Policy Position

Plastic Waste

September 2019

There is a growing awareness of the impact of plastic waste upon the natural environment, and citizens and governments are increasingly calling for a move towards circular economy models to make better use of our natural resources. Many companies, charities and individuals are making welcome commitments to reduce or eliminate plastic packaging. In parallel, scientists are working to develop new types of materials, as well as new methods for recycling plastics, both to reduce the environmental impact of plastic waste and to ensure that useful functional materials remain in the economy for longer.

Beyond packaging, plastics and polymers are also used in construction, vehicle manufacture, fishing, agriculture, clothing, medical products and consumer goods. Since their discovery a century ago, plastics have become integral to our everyday lives. Because they are light, strong, versatile, cheap and have low toxicity levels, they have delivered many benefits for our society, such as radical improvements in medical technology and food handling, as well as reducing carbon emissions for transportation. However, the properties that make plastics so useful have led to an explosion in the amount of plastics that we use, and in the amount discarded carelessly, with adverse impacts on the natural environment. For plastics to continue to benefit us, whilst mitigating environmental harms, the RSC recommends that the implementation of Resources & Waste Strategies is based on the following principles:

1. Introduce measures that focus on **reduce and re-use**, following the 'waste hierarchy', before recycling and eventually discarding;
2. Government, academia, industry and society **working together** to achieve a circular plastics economy;
3. **Invest in research and innovation** (R&I) so researchers can address fundamental questions, develop new materials, understand impacts on the environment and develop circular economy strategies;
4. Make ecodesign and effective product labelling part of **product requirements** to faciliatate plastics re-use and recycling;
5. Use lifecycle analysis (LCA) to ensure that government (and manufacturer) decisions are based on assessment of the full environmental impact of plastic materials, particularly biodegradable plastics.

What do we mean by 'Plastics'

'Plastics' is a broad term encompassing a range of different materials. Plastics are complex composite materials, combining polymers with other chemical additives (including plasticisers, dyes, fire retardants, or antioxidants) to confer specific properties. Polymers commonly used in plastic packaging and in other applications include polyethylene (PE), polypropylene (PP), poly(ethylene terephthalate) (PET), polyester, Nylon, polyvinyl chloride (PVC) and polyurethane.

1. **Reduce and re-use: following the waste hierarchy**

Plastics are useful and important materials, and can be the most environmentally friendly choice in many applications due to their light weight and durability. They often have a lower CO_2 impact in manufacturing and transportation than alternative materials (for example, cotton, glass, paper or metal). We can and should continue to use plastics to make the most of these benefits, while reducing the amount of plastics discarded by ensuring they retain their value for longer. Measures to this effect should follow the waste hierarchy and focus on reduction and re-use as well as on recycling. This includes creating societal awareness to reduce plastics use, promoting re-use through deposit return schemes, alongside support for technologies, incentives and regulations that promote plastics recycling.

2. **Working together: enabling a circular plastics economy through 'Quadruple Helix' collaboration**

Plastic waste is a problem that is interactive in nature, influenced not only by science, but by economics, policy and consumer behaviour. A 'Quadruple Helix' model should be pursued, whereby government, academia, industry and society work together to address the challenges posed by plastic waste. This includes finding ways to enable us to move away from take-use-dispose models, investing in applied and discovery research into new materials and recycling technologies, developing regulation and incentives to promote the use of recycled plastics in new products, and enhancing producer responsibility requirements to facilitate effective tracking, management and recycling of plastic waste.

3. **Invest in R&I: addressing challenges related to plastics use and disposal**

Investment is needed to support early-stage research into the chemistry of plastic materials and their alternatives, in order to reduce the use of plastics and the cost of recycling plastics.This will help develop a circular economy by reducing our dependence on raw materials and reducing the impact of waste from plastics that are already in use. Investment should also be made available to support the monitoring, analysis and measurement of plastic waste in water, soil and air, and to understand its impacts on the environment and on our health. Interdisciplinary and international collaboration will be an essential part of these research efforts due to the global nature of the problem.

4. **Ecodesign & product labelling as part of product requirements: facilitating plastics re-use and recycling**

Ecodesign should be made part of product requirements to ensure that products and components are made durable, repairable and reusable. Effective product component labelling also should be required so recycling companies can identify and direct components to the appropriate recycling route. Effective labelling would also incease traceability of plastics in supply chains and could be used to better inform consumers on re-use and recycling options.

5. **Lifecycle analysis: assessing overall environmental impact**

Policymakers and manufacturers should use evidence and lifecycle analysis (LCA), to assess the total environmental impact of materials and product design choices across all stages, from manufacturing, transport and use, through to recycling and disposal. There is an urgent need for the broader environmental picture, including LCA, to be consistently considered in policy decisions on material choices and plastics. Increased investment also is needed into LCA research, including database technologies, to develop more robust methods of measuring environmental impact.
In particular, bio-derived and biodegradable plastics in some cases have a greater climate change impact than conventional plastics due to more energy-intensive production processes, and their impacts as a replacement for conventional plastics must be considered on a lifecycle basis.

Contact

The Royal Society of Chemistry would be happy to discuss any of the issues raised in our statement in more detail. Any questions should be directed to policy@rsc.org.