Other capturing techniques involve incorporation of carbon dioxide into existing polymeric materials. For example, polyurethanes may be produced using polycarbonate and polyether carbonate polyols that incorporate carbon dioxide into the carbonate backbone. Such use of carbon dioxide not only prevents its escape into the atmosphere but also utilises it in a practical application thus making capture more economically viable.

Biofuels

Fossil fuels continue to be our primary source for energy and feedstock chemicals. Global carbon emissions from fossil fuels account for ninety percent of all emissions from human activity.[3] Biofuels can play an essential role in reducing carbon emissions from transportation and are an important form of renewable energy. Examples of biofuels include biodiesel, bioalcohols, bio-dimethyl ether, bio-oil, biogas and biohydrogen.[4] Their production often involves innovative catalytic process technology. In addition, their use may involve a range of additives to reproduce or harness performance.

Biofuels are not without problems. Biofuels have a lower energy density and are often made from potential food crops or grown where a food crop could be grown instead. Current research is aiming to develop more sustainable and efficient biofuels, known as advanced biofuels from non-edible, lignocellulosic (woody) biomass, such as agricultural wastes or forestry residues.[5]

Hydrogen

Hydrogen is carbon-free, non-toxic, and can be used to generate heat or electricity wherever it is needed leaving behind only water vapour or molecular oxygen rendering the process environmentally benign. However, an on-going issue is how to make it in the first place. Most hydrogen today is still generated by heating coal and natural gas with steam, but this process emits significant amounts of carbon dioxide, potentially nullifying hydrogen's eco-credentials.[6]

This method could be coupled with carbon capture and storage technology, however firstly, further research is focusing on the development of efficient catalysts for use in electrolysis of water, a process in which molecular oxygen is the only by-product. The widespread use of fuel cells will likely lead to new innovations related to their use such as from adaptation of the materials of production for longevity to novel gasket seals for the interfaces.

Improvements to existing technologies

As well as the development of new products and processes such as those described above, a great many inventions arise from improvements made to existing products and processes in order to reduce energy use, avoid harmful by-products and minimise waste.

The Future

As outlined above, we expect to continue to see an increase in green innovation in the industrial chemical field driven by political pressure, legislation and consumer expectation.

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Patent Box scheme

As provided in the recent UK budget announcement, the UK corporation tax rate is set to rise from 19 to 25 percent from 1 April 2023. As a result, companies should now be thinking about whether they can make use of the tax relief provided by the Patent Box scheme.

In episode 15 of The Greenshoots Podcast by intellectual property firm Appleyard Lees, partner and patent attorney David Walsh is joined by Tom Dewes, Patent Box specialist and corporate tax partner with leading audit, tax and consulting firm RSM. David and Tom discuss: What is Patent Box? | How does a company qualify for Patent Box? | How is the tax relief accrued? | What types of patents does the tax relief apply to? | Can multinational organisations benefit from the tax relief?

Alternatively, this briefing note outlines key areas for consideration.