector waste work
SDG 11: sustainable cities and communities	▪ Enabling role in packaging and transportation systems of major cities	▪ Overall waste and pollution issues ▪ Interference with sanitation	▪ Benefits of circularity accrue most to crowded urban communities
SDG 12: responsible consumption and production	▪ Real opportunities for consumers and producers to quickly reduce their plastic consumption	▪ Significant over-use of plastics in current linear systems	▪ Reduce excess waste shipments from developed countries ▪ Allow for new plastics production processes that have better local-level employment and health outcomes
SDG 13: climate action	▪ *Relatively* lower GHG profile of plastics compared to similar materials ▪ Insulation in homes	▪ GHG cost of plastics, growing responsibility in sustaining crude oil demand	▪ Plastics recycling plays a key role in chemicals industry GHG reductions ▪ Poorest countries suffer most from climate change
SDG 14: life below water		▪ Impact of plastic pollution on marine ecosystems	▪ Benefits for marine-reliant industries and communities with marine-reliant diets

Source: Eurasia Group

In the area of employment in particular, there are lots of opportunities related to a shift to greater plastics circularity, as detailed in box 6.

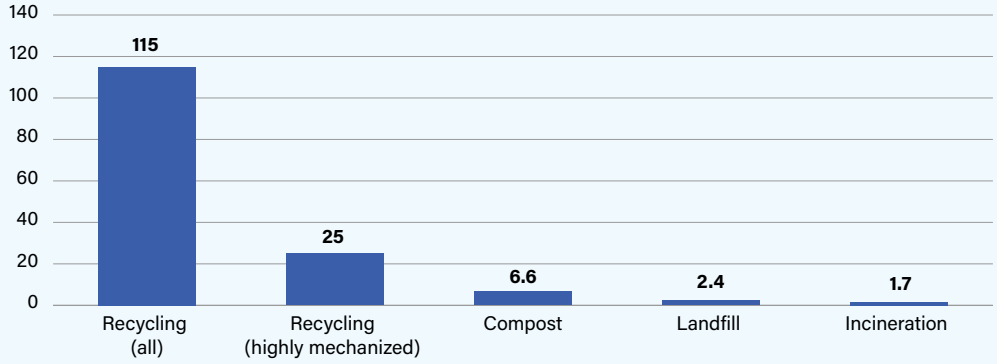
Box 6: Recycling jobs in a circular plastics economy

One of the major advantages of a circular plastics economic model is its potential to create employment in high-value plastics recycling. Recycling can create 50 times more jobs per unit of waste compared to waste destined for landfills or incineration. This is the case even for highly mechanized recycling processes seen in higher-income markets. From an individual country-level perspective, these are attractive jobs not only for employment reasons, but also because they address the political problems associated with plastics, namely marine leakage and domestic air/water pollution. New jobs in a circular economic framework are also important mechanisms for enabling informal sector workers to raise their incomes at the same pace as the rest of the economy—as long as sufficient attention is paid to ensuring high health and safety standards. Public and private sector actions will both be necessary to provide this upward economic mobility.

Several Asian countries have already begun to estimate the labor benefits of a circular plastics economy. Indonesia estimated that eliminating plastic pollution by 2040 would create 150,000 *direct* net new jobs in the plastic waste and collection sector. A separate analysis of Indonesia found that economy-wide circular economy initiatives would create a net gain of 4.4 million jobs, with over 100,000 of those jobs tracing back to improved plastics management and 85% of those jobs going to women. On a city level, GAIA estimates that achieving a waste recovery rate of 80% would create over 15,000 recycling jobs in Ho Chi Minh City and over 5,000 recycling jobs in Dhaka. Outside of Asia, the European Commission estimates circular economy programming could produce over 600,000 jobs in waste management in the EU.

Labor intensity of recycling operations compared to traditional disposal options

Jobs created per 10,000 tonnes of annual waste



Source: GAIA, Eurasia Group

Economic benefits from better waste management extend well beyond the plastics value chain itself; tourism, fishing, and shipping are all sensitive to the effects of poor waste management. This is of particular concern given the importance of tourism to many developing Asian countries (pre-pandemic, tourism accounted for 22% of GDP in Thailand and 13% in Malaysia, for example).

"First, [plastic pollution] really is damaging to the tourism industry, which is a big thing for several countries in East Asia, because they have beautiful, world-class tourism facilities, beaches, reefs, and mangroves, and marine plastic pollution is damaging all of that. The second thing is we know that countries in East Asia are highly vulnerable to climate [disasters] ... what marine plastic pollution does is clog landfills and sewage and drainage systems, and accentuates the risks of flooding, which worsens the climate vulnerabilities of these countries. Also, plastics break down into microplastics, which go into the environment and create all kinds of health risks."

–Victoria Kwakwa, currently vice president, strategic corporate initiatives, World Bank, formerly vice president for East Asia and the Pacific, World Bank, April 2016–August 2021

Chapter 2: Key takeaways

- **There is no clear global leader in today's world.** This fluidity has risks but also creates opportunities for novel coalitions.
- **Global and regional initiatives around plastic waste** are already taking shape. These include efforts to achieve a **global plastics treaty**, **ASEAN's marine plastics pact,** and the **Osaka Blue Ocean Vision**. Other international negotiations—notably around climate and biodiversity —also affect the plastics industry.
- **Geopolitical and economic pressures around the need to achieve net-zero** GHGs will increase. Inaction in this space will become increasingly risky for corporations and governments in relation to consumers/citizens, investors, and their broader international reputations.
- Many companies have already recognized the opportunities of moving ahead on sustainability. Others are being pushed in that direction by shareholders and the financial sector.
- Action on plastics needs to take place within the broader context of environmental justice. Changes in the plastics economy have the potential to create jobs within the sector and to minimize the harms of poor plastic waste management that have been observed in adjacent industries such as tourism and fishing.

Chapter 3: Between today and a circular economy

Achieving a sustainable plastic ecosystem requires a broad suite of policy and business components, all under the umbrella of the circular economy. The circular agenda is broad, ambitious, and challenging. It goes beyond any single actor or technical solution and implies a systemic shift in our relationship with plastic packaging toward one that can preserve the benefits we reap from plastics while minimizing the downsides.

The central pillars of a circular plastics economy are a **reduction in the use of virgin packaging plastics** and **maximization of recycling** which, in turn, can be broken down into several elements:

- designing for recyclability;
- expanding and improving waste collection, sorting, and recycling infrastructure;
- orienting consumer behavior away from single-use models; and
- encouraging technical innovation around recycling technologies, including supporting new opportunities to reduce the GHG footprint of recycling.[32]

Circularity already enjoys name recognition and some degree of global public understanding. Many countries (and local-level governments) in Asia and around the world have already established broad circularity visions: Japan and China have announced explicit circular economy plans while Thailand, Malaysia, and the Philippines are moving in a similar direction.

On a cultural level, circularity aligns with many traditional Asian principles, including:

- Japan's principle of *mottainai,* which denotes regret for creating excessive waste;
- Thailand's "Sufficiency Economic Policy," one of the Thai King's hallmark campaigns, calls for moderation and environmental stewardship in line with circular principles;
- China's growing rhetoric around the idea of being an "ecological civilization" coincided with the country's 2019 decision to ban plastic imports.

Section 3.1: The foundations of circularity

To be successful, circularity must be underpinned by conducive policy at all levels (local, national, and international). Such policy is required to create market incentives that enable the effective functioning of circular systems. Table 3 examines each component of the circular system, highlighting the role of policy and identifying Asia-specific considerations.

While governments at different levels are the main actors in policymaking, consumers and corporations can also help define the policy landscape:

- **Consumer/public pressure**: Consumers and local communities signal to policymakers that reforming the plastic packaging ecosystem is a priority for them and one where they expect action on the part of their representatives.
- **Corporations**: Corporations can commit to being constructive partners in reducing packaging volumes in general and moving away from non-recyclable, single-use plastics in particular, signaling that they are ready for change and are even leading the way.

The point about circularity is that it requires all players to work together.

> "Important leadership needs to be had from business, that's the producers of plastic, to set stronger and more ambitious goals for reducing plastic, [and from] government to help catalyze that business action, and actually be bold about trying to foster this transition to a post plastic future, through thinking about new kinds of legislation to support new plastic and new kinds of materials. Also, to think about what kinds of bans we might have on plastic that are clearly harmful, and really should be replaced. And then community action, cleaning up plastic and working on education to help each of us in our own households and communities and reduc[ing] that leakiness in these waste management systems, think[ing] about alternatives to plastic use."
>
> *–Douglas McCauley*

It should also be noted that even when governments do act, there can be problems with on-the-ground enforcement. For example, plastic bag bans—which have been enacted in several countries including China and Thailand on the national level and in Islamabad and New Delhi at the local level —often go unheeded. Bans on placing certain recyclable materials such as cans and plastics in waste streams destined for landfills also exist but are hard to enforce. Waste import regulations are another example of national-level plastics policies that are currently flaunted. A clear multilateral framework for plastic waste trade is in place under the Basel Convention, but enforcement lags. If regulation is to work, there needs to be active government supervision and conformity from both industry and consumers.

Table 3: Components of circularity

Stakeholder	Relevant policy framework	Level of government	Relevant non-policy actors	Challenges	Asia-specific considerations
Demand reduction	▪ Enforced bans on most problematic single-use plastics ▪ Encouraging multi-use/refilling	▪ Local ▪ National	▪ Consumers ▪ Retailers	▪ Plastic consumption growth underpinning broader growth expectations ▪ Technical feasibility of multi-use/refillable plastics ▪ Equity concerns for reducing consumption of materials such as sachets	▪ Business interests in plastics and petrochemicals in Asia expecting growth ▪ Developing Asian countries have opportunity to "leapfrog" traditional plastics consumption growth models
Design for recyclability	▪ Minimum recycled content legislation ▪ Regulatory certainty for accepted uses of recycled plastics (especially food uses) ▪ Industry clarity on chemistry standards for most common plastic types	▪ National ▪ International	▪ Chemicals companies ▪ Plastics producers ▪ Retailers	▪ Disparate recycling frameworks/standards across the region ▪ Ensuring sufficient high-quality collection/sorting to justify investments in design-for-recyclability ▪ Ensuring continued low-cost access for vulnerable groups	▪ Concentration of smaller, independent markets makes regulatory overlap challenging ▪ Stark differences in advanced recycling capabilities, overall recycling infrastructure
Pre-collection sorting	▪ Local mandates ▪ Clearer labeling to improve consumer sorting accuracy ▪ Educational campaigns	▪ Local ▪ Municipal	▪ Consumers ▪ Informal collectors ▪ Retailers	▪ Lack of robust collection infrastructure in many countries ▪ Threat posed to informal sector by increasing centralization of collection ▪ Preventing contamination of recycled plastics supplies by under-informed consumers	▪ Nuanced sorting programs in leading Asian countries (Japan, Korea) can serve as model for other markets ▪ Formal pre-collection sorting only immediately feasible in higher-income areas of developing countries

Stakeholder	Relevant policy framework	Level of government	Relevant non-policy actors	Challenges	Asia-specific considerations
Improving collection coverage	▪ ERP ▪ Economic/social protections for informal collection sector ▪ Target unsustainable/ opaque waste collection services ▪ Include waste collection as a reason for general infrastructure investments	▪ Local ▪ Municipal ▪ National ▪ International	▪ Brand owners ▪ Chemicals companies ▪ Plastics producers ▪ Local civil society/ NGOs ▪ International financiers	▪ Funding constraints on local governments to increase collection budget ▪ Lack of formal protections, paths for increased earnings for informal sector ▪ Ease of plastic leakage in seaside/riverside communities ▪ Volatility of plastics incomes depending on raw material input prices (oil prices)	▪ Basic infrastructure challenges in reaching rural communities ▪ Impact of rising incomes on feasibility of informal collection systems ▪ Growing importance of clean water supplies to local communities, industries
Expanding recycling infrastructure	▪ ERP ▪ Pre-set offtake agreements with plastics producers/ retailers ▪ Regulatory alignment to facilitate exports of recycled plastics	▪ National ▪ International	▪ Brand owners ▪ Chemicals companies ▪ Plastics producers ▪ Recyclers ▪ International financiers	▪ Bankability of recycling investments fluctuates with oil/ gas price volatility ▪ Lack of demonstrated investment success ▪ Small size of many recycling operations makes it difficult to attract financing ▪ Contamination issues with collected supplies ▪ Difficulty of small-scale recyclers to meet expectations of large-scale buyers	▪ Opacity of sources/quality of recycled plastics inputs
Decarbonizing plastics production	▪ Climate disclosures for plastics producers ▪ Fiscal incentives for lower-carbon procurement in plastics operations ▪ National systems to reduce power grid intensity	▪ National ▪ International	▪ Plastics producers ▪ Retailers ▪ Energy suppliers	▪ High-intensity fuel needed for plastics makes it difficult to switch away from fossil fuels ▪ Low margins in plastics make expensive facility changes challenging in the short term ▪ Many Asian countries are not yet committed to net-zero goals and mandatory climate disclosures	▪ High-income Asian countries (Japan, Korea, Singapore) are committed to net-zero, increasing climate disclosures ▪ Japan and Korea at the forefront of green hydrogen and other clean industrial fuels that could be used in plastics operations ▪ Reducing coal consumption for industrial processes is already a major focus for Asian climate efforts

Source: Eurasia Group

Section 3.2: The essential components of a circular plastics economy in Asia

Establishing a circular plastics economy in Asia requires collaboration and action across many fronts. Progress is best incentivized by establishing clear timelines, scopes, and targets—and likely through alignment with external benchmarks and standards such as those established by the Science Based Targets Initiative and the World Benchmarking Alliance. Coming to agreement on these issues, and disclosing progress against them, are two very important steps in a collective approach (either global, regional, or industry-wide).

Demand reduction

Without placing limits on the overall amount of plastic packaging in circulation, it is extremely unlikely that meaningful circularity will be achieved. Systemiq and The Pew Charitable Trusts estimate in their *Breaking the Plastic Wave* report that even if we were to scale mechanical recycling infrastructure, waste collection infrastructure, designing-for-recycling, and even chemical conversion as ambitiously as possible, we would still see a 40% *increase* in plastic pollution globally, especially in the Global South where infrastructure is most lacking. In order to achieve full global

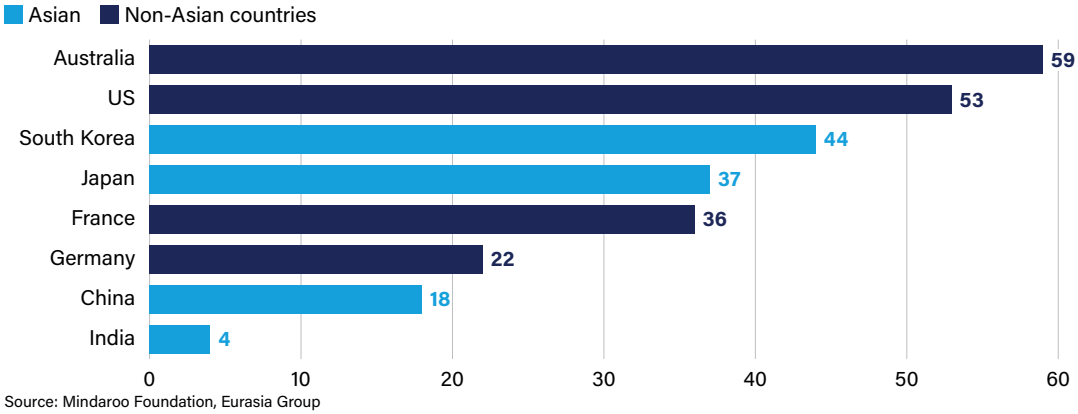
collection of plastic waste, and to eliminate plastic leakage by 2040, we would have to extend collection services to 500,000 unserved people *every single day* until that date.[33] Given how unlikely this is, a combination of overall reductions in plastic packaging—especially in those types of packaging that cannot be recycled and where it makes sense socially and environmentally—and a shift towards polymers that can be recycled, such as PET, are both essential.

A caveat is that there should not, of course, be a shift to solutions that are more damaging for the environment. This can, at times be a complex calculation since waste considerations and GHG considerations do not always point in the same direction—for example, with some forms of composting that can be better for waste but emit more GHGs. A key point is that with targets for reduction in place, we would expect to see both behavior changes around consumption and the identification of materials that are net GHG negative such as those being developed by the US company Twelve.

If they are able to identify ways to reduce plastic packaging, Asian countries can begin to alter the existing narrative (upon which most projections are based) that as a country gets richer, its population will consume more plastics and generate more waste. This has certainly been true until now (figure 7), but it does not have to be true forever.[34] Just as some countries in Africa skipped building landline phone infrastructure to "leapfrog" straight to mobile devices and 5G, so Asian countries could lead the way, through circularity, to a high growth, low plastic waste future. Time is of the essence: It is easy for consumers, systems, and economies to become "locked in" to expectations of rising plastic consumption, making change harder to achieve.

Figure 7: Legacy of plastic consumption models in high-income countries

2019 single-use plastic waste per capita, kg



Source: Mindaroo Foundation, Eurasia Group

One way to reduce demand is through greater reuse/refilling. On a full lifecycle basis, reuse can lower the environmental footprint by over 70% compared to similar single-use plastic bottles, assuming these have little recycled content.[35] In Asia, this is most likely to be feasible in higher-income areas where commercial activities are more formalized and predictable. The population density in Asia's cities could represent an opportunity here: One company that has already introduced a high-profile reuse campaign in the region is Unilever, which recently launched in-store refill stations in Indonesia, Vietnam, and the Philippines. Once systems are in place, companies can gain an important touch point with consumers at the point of refilling. The feasibility of reaching lower income consumers with refill models is much more challenging, both because of the non-availability of safe washing facilities and the very small scale/low value of individual purchases.

Box 7 provides more detail on the types of incentive structures that can help promote reuse/refill models as part of a circular economy (that is also strongly oriented toward recycling).

> "I think there's a lot of enthusiasm for refill and reuse … there are lots of systems that are already in place. The lunchbox system in Bombay, for instance, has millions of lunchboxes collected from individual homes, aggregated, redistributed, and then delivered to offices every single day. And then the used lunchboxes are then collected at the end of the day and then delivered back home … In Hong Kong, we are seeing lots of innovation on food ware being re-usable … In countries like Indonesia and the Philippines we're actually seeing soy sauce and oil coming in a lot of reusable and refillable solutions. These are absolutely a fantastic way of actually reaching communities."
>
> *– Satyarupa Shekhar, Asia Pacific coordinator, Break Free from Plastics*

Box 7: Deposit return

Return for recycling or refilling: Deposit return systems work by charging the consumer a small deposit on a container which is refunded upon the return of the empty container either for recycling or refilling. Deposit return systems and refillable systems have been widely used for beverages including beer and alcohol for many years. Containers are commonly collected at special depots, through reverse vending machines or through closed loop delivery and return systems such as those operated by breweries.

Deposit return systems for single-use containers are common in Europe, Canadian provinces, and some US and Australian states. Refillable systems are more common in Asia and are used in Thailand, the Philippines and Vietnam.

Effectiveness: Deposits, even if modest, have been proven to provide sufficient incentive for people to return containers. Such systems have demonstrated return rates averaging around 80% with the worst recovering 60% and the best in excess of 90%—97% in Germany, for example).

Other possibilities for reducing (traditional) plastic packaging include substituting it with non-petrochemical feedstocks (bioplastics derived from agricultural commodities) and a greater use of non-plastic alternatives. While bio-based plastics avoid the GHG emissions of initial hydrocarbon extraction, they may incur the same GHG emissions during production (though energy use). In addition, the land available to produce the feedstocks and land-use emissions associated with their production mean that they are not likely to be a meaningful part of the circularity puzzle, though they may fulfill some niche functions. It should also be noted that there is often confusion between bio-plastics (made with bio-based feedstocks) and biodegradable plastics (which can be broken down by microbes in a reasonable timeframe). Sometimes products may have both qualities, but not all bio-plastics are biodegradable and not all biodegradable plastics are bio-based. While biodegradability seems like an attractive characteristic, problems can arise from the difficulties of sorting biodegradable plastics from conventional plastic resins at recycling facilities, leading to contamination of regular recycling streams.

Using non-plastic packaging materials generally holds higher promise than bioplastics—on the waste side, at least. For example, up to one-third of monomaterial plastic films could be substituted

with paper or compostable alternatives by 2040.[36] Another example of innovation in creating alternatives to traditional plastic packaging materials comes from the Japanese company TBM. TBM produces a new material known as LIMEX by substituting limestone pellets for up to 80% of the regular petroleum-based feedstock, resulting in significant GHG reductions. LIMEX can already be recycled and TBM is now exploring efforts to develop biodegradable LIMEX products.

Design for recyclability

Governments and corporations both have a role to play in this space. On the government side, regulating the use of colored PET bottles (which have branding advantages but are far more difficult to recycle and are often downcycled rather than left within the packaging supply chain) is one example of effective regulation. Korea banned colored PET bottles in 2020 alongside a ban on the use of polyvinyl chloride (PVC) in packaging applications, while Japan adopted voluntary standards to promote PET recycling in the early 1990s. Banning PVC and similar challenging materials such as polystyrene, helps in that it pushes users toward plastic packaging types such as PET and HDPE that are easier to process and more valuable. Another option, that could be stipulated by governments or voluntarily adopted by industry, is to standardize and reduce the use of contaminating adhesives in packaging, switching to colored sleeves instead, to maintain branding possibilities.

Barring select examples such as those above, there is little effective legislation or willingness on the part of governments to regulate product design or undertake initiatives such as green procurement standards for plastics. Most of the responsibility for and initiative around design lies with corporations (petrochemical companies, plastics companies, and plastic packaging users). One particularly fruitful area for corporate leadership lies in voluntarily reducing the complexity of packaging and the use of multi-materials/laminated materials, which are difficult—if not impossible—to separate for recycling. Walmart is a leader in this space. The company has pledged to achieve 100% recyclable, reusable, or industrially compostable packaging for its private brand packaging by 2025 and has developed a detailed *Plastics Playbook* to help guide its own and suppliers' efforts around design for recycling.

Achieving plastics supply compatible with recycling procedures is important given the razor-thin allowable margins of contamination when recycled plastics are to be used for food and beverage packaging. Just one PVC bottle in a bale of 20,000 recycled PET bottles can make the entire batch unusable for food applications.[37] This quality issue is just one of several challenges recyclers face around securing reliable, high quality input supply, a key factor in the financial viability of plants and therefore their eligibility for financing.

If the global plastics industry comes together around a suite of primary plastics chemistries, then chemical companies will be better able to identify processes to maintain and modify polymer structures across different recycling rounds. Where policy mechanisms and corporate commitments are unable to create recycle-friendly waste streams, there is promising movement in chemical or feedstock recycling, where mixed materials are either dissolved or heated to high temperatures to depolymerize them and return them to original feedstock form.

One exciting example of these technologies is enzymatic PET recycling, which has been developed by a consortium of Carbios, L'Oréal, Nestlé Waters, PepsiCo, and Suntory Beverage & Food Europe. It can produce food-grade PET bottles entirely from r-PET feedstock.

Although chemical recycling requires more energy than mechanical recycling, it provides opportunities for recycling in segments that previously had none and is already net-positive in terms of GHGs.[38] Because chemical recycling is a new innovation (there are no chemical recycling plants operating at scale globally), there may also be room to improve the energy efficiency and GHG benefits of the process. Continuing to push the technical frontiers of recycling and

finding solutions for materials that are currently classified as "non-recyclable," is of enormous importance to establishing a robust and flexible recycling network globally. R-Plus Japan, an agreement signed in 2020 among 12 industrial partners in the plastics industry in Japan, is one example of industry players coming together to push forward recycling technology for polymers where recycling is currently limited.

Collection and sorting: The backbone of the recycling system

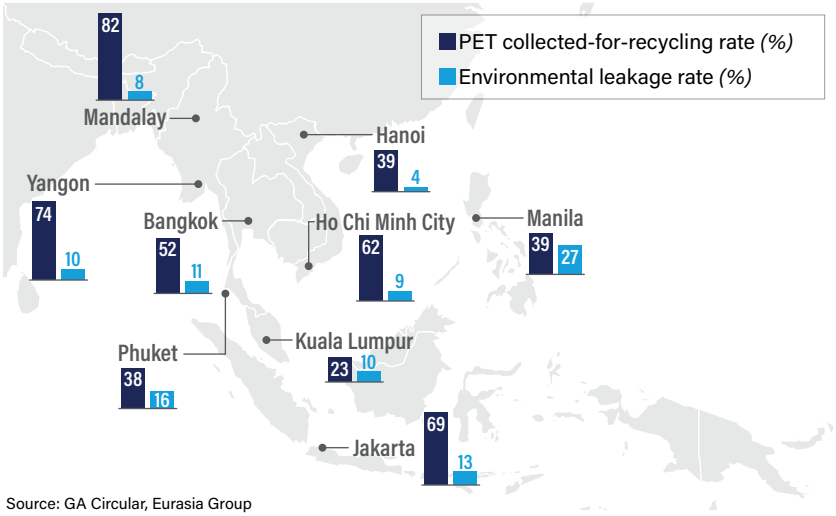
As we saw in chapter 1, Asia currently lags most other global regions in total waste collection coverage, particularly in lower-income and rural areas. This is partly because formal waste collection systems in the region remain in their infancy and partly because government policy often fails to create the right incentive structures (please see below).

> "In many developed markets, such as the US and Europe, we had probably a hundred years of economic development to build our waste management infrastructure. And in most parts of the emerging world, we've had ten to 15 years. And it's obvious that investment in infrastructure hasn't kept pace. Building circular value chains in emerging markets is a great opportunity to address both the plastics and the climate crises while generating significant economic value."
>
> *–Rob Kaplan*

This gap represents both a challenge and an opportunity that Asia must seize if it is to become a global leader in plastics circularity. Asian countries are much more likely to succeed by building on the existing strength of their informal systems. Because all sorting is manual, these systems can provide higher quality feedstock for recycling *and* be lower cost, given prevailing wage rates. For example, in Pune, India, informal collection networks saved the city almost 50% of its solid waste management budget.[39]

Remarkably, the informal sector already supplies almost 60% of the world's total recycled plastic.[40] It is perhaps surprising, then, that recycling rates for even high-value materials, such as PET bottles, remain below 40% in most large Asian cities, including Hanoi, Kuala Lumpur, and Phuket (Figure 8).[41]

Figure 8: Wide variance in post-consumer PET recycling rates in Southeast Asian cities



Source: GA Circular, Eurasia Group

Since collection rates for lower value plastics would be even lower, there is an evident need for policy mechanisms that either raise the implied value of recycled feedstocks (mandatory recycled content legislation or deposit return schemes) or designate legal responsibility for increased collection and recycling (EPR schemes). Examples include:

- **Recycled content legislation**: Legislation that mandates a minimum recycled content in "new" beverage containers is already in place in the EU and has been proposed by the Canadian federal government, but this is far from common globally. Indeed, countries such as Thailand and India continue to *ban* the use of recycled materials in food packaging, rather than encourage it. Other countries in the region such as Vietnam, Myanmar, Laos, and Cambodia lack clear standards for the quality of recycled PET that is permissible for food applications.[42] Japan has been the regional leader in setting clear guidelines to encourage recycled PET usage in food applications (box 3). Regional alignment in this space could both encourage r-PET uptake and open up regional r-PET export opportunities.
- **Deposit return systems:** End users initially pay a small additional fee when they purchase a product that is returned to them when they deliver the packaging to a designated end point. This incentivizes the end user to contribute to collection or—where this does not happen—a local entrepreneur to step in and claim the deposit, making this approach highly compatible with informal collection systems (box 7).
- **EPR schemes:** EPR can contribute enormously to circularity by creating income for collection or other infrastructure. Under an EPR program, designated producers of a category of products, such as beverages, are legally obligated by governments to manage, fund, and operate systems to ensure the proper end-of-life disposal of the products they put on the market. Obligated producers commonly organize themselves into special purpose not-for-profit bodies called producer responsibility organizations (PROs) to collectively fulfil their obligations. The costs of running the EPR program are borne by the producers based on the number of units they put on the market with offsetting revenue coming from the sale of material to recyclers. Governments must play a role in ensuring that all designated producers are equally obligated in the system and that there are clear obligations for collection and recycling, as well as targets, performance metrics, and reporting. The informal waste collectors should be granted equal access to bid for collection contracts under EPR systems, to avoid them being frozen out of a newly attractive business.

The benefits of EPR programs extend well beyond collection, as they provide both financial and operational incentives for producers to make the products and packaging they put on the market as easy to collect and recycle as possible (to reduce overall system costs and improve the marketability of the recovered plastic resins).

Other things that can be done specifically to target and support informal collection systems include:

- **Ensuring the financial viability of informal sector employment**: As incomes rise, particularly in fast-growing Asian cities, it becomes ever more challenging for informal sector workers to cover the cost of living.[43] Overall increases in the price of collected materials are important but do not necessarily feed their way through to waste collectors. Ensuring greater transparency in the prices paid by aggregators/recyclers and setting ground rules for fair price negotiations between individual collectors and aggregators/recyclers can help here. Providing support to help informal sector collectors come together in cooperative ventures can also increase the efficiency of the system as well as the bargaining power of the collectors.
- **Increasing non-wage benefits:** Though they operate in hazardous environments, informal collectors typically have no wage security and little access to healthcare or protective equipment. Identifying creative ways to address this issue, for example by organizing cooperatives, could significantly improve the attractiveness of working in informal systems.

- **Empowering individual collectors:** Ensuring that collectors can access equipment such as balers and high-quality plastic washers can also increase their status and economic returns. The challenge here is that initial costs are usually well out of the reach of collectors who may have limited interactions with formal financing systems. Impact investors and civil society groups that can interact more closely with individual collectors and small-scale enterprises can play a large role here.
- **Raising the social status of collection work:** The work of informal collectors should be viewed as a crucial part of any community's effort to manage their local environment. Governments can lend their voice to this effort, emphasizing the contribution that informal collectors make to both waste reduction and climate goals.

> "We also have to re-engineer how to create leaders at the local level. We need, for example, waste pickers at the other end of the spectrum not to be thought of as marginalized folks that are playing a non-important role in society and communities, but [to] be elevated to really being leaders that are tackling this challenge and are really being the people that are bringing circularity to life within your own community, helping to clean up communities, helping to solve this issue where the rubber meets the road. Leadership opportunities [are] from top to bottom in this issue."
>
> *–Douglas McCauley*

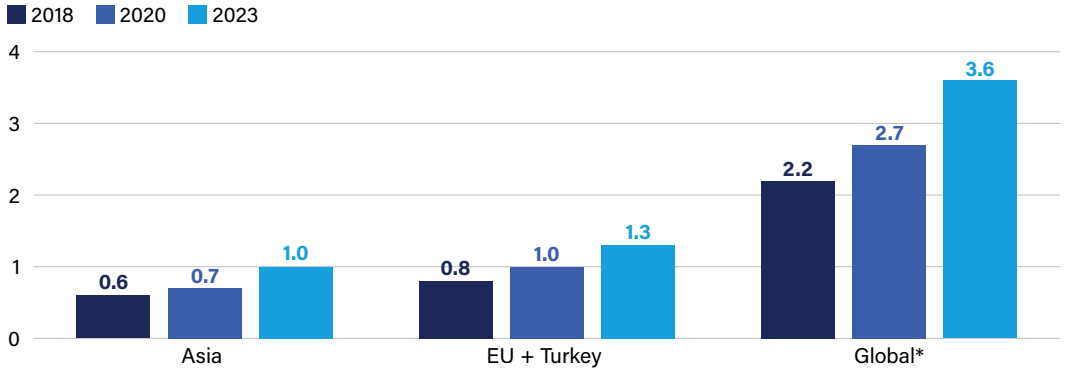
The final piece in the collection puzzle is pre-collection sorting, especially where formal systems are in place. Consumer incentives and educational campaigns for better sorting can improve the quality and value of recycled plastics. Sophisticated artificial intelligence-based sorting technologies provide possibilities, but the most direct way to improve the efficiency of recycling operations remains better pre-sorting by consumers. This in turn requires information campaigns, better labeling and, ideally, greater streamlining of plastic types.

Recycling capacity

About 250 million metric tons of plastic waste (in general) are generated each year, of which only about 14% gets recycled. Recycling rates vary by application and polymer, ranging from less than 5% in PVC and PP applications to over 50% today for PET bottles. Increasing the production capacity for recycled plastics in Asia is where the greatest investment needs are, particularly food-grade r-PET given the technical possibilities of r-PET and the need to move away from hard-to-recycle plastics. Today, r-PET accounts for just 10% of global PET but, over the next two years, with environmental awareness and circularity increasing, demand is expected to grow at up to three times the rate of that for virgin PET (Figure 9).[44]

Figure 9: Short-term r-PET demand growth in Asia, Europe

r-PET demand, million metric tonnes



*CAGR of 10.6% for global r-PET demand to 2023
Source: Indorama Ventures, Eurasia Group

As of 2020, there was capacity for less than 30,000 tonnes per year of food-grade r-PET production across the whole of Southeast Asia—a sum equal to just 0.01% of global plastics production.[45] While other Asian countries have higher r-PET capacity—Taiwan (75,000 tonnes) and Japan (90,000 tonnes)—the numbers are low across the region and suggest that significant investment is required if Asia is to lead on plastics circularity. Several major recycling projects have been launched recently, but the investment gap remains large. While expanding recycling infrastructure and investment for the most easily recyclable polymers should be the major priority for policymakers, it will also be important to maintain research efforts that seek to make currently hard-to-recycle plastics more recyclable. These technologies will be important for efforts to fully close plastics loops in the future.

Decarbonization

Given the need to move to global net zero GHGs, the GHG intensity of the production process itself must be addressed regardless of the recycled content or feedstock composition. As stated earlier, under traditional processes, production normally accounts for approximately half of the total fossil fuel demand in every unit of plastics.[46] Virgin plastics production requires high-intensity fuels, limiting the scope to readily substitute low-carbon alternatives. For industrial processes, green hydrogen attracts the most investor attention, although biomass and biogas applications also have some potential. Rather than substituting the energy source, there is also the option to capture GHGs at the point of emission using carbon capture and storage (CCS) systems, though the large-scale deployment of CCS technologies is lagging.

As recycling rates increase, so will the attention paid to the GHG profile of recycling processes themselves. Presently, the lowest GHG recycling approaches are mechanical (traditional bottle-to-bottle) recycling for PET and chemical recycling that does not require cracking processes. All processes still require energy so will be subject to scrutiny in a net-zero world. It will therefore remain important to continue to push for new opportunities in this space. For example, a new approach to mechanical recycling called FtoP Direct Recycle Technology that was developed by Suntory Group and its partners reduces the number of steps in the process and holds the promise of reducing GHGs by 60% or more compared to using petroleum based materials and 25% compared to other recycling processes.[47] It is also possible to run PET mechanical recycling plants on solar energy, as is the case for Indorama's Nakhon Pathom r-PET facility.[48] Now is certainly the time to make sure that any new facilities operate along the far reaches of the efficiency curve and are equipped to use non-fossil fuel energy sources.

Section 3.3: Overcoming the challenges to circularity in Asia

Whether at a national or a regional level, the pathway toward circularity is neither straight nor simple. Achieving meaningfully higher levels of recycling, alongside identifying the scope for significant reductions in overall plastic packaging use (where this makes sense, socially and environmentally) requires a combination of policy support, determined corporate effort, changes in consumer behavior and expectations, and much higher investment. But the prize could be an environment with less waste, fewer GHGs, and a more just society.

In this section we briefly detail some of the key challenges facing a circular plastic packaging system in Asia and offer some suggestions as to how these might be overcome.

Everyone must play their part

Circularity involves everyone, which of course increases the complexity. Drawing on the sections above, table 4 highlights priority actions by stakeholder type (with bolded items being particularly urgent). Importantly, no country is starting from scratch in this space but, equally, no country or region of the world has fully cracked the challenge of circularity. At the time of writing, the EU is leading a number of circularity initiatives. The extent of these underlines the multi-faceted nature of the challenge (box 8).

Table 4: actionable steps to circularity

Stakeholder	Positive impact of plastics
Policymakers	▪ Put in place minimum recycled content legislation ▪ Increase social/economic protections for informal waste collectors and funding for formal waste collection ▪ Ensure regulatory approval for recycled plastics to meet same use cases as virgin plastics ▪ Establish reporting requirements for producers and recyclers to improve the transparency and bankability of external investments in circular infrastructure ▪ Support the establishment of plastics innovation hubs with mentorship, facilities, and patient capital ▪ Educate consumers about the importance of a shift to circularity
Industry associations	▪ Convene members and ensure shared approach to issues such as disclosure and EPR schemes ▪ Work with policymakers to improve collection coverage and recycled plastics markets, and ensure consistent recycled content legislation across the region ▪ Help secure industry appetite for offtake of recycled plastics
Individual producers/ retailers	▪ Reduce overall plastic usage in products and create incentives to reduce plastic packaging throughout supply chain ▪ Adopt internal decarbonization, recycled content, and ESG targets ▪ Participate in EPR schemes ▪ Report regularly on progress toward meeting these internal goals ▪ Educate consumers about the importance of a shift to circularity
NGOs/civil society	▪ Monitor progress on overall circularity and hold companies and governments to account ▪ Expose greenwashing and illicit activity including illegal waste shipments related to plastics disposal ▪ Spotlight the informal sector and facilitate local government interventions for informal sector protections ▪ Conduct research on long-term implications of plastic leakage into human and animal ecosystems ▪ Educate consumers about the importance of a shift to circularity
Investors	▪ Insist on ambitious climate goals and regular reporting ▪ Participate, where possible, in blended financing opportunities that bring together the private sector with development finance organizations and other concessionary funders ▪ Include waste management and recycling as important components of broader infrastructure investing ▪ Make longer-term investments in innovation hubs

Stakeholder	Positive impact of plastics
Development finance institutions	▪ Provide concessional finance and technical assistance to remove investment barriers for recycling infrastructure and technologies that facilitate the circular economy ▪ Encourage and convene governments to share experiences and create consistent policies ▪ Fund data collection and studies that help identify progress, gaps and pathways for a circular economy ▪ Make longer-term investments in innovation hubs
Consumers	▪ Participate in pre-collection sorting of plastics and other recyclables ▪ Participate in pilot programs for refill/reuse to establish the feasibility of such programs ▪ Reduce use of the most difficult-to-recycle plastics—films, bags, sachets, etcetera—and place pressure on companies to identify cost-effective alternatives
Regional organizations	▪ Emphasize the importance of finding solutions in the plastics arena and supporting a race to the top ▪ Place pressure on national governments to participate in regional framework agreements and ensure shared learning across members and regional consistency

Source: Eurasia Group

Box 8: Plastics in the EU

THE EU PLASTICS STRATEGY: In 2018, the EU adopted a strategy and timelines to address plastics pollution and marine litter and to accelerate the transition to a circular and resource-efficient plastics economy. The strategy focuses on a number of areas including:

- Global action on plastics: committing to work for a global agreement on plastics, to support the global shift toward a circular economy
- Microplastics: addressing the growing volume of microplastics through labeling, standardization, certification, and regulatory measures on unintentional release of microplastics
- Plastic bags: requiring member states to establish national reduction targets and/or economic instruments (for example, fees and taxes) and marketing restrictions that limit annual consumption of plastic bags
- Plastic waste shipments: restricting imports and exports of plastic waste and implementing the Basel Convention decision on restrictions on international transboundary shipments of plastic waste
- Single-use plastics: banning single-use plastics where sustainable alternatives are easily available and affordable; a directive on single-use plastics establishes obligations on waste management and clean-up obligations for producers (including EPR schemes)
- Bio-based, biodegradable, and compostable plastics: by addressing the sourcing, labeling and use of bio-based plastics, and the use of biodegradable and compostable plastics

The ten items being addressed by the directive are: cotton bud sticks, cutlery, plates, straws and stirrers, balloons and sticks for balloons, food containers, cups for beverages, beverage containers, cigarette butts, plastic bags, packets and wrappers, wet wipes, and sanitary items.

Trust is key

Circularity leaves no room for either corporate greenwashing or unscrupulous actors (in what can be an opaque global waste management value chain).[49] Consumers can easily lose trust in the plastics system in response to stories about illegal dumping, the non-recycling of collected waste, or false claims by companies about either the source or disposal options for their products. If they do, they may be less willing to support necessary changes in their own purchasing and disposal practices and less willing to support new regulation from governments.

On the corporate side, climate reporting frameworks such as the Taskforce on Climate-related Financial Disclosures and commitments on renewable energy use (for example, through Climate Action 100+) have been successful in translating public statements into concrete action. As plastics producers and users move toward circular business models, standardization of the reporting metrics most important to circularity would be beneficial so things like recycled content levels, plastics recovery rates, and GHG emissions of plastics production can be tracked over time.

At the consumer end of the spectrum, new metrics and protocols can help establish the criteria for what can be justifiably labeled "green" and reduce the chance of corporate greenwashing. Initiatives such as the new Eco-Beauty Score Consortium in the cosmetics space are leading the way here. This consortium will require participating firms to use a common, science-based methodology and to disclose environmental impact information relating to product formula, product use, and packaging (the methodology for calculating the environmental impacts of products will be based in the European Union's Product Environmental Footprint principles). The emphasis is on clarity and ease of comprehension.

Another area in which reporting could add value is in "chain-of-custody." This would make it easier to determine the actual disposition of collected materials and, specifically, to what uses they are put. We will not achieve circularity unless we can be assured that recycling and reuse claims are trustworthy.

The cost of circularity

With the right policy measures in place—for example, recycled content regulation, a price on carbon emissions, and EPR—incentives will exist to use less plastic packaging in the first place, to switch to recyclable alternatives wherever possible, to recycle as much as possible, and to decarbonize the plastic supply chain. The benefit of policy is that it can level the playing field for producers and users of plastics, rather than relying on voluntary actions that could threaten problematic changes in the price of different companies' products.

In general, although there will be cost implications to developing a circular economy, the end cost likely to accrue to consumers is minimal because of the very small weight of plastic in each packaging product. An estimate by Systemiq for the Energy Transitions Commission suggests that while decarbonizing the plastics supply chain would add a cost of $500 to a tonne of ethylene, the price impact on an individual plastic bottle would be just 1 cent. A 2021 study by S&P Global Platts Analytics predicted that higher grades of rPET will cost about $150 per tonne more than virgin PET in the medium term, or about 10% of the current price of virgin PET in Europe.[50]

Alongside efforts to keep cost increases as low as possible, broad partnerships with wide burden sharing likely provide the best solutions in this space (please see the example of the Japanese PET collection system in box 4).

The investment gap

On the investment side, significant, but not insurmountable amounts of capital are needed to decarbonize the plastics supply chain. Problems can arise throughout the plastics innovation system and value chain. At the bottom end (in terms of scale), it can be prohibitively expensive to invest in the small-scale and informal collection and recycling operations that are typical in Asia, but which fail to meet the size or due diligence criteria of outside investors. For example, many small-scale aggregators or processors in South or Southeast Asia require financing of between $2 million–$10 million, but even these levels of investment can be difficult to obtain.[51] Also at the smaller end of the scale, there are significant challenges with ensuring that adequate financing is available to innovators working on alternative packaging materials and processes. Testing innovations

takes many years and requires both lab space and support. Patient, non-dilutive capital is what is required; there may be growing opportunities to work with impact investors in this space.

When it comes to the most capital-intensive component of the circular plastics system, a mechanical recycling plant in Asia typically costs between $5 million–$20 million, while chemical recycling facilities cost between $50 million–$100 million. Many Asian countries will struggle to fund investments such as large recycling facilities domestically and may need to look to development finance institutions for support. These entities are partnering with banks to provide solutions, including the new partnership between HSBC and Temasek to invest $150 million in sustainable infrastructure projects.[52] The platform includes technical assistance from Asian Development Bank and Clifford Capital Holdings and will include blended finance that enables funding toward projects that are not fully commercially bankable.

The "blue loan" that the International Finance Corporation provided to Indorama Ventures is an excellent example. The $300 million loan focused specifically on reducing ocean plastic waste. With this loan, signed in 2020, Indorama will expand its post-consumer PET recycling capacity, primarily in Indorama's facilities in Thailand, Indonesia, the Philippines, and India. Some of the financing will also be used to expand renewable energy uptake and energy efficiency improvements in Indorama's plastics facilities.

Increasing investments in plastics recycling would benefit from bringing these investments more clearly under the umbrella of infrastructure investment itself. That would both serve the goal of coordination but also potentially attract finance from traditional infrastructure investors who have not previously considered plastics recycling to be a relevant asset class. This will require investors to come up the learning curve and get more comfortable with recycling infrastructure investments. Companies such as Circulate Capital are acting as anchor investors and building capacity to facilitate this.

Another challenge to assuring the "bankability" of projects relates to the difficulty of securing a supply of high-quality feedstock for recycling—owing to fragmented collection systems and poor transport infrastructure as well as, in some cases, the unwillingness of recyclers to pay adequate prices for their inputs—and of finding firm offtake agreements for recycled products. This problem is exacerbated by fluctuating market prices for plastics (including r-PET) and other recycled alternatives. Again, policy that mandates either recycled content or EPR can help overcome such issues by extending markets and injecting money into the system.

> "There haven't been many private sector investments in plastics waste management infrastructure [in Asia] because of a lack of bankability and other challenges."
>
> *–Navneet Chadha, regional lead circular economy, International Finance Corporation*

Promising developments in the financing space include a recent initiative from the Asian Development Bank, which in September issued its first ever dual-tranche blue bonds to finance ocean-related projects, including those that will stem the flow of plastics to the ocean, in Asia and the Pacific.[53] The two primary funders of this bond issuance were both major Japanese insurers. On the private finance side, many of the investors in Circulate Capital's most recent fund have been large corporates interested in the potential for plastics recycling projects to yield positive climate outcomes, including the possibility of claiming credit for avoided GHG emissions. Expanding this opportunity could encourage more investments in recycling.

Entrenched interests and the need for leadership

In most cases in which significant change is required, there are entrenched interests whose first instinct is to resist. For this reason, some have expressed concerns that the global oil industry will pivot strongly toward plastics once fossil energy demand begins to recede.[54] It would be foolish to dismiss such worries altogether, but the one advantage in the plastics space is that all players are broadly on the same side—at least on waste. From plastics manufacturers to end users, nobody wants to see plastic waste in the environment.

Broad national action aligned with regional cooperation and international declarations of intent can help change the overall direction of travel, as is now the case with GHGs and has previously been the case with ozone depleting substances. Identified "win-win" opportunities around employment and social justice are also critical to creating a positive environment for change, as is continued technical innovation in the recycling and new materials space.

In conclusion

We have a long way to travel, but at the end of 2021, the world looks quite different to how it looked a decade ago (or even two years ago). Momentum is headed in the right direction, and the necessary steps toward circularity are increasingly apparent. Most critical now is effective leadership. Given the plethora of stakeholders involved in Asia, identifying—or creating—the most effective collaborative body to lead the charge at both a national and a regional level is an immediate priority. As we have outlined, the challenges to effective circularity are many, but the benefits associated with clear leadership by individual corporations, countries, and even regional bodies in sustainable plastics will outweigh these challenges as we move toward a net-zero world.

> "I think especially during lockdown, we've seen a lot of intersections when it comes to sustainability, environmental justice, and climate change and being able to kind of connect them all with a web has shown us that we're all in this together and there is no one solution to this issue, but that we all have to tackle these issues from all different sides and different angles."
>
> *–Hannah Testa*

Chapter 3: Key takeaways

- **Circularity provides the best path forward** for preserving the benefits of plastics while minimizing the environmental and social challenges.
- Circularity is anchored by two pillars: overall reductions in per capita demand for plastics (decoupling rising levels of population and standards of living from growth in the use of plastics) so that nascent collection and recycling facilities are not overwhelmed; and increased recyclability and actual rates of recycling of those plastics that we do use. It will be important to establish baselines, timelines, and definitions of scope in both these areas and to report regularly on achievements.
- To achieve circularity, we need to see changes throughout the plastics ecosystem and require the active participation of all stakeholders in the plastics value chain.
- **National governments and regional frameworks are important** to ensure that programs such as EPR are instituted in an equitable manner and are followed-up on through consistent disclosures and reporting.

- To increase circularity in Asia, **attention must be paid to economic incentives and the allocation of responsibility for recycling**—for example, through EPR—as well as the provision of support for and investment in *both* the formal and the informal collection systems.
- **New investment in Asian recycling infrastructure will be important.** Increasing financial flows will require that traditional infrastructure investors become more familiar with investing in waste and recycling technologies. It will also require that impact investors and development finance institutions find creative ways to make financing available for smaller-scale operations in the plastics value chain that are typically too small to qualify for standard development finance and for innovation hubs.
- **Technical innovation is an important component of circularity** that will help define the "shape" and priorities for circularity going forward.
- While there are certainly significant obstacles to achieving a circular plastics economy, there is new momentum and broad agreement that a real alternative must be found to the current linear plastics economy. **Identifying—or creating—the most effective collaborative body to lead the charge at both the national-level for Asian countries and at an Asian regional level is an immediate priority.** Such organizations can draw on the support and resources of well-established initiatives from the corporate and not-for-profit sectors, such as the new Plastics Economy Initiative of the Ellen MacArthur Foundation.

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