

# CHINA - SCIENCE AND INNOVATION

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**China is on a path to becoming the world's second largest economy and its impact on innovation and markets matters to UK innovators and researchers. It is already our largest market for goods outside the US and EU and the UK is its largest cumulative European investor. Major companies, such as GSK, BP, Unilever, AstraZeneca, Vodafone and Rolls Royce, already invest substantially in technology and research.**

China has set independent innovation as a top national priority. Rebuilding the nation's innovation infrastructure from a base of mass, low cost manufacturing will be challenging. If the UK collaborates in this process it can facilitate future partnership in innovation and trade.

China is a highly important science partner. It quadrupled its output of research papers in a decade and has overtaken the UK as world Number 2. In citation performance, its world share is already over 10% in physical sciences and above 12% in engineering, in 2007 outranking France and Japan in the number of top three places in major research fields<sup>1</sup>.

China is a key partner in science and innovation to help solve global challenges – whether climate change, pandemic disease or food and drug safety. It is itself a potential source of infectious disease such as SARS or avian flu and accounted for nearly three

quarters of growth in world energy consumption in 2008. It burns 43% of the world's coal, produces 37% of the world's steel and emits 25% of greenhouse gases from nitrogen fertilisers.

For reasons of promoting scientific excellence, economic growth and sustainable development the UK has much to gain from its engagement.

But China stands to gain too. Twenty-five years of UK support for university research partnership have built strong links with excellent UK science. There is strong interest from Chinese partners in world-class UK research and its record in developing effective policy. University-driven partnerships are growing, including joint postgraduate degree programmes and research collaborations. According to Thomson Reuters, over 3,000 scientific papers in 2008 included Chinese and UK authors, more than with any country apart from the US. Recent UK investments include £10m in renewable energy research from the Engineering and Physical Sciences Research Council and £10m in a Carbon Trust Joint Venture to commercialise low carbon technologies.

In addition, bilateral projects in innovation, research management and intellectual property reflect the benefits to China of working with the UK on science and innovation policy and practice. Chinese

researchers engaged extensively in follow up from the Foresight projects including Flood and Coastal Defences and Infectious Disease. The Sustainable Agriculture Innovation Network brings together research and policy making at Vice Ministerial/Chief Scientific Adviser level. And a £4.8m programme in Chinese climate change adaptation led by the Department for International Development is being launched this month.

But challenges remain. Intellectual property management and market access remain an issue for UK investors and innovators. The World Bank ranks China 89th in the world for the ease of doing business. Balanced co-operation in research and in opportunities for industrial innovation should go hand in hand and benefit both parties. Both the UK and Chinese research systems have complex structures for decision making and funding that create obstacles to a strategic approach for exploiting benefits. Differences in national funding can hamper development of joint PhDs. The speed of China's rise in science poses challenges in identifying promising opportunities for UK researchers. And there are some signs of overheating in China's science, with reductions since 2005 in citation impact and impact of joint publications with the UK<sup>1</sup>.

The UK seeks constructively to support, influence and benefit from China's development.

Commitments at Prime Ministerial and Ministerial level include increasing investment, joint scientific papers and joint funding. They also include sectoral initiatives such as on food security and sustainable development.

Working with other UK agencies, the Science and Innovation Network in China promotes greater transnational innovation – through policy collaboration, bilateral programmes and sectoral initiatives. It uses science to address climate change, sustainability, health and food security. The Network is identifying areas where excellent research can be supported by new funding opportunities, focusing mainly on climate change, energy and the environment, stem cell and regenerative medicine, infectious disease, nanotechnology, materials and space. Recognising the lack of awareness in the UK, the Network is working across the country to identify what China can offer in science and technology and promote this to UK partners. And it is exploring the scope to improve the framework for University-led research partnership.

This agenda is challenging to deliver across such a large country, but critical to the UK's long term interests.

<sup>1</sup> International comparative performance of the UK Research base, Evidence, July 2008 for Department of Universities, Innovation and Skills

