

FUNDAMENTALS

What the battle against plastic means for oil demand

Cleaning up the world’s plastic waste will be a monumental effort – one which will have major implications for petrochemical companies and the long-term demand for oil.



Nick Stansbury joined LGIM in 2013 and is a fund manager on the Inflation Plus team within Active Equity. He joined LGIM from Revelation Capital, an equity hedge fund focusing on special situations.

In many ways, plastic is the perfect product. It’s lightweight, cheap and durable. Some modern plastics can have the same strength as steel or aluminium, at significantly lower weight. Relatively speaking, the environmental benefits of plastics should not be underestimated – if the next best packaging alternative were used, greenhouse gas emissions

would triple alongside a similar increase in the mass of packaging required. It is no accident that demand for plastic has grown 20-fold in the past 50 years, and is expected to double again in the next 20.

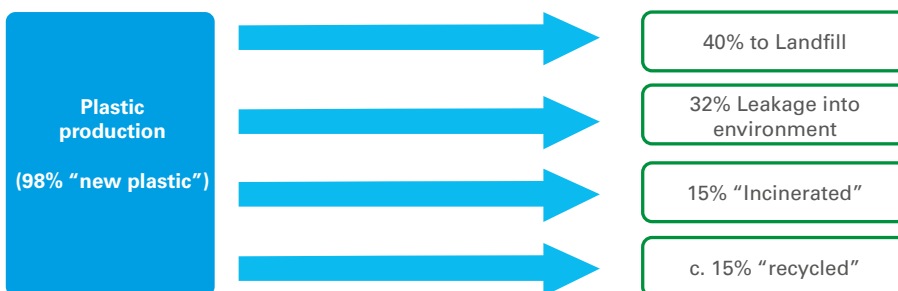
But as the recent BBC documentary series *Blue Planet 2* so vividly brought home for so many, plastic’s durability

and chemical make-up is killing untold numbers of sea creatures, fish and birds. Nearly every government has committed to reducing plastic usage in response to this global problem. With this in mind, we look at the key implications of a ‘global clean-up’ for investors: petrochemical companies and the demand for oil.

THE SCALE OF THE PROBLEM

Of the millions of tonnes of plastics produced, only a fraction is recycled. The majority is destined for either landfill or combustion but what perhaps is more concerning is the near-third of all plastic packaging lost from the global disposal system, ‘leaking’ into the oceans.

Figure 1: Oh, the places your plastics will go



Plastic packaging destinations (Source: New Plastics Economy)

Plastic that leaks into the natural environment does not degrade or break down easily or quickly and lasts for years, often decades. Even worse, when it does degrade, it both releases polluting chemicals into the environment and micro-plastic particles into the food chain.

Whilst estimates vary, it is likely that at least eight million tonnes of plastic enter the ocean each year. Imagine roughly one large rubbish truck full of plastic being dumped into the ocean every minute. Sadly, that number also understates the scale of the problem

as other researchers estimate the true figure may be around double this.¹ The cumulative effect of all of this 'leakage' is that now for every five tonnes of fish, there is one tonne of plastic in the oceans. If demand for plastics continued to grow at its historical rate, in just 30 years there will be the same number of tonnes of plastic in the ocean as there is fish.

THE COST OF CLEAN-UP

Needless to say, the cost of cleaning this up is going to be enormous. Environmental consultancy Trucost has estimated that the cost of

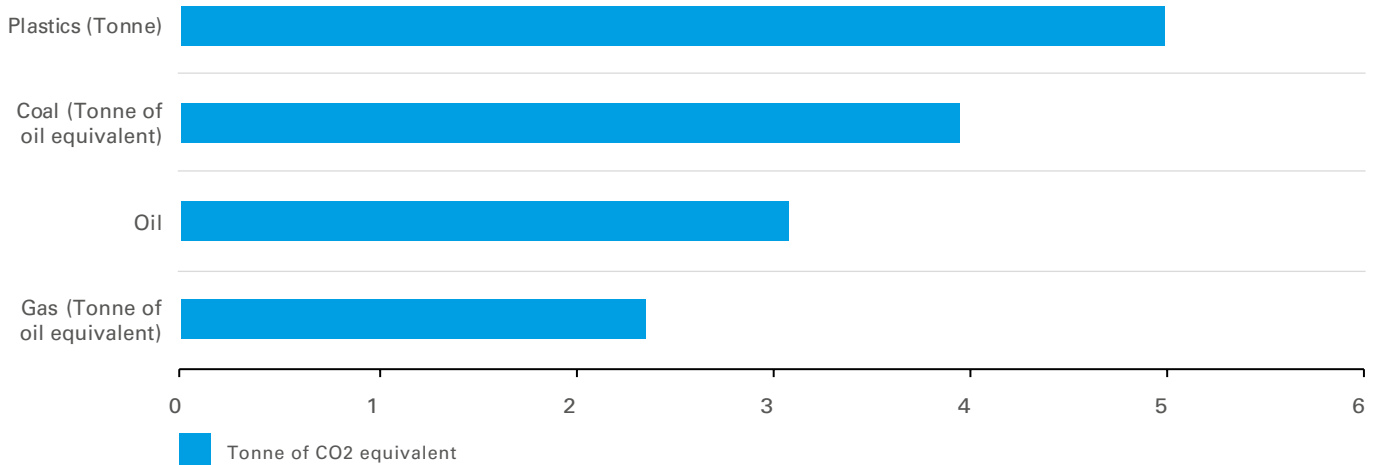
cleaning up plastic pollution in the oceans could be at least \$13 billion and simply cleaning up the world's beaches would cost further billions. Governments are loathe to commit such large amounts of capital on an ongoing basis and so have opted to tackle the problem at its roots: reduce consumption and production. The regulatory backlash by governments – particularly here in Europe – has accelerated, and new measures and regulations are being introduced to try to limit single-use plastics, and to encourage recycling.

Figure 2: Policies and regulations on plastic products

Region		Government Policies
Europe	European Union	The European Strategy for Plastics in a Circular Economy, agreed in January 2018, targets that all plastic packaging be reusable or recyclable by 2030
Europe	Germany	Introduced by Germany's Social Democrat/Green coalition government in 2003, Germany's Pfand (deposit) system has succeeded in increasing recycling rates. Also, all stores in Germany that provide plastic bags must pay a recycling tax
Europe	France	In July 2016, France banned free distribution of thin single-use plastic bags typically distributed at grocery stores
Europe	UK	From 2015, large shops in England are required to charge 5p for all single-use plastic carrier bags. In 2018, a ban on the manufacture of 'microbeads' also came into effect
Europe	Ireland	Ireland was the first country to place a significant tax on plastic bags – now €0.22 – at checkout in 2002
Europe	Italy	In January 2011, Italy banned the distribution of plastic bags not from biodegradable sources
Asia	China	Since June 2008, China has had a total plastic bag ban although enforcement has been inconsistent across the country
Asia	Japan	Many cities have very strictly enforced rules on the separation of waste, including plastics
Africa	Rwanda	Rwanda implemented a strict plastic bag ban in 2008 as illegal use can result in fines or jail time
Africa	Morocco	After a partial ban in 2009, Morocco's law fully banning plastic bags came into effect in July 2016. This law covers both the import and production
South America	Brazil	Brazil imposed bans on plastic bags, effective from October 2007
Central America	Mexico	In 2009, Mexico City introduced legislation to prohibit retailers from distributing single-use non-biodegradable plastic bags
North America	Canada	Montreal implemented a ban on plastic bags with thickness of less than 50 microns in January 2018
North America	US	The California Department of Resources Recycling and Recovery mandates that each plastic container must meet at least one of the following five criteria: <ol style="list-style-type: none"> 1. The container must be made from a minimum of 25% recycled materials 2. The container must be reusable 3. The container must be source-reduced (container weight reduced by 10%) 4. The container must contain floral preservatives and later be used in the floral business 5. The container must have a 45% recycling rate at minimum

¹ Raveender Vannela, Are We "Digging Our Own Grave" Under the Oceans? Biosphere Level Effects and Global Policy Challenge from Plastic(s) in Oceans, 46(15) ENVTL. SCI. & TECH. 7932, 7932 (2012), available at <https://sustainability.water.ca.gov/documents/18/3334111/Ocean+Pollution.pdf>.

Figure 3: Measuring carbon intensity



This calculation assumes a two tonnes CO2 per tonne of plastic produced intensity
 Data source: BP

As an investor, simply assuming that the long-term demand for plastics continues to grow at historic rates is probably unrealistic. But if we are not going to continue to throw away hundreds of millions of tonnes of single-use plastics, what will we do instead? The answer many in the industry suggest is more incineration – burning single-use plastics for energy in high efficient conversion units. The trouble with this approach is that it is extremely carbon intensive when the ‘carbon cost’ of producing the plastic is included. Our estimates show that energy produced by incinerating plastics is more carbon intensive than burning hard coal!

Given the scale of the global outcry over limiting carbon emissions as well as plastic usage, incineration is unlikely to be the answer. This leaves governments with three options with innovation playing a key part in all three:

- 1) More reuse
- 2) More recycling
- 3) More substitution of other materials

Our research has led us to be optimistic on the prospects for all of these options and believe there is likely a role for each to play. All of these factors will ultimately depress demand for plastics in the long term. That’s great news for the environment, but what are the consequences for investors?

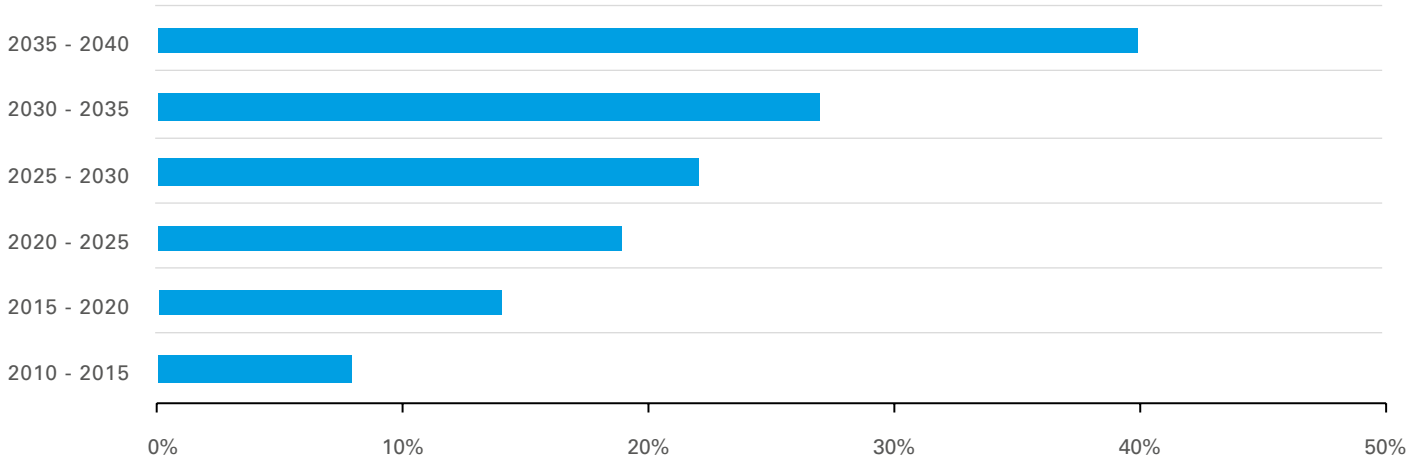
INVESTMENT CONSEQUENCE 1: PETROCHEMICAL COMPANIES

The petrochemical industry has a combined market capitalisation of over \$2 trillion dollars. This sector is currently engaged in a large capital spending program, building new chemicals plants all over the world, many of which have expected economic lives of 30 years or longer. If consumer demand for plastics grows more slowly than the industry expects, the industry would suffer from global overcapacity, which could potentially significantly affect profitability for this very capital intensive industry.

INVESTMENT CONSEQUENCE 2: OIL DEMAND

Petrochemicals demand accounts for around 6% of total oil demand today and is rising in importance. Despite this, a major global agency allocated just five out of around many hundreds of pages to the subject in its long-term outlook report on energy demand. For most forecasters, as long-term demand for oil used in transportation and power starts to slow down in favour of renewables, petrochemical demand becomes a very important component of total oil demand growth. For example, in the latest BP Energy Outlook, by 2035 petrochemical demand growth makes up 40% of all end-use demand growth for oil. Given the sensitivity of these forecasts to many small changes in assumptions, such as how many electric vehicles are sold in the intervening period, what happens to petrochemical demand globally matters a lot more than just those five pages of analysis would suggest.

Figure 4: Petrochemical demand growth as a share of all oil demand growth



Source: BP Energy Outlook, 2018

THE COMPLICATIONS OF ESTIMATING THE IMPACT ON OIL DEMAND

Plastics can be produced from one of three distinct routes – and each one has a different primary ‘source’ hydrocarbon:

- Coal (China)
- Oil (Asia and Europe, with Naphtha as an intermediate product)

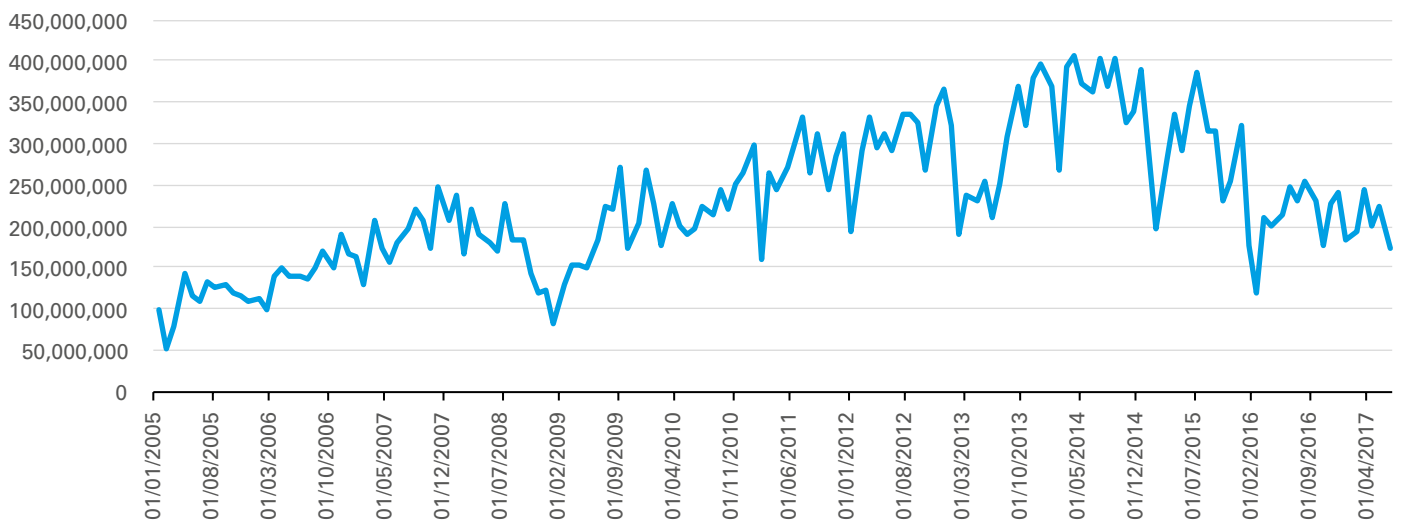
- Natural gas liquids (US and the Middle East where they have abundant sources of indigenous natural gas)

Therefore, predicting how much oil demand growth is threatened by a rise in a change in consumer behaviour and regulation is challenging.

What complicates the matter further is that the rise in environmental concern in Asia, particularly in China,

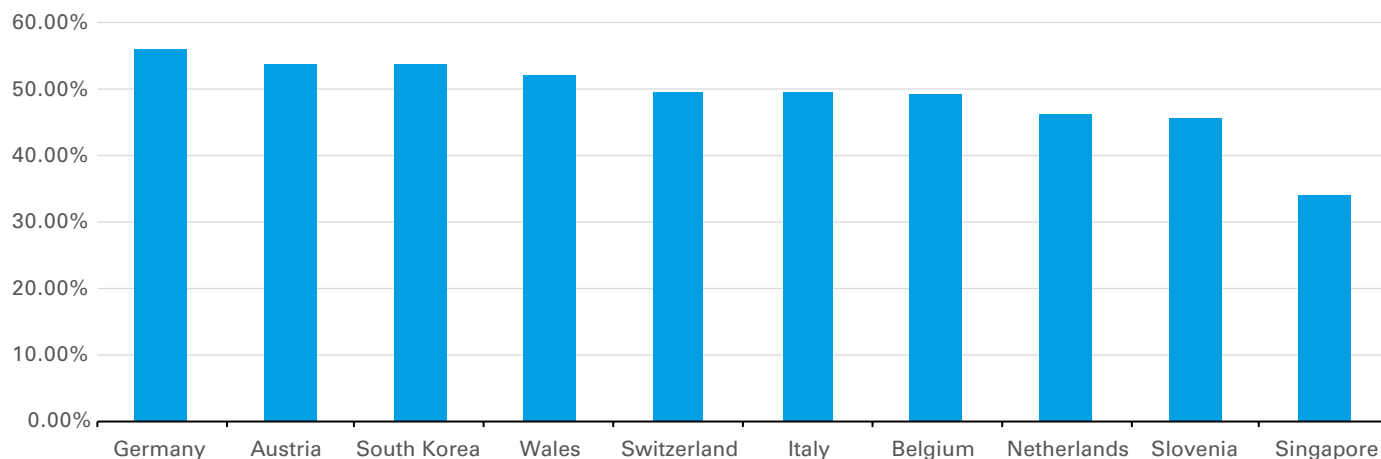
has reduced the appetite to import low quality recyclables. This has implications for Europe in particular as we export roughly half of all the plastic we collect for recycling and of that, roughly 90% goes to China. In the short term, we think this is likely to actually increase, rather than decrease demand for non-recycled plastics. We can see this already emerging in the data that shows a dramatic reduction in the quantity of plastics imported into China.

Figure 5: Total China plastic waste and scrap imports (Kg)



Source: Cheminfo.gov.cn

Figure 6: Adjusted municipal waste recycling rate



Source: Eunomia, EEB, Global Recycling Rates Report, 2017

Given how energy and labour intensive recycling is, and the environmentally harmful by-products produced, we think it is going to be difficult to find another home for this material.

However, in the long term we think an increase in both reuse and recycling is inevitable, as is substitution by biodegradable bio-plastic substitutes. There are big differences between forecasters' predictions and knowing how much demand will be reduced by in the long term but if the world can indeed make a significant improvement in recycling and reuse, an important component of global oil demand is at risk.

One approach is to look at what percentage of plastic packaging of various sorts is recycled in different

countries. Whilst less than 10% of all plastics globally are recycled, in some countries that number is far higher. For example, as far back as 2005 nearly 80% of all plastic bottles in Switzerland were recycled. While fair comparison of recycling rates between countries remains difficult, a recent study by Eunomia has shown a very wide disparity in recycling rates globally across even the top ten recyclers.

We calculate – as an illustration rather than a forecast – that if by 2025 the world were able to achieve a recycling rate of 50% of single-use plastics, and conservatively assume no improvement in reuse, substitution or thrifting, then 2.5 million barrels of oil equivalent of daily demand from petrochemicals would be 'at risk' on a gross basis.

To put this in perspective, the major outcome of the recent meeting of the Organisation of the Petroleum Exporting Countries (OPEC) was to increase oil production by just one million barrels per day.

Oil demand growth has played an important stabilising role historically in rebalancing markets when they become oversupplied. However, investors should recognise the risk that long-term oil demand growth cannot be relied upon as plastic and oil consumption is dramatically reduced. We cannot pinpoint when peak oil demand will arrive, but we are sure it will happen. The destabilising effect on oil markets will be profound and we believe that investors, and oil companies, need to start taking those risks more seriously.

Important Notice

The term "LGIM" or "we" in this document refers to Legal & General Investment Management (Holdings) Limited and its subsidiaries. Legal & General Investment Management Asia Limited ("LGIM Asia Ltd") is a subsidiary of Legal & General Investment Management (Holdings) Limited. This material has not been reviewed by the SFC and is provided to you on the basis that you are a Professional Investor as defined in the Securities and Futures Ordinance (Cap.571) (the "Ordinance") and subsidiary legislation. By accepting this material you acknowledge and agree that this material is provided for your use only and that you will not distribute or otherwise make this material available to a person who is not a Professional Investor as defined in the Ordinance.

This material is issued by LGIM Asia Ltd, a Licensed Corporation (CE Number: BBB488) regulated by the Hong Kong Securities and Futures Commission ("SFC") to conduct Type 1 (Dealing in Securities), Type 2 (Dealing in Futures Contracts) and Type 9 (Asset Management) regulated activities in Hong Kong.

The contents of this document may not be reproduced or further distributed to any person or entity, whether in whole or in part, for any purpose. All non-authorized reproduction or use of this document will be the responsibility of the user and may lead to legal proceedings. The material contained in this document is for general information purposes only and does not constitute advice or a recommendation to buy or sell investments. Some of the statements contained in this document may be considered forward looking statements which provide current expectations or forecasts of future events. Such forward looking statements are not guarantees of future performance or events and involve risks and uncertainties. Actual results may differ materially from those described in such forward-looking statements as a result of various factors. We do not undertake any obligation to update the forward-looking statements contained herein, or to update the reasons why actual results could differ from those projected in the forward-looking statements. This document has no contractual value and is not by any means intended as a solicitation, nor a recommendation for the purchase or sale of any financial instrument in any jurisdiction in which such an offer is not lawful. The views expressed in this document by any contributor are not necessarily those of the LGIM Asia Ltd affiliates and LGIM Asia Ltd affiliates may or may not have acted upon them.

The value of investments and the income from them can go down as well as up and investors may not get back the amount originally invested. Past performance contained in this document is not a reliable indicator of future performance whilst any forecast, projections and simulations contained herein should not be relied upon as an indication of future results. Where overseas investments are held the rate of currency exchange may cause the value of such investments to go down as well as up.

LGIM accepts no responsibility for the content of any website to which a hypertext link from this document exists. The links are provided 'as is' with no warranty, express or implied. We accept no responsibility for the accuracy and/or completeness of any third party information obtained from sources we believe to be reliable but which have not been independently verified.

Legal & General Investment Management Asia Limited, Unit 5111-12, Level 51, The Center, 99 Queen's Road Central, Central, Hong Kong.
www.lgim.com.

M1743_ASIA