

Chemistry for Tomorrow's World

Energy conversion and storage



The performance of energy conversion and storage technologies, such as fuel cells and batteries, needs to be improved to allow better use of intermittent renewable electricity sources, for example solar and wind power. These forms of energy offer huge potential but their supply is intermittent, depending on the time of day and year; therefore methods are needed to store the energy ready for conversion into a convenient form, such as electricity, at a later time.

Improved energy storage methods are also vital to the development and wide-spread deployment of low-carbon transport. Without this, the global carbon dioxide emissions associated with road transport are set to double from the level in 2000 by 2050.¹ Sustained investment in research is vital and it is essential to link developments in fundamental science with efforts to exploit technologies.

How can the chemical sciences help?

- While methods already exist to store energy from renewable sources, further development of current technology is required to enable widespread application.
- For technologies such as batteries, the life span, recyclability and durability must be improved. By producing better batteries, and encouraging the move to recyclable materials, their adverse impact on the environment will be greatly reduced.²
- The chemical processes that occur within storage devices such as batteries must be fully understood so that when designing new components their performance can be optimised.
- The amount of material used in manufacturing current and new storage devices must be reduced and optimised to prevent draining finite resources. This can be achieved through the development of nanotechnology and smart materials, which are tailored to specific uses.
- If scientists can further understand the materials used and the processes involved in fuel cell technology, portable fuel cells could result in a sustainable transport solution where the predominant emission will be clean water.

About the RSC & Chemistry for Tomorrow's World

The Royal Society of Chemistry (RSC) is the leading society and professional body for chemical scientists. Over 2008 and 2009, it gathered expert views to identify priority areas where the chemical sciences can play an important role in the development of society.

For more on this initiative please visit our website:

www.rsc.org/roadmap, contact us at **roadmap@rsc.org** or call the RSC science team on +44 (0)1223 432424.

¹ King review of low carbon cars, part 1: The potential for CO₂ reduction, HM Treasury, 2007
² Parsons D (2007): The Environmental Impact of Disposable versus Re-Chargeable Batteries for Consumer Use. Int J LCA 12 (3) 197–203