

Chemistry for Tomorrow's World

Nuclear energy

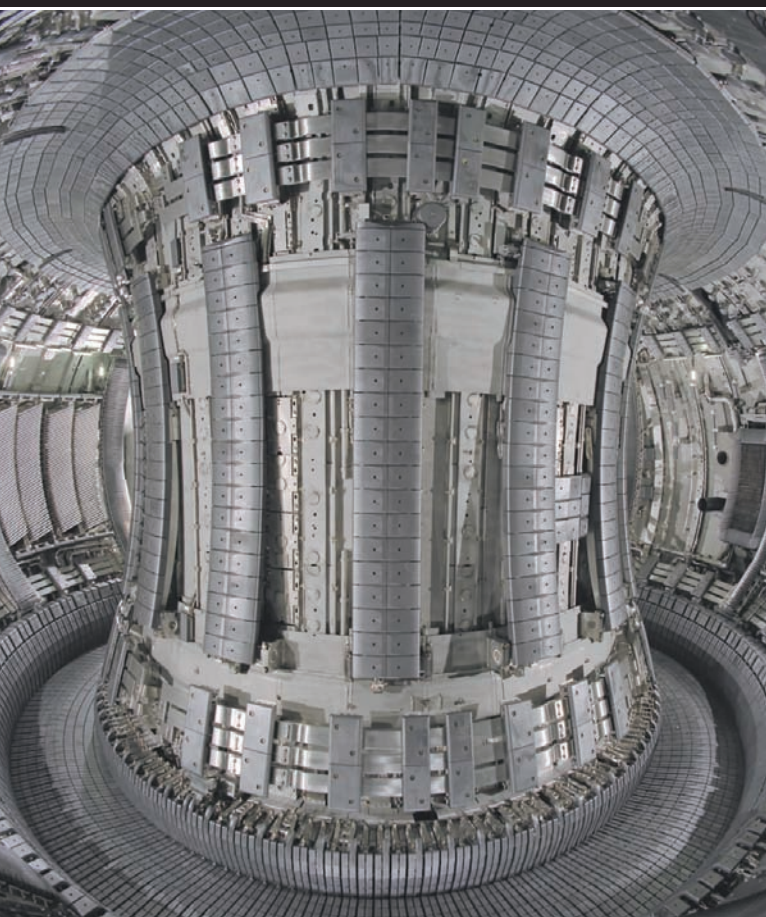


Image: EFDA-JET

Nuclear energy generation is a critical medium-term solution to our energy challenges. It accounted for 16% of global energy generation in 2005¹ and without existing nuclear power stations in the UK for example, carbon emissions would have been 5-12% higher in 2004.²

The technical challenge is for the safe and efficient harnessing of nuclear energy by further developing the currently employed fission technologies and exploring the future possibilities for fusion technologies. It is vital that research is adequately supported in this area, including strategies to ensure a strong pipeline of trained chemists.

How can the chemical sciences help?

- Chemists need to improve the understanding of how radiation affects materials, such as by causing fatigue, stress and corrosion; this would lead to the development of more efficient and even safer technologies.
- Before nuclear capacity is increased, safe methods for handling and processing spent fuel must be developed. If nuclear waste can be suitably managed, the scale on which nuclear energy can be implemented could significantly increase.
- For nuclear energy to be a viable long-term option, new generations of nuclear plants using new technology and new fuels will need to be developed as global reserves of standard fuels begin to dwindle.
- Nuclear *fusion*, a technology currently in the research and development stages, offers the same carbon savings associated with currently employed *fission* technologies, with the addition of more efficient energy production and the possibility of safer waste products. The chemical sciences will be vital in bringing fusion technology to a feasible scale. Chemists must work with physicists to understand and develop the processes, and with engineers to design materials capable of withstanding the extreme operating conditions involved.

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 IPCC Fourth Assessment Report: Climate Change. Mitigation of Climate Change, Chapter 4 Energy Supply, 2007

² The Role of nuclear power in a low carbon economy, paper 2: Reducing CO₂ emissions – Nuclear and the alternatives, Sustainable Development Commission, 2006