

Alternatives to single-use plastics: Lay Summary

Results available: Results available

Area of research interest: [Innovative regulator](#)

Research topics: [Food contact materials](#)

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This rapid evidence assessment undertaken by RSM UK Consulting LLP (RSM) and Dr Samuel Short (University of Cambridge) aimed to develop an understanding of the alternatives to single-use plastics in food packaging and production in terms of their risks and opportunities, as well as potential future developments. Literature from within and beyond the UK was gathered from academic databases and reports published by government and non-governmental organisations such as environmental charities. Evidence from the literature was supplemented by findings from a workshop with experts in the field from a variety of industries such as academia, manufacturing, and government.

Two broad groups of alternatives were established: material/product alternatives (traditional materials, natural fibres, biopolymers synthesised from biomass, biopolymers synthesised from bioderived monomers, biopolymers produced by microorganisms) and, and system/process alternatives (reducing, reusing, and recycling food packaging and, active and intelligent packaging). These alternatives and systems vary considerably in terms of their properties, such as effectiveness as a barrier to moisture or contamination, convenience for consumers, production costs, and potential for commercialisation. Our review also highlighted gaps in the current knowledge, for example in terms of consumer acceptance and carbon footprint at each stage of their life cycle.

The capacity to produce bioplastics (i.e. biopolymers that look and feel similar to conventional plastics but are made from natural materials rather than fossil fuels and are biodegradable or compostable) is anticipated to increase globally from 2.1 million tonnes in 2019 to 6.3 million tonnes by 2027. This growth appears to be enabled by increased consumer awareness of environmental issues and existing regulation and legislation encouraging the development and establishment of a circular economy. However, there are barriers that may challenge this growth. These include already established industry regimes, high production cost of novel materials and a lack of waste management guidance.

Overall, fossil-based conventional plastics are a very cheap, versatile material compared to the alternatives currently being developed and tested. Because of this, they might remain the preferred industry choice for certain applications, while alternatives continue to be optimised and commercially scaled. To add to this, the reviewed evidence suggests that there is unlikely to be one single solution to the single-use plastics problem. The solution will likely draw on a range of materials and systems depending on food type and context.