KPMG

To ban or not to ban

The complex challenge posed by plastic and its alternatives

June 2019

kpmg.com

Bad guy … or irreplaceable component in our daily lives? The issue of plastic and its harmful environmental impact is right at the top of the news agenda. And with good reason. The evidence is incontrovertible that the world's extensive reliance on plastics is doing untold damage to our fragile ecosystem.

Yet finding a solution to this challenge is far from straightforward. Calls to ban plastics outright trigger as many questions as they answer. The world's reliance on plastics can't be rolled back overnight. And while alternative materials exist, in some cases they can create as many problems as they solve.

The demand for immediate action is understandable. But there isn't an easy fix or a one-size-fits-all solution. Society's huge dependence on plastics means that any alternatives would need to be introduced at scale. And rigorous analysis needs to be carried out to ensure that we're not replacing one type of environmental harm with another. We look to explore the challenge posed by plastic and what some of the unexpected impacts from switching to plastic alternatives could be.

The only approach is to return to basics and tackle the problem at the source. To materially put an end to plastic-infested oceans, corporates need to reduce the amount of single-use plastic they are selling and to reduce the levels of plastic discarded in the first place.

Governments also have a crucial role to play in improving waste management systems and boosting the re-use of plastic through initiatives that incentivise resource efficiency and a circular economy.

KPMG

© 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

Plastics, plastics everywhere

Plastic is literally embedded in our everyday existence. Production has grown faster over the past 65 years than any other manufactured material. Scientists estimate that 8300 million metric tons (Mt) of virgin plastics have already been produced to date.[1]

It's not hard to understand why the world has become so plastic-dependent. The material is cheap, easy to use and transport – and extremely strong and durable. For instance a 60g milk jug can hold 4kg of milk.

And it doesn't just come in the form of bottles, cups, straws, take away containers and so on, but is also present in everything from our clothes to the cars we drive, the toys we give our children and the transportation of goods that cross borders worldwide.

More harm than good?

And yet the very durability that makes plastic so attractive to manufacturers – and consumers – is also what makes it so harmful. Plastic cannot be consumed by most bacteria, so it never fully degrades.

Instead, it has to be broken down by wind, sun or ocean waves, with the pieces constantly reducing into tiny microplastics until they become invisible – and yet still enormous compared to most natural molecules. So don't think of plastic breaking down, it merely breaks up into microplastics. Not only that, as microplastics are hydrophobic (insoluble), and have a high surface area-to-volume ratio, they can absorb environmental contaminants (polychlorinated biphenyl; PCB) making them even more toxic to animals.

The visible and – worse – invisible damage plastics are wreaking on the environment is well documented:

— Some 18 billion pounds of plastic flows into the ocean every year, according to the National Geographic.

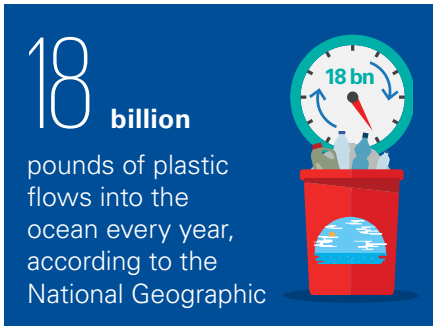
— As plastic can't fully degrade, it means every single piece of plastic ever made is still around in the ecosystem in some form.

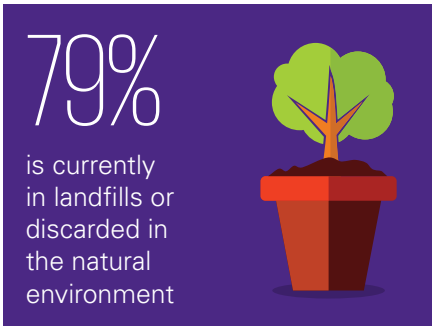
— A mere 9% of all the plastic produced has been recycled, 12% has been incinerated and 79% is currently in landfills or discarded in the natural environment.[2]

— The UK throws away two double-decker busloads of plastic waste every 30 seconds.[3]

— If current production and waste management trends continue at the same rate, roughly 12,000 Mt of plastic waste are likely to be in landfills or the natural environment by 2050 – equal to the weight of one billion elephants.

How are these huge volumes of plastic entering the environment? Two ways: 'intentionally' through, say, litter on the street and beach; and 'unintentionally', via accidental industrial waste leakage or landfill sites. In other words, whether we're consumers, corporates or waste management companies, we're all part of the problem and the solution.





[1] Production, use, and fate of all plastics ever made, Roland Geyer1,*, Jenna R. Jambeck2 and Kara Lavender Law3Science Advances 19 Jul 2017: Vol. 3, no. 7, e1700782, DOI: 10.1126/sciadv.1700782

[2] https://advances.sciencemag.org/content/3/7/e1700782

[3] https://learn.tearfund.org/~/media/files/tilz/circular_economy/2019-tearfund-consortium-no-time-to-waste-en.pdf?la=en

KPMG © 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

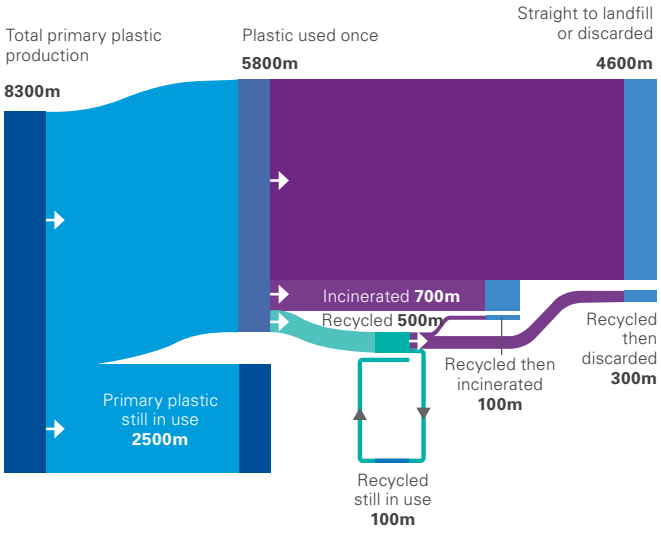
The problem of plastic production

Global plastic production and its fate

There has been a cumulative total of 8,300 million tons of plastics (Polymer Resins, Fibres and additives) produced globally over the period 1950-2015. The figure below shows the journey from production to its ultimate fate.

Balance of plastic production and fate (m = million tonnes)

8300m produced → *4900m discarded + 800m incinerated + 2600m still in use (100m of recycled plastic)*



Source: based on Geyer et al. (2017). Production, use, and fate of all plastics ever made. This is a visualisation from OurWorldinData.org, where you find data and research on how the worl is changing.

Licensed under CC BY SA by Hannah Ritchie and Max Roser (2018).[4]

How does plastic affect animals?

Around 700 species of marine animals have been affected by the plastic infesting the world's ocean. When organisms ingest microplastics, it can take up space in the gut and digestive system, leading to reductions in feeding signals, which in turn results in energy depletion, inhibited growth and fertility impacts. Additionally, if there is significant accumulation of toxic chemicals building through the food chain, it means trophic level dynamics can change. This then has the potential to destabilise the ocean and eventually our ecosystem. For instance a report has found that when plastic nanoparticles are transferred up through a food chain, they enter the brain of the top consumer and affect its behaviour, thereby severely disrupting the function of natural ecosystems.[5] If this is happening in the marine environment what is to say it isn't happening in other ecosystems that consume marine animals?

How does plastic affect human beings?

Currently there is no clear evidence whether microplastics have a similar effect on humans, as the level of microplastics ingested is not at sufficient concentrations to cause the same issues as it does in marine animals. (One reason is for this is because microplastics remain in the guts of fish and do not move into muscle tissue, which is what we eat). However, this precautionary principle is not evidence against taking exposure seriously – we must take it seriously. Current knowledge is mostly based on research conducted within the last decade; however, interest in studying microplastics and its effect on humans is growing and new analytical methods are being developed to assess the full extent of its impact.[6]

How does plastic affect climate change?

It's not only animal consumption of plastic and ocean well-being that is causing grave concern. Plastic is also increasingly contributing to climate change. A 2019 report by the TearFund states that global plastic production emits 400Mt of greenhouse gases each year – more than the UK's entire carbon footprint.[7] If the growth of plastic production continues at its current rate, by 2050 the plastic industry could account for 20% of the world's total oil consumption.

Moreover, a study from the University of Hawaii found that plastic is known to release a variety of harmful chemicals as it breaks up, with a negative impact on biota. When exposed to solar radiation, the most commonly used plastics produce two greenhouse gases, methane and ethylene. Methane alone is roughly 30 times more potent a heat-trapping gas than carbon dioxide.[8]

On top of that, there's also the fact that plastic waste from developed countries such as the UK has been shipped off to developing countries to be 'recycled', because the current UK waste infrastructure simply cannot cope. As developing countries can't manage it either, this plastic waste is being burned or dumped, rather than managed safely, potentially causing up to a million people a year to die from conditions such as cancer, heart disease and diarrhea. Very recently there has been a direct response from these developing countries rejecting any further waste meaning developing counties such as the UK will need to manage it themselves.

[4] https://ourworldindata.org/uploads/2018/08/plastic-fate.png
[5] https://www.nature.com/articles/s41598-017-10813-0
[6] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6132564/
[7] https://learn.tearfund.org/~/media/files/tilz/circular_economy/2019-tearfund-consortium-no-time-to-waste-en.pdf?la=en
[8] Royer S-J, Ferrón S, Wilson ST, Karl DM (2018) Production of methane and ethylene from plastic in the environment. PLoS ONE 13(8): e0200574. https://doi.org/10.1371/journal.pone.0200574

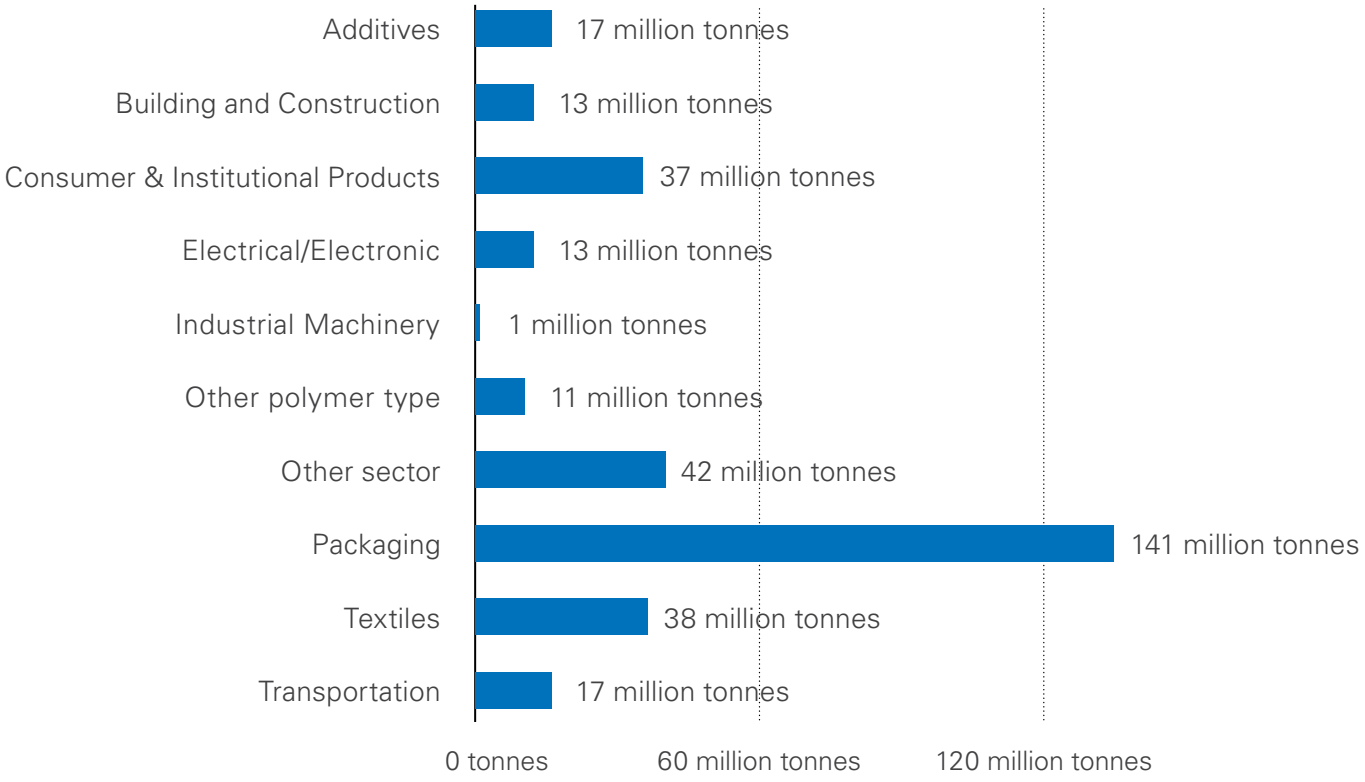
KPMG
© 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

Which sectors use plastic the most?

The graph below shows which industries produce the largest amounts of plastic waste. Packaging, for example, has a very short 'in-use' lifetime (typically around 6 months or less). This is in contrast to building and construction sectors, where plastic use has a mean lifetime of 35 years. The packaging sector is therefore the dominant generator of plastic waste, responsible for almost half of the global total.[9]

Plastic waste generation by industrial sector, 2015

Global plastic waste generation by industrial sector, measured in tonnes per year.



Source: Geyer et al. (2017).[10]

Where does all this plastic waste go?

Plastic is disposed of in three ways:

1. **Recycling or reprocessing into a secondary material**[11], involving the circular economy process, which delays the consequences of further virgin plastic production. It does, however, inevitably involve the contamination and mixing of polymer types, producing secondary plastics of limited or low technical and economic value.
2. **Destroying it thermally** through incineration, which in some cases also allows some energy to be recovered, however a large level of energy is needed to power the incineration in the first place. Emerging technologies, such as pyrolysis, are now extracting fuel from plastic waste.
3. **Discarding it**, either by containing it in a managed system, such as sanitary landfills, or leaving it uncontained in the natural environment or dumps.[12]

[9] https://ourworldindata.org/plastic-pollution
[10] https://www.european-bioplastics.org/market/market-drivers/
[11] N. H. Mutha, M. Patel, V. Premnath, Plastics material flow analysis for India. Resour. Conserv. Recycl. 47, 222–244 (2006).
[12] Production, use, and fate of all plastics ever made, Roland Geyer1,*, Jenna R. Jambeck2 and Kara Lavender Law3Science Advances 19 Jul 2017: Vol. 3, no. 7, e1700782, DOI: 10.1126/sciadv.1700782

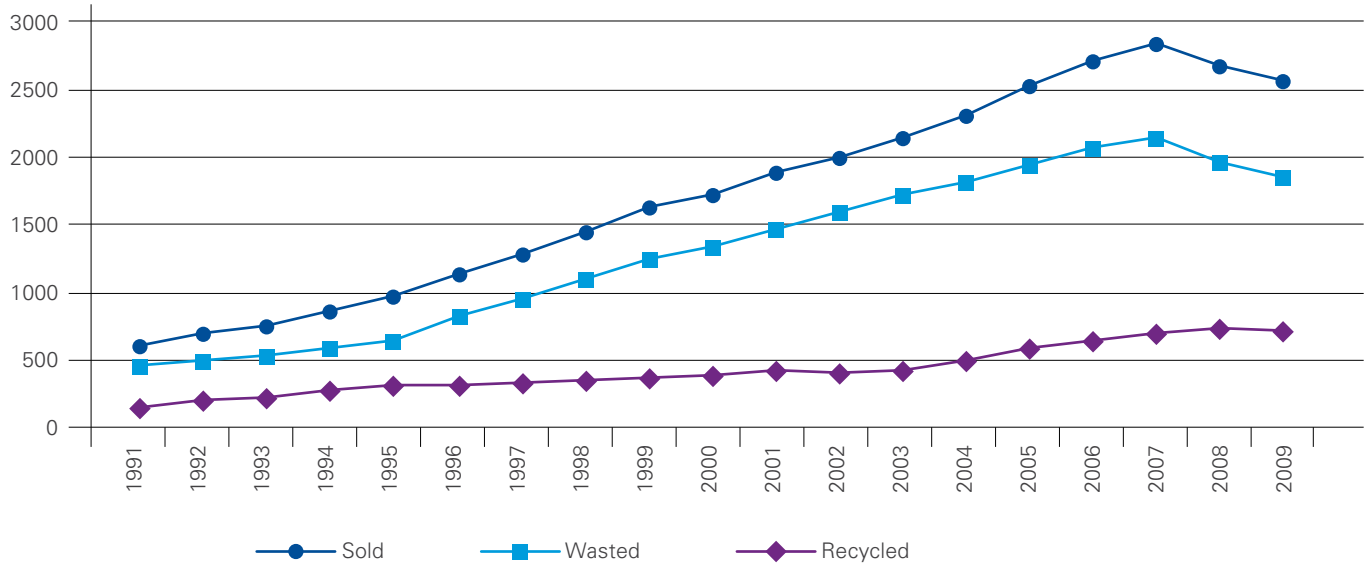
KPMG
© 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

Recycling is clearly an attractive solution in many respects – and yet its' potential is frustratingly under-exploited. There is currently a shortage of PET (Polyethylene terephthalate – plastic that can be iteratively recycled) simply because the material is not being collected and repurposed in sufficient quantities. As a result, we are seeing far fewer products made out of a high percentage (>30%) of PET than there is the opportunity for.

The graph below provides a snapshot into the recycling rates in the US from 1991 – 2009, showing how much PET is wasted vs being collected as production grew over the years.

PET Sales, Recycling, and Wasting (in Thousands of Tons)

PET bottle sales and wasting in the U.S., 1991-2009



Source: Container recycling institute.

Weighing up the alternatives

There are many different alternatives to plastic in the market – from the quirky and diverse to the small and simple. Below we are going to look at a few of the most common alternatives but it is by no means a conclusive list.

Bioplastics

Bioplastic is a material made from plants and biological material rather than petroleum. It is produced either by extracting sugar from plants such as corn and sugarcane and converting it into polylactic acids (PLAs), or from polyhydroxyalkanoates (PHAs) engineered from microorganisms. PHA is used for medical devices such as cardiovascular patches, while PLA plastic is commonly used in food packaging. PLA is often the cheapest source of bioplastic as it originates from the same large industrial facilities that make products such as ethanol. As such, it is the most common type, also used in plastic bottles, utensils, and textiles.[13]

Bioplastics contribute less carbon to the atmosphere than petroleum-based plastic because they return only the amount of carbon sucked up by the plants from the soil rather than releasing carbon trapped underground in the form of oil.

Nevertheless, there is a downside. A 2011 study from Pittsburgh established that there are environmental issues associated with growing plants for bioplastic. That includes the pollution created from fertilisers and cases where land usage is diverted from essential food production.[14] There is also the ethical question of whether we should be using food such as corn to create plastic, given the food shortages faced by much of the world's population.

Issues with disposal

Then there's the issue of disposal. Is it better to deliver it to a landfill, recycle it or send it to the industrial composite site? If the latter, the material needs to be heated at high enough temperatures to allow the microbes to break it down. Without that intense heat, the bioplastics won't degrade in a meaningful timeframe. If they end up in marine environments, they will have exactly the same harmful effects as petroleum-based plastic.

[13] https://www.nationalgeographic.com/environment/2018/11/are-bioplastics-made-from-plants-better-for-environment-ocean-plastic/

[14] Sustainability Metrics: Life Cycle Assessment and Green Design in polymers , Michael Angelo D. Tabone, James J. Cregg, †, §eric jJ. Beckman, and Amy E. Landis* , † Mascaro Center for Sustainable Innovation, Department of Chemical Engineering, Department of Chemistry, Department of Civil and Environmental Engineering, University of Pittsburgh, Pittsburgh, Pennsylvania 15261 Received May 13, 2010. Revised manuscript.

© 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

Non-plastic-based alternatives

Paper

Paper is the most common alternative to single use plastic items, as seen in straws, cups and bags. This is because usually it can perform the same function as its plastic sibling without the harmful microplastics, chemical leaching and fumes released during burning, which plastic waste creates. Does this mean paper could be out answer to solving the plastic problem? No – not entirely as there are environmental trade-offs to take into account.[15]

Research done by the Northern Ireland Assembly shows that it takes more than four times as much energy to manufacture a paper bag as it does a plastic bag. And during the production of a paper bag, trees – which would otherwise absorb greenhouse gases – need to be cut down to fuel this demand.

What's more, most paper bags are made by heating chips of wood under high temperature and pressure within a chemical solution, inevitably resulting in the emission of greenhouse gasses. The toxic chemicals involved also contribute to water pollution – and cause a long-term problem as they work its way through the food chain.[16]

Even more toxicity is created when paper bags degrade. Strikingly, paper bags generate 70% more air and 50 times more water pollutants than plastic bags. Then there's the issue of the space they consume: around seven lorries would be needed to transport exactly the same number of paper bags as could be delivered by a single lorry carrying plastic bags.[17]

Then there's the fact that paper bags are almost never reusable and also tend to be very fragile. Plastic bags, on the other hand, can be very lightweight and yet still strong enough to carry a full load of shopping. A plastic bag can carry 2,500 times its own weight and stay strong when wet and also put to many other uses in the home.

Reusable plastic bags ('bags for life') go even further, more sustainable than all types of lightweight plastic carrier bags if they are used at least four times. For that reason, some argue that they offer the best environmental benefits of all over the full life cycle.[18] The Welsh Assembly Government studied the environmental impacts of different types of carrier bags. It concluded that, for a paper bag to have match the environmental impacts of plastic bags, it would need to be used at least four times. However, most paper bags would not be durable enough to be used four times to test that theory.[19] Moreover, in terms of recycling, it takes 91% less energy to recycle a pound of plastic than it does to recycle a pound of paper.[20]

[15] Research leverages lifecycle assessment conducted between 2005 – 2011 by national government in the UK which are still very much valid and is widely cited in publications and literature reviews.

[16] http://www.niassembly.gov.uk/globalassets/documents/raise/publications/2011/environment/3611.pdf

[17] https://enviroliteracy.org/environment-society/life-cycle-analysis/paper-or-plastic/

[18] Environment Group Research Report (2005) 'Proposed Plastic Bag Levy – Extended Impact Assessment' http://www.scotland.gov.uk/Resource/Doc/57346/0016899.pdf

[19] Welsh Assembly Government http://wales.gov.uk/topics/environmentcountryside/epq/waste_recycling/substance/carrierbags/chargeqanda/types/?lang=en [accessed 23/02/11)

[20] http://www.reuseit.com/learn-more/myth-busting/why-paper-is-no-better-than-plastic

KPMG

© 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

Doing the sums on the drawbacks and the benefits

A similar story emerges from the full environmental impact assessment report issued by the Scottish Government in 2005 on the effects of a proposed plastic bag fee.[21] The report calculated the cost-benefits and offers a telling comparison between plastic and paper bags, as outlined in the table below. The lightweight plastic bag was given a score of 1 in all categories as a reference point. A score higher than 1 indicates that a paper bag contributes more damage to the environment than a lightweight plastic bag when balanced against the actual volume of shopping carried. The indicators take into account emissions which occur over the whole lifecycle.

Indicator of environmental impact	Lightweight plastic bag (Single use)	Paper bag (Single use)
Consumption of non-renewable primary energy	1.0	1.1
Consumption of water	1.0	4.0
Climate change (emission of greenhouse gases)	1.0	3.3
Acid rain (atmospheric acidification)	1.0	1.9
Air quality (ground level ozone formation)	1.0	1.3
Eutrophication of water bodies	1.0	14.0
Solid waste production	1.0	2.7
Risk of litter*	1.0	0.2

*Risk of litter is categorised as the likelihood for the item to be discarded irresponsibly into the environment, which would lead to environmental contamination in the form of toxin accumulation, greenhouse gases, animal ingestion etc.

[21] Environment Group Research Report (2005) 'Proposed Plastic Bag Levy – Extended Impact Assessment' http://www.scotland.gov.uk/Resource/Doc/57346/0016899.pdf

KPMG © 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

A mixed picture for glass and aluminium

Many have also long turned to aluminium and glass as simple alternatives to PET. Once again, however, the full environmental picture needs to be assessed in the round.

Glass bottle production, for example, use more energy when compared to aluminium and virgin PET and produces the most solid waste and the highest volume of greenhouse gasses.[22]

Even though an aluminium can is the lightest product, the level of energy used in the smelting and sheet production process offsets the weight advantage. As a result, the PET bottle system has the lowest total energy input the manufacturing process.

If we then consider fossil fuel consumption, an aluminium can will have the lowest fossil fuel profile. Case studies have shown that 78% of production energy can come from fossil fuels, the remaining 22% from the hydropower used in aluminium smelter factories for instance.

PET, on the other hand, uses the most fossil fuels in its production, as its raw materials are oil and natural gas. At the same time, however, it is the lightest material and therefore has the lowest travel costs and carbon emissions. Glass, meanwhile, is the heaviest meaning it has the most travel costs and carbon emissions. When finally discarded, glass has a higher volume density than aluminium and PET (both of which can be crushed) and disposal, therefore, requires more transportation loads leading to more fuel consumption and carbon emissions etc.

Yet glass also has the benefit of zero leaching issues, meaning that it can be used year after year with no negative impact on our health. That contrasts favourably with plastic, where long term use will inevitably lead to plastic leaching into the substance it is carrying.

[22] http://docplayer.net/26801106-Life-cycle-inventory-of-three-single-serving-soft-drink-containers-revised-peer-reviewed-final-report-prepared-for-pet-resin-association.html

KPMG

© 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

Where next for plastics?

It's fair to say that there is no easy answer to the challenge plastics represent. Everything is a trade-off. Some of the alternatives may offer genuine improvements in some areas, but some give with one hand and take away with the other. A solution might, say, reduce the environmental impact in terms of greenhouse gas emissions, and yet involve the risk of serious pollution issues further down the line.

The only approach is to return to basics and tackle the problem at the source. To materially put an end to plastic-infested oceans, corporates need to reduce the amount of single-use plastic they are selling and on the levels of plastic discarded in the first place.

Governments also have a crucial role to play in improving waste management systems and boosting the re-use of plastic through initiatives that incentivise resource efficiency and a circular economy.

It's essential that we 'close the loop' on plastic, to prevent it escaping into our environment causing additional greenhouse gas emissions and potential impact on human health.

— There needs to be a reduction in single use plastic across all sectors, a source of high levels of unnecessary plastic consumption and pollution. Encouragingly, the UK government has recently announced that a scoped single use plastic ban will come into force in April 2020.

— The recycling infrastructure in the UK needs to improve dramatically to handle the country's recycling needs. Investment must be directed into new technologies that can recycle all types of plastics. Some plastic recyclers have created technology capable of recycling any grade of plastic showing that there are innovations out there that work.

— Further government intervention and leadership is required; for instance, to reduce the level of incineration – which would otherwise increase due to the UK's lack of sufficient waste recycling capability. While the output energy from incineration can be harnessed to power industries, it is still very damaging to the environment due to the large amounts of fuel involved in the first place.

— Implementing a circular economy is an effective way to achieve environmental goals linked to plastic pollution. It is a system where everyone and everything wins – from consumers and producers to businesses and the environment.

— Further research is needed to understand the effects of plastic toxins on humans, the potential damage done by microplastics in the environment, and into developing new alternatives to plastic and their effects on the world.

— Public education is needed to ensure consumers are fully aware of the impacts of plastic, as well as the already widely-understood impact on marine animals, and to improve recycling behaviour.

KPMG

© 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

Good news on the ground

Keenly aware of the huge volumes of plastic waste being created, and the environmental damage caused, many companies – and consumers – across the UK are now taking matters into their own hands.

The sale of plastic items is being banned in workplaces, in an effort to cut plastic waste, and replaced by aluminium and natural alternatives. Large public events such as the Glastonbury festival are also putting a stop to the sale of plastic bottles, while the London marathon events have set up a dedicated team to develop new environmental initiatives and practices for sustainable mass participation sports events.

Likewise, the retail industry is doubling down on its efforts to eliminate plastic packaging and ensure that what can't be completely removed is recyclable, whether that's product packaging or products on their supermarket shopping aisles.

At KPMG, we have introduced a number of our own initiatives:

— **Plastic free coffee shops** at our London HQ. We also have a reusable cup incentive where employees receive reductions on the price of their hot drink.

— **Reusable metal water bottles** supplied free to our 15,000 employees. Instead of spending £60,000 a year on plastic cups, the new scheme will have paid for itself within 18 months. As a result, we have removed three million plastic water cups across our UK offices, and the same number from our hot drink vending machines.

— **Removed the use of plastic straws** from our offices and saved over 750,000 items of plastic cutlery this year by removing them from the entire firm.

— **Recycling plastic coffee cups** across five of our regional offices, via one of the UK's only coffee cup collection services. The cups are taken to a processing facility to be made into new products, including reusable cups.

— **Carpet recycling.** Carpet fibres in our offices are recycled to be reused for other carpets and the backing materials help to create energy from the waste.

KPMG

© 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

Solving an urgent and complex dilemma

Global plastic pollution and the damage it causes to our world is one of the most urgent and complex challenges we face today. Yet, as we've seen, there are no off-the-shelf solutions; all the responses that exist inevitably offer a degree of trade-off and compromise, meaning consumers and corporates alike must be very clear on what alternative environmental impacts are created when switching away from plastic and managing them accordingly.

An evidence-based approach is therefore essential – and a clear-eyed understanding of where the greatest benefits lie. Expect also to see technology – the great enabler across so many sectors in so many ways – play its part in the future in helping the world navigate a way around this most intractable of dilemmas.

How we can help

KPMG's team of sustainability experts draw on the insights and experience of a global multidisciplinary practice.

We have particular expertise in advising clients in:

- Strategy creation and development
- Circular Economy Model implementation
- Impact assessments and supply chain modelling
- Consumer Behaviour Change models and impact
- Collaboration and Convening initiatives across markets
- Regulation assessments
- Risk Integration
- ESG Due Diligence
- Non-Financial Assurance and Reporting services

If you would like to find out more please contact;

Jeremy Kay
Global Strategy Lead for Energy and Natural Resources, KPMG International
jeremy.kay@kpmg.co.uk

Troy Mortimer
Head of Sustainability and Responsible Investment, KPMG UK
troy.mortimer@kpmg.co.uk

Joshua Hasdell
Strategy and Sustainability, KPMG in the UK
joshua.hasdell@kpmg.co.uk

kpmg.com/uk

The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavour to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.

© 2019 KPMG LLP, a UK limited liability partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved.

The KPMG name and logo are registered trademarks or trademarks of KPMG International.

CREATE. | CRT114793 | June 2019