



Plastic not so fantastic

Holistic approaches to removing single use plastics

As we all know, concerns about the environmental impact of single use plastics are at the forefront of consumer consciousness and increasingly business consciousness too.

It's easy to be cynical and assume that consumer perceptions are driving business's reputational risk awareness and reducing plastic in packaging and supply chains has becoming this year's top priority. However, it is clear that many companies really want to do "the right thing", albeit not at unlimited business or financial risk. There is a lack of consensus, however, about what is and the sense that in trying to do the right thing one could well end up doing absolutely the wrong thing. In such a volatile and uncertain space, with emerging technologies, a range of end-of-life options, multiple influencing groups and stakeholders with strong vested interests, it is as yet unclear which solutions will become ubiquitous and therefore where it will be best to invest.

It's a material science problem, yes?

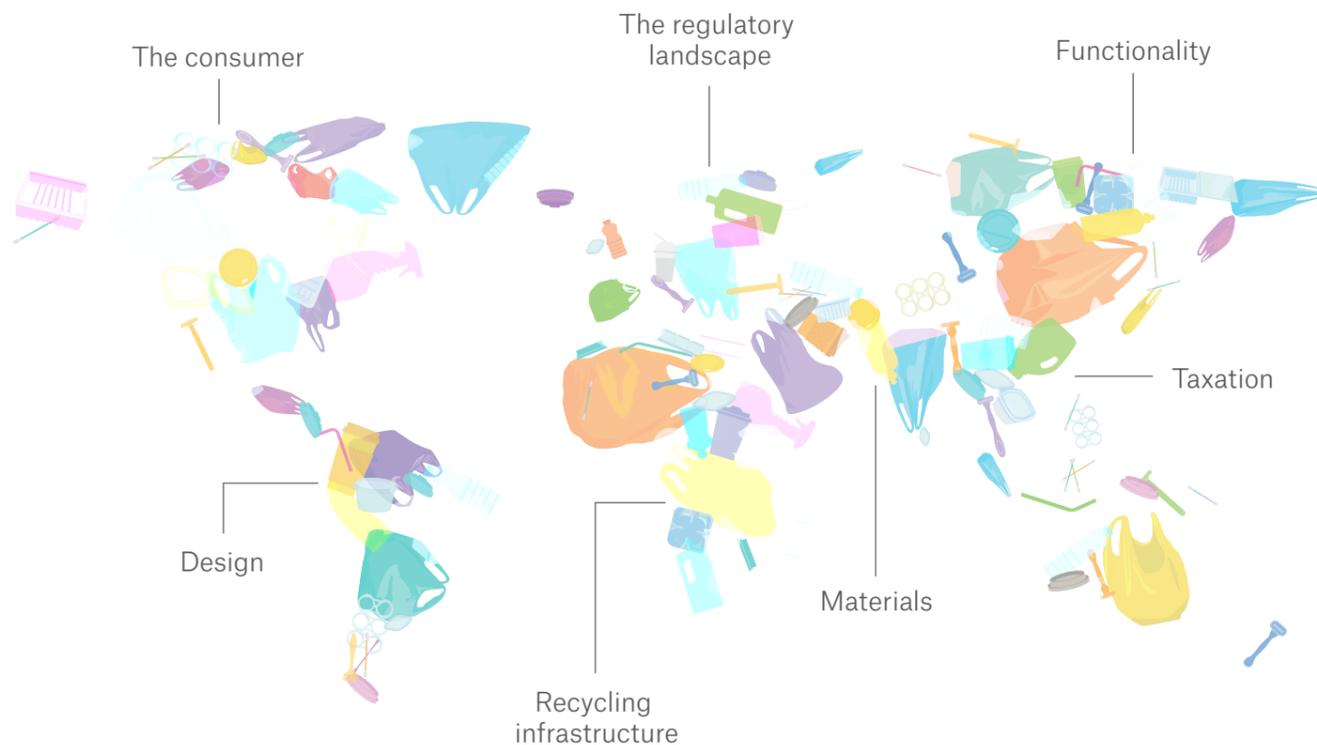
The first assumption is generally that this is about replacing plastic with something "nicer"; something that degrades naturally and without unpleasant emissions, or is truly circular – i.e. recyclable rather than a single-use solution that will persist on a beach long enough to shame its manufacturer thirty years hence. But that's the thing, it is not as simple as changing one material for another. The choice depends on functionality in terms of food quality and safety, shelf life stability and also in conveying brand messaging. Is it recyclable? Is it going to incur extended producer responsibility (EPR) tax? Is it regulatorily compliant? Is there a defined waste stream and infrastructure for recycling and do deposit return schemes (DRS) apply? Do consumers understand how to recycle or dispose of the material – all of these things are important for material/packaging sourcing.

The first assumption is generally that this is about replacing plastic with something "nicer"; something that degrades naturally and without unpleasant emissions. But that's the thing, it is not as simple as changing one material for another.



The Significant Seven

We believe there are seven key factors which organisations need to consider when putting together their end of life packaging strategies: the consumer; the regulatory landscape; functionality; design; recycling infrastructure; materials and taxation.



The consumer story

At the centre of the piece is the consumer. Opinion formers and leaders such as David Attenborough in the UK, the Ellen MacArthur foundation and former US Vice President Al Gore are driving public opinion. Brands fear reputational damage should they be deemed laggards in delivering a sustainable solution to single use plastics. Brand tarnishing, with associated sales downturns or product boycotts, is clearly the worst outcome. Potentially there is competitive advantage from being seen to be a leader here, indeed there is growing evidence for the success of a brand which has a clear purpose in terms of its contribution to society. For many brands, however, this is perceived as a cost programme rather than an investment one.

But the consumer can be fickle. A consumer may want a product in less environmentally-damaging packaging but will they pay more for it – how much more? Will they continue to buy the product if it is less shiny, has a shorter shelf life, or melts in their hand? Educating consumers, both as to the nature of packaging and how to dispose of it, is going to be an important part of defining any strategy and will undoubtedly need to be coordinated between government and industry.

But the consumer can be fickle. A consumer may want a product in less environmentally-damaging packaging but will they pay more for it – how much more? Will they continue to buy the product if it is less shiny, has a shorter shelf life, or melts in their hand?



Regulation

While the consumer is clearly driving change in the industry, regulation will undoubtedly shape how, and how quickly that change occurs. Regulation is one of the hardest challenges because not only are individual countries responding differently so it is unlikely that one solution will fit all, but also it's a moving target. To some extent manufacturers are assessing regulatory futures – what is the likely regulatory framework going to look like in five or ten years' time?

Regulation encompasses a broad range of areas: what is actually defined as plastic, defining producer responsibility and labelling of packaging for recycling, as examples. Governments are keen to be seen to be active in tackling plastic waste but different governments are taking action in different ways, including in the application of the EU Single Use Plastics Directive in individual European countries.

An example of where different regulatory jurisdictions are taking quite different approaches is in food and beverage. There is considerable focus, for obvious reasons, on food contact materials and to what extent recycled plastics can be used for packaging which comes directly in contact with food. In the EU, in order to use a recycled polymer film in a food contact application, it needs to be approved by the European Commission. This process requires the European Food Standards Authority (EFSA) to give a positive scientific opinion on a polymer

type and recycling process. It has to approve the company that has the recycling technology that produces the particular polymer and that it can be used in a particular food application. Then the Commission itself has to sign this off. In fact, this is something which it has been extremely unwilling to do – despite EFSA approving over 140 products/processes for applications submitted since 2009, the Commission has not rubber-stamped any of them.

The EU approach is in contrast to the prevailing orthodoxy in the US. Where the EU is hazard-based – with no tolerance for any kind of issue with the product notwithstanding the likelihood of its manifesting, the US is risk-based in its approach. This means it takes into account the likelihood of a poor outcome rather than just its theoretical possibility. So a US-based approach is unlikely to be viable in the EU.



Function

In creating consumer friendly products and in complying with regulation, manufacturers cannot ignore the basic functions that packaging has to perform. The truth is that plastics do the job incredibly well. Plastic packaging is cheap, has a stable structure, carries graphics well, looks nice, provides a reliable barrier to protect food contents, lasts years even decades but provides long lasting protection for the product inside, is light, is easily shaped, and comes in so many formats to do so many jobs. Businesses have hitherto operated on what is the functionally perfect packaging - maybe now they need to operate on what's the bare minimum packaging. Unless a technical solution presents itself, it is likely that product shelf-lives will be reduced with a knock-on effect on logistics, delivery systems and the consumer.

Design

There are two considerations when looking at design of new packaging – changing the design to enable materials to be recycled and/or designing for end of life (re-use).

If proposed taxation changes take effect then it is likely that businesses will push R&D to find solutions where a stream of recycled polymer is readily available, can be readily recycled, can be easily incorporated into packaging design and which can be made fit for purpose.

However it's not all about the material – Design for Environment (DfE) – i.e. designing for end of life is a relatively new concept and requires the designer to understand the nature of the recycling schemes in addition to materials properties and design principles so that they can be designed effectively. (See for example OECD guidance on efficient waste management for EPR in which Part II Chapter 5 discusses means by which taxation regimes can help to incentivise Design for Environment.

Plastic packaging is cheap, has a stable structure, carries graphics well, looks nice, provides a reliable barrier to protect food contents, lasts years even decades but provides long lasting protection for the product inside, is light, is easily shaped, and comes in so many formats to do so many jobs.



Recycling infrastructure

One of the issues with designing packaging for end of life is that recycling schemes vary hugely between countries and within countries. Understanding the recycling process and infrastructure in which your product's packaging will end up is critical. If you change the packaging to reduce its plastic content but this means that it can't be automatically detected in a sorting plant or Material Recovery facility (MRF) it will end up in landfill.

Historically, recycling has mainly been mechanical –and the quality of the plastic going in impacts the quality of what comes out. In an ideal world it would take the article back to its constituent polymers and reuse those granules in new materials. In practice, mechanical recycling shreds material and forms it into pellets. If a single stream of material went in then there is the possibility of recycling into similar articles, if not, as is often the case, it is downgraded into lower value materials such as textile fibre, plant pots and park benches. Generally speaking, each successive generation of plastic is of lower quality than the last and less usable in multiple functions.

Chemical recycling promises to take plastics back to their original building blocks to create totally new plastics or energy, (although the latter is in itself controversial). It involves taking the waste plastic materials to 600 degrees Celsius, cracking the substance over a catalyst and producing monomers. There are various initiatives going on under this approach and these will need to be cross industry and even pan industries if the oil & chemicals companies become involved. It is a very immature technology for most applications, including food packaging, and is not currently technically or commercially viable. But this type of innovative thinking is bound to gain traction.

One of the issues with designing packaging for end of life is that recycling schemes vary hugely between countries and within countries. Understanding the recycling process and infrastructure in which your product's packaging will end up is critical.



Taxation

The British Government is seen to be world leading with its announcement of a plastic tax to be levied on brand owners that place plastic packaging on the market, with less than 30% recycled content. It is envisaged that this will increase demand for recycled plastics. The tax will likely take effect from 2022, although it is still in consultation with industry. It is reasonable to assume that, as with the sugar tax, this is unlikely to be a single country initiative. Plastic and food & drink manufacturers are unlikely to be happy about such financial disincentives especially if suitable products with greater than the threshold 30% of recycled plastic are not available or not legal in the food applications they support. Governments do need to ensure that regulation keeps step with taxation or the industry will simply feel chastised.



Materials

One of the joys of plastic is the number of different forms that it can come in that are suited to specific jobs but the corollary of this is that there are many material sciences challenges to overcome in making it reusable or recyclable. For PET bottles, for example, understanding the technical challenges of the number of recycling cycles possible before the material loses essential functionality is important. Black plastic, which though technically recyclable, is very difficult to sort through optical sorting. Films, which consist of multiple layers of different polymers optimised for sealant and barrier properties, are very difficult both to handle and to separate into constituent parts at end of life.

In response to pressure from consumers (and increasingly regulators) many manufacturers are considering compostable and/or biodegradable materials. But are these the right choices where industrial composting infrastructure may be nascent and consumer confusion at point of collection of material may well lead to contamination of recycling streams?

Finding Solutions

The multi-faceted nature of the problem, as we outline above, means that companies need to define policy, strategy and planning carefully - taking into account the complex factors which will affect their brands, supply chain, product range and consumers. Companies will be impacted to varying degrees and will be at different stages in their planning, leading some to seek to actively influence governments in their key markets.

Whose problem is it?

In many companies reducing the use of plastic is a top down policy, driven at C-level in response to brand reputation and a regulatory agenda which mandates "polluter pays", often with a target and a deadline for action. Once the commitment has been made and the deadline set, the initiative results in a multitude of projects in different functions of the business - often without coordination around an agreed strategy. It's a knotty issue because so many teams could be involved - supply chain, procurement, regulatory, finance, brand/marketing, corporate communications but actually defining solutions will often end up at the door of R&D.

Pan industry collaboration

Many companies are involved in and interested in cross-industry collaboration. Some companies view the issue as pre-competitive and would welcome joint ways of solving problems. Certainly industry does not want to end up with consumer and taxation obligations which are at odds with regulatory imperatives or recycling infrastructure realities. Understanding all the factors that are shaping this industry transformation is vital in deciding corporate policy.



How we can help

Oakland is a science and technology, front-end of innovation consulting company helping clients derive most value from their investments in science and technology.

We bring together unusual skills across our business: we have highly skilled scientists (chemists, physicists, mathematicians, materials scientists, toxicologists, microbiologists, food scientists and more); food safety experts; regulatory consultants specialising in food & beverage and chemicals; consumer insight professionals; engineers (software, mechanical and electrical); researchers and domain experts. Combining these different perspectives, we can guide you through most aspects of the plastics challenge.

We can help:

Research and shape your strategic position and response to government or industry consultation exercises

Assess the state of play in different geographies across all different facets of plastic use from consumer understanding to government policy to the state of current infrastructure

Identify and sequence different initiatives to meet corporate deadlines and targets

Review and critique your plans, roadmaps or projects

Assess the impact of new regulation on your portfolio of packaging materials and R&D initiatives

Undertake technology landscapes for materials or recycling schemes to help you establish what is out there and how you could benefit from it

Identify emerging suppliers, partners or acquisition targets with promising, new technology options

Provide regulatory advice for most geographies to apprise you of the state of legality of recycled plastic for food use

Navigate regulatory approvals if you have new technologies which you wish to market

Benchmark the sustainability of existing packaging

**oakland
innovation**

a **science group** company

E info@oaklandinnovation.com T +44 1223 507500 oaklandinnovation.com