

2<sup>nd</sup> World Congress and Expo on

# Recycling

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### Recycling of carbon fibre: Re-use and Re-manufacture

With the ever increasing use of Carbon Fibre Reinforced Composites (CFRCs), there is growing concern regarding the level of waste the industry is expected to produce. Approximations vary, but some estimates state that the demands will increase by 10% per year from 78 kT in 2014 to 150 kT in 2020. In addition to various products reaching end-of-life, there is also the necessity to dispose of waste generated from the manufacturing process, which can be up to 40% of all the material needing reprocessing. Despite being a relatively cheap disposal method at £82.60 per ton in the UK, landfill waste is the least preferred option and is already outlawed in Germany with other countries expected to follow suit. Commercial recycling technologies for CFRCs focus on the use of pyrolysis but do not effectively close the loop due to the loss of the polymer matrix which is typically about 50% wt. Chemical recycling (solvolysis) uses an appropriate solvent to depolymerize the resin and release the fibres and eventually, the fillers or inserts. This approach enables the recovery of monomers and other chemicals from the resin and high-quality fibres. In this presentation, the viable recycling methods are presented and discussed together with their LCA. Demonstrator products manufactured from fibres recovered after a solvolysis recycling process are presented in particular materials with randomly distributed carbon fibre tows and materials with realigned carbon fibre tows of which the mechanical properties were measured. The results are discussed in relationship with the material structure and composition.

### Biography

Gary Leeke is the Chair of Chemical Engineering and Head of Bioenergy and Resource Management Centre at Cranfield University, UK. His research interests lie in the areas of recycling enabling technologies and resource efficiency. He has expertise in high pressure engineering and thermo-chemical processing, specifically in reaction engineering, separation technology, flow reactors, and their applications to polymer/composite processing and remanufacture, mixed plastic waste and the circular economy. He also leads the Exhume Project in UK investigating the deconstruction of fibre reinforced composites. He sits on the Composites Leadership Forum sustainability working group for composites UK.

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