

Strategic Materials for a Low-Carbon Future: From Scarcity to Availability
2-3 November 2017 – Session Summary

Breakout 3e: Plastics in a zero-carbon world

To increase resource efficiency, complex plastics are increasingly replacing heavier metals. Many hybrid or electric vehicle makers are investigating the use of carbon-fibre reinforced plastic (CFRP) bodies. How do we ensure those new plastics, and the products that contain them, are designed to be recycled or re-used? What is the climate and waste impact of a shift from metals to complex plastics? How can plastics be incorporated in new uses? How can the use of recycled plastics vs the use of virgin plastics be incentivised when virgin plastics are cheaper at current oil prices? What can be done with plastics that can't be recycled?

Gary Leeke, Chair in Chemical Engineering and Head of the Bioenergy and Resource Management Centre, Cranfield University

Pascal Peslerbe, Deputy Manager of 2EI, Development and Innovation Department, Veolia

Moderator: Julie Hill, Chair, WRAP (The Waste and Resources Action Programme)

- Plastics are readily recycled, but virgin plastics currently use oil as a feedstock, and plastics generally have low recovery rates. Future plastics such as carbon-fibre reinforced plastics (CFRP) may be more complex and hence difficult to recycle. CFRP in the automotive industry is 50% lighter than steel but costs twice as much; it's 10 times more expensive than aluminium but 30% weight saving, which contributes to fuel efficiency.
- Technical solutions exist to recycle CFRPs, ranging from mechanical grinding so the material can go into lower-value products, to pyrolysis of production scrap for other uses such as car roofing, to solvolysis (pressure and heat) that can break down and reclaim military-grade composites and recover ammonium and phenol used in the process. One technical action point is to develop depolymerisable thermosets.
- Ideally, complex plastics would be traceable and upcycled, and eco-design would incorporate both previously-used materials and design for recyclability.
- Speakers received questions about standardisation and managing complexity brought about by the difference in use cases; the energy efficiency of recycling CFRPs; and how to address developing-country plastic waste. Pascal Peslerbe pointed out that while there are tens of thousands of different polymers on the market, it's possible to collaborate with a few large manufacturers such as Unilever to reduce the range of polymers. Gary Leeke

noted that the amount of energy used to recycle carbon-fibre plastics competes well with metal recycling, while the embodied energy in CFRPs is wasted if they are not recycled.