Verisk Maplecroft

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Waste Generation and Recycling Indices 2019

Overview and findings

Changing the perspective on risk

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Contents

Analysis

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Overview

The Waste Generation Index and Recycling Index are two 2019 additions to the Verisk Maplecroft Environment Dataset, which now consists of 52 indices capturing key risks relating to climate change, environment and natural hazards. This dataset forms part of the wider portfolio of global risk indices offered by Verisk Maplecroft, which spans 150+ political, human rights, economic and environmental risk issues.

Waste Generation Index

Definition of the Index

The Waste Generation Index (WGI) provides a quantitative assessment of the rate of waste production by country, considering a selection of key waste types including municipal solid waste (MSW), hazardous waste, food waste and plastic waste. Elevated rates of waste generation occur in countries with high levels of consumption. This combination can be unsustainable and leave companies operating in these locations to face reputational, physical and regulatory risks.

Definition of the Issue

Population, urbanisation and economic growth, in addition to increasingly unsustainable consumer behaviour, have caused rates of waste generation to rise exponentially in recent decades. These patterns of production and consumption have led rates of waste generation to become a high priority concern for both human health and preservation of the natural environment. Since a variety of business activities are either directly responsible for or indirect drivers of solid waste generation, there is a likelihood that risks can be transferred to companies in these operating environments.

As economic growth continues, waste flows have diversified with new waste types presenting distinct challenges. Materials like plastic polymers are particularly alarming as environmental pollutants considering their durability, long residence times and tendency to interact with marine trophic systems upon reaching the oceans. Food waste is of concern as this highlights the inequity of the global food system, with a total of one third of produced food being lost or wasted, disproportionately in high income countries. Hazardous waste with properties that are toxic to biological organisms present significant threats to human health, biodiversity and the provision of ecosystem services.

In addition to better understanding risk exposure, the index can help highlight where opportunities exist for companies to start developing action plans to mitigate risks associated with waste generation, or address problems with specific waste types that might be central to their business.

Implications for business

High rates of solid waste generation impose pressure on public waste management systems, increasing the likelihood that waste is not disposed of responsibly. This presents potential health and safety risks to residents, damage to ecosystem services, and management challenges for local and national governments.

Consumers and NGOs are increasingly aware and vocal on issues such as waste generation, plastic pollution, overproduction and resource consumption. Companies are often linked to these issues either directly through their operations and supply chains, or indirectly through the consumption of their products. Reputational damage can arise when companies are deemed to be a key driver of high rates of waste generation and thus partly responsible for any subsequent impacts to human health and the environment.

In countries where waste is produced at high rates new or more stringent regulations have a greater likelihood of being established to reduce the levels of resource consumption. If this occurs, regulatory risks would present additional costs to businesses, especially in industries considered to be primary drivers of the issue.

Physical risks can arise from elevated rates of waste generation when damages occur to the environment, causing issues such as resource constraints. An example of this is plastic pollution impacting marine ecosystems and subsequently disrupting fishing or tourism industries.

Recycling Index

Definition of the Index

The Recycling Index assesses a country's willingness and ability to manage solid waste in a manner which promotes circular material flows. This index identifies countries where the inability to recover and recycle solid waste is likely to result in risks to businesses. These risks are quantified by considering the proportion of a given country's solid waste that is collected, adequately managed and recycled, in addition to the level of governmental commitment measured through compliance with international waste-related treaties.

Definition of the Issue

The management of solid waste is one of the largest and fastest growing sustainability challenges emerging alongside global development. Economic and population growth, urbanisation, globalisation and industrialisation have caused rates of waste generation to accelerate in recent decades. However, the mechanisms that societies have put in place to properly manage and dispose of solid waste have not grown or evolved in tandem.

On a global scale, it is widely recognised that an urgent transition is needed towards circular material flows or a 'closed loop' system, where raw material extraction and waste generation are minimised, and resource use efficiency is maximised. In this system, concepts like long-lasting design, repair, reuse and recycling help to achieve this narrowing of material flows. This contrasts with the existing model of production and consumption where goods and products are used and disposed of in a predominantly linear fashion.

With populations projected to continue growing and becoming increasingly concentrated in urban agglomerations, it is critical that governments improve waste management systems and tailor them towards society's need for a 'closed loop' system. Waste streams in modern economies have also diversified greatly, generating larger quantities of problematic pollutants. Some of these specific waste streams, like plastic for example, can be reintegrated into the economy at what is currently the end-of-life stage of the life cycle.

Implications for business

In economies where a large proportion of solid waste is mismanaged rather than recycled, waste is likely to end up in environmental reservoirs or sinks where it presents significant threats to the provision of ecosystem services, biodiversity and human health. Businesses with a direct presence or an indirect association with these locations can face significant reputational risks as a result. Responsible consumers increasingly express a preference for goods and services from socially responsible companies, and hence negative brand reputation related to a lack of recycling can impact consumer perceptions and compromise revenues.

Companies can also face operational risks when operating in locations with a weak propensity for recycling, as this can increase the overall costs of managing and handling waste, particularly if facing landfill taxes. Similarly, legal risks can also be presented to companies that do not meet their waste management obligations, depending on the products or services. Certain industries have a legal obligation for responsible disposal of waste. Failure to ensure compliance through measures such as recycling can result in fines, penalties or litigations.

Summary of findings

US tops list of countries fueling the mounting waste crisis

America's thirst for consumption is not matched by an appetite for recycling, reveals new a new index identifying the country is the world's top producer of waste and one of the worst of any industrialised nation for managing its trash.

In two new global risk indices, Verisk Maplecroft has measured the waste generation and recycling performance of 194 countries to uncover a global picture of how countries are dealing with the waste they produce at a time where the world is facing a mounting crisis, primarily driven by plastics.

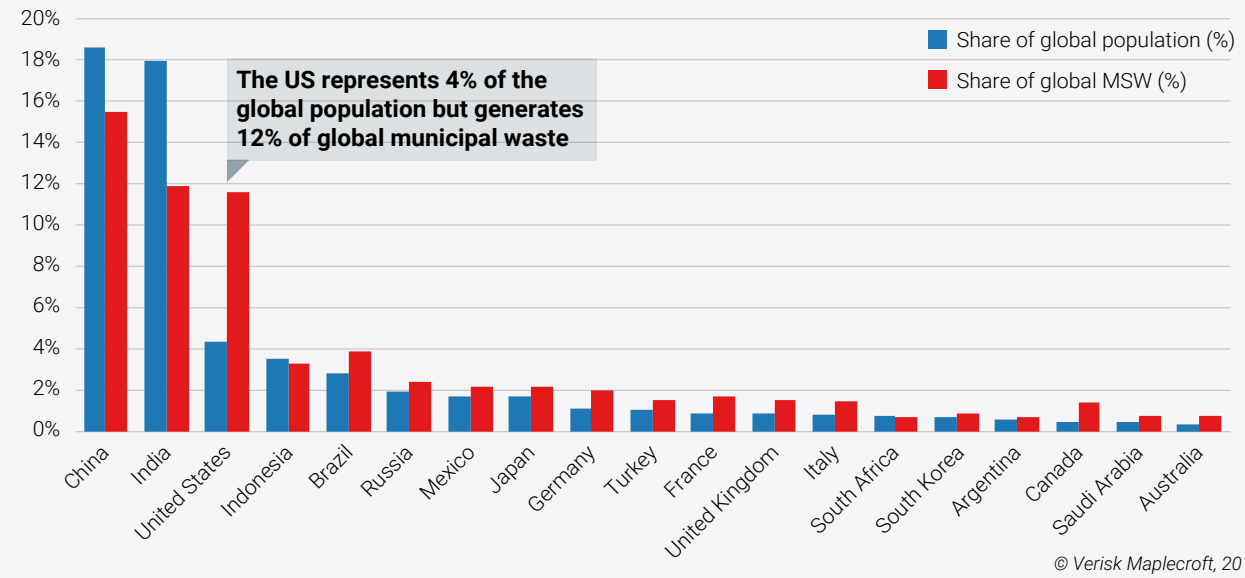
The research calculates that over 2.1 billion tonnes of municipal solid waste (MSW) are generated globally each year – enough to fill 822,000 Olympic-size swimming pools, which would stretch 41,000 kms if laid out end-to-end. However, only 16% (323 million tonnes) of this is recycled each year, while 46% (950 million tonnes) is disposed of unsustainably.

The gulf between what we produce and what we recycle is creating profound challenges for governments and populations. But it is the companies producing large volumes of waste that may find themselves footing the bill if they do not find sustainable solutions to drive a more circular economy.

US creates three times the global average of waste

Verisk Maplecroft's Waste Generation Index (WGI), which captures per capita rates of MSW, plastic, food and hazardous waste production, shows that US citizens and businesses are the largest contributors to the waste problem across the four indicators measured. At 773kg per head, the country generates 12% of global MSW, approximately 239 million tonnes, while only accounting for 4% of the world's population.

Figure 1: Share of global population and Municipal Solid Waste (MSW) for G20 countries



Source: Verisk Maplecroft, 2019

In contrast, China and India make up over 36% of the global population, but generate 27% of global municipal waste. American citizens produce over three times as much waste as their Chinese counterparts and 7 times more than the people of Ethiopia, the lowest risk country in the index.

The US is not alone though. Highly developed European and North American countries are disproportionately responsible for the highest levels of waste generation. The highest risk countries in the Waste Generation Index feature the US, the Netherlands, Canada, Austria, Switzerland, Germany, France and Australia.

The UK ranks 14th in the WGI, with its residents generating 482 kgs of household waste each per year.

US circling the circular economy

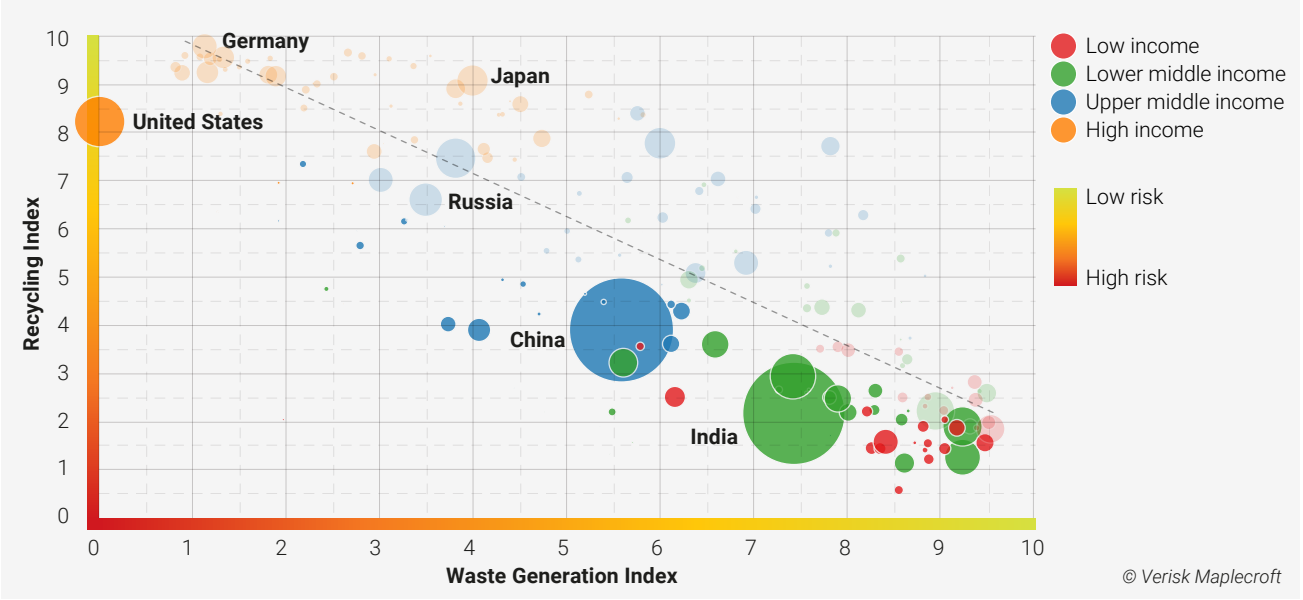
Given the US is the world's largest economy it may not be surprising that it is one of the largest producers of household waste, but what is significant is its lack of commitment to offsetting its waste footprint.

Verisk Maplecroft's Recycling Index (REI) captures the willingness and ability of countries to manage solid waste and promote circular material flows by measuring national rates of recycling, collection and adequate disposal, as well as government's commitment to international treaties on waste.

The index shows that the US falls well behind all other industrialised nations. The country only recycles 35% of its MSW. In comparison, Germany, which has the world's most efficient record on waste management according to the REI, recycles 68% of MSW. Even in the best performing countries there is plenty of room for improvement though. Progress in the UK for instance has stalled for the best part of a decade. While it is the 7th best performing country in the REI globally, it still only has a recycling rate of 44%.

In Figure 2, it is evident that many developing economies do not have the resources to recycle efficiently, while the United States is shown as a laggard on the global stage.

Figure 2: The US lags behind other developed countries in recycling performance, despite having the highest levels of consumption globally



Source: Verisk Maplecroft, 2019

The US is the only developed nation whose waste generation outstrips its ability to recycle, underscoring a shortage of political will and investment in infrastructure. The country's seeming lack of resolve to deal with waste domestically may become a mounting problem in the face of plastics import bans from China and many developing countries, where the US currently exports a large proportion of its plastic waste.

China, Thailand, Vietnam and Malaysia have all banned, or are set to ban, imports of solid waste, including a host of plastics. Additionally, in May, almost all the world, with the notable exception of the US, agreed to restrict shipments of hard-to-recycle plastic waste to developing nations.

These emerging shifts in policy are going to make it all the harder for countries such as the US who are underperforming in relation to recycling.

The world is also witnessing rising number of international incidents between developing and developed nations over waste shipments. Most notably tensions have risen considerably between Canada and the Philippines' government, which has sent 69 shipping containers of waste back Vancouver after a diplomatic spat escalated over imports of trash.

Companies could be on the hook to join the circular economy or pay the price

"With the world's attention firmly fixed on the problem of waste, we expect governments to act, with businesses footing the bill," says Niall Smith, Senior Environmental Analyst at Verisk Maplecroft. "Beyond the potential financial impacts, the reputational risks for business are high if they ignore intensifying interest in the issue from consumers and investors."

Using data from its suite of waste indices, Verisk Maplecroft identifies the Netherlands, the US and the UK as the most likely countries to pass new regulations on plastic materials that could hit companies in the pocket. But, France, Canada, Australia and Belgium are also flagged as jurisdictions to watch.

"It's going to be vital for companies to get ahead of these issues," adds Smith. "Investing in circular economy measures can not only mitigate risk but can open up new markets and improve brand reputation."

Analyses

Analysis 1: A global snapshot of waste issues

The global garbage glut

The rate at which society extracts raw materials from finite resources to produce goods has had to increase exponentially to satisfy the demand from rising populations. Furthermore, the rate of raw material extraction per capita has also risen, as consumers have steadily grown to demand larger amounts of products. Waste streams have diversified over this period too, introducing previously unheard-of categories like plastics and e-waste. The result is a society which produces more waste overall, more waste per person, and a wider variety of waste types.

Transitioning to a more resource efficient economy will not come entirely from command and control legislation. Both consumer behaviour and actions from the private sector will play pivotal roles in facilitating this transition. More than ever, companies need to understand their exposure to waste issues, and put the necessary protocols in place to align their operations with the circular economy.

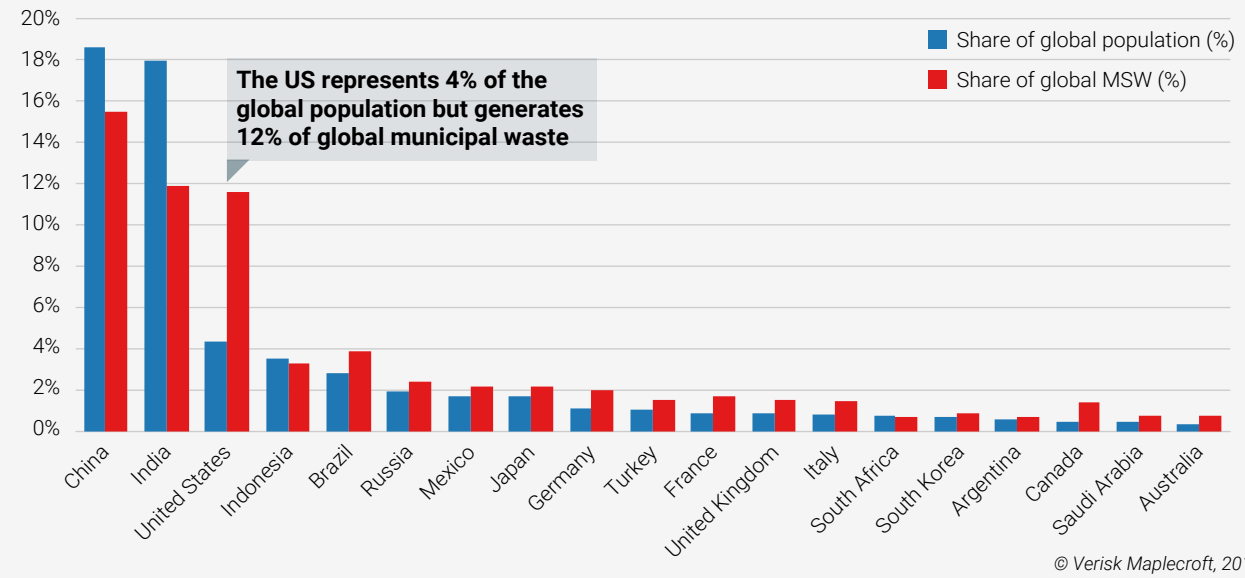
Who's generating all the junk?

A snapshot of the current global dynamic is made possible using the Verisk Maplecroft Waste Generation Index, which measures the rates of waste production by country, looking at several key waste streams. Europe and North America dominate the list of highest risk countries in the index. While these countries have reaped the benefits of being ahead of the curve in terms of economic development, their rates of waste generation have soared as a result.

The United States is an exceptional case. It is the most extreme risk country overall and ranked in the top 10 highest risk countries in all four of the indicators which capture municipal waste, plastic waste, food waste and hazardous waste. Municipal waste generation per capita is four times higher in the United States than in India - a striking difference.

In the chart below, G20 countries are ranked by their share of global population (blue bars). The countries' respective share of global municipal waste is shown by the yellow bars. While China and India together comprise over 36% of the global population, they together generate 27% of global municipal waste. The United States, on the other hand, comprises 4% of the population yet generates 12% of municipal waste.

Figure 1: Share of global population and Municipal Solid Waste (MSW) for G20 countries

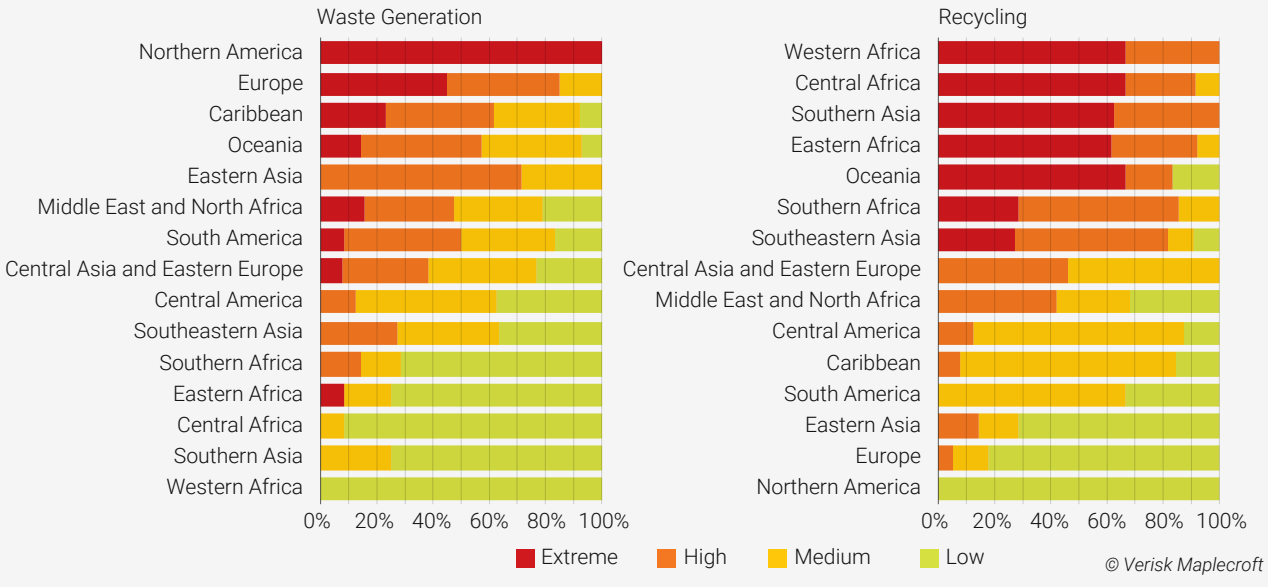


Source: Verisk Maplecroft, 2019

Countries moving to 'close the loop'

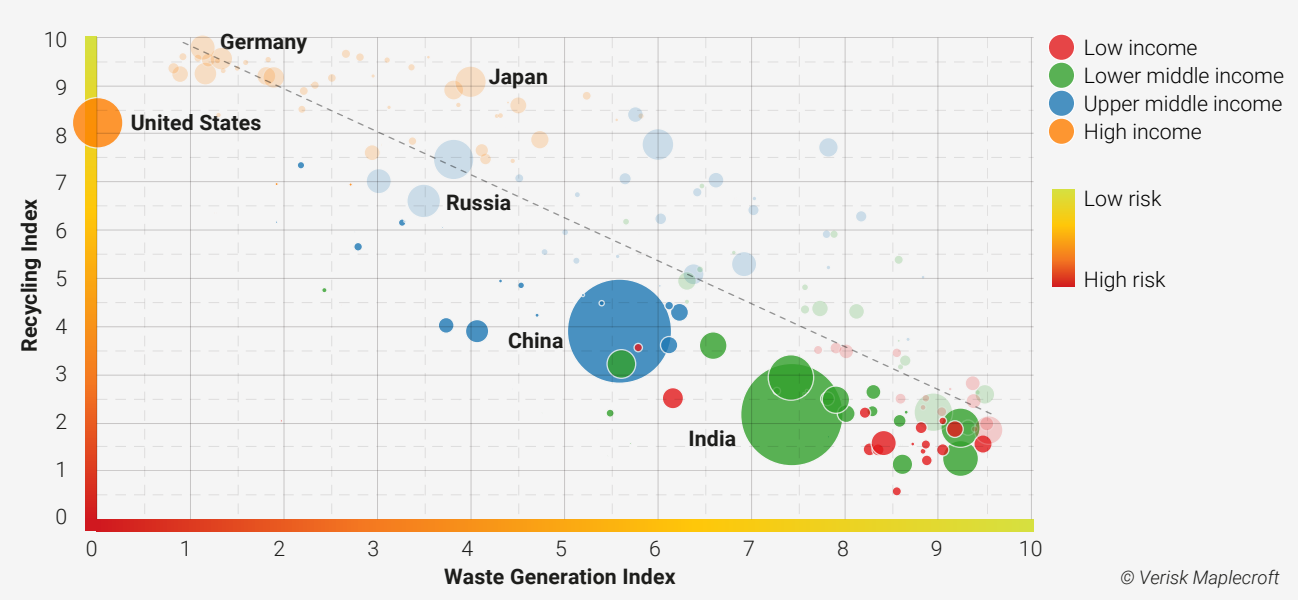
Transitioning from a linear to a circular economy can help avoid ecological catastrophe and maintain a healthy living environment. A circular economy is one that minimises resource extraction and material inputs and maximises efficiency, through regenerative design, recollection and recycling. Clearly, not all countries are moving at the same pace to achieve this. The Verisk Maplecroft Recycling Index was launched to quantify the performance of countries at managing solid waste in a manner which maximises resource efficiency and minimises waste.

Figure 2: Proportion of countries per risk category



Source: Verisk Maplecroft, 2019

Figure 3: The US lags behind other developed countries in recycling performance, despite having the highest levels of consumption globally



Source: Verisk Maplecroft, 2019

The global pattern under this index is diametrically opposite to that of Waste Generation, with developed countries exhibiting low risk profiles and low-income countries mostly rated as high or extreme risk. Eight of the 10 lowest risk countries are in Europe, with Singapore and Australia also featured. Germany tops the ranking with exceptionally high levels of waste collection, recycling, compliance with international treaties and a low proportion of waste mismanaged.

Developing countries in Africa and Asia perform poorly in the index. These countries are experiencing higher rates of population growth and urbanisation. Waste generation is increasing in these locations as a result, underlining the importance of improving waste management systems which enhance reuse and recovery.

Mind the gap

Considering how strongly countries perform in the Recycling Index relative to their rates of waste generation helps to determine laggards who generate disproportionately high volumes of waste without recycling performance to match.

Figure 4 demonstrates the strong negative relationship between the two indices, which broadly aligns with global patterns of economic development. Many developed countries sit in the upper left quadrant, with both high volumes of waste generation and strong performance in recycling. The vertical distance below the trend line indicates how much a country's recycling performance is lacking, relative to its level of waste generation.

Once again, the United States emerges as an underperformer on the global stage. While several other major economies possess a strong negative intercept, the US is the only one of which that is in the high income group.

The Philippines, Malaysia and Thailand are three Southeast Asian countries who also fall well below the mark. China and India have less pronounced recycling 'shortfalls', but the sheer size of their respective populations make this highly concerning.

Analysis 2: Where to send the world's waste?

Wasting away

Throwing something out kicks off a complicated, global process. Many waste streams, including plastic, are difficult to deal with because the necessary infrastructure is not in place. And, even if the object can be recycled, there may not be a market for the treated material. Material that cannot be sold or treated is either landfilled or sent abroad.

But as long as China was willing to buy these exports, Western nations had no incentive to invest in their own treatment facilities.

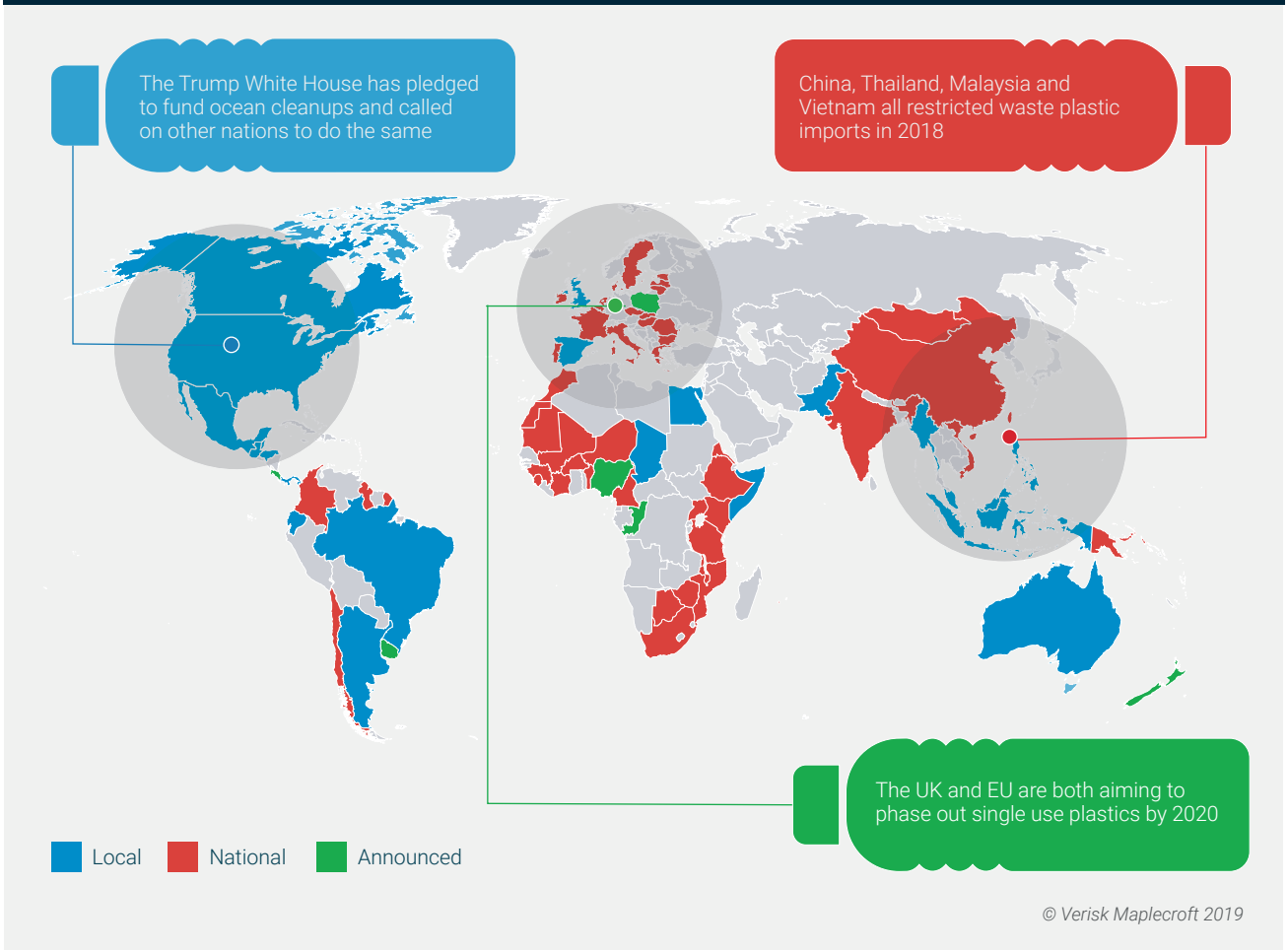
So, when China banned imports of 24 varieties of solid waste on January 1 2018, including a host of plastics, global waste flows were overturned. Another 16 categories were prohibited from the end of the year and another 16 will be from the end of 2019.

Banning so-called 'foreign garbage' aligns with Xi Jinping's 'Beautiful China 2035' policy amid a broader push towards a greener economy, but by 2030 will create an 111-million tonne mountain of waste that will need to be treated – much of it plastic.

Other waste importing countries have also moved to limit the material they accept, ban it outright, or return it. Thailand is set to ban foreign plastic waste from 2021, Vietnam is due to follow in 2025, and Malaysia is weighing up longer term options after issuing a temporary halt to imports in 2018. This year, the Philippines came close to causing an international incident by pressuring Canada to repatriate waste falsely labeled as plastic scrap. It was no surprise when, in May, almost all the world's nations, with the US a notable exception, signed an amendment to the Basel convention that would restrict shipments of hard to recycle plastic waste to developing nations.

Meanwhile, companies face growing domestic pressure to deal with waste, notably plastic: more than 60 countries and a host of regions are introducing – or have already brought in – legislation aimed at reducing the use of plastic bags and other single use plastic materials (see Figure 4).

Figure 4: Single use plastics



Source: Verisk Maplecroft, 2019

A global problem

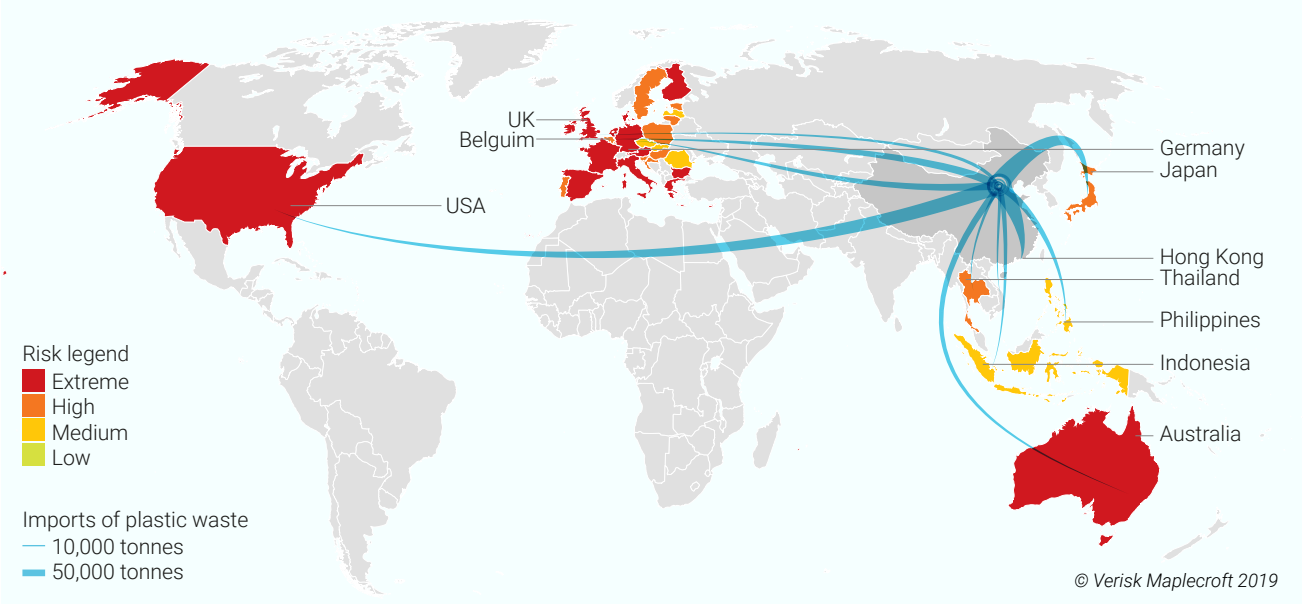
Companies' responsibility for their waste does not end when it is collected. Pushing materials overseas where they may not be disposed of properly, heightens the risk that companies will see branded bottles washing up on pristine beaches. Plastics are the most high-profile source of reputational risk related to waste, given consumers, politicians and investors are all highly engaged in the global marine pollution problem. But interest in other streams is growing, which means companies need a solution to avoid brand damage and regulatory action.

Using the Waste Generation Index (WGI) we can see that those countries exporting large quantities of waste are also producing large volumes. Following China's ban, major waste exporters like the EU, US and Australia (see Figure 5) will not be able to manage much of the plastic waste they generate domestically without concerted investment in treatment infrastructure.

Upgrading infrastructure comes at a high cost to governments and in many developed nations responsibility has been passed to the private sector. So, companies, or groups of companies, could have to finance their own disposal facilities and processes.

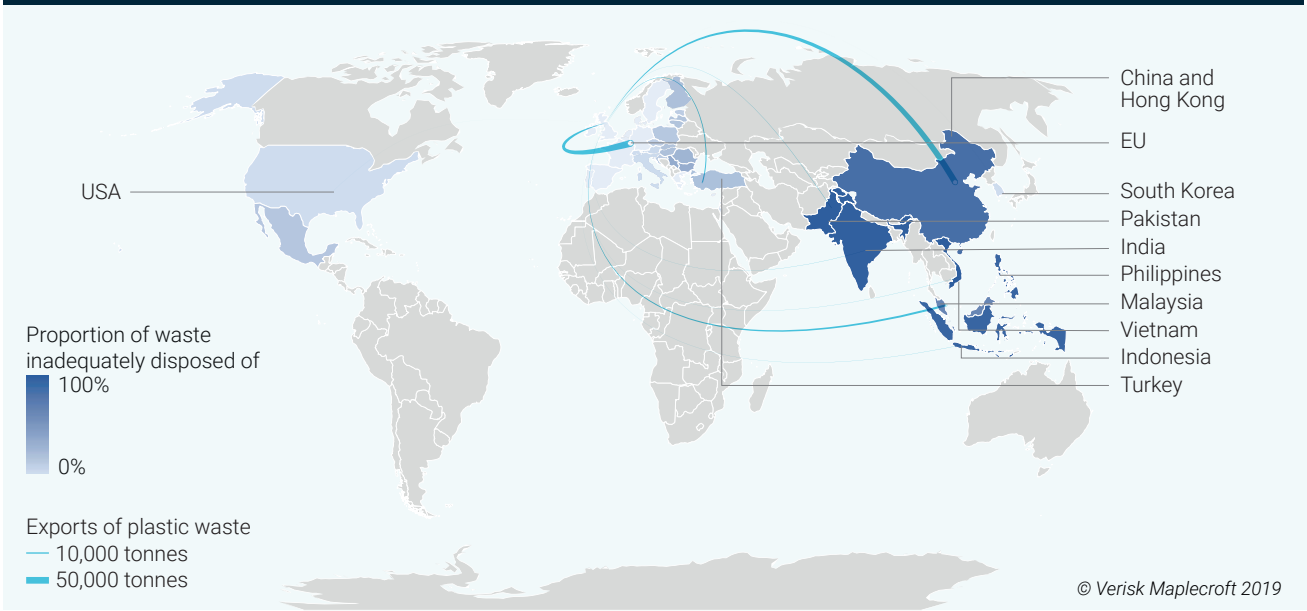
In nations where infrastructure is already struggling to cope with waste management pressure, finding new destinations for waste will be paramount. But taking the UK plastic waste exports as an example, large swathes are already going to countries set to introduce import bans.

Figure 5: Source of waste imported to China



Source: UN, 2019; Verisk Maplecroft

Figure 6: UK waste exports

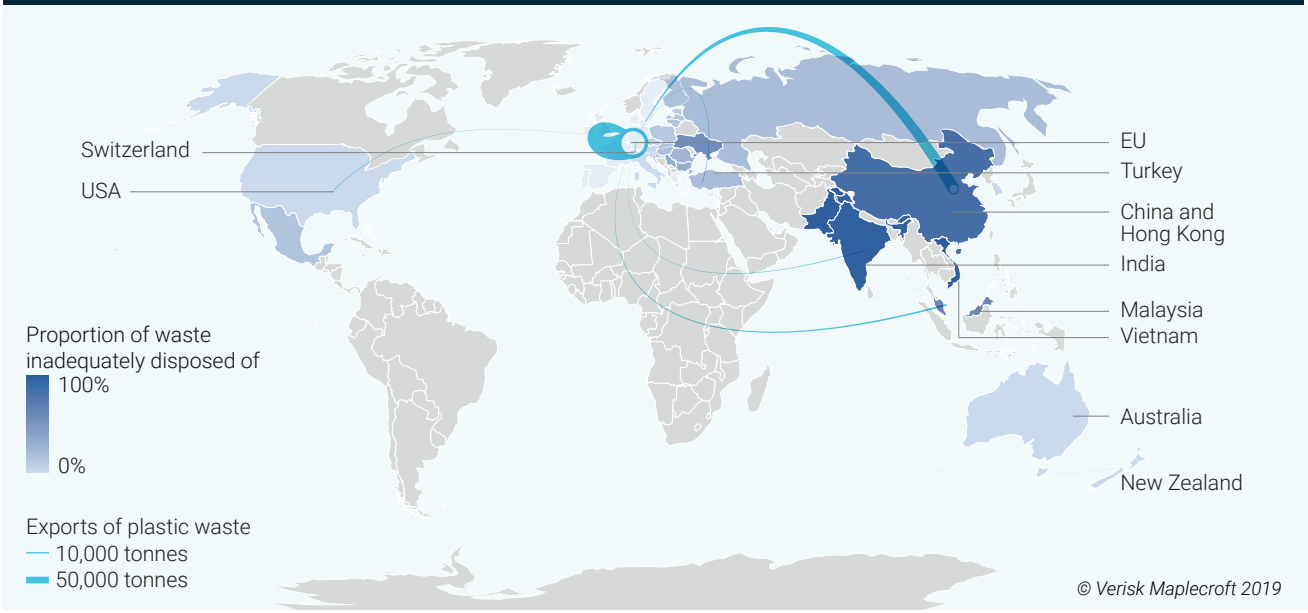


Source: UN, 2019; Verisk Maplecroft

Figure 6, pairing the top 10 export recipients and using data from our Recycling Index, shows that other plastic waste export flows are going to countries where large amounts of waste are inadequately dealt with, increasingly the potential for mismanaged waste to become a reputational issue.

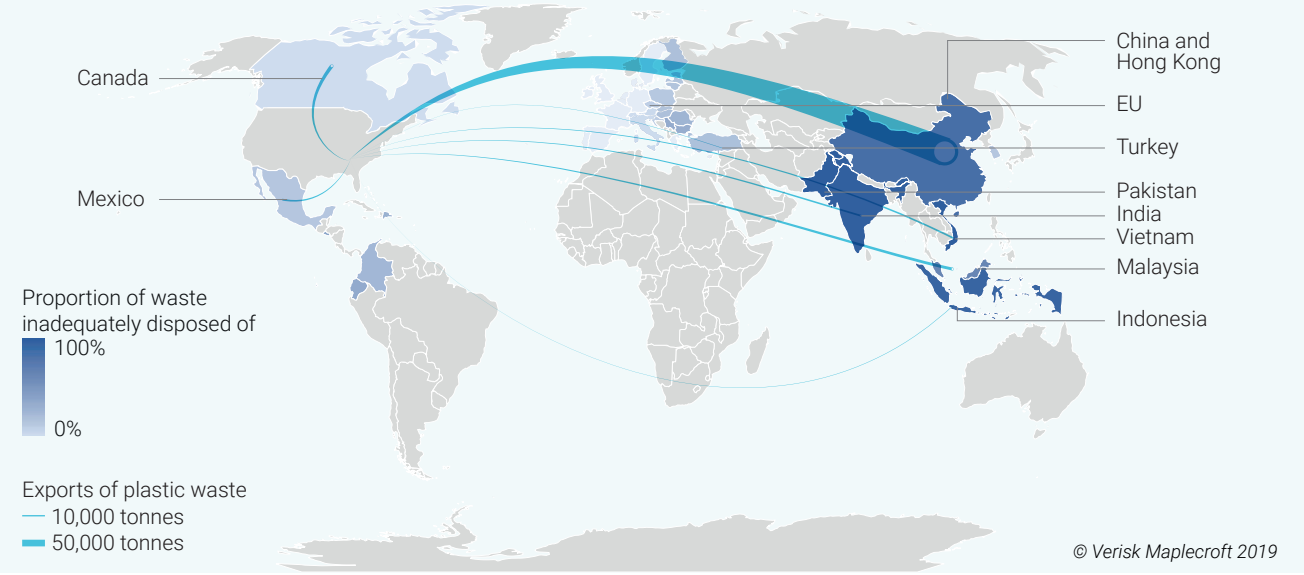
Germany's export flows for its top 10 partners look strikingly similar to the UK's profile, but higher proportions of plastic waste exports to eastern Europe and Russia. Corporations in Germany whose plastic waste is exported are less exposed to that waste being mismanaged than those in the UK.

Figure 7: German waste exports



Source: UN, 2019; Verisk Maplecroft

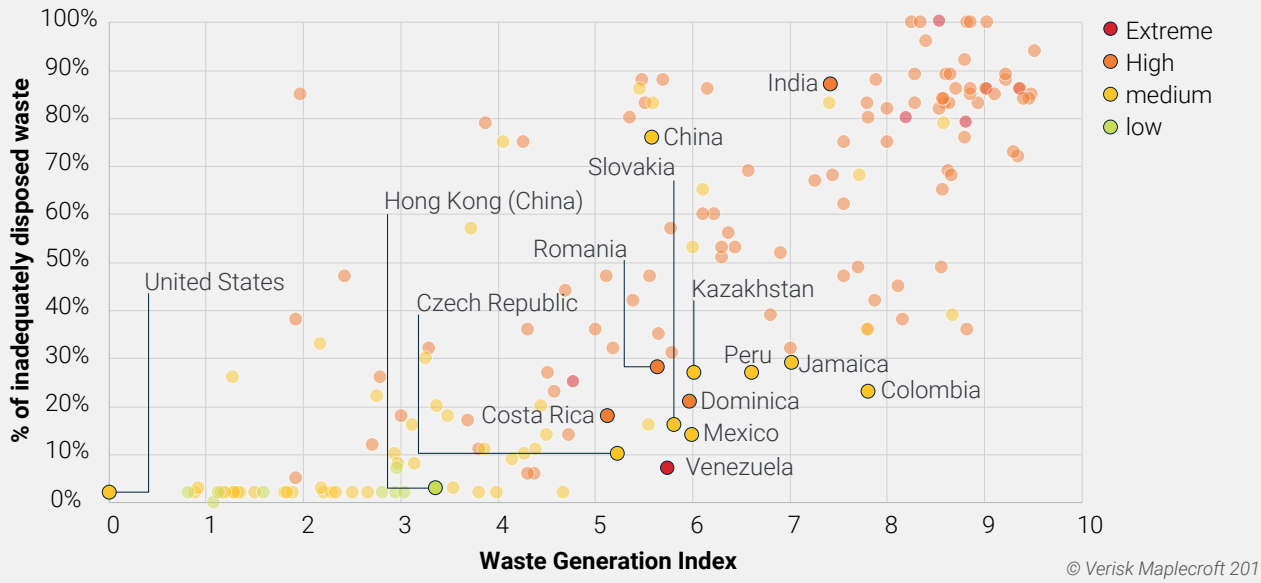
Figure 8: US waste exports



Source: UN, 2019; Verisk Maplecroft

US plastic waste exports to China vastly outweigh those of the UK or Germany, which elevates the risk of waste being mismanaged when it is diverted from China and other countries with import bans. While Colombia, Ecuador and El Salvador manage waste better than many of their South East Asian counterparts, they do not have the infrastructure to cope with an exponential increase in plastic waste. Other mooted destinations have even poorer records: Ethiopia mismanages 94% of its waste, Senegal 84%, and Bangladesh 89%.

Figure 9: Latin America and Eastern Europe offer new frontiers for plastic waste exports



Source: Eurostat, 2019; OECD, 2015; Verisk Maplecroft

Where now for waste?

With the new global pact, China and other countries refusing to take waste, and many governments reluctant or unable to invest in waste management upgrades, corporates will need to find their own solutions.

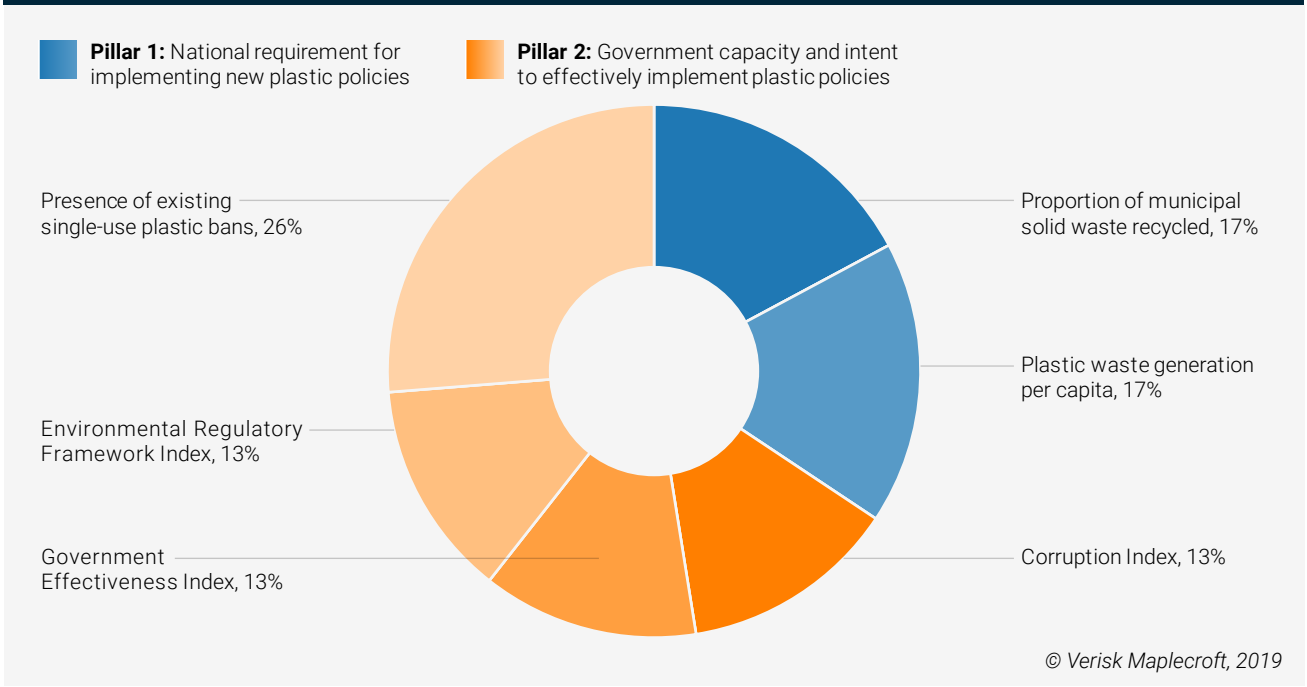
One option is new destinations for waste exports. Figure 9 highlights that many countries that manage waste well, also produce a lot of it. Nations that not only produce little waste, but are also adept at dealing with what they do generate, may be better bets for companies looking to dispose of waste responsibly.

Countries with at least a medium risk score in the WGI and below 30% waste inadequately disposed of include a host of Latin American and Eastern European nations.

However, Figure 9 also shows the potential risk investors would face in financing new waste infrastructure in these nations. Using the Fiscal Environment Index as a proxy for sovereign credit risk it is clear that low risk countries are also big waste generators. Investors could consider medium risk nations such as Mexico, Peru, Colombia, Slovakia or the Czech Republic.

Any change in waste management process will be difficult without forcing up operational costs and product prices. We can expect companies using large amounts of packaging, such as logistics or retail, as well as ICT firms using plastic in their products to be most affected.

Figure 10: New frontiers for waste management



Source: Eurostat, 2019; OECD, 2015; Verisk Maplecroft

However, investing in circular economy solutions to should insulate companies against growing customer and regulatory pressure (see Figure 10), while aligning with benchmarks like the Sustainable Development Goals (SDGs). All of which will please investors concerned about a companies' impact on the environment.

Some companies are already transitioning ahead of the curve. Starbucks, Unilever, Evian and McDonald's are among those that have made high profile switches away from plastic to alternative materials. This trend will drive innovation and investment opportunities in materials design, processing and disposal and could eventually result in lower cost alternatives such as bioplastic.

The scale of investment needed to realise a circular economy will require partnerships with rivals and across sectors. But companies failing to act in the face of rising political, consumer, and shareholder concern will be consigned to the scrapheap.

Analysis 3: The proliferation of plastic policies

Solid waste is everyone's business

Companies and investors are increasingly aware of the need to address the issues of resource efficiency, waste management and the transition from a linear to a circular economy. In addition to maintaining a positive reputation in the eyes of consumers, however, there is also a strong business case for addressing these aspects of sustainability. Failure to properly assess and manage resource consumption and waste can lead to adverse impacts on companies.

By maintaining a business strategy centred on the linear industrial model, expenditure on energy, water and material inputs will remain unnecessarily high. In addition to operational costs, regulatory requirements around solid waste will become more common and more stringent. We are already seeing this pattern emerge in developed markets in the form of single-use plastic bans.

Reputational risks and brand damage are inevitable if companies continue to operate in line with a linear model. Already we are seeing a wave of multinational companies moving to eliminate single use plastics and making lofty commitments for integration of recycled material.

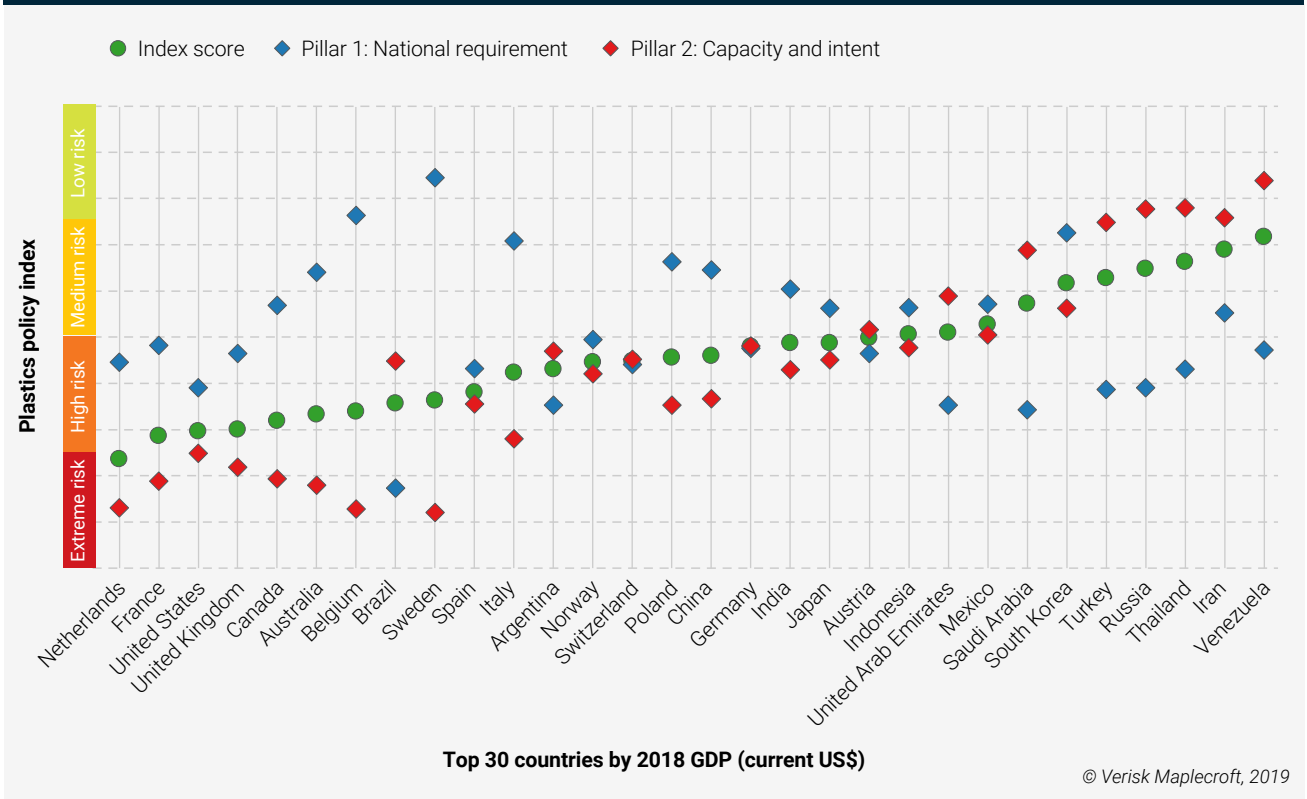
The advent of plastic policies – countries to watch

Plastic is a revolutionary material. It is lightweight, durable, chemically inert and relatively cheap to produce. However, these characteristics which have led to it becoming embedded in our economy as a staple material, are also the reasons why it is touted as a key driver of the current ecological crisis. Plastic has become ubiquitous in consumer goods and packaging but is now also being found in far flung corners of the natural environment. Plastic particles have been found at the bottom of the Mariana Trench, where less humans have explored than in outer space.

Public awareness of plastic pollution has steadily increased in recent years and is now reaching a tipping point. We are now witnessing companies committing to phasing out plastics, and investors honing in on this amongst other key ESG focus areas. Recent shareholder resolutions have driven global companies including Coca Cola and Starbucks to phase out single-use plastics, setting the bar for their peers. Private sector initiatives like the Ellen MacArthur Foundation's New Plastics Economy Global Commitment, which include companies responsible for over 20% of plastic packaging, and the more recent Alliance to End Plastic Waste, further demonstrate this trend.

Companies must seek to understand their exposure to business risks stemming from plastics. Using data from Verisk Maplecroft's new waste indices, it is possible to determine the countries most at risk for new and more stringent regulations on plastic materials. In this bespoke index, the probability of new or more stringent plastics policies is measured using factors grouped into two pillars capturing the national requirement for such policies, and the capacity and intent of the national government on implementing them.

Figure 11: Where will we see more stringent plastics legislation in the future?



Source: Verisk Maplecroft

In Figure 11, the risk of new plastic regulations emerging is assessed for the 30 largest economies by 2018 GDP. The Netherlands, the United States and the United Kingdom are the three countries singled out in this analysis as being the ripest for new regulations on plastics.

For all three countries, Pillar 2 is driving this score. Each of these countries possess a national government which is proven effective with a low level of corruption, a strong record of environmental legislation, and a demonstrated ability to emplace plastic-specific legislation.

South American countries Brazil and Argentina are also recognised as being high risk, though for different reasons. Here, the national urgency for such policies is greater since the populations generate large quantities of plastic waste and recycling rates are poor. However, the ability and willingness of the government to roll out such policies is more questionable in these cases.