



清华大学中国科学技术政策研究中心  
China Institute for Science and Technology Policy at Tsinghua University



**US** University  
of Sussex

Innovation, Sustainability, Development: A New

**MANIFESTO**

# UK-China Innovation for Sustainability and Equitable Development

Report of a workshop held at Tsinghua University School of Public Policy and Management,  
Beijing, 19<sup>th</sup> March 2010

Produced by:

Adrian Ely, SPRU – Science and Technology Policy Research, University of Sussex

With special thanks to the following for their contributions:

Yantai CHEN, Lars Frederiksen, Shulin GU, Michael Harris, Geoff Oldham, Fred Steward,  
David Tyfield, Frauke Urban, Lan XUE

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## **Executive Summary**

China is taking the lead within the G20 for investment in 'green' (primarily, but not solely low-carbon energy generation) technologies, and making significant efforts to re-align its innovation system to contribute to building a harmonious society. At the same time, the UK has identified innovation as a crucial tool not only in its emergence from the recession but also in response to global challenges of poverty reduction and environmental sustainability.

The workshop on 'UK-China Innovation for Sustainability and Equitable Development' was hosted by the CISTP (China Institute for Science and Technology Policy) (Tsinghua University) and held with the ESRC STEPS (Social, Technological and Environmental Pathways to Sustainability) Centre (University of Sussex) in Beijing on 19th March 2010. The workshop aimed to develop links between UK and Chinese scholars and decision-makers working in these areas, and to provide a forum for discussing experiences and putting forward recommendations for bilateral co-operation on innovation policy, and was covered in the Chinese national press. The workshop was held as part of the STEPS Centre's international project 'Innovation, Sustainability, Development: A New Manifesto' (<http://anewmanifesto.org>).

**The day's discussions generated a number of policy recommendations, each of which require further bilateral discussion and collaborative research before their introduction at various levels:**

### **International reforms**

- Global Science Foundation: a need was identified for an international body to identify research and innovation priorities, deliver policy advice and provide funding for initiatives to address global public goods concerns.
- Intellectual Property Reforms: a more inclusive international dialogue is required on the possibility of more equitable intellectual property regimes and technology standards.

### **Bilateral cooperation**

- Mutual collaboration (through research and policy dialogue) and ongoing research and policy dialogue will help to identify ways to integrate innovation policy and sustainability policy – recognised as a challenge for both countries.
- Foresight: further UK-China collaboration on technology foresight and technology assessment could, over time, foster synergies between the countries' innovation systems. Inclusion of Chinese experts in UK Foresight exercises and joint identification of shared policy objectives for innovation might be appropriate starting points.
- There is an urgent need for collaborative horizon-scanning efforts to identify technology-related shocks and stresses with potential political, socio-economic, sanitary and phyto-sanitary implications. UK-China collaboration on food safety, food security and the regulation and governance of emerging technologies should be maintained and strengthened, including at sub-national levels (with a focus on monitoring/ implementation challenges).
- Beyond government facilitating introductions between researchers, efforts to establish and support networks that extend to other actors in the innovation system (government ministries, firms, civil society and communities) are vital. Strategically-focussed, long-term

investments are required to deliver more concrete, visible results. One example could be in the area of low-carbon/ sustainable cities or communities, with UK-China partnerships based on 'friendship cities'/ 'sister cities', taking forward ideas around eco-cities that have already received interest and investment from both sides.

### **Areas for research collaboration**

- Questions were asked over whether or not understanding innovation for sustainability and equitable development ('3D') innovation required different metrics and tools for analysis and policy-making in comparison to conventional innovation, that is largely (although not entirely) studied for its impacts on competitiveness and economic growth.
- Multi-level governance of innovation for sustainability: from the UK side there was an interest in further research to understand national-provincial dynamics in priority-setting and policy making, especially in terms of Chinese incrementalist-empiricist approaches to pilot schemes and 'pilot' counties/ cities.
- Beyond aggregate statistics, a focus on innovation practices in specific locations was identified as an appropriate approach to furthering mutual understanding. This could include research in corporate settings, public sector institutions and communities themselves. Case studies should be selected on the basis of shared interests and priorities.
- Beyond exchanges of empirical data, theoretical insights need to be shared, compared and where possible integrated from both UK (Western) and Chinese social science traditions. This was highlighted as a weakness in current collaborative work.
- Diversity in innovation systems was identified as an important, and under-emphasized consideration. In both the UK and China, research on the diversity of R&D programmes, on business models and the integration of indigenous knowledge (e.g. traditional Chinese medicine, integrated agricultural solutions) into the formal innovation system would serve to inform both 'research into use' policy as well as grassroots innovation approaches.

### **Facilitating knowledge-exchange**

- Tools for online information sharing: existing websites such as SciDev.Net and China Dialogue represent useful tools for information sharing between researchers and other parties from the UK and China. These, along with other initiatives such as the China Low Carbon Innovation Platform, should continue to be supported, with further efforts dedicated to outreach and engagement beyond academics and elite groups.
- Continued dialogue: participants suggested regular fora or roundtables, especially for younger scholars, to explore these rapidly evolving questions. Globelics represents a network already discussing related issues, and could be built upon, especially if the 2012 international meeting takes place in Beijing.

The above recommendations are discussed in more detail below. Information on the workshop, including presentations given, is available on the website of 'Innovation, Sustainability, Development: A New Manifesto' (<http://anewmanifesto.org>)

## **Background**

This report emerged from a workshop supported by the UK Departments for Business, Innovation and Skills (BIS) and International Development (DfID) and the Chinese Ministry of Science and Technology that took place at Tsinghua University School of Public Policy and Management (SPPM) on 19<sup>th</sup> March 2010. The workshop was convened by Lan XUE, Dean of the SPPM, and attended by high-level academic and policy representatives from both the UK and Chinese sides.

The workshop was held in association with the project “Innovation, Sustainability, Development: A New Manifesto”, which is being undertaken by the STEPS Centre at the University of Sussex and its international partners. It represented one of a series of roundtables in 20 locations around the world, that invited diverse inputs to an international discussion around the role of different forms of innovation in contributing to poverty reduction, social justice and environmental sustainability. The outputs of these roundtables, including video, audio and documentary reporting, are all available on the New Manifesto project website (<http://anewmanifesto.org>). The STEPS Centre produced and launched the ‘New Manifesto’ in June 2010, with several of the delegates from the UK-China workshop giving presentations. The project is ongoing, with members of the STEPS Centre currently engaging in policy discussions at national and international levels.

The workshop was divided into two parts. The morning discussions focussed at the system-level, with a discussion of the draft of the new manifesto and presentations on national innovation systems for sustainability and development. The afternoon was dedicated to more focussed discussion around existing research projects or other initiatives, and ended with a session to formulate recommendations for future bilateral collaboration. This report provides a summary of these discussions, but the reader is advised to consult the ‘New Manifesto’ website for more detailed information. The agenda for the event is included as Annex 1 of this report.

The workshop brought together a group of six leading UK innovation policy researchers from 5 academic institutions, as well as representatives from NESTA and from the UK embassy (BIS and DfID). Each of these provided an overview of their work, or introduced case studies of policies or initiatives that had contributed to sustainability or equitable development goals in the UK, China or across the two countries. The case studies were discussed in presentations throughout the day (all of which are available on the STEPS ‘New Manifesto’ website) and are included in Annex 2 of this report. In addition, presentations on cutting-edge research in the field of innovation, sustainability and development were given by 10 leading Chinese scholars, with an emphasis on young researchers. Again, the powerpoint slides of these presentations are available on the New Manifesto website.

## **UK-China Innovation for Sustainability and Equitable Development**

Fuelled by continued growth and strong political commitment from Beijing, China is taking the lead within the G20 for investment in 'green' (primarily, but not solely low-carbon energy generation) technologies. At the same time the UK has identified innovation as a crucial tool not only in the emergence from the recession but also in response to global challenges of poverty reduction and environmental sustainability. But what kinds of innovation are required, how can governments support them, and how can the UK and China work together to provide a conducive environment to research institutions, firms, civil society organisations and citizens working towards these shared goals? The workshop on "UK-China Innovation for Sustainability and Equitable Development" hosted by CISTP (Tsinghua University) and the STEPS Centre (University of Sussex) on 19th March 2010 aimed to tackle these questions. The workshop was supported by the Chinese Ministry of Science and Technology (through the China Institute for Science and Technology Policy at Tsinghua University) and funded by the UK Department for Business, Innovation and Skills (BIS) through the Science and Innovation Network, and the UK Department for International Development (DfID). It was and covered in the Chinese national press (see Annex 3) by the 'Science and Technology Daily', the official paper of the Ministry of Science and Technology.

### **1. Welcome and Introduction**

**(Chairs: Prof. Jun SU / Dr Adrian Ely)**

The morning's discussions focussed at the 'system-level' and investigated broad trends in approaches to innovation policy (as it linked to sustainability and equitable development) in the two countries. The first session provided introductions to the challenges facing China and the UK, and described the ongoing work of the UK government in its partnership with China. Following a formal welcome by Professor Lan Xue, Dean of the School of Public Policy and Management at Tsinghua Director of the China Institute for Science and Technology Policy, a short presentation was given by Yu HU, Deputy Chairman, Youth Union of MoST, Director, Department of Theory, Science and Technology Daily. HU stressed the good timing for the workshop, following high-profile ministerial visits from the UK to China and the identification of low-carbon innovation as an area for positive bilateral collaboration. HU highlighted science and technology's contribution to development in China, especially its role in improving the use of limited resources. He pointed out that the global financial crisis had impacted significantly on China's innovation system, especially OEM firms (e.g. in Guangdong), but stressed that indigenous innovation could benefit the industry and held the key to recovery.

Dr David Bacon, Counsellor (Science and Innovation) at the British Embassy, gave an informative presentation on the UK government approach to innovation, highlighting the five generic drivers of productivity - investment, innovation, skills, enterprise and competition – and a number of key sectors in which targets and programmes built on these to contribute to the UK's economy. He gave a situation report on UK innovation and outlined the UK's innovation framework, which focussed on fiscal incentives, international infrastructure, competition and the enabling climate (including legislation). The aim of the integrated framework was to make the UK "*the best place in the world to be an innovative business, public sector or 3<sup>rd</sup> sector organisation*", and this translated to challenge-driven in

areas such as infectious disease detection, ageing/ assisted living and low-carbon vehicles, and across technologies such as nano, bio, ICTs and manufacturing. He outlined the work of the Technology Strategy Board, which had been responsible for £1billion of investment over the past three years, and described the case of low-carbon vehicles, where a number of initiatives were being supported to make electric vehicles widely available in the UK by 2020. As a sectoral case study he outlined the work of the Office for Life Sciences (focusing on biomedical innovation). Finally, Dr Bacon described the role of innovation in fostering equitable development and spreading benefits across the UK population. He recognised that there existed pockets of intense deprivation in both urban and rural areas, and that, like in China, there was a notable 'innovation gap' between urban and rural areas. The UK's national framework on urban and rural renewal used differential targets and funding to provide infrastructure and business support, and relied on user-input to improve service delivery. The UK government aimed to encourage and foster social enterprise through supporting enterprise growth initiatives and specialist agencies with a focus on advocacy.

Ling CUI (DfID) next introduced the work of the Department for International Development in China. The department focussed its activities around the millennium development goals, especially those centered around health, education and water, but CUI described how these activities would draw to a close over the next 12 months or so. DfID's role is shifting to a formal partnership with China through the "Working with China on international development issues (WCIDI) programme" and a number of innovative partnerships. The Sustainable Development Dialogue (SDD), for example, is led by DfID and DEFRA (Department for Environment, Food and Rural Affairs) with the Chinese NDRC (National Development Reform Commission) and involving 20 ministries from across the UK and China. Over 40 UK-China partnership projects have been agreed on a range of sustainable development topics. £1.3 million has been invested from the UK side (with matched funds from China) for projects carried out under the Sustainable Agriculture Innovation Network (SAIN) and future investments are foreseen. DfID's work aims to span from the highest bilateral level down to work in communities, for example with farmers in Shaanxi province. DfID realises that China will spend the coming 15 years turning itself into an innovation-focussed economy, and wishes to continue as a partner in extending the benefits of this innovation to poorer communities both in China and worldwide.

## **2. Innovation, Sustainability, Development: A New Manifesto**

**(Chairs: Yu HU/David Bacon)**

The second session provided a historical overview of UK-China collaboration in science and innovation, from the perspective of SPRU-Science and Technology Policy Research, and linked to the STEPS Centre project 'Innovation, Sustainability, Development: A New Manifesto'. The project draws inspiration from a report that was produced by colleagues from SPRU and IDS (the Institute of Development Studies) at the University of Sussex in 1970. The document had originally been commissioned by the United Nations as the introductory statement to the World Plan of Action on Science and Technology for Development. The document included an analysis of the global distribution of scientific and technological capabilities in 1970 and put forward quantitative targets (e.g. for GERD<sup>1</sup> as a

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<sup>1</sup> GERD = Gross Expenditure on Research and Development

percentage of GDP) and qualitative recommendations for institutional reform in developed and developing countries. The chapter was initially rejected by the UN, but ended up being published as an annex to a report of the Advisory Committee on the Application of Science and Technology to Development (Singer, 1970). In UN debates, it earned the moniker 'The Sussex Manifesto' based on its political (as opposed to technical) recommendations. The Sussex Manifesto represented a somewhat radical vision, advocating the build-up of indigenous capabilities that might enable science and technology to respond directly to the 'problems of developing countries' at a time when most efforts focussed on the transfer of technologies, in many cases from former colonial powers.

Yet the original Sussex Manifesto remained relatively silent on issues of the environment, gender and poverty alleviation at a time when groups across the world were awakening to the potential social and environmental implications of new technologies, and mobilising for their control and regulation.

The world has changed almost unrecognisably since 1970. As the example of China illustrates perfectly, centres of science, technology and innovation have shifted, becoming more widespread than they were in 1970. By the early 1990s, China had increased its GERD to pass the original Sussex Manifesto's target (for 1980) of 0.5 per cent of GDP. It is now responsible for almost one eighth of global R&D expenditure. Yet China, along with the UK and the world as a whole, faces immense challenges in fostering innovation that contributes to environmental sustainability and more equitable development.

As a global policy research and engagement hub whose members are drawn from SPRU and IDS (the same institutions that produced the original Sussex Manifesto), the STEPS Centre has, since February 2008, been working on a new manifesto, this time adopting a more plural view of innovation and its potential role in addressing objectives of environmental sustainability and poverty alleviation.

A series of 20 international roundtable events provided an opportunity for organisations and individuals to discuss issues associated with innovation for sustainability and development at varying levels and in different sectors. Outputs from these events (both multimedia and written) were collected for publication on <http://anewmanifesto.org>. The partners who hosted and participated in these events have included students and alumni from both SPRU and IDS, as well as Practical Action International New Technologies Programme (roundtable 6 May 2009, Kathmandu, at the Innovation Asia-Pacific Symposium), 3TU Delft (roundtable 24 November 2010, The Hague, Netherlands), the African Technology Policy Studies (ATPS) Network (inter-manifesto discussions 27 November 2010, Abuja, Nigeria), the African Centre for Technology Studies (ACTS)(roundtable 4 December 2010, Nairobi, Kenya), TWAS-the Academy of Sciences for the Development World Regional Office for Sub-Saharan Africa (roundtable 8 December: Nairobi, Kenya at the fourth TWAS-ROSSA Young Scientists' Conference), Ashok Parthasarathi (roundtable with large group of Indian colleagues, 8 February 2010, Delhi, India) TWAS Regional Office for Central and South Asia (roundtable 12 February: Bangalore, India), Practical Action Southern Africa Office (roundtable 4 March: Harare, Zimbabwe), Instituto Venezolano de Investigaciones Cientificas (IVIC) (roundtable 5 March 2010: Caracas, Venezuela), Universidad de Quilmes (roundtable 10 March 2010: Buenos Aires, Argentina), Corporacion

BIOTEC (roundtable 12 March 2010, Cali, Colombia), Brighton & Hove City Council (roundtable 15 March 2010), Marathmoli (Indian womens' empowerment group) (roundtables 29 March, Sangamner and 9 April 2010, Maharashtra, India) and Practical Action - Sri Lanka (roundtable 30 March: Colombo, Sri Lanka).

This section of the workshop on 'UK-China Innovation for Sustainability and Equitable Development' functioned as an additional roundtable within the manifesto project, with a focus on sharing lessons between the UK and China. As well as contributing to the diverse perspectives that were highlighted during the course of the Manifesto process, it provided an important forum for discussing bilateral collaboration between China and the UK. It was on this topic that the session began, with Professor Geoffrey Oldham, former director of SPRU and one of the co-authors of the original Sussex Manifesto, providing a personal and institutional perspective of UK-China collaboration in science and technology policy over the past four decades.

Professor Oldham described his experiences since his first visit to the Chinese mainland in 1964, when he predicted a forthcoming 'scientific revolution' in China (Oldham, 1964). The subsequent 'Great Leap Forward' and the cultural revolution severely the country's science and technology base around the time of the original manifesto, and this was recognised in 1976, when Premier Zhou Enlai established science and technology as one of the 'four modernisations' along with agriculture, industry and defence. The following period of reform and opening up enabled more investment in R&D in selected areas where needs were identified, and the second meeting of the TWAS (then the Third World Academy of Sciences) in Beijing 1987 marked the opening of China's scientific system to the world (Hasan, 2008). The subsequent decade delivered a number of programmes aimed not only at boosting research and development, but also technological innovation and commercialisation of new knowledge (IDRC/SSTC, 1997). These included the National Program for Tackling Key Technology Problems (1984), the Spark Program (1986), the National Development Program for High Technology, or 863 Program (1986), the Torch Program (1988), and the Climbing Program (1991) and the 973 (1997) programmes, Chinese Academy of Sciences Innovation Project, the 985 programme (1998), the establishment of state key laboratories, productivity promotion centres and technology transfer centres. More recently China has recognised the comparatively low value-addition associated with its manufacturing, as well as the high degree of foreign ownership in its innovative activities, and identified the need for a move from indigenous S&T to indigenous innovation (Wilsdon and Keeley, 2007).

In the intervening period, Professor Oldham described how UK-China collaboration on science and technology policy had initially been taken forward through the British Council-funded link between SPRU and the National Research Centre for Science, Technology and Development (now CASTED), which ran between 1982 and 1992. Over this 10 year period 30 Chinese S&T policy researchers from the NRCSTD were embedded in SPRU research teams for periods in excess of 3 months. Individual SPRU – China projects in addition to this link included the following:

- 1981-83 Technological and Industrial Policy in China and Europe: a series of annual conferences in Stockholm, Brighton and Beijing

- 1984-5 Technology Transfer to Offshore oil industry in China. Collaboration with CNRCSTD
- 1987 Links between S&T policy research and policy making at Provincial Government level

Following the culmination of the British Council link and until the turn of the century, individual researchers from SPRU took part in several additional projects with Chinese colleagues, including those on the following topics:

- 1996-7 The transfer of clean coal technology to China - collaboration with Beijing University
- 1997-8 The Clean Development Mechanism: its implications for China - collaboration with Beijing University
- 1997-8 International S&T Collaboration - collaboration with Science Policy Centre of the Chinese Academy of Science, Tsinghua University, and the University of Oregon

Research collaborations between SPRU and Chinese colleagues have been ongoing since this period and, indeed, have increased dramatically in recent years but the past decade of activities were not covered by Professor Oldham. Bilateral collaboration in other areas of research has also been growing rapidly. Recent figures suggest that UK-China co-authored papers grew by 4.76 times from 1999 to 2008, with the UK overtaking Germany to become China's 3rd largest global partner and the largest partner in Europe.<sup>2</sup> This research has a high academic impact (more than half UK-China papers receive above the world average number of citations and 12% receive four times the world average), however focussed research on how to transform this collaborative research into significant innovation outcomes remains an important area for consideration.<sup>3</sup>

Based on his substantial body of experience, Professor Oldham put forward a number of recommendations for future UK-China collaboration in the field of science, technology and innovation policy:

- Collaboration is essential on issues of mutual interest
- Good collaborations depends on mutual trust and respect
- The transfer of knowledge from research to policy depends on many factors. One important mechanism is through the membership of researchers on advisory committees. In turn, the work of advisory committees can lead to new policy research.

The STEPS Centre's project "Innovation, Sustainability, Development: A New Manifesto" (on which this workshop builds) was inspired by work on science and technology for development produced for the UN by SPRU and the Institute of Development Studies (IDS) colleagues in 1970 ("The Sussex Manifesto"). Adrian Ely then went on to introduce the new STEPS project 'Innovation, Sustainability, Development: A New Manifesto', arguing that there was a significant need for a rethink in innovation studies and policy. From early on in

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<sup>2</sup> See the most recent bibliometric analysis on UK-China research collaboration, commissioned by RCUK, at

[http://www.rcuk.cn/rcuk/fore/s\\_ncontent\\_cnt\\_en.php?ncnt\\_id=288](http://www.rcuk.cn/rcuk/fore/s_ncontent_cnt_en.php?ncnt_id=288)

<sup>3</sup> This was recognised in the 2008 Joint Commission's priority to extend partnership to include a "series of exchanges and collaborations in innovation policy", of which this forms one.

its conception, the project advocated an increased focus (in academic and political discussions around innovation) on what it termed the 3 'D's:

- Rather than focussing on the rate or scale of innovation (as measured by input metrics such as GERD/GDP or outputs such as papers, citations or patents), more emphasis should be put on the Directions in which innovation proceeds and their social and environmental impacts;
- Rather than attending to the gross economic impact of innovation activities, the STEPS Centre argues that more emphasis should be placed on the differential Distribution of various costs, benefits and risks associated with these innovations;
- The harmonising pressures of globalisation, along with many other factors is contributing to the marginalisation and erosion of diverse forms of knowledge - a greater emphasis must be placed on the maintenance and enhancement of a diversity of innovation pathways across different social, technological and environmental contexts.

Ely argued that this new '3D' agenda (Stirling, 2009), already embodied in countless inspiring innovation policies and initiatives worldwide, represented an important area of research for the forthcoming decades that required new forms of collaboration between scholars in China, the UK and elsewhere. In addition, he argued that more than ever, science, technology and innovation were becoming foci of political debate and sites of political action, even when not recognised as such. Moving beyond growth and competitiveness, it was imperative that governments, higher education establishments, firms and civil society formulate and adopt new measures for evaluating innovation activities that prioritise poverty alleviation, social justice and environmental sustainability. The delegates at the workshop had been provided with a first draft of a new manifesto in advance, and a small number of Chinese experts had been invited to comment.

Professor Lan XUE initiated the responses by providing comments and putting forward key ideas that would be important from Chinese perspective. He described how globalisation was accelerating, and how this provided both positive and negative impacts on different countries, with resultant new challenges for global governance. Whilst there are existing global governance systems, these are largely out of date (highlighting the example of 'traditionally' allocating leadership of the IMF and World Bank to representatives of US and EU) and do not work well any more, partly because 'developing countries' becoming global players. Outside the formal institutions, it is these informal ideologies, rules and norms, including 'grandfather' laws determining procedures try to maintain the old order. The OECD has provided intellectual leadership in recognising this and extending its attention to the new players. Even the G8, formerly an important club, is now in question. Attempts have been made to address the changing global power structure (e.g. in G20. L14 and L20 discussions), however these have not yet delivered.

The language of seeing China, India or "Chindia" as a "challenge" or a "threat" illustrates the sentiment globally, however there are many shared problems for which a collaborative approach is more appropriate. Climate change, poverty etc are global commons problem, and must be addressed by new global governance systems. There is a need for a summit meeting, with honest and open discussions between leaders to discuss the geometry and legitimacy of G20 including but not limited to included and excluded parties. Alongside, and

inseparable from these issues are questions of whose agenda these institutions are working to, whom they are representing and to whom they are accountable.

There is a need for the efficiency of a smaller group, but with the legitimacy of a larger group. XUE suggested that the management of G20 might be improved by a permanent secretariat? The question that therefore arose was where this would be based? His personal view is that moving from one country to another leads to efficiency losses.

XUE turned his focus to the idea of a global innovation system, highlighting that international public funding already exists for large-scale science projects (e.g. ITER) but that private finance, on the other hand was driven by IPR and markets rather than shared need. A global knowledge system based on those principles raises governance challenges:

- the global science system is already complaining about a declining supply of funding for public goods.
- there is ineffective co-ordination between countries and trade blocks (e.g. unhealthy competition on standards etc)
- a continued knowledge divide (including within, as well as between countries)
- problems of 'brain drain' to wealthier innovation centres

Many of these issues resulted from the fact that despite there being an increasingly globalised supply of innovation, demand remained localised.<sup>4</sup> As was well-known, ISI citations of Chinese research (in international journals) have been soaring in recent years.<sup>5</sup> However, at the same time, the quality of submissions to Chinese language journals has been declining. In discussions with medical doctors XUE found that many of them are still using Chinese language journals, and thus suggested that the application of the knowledge from Chinese research might even be decreasing.

Another issue that XUE drew attention to was the distorted use of IP regimes (e.g. TRIPS), and challenges with the governance of multi-nationals in licensing and standards. 50 global corporations, he said, determine what the 250 international ICT standards consortia do and, more importantly, how they do it. Of these 50 players, only 5 are from emerging countries. XUE asked whether just relying on the private market to determine these arrangements was healthy or not?

Moving on to concrete proposals, XUE outlined the following ideas for discussion:

- World Science Foundation – focussing on the need for financing innovation for global public goods, XUE put forward the idea of a new institution funding key global challenges
- A more balanced IP regime, including reform of TRIPS to allow access to public good technologies for developing and emerging countries
- Improved governance of standards. This discussion has already been started by Dieter Ernst and colleagues.

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<sup>4</sup> See also Xue, L (2008) "Pushes to globalize science must not threaten local innovations in developing countries, argues Lan Xue", *Nature* 454, 398-401

<sup>5</sup> See also Xue, L (2008) 'China: the prizes and pitfalls of progress'. *Nature* 454, 398-401

- Rather than focussing uniquely on national systems of innovation, regional higher education systems and knowledge institutions for developing countries may in some cases (e.g. in parts of Africa) make more sense?
- There is a need for creative ways to harness existing knowledge – an example might be a “knowledge pool” of green technology (for combating climate change), which would be funded either either by donation or by using ‘global money’ (through institutions such as the world science foundation, above). This could be used to provide the technologies to developing countries at lower cost. Particularly in the case of China, the current investment in infrastructure will determines emissions for the next 50 years. There is a need to create a system or to provide incentives for investment now in order to prevent lock-in to carbon-intensive pathways.

He then asked delegates to come forward with their own ideas for what could be done by China and the UK.

Rongping MU (Director, CAS-Institute of Policy and Management) spoke next. He observed that China’s move from focussing on creating a moderately well-off society in 2002 towards the harmonious society and the scientific outlook on development expounded by the current leadership mirrors the trends in international innovation policy illustrated by the earlier talks, which see innovation as a tool for sustainability and equitable development. Global issues where China sees innovation as playing an important role include SARS, climate change, anti-terrorism. Studies around sustainable development also started from the 1990s, with the CAS establishing a Sustainable Development Research Institute in 1992, and publishing annual reports since 1999. Innovation and sustainability policies were largely separated in the past, but have been increasingly linked – MU, for example, participated in a workshop on the topic in Manchester in 1997.

In describing other trends that have led to the current status of Chinese innovation policy, MU identified the move from an R&D-focussed science and technology policy in China to a recognition of the importance of broader innovation systems, entrepreneurship and an innovation culture. An increasing focus on institutional/ organisational innovation, as has been the trend in the West, was also apparent in the past decade. The broadening of the innovation system as the focus for policy included a number of components, including paying “more attention to the management ability of innovation, or the organization and coordination ability of innovation activities”, extending the national plans on science and technology into the industrial field (thus integrating with the national industrial policy) and social fields (including through integration with the health sectors, public services and public security, including the improvement of the environment. Development of “innovation infrastructure”, which enables government to share some of the innovators’ risks is also very important in the national Five-year Plan. The last aspect of the broadened view of innovation in China that MU mentioned was that of an “innovation culture and institutions”. “The aims of the institutions are to coordinate and balance relationships amongst the innovation stakeholders, which is in fact very important in order for us to implement the whole innovation policy. It entails an innovation culture. We believe the innovation culture is a kind of soft institution, which may bring more far-reaching effects.” The new plan has shifted to development of the whole society and MOST is also taking serious measures to encourage innovation in every walk of life.

Guanglin XIAO (Director, Tsinghua University Institute of Science, Technology and Society) agreed with the general principles of the new manifesto, as presented, but asked whether it might be possible to add to it by describing specific market mechanisms, policies and initiatives that could foster goals of sustainability and equitable development. The more recent trend towards a focus on organisational and institutional innovations (as indicated, for example, by the categories in the Oslo Manual as opposed to the Frascati Manual) has also begun to be recognised in China and it may be here that the most important changes for sustainable development are required. "In a general sense, all innovations need be made institutionally. But for sustainable development, it may even more need innovation in systems and mechanisms." He also described the need for more research on innovation policies that ensure compatibility with earth systems. In response to Prof XUE's ideas of a World Science Foundation, Prof XIAO stated that much has been done at international levels (for example in the realm of carbon trading), and that an international organisation should be proposed in the new manifesto. At the same time, there needs to be more focus in the manifesto on concrete actions.

Xielin LIU (Associate Dean, School of Management, Graduate University of Chinese Academy of Sciences) started by expressing his appreciation for the opportunity to contribute, and describing the impacts of the original Sussex Manifesto and 'innovation systems' research at SPRU and elsewhere on China's innovation policy thinking. He agreed that innovation for sustainability and equitable development was a challenge faced by China as well as the UK, and observed that it required significant cross-departmental co-ordination within government, but also new thinking amongst researchers. "Scholars should make contributions to the shift from 'wealth' innovation to 'value' innovation." He then asked whether innovation serving these objectives required new concepts, theory, analytical frameworks and systems of measurement, or whether conventional innovation studies was capable of combining objectives of wealth creation with those of sustainable development. LIU suggested that further research could clarify such questions. Lastly, LIU pointed to the challenges of globalisation and the different development contexts in China and Europe and asked whether it was appropriate for each to take the same form of responsibility for sustainability and equitable development. He urged the producers of the new manifesto to appreciate these differences and adopt a new "global way of thinking".

### **3.Comparing UK-China Approaches to STI Policy for Sustainability (Chairs: Prof. Xiao Guanglin XIAO/ Dr Lars Frederiksen)**

The next session looked at system level challenges for both the UK and China, and began the discussions on more detailed studies, initiating an exchange of data and information that could lead on to further collaboration. Professor Fred Steward (PSI, University of Westminster) began the session by discussing how innovation policy and sustainability policy, previously separate spheres of government, were now becoming integrated, signifying a new direction for innovation policy for the UK, China and across the world. What were marginal arguments one decade ago have now become mainstream arguments – the perspectives of environmental groups and environmentalists 10 years ago are now part of the central policy discourse. Professor Steward outlined "Securing the future" – the UK's sustainable development policy 2005, which had already begun to identify that

innovation was a core element in sustainability strategy and embraced the notion of a '1 planet' economy.

In discussing incremental and radical change, Steward outlined the limits to incrementalism as insufficient to deal with the growing environmental impact of transport/ household energy use which continues to rise. DEFRA's (the Department for Environment, Food and Rural Affairs) strategy is now not only thinking about traditional innovation and radical innovation, but also transformative innovation (seen as system-wide and affecting the way that consumers behave as well as firms and politicians). Professor Steward also outlined the UK's "National Transition Plan", which sets ambitious targets of 80% emissions cuts by 2050. Through 5 year budgetary targets this is translated into short-term goals. Overall, Steward argued that technical feasibility is not the fundamental problem. Creating the right social and economic context is the main issue - this is a huge challenge.

China's national target for 2005-2020 is a 45% reduction in carbon intensity of growth – this appears in the most recent 5 year plan, so represents a legally-binding target. China has reduced its intensity by 75% since 1980, but this has stabilised since 2008. Overall, we know that emissions continue to rise in China.

We therefore see extraordinarily ambitious targets being set by each of these countries, which emphasises the importance of radical change. Professor Steward looked back at some historical narratives to which the current challenge has been likened:

- the 'big science' approach – a new 'Apollo programme' (as espoused, for example, by Martin Rees) proposes a linear science-push model. This is not a view held by most innovation researchers at the moment.
- Industrial revolution – we are in the middle of an époque-making transition. Policy options need to support this transition. This view draws on innovation ideas around techno-economic paradigms, Schumpeterian evolutionary theory.
- Social reform (akin to the new deal of 1930s) - this sees a need for large-scale state investment focussing on environmentally-sound infrastructure and research. Such 'green new deals' have been argued for by social democratic parties and green parties in Europe.
- A 'moral crusade' – akin to the political struggles around the abolition of slavery and focuses on individualistic approach.

How has the UK reconfigured innovation policy to address these challenges? Lord Sainsbury in 2007 described a 'Race to the Top', largely putting forward the traditional science-push model. The NESTA report 'Innovation Nation' in 2008 focussed on challenge-led investment, rather than responding merely to opportunities that the market provides. This and other work draws upon more modern thinking in innovation studies, highlighting organisational as well as technical change. We are seeing a new landscape emerging for innovation and sustainability and the opportunities for path-breaking research are great.

Next Jiang YU, Associate Professor at the Chinese Academy of Sciences Institute of Policy and Management spoke on "Innovation Policy for Sustainable Development: Some Primary Study in Nanotech Sectors of Europe and China". He described nanotechnology as a converging technology with serious implications for social development. The UK and China have already supported bilateral collaborative research in nanospintronics, as well as a

number of workshops to discuss the social implications of the new technology. Professor YU outlined some similarities and, in many cases significant differences between the contexts and debates in 'developed' and 'developing countries. He described the small number of isolated firms (e.g. Lux Research) working in this field at present, but estimated that in the future, nanotechnology would be ubiquitous. The EU and UK have based initiatives about 'effectively and safely developing the technology' and have supported public participation in these debates (through Sciencewise in the UK, or the EU Science and Society programme) . China's SCI paper publications and patent quality in the area is rising. Professor YU's question was 'how can we support the sustainability of nanotechnology funding?

Dr Jun JIN (College of Public Administration, Zhejiang University) next discussed her research in a presentation entitled "To be sustainable and innovative: The Hangzhou experience". Hangzhou is a wealthy city near Shanghai that has developed a reputation for innovation and competitiveness. There is a lack of resources (e.g. mineral endowments), but the city has a well-developed manufacturing base and is creating a knowledge-based economy. There has been a priority on services and IT (and now tourism), with manufacturing now seen as less important.

The Hangzhou government has put forward a number of policies not only to promote the science base, but, importantly also for entrepreneurship. Continuously-running incubators (JIN gave the example of the 'Enjoyer incubator', a private company focusing on the IT solutions to the transportation, the health care, and others) foster university-industry collaboration and provided services to new enterprises. An entrepreneurship park has been established for graduates and post-graduates, with a number of incentives to support start-ups by these young entrepreneurs

- Reduced rental cost
- Registered capital can be 0
- Capital support from the government: RMB 20,000 to 200,000 (90%)
- Angel capital, seed capital, and venture capital

Other science parks have commented that this approach is too risky.

There is an emphasis on low carbon in both Hangzhou and Zhejiang – which are aiming to become green, innovative, low carbon cities – through support of wind and tidal power, as well as low-carbon vehicles. In discussing the challenges faced in attempting to become the first pilot province of industrial transition and upgrading in China, JIN highlighted questions of how to approach the problem, which should be the priority industries and, importantly, how can the process be evaluated (i.e. if GDP growth is not the relevant indicator, what should take its place and what incentives should be introduced to support it)?

#### **4. Building sustainable innovation capabilities among UK + Chinese firms**

**(Chairs: Prof. Liu Xielin/ Fred Steward)**

Following lunch, Dr David Tyfield (Lancaster University) joined the meeting via video – conference with a presentation on "Game-changing Innovation in China". This was based on a report that Dr Tyfield was producing for NESTA, which has since been published. Recognising that a radical re-orientation of the socio-economic model was required to deal

with systems failure associated with food, agriculture, mobility and energy provision, Dr Tyfield some of the theoretical contributions from the social sciences in Europe to these challenges. He outlined the transitions theories (mentioned earlier by Professor Steward) that are now seen as important in understanding the move towards sustainable systems, but argued that, to date, there was no evidence of the kinds of ruptures in the structures and dominant configurations (socio-technical regimes). Major shifts are required to destabilise these regimes and avoid 'lock-in' to unsustainable systems. Central to these were the concerns of direction, distribution and diversity outlined earlier in Dr Ely's talk (and by the STEPS New Manifesto project). In his work with Chinese colleagues, Dr Tyfield have taken the model of 'disruptive innovation' and tried to apply it to wider systems transitions, especially in the case of global public goods. He described the opportunities for China (as previously outlined by Zeng and Williamson) in disruptive innovations – especially in producing high tech, variety and customization and speciality products at low cost – and argued that this kind of approach could also facilitate the low-carbon transition in China. He also suggested that, as proposed by authors such as Geels, Elzen and Green (2005), these kinds of innovations, which most actors see as irrelevant, are key contributors to transitions, themselves multi-actor, multi-factor, multi-level socio-technical processes. Multiple crises (financial, food system, agrarian) were not being translated to forces on incumbent socio-technical regimes or at the level of niches.

Highlighting an earlier report from NESTA (2007) entitled 'the Disruptors', he noted certain opportunities in the Chinese context that were being studied in the current research, including corporate strategy, national economic development, systems transition and Global public goods and governance of innovation and sustainability. Each of these was related to the '3Ds' outlined earlier. Tyfield provided case study examples (see Annex 2) from the Chinese side - Shengchang Bioenergy, GEI/ Lijiang Snow Mountain and used them to illustrate how this kind of disruptive "game-changing" innovation in China was already emerging.

Further information on Dr Tyfield's work is available at [www.lums.lancs.ac.uk/lowcarboninnovation](http://www.lums.lancs.ac.uk/lowcarboninnovation) .

Professor Lars Frederiksen (Imperial College Business School), then talked about his UK-China collaborative work on sustainable cities in a presentation entitled "Ecocit: Research on innovation and sustainability in urban design". He suggested that the research fitted within "meso-level innovation policy" – complementary to national and regional initiatives but with a more agency-based, bottom-up approach to changing the innovation system. The project is described in more detail in Annex 2 and has been studied by a network of UK and Chinese researchers, with other partners (including the Chinese government and Arup) helping the research councils with support. It is part of the larger Ecoregion Research Networks, which have been funded by the UK Engineering and physical sciences research council (EPSRC) from 2007-2010. As with the earlier research presentations, these studies have had less focus on stand-alone technological opportunities and has been more concerned with systemic/market-facing end of solutions for low-carbon future (i.e. local authorities and firms). As well as a research grant on energy service business models in Kenya, India and China, the network has also won money to study the Dongtan Ecocity near Shanghai.

Frederiksen outlined the important trends seen and lessons learned from the Dongtan case study. Dongtan was set up as a demonstration model to learn from, rather than a solution in itself and engaged in the question of whether there was a radical new way of creating a city. The primary lessons learned in the planning of Dongtan, he said, have been in systems integration – of socio-techno-ecological systems. He described three overlapping phases in the development of these capabilities – the renewal, replication and reinforcement phases – and highlighted that building dynamic capabilities was an ongoing process. Discussion focussed on whether there were other examples of governments fostering innovation at the community level in a similar way to that described in Zhejiang. Tongshan is another circular economy demonstration city, and Wuhan and Shenzhen have also experimented in this area. Delegates also described eco-villages (e.g. An Qi ecovillage, which specialises in biomass energy contributing to the circular economy and also promotes village tourism). There are several such examples.

Xudong GAO (Associate Professor, School of Economics and Management at Tsinghua University) next gave a presentation on “Sustainable growth at the bottom in China through resource integration to serve the high end market”. GAO first asked “What is sustainable growth?” and drew from the literature to outline notions of ‘Bottom of the Pyramid’ (BOP)/ ‘inclusive growth’. He argued, however, that selling products to the poor people will not solve the problem – BOP needs to think about what happens when people start climbing the pyramid. GAO described the research project that he had been working on, outlining the resource divide between urban and rural areas and the role of entrepreneurs and the government in fostering inclusive growth. He illustrated the research with case studies of three companies:

- ZPMC (Shanghai) Zhenhua Port Machinery Co., Ltd
- Shunhua (Hunan) Linwu Shunhua Duck Development Co., Ltd
- Jiukang (Nanjing) Jiukang Science and Technology Development Co., Ltd

Dr. Michael Harris (NESTA) next gave a presentation on the work that his organisation has been doing on community-level innovation in response to global challenges such as climate change. Further details of these projects (NESTA’s Big Green Challenge) can be found in Annex 2. In addition, he described the approaches that the UK government had adopted in order to foster innovation amongst individuals and communities through the Department for Energy and Climate Change (DECC)’s ‘Low Carbon Communities Programme’. There was much interest in these approaches to engender ‘bottom-up’ innovation, in a way that resonated with the previous discussion of building an innovation culture.

## **5. International (including UK-China) collaboration for more equitable low-carbon development (Chairs: Prof. Hui LUO/Dr. Adrian Ely)**

The first speaker in this session, Dr Frauke Urban (Institute of Development Studies), described some ongoing collaborative work between the UK and China specifically focussed on innovation for low-carbon development. The UK-China near-zero emissions coal project (NZECC) is a bilateral initiative for carbon capture and storage (CCS) between the UK and China which plans to demonstrate CCS in China and the EU by 2020, including to build a CCS plant in China by 2015. This was very much a national level, top-down project (based on a

bilateral agreement at the EU-China summit in 2005). It is funded by DECC and implemented by MOST in the first phase (2007-2009). The second phase will be estimated to cost £7.5-15 million (but may be much more expensive) and the third £35-750 million (depending on the technology selected). The project involves a wide variety of partners - 10 UK partners including the British Geological Survey, BP, Cambridge University, Imperial College, Shell and 20 Chinese partners including the Chinese Academy of Sciences, Tsinghua University, Energy Research Institute, Greengene, BP Centre at Tsinghua, China University of Petroleum and PetroChina. The project has a number of expected longer-term impacts, including knowledge transfer between China and UK, technology cooperation between China and UK for low carbon innovation.

Dr Urban then went on to describe the low-carbon innovation centres that DfID is planning to support over the next 3 years. These should be initiated in several partner countries around the world at a cost of \$40-\$100 million per centre per year. Short-listed countries in 2008 were China, India, Brazil, South Africa, Indonesia, Mexico, Vietnam and Kenya, so it is possible that a centre could be established in China some time after 2010. Again, longer-term, intangible innovation impacts are expected from these centres (other than merely the emergence of new technologies). They will enable the adaptation of technology for local needs, set up business incubators and help to create new enterprises. They also represent possible opportunities for collaboration or future research. More information on these projects is included in Annex 2.

Dr. Wansong SUN (Director of Investment Promotion, China Ministry of Commerce) drew on his considerable practical knowledge and experience to give a presentation entitled "Investment Promotion Work under Low Carbon Economy", about the government's low carbon investment strategy in China. In covering MofCOM – EU discussions, Dr SUN noted that Premier Wen had mentioned promotion of low carbon technology and industry within the NPC. In the CPPCC these also appeared as the No 1 and No 2 proposals, with 10% of total proposals for low carbon industry around 28 provinces in China. The week previous to the workshop, China and India had both agreed (last week) to sign the Copenhagen accord. Alongside several international partnership programmes, SUN outlined some important pilot projects in different provinces around China, focussing on low carbon architecture, agriculture, and industry (chemicals, steel). He also listed the different funds in China dedicated to supporting innovation for sustainability and equitable development. The China Investment Promotion Agency (CIPA) is also arranging training courses in low-carbon technology and investment strategy, including a visit to the UK scheduled for July 2010. SUN completed his presentation by calling for "Action today to protect tomorrow."

Dr. Yixin DAI (CISTP, Tsinghua University) next gave a presentation on "Low carbon city development in China: A case of Baoding." She described Baoding and its objectives to develop as one of the low carbon cities that, like several in Europe, have named themselves 'low carbon' (e.g. Zhu Hai, Ri Zhao, Bao Ding, Hang Zhou, Shang Hai, Wuxi). Since 2008, her colleagues have been studying with three research foci/keywords: motivation (what motivates cities to term themselves 'low-carbon'), cases (documenting real-life experiences and lessons) and governance (interested in national down to local development). Using quantitative and qualitative (interview-based) case-study methodologies, DAI and colleagues

looked at Baoding, Hebei province, which has a higher than average percentage of GDP contribution from agriculture, a lower contribution from services, and an average contribution from manufacturing/industry (i.e. mainly agriculture). Important waypoints in the Baoding story were:

1998 – renewable energy enterprise appeared in Baoding (solar PV)

2000-2003 – renewable energy related industry development

2006 – electric valley of China project

2007 – solar city project

2008 – low-carbon city, strategic urban planning

DAI described the national-local policy dynamics, and a number of policies that had been experimented with in Baoding: for example government providing land/ buildings (subsidised or free), tax reduction, government facilitating introductions/networking between different entrepreneurs. The role of international and non-government actors, as well as enterprises was also highlighted in the Baoding case. In February 2010, the NDRC named 5 ‘experimental regions’ for low carbon development – aiming to enlarge it to a nationwide scale if successful – the mix of top-down policy and international-national-local dynamics provide an interesting phenomenon in this case. Questions around how ‘low-carbon development’ influences the city, especially in terms of its governance structure, require further research.

Xufeng ZHU, Associate Professor (NanKai University) ‘Low Carbon Cooperation and Global Leadership’, next spoke about low carbon cooperation with global leadership, drawing on and expanding on an earlier publication in Nature (Zhu, 2009). ZHU explained that although the USA and EU were taking a leading role in low carbon technologies, both had undergone recent changes and the BRICS were having a greater say. Copenhagen, he claimed, had not been very successful in terms of delivering the policy changes required, and there was a need for leadership based on recognition from developing countries - not just in terms of opinion-leadership, but based on real action. Zhu argued that the industrialised country that collaborates the best with developing nations will be able to seize the opportunity to spread their technologies around the world, and will therefore be able to retain their leadership – technologically, economically and politically. His challenge to Europe was whether, after years of technological co-operation with developing countries, she was ready to seize the opportunity to become a global leader in the future low-carbon economy?

## **6. Science, Technology and Innovation among BRICS and implications for global governance (Chair: CHEN Yantai/ Geoff Oldham)**

Hui LUO (MOST-CAST), who had recently been working at the Chinese Embassy in the USA, spoke on the ‘global governance of science and technology: adapting to the adjustment of global innovation patterns’. She provided statistics showing a shift in R&D expenditure and capabilities toward the BRICS countries, also highlighting that collaboration dynamics were also leading to more open, cooperative, and integrated innovation. Discussing China’s objectives of ‘home-grown’ or ‘indigenous’ innovation, LUO argued that ideology could sometimes restrict this openness. However, she pointed to a new ‘science revolution’ coming alive and pointed to different strategic considerations around international science and technology collaboration (and S&T diplomacy). Comparing US, UK, EU and Japanese approaches, she also pointed to BRICS examples – Russia, the IBSA forum to promote

cooperation in a number of areas (including S&T) and China's desire to utilise global science, technology innovation resources.

Cheng Peng (Management School, Graduate University of Chinese Academy of Sciences) next spoke on "The Scale of FDI and Innovation of Local Firm R&D Intensity", again looking at R&D in BRICS countries. He explained that although foreign investment supported a large proportion of R&D in China, there were also have some major domestic players – Huawei, Lenovo etc. He also pointed to some interesting structural differences between BRICS' foreign investment, and compared the relationship between FDI scale and innovation in local firms. Although FDI had been reported to be inversely proportional to R&D intensity in local firms in Brazil, the same pattern was not shown in China – Cheng argued that this boded well for homegrown innovation in the country.

The last speaker in this session was Zheng LIANG, Associate Professor and Assistant Director, CISTP, Tsinghua University. His presentation "Comparison of China and India in R&D globalisation" outlined trends in the globalisation of R&D, pointing to Asia as the preferred destination for R&D FDI among developing regions. Drawing on findings from the UNCTAD survey in 2005-6, he provided evidence for China and, to a lesser extent India, becoming 'hot-spots' in the 'import' of R&D (for countries generating less than US\$1 billion in R&D), also pointing to a number of drivers for these future R&D sites. LIANG argued that Indian and Chinese situations were very similar in terms of globalization of R&D, but could be seen as complementary as well as competitive. India displayed better performance at integrating innovative resources from outside, however China showed great potential in this area and had proved itself capable of rapid learning. The rise of China and India is influencing global industry composition and therefore innovation governance – an obvious focus for policy attention into the future.

Discussions after LIANG's talk highlighted the important question around the factors driving R&D investment in each country. LIANG responded that this was not a well-understood area, but that interactions between multinationals and partners in China seemed very important. It was difficult to gather evidence on this, although deep-level interviews had led to some interesting stories. This seemed an interesting area for future research. Other questions pointed towards the restrictions of technology being transferred to China, and highlighted the challenge of opening up these processes. An alternative viewpoint was put forward that highlighted the risks of failure from new technologies – urging that China does not open up to all new technologies, but focuses on balancing trade-offs between various kinds of technologies, their benefits and possible harms.

## **7. Concluding Session - Taking forward UK-China collaboration on innovation for sustainability and equitable development**

**Chair: Shulin GU (Tsinghua University)**

Prof GU thanked the organisers and asked them to take forward the discussions into the future. She summarised the different sessions that had taken place throughout the day, and invited those present to comment.

Dr Yantai CHEN (Tsinghua University, SPPM) intervened with some slides that he presented on behalf of the Chinese hosts. These covered a number of issues raised over the course of the day that required emphasis. CHEN highlighted the need for developing countries to balance scientific investments aimed at a) the international science and technology frontier and b) locally-defined problems around public health, water, food security and environmental protection. The role of SCI/SSCI journal lists in incentivising the former kind of research at the expense of that relating to local needs was highlighted as an area for improvement. The need for maintaining diversity in research and innovation systems was also noted (pointing to the threat that Western medicine poses to the diversity contributed by traditional Chinese medicine), and it was pointed out that community innovation and grassroots innovation in low-tech sectors could play an important role in addressing sustainability and development goals (as well as high-tech 'big science' approaches). Further networking, especially between young innovation policy researchers, was seen as an important way to take forward these ideas into the future, and to enable continued lesson-sharing between academic communities in the two countries.

There was a general approval of the draft New Manifesto and its primary messages. These seemed to chime with Chinese objectives of indigenous innovation and building the harmonious society – taking into account equity and social justice as well as climate-focused and other environmental sustainability considerations. The discussion that followed was wide-ranging, but forward a number of points that delegates thought should be borne in mind as UK-China innovation policy collaboration, initiated through the 2008 Joint Commission, continued to be supported.

### **Policy reforms to enhance innovation for sustainability and equitable development**

A number of ideas were discussed that centred on policy approaches that might be adopted or advocated. These focussed both at the international and national (including bilateral) levels.

#### International governance reforms

It was clear that changing patterns of innovation around the world were leading to new and urgent governance challenges – both in terms of directions of innovation and the distribution of its benefits.

As Yantai CHEN's presentation argued, the global science community has a responsibility to help those developing countries that do not have adequate resources to solve some technological problems themselves (he mentioned carbon capture technology and methods of air-pollution alleviation). In order to ensure that science, technology and innovation more closely respond to pressing global needs (e.g. in the areas of poverty alleviation and environmental sustainability), delegates discussed the possible utility of a new international body. This could take the form of a 'Global Science Foundation' (suggested by Lan XUE) to identify research and innovation priorities, and provide funding for initiatives to address global public goods concerns. Recommendations in 'Innovation, Sustainability, Development: A New Manifesto' proposed a 'Global Innovation Commission' – an international body with responsibility for evaluating the efficacy of existing innovation

investments (in terms of poverty alleviation, social justice and environmental sustainability). Either body should be enhanced by clear arrangements for monitoring, evaluation and accountability and inclusion of actors beyond the 'usual suspects' (with strong representation from the global South, involvement of civil society organisations and other accountability measures).

At the same time, several speakers highlighted challenges associated with existing governance systems. Prof GU drew on other presentations to suggest that developing countries need 'room to manoeuvre' if the new manifesto's '3D' agenda is to be taken forward. Diversity – one of the manifesto's most important considerations – is reduced as a result of globally harmonised regulatory frameworks, within which China is rapidly integrating. It will be important (for the New Manifesto and for future policy and research) to understand the diversity of different countries within their own development pathways – and the ways in which international governance can make room for this. International institutions could benefit from further reform - responding to shifts in technological and political power - and could be more efficiently organised to target shared global concerns. A more inclusive dialogue on international intellectual property regimes and technology standards, involving developing countries from Africa, Asia and Latin America in a steering role, was one approach to ensuring that intellectual property regimes, whilst incentivising innovation, ensured the more equitable distribution of its products.

#### Bilateral collaboration around policy

There was mutual agreement of the shared challenge facing both China and the UK in spanning innovation policy and sustainability policy. Exercises like the current workshop help in addressing this challenge, however should be enhanced and organised around a framework of ongoing research, policy experimentation and lesson-learning across the two countries. There are significant opportunities for enhancing bilateral innovation policy dialogue through strategic partnership processes. Two possibilities are outlined below.

The UK and China have already invested in research dialogues around emerging technologies such as nanotechnologies, and are working together closely on biotechnologies and their contribution to environmentally sustainable food security. Based on discussions at the workshop, collaboration around governing these emerging technologies (through regulation and standards) for environmental sustainability benefits, balancing and guarding against risks and uncertainties, and allowing for diversity is still a priority. As part of these processes, there is an urgent need for horizon-scanning efforts to identify technology-related shocks and stresses with potential political, socio-economic, sanitary and phyto-sanitary implications. UK-China collaboration on food safety, food security and the regulation and governance of emerging technologies should be maintained and strengthened, including at sub-national levels (with a focus on implementation challenges).

More broadly, bilateral collaboration on technological futures as China builds capacity in technology foresight (Mu, 2008) could further enhance the UK's and China's scope for innovation collaboration, aligning innovation policies whilst also providing co-ordination opportunities to maintain and enhance diversity across innovation systems. Such bilateral

initiatives could potentially be expanded when appropriate, offering opportunities for international technology foresight (Van Zwanenberg, 2009).

Linkages between various actors in the innovation systems can be strengthened by current approaches to facilitating introductions (between researchers) and establishing networks, however strategic, long-term investments are required to deliver more concrete results. The investment in eco-cities (as discussed in Frederiksen's talk) provides an example but also a missed opportunity for ongoing partnerships. Joint initiatives between universities, ministries, firms, civil society and communities (e.g. in low-carbon cities and regions), based on low-level support for bottom-up initiatives, could provide more sustainable partnerships. Going beyond the usual suspects of institutional linkages, UK-China partnerships could be based on 'friendship cities' / 'sister cities', taking forward ideas around eco-cities that have already received interest and investment from both sides.

### **Areas for Future Research Collaboration**

Secondly, discussions in the final session highlighted a number of research priorities that had emerged out of the day's presentations, and that were thought to be of interest to both DfID and BIS. Following the recent signing of the inter-agency agreement for joint UK-China research and other activities in subject areas common to the UK Economic & Social Research Council and the Department of Management Sciences of the National Natural Science Foundation of China<sup>6</sup>, collaborative research on innovation policy for sustainability and inclusive growth should be funded through dedicated, focussed calls.

As noted above, bringing innovation policy and sustainability policy together (as highlighted by Steward) was a challenge recognised in both countries. This translates to a general research goal of building frameworks for understanding innovation for sustainability and equitable development (LIU). There was a plea (GU) that the government ministries present focus on these challenges – in line with central objectives of building a harmonious society and fostering indigenous innovation. This requires a move beyond sharing empirical data (as illustrated by the newly-initiated Pathfinder collaborations) towards a genuine exchange of theoretical insights and approaches.

Recent work focussing from Europe and the UK has studied system innovation at various levels, with a focus on transformative innovation and socio-technical transitions (see Tyfield's presentation). It was seen as important to take these theoretical contributions and evaluate their utility in the Chinese, or other socio-political contexts. Transitions in China could be different to those studied in the UK – for instance in terms of the role of government, firms (domestic and foreign), communities, households and social entrepreneurs. These and other theoretical perspectives should be shared between networks such as those developed through this workshop, and developed through long-term research collaborations. The new manifesto's call for '3D' innovation as a tool for sustainability and equitable development received a strong endorsement from many Chinese participants. However, questions were asked over whether or not '3D' innovation

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<sup>6</sup> See "ESRC - NSFC MoU paves the way for joint UK-China activities in Economics, Management and Public Policy", 7 Jun 2010, [http://www.rcuk.cn/rcuk/fore/s\\_ncontent\\_cnt\\_en.php?ncnt\\_id=287](http://www.rcuk.cn/rcuk/fore/s_ncontent_cnt_en.php?ncnt_id=287)

required different metrics and tools for analysis and policy-making in comparison to conventional innovation that is largely (although not entirely) studied based on its impacts on competitiveness and economic growth. Development of these metrics (alongside, for example, 'green GDP' or alternative development measures) could be another area for focussed bilateral research partnerships.

Encouraging a convergence between innovation policy and sustainability policy will require action not only at national levels, but crucially in local government settings and across non-governmental bodies. There was a recognition that scholars present understood little about the multi-level governance contexts in each others' countries. From the UK side there was an interest in further research to understand national-provincial dynamics in priority-setting and policy making, especially in terms of Chinese incrementalist-empiricist approaches to pilot schemes and 'test' counties/ cities. Such research could compare the examples highlighted by DAI in China with similar examples (The South-West<sup>7</sup>, The Midlands<sup>8</sup>, The North-East<sup>9</sup>, all designated 'low carbon economic areas') in the UK. As noted above, such comparisons should aim to contribute to theory utilised by researchers internationally, as well as bolstering the empirical evidence in this field.

A central route to understanding innovation processes for sustainability and equitable development would be to focus on theoretically-informed but strongly grounded research at the level of different organisations/groups (firms, government departments, civil society organisations or communities) and places (regions or cities where system innovation is occurring that contributes to sustainability goals). Within each of these levels, a systems perspective can be adopted (e.g. studying electric/ low emissions vehicles in Shenzhen would require attention to infrastructures, institutions and culture – as well as the technological innovations at play). By doing this joint empirical work, we would be embarking on a new kind of collaboration that fosters cross-cultural understanding beyond aggregate statistics to characterise the micro-processes of innovation at different levels.

There was a focus in discussions on characterising and measuring these forms of innovation at different levels. The workshop illustrated a great deal of interest in various kinds of innovation that do not fit neatly within the measures provided by Frascati and Oslo manuals. In the UK, NESTA has published a number of reports on hidden innovation/ total innovation and committed significant resources to trying to characterise these by developing new indicators and indices. Opportunities exist for collaborative work to extend these findings and explore opportunities for their application and adaptation to the Chinese context. Likewise, there was interest in whether Chinese analogues exist to the UK shift towards behaviour change and community-led innovation (see presentation by Harris) – illustrated by NESTA's more recent focus on 'mass localism' and a growing appreciation for the role of social enterprise in providing for community needs that are otherwise neglected

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<sup>7</sup> [http://swnews.swcouncils.gov.uk/nqcontent.cfm?a\\_id=5456](http://swnews.swcouncils.gov.uk/nqcontent.cfm?a_id=5456), accessed 19<sup>th</sup> April 2010

<sup>8</sup> [http://www.lowcarboneyconomy.com/community\\_content/low\\_carbon\\_news/8675/midlands\\_designated\\_low\\_carbon\\_economic\\_area](http://www.lowcarboneyconomy.com/community_content/low_carbon_news/8675/midlands_designated_low_carbon_economic_area), accessed 19<sup>th</sup> April 2010

<sup>9</sup> [http://www.hmg.gov.uk/buildingbritainsfuture/news/news\\_archive/20\\_july\\_2009\\_north\\_east\\_uk's\\_first\\_low\\_carbon\\_economic\\_area.aspx](http://www.hmg.gov.uk/buildingbritainsfuture/news/news_archive/20_july_2009_north_east_uk's_first_low_carbon_economic_area.aspx), accessed 19<sup>th</sup> April 2010

by the private sector. Whether work in China on ‘grassroots innovation’<sup>10</sup> or work in Yunnan utilising traditional knowledge has anything to contribute could be worth exploring. Whatever examples form the basis for research, however, case studies should be selected on the basis of shared interests and priorities.

Diversity in innovation systems was identified as an important and under-emphasized consideration, previously highlighted in the manifesto discussions and background papers (Ely and Scoones, 2009). DfID’s interest in China’s 55 ethnic minority groups, often located in remote, resource-poor or environmentally fragile regions, could provide a basis for such research – and a novel area of collaboration on more diverse forms of indigenous innovation. In both the UK and China, other areas of research could include the diversity of R&D programmes, business models and the integration of indigenous knowledge (e.g. traditional Chinese medicine, integrated agricultural solutions) into the formal innovation system.

#### Research collaboration – recommendations for modalities going forward

Some discussion focussed on the means for taking forward the outputs of the workshop, and on facilitating ongoing collaboration across the UK and China. Online fora were highlighted as a low-cost and broadly accessible approach. Existing websites such as SciDev.Net and China Dialogue represent useful tools for information sharing between researchers and other parties from the UK and China. These, along with other initiatives such as the China Low Carbon Innovation Platform (<http://community.eldis.org/china>), should continue to be supported, with further efforts dedicated to outreach and engagement beyond elite research organisations to include wider actors across innovation systems.

Participants also suggested regular fora or roundtables, especially for younger scholars, to explore these rapidly evolving questions in innovation studies and build both the empirical base and new frameworks for research. Globelics represents an international network that is already discussing related issues, and could be built upon, especially if the 2012 international meeting takes place in Beijing. At the same time, it was suggested that young scholars from the UK (or EU) and China could be supported to attend other fora (Cicalics), or dedicated conferences beyond the summer schools already supported by RCUK. These could possibly be linked to new, joint research programmes focussing on innovation policy for shared development and sustainability goals. Delegates agreed to take forward these ideas together and to explore possibilities for further workshops and collaboration into the future.

Annexes to the workshop report follow:

1. Workshop agenda
2. Case studies provided by UK delegates in advance of the workshop
3. Event news coverage in ‘Science and Technology Daily’

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<sup>10</sup> See, for example work under the Asia and Pacific Centre for Transfer of Technology’s Grassroots Innovation project -<http://nis.apctt.org/griHome.html>

**More information on the workshop, including the presentations given, can be found on a dedicated page in the 'roundtables' section of the New Manifesto website  
<http://anewmanifesto.org>**

## **Annex 1. Workshop Agenda**

### **UK-China Innovation Workshop for Sustainability and Equitable Development**

Co-Organised by China Institute for Science and Technology Policy (CISTP)  
at Tsinghua University and the ESRC STEPS Centre (Social, Technological and Environmental  
Pathways to Sustainability, University of Sussex  
19<sup>th</sup> March, 2010

**Venue:** Room 302, School of Public Policy and Management, Tsinghua University

#### **Programme**

##### **2. Welcome and Introduction**

**(Chair: Prof. SU Jun / Adrian Ely)**

- 8: 30-8: 40 Formal welcome by Prof Lan XUE, Dean, School of Public Policy and Management, Director, CISTP Tsinghua University
- 8: 40-8: 50 Short presentation by Yu HU, Deputy Chairman, Youth Union of MoST, Director, Department of Theory, Science and Technology Daily
- 8: 50-9: 10 Short presentation by : David Bacon, Counsellor, Science and Innovation, British Embassy , and Ling CUI (DfID)
- 9: 10-9: 20 Q&A

##### **2. Innovation, Sustainability, Development: A New Manifesto**

**(Chair: HU Yu/David Bacon)**

9:20-9:40 Historical perspective on UK-China STI policy collaboration from the SPRU perspective—  
Professor Geoff Oldham (Sussex University)

9:40-10:00 Introduction - “Innovation, Sustainability, Development: A New Manifesto—  
Dr. Adrian Ely ( STEPS, Sussex University )

10:00-10:10 Q&A

##### **Tea/Coffee Break: 10: 10-10: 30**

- 10: 30-10: 45 Response: Professor Lan XUE
- 10: 45-11: 10 Responses from other Chinese experts:

Rongping MU (Director, CAS-Institute of Policy and Management), Guanglin XIAO (Director, Tsinghua University Institute of Science, Technology and Society), Xielin LIU (Associate Dean, School of Management, Graduate University of Chinese Academy of Sciences)

### **3. Comparing UK-China Approaches to STI Policy for Sustainability**

**(Chair: Prof. Xiao Guanglin (tbc)/ Lars Frederiksen)**

- 11: 10-11: 30 Professor Fred Steward (PSI, University of Westminster)
- 11: 30-11: 45 Director ZHAO Huijun (Department of Policy and Regulation, MOST)
- 11: 45-12: 00 YU Jiang Associate Professor (Institute of Technology Policy, CAS) “ Innovation Policy for Sustainable Development: Some Primary Study in Nanotech Sectors of Europe and China”
- 12:00-12:15 JIN Jun (Zhejiang University) “To be sustainable and innovative: The Hangzhou experience”

**Lunch 12.15-13.00** School of Public Policy and Management, Tsinghua University

### **4. Building sustainable innovation capabilities among UK + Chinese firms**

**(Chairs: Prof. Xielin LIU/ Fred Steward)**

- 13:00-13:20 Dr. David Tyfield (Lancaster University, via video conference) – “ Game-changing Innovation in China”
- 13:20-13:35 Dr. Michael Harris (NESTA)
- 13.35-13.55 GAO Xudong, Associate Professor, School of Economics and Management at Tsinghua University) “Sustainable growth at the bottom in China through resource integration to serve the high end market”
- 13:55-14:15 Dr. Lars Frederiksen (Imperial College Business School), “Ecocit: Research on innovation and sustainability in urban design”
- 14:15-14:25 Q&A

### **5. International (including UK-China) collaboration for more equitable low-carbon development**

**(Chairs: Prof. Hui LUO/Dr. Adrian Ely)**

- 14:25-14:45 Dr Frauke Urban (Institute of Development Studies)
- 14:45-15:00 Dr. SUN Wansong (Director of Investment Promotion, MofCOM ) “Practice of Low carbon investment strategy in China.”
- 15:00-15:15 Dr. DAI Yixin (CISTP, Tsinghua University) “Low carbon city development in China: A case of Baoding”

15:15-15:30 ZHU Xufeng, Associate Professor (Nankai University) 'Low Carbon Cooperation and Global Leadership'

**Tea/Coffee Break: 15: 30-15: 45**

**6. Science, Technology and Innovation among BRICS and implications for global governance (Chair: CHEN Yantai/ Geoff Oldham)**

- 15:45-16:00 LUO Hui (MOST-CAST)
- 16:00-16:15 Cheng Peng, Management School, Graduate University of Chinese Academy of Sciences "The relationship between FDI scale and Local Firm R&D Intensity"
- 16:15-16:30 LIANG Zheng, Associate Professor, Director Assistant, CISTP, Tsinghua University, "Comparison of China and India in R&D globalisation"
- 16:30-16:40 Q&A

**7. Concluding Session - Taking forward UK-China collaboration on innovation for sustainability and equitable development(16:40—17:30)**

**Chair: Gu Shulin (Tsinghua University)**

This session will take forward the discussions during the day to help to identify:

- new policy approaches linking innovation to global and local sustainability challenges (of relevance to both DIUS/BIS and DfID Research)
- possibilities for future UK-China innovation policy research partnerships that more directly link innovation to sustainability and development goals

**Dinner 18: 30—20: 00 Restaurant near Tsinghua University**

## **Annex 2: Case Studies provided by UK delegates**

These case studies, detailing ongoing innovation-focussed initiatives fostering goals of environmental sustainability and equitable development, were contributed by UK representatives in advance of the workshop in March 2010. They serve to illustrate many of the exciting activities already underway in China, the UK and globally that may be built upon alongside some of the recommendations in this report. The author wishes to thank each of his colleagues for their case study contributions.

### **Case studies provided by Dr David Tyfield, Centre for Mobilities Research, Sociology, Lancaster University, UK (d.tyfield@lancaster.ac.uk)**

The following two case studies are drawn from the NESTA report, 'Game-Changing China: Lessons from China about disruptive low-carbon innovation' (Tyfield *et al*, 2010). The report argues for the particular importance to China – and other developing countries – of so-called 'disruptive' low-carbon innovation, which involves 'cheaper, easier-to-use alternatives... often produced by non-traditional players that target previously ignored customers' and/or use in novel contexts (Wilsdon *et al* 2007). The innovative step of a disruptive innovation is thus a social redefinition of technologies, rather than advance at the forefront of established hi-tech development trajectories. Such disruptive low-carbon innovation is advocated for several reasons:

- A low-carbon systems transition is needed, not merely marginal improvements in the efficiencies of consumption of fossil fuels from existing technologies. Such profound systemic changes have historically emerged from what contemporaneously appear unpromising and insignificant sources and innovations.
- Innovation is always a socio-technical process, involving the parallel development of social and technological change, as well as governance. Given the systemic nature of the low-carbon challenge, social and institutional innovation will be key – transforming ways of life to make low-carbon living both 'normal' and valued – yet innovation policy continues to privilege technological advancement to the exclusion of these types of innovation. Disruptive low-carbon innovation attends to this crucial social dimension.
- Efforts towards the low-carbon transition are urgent and must take place at a global scale. China's innovation capacities are improving rapidly, but hi-tech innovation capacity remains comparatively underdeveloped, and will take many years to embed. Conversely, disruptive innovation, both generally and regarding low-carbon issues, is already a strength of many Chinese firms and innovators. To pay such innovation due policy attention is thus to play to an existing strength, which will in turn encourage the further strengthening of Chinese innovation capacities.
- Low-carbon innovation is inseparable from issues of socio-economic development, especially in China, where the latter is the top policy priority. Disruptive low-carbon innovation facilitates attendance to both of these concerns, hence incorporating the importance of 'distribution'. Furthermore, regarding 'diversity', by focusing in the first instance on low-cost innovations, it offers significant opportunities regarding the development of appropriate technologies for developing countries. Regarding 'directions', this also opens up the possibility for Chinese development to imagine and pursue an alternative path from the resource-intensive consumerist model of the US-dominated 20<sup>th</sup> century.

The report 'Game-changing China' is available online at:

[http://www.nesta.org.uk/publications/reports/assets/features/game-changing\\_china](http://www.nesta.org.uk/publications/reports/assets/features/game-changing_china)

Beijing Shengchang Bioenergy S&T Co. Ltd, Beijing, China

Date started	February 2006
Funding	Self-funding and Government funding for individual projects
Business model	Production of biomass pellets from agricultural residues and biomass combustion equipment, focusing on local collection of raw materials and distribution of pellets.
Potential impact	Domestic boilers save about 10tCO <sub>2</sub> e per year, the patented cooking stove saves about 1.2tCO <sub>2</sub> e per year and industrial/ building heating boilers save about 265tCO <sub>2</sub> e per heating season for 18 000 sq m building (in each case compared to coal combustion).
The concept	Under the slogan “We care and we do biomass” Shengchang aims significantly to reduce carbon footprints from heating and cooking by providing locally-sourced biomass pellets to replace coal.
Brief description	<p>Biomass pellets are made from a range of agricultural residues, including wood chips, corn and cotton stalks and peanut shells. These are collected from farmers within a 20km radius of the pellet-making plants, delivered by the farmers themselves in return for RMB160 per tonne. By turning these residues into efficiently burning feedstocks, inefficient combustion of both coal and the residues themselves on the farm is avoided.</p> <p>Pellets are then delivered by the company to customers, either in 50kg bags or, for industrial users, in a specially adapted truck as bulk.</p> <p>To ensure maximal efficiency of the combustion of the pellets, Shengchang have also developed their own boilers, using technology from Tsinghua University that was not otherwise commercialized, and a patented cooking stove. Tests have been done by 3<sup>rd</sup> parties (including Tsinghua) regarding emissions from these boilers using Shengchang pellets with very favourable results regarding emissions vis-à-vis coal (see above). SO<sub>2</sub> savings are also considerable, at less than 10% of coal combustion. Both the boilers and the fuel are also relatively low-cost and an economical option for both individuals and business customers. The pellets are sold at RMB550 per tonne (vs. RMB950 per tonne for coal at 2008 prices) with consumption only about 25% more by mass. The boilers are also cost effective, especially with a RMB300 subsidy for the RMB400 cost from the Beijing municipality, while the stoves sell at under RMB200 each.</p>
Barriers encountered	<p>Encouraging farmers to change their routines and habits and shift towards both selling their agricultural residues and using biomass boilers instead of coal has been difficult. Government has provided considerable support, in the form of a transport survey (regarding delivery of residues from farmers), pellet subsidy, boiler subsidy and funding for some R&amp;D. Experience with the new boilers has also served to encourage other farmers to follow suit, especially due to the reduction in smoke, which improves the living environment.</p> <p>The business model was not immediately viable without government support but is quickly moving into profit. The CEO was lucky enough to have good contacts from his former work in the pharmaceutical industry to access such support. However, continuing government support for the coal industry undermines the economic case for shifting to biomass, just as it presented Shengchang with a closed system into which it had to break when starting out.</p>

Future plans	Shengchang plans to expand its locally-sourced biomass model across China, following on openings already under negotiation. As people become more aware of the problems – ecological and economic – associated with coal and oil and experience shortages of energy (e.g. during the cold snap at the end of 2009), growing demand for alternative energy sources is expected. Despite some interest from Europe, it is not at this stage deemed strategically worthwhile to pursue opportunities overseas. Long-term plans focus on building strategic partnerships with biomass electricity generating projects.
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GEI (Global Environment Institute), Beijing, China; Snow Mountain Organic Vegetable Corporation, Lijiang, Yunnan Province, China

Date started	GEI's rural biogas project in Lijiang began in 2004
Funding	Initial funding from overseas aid funds, together with funding from Lijiang government for biogas digesters and Beijing government for technical support.
Business model	GEI is a Chinese NGO committed to setting up 'market based solutions to environmental problems to achieve sustainable development'. Snow Mountain is part of a full-system transition toward sustainable low-carbon agriculture incorporating biogas digesters and organic vegetable farming.
Potential impact	Savings of 4.2t per year of firewood and combustion of 550m <sup>3</sup> of methane that would otherwise be released leads to savings of about 22 tCO <sub>2</sub> e per household. Increasing the model to include 10,000 households would generate annual savings of about 220,000 tCO <sub>2</sub> e. Impacts from avoided deforestation increase this figure further, as do reductions in use of mineral fertilizer regarding its production, transport and release of N <sub>2</sub> O, which is nearly 300 times as potent a GHG as CO <sub>2</sub> . As a result, 70% of agricultural emissions come from nitrogen fertilizer.
The concept	GEI's work encourages farmers to shift to low-carbon forms of agriculture & heating, while also attending to their paramount concern of stable and higher earnings.
Brief description	Snow Mountain is a private limited company that sells organic vegetables from Lijiang farmers to markets in large Chinese cities on the coast. The farmers are aggregated into cooperatives to improve economies of scale and to increase access to finance. Stable sales of lucrative organic vegetables have increased farmers' incomes and add to the economic viability of the biogas digesters provided by GEI, which produces the organic fertilizer or slurry. The digesters also produce enough methane to service cooking requirements. This reduces demand for wood (4.2t per household per year), and so deforestation (about 8 mu or 1.3 acres or 0.5 hectares of forest per year), while also burning methane – a much more potent GHG than CO <sub>2</sub> – that would otherwise simply be released into the atmosphere.
Barriers encountered	Coordinating all of the various elements of the full system transition involved was in itself a significant barrier. Such a comprehensive solution was necessary to get the farmers to engage with and commit to the changes, and hence make the most efficient low-carbon use of their biogas digesters. Establishing the cooperatives was also problematic. Encouraging the farmers to participate was difficult given previous experiences of collective agriculture, and legal status for these cooperatives was only achieved after July 2007, when the central government enacted the Law on Specialized Cooperatives. Lack of funding for the project and shortage of investment remained a problem and continues to do so regarding rolling out to other locations. Poor transport infrastructure is one main consideration regarding investment – trains are usually too slow for the perishable organic vegetables, while planes will not transport cargo, only people, during winter months. Low-carbon forms of transport for organic vegetables have yet to be developed, while markets for organic produce are weak or

	non-existent outside the largest Chinese cities, even in large provincial cities such as Kunming.
Future plans	GEI is exporting its model to other developing countries, including Sri Lanka and Laos. The success in Sri Lanka has been such that the Sri Lankan government has been concerned that all farmers will start to demand biogas digesters. Funding for these overseas ventures is available from the Chinese central government, but investment in expanding the model within China is not. GEI instead continues to look for investors, including from overseas, to pursue this opportunity.

## ***Ecocit: A meso-level policy response to climate change***

Case study by Lars Frederiksen, Imperial College Business School ([l.frederiksen@imperial.ac.uk](mailto:l.frederiksen@imperial.ac.uk))

### **Three EPSRC networks**

Ecocit is one of three networks (Ecoregion Research Networks) initiated in collaboration between the UK Engineering and physical science research council (EPSRC), the global design and engineering firm Arup and the Chinese government. The networks were launched in 2007. The planned development of eco-cities in China and the UK acted as the catalyst for the formation of networks between researchers in the UK, China and other nations. The aim of the networks was twofold, on the one hand the three partners looked strategically to forge stronger relationships in research between Chinese and UK academics and universities for example, joint publications and other types of sharing of knowledge. On the other hand the objective was to improve our understanding of the new phenomenon of ecocities and how these new types of low-carbon cities demanded integration of technologies, incentivized behavioural change, encouraged new planning processes, and generally added a new dimension to the urban activities of sustainable development. The three networks represent of meso-level type of policy aimed directly at improving knowledge creation and sharing experiences among academics and transferring these findings and considerations to the involved industry partners. The aspiration was that from such platform Chinese and UK based academics would develop and lead joint research applications for the Chinese, UK or international funding bodies. The networks had three specific focus areas:

CHaMSpaM	Governance, culture and space	Led by University College London
ECOCIT	Economics, environment and regional context	Led by Imperial College Business School
SUSTAIN	Sustainable infrastructure and behaviour adaptation	Led by University College London

### **Ecocit**

Funding, EPSRC (**£ 283,517**), **Period: Oct. 2007- June 2010.**

Ecocit is a global network of leading academics, industry partners and concerned public bodies focused on developing and transforming cities that are sustainable both ecologically and economically. Ecocit aims to develop a research agenda that brings value to policy makers, practitioners, enterprises and institutions engaged in developing or transforming the next generation of cities. The network addresses the planning and policy actions to determine what conditions are necessary to combine sustainable economic development and sustainable ecological objectives in urban units on the periphery of a mega-city.

#### **Outcomes:**

- A community of researchers build a virtual platform, 15 virtual seminars
- Played important part of establishing the Sino-UK Research Institute for Sustainability at Tongji University. A sister institute is being developed in London, Thames Gateway.
- Developed three major research applications (three research groups participated with four to six key members in each group):

- New management paradigms and business models required to support the design of ecocity developments
- Urban entrepreneurship: Planning and policy actions required to drive inward investment, attract and retain firms, and harmonise local employment opportunities and human capital
- Learning from Dongtan, focusing on the exploitation of innovation and the transfer of best practices from this leadership project to other ecocity projects on a worldwide basis. The importance of simulation models and case studies
- Two successfully funded research projects (EPSRC).
  - Dongtan ecocity: integrated sustainable urban design, capability development and replication, research progressed since 2007
  - Energy service business models in developing countries: Kenya, India and China, research progressed since 2009
- Three major workshops organised in China and in the UK (2) with participation of academics and industry partners from China, UK (more than 7 universities), Australia, and Spain.
- Organised public and academic events with industry representatives, authorities, and researchers

## **NESTA's Big Green Challenge and social enterprises**

([www.nesta.org.uk/areas\\_of\\_work/public\\_services\\_lab/environment/big\\_green\\_challenge](http://www.nesta.org.uk/areas_of_work/public_services_lab/environment/big_green_challenge))

Case study by Michael Harris, NESTA ([michael.harris@nesta.org.uk](mailto:michael.harris@nesta.org.uk))

**Background:** Inspired by challenge-led innovation prizes such as the X-Prize, NESTA launched the Big Green Challenge in 2007, a 1 million GBP (10,370,000 CNY) challenge prize for community-led responses to climate change. We set out to test an innovative way of stimulating and supporting communities to act on climate change, and to develop ideas that would be sustainable beyond the challenge prize itself.

**Objectives:** Rather than looking for just one breakthrough solution, NESTA designed the Challenge to galvanise as much community action as possible (NESTA, 2010). It was designed to encourage and reward community-based organisations to develop and deliver innovative approaches to significantly reducing carbon dioxide emissions in their communities. We developed a new, hybrid model, combining support and recognition for entrants with small-scale financial support for finalists. The process was designed to minimise bureaucracy and maximise participation: i) an 'open access' approach, with a very open first stage; ii) a clear outcome, and a clear timetable; iii) a staged process, with help for the development of ideas and graduated rewards.

**Initiators and level of initiative:** We had over 350 entries from community-based groups all across the UK, of which the 100 most promising were selected for the next stage. Through workshops and one-to-one advice, these 100 were supported to develop their ideas into more detailed plans. From these ten finalists were selected to receive support. The finalists then had one year to begin implementing their plans, with the help of a 20,000 GBP (207,500 CNY) grant and further development support, guidance (at an approximate value of 5,000 GBP/51,800 CNY) and access to NESTA's wider networks. At the end of the year the finalists were judged according to their performance against a measurable outcome – reduction in CO2 emissions. The prize was awarded to the finalists who proved their approaches were most successful.

**Actors:** NESTA is the UK National Endowment for Science, Technology and the Arts, an independent innovation agency which tests and demonstrates new ways to tackle social and economic challenges.

The Big Green Challenge community projects were very diverse both geographically and in approach. They tended towards approaches that addressed lifestyle and behaviour change (80 per cent of projects). Overall, up to 5,800 people were engaged in the finalist projects, with around 2,000 people involved in a substantive way.

The Challenge began to demonstrate that communities can develop and implement new approaches locally, which can make them more effective. Responses that are developed as well as delivered locally provide for real local ownership. This ownership matters because it means that projects can make better use of local knowledge, assets and infrastructure. These assets help to make solutions more efficient and effective than nationwide generic or 'best practice' approaches.

Many of the most successful projects were 'social enterprises' (businesses with primarily social objectives whose surpluses are principally reinvested for that purpose in the business or in the community, rather than being driven by the need to maximise profit for shareholders and owners). Community ownership invests back into the community and builds capacity for action. For example, The Green Valleys project is developing community-owned micro-hydro schemes, and improving the energy efficiency of homes in the Brecon Beacons National Park in Wales. The Green Valleys team

wanted to create a local sustainable energy market, supporting the community to reduce their own carbon emissions and explore the potential of alternative energy sources. By setting up community renewable energy schemes and reinvesting revenue in community-based carbon reduction projects, the team aims to make the region a net exporter of sustainable energy. Green Valleys installed a number of community-owned, hydro electric power turbines, just one of which will generate over 80 per cent of the electricity needed by the local community. The Green Valleys team led an intensive local education campaign around climate change to encourage support for the project. They put on more than 60 public lectures to get people thinking and talking about climate change. Not only did they develop demand for alternative energy sources, but they built a coalition and community ownership around the project that was critical to its success. As a result, Green Valleys will reduce emissions by 20-23 per cent. This impact is set to increase, with 40 hydro schemes planned to be installed in the next four years.

The Green Valleys team used a 'social franchising' model to take the project to scale. This was a key feature of the project's success, as it sparked a network of interdependent but sustainable Community Interest Companies (CICs) that were owned by particular parts of the community. The Green Valleys is itself a CIC, but rather than extending their service across the Brecon Beacons, they developed a model that enabled other groups to set up local enterprises. The Green Valleys project has established 13 town and village community groups focused on developing a variety of different carbon reducing activities, including electric vehicle trials, cultivating allotments, art projects, energy advice surgeries and woodland fuel schemes. Like Green valleys, a number of the finalists either are or have the potential to become self-sustaining. Such local ownership has other benefits. The Big Green Challenge finalists have, in a very short time, developed the capacities of their communities to act on climate change. Whether in establishing the right legal structures to assist the development of social enterprises, organising their initiatives so communities can input into decision-making or utilising local expertise to write business plans, funding bids or risk assessments, these capacities are the essential basis for effective community action or the operation of successful social enterprises. Many have developed independent funding schemes by harnessing financial support directly from their community – offering shares or community investment programmes.

**Time frame:** 2007–2010, with 2009 as the project evaluation year.

**Funding:** NESTA provided the funding. The total costs were around 3.5 million GBP (36,300,000 CNY).

**Impacts:** In January 2010, we announced the winners. Four of the ten finalists received a share of the prize money: the Green Valleys; Household Energy Services; Low Carbon West Oxford; and the Isle of Eigg. All four achieved reductions in CO<sub>2</sub> emissions of between 10 and 32 per cent in a very short time span. This means that in the space of just one year these community-led interventions have met almost half (44 per cent) of the UK's target for reducing CO<sub>2</sub> by 2020 in their communities. Because the challenge has been successful in developing sustainable projects, the reductions in emissions achieved by these communities are likely to treble over the next three to four years.

In addition, the UK Department of Energy and Climate Change (DECC) was impressed by the ambition and emerging impact of these participants, and offered 17 further, non-finalist projects extra funding and support – worth a total of 600,000 GBP (6,200,000 CNY). These projects are now part of the Big Green Challenge Plus, a joint initiative between DECC and NESTA ([www.nesta.org.uk/areas\\_of\\_work/public\\_services\\_lab/environment/big\\_green\\_challenge/decc\\_projects](http://www.nesta.org.uk/areas_of_work/public_services_lab/environment/big_green_challenge/decc_projects)).

But the success of the programme lies not just with the performance of the finalists. NESTA's analysis shows that a significant number of applicants chose to progress their own projects despite not making it to the final stage. The Challenge had been successful on its own terms, but it had also

generated some valuable insights about localism – not only about why local solutions work, but how to achieve lots of them. It was a process for finding distributed answers to problems and as a result has galvanised widespread local solutions with rapid impact at a national scale ('mass localism')(Bunt and Harris, 2010).

**Future plans:** Testing further challenge prizes in other social challenges (e.g. obesity), and other platforms (e.g. Innocentive).

**Department of Energy and Climate Change, Low Carbon Communities Programme**  
([www.decc.gov.uk/lccc](http://www.decc.gov.uk/lccc))

Case study by Michael Harris, NESTA ([michael.harris@nesta.org.uk](mailto:michael.harris@nesta.org.uk))

**Background:** The UK's major political parties have all pointed to the importance of encouraging and supporting more community action to address big social challenges, in part because of a shared recognition of the limitations of traditional government approaches. However, government has traditionally found it difficult to support genuine local solutions, and when it does struggles to marry localism with national impact and scale. This is for two reasons: firstly, because local solutions seem marginal in contrast to the strategic and increasingly expensive nature of today's social and economic challenges; and secondly, as greater local agency inevitably leads to greater diversity, this raises concerns about equity, cost-effectiveness and strategic coordination.

**Objectives:** The Low Carbon Community Challenge (LCCC) is a two-year research programme designed to test delivery options for achieving ambitious cuts in carbon emissions at community level. Providing financial and advisory support to 20 test-bed communities, LCCC will enable the development of bespoke local schemes to improve energy efficiency and tackle the wider issue of climate change. Helping to challenge and shape government policy, and to galvanise and support local action, LCCC will provide vital insights into the technical innovations and social changes required to enable Britain to reach its carbon reduction targets. Specifically, the programme will help government understand the potential role of communities in the transition to a low carbon future, and the systems, infrastructure and governance required to make this future a reality. It will also help to establish positive models for community action, and enable the sharing of ideas, stories and information to inspire other communities to launch their own low carbon initiatives.

**Initiators and level of initiative:** The main initiator is the need to reduce the UK's carbon emissions by 80 per cent by 2050. Twenty-two communities across England, Wales and Northern Ireland, both rural and urban, have won a competition to participate and be supported in the LCCC. The projects receive financial support – up to 500,000 GBP (518,400 CNY), as well as the potential savings from improved local energy efficiency, and increased local employment opportunities. The projects also receive help from a specialist support team – a collection of companies, charities, government-funded organisations and public sector departments, and free real-time home energy displays to help monitor energy use.

**Actors:** The Challenge was devised by the UK Government working in partnership with the Welsh Assembly Government and Northern Ireland Assembly Government, who will provide funding and guidance to all participating local communities.

Announced in December 2009 and February 2010, 22 communities from across the UK are participating the project. Here are three example projects:

- Hook Norton, near Banbury, Oxfordshire: The 2,500-strong community has been working on reducing its carbon footprint for a number of years. It will spend the money on installing a heat recovery system, solar panels, two community electric pool cars and a ground source heat pump at the local primary school (Hook Norton Church of England Primary School); provide interest free loans for a whole-house retro-fit of six homes; on top of this, it will insulate 40 homes and install solar thermal panels on a further 20; put a bio-diesel tank in the local brewery (Hook Norton Brewery) to supply bio-diesel fuel for the vehicles of 50 households. All these activities will provide income back in to a rolling low carbon fund so that the community can continue to take action for the next 10 years.

- Ashton Hayes, near Chester, Cheshire: Since 2005, Ashton Hayes has been working to become England's first carbon neutral community and has already cut average household emissions of the 370 homes by 23% since May 2006. It will spend the money on a various renewable generation technologies which will power part of the community. This includes a renewable energy CHP plant and solar panel focused on the school. This will link with measures to encourage energy efficiency via real time displays and demand side management.

- Ballymena, Northern Ireland: Intends to build a district heating network based on deep geothermal, biomass and residual heat technologies. This will benefit public buildings, social housing as well as private residences and will reduce fossil fuel use and fuel poverty.

Further, the UK Research Councils' Energy Research Programme inviting proposals for new research to compliment the LCCC, under the themes of: energy literacy and visibility; transformative innovation, lifestyles and socio-technical practices; communities, ownership and social movements; and policy, governance and legislation. The call is funded by the ESRC and the EPSRC, with 6 million GBP (62,100,000 CNY) available.

**Time frame:** The selected projects commenced work in January 2010. The projects will run for two years, ending in 2012.

**Funding:** DECC has provided 10 million GBP (103,600,000 CNY). The communities can access help to set up social enterprises, thanks to support from the Office of the Third Sector's Social Enterprise Action Research programme.

**Impacts:** This is a current programme. The LCCC explicitly states that it has been designed to involve communities as case studies for the applicability of new systems, infrastructure and technologies towards a low carbon future – acting as “national blueprints that will be used to inform government policy development and delivery”.

However, scaling successful local solutions by mandating their adoption in other areas or showcasing them as ‘best practice’ can undermine the local ownership, engagement and sustainability of solutions that make them effective in the first place, and erode communities’ own motivation and capacity for action. This questions the assumption that localism is in effect a testing-ground for ideas that can subsequently be scaled up at a national level, a kind of ‘R&D lab for public sector practice’.

‘Mass localism’ (Bunt and Harris, 2010) is an alternative approach to combining local action and national scale, by supporting lots of communities to develop and deliver their own solutions and to learn from each other. Mass localism is about seeking distributed solutions to problems and supporting communities to implement them. It depends on a different kind of support from government and a different approach to scale. Our research suggests that given the right kind of opportunity, advice and support, communities from various backgrounds would be likely to participate in local projects that address a social issue. Though many people face significant barriers to participation, class and income do not necessarily define desire and capacity to act provided appropriate support is in place. Further, the public appear much more likely to get involved in a local project if it is truly local rather than government-led.

Looking at the Big Green Challenge, we have drawn out a number of principles that indicate how government can stimulate and support communities to take the lead in addressing major social challenges (NESTA, 2010). These are not highly specific design features for future government programmes and initiatives. Rather they are a set of deliberately broad principles that government and others could use to reformat or complement aspects of some existing programmes. There are five principles: i) establish and promote a clear, measureable outcome; ii) presume a community

capacity to innovate; iii) in the early stages, challenge and advice is more valuable than money; iv) identify existing barriers to participation and then remove them; v) don't reward activity, reward outcomes.

**Future plans:** As above.

## Low Carbon Innovation Centres

Case study by Frauke Urban, Institute of Development Studies (f.urban@ids.ac.uk)

**Background:** Low carbon development can only be achieved when appropriate low carbon technology innovation will be developed and promoted. Developing countries need enhanced support to gain access to and develop low carbon innovation. The Low Carbon Innovation Centres currently under establishment by the UK Department for International Development (DFID) serve these aims.

**Objectives:** “The aim of the low carbon innovation centre concept is to accelerate the development and commercialisation of emerging low carbon technologies for national, regional or global deployment, thus supporting the transition to low carbon development pathways in both low and middle-income countries” (DfID, 2008).

**Initiators and level of initiative:** The Carbon Trust held consultations with thirty developing country experts to “explore whether and how the global transition to a low carbon economy could be accelerated by a network of centres designed to stimulate low carbon technology innovation and diffusion, with an emphasis upon their possible contribution in developing countries”(Carbon Trust, 2008). In late 2008, DFID decided to test the low carbon innovation approach together with InfoDev, drawing on the experience of the Carbon Trust. This initiative is designed to target three developing countries as a multilateral innovation initiative. The short-listed countries in 2008 were: China, India, Brazil, South Africa, Indonesia, Mexico, Vietnam and Kenya (DfID, 2008). According to insider information in 2010, one low carbon innovation centre will be established in China.

**Actors:** The key actors are DFID, the World Bank-based network InfoDev and institutions and experts such as the Carbon Trust. InfoDev is a global partnership of international development agencies that work on information and communication technologies in developing countries (DfID, 2008).

**Time frame:** In 2008-9 the scoping and stakeholder engagement for the low carbon centres happened. The centres are anticipated to be set up from 2010 onwards and should run for a 1-3 year trial period (DfID, 2008) or even for up to 5 years as the Carbon Trust suggests (InfoDev / Carbon Trust, 2009).

**Funding:** The Carbon Trust estimates that the low carbon innovation centres will need approximately US\$ 40 -100 million per centre per year over the next five years (InfoDev / Carbon Trust, 2009). This funding is anticipated to come from DFID and other bilateral and multilateral development agencies.

**Impacts and future plans:** The impacts of the low carbon innovation centres will be that the developing countries could accelerate low carbon development and deployment by addressing key barriers to innovation. This could include applied R&D by adapting technology to local needs; business incubator services by providing business skills for start-ups; enterprise creation; early stage funding for low carbon ventures; deployment of existing energy efficiency technologies; enhanced capacity building and new insights into innovation policy and markets (InfoDev / Carbon Trust, 2009).

## **NZEC: the UK-China Near Zero Emissions Coal project**

Case study by Frauke Urban, Institute of Development Studies (f.urban@ids.ac.uk)

**Background:** China is currently the world's largest CO<sub>2</sub> emitter and almost half of its emissions come from the coal-dominated energy sector (IEA, 2009). Low carbon technologies are thus urgently needed to reduce emissions and to move towards a low carbon economy. NZEC is a new low carbon initiative for clean coal technology. NZEC stands for Near Zero Emissions Coal project and is a bilateral innovation initiative for carbon capture and storage (CCS) between the UK and China. CCS is a new technology which captures the CO<sub>2</sub> from fossil fuels during the combustion process and stores it underground in geological formations such as depleted oil and gas fields and saline aquifers.

**Objectives:** NZEC "has the objective of demonstrating advanced, near zero emissions coal technology through carbon capture and storage (CCS) in China and the EU by 2020" (NZEC, 2007). Specific objectives are to enhance knowledge transfer between Chinese and UK parties on an academic, industrial and policy-making level, to build capacity for CCS in China, to explore options for demonstration projects and CO<sub>2</sub> storage, to develop CCS technology and construct a demonstration plant by 2015 in China (NZEC, 2010).

**Initiators and level of initiative:** The EU-China NZEC agreement came into force in 2005 at the EU-China Summit as part of the EU-China Partnership on Climate Change. UK and Chinese policy-makers then developed a bilateral agreement within this framework.

**Actors:** NZEC is funded by the UK's Department of Energy and Climate Change (DECC) and is implemented in China by the Ministry of Science and Technology (MOST). There are a wide range of project partners from academia, private sector businesses and state-owned businesses. The UK partners are the following: AEA, Alstom Power, British Geological Survey, BP, Cambridge University, Doosan Babcock, Heriot Watt University, Imperial College, Shell, Schlumberger. The Chinese partners are the following: ACCA21, Chinese Academy of Sciences, Centre for Energy and Environmental Policy, China University of Petroleum Beijing, China University of Petroleum Huadong, Department of Environmental Sciences and Engineering at Tsinghua University, Department of Chemical Engineering at Tsinghua University, Department of Thermal Engineering at Tsinghua University, Energy Research Institute, Greengen, Institute of Engineering Thermophysics, Chinese Academy of Sciences, North China Electric Power University, BP Tsinghua University Clean Energy Research and Education Centre, Thermal Power Research Institute, 3E Institute Tsinghua University, Wuhan University, Zhejiang University, PetroChina, Jilin Oilfield (NZEC, 2010).

**Time frame:** 2005 – 2015, with consultations in 2005/2006 and the first phase being completed during 2007-2009 (NZEC, 2010).

**Funding:** DECC provided £3.5 million funding for the first phase. The costs for phase 2 and 3 are estimated between £7.5 -15 million (Phase 2) and £35-750 million (Phase 3) based on the technology chosen (MIT, 2010).

**Impacts:** China is particularly interested in developing CCS technology for its coal sector, which could reduce emissions by up to 85% (NZEC, 2010). There is significant potential for CO<sub>2</sub> emission reductions. Other impacts are knowledge transfer between China and the UK and cooperative work for low carbon innovation.

**Future plans:** Develop CCS technology and construct a demonstration plant by 2015 in China (NZEC, 2010).

### **Annex 3: Event News Coverage**

#### **“创新、可持续与发展宣言”将在今年发表**

**发布时间：2010-03-20 | 作者：张晶**

<http://www.stdaily.com> 2010年03月20日 来源：科技日报 作者：张晶

本报北京3月19日电（记者张晶）记者在今天召开的“基于可持续和合理性发展的中英创新专题研讨会”上获悉，由英国苏塞克斯STEPS中心起草的“创新、可持续与发展宣言”将在今年发表。

苏塞克斯STEPS中心是一个跨学科的全球性研究和政策参与中心。“创新、可持续与发展宣言”的主要起草人之一Adrian Vincent

Ely认为，和过去相比，世界的创新与发展已大不相同。在一个高度全球化和信息化的世界中，需要一个新的宣言挑战当前政府和国际机构科技促进发展的主流模式。

据介绍，新宣言融合已有的经验教训与新兴的观点，探讨当前有关科技促进发展的问题，对各种主题进行前瞻性的研究，并提出相应的措施。议题包括：全球创新活动、发展、产业化和公平的再分配、高科技挑战等。对涉及农业、卫生、水利、环境和能源问题的研究，宣言将形成针对部门的具体建议。

Translation

#### **"Innovation, Sustainability, Development Manifesto" will be published this year,**

**Release Date: 2010-03-20 | Author: Zhang Jing**

March 20, 2010 Source: Science and Technology Daily Author: Zhang Jing

Beijing, March 19 Our reporter Xinhua Zhang Jing learned at today's workshop "UK-China Innovation for Sustainability and Equitable Development", that the STEPS Centre, Sussex, United Kingdom has drafted "Innovation, Sustainability, Development: A New Manifesto", which will be published this year.

Sussex STEPS Centre is an interdisciplinary global research and policy engagement centre. Adrian Vincent Ely, one of the main drafters of "Innovation, Sustainability, Development: A New Manifesto" believes that the world's innovation and development context is very different to in the past. In a highly globalized and information-oriented world, a new manifesto is needed to challenge mainstream models used by governments and international agencies to promote the development of science and technology.

According to reports, the new manifesto combines past experiences and emerging viewpoints to explore current issues relating to science and technology in order to advance forward-looking proposals. Topics include: global innovation, development, industrialization and equitable redistribution, high-tech challenges. In the areas of agriculture, health, water conservation, environment and energy research, the manifesto will form sector-specific recommendations.

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