Low-Carbon Growth Links with China

Third Report of Session 2012–13

Report, together with formal minutes, and oral and written evidence

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The Energy and Climate Change Committee

The Energy and Climate Change Committee is appointed by the House of Commons to examine the expenditure, administration, and policy of the Department of Energy and Climate Change and associated public bodies.

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The current staff of the Committee are Sarah Hartwell-Naguib (Clerk), Jenny Bird (Senior Committee Specialist), Luanne Middleton (Inquiry Manager), Katie Phelan (Senior Committee Assistant), Jonathan Olivier Wright (Committee Assistant), Danielle Nash (Administrative Assistant), and Nick Davies (Media Officer).

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Summary

China is central to global efforts to tackle climate change and should be at the heart of HMG’s climate change mitigation strategy. UK emissions reductions are tiny compared with the growth in Chinese emissions, but reducing our own emissions also serves other purposes. Low-carbon leadership by the UK may encourage major emitters like China toward sustainable development. Developing the UK’s green economy will also be vital to ensure that our businesses can continue to compete in a decarbonised world.

The environmental and economic costs if the threat of climate change is not addressed are daunting and cannot be avoided without international action. Meanwhile, the possibilities for growth in low-carbon industries are highly attractive. The UK can encourage the trend toward low-carbon development in China at the same time as creating new opportunities for British businesses.

The UK has set itself the objective of being a climate change leader and pioneered decarbonisation policies such as the Climate Change Act 2008 and emissions trading. We were impressed by the work of the Foreign and Commonwealth Office in China, but we found that leadership was being undermined in a number of ways.

Firstly, the Government’s work in China suffers from a lack of strategic direction. There are too many projects, focusing on too many different areas, rather than a coordinated effort to achieve key objectives. The Government must take stock of where UK strengths and Chinese priorities overlap and focus interventions in these areas.

Second, our leadership role in China is being undermined by our “image”. We have not been as effective as other countries at showing what the UK has to offer. The UK’s image is also tarnished by the reputation of being “all talk and no action”. Action at home will be key to maintaining British influence in international debates and the competitiveness of UK low-carbon industries. Slowing the pace of decarbonisation at home could undermine our low-carbon businesses and the export opportunities for this sector, and the credibility of UK leadership on climate change.
Introduction

1. The People’s Republic of China is the fastest growing economy in the world. By 2030, China could account for half of the world’s emissions.¹ But China’s ambitions to grow its green economy as it attempts to reduce emissions mean that it is also likely to be a world leader in low-carbon development. One of the four key priorities set out by the Department of Energy and Climate Change is to “drive ambitious action on climate change at home and abroad”.² One of UK Trade and Investment’s headline objectives is “winning high value opportunities in overseas markets for UK businesses of all sizes”.³ Engagement with China on low-carbon development ought to be at the heart of the UK’s efforts to achieve both of these goals.

2. China has set out some of the most ambitious decarbonisation plans in the world. The scale of ambition and activity mean that this is the ideal time for the UK to work together with China to help ensure that plans to reduce emissions are delivered successfully. The UK can learn from China’s experiences, for example in using smart grid technology and high voltage direct current transmission. As China develops its policies and programmes, there are opportunities to share the UK’s own experiences in this area and to avoid the problems that have afflicted schemes such as the EU Emissions Trading System. Furthermore, a strong policy on emissions reduction at home provides a clear signal to the rest of the world that may catalyse action. The UK can be regarded as a key reference point on climate change mitigation activity technology, and its leadership will help to promote the low-carbon growth model internationally.

3. At the same time as showing leadership and sharing experience, there are ample opportunities for UK businesses to benefit. With this in mind, we launched our inquiry to examine the effectiveness or otherwise of existing areas of low-carbon cooperation between China and the UK.

4. The terms of reference for the inquiry are set out in Annex I. We held two oral evidence sessions, with academics, business groups and the Minister of State, and received a range of written evidence which is published alongside this Report. A full list of witnesses can be found in Annex II. We also visited Beijing, Guangdong and Hong Kong as part of our investigation. An outline of the visit can be found in Annex III. We are extremely grateful to all those who gave evidence to this inquiry and especially for all those who gave us their time on our visit to China.

¹ Ev 47
³ UKTI, Corporate strategy: Britain open for business – UKTI’s five year strategy, May 2011
1 Why cooperate on low-carbon growth?

5. This chapter sets out the main reasons for improving bilateral cooperation with China on climate change mitigation: First, it is impossible to avert dangerous climate change unless China succeeds in its push for low-carbon growth. In doing so China faces a challenge in balancing emissions-intensive growth and low-carbon ambitions: sharing the UK’s wealth of experience could help to tip the balance. Second, in doing so, there are opportunities for long-term economic growth. Cooperation with China can help the UK to capitalise on its low-carbon expertise.

Emissions in China

6. China’s emissions increased from 3.8 billion tonnes of CO₂e in 1990 to 9 billion tonnes in 2011—20% of global emissions.4 The International Energy Agency has estimated that half the growth in energy-related emissions from now until 2030 will come from China. However, if China makes a success of the low-carbon growth model and reduces emissions it may be possible to limit global warming to 2°C, relative to pre-industrial levels—the target set by the UN Framework Convention on Climate Change. Without curtailment of emissions growth in China, warming of at least 3°C would be likely. The importance of China’s participation in a global climate treaty increases with each year, as its economy and energy use continue to grow rapidly.5

![Growth in primary energy demand in the New Policies Scenario](source: World Energy Outlook 2011)

China’s low-carbon ambitions

7. As Dr Fatih Birol, Chief Economist at the International Energy Agency (IEA), told us, the situation could be far worse without the action China is already taking.6 China’s part in

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6  Committee private seminar with the International Energy Agency
the agreement at COP-17 in Durban last year was a significant step forward. At home, China’s carbon intensity fell by 15% between 2005 and 2011, in terms of emissions per unit of GDP. The IEA’s analysis indicated that the path of Chinese development could determine the success or failure of international climate change mitigation efforts.7

8. Several influences are driving the shift toward a low-carbon growth model, even without an international deal. First, the impacts of climate change in China would be severe, affecting coastal cities, agriculture, forestry and water systems.8 Second, air pollution afflicting many Chinese cities could be lessened by a switch away from fossil fuels. Third, China’s rapidly growing appetite for energy means it has become increasingly dependent on imported fossil fuels, raising concerns about energy security. National Energy Administration Deputy Administrator Mr Qian explained that energy security was paramount for China.9 Finally, the prospect of a global “green industrial revolution” offers the potential for new markets around the world and China is keen to develop the high-tech low-carbon portion of its economy.

9. Moving away from the dirty development model that has driven growth in the West would be a major achievement. However, China’s prospects for achieving decarbonisation are far from certain. In China’s developing economy, where demand for energy will continue to rise, a major priority remains the need to provide for the rising hopes of a “developed” consumer lifestyle. Urbanisation, electrification, abundant coal reserves and rapid increases in car ownership all push strongly in the direction of high-carbon development.

10. The People’s Republic of China is central to global efforts to tackle climate change. China is at a crossroads and it may be able to make a success of the low-carbon growth model to resolve the tension between the desire for development and ambitious plans for decarbonisation.

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7 IEA, Global carbon-dioxide emissions increase by 1.0 Gt in 2011 to record high, 24 May 2012
8 China State Council Information Office, White paper: China’s policies and actions on climate change.
9 See Visit Note.
The Challenge for China

Some of the toughest obstacles China is facing include:

a) China’s electricity generation capacity is around 930 GW. 70% of this capacity is unabated coal-fired plant. 3.3Gt of coal were consumed in China in 2010—50% of global consumption. China will double total generation capacity by 2020 which is likely to include over 450 GW of additional coal-fired capacity. China will cap domestic coal production and consumption at 3.9 billion tonnes in 2015, nearly 10% higher than 2011 levels, according to its 12th five-year plan for the coal industry.

b) The urban population increased by 290 million from 1990 to 2007. Two more “mega-cities” (10 million people or more) and over 50 second-tier cities are anticipated by 2030, bringing a further 350 million urban residents.

c) With increased urbanisation, comes increased personal car ownership. A new report from IHS Automotive forecasts annual car sales in China will grow by 74% to more than 30.6 million vehicles a year by 2020.

d) Many of the easiest emissions reduction opportunities have already been taken. Command and control policies, such as shutting down the dirtiest power plants, have helped China to make a start at emissions reductions, but more subtle policies will be necessary to combine decarbonisation with continued economic growth.

UK leadership

11. Partly thanks to early action on emissions reduction and partly thanks to the switch from coal to gas and the recent recession, UK emissions fell from 780Mt of CO₂e in 1990 to 580Mt in 2010. But these are only a fraction of global emissions. The UK’s emissions reduction efforts are negligible compared with emissions increases elsewhere. In 2011, the increase in Chinese emissions was almost 200Mt more than the UK’s total territorial emissions. Increases in other developing countries like India are considerable.

12. Despite this mismatch, the Minister told us in our inquiry on consumption-based emissions reporting that the focus of the Government’s climate change mitigation strategy was on the reduction of domestic emissions, although a good deal of Chinese emissions are fuelled by British consumption. Internationally, he told us that the Government was working to achieve an international deal that could ensure that other countries make similar commitments. A third strand of action was the bilateral work that the Government pursued to encourage action on climate change with individual countries.

13. However, as Professor Fankhauser asked, “what is the point of the UK having all those carbon targets if the world does not follow?”. He went on to explain that “through example the UK can leverage other countries to do similar things, but that does not happen on its own. That needs a certain amount of engagement”. As well as pushing forward best practice, the UK can help to accelerate carbon reductions in other countries by sharing the

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10 Energy and Climate Change Committee, Twelfth Report of Session 2010-12, Consumption-Based Emissions Reporting, HC 1646, Q 124 [Greg Barker]

11 Q 16 [Professor Fankhauser]
experience we have developed through our own efforts. Even though the UK is only directly responsible for a small proportion of the world’s total carbon emissions (measured on a territorial basis), action to reduce domestic emissions can catalyse carbon reductions outside the UK’s borders. Moreover, as we argued in our Report on consumption-based emissions reporting, the UK has a responsibility for international emissions associated with our own consumption.12

14. The Minister noted more than once during oral evidence that the UK is China’s “partner of choice”.13 He stated:

There is a genuine interest in what we are doing and I come back to my opening point, I think we are seen as the country of choice, or destination of choice, for not just one particular section of the renewable energy economy but in terms of the holistic low-carbon transition.14

This underlines the potential effectiveness of UK leadership and indicates that strategic dialogue and high level diplomacy should complement collaboration on the detail of policy and technological development. As John Ashton, UK Special Representative on Climate Change highlighted “Chinese choices - more than anybody else’s choices actually - are building the new global economy, the post 2008 global economy”.15

15. Action at a bilateral level could also ease some of the competitiveness concerns that have blighted the development of UK low-carbon policies. If a credible price of carbon can be established in China, for example, then this could level out the playing field for British businesses working under the EU ETS and other environmental levies.16

16. Furthermore, China’s willingness to become a champion of the low-carbon growth model has implications for the progress of the international system. China has great influence over the actions of its near-neighbours and the other member states of the G-77. The deadlock between China and the world’s other major emitter—the United States—has been the sticking point in the progress of UN negotiations for two decades. A significant shift in favour of low-carbon development from China could leave the US with little choice but to follow suit.17 In this way, the dividends of encouraging low-carbon development in China are further enhanced.

17. The UK Government should be aware that in order to make the most of UK emissions reductions, our leadership role must be one of active and strategic engagement and not just passive demonstration. Making low-carbon growth a reality in the UK is potentially a powerful lever of political diplomacy. The UK Government should acknowledge that encouraging more ambitious emissions reduction targets internationally should be a fundamental goal underpinning its own emissions

12 Energy and Climate Change Committee, Consumption-based emissions reporting, Twelfth Report of Session 2010–12, HC 1646, para 22
13 Q 106 [Gregory Barker]
14 Q 125 [Gregory Barker]
15 Q 107 [John Ashton]
16 Q 53 [Richard Baron]
17 Ev 47
reduction objectives. This should be reflected in the objectives of every Department (including DfID and the FCO) with a responsibility for climate change mitigation. The Government should recognise that the combination of Britain’s leadership in understanding the challenge of climate change sooner than many other countries, if combined with practical action to address it now, could enable us to punch well above our weight in influencing how China, and other expanding economies in the East react and cooperate in the next few years.

**Policy development**

18. Professors Fankhauser and Davies both highlighted policy development as one of the most fruitful areas for collaboration. The UK has a number of years of experience of developing low-carbon policies, which could be of benefit as China looks to develop its policies and framework. In fact UK domestic policy on climate change has already been something of a game-changer in China where there was enormous interest in the Climate Change Act and the concept of mandatory carbon budgets. Our inquiry identified three particular areas where UK policy expertise could be useful to China: emission reduction targets, carbon budgets and emissions trading. We explore each of these areas in turn.

**Emission reduction targets**

19. The Chinese 12th Five Year Plan (FYP), which runs from 2011–2015 was formally approved on 15 March 2011. It set out a number of targets for 2015, including:

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<th>Metric</th>
<th>Target for 2015</th>
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<tr>
<td>GDP</td>
<td>$8.5 trillion</td>
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<tr>
<td>Carbon intensity reduction</td>
<td>17%</td>
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<tr>
<td>Energy intensity reduction</td>
<td>16%</td>
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<tr>
<td>Share of non-fossil fuel in primary energy consumption</td>
<td>11.4%</td>
</tr>
<tr>
<td>Percentage of research and development spending as a part of GDP</td>
<td>2.2%</td>
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China plans to cut emissions per unit of GDP by 45% between 2005–2020 and has announced its intention to develop a climate change law. A “Law Team” was set up in early 2011 to develop the law. The UK is well placed to offer support in this area, having been the first country in the world to set itself a legally binding carbon reduction target through the Climate Change Act 2008. We were pleased to hear about the work of GLOBE International during our visit to Beijing, which has facilitated several learning exchanges between UK and Chinese policy makers to share best practice in this area.

20. The first draft of the climate change law is expected in 2012 and legislation is expected to be in place by 2015. Although the climate change law is unlikely to raise the overall level of ambition beyond the targets already set out, it is expected to establish the domestic frameworks to measure, manage, report and verify emissions of greenhouse gases.

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18 Q 1 [Professor Fankhauser]; Q 2 [Professor Davies]
19 Sandbag, *Turning the tanker*, April 2012, p 10
Carbon budgeting

21. Accurate accounting is vital for underpinning national and international emissions reduction policies and for ensuring that targets are really met. The Climate Change Act 2008 is a model for carbon budgeting standards with vital independent input from the Committee on Climate Change. Encouraging similarly rigorous standards of accounting and planning could help to provide the data necessary for an equitable and effective climate change mitigation regime.

22. Annual emissions data for China were not available for all sectors and the most up-to-date statistics were typically more than two years out of date or not subject to systematic scrutiny. Annual publications could provide objective verification of progress and maintain pressure on actions to control emissions growth. As the University of East Anglia pointed out, CO₂ intensity data is required to verify progress against China’s own objective to reduce their CO₂ intensity by 40–45% by 2020. The Chinese government has been working on these systems in preparation for its new Five Year Plan (FYP) goals and there are demands for better systems coming not just from the central government officials charged with monitoring local performance, but from the localities that want to ensure they get credit for the changes they make. Professor Le Quéré reported a discussion with the Chinese Ministry of Transportation, which had explained that it did not yet have the necessary skills to account for the emissions from transportation accurately in intermediate-sized cities. She believed that this expertise was available in the UK and could be transferred to China.

Emissions trading

23. The development of a rigorous emissions trading system (ETS) in China is a double opportunity. Establishing a price for carbon can have a significant impact in attracting low-carbon investment and encouraging other emissions reduction efforts. In China, an effective carbon price could save millions of tonnes of carbon emissions. Second, the creation of a robust emissions trading scheme in China could make a real difference in encouraging other countries like the United States to adopt their own systems. Baroness Worthington emphasised China’s soft power over its near neighbours in Japan, Korea and Australia. These systems could, in turn, be compatible with the EU system.

24. China plans to launch pilot emissions trading schemes in seven areas before 2013 and a unified national ETS in 2015. The selected regions have been asked to “attach great

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20 Ev 52
21 Ev 52
22 Q 7 [Professor Le Quéré]
23 Q 53 [Richard Baron and Baroness Worthington]
24 Q 53 [Richard Baron and Baroness Worthington]
25 Beijing, Tianjin, Shanghai, Chongqing and Shenzhen municipalities, and in Guangdong and Hubei provinces.

Some of the details of the Chinese pilot programmes are beginning to emerge. For example, six heavy-emitting industries including cement, iron and steel production will be covered by Chongqing’s pilot emissions trading scheme, while a working group has proposed to include 120 of Tianjin’s biggest energy consumers in the city’s emissions trading scheme. The Guangdong pilot Emissions Trading Scheme (GD ETS) may include the power and building sectors and teams have been commissioned to compile a GHG emission inventory, monitoring system, registry and emissions trading platform.
importance” to determining the sectors that are to be covered by their trading systems. They will also need to define the basic rules for the pilot and set up the infrastructure necessary to run a trading scheme. John MacArthur of Shell told us that he could “see cap and trade moving very quickly” in China and believed it could help to reduce the expansion of emissions from coal.\textsuperscript{26} Nevertheless, this timetable is extremely tight. Although China has considerable experience as the world’s largest supplier of carbon offsets under the UN Clean Development Mechanism and has set up several environmental exchanges that deal in carbon, so far it has little experience of cap-and-trade. During our visit, we found that there was great determination to succeed in the provinces but that progress in implementing the plans for cap-and-trade was slow.\textsuperscript{27}

25. We also heard about an array of challenges for emissions trading in China. There are great disparities in wealth and economic development between and within provinces. This may raise difficulties for methods of allocation and the capacity for different emitters to participate. There were also concerns about how a market-based mechanism could function in an economy that is still characterised by direct government control, dominant state-owned enterprises and fixed prices for key services and commodities such as energy.\textsuperscript{28}

26. In order to encourage efficient design of its emissions trading systems, China is encouraging its provinces to experiment separately in how their systems will operate. Dr Jiang Kejun, Director of the Energy Research Institute of the NDRC, told us that different models would be trialled in each region, to ascertain which type of system would be most effective in China.\textsuperscript{29} As we set out in our Report on the EU Emissions Trading System, the efficient design of an ETS is crucial to its environmental and economic success and we welcome China’s decision to test different options to find the most effective system.

27. The opportunity to trade between the EU ETS and a Chinese scheme could one day improve access to economically efficient emissions reductions for both jurisdictions. In Europe, we have made many mistakes in the implementation of our own scheme, but it is finally beginning to take shape. It makes sense to work closely with the Chinese to share our insights and experience, and learn from theirs. The pursuit of different designs creates the risk that China will opt for a kind of ETS that is too weak to have real environmental benefits. Some models of emissions trading are less robust than the EU ETS, such as the scheme in New Zealand, where there is no real cap on emissions. The detailed design of an ETS could make the difference between cost-efficient emissions reductions and a waste of money.

28. UK experts have a great deal of experience in designing an effective scheme. Baroness Worthington and George Yu highlighted the UK’s experience in designing the regulatory and legal framework necessary to support emissions trading, as well as the IT systems that can underpin it.\textsuperscript{30} The UK has already successfully exported the IT system that supported

\textsuperscript{26} Q 84 [John MacArthur]
\textsuperscript{27} PointCarbon, http://www.pointcarbon.com/news/1.1914260
\textsuperscript{28} See Visit Note. There have since been indications from the NDRC that the power sector may be excluded from emissions trading in China, because of potential conflicts with fixed prices. http://www.pointcarbon.com/news/1.1915861
\textsuperscript{29} See Visit Note
\textsuperscript{30} Q 59 [Baroness Worthington and George Yu]
the UK national emissions registry to other countries in the EU, creating business for the UK and improving the standard of emissions accounting internationally. As the Government acknowledged in its response to our Report on the EU ETS, it is imperative that international emissions trading systems are designed to encourage real emissions reductions at least cost, in a way that facilitates the linking of systems across the world.31

29. One of the most crucial design elements is whether an absolute cap on emissions is established and whether it is set at a level that generates real emissions reductions. While the State Council’s targets for the cities and provinces are intensity-based, it will be possible for the pilot schemes to establish absolute targets. For example, Guangdong Province has announced a cap of 660Mt in 2015, a 30% increase on its 2010 emissions.32

**DECC’s work on emissions trading in China**

30. The UK is providing £7m of International Climate Fund (ICF) money to the World Bank’s Partnership for Market Readiness (PMR), a fund designed to help middle income countries to develop market-based mitigation policies. China is expected to submit its business case for funding early this year.33 DECC said that it would continue work towards developing a dialogue between experts in the UK and those institutions responsible for collecting emissions data, carbon accounting and reporting in China. The dialogue aims to assess the progress in building capacity, identify urgent gaps, and put in motion new projects that would enable construction and strengthening of the institutions to underpin the creation of a successful national carbon market during this Five Year Plan period.34

31. China’s experiments in emissions trading are ambitious and commendable; a successful scheme in China could be key to the development of emissions trading across the world. Every assistance should be offered to the Chinese Government, and to pilot regions, to bring these systems into operation as soon as possible. We should also take the opportunity to advocate the benefits of compatibility with the EU Emissions Trading System, for environmental reasons and for mutual economic advantage.

32. During our visit, we suggested to Governor Zhu Xiaodan of Guangdong Province that the UK had much to offer in experience of market mechanisms for climate change mitigation. We are delighted that the Governor directed a delegation led by Deputy Director General Lu Xiulu to visit the UK.

33. As a priority, the UK Government should offer its assistance in measuring emissions more accurately and designing a legal infrastructure for emissions trading. This should include work on the legal definition of emission units, allocation arrangements, trading rules, monitoring, and enforcement rules. The UK Government should offer support both at the national level and at the provincial/city level. Since the provincial pilots are testing the merits of the different models of emissions trading, it may be advisable to focus our efforts in advocating the potential benefits of systems.
that would be internationally compatible (for example the EU ETS); the Guangdong ETS seems to be one such system. At the national level, the development of a climate law presents an opportunity to put the necessary legal infrastructure in place, which the UK is well-equipped to support.

34. It appears that the question of whether individual emissions trading schemes will be linked together, or replaced by a national scheme, is undecided. There will need to be careful consideration of how to draw together the different pilots with sectoral initiatives. The UK has particular experience of integrating a pilot system with a broader scheme, having run the UK ETS alongside the EU ETS. This experience may be relevant for the successful integration of China’s pilots.

Cooperation and Competition

35. The second reason for cooperating with China on climate change mitigation is to ensure that the UK can make the most of the potential for markets in low-carbon goods and services that will emerge over the next decade. China’s 2011–2015 Five Year Plan identifies seven strategic industries, five of which are low-carbon, and this is supported by a $1.7 trillion public fund: it has an active industrial policy backed by mass investment.35 One major lesson that the UK should learn from the Chinese is approaching low-carbon development as a business opportunity. The key to unlocking low-carbon growth in the UK may lie in attracting Chinese investment and accessing Chinese markets. This is highly relevant to the FCO’s strategy of building UK prosperity by increasing exports and investment, opening markets, ensuring access to resources, and promoting sustainable global growth.

The growth in low-carbon markets: the race is on

36. Markets in low-carbon products constitute a significant share of global GDP, which is likely to increase as climate change mitigation efforts develop. The UK is well-placed to capitalise on this growth. According to UEA, the size of the global market for low-carbon environmental goods and services (LCEGS) was around £3.2 trillion in the 2009–2010 financial year.36 The UK’s share of the LCEGS market was £116 billion.37 The UK currently has the sixth largest LCEGS market, behind the US, China, India, Japan and Germany.38 Growth of the LCEGS market in the UK during 2009–2010 was 4.3%, compared to -0.5% in the US and 1.8% in China.

37. However, a new study by WWF found that in 2011 China overtook the EU as the largest “cleantech” manufacturing region, with sales increasing to €57bn. Cleantech sales in the EU declined by 5% over the same period to €47bn. On a country-by-country basis, the

35 David Held, Eva-Maria Nag and Charles Roger, The Governance of Climate Change in China, January 2011
36 Ev 52
37 Ev 47
38 Country Attractiveness Indices
UK ranked 12th out of 25 countries measured in terms of cleantech sales as a proportion of the overall economy, down from 11th position in 2010.39

38. Nevertheless, expanding Chinese markets in low-carbon goods represent an important opportunity for UK businesses. The EU is already China’s biggest trading partner, while China is the EU’s largest source of imports and second largest two-way trading partner. Bilateral trade is worth €1 billion a day.40 The Chinese economy continues to grow by almost 10% each year, so potential market opportunities are substantial. The low-carbon market in China is around £430 billion (13% of the market).41 Of the total UK LCEGS market in 2009–2010, exports were around £12 billion, while imports were around £7 billion. Of this, exports to China accounted for around £840 million (7% of total UK LCEGS exports) and imports from China accounted for £460 billion (7% of total UK LCEGS imports).42

39. However, there is no guarantee that the UK will be able to maintain its position as a low-carbon leader, or that it will win important contracts in China over Chinese businesses and competitors from other countries. The Grantham Institute emphasised the element of competition in capturing low-carbon markets. For example, noting the overlap between the UK’s high-tech industries and China’s strategic emerging industries, it argued that plans for green development could enable China to move ahead of the UK in these lucrative industries.43 The economic crisis could divert focus from high-tech low-carbon industries and allow China to win significant market share, constraining growth and accelerating the shift of skilled and secure jobs to China.44 Ernst and Young also predicted that renewable energy businesses in emerging economies could out-compete Western countries.45 The Chinese government has set bold targets to increase non-fossil fuel energy, including renewables, to 11.4% of primary energy consumption by 2020. The National Energy Administration announced plans to spend $738 billion over the next ten years on alternative energy development.46 In 2012, China plans to spend £17 billion to promote energy conservation, emission reductions and renewable energy development.

40. Central to the 12th Five Year Plan is China’s new “green” industrial strategy. Production of renewable energy technology is already significant; China is now the largest manufacturer of solar photovoltaic technology and has increased its own installed capacity from 140MW to 2,900MW between 2008 and 2011.47 Now, the Chinese government intends to capitalise on seven new strategic industries.48 The total value-added output of

39 WWF, Clean economy, living planet, 3rd ed, June 2012
40 http://eeas.europa.eu/china/index_en.htm
41 Country Attractiveness Indices
42 Ev 47
43 Ev 47
44 Ev 47; WWF, Clean economy, living planet, 3rd ed, June 2012
45 Country Attractiveness Indices
47 David Held, Eva-Maria Nag and Charles Roger, The Governance of Climate Change in China, January 2011;
48 Alternative energy; biotechnology; new-generation information technology; high-end equipment manufacturing; advanced materials; alternative-fuel cars; and energy saving and environmental protection.
the new industries is expected to rise from 3% to 8% of China’s GDP in 2015 and 15% by 2020. Given the rate of GDP growth, the Grantham Institute estimated that output in these industries was likely to increase by a factor of 10 by 2020, creating a high-tech low-carbon group of industries worth around US$1.5 trillion.

41. It was evident from our visit to China that the low-carbon transition is considered to be a business opportunity. China is positioning itself as a global technology innovator. Research and development funding is set to increase dramatically, from 1.7% to 2.2–2.5% of GDP. This was true at the company-level and provincial level as well as nationally. In the provinces, local politicians and companies were competing to become the “greenest”. For example, the Vanke Property Development Company, the largest building company in China, was investing in green design. We asked whether consumer demand or regulations had motivated Vanke to move towards green buildings. Vanke’s President Yu explained that he believed that in future the building industry would become more sustainable, particularly since the Chinese Government was now focusing on green buildings.

42. Given the scale of China’s investment potential and ambition to lead the world in technological innovation, the rate of growth of the Chinese market may well be the single most important factor in defining the cost of low-carbon technology in the future (as the solar PV example demonstrates). If the UK is engaged with, and mirrors, China’s move to a low-carbon growth model, it is highly likely that we will find quicker and more cost effective ways of achieving our own emissions reductions targets.

43. In the past, the protection of intellectual property has been a serious concern for businesses operating in China and safeguards are still weak in some areas. However, most of our witnesses were sanguine about doing business in China, judging the opportunities to be greater than the risks. IP risks could be managed by working in long-term partnership with Chinese institutions, to ensure that both parties have a significant stake in a project. Business people we met in China suggested that the best response to IP issues was to keep innovating. DECC told us that a high-level intellectual property dialogue had been opened and that the first IP attaché had recently been stationed in Beijing. We welcome these developments.

44. The development of joint ventures was proposed as the most effective way for UK businesses to benefit from the opportunities for green growth in China. Collaborative projects provided benefits for both parties, with UK companies bringing technical know-how to the table and Chinese companies bringing local know-how and production techniques. Shell pointed out that these joint ventures included projects with Chinese companies in other countries.

49 Ng S.W. and Mabey N, Chinese Challenge or Low-carbon Opportunity: The implications of China’s 12th Five-Year-Plan March 2011
50 Ev 47
51 Ev 52
52 See Visit Note
53 Ev 38
54 Q 76 [John MacArthur]
45. As UEA told us, knowledge transfer and capacity building in research could be mutually beneficial in these sectors. Chinese industry had built up expertise that could be deployed in the UK, particularly in relation to rapid diffusion and deployment of low-carbon technology. For example, the Chinese government aimed to increase the nation’s solar energy generation capacity from 5GW to at least 10GW during the current 12th FYP period. It also had ambitious plans to increase nuclear power capacity from the current 10GW to 80GW by 2020, which mirrors the ambition to deliver 16GW of new nuclear in the UK by 2025.55

46. At the moment, UK businesses enjoy a precious opportunity to capitalise on China’s low-carbon ambitions. However, to benefit from low-carbon cooperation, the UK must maintain its low-carbon competitiveness. The financial crisis must not cause the Government to take refuge in short-term fixes, such as markets in carbon-intensive fuels, without regard for the development of markets that offer growth and competitiveness in future. Our ability to compete in international markets also depends on our domestic policies: if British companies are to remain low-carbon leaders, our own decarbonisation efforts need to keep encouraging innovation. HMG should seek to maximise opportunities for joint ventures and should actively consider how to help UK businesses access Chinese markets and attract Chinese investment.
2 Structuring bilateral cooperation

47. The Government is already working to encourage emissions reductions in China and to promote British businesses. According to DECC, the UK was the only country offering dedicated partnership to China in its low-carbon pilot effort and both the closeness of this relationship and its potential benefits were evident on our visit.56 We witnessed impressive cooperation between UK initiatives and Chinese government, NGOs and private sector. However, we heard concerns that to encourage low-carbon development and capitalise on the opportunities, the UK needed to develop its low-carbon “brand”. In this section, we look at how projects in China could deliver more emissions reductions and opportunities for UK business.

Existing programmes

48. At the national level, the first *UK-China Energy Dialogue* was held in Beijing in 2010. Witnesses agreed with DECC that the Dialogue had improved access for business in both directions.57 Global Action Plan pointed to long-term benefits of high-level engagement for embedding ideas about sustainability in the education system.58 Peter Budd, of the China-Britain Business Council, emphasised that high level government-to-government frameworks were a necessary scaffold for collaboration. They could help “to structure the UK offer” so that UK businesses could access Chinese markets most effectively. In turn, the government-to-government memoranda filtered down to municipal governments and enabled UK companies to make a strong bid for business. Mr Budd believed that the Government could do more to create this kind of structured opportunity.59

49. While high-level engagement was very important, it may not always be the most effective route. Professor Le Quéré noted that it was likely to be difficult to influence policy without building partnerships between people working “on the ground”.60 By working in partnership and building these interactions at the local level, the UK could share the latest approaches, which may filter upwards and lead to policy change at the higher level.61

50. The Chinese government’s intentions for carbon reductions over the next few years place much responsibility on local officials and staff.62 We found that local officials and academics were impressively open to discussion.63 Our own experience confirmed that local collaboration could open dialogue routes to Chinese policymakers.64 Nick Mabey highlighted the need for different types of intervention at different levels. A high-level delegation of key decision makers could make a short visit to share experience and
practical advice with Chinese counterparts, but building relationships at the local level required a longer-term form of engagement.  

51. A number of UK Government Departments were running programmes in China with low-carbon aspects. In 2011, DECC signed a Memorandum of Understanding (MoU) on low-carbon co-operation with China’s National Development and Reform Commission (NDRC). The aim of the MoU was to support China’s low-carbon pilots and DECC now funds four projects in this area. The budget for this work was £200,000 a year until 2014. The Departments for Business, Innovation and Skills, International Development, Environment, Food and Rural Affairs and Transport were also all actively engaging with China. 

52. The most significant work was the Foreign and Commonwealth Office’s China Prosperity Fund, known as the “China Prosperity SPF programme”. The programme included funding for projects under the headings of “energy security”, “low-carbon/climate change” and “green investment”. The programme had funded 52 projects for the current year, which included tools for reducing emissions from industry, supporting the development of carbon capture and storage (CCS) and building capacity for low-carbon development of China’s cities and provinces. The fund was also supporting officials from DECC to work with colleagues from the Chinese government’s Energy Research Institute to develop a "2050 Pathways Calculator" policy tool for China, based on DECC’s UK model for exploring different decarbonisation scenarios.

Coordination

53. Many witnesses were positive about the UK’s influence in China. The low-carbon pilots initiative was cited as an example of British influence. Other praiseworthy projects included the China-UK Near Zero Emissions Coal Initiative, the positive momentum gained from the DECC-NDRC memorandum and the work of the FCO in inviting UK experts to share their knowledge with Chinese policymakers. However, we heard mixed views on how well UK departments were coordinating their work. Some witnesses said they had found the departments to be well-integrated and speaking with “one voice”. The Minister told us that “alignment between the climate change agenda, UKTI and the business opportunities […] is looked at and envied by a lot of other countries”. On the other hand, others felt there was room for improvement, particularly in better integrating the work of BIS and UKTI with the programmes run by the FCO and DECC.

54. The other aspect of Government coordination raised with us, was engagement between Ministers in Whitehall and civil servants in China. Ministers told us that there was already

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65 Q 52 [Nick Mabey]
66 Ev 42, Q 116 [James Hughes]
67 Ev 38
68 Q 39 [Felix Preston] Q 120 [John Ashton]
69 Q 8 [Professor Fankhauser] Q 75 [John MacArthur], Q 91 [John MacArthur]
70 Q 39 [Felix Preston], Q 92 [John MacArthur], Q 121 [John Ashton],
71 Q 120 [Henry Bellingham]
72 Q 43 [Nick Mabey], Q 93 [Peter Budd]
oversight of activity in China from Ministers on “an ad hoc basis” and that at official level the **High Level China Group** met on a formal basis.73 However, Nick Mabey advocated the development of a “proper UK strategy, driven at Cabinet level with clear objectives”.74 Felix Preston of Chatham House suggested that a “China Taskforce” be established within Government to guide the UK’s efforts in China. On the other hand, Ambassador Ashton cautioned against too many decisions being made in Whitehall rather than by staff on the ground on China, who have a better understanding of how money can be spent to maximum effect given the local context. He said:

> I was the Science and Technology Attaché in Beijing in the early 1980s, and whenever I heard that London was going to do more co-ordination I knew that more inefficiency was going to result from that, because the different Departments in London can’t match the close-up view that you can get in the network in China, of the realities in China.75

**Funding**

55. The FCO’s Prosperity Fund spent £5m on work to support the climate change, energy and economic reform agenda in China in 2011–12, but in 2012–13 the overall Prosperity Fund will fall from £20m to £18m per annum, with £4.5 to be spent in China. Witnesses emphasised that this was a critical juncture in Chinese development and that China was more open to outside influence than ever before. They emphasised the need to back up engagement efforts with resources. Nick Mabey warned that “even though we have created the conditions where it could have massive leverage on Chinese positions, we are reducing funding rather than supporting extra action”.76

56. There was also an impression that UK funding could be targeted more effectively to attract further funding from other sources. Professor Le Quéré told us that “one way to improve the efficiency in these instruments would be to align the funding opportunities in China and the UK at the same time”.77 She explained that mismatched timetables posed a risk that funding for joint projects could be rejected in the UK after Chinese funding had been agreed and that this could damage relationships and jeopardise future collaboration.78 By contrast, the coordination of financing could facilitate more ambitious projects and multiply the impact of the individual funds. Several witnesses suggested institutional options for improving the coordination of funding:

a) UEA believed that a formal agreement for a UK-China research institute on the interdisciplinary aspects of low-carbon—following the model of the British Antarctic Survey—could provide a focus for collaborations between the two countries.
b) Peter Budd suggested that joint funding, from Chinese and British institutions “where joint research projects can be set up, funded jointly with a view to exploiting existing technologies or, indeed, refining existing technologies” could provide valuable opportunities. He said that the Royal Society was pursuing work in this area.\(^79\)

c) John MacArthur recommended the Energy Technologies Institute model, which directed industry co-funding with Government to explore technologies which were likely to be the most important in future. He also believed that the European Zero Emissions Power Programme—which brought together industry, governments and NGOs to consider carbon capture and storage—could have a useful country-to-country equivalent with China.\(^80\)

57. We commend the work of UK civil servants in China. The people we met on our visit had built productive relationships and organised a number of impressive projects on a relatively modest budget. This relationship-building is vitally important at a time when China is more open to external engagement than ever before—representing an opportunity to make the most of UK leadership to leverage major emissions reductions abroad. While we recognise the economic constraints, we are disappointed that 10% of the very limited project funding for China is being cut. However, we acknowledge that in the current tough economic climate funds are limited. It is therefore essential that maximum value for money is obtained from the resources that are available.

58. The UK Government must adopt a clearer set of high-level objectives with regard to low-carbon cooperation with China. These objectives should then be used to frame the programmes of work that are delivered by individual departments. Decisions about the specific design and delivery of programmes are best made by staff on the ground with an understanding of the Chinese context. It may be possible for Ministers to agree a set of high-level objectives through continuing to meet on an ad hoc basis. However, if this proves impossible, the UK Government should set up a formal cross-departmental committee with the remit of delivering a high-level strategy for low-carbon cooperation with China.

59. There is scope for better alignment of funding opportunities and joint research ventures. The UK Government should make the most of the resources available for projects in China by agreeing schemes for match-funding and for collaborative work. It should investigate the possibility of institutional solutions for knowledge-sharing and coordinating funding, following the example of the UK-China low-carbon research institute, the Royal Society, the Zero Emissions Power Programme or the Energy Technologies Institute.

Improving UK influence: building a British “brand” for low-carbon

60. In order to achieve the maximum impact with the resources the UK deployed in China, it may be necessary to reconsider the scale of projects and how they are chosen.

\(^79\) Q 75 [Peter Budd]  
\(^80\) Q 75 [John MacArthur]
The scale of projects

61. During our visit to China, we heard that the UK’s current projects were not large enough to be visible or to make a lasting impression. E3G suggested that it was important to focus on “a few big things” and not “hundreds of little penny packets”, which would not be taken seriously.81 Rather, it was important to target efforts in areas where the UK could make a visible impact, because “making a demonstrable difference will persuade the Chinese a low-carbon economy is possible”.82

62. The tendency to approach interventions in China on a broad, ad hoc basis also contributed to a lack of visibility for UK low-carbon expertise. According to UEA, the private sector strengths of the UK’s low-carbon sector were relatively unknown in China. This stood in contrast to the French company Alstom (which hosts a “China Technology Centre”), the German companies Siemens Ltd and IBC Solar (with major offices in Beijing and Shanghai and joint ventures in South Africa and Germany) and the American multinational Hewlett Packard (with nine regional offices, 36 city offices and joint initiatives with the Chinese government, such as HP Labs China and the ChinaGrid initiative).83

63. Models for effective interventions included the “Eco City” projects supported by countries like Singapore, Denmark and Finland. China had 666 cities which account for most of China’s economic activity and CO₂ emissions.84 Other countries had chosen to focus on city-level cooperation to promote their companies.85 As access to multiple cities is time consuming and costly for companies, the UK Government could help by establishing a bilateral platform for engagement with a number of cities with significant prospects for low-carbon growth. The selected cities should have critical interests for multiple UK companies. The current US-China clean energy cooperation is regarded as a successful model in which inter-governmental cooperation provided a platform for US companies to develop business in China.86 The Committee also heard that UK expertise could be showcased by developing a “package” of low-carbon companies, spanning a number of different specialisms such as architecture, planning and implementation.87 Other EU countries had developed formal partnerships, such as the Sino-German low-carbon science park in Qingdao, which contributed to a positive national image that was easily accessible and marketable.88

The choice of projects

64. Linked to the need for fewer but larger scale projects was the suggestion that the UK needed to be more strategic in its choice of projects. Although Ministers argued that
Government was already taking a strategic approach, UK initiatives support a plethora of low-carbon technologies and policies, rather than putting their collective weight behind one or two strategic areas. Our analysis of departmental initiatives shows a wide range of subject areas (see Annex IV). For example, UKTI has identified wind, civil nuclear and smart grids as priority areas, while DECC is focused on emissions trading, product standards and low-carbon communities.

65. Part of the difficulty in coordinating UK interventions may be the method of choosing projects to support, which remains very open. The FCO’s flagship SPF fund operated by inviting bids for new projects on an annual basis. Bids were encouraged under broad headings, such as “energy security”, “low-carbon/climate change” and “green investment”. The result was that the successful projects span a range of different areas, from reducing emissions from the steel and iron sector to developing a low-carbon development roadmap for Jilin City. The risk with this approach was that scarce resources were spread too thinly across a large number of policy and technology areas. Nick Mabey of E3G told us:

a scattergun approach, purely driven by who puts applications to the embassy in Beijing, is not a good way of allocating resources, because you are not sure you are going to get enough focus on the thing to have even a chance of getting above the bar of success. […] That for me is a complete waste of taxpayers’ money and a complete waste of time, because it has no chance of success, no matter how good the people you back are. You are condemning them to failure at the beginning, and that is a lesson we have learnt the hard way through many years working in China.

66. A more strategic approach could involve selecting a smaller number of areas to focus on. This could avoid diluting the impact of scarce resources and deliver projects on a more visible scale. This applies both to the choice of policy interventions and target markets for British businesses. Our evidence suggested that priority areas need to meet two basic criteria: they should be fields in which the UK has an economic comparative advantage and they should be subjects which are salient to Chinese domestic policy objectives.

67. The UK certainly enjoys a leading position in research, development and deployment of offshore marine and offshore wind technologies, but no country yet enjoys a definite lead in terms of manufacturing. As for smart grids, we met Chinese businesses that were baffled by UKTI’s claim to leadership in this area, as China led the world in building interconnected and flexible high-voltage electricity grids. Witnesses highlighted other sectors that could be developed: transportation and mobility planning, infrastructure and urban planning, engines and aeronautics, carbon trading/carbon accounting services.

90 Q 52 [Nick Mabey]
91 Q 33 [Felix Preston]; Ev 52
92 Ev 47. We use comparative advantage to describe the situation in which one country can produce a good or service at a lower opportunity cost than a competitor.
93 Ev 47
94 Ev 44
95 Q 5 [Professor Fankhauser]
96 Ev 63
The Grantham Institute had conducted an analysis of UK trade shares and patents granted for low-carbon products in comparison with other countries, in order to identify areas where the UK was already a leader in low-carbon innovation and enjoying a significant portion of world trade. These sectors are set out in the table below:

**UK sectors pulling ahead in the green race**

<table>
<thead>
<tr>
<th>Sector Description</th>
<th>Green patent share relative to world average</th>
<th>Trade share relative to world average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft and spacecraft</td>
<td>0.00</td>
<td>0.46</td>
</tr>
<tr>
<td>Engines &amp; turbines</td>
<td>0.06</td>
<td>0.37</td>
</tr>
<tr>
<td>Machinery for mining and construction</td>
<td>0.41</td>
<td>0.24</td>
</tr>
<tr>
<td>Service activities related to printing</td>
<td>0.55</td>
<td>0.22</td>
</tr>
<tr>
<td>Measuring/testing/navigating appliances etc.</td>
<td>0.01</td>
<td>0.22</td>
</tr>
<tr>
<td>Agricultural and forestry machinery</td>
<td>0.10</td>
<td>0.12</td>
</tr>
<tr>
<td>Sawmilling and planing of wood</td>
<td>0.05</td>
<td>0.10</td>
</tr>
<tr>
<td>Lifting and handling equipment</td>
<td>0.01</td>
<td>0.09</td>
</tr>
<tr>
<td>Office accounting and computing machinery</td>
<td>0.17</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Note: The numbers are normalised to the range -1 to 1. Zero represents the world average. A ‘ratio’ of 0.5 means double the world average. A value of -0.5 means half the world average. In these industries/sectors the UK has both a green patent share and a trade share above the world average.

The UK could learn from China’s domestic industrial strategy. The Grantham Institute asserted that, with a competitive low-carbon strategy, the UK low-carbon export markets could grow rapidly and attract Chinese investment in UK low-carbon industries where the UK has a clear competitive edge. Professor Fankhauser told us that the UK was much less strategic than China in encouraging low-carbon innovation in sectors where the UK was already pulling ahead. He emphasised that the potential markets for low-carbon products were vast, but in order to benefit from them “the trick is to find the niches where the UK can have a sustainable comparative advantage, not just a temporary comparative advantage”. By contrast, the Chinese carefully targeted efforts to increase low-carbon technology in their most competitive sectors. Our inquiry identified three sectors where our witnesses believed the UK has an established lead: the oil and gas sector; buildings; and carbon capture and storage. We explore each of these areas in turn.

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97 UCL  
98 Ev 47  
99 Q 4 [Professor Fankhauser]  
100 Q 5 [Professor Fankhauser]
**Oil and gas**

69. No matter how significant its low-carbon ambitions may be, China is bound to develop its conventional fuel capacity; coal is cheap and abundant and demand continues to soar. Even though the oil and gas sector is based around “conventional” fossil fuels, British expertise could help to ensure that those resources were accessed in the most sustainable way possible. The UK’s own emissions profile has been improved by the “switch to gas” and Shell believed that a similar switch could be achieved in China, reducing emissions between 50% and 70%.\(^{101}\) Significant potential for gas development lies in the exploitation of unconventional resources. The U.S. Energy Information Administration estimate China’s shale reserves to be as much as 1,275 trillion cubic feet, more than the combined estimates for the volumes in the U.S. and Canada.\(^{102}\) UK skills in the emerging market for unconventional “shale” gas could help China to diversify its energy mix away from coal.

70. In China, Dr Xavier Chen, Vice President, BP China praised the UK’s mature expertise in oil and gas and said that there is scope to support China to meet its targets on increasing the proportion of gas in the energy mix—to increase from the current level of 4% to 7.5% by 2015.\(^{103}\) John MacArthur, Vice President CO₂ Policy, Shell, emphasised the advantage for the UK in having an indigenous oil and gas industry, which had been developing technology and making investments steadily over the last 40 to 50 years. He said that this could be exploited to create jobs and build on UK technical skills across the world.\(^{104}\)

**Low-carbon buildings**

71. In Guangzhou, we witnessed huge tracts of city that had grown up and filled up in a matter of years. We heard high aspirations for ensuring clean development, but it was clear that some aspects of growth were proving difficult to “green”. Professor Davies told us that there was a “lack of awareness within China of how one goes about delivering high-efficiency buildings to spec”.\(^{105}\) He also believed that post-construction management of energy could be improved, but this would require a coordinated effort at the pre-planning and the design phase between architects, designers and engineers.\(^{106}\)

72. We heard repeatedly that this was a great opportunity, both for British businesses and for sustainable development in China. As we have experienced in the UK, once construction is complete it is difficult and costly to retrofit, so if China’s development is not carried out carefully, high emissions infrastructure could be locked in for decades. By contrast, building a sustainable urban environment could improve public health, awareness of climate change and save money. The China-Britain Business Council believed

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\(^{101}\) Q 71 [John MacArthur]  
\(^{103}\) Visit note, Tuesday 14 February, business breakfast  
\(^{104}\) Q 76 [John MacArthur]  
\(^{105}\) Q 28 [Professor Davies]  
\(^{106}\) Q 28 [Professor Davies]
that there were attractive opportunities for designers, for equipment and for product manufacturers which would develop over the next 10 or 15 years.\(^ \text{107} \)

73. The Government was already working in the buildings sector in China. The UK-China Eco-cities & Green Buildings Group draws on international best practice to promote sustainable construction. The UK-China Sustainable Cities Initiative is part of the BIS-China MoU signed in 2007. UKTI now has individual city MoUs and Project Action Plans in place with municipal authorities in four cities: Wuhan, Changsha, Chongqing and Hangzhou. Peter Budd believed that, after two years in operation, the programme should now be reviewed in order to see how much business it had generated.\(^ \text{108} \) However, more could be done to highlight UK expertise. British architects and master planners are preeminent in low-carbon development and could contribute to reaching high standards in these new developments. British companies are also expert in sustainable transport and mobility planning. Alistair Guthrie emphasised British know-how in demand reduction, particularly in terms of integrated total design strategies for cities and the integration of efficient technologies into the built environment.\(^ \text{109} \)

74. In order to showcase this British talent, UEA suggested that science parks could exhibit UK specialist expertise, inspiring higher standards, generating repeat business and delivering emissions reductions faster.\(^ \text{110} \) A number of witnesses emphasised the importance of “demonstration” or “exemplar” buildings—developments which exceed regulatory standards and are verified through third party environmental rating systems, such as the Building Research Establishment’s BREEAM. UEA suggested that demonstration projects could create a virtuous cycle, raising aspirations and generating business opportunities for UK low-carbon professionals to assist with the development of Chinese rating systems and in achieving those standards. Alistair Guthrie suggested that, although a number of exemplar buildings had been constructed in the past, there was still significant scope for expansion. In particular, he believed that “second tier” cities opened up large-scale development opportunities, which could be encouraged through demonstration projects.\(^ \text{111} \)

**Carbon Capture and Storage**

75. At the 14th EU-China Summit in February 2012, the EU-China Climate Change Partnership set out a commitment to cooperate on carbon capture and storage (CCS).\(^ \text{112} \) CCS was considered to be crucial to Chinese decarbonisation efforts, because coal remained a cheap and abundant energy source and China had made CCS research a priority in the 12th Five Year Plan. It would remain important even if China were able to achieve a switch to gas, because this would only deliver part of the necessary emissions

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107 Q 71 [Peter Budd]
108 Q 71 [Peter Budd]
109 Q 85 [Alistair Guthrie]
110 Ev 52
111 Q 72 [Alistair Guthrie]
112 Joint Press Communiqué of the 14th EU-China Summit, section 17
reductions. CCS could make a major contribution to emissions reduction in the energy sector, as well as heavy industry such as steel, cement, refining and chemicals.\textsuperscript{113}

76. The Carbon Capture and Storage Association pointed out that the Government needs to develop its CCS capacity just to keep up with China:

> The first thing and above all is that the UK should quickly proceed to install the first commercially sized CCS installations. This is not so as to demonstrate technology to the Chinese as was the pretext of the proposals for the UK’s first demonstration launched four years ago, now abandoned […] this is to put the UK in the CCS club with China who meanwhile has delivered on pilot and demonstration scale plants.\textsuperscript{114}

77. John MacArthur, of Shell was more optimistic about the situation, saying that he did not believe any country was “really leading that game yet” and that “the window of opportunity to become a leader there remains”. He was confident that the UK would have the expertise to operate CCS successfully, safely and with acceptable costs, if the Government was able to deliver its demonstration projects.\textsuperscript{115}

78. In China, the FCO is supporting two CCS projects through its Prosperity Fund. One is looking at early demonstration of cost-effective CCS potential in non-power industrial sectors in order to address coordination problems that currently exist between the capture and storage sectors. The second is carrying out feasibility studies for capture-ready projects on new power plants in Guangdong province in southern China, aiming to demonstrate cost-effective ways to develop CCS.\textsuperscript{116} China also has a number of CCS demonstration projects, including the GreenGen IGCC project in the Binhai New Area in Tianjin and the Shenhua Coal to Liquids Plant Project at Ordos in Inner Mongolia.

79. Working unilaterally makes it difficult to fund expensive demonstrations and has resulted in inadequate investment and slow progress.\textsuperscript{117} Shell suggested that China and the UK should invest in demonstration projects and aim for rapid commercialisation of CCS installations in order to make CCS cost competitive.\textsuperscript{118} UK technical expertise could be combined with the energy of Chinese development and deployment, which has already proven effective in bringing down the cost of low-carbon technologies. The Carbon Capture and Storage Association suggested that funding from the UK’s £2.9 billion International Climate Fund could be combined with the Chinese Sovereign Wealth Fund to invigorate these projects, building on the £2 million commitment from Research Councils UK and matching funding from China’s National Science Foundation.\textsuperscript{119}

80. Tony Day advocated the development of coal gasification technologies, saying that there was great interest in China and that the UK had substantial capability in this area.\textsuperscript{120}

\textsuperscript{113} Ev 63
\textsuperscript{114} Ev 63
\textsuperscript{115} Q 80 [John MacArthur]
\textsuperscript{116} Ev 38
\textsuperscript{117} Ev 47
\textsuperscript{118} Ev 44
\textsuperscript{119} Ev 47
\textsuperscript{120} Ev 59
The CCSA agreed that gasification technology could help China to utilise its vast coal resources for power generation, vehicle fuel and industry in a more sustainable way. Shell told us that it was already engaged in work in new coal gasification technology, and new syngas conversion technology in China. Tony Day believed that DECC was blind to the potential development of gasification technology in the UK.

Keeping promises: the need to deliver

81. Finally, the UK’s reputation as a low-carbon leader hinges on our ability to deliver on our low-carbon commitments. We heard from many witnesses that practical examples were much more persuasive than policy papers or high-level discussions. In short, “telling people isn’t the same as showing them”. However, during our visit to China, we heard that there was a perception that the UK was “all talk and no action”. The need to deliver applied both to the successful completion of engagement work in China and to the effective implementation of UK domestic climate change mitigation commitments. If the UK was failing to turn high-level agreements into real projects and activity on the ground, then British influence would be limited.

82. A prime example was the programme of cooperation on CCS that was established in 2005, but had not yet led to significant results: “in China, if you can show it works, it is worth 1,000 times more than a million policy papers […] so you have to invest enough to get it across the line”. The National Audit Office found in its value for money report on the Government’s first, failed CCS competition “regulatory uncertainty contributed to the Department’s inability to reach a commercial contract”. Although the Government’s new CCS Roadmap is intended to guard against this kind of uncertainty in its second attempt at a demonstration project competition, the target range for the first operational project of 2016–2020 is very wide and may leave the UK a runner up in the development of the CCS sector.

83. At home, therefore, it will be necessary to demonstrate that the UK is able to match its rhetoric about low-carbon development with visible progress. We were questioned by our counterpart Committee in the National People’s Congress about why investment in renewables in the UK had fallen in the last 12 months. Many people we met in China noted that the UK was still no closer to delivering its own CCS demonstration plant. Meanwhile, even though there was no initial proposal for projects there, China was now funding a number of projects itself. A second example is the delivery of low-carbon zones in China. Mr Mabey argued that although the UK had played an influential role in the decision to

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121 Ev 63
122 Ev 44
123 Ev 59
124 Q 52 [Nick Mabey], Q 82 [John MacArthur], Q 88 [Alistair Guthrie], Q 90 [Peter Budd]
125 Q 52 [Nick Mabey]
127 DECC, CCS Roadmap, April 2012
128 Q 30 [Nick Mabey], Q 156 [John Ashton]
establish the zones, the level of resources that we are providing to support their delivery was not sufficient to make the zones a success on the ground.\textsuperscript{129}

84. There is also a risk that the UK Government is giving mixed signals about its own commitment to the low-carbon growth model. For example, ambiguity over support for wind is counter-productive.

85. Practical demonstration carries considerably more weight than a policy idea. The UK Government must take stock of the promises and agreements that have already been made between China and the UK and focus its efforts on the delivery of these initiatives. The UK’s ability to influence policy in China and to compete for business in low-carbon development depends on the reputation of the UK as a credible leader. In this context, we welcome the new CCS Roadmap, but the UK Government must set a more challenging objective for the first operational project with an explicit start date of 2016 or earlier.

86. British expertise is not widely recognised and the UK is sometimes seen as failing to match its rhetoric on climate change with real action. The small size of projects currently promoted by UK Government in China is hampering their effectiveness. This could be improved without extra cost by focussing on strategic interventions. The key criterion for the overall assessment of projects should be the extent to which an intervention will enhance the possibility of success of China’s low-carbon growth policy. Projects should be tailored to appeal to Chinese priorities and to build on UK strengths. For policy, this means a focus on key themes, like carbon pricing and accounting, where the UK has experience to offer. In the business area, this means identifying UK comparative advantage. In the next twelve months, the UK Government should undertake a systematic assessment of the sectors where the UK has a comparative advantage and develop a strategy for their promotion and deployment in China. We recommend that in future, project funding should be directed toward these strategic areas, in a smaller number of large-scale projects.

87. We are not convinced that UKTI’s High Value Opportunities represent the best areas to focus on. As a key decarbonisation technology in which we enjoy some leadership, carbon capture and storage should certainly be added to the list. As a technology with substantial export potential to coal-dependent countries like China, the development of CCS expertise in the UK is both an environmental imperative and a commercial opportunity. With this in mind, the UK Government should be aware of the international applicability of projects that it funds. The UK can learn from greater collaboration across research, development and deployment on CCS with China and should consider coordinating demonstration projects.

88. Chinese exploitation of shale gas reserves presents an environmental and commercial opportunity, but brings its own environmental risks. The UK is building a reputation as an innovative but responsible player in the unconventional gas sector. The UK Government should seek a dialogue on gas with the Chinese Government, looking at the ways in which the economic and environmental risks of exploitation can

\textsuperscript{129} Q 30 [Nick Mabey]
be handled. This may involve coordinating standards for gas exploitation and planning for mitigation measures, such as carbon capture and storage for gas.

89. Chinese urbanisation presents a prime opportunity for locking in low-carbon development. The UK Government has helped to promote the concept of low-carbon cities through its Ecocities and Sustainable Cities initiative, but could do more to encourage effective implementation. We recommend that UKTI coordinates a British Sustainable Buildings project, which combines exemplar buildings with demonstrations of British expertise in other aspects of urban planning. The core of the project could be a platform for engagement between UK companies and Chinese developers, setting out a comprehensive menu of British talent.
3 Conclusion

90. Low-carbon cooperation with China offers a number of benefits. First, China is central to global efforts to tackle climate change. Endeavours to avoid dangerous climate change will depend on China’s success in curbing its emissions. It is therefore clearly in the UK’s (and the world’s) interest to help China accelerate progress on low-carbon development.130

91. Second, UK-China co-operation could act as a catalyst for action in other countries because China’s policy decisions have the potential to influence global dynamics.131 If the EU and China were to form a low-carbon trade bloc, this could prompt action from otherwise reluctant parties, such as the US, who would otherwise risk falling behind in the high-tech low-carbon race.132 In addition, there is potential for South-South initiatives to spread low-carbon development practices more widely.

92. Finally, co-operation could help to open up large new markets in China for low-carbon goods and services. There is considerable potential for British companies working in this sector to benefit from these new opportunities.133

93. The FCO is already undertaking effective bilateral work in China, but could do more to develop the British brand. Following the Chinese example, the Government should identify key sectors and key policy areas where its low-carbon interventions are likely to be most effective and target its resources on those areas. A small number of carefully chosen projects could have more impact than the range of efforts currently underway.

94. Several of our conclusions reflect back on UK domestic policy. If we are to capitalise on emerging markets in China, we will need to establish credibility in China. First, this means that we must show that we practise what we preach in terms of decarbonisation. In doing so, we will also need to ensure that the UK is a cradle for low-carbon innovation. To achieve that, we will need to increase our own incentives for decarbonisation.

130 Ev 47, Ev 63
131 Ev 47
132 Ev 47
133 Ev 47
Recommendations

Why cooperate on low-carbon growth?

1. The People’s Republic of China is central to global efforts to tackle climate change. China is at a crossroads and it may be able to make a success of the low-carbon growth model to resolve the tension between the desire for development and ambitious plans for decarbonisation. (Paragraph 10)

2. The UK Government should be aware that in order to make the most of UK emissions reductions, our leadership role must be one of active and strategic engagement and not just passive demonstration. Making low-carbon growth a reality in the UK is potentially a powerful lever of political diplomacy. The UK Government should acknowledge that encouraging more ambitious emissions reduction targets internationally should be a fundamental goal underpinning its own emissions reduction objectives. This should be reflected in the objectives of every Department (including DfID and the FCO) with a responsibility for climate change mitigation. The Government should recognise that the combination of Britain’s leadership in understanding the challenge of climate change sooner than many other countries, if combined with practical action to address it now, could enable us to punch well above our weight in influencing how China, and other expanding economies in the East react and cooperate in the next few years. (Paragraph 17)

3. China’s experiments in emissions trading are ambitious and commendable; a successful scheme in China could be key to the development of emissions trading across the world. Every assistance should be offered to the Chinese Government, and to pilot regions, to bring these systems into operation as soon as possible. We should also take the opportunity to advocate the benefits of compatibility with the EU Emissions Trading System, for environmental reasons and for mutual economic advantage. (Paragraph 31)

4. During our visit, we suggested to Governor Zhu Xiaodan of Guangdong Province that the UK had much to offer in experience of market mechanisms for climate change mitigation. We are delighted that the Governor directed a delegation led by Deputy Director General Lu Xiulu to visit the UK. (Paragraph 32)

5. As a priority, the UK Government should offer its assistance in measuring emissions more accurately and designing a legal infrastructure for emissions trading. This should include work on the legal definition of emission units, allocation arrangements, trading rules, monitoring, and enforcement rules. The UK Government should offer support both at the national level and at the provincial/city level. Since the provincial pilots are testing the merits of the different models of emissions trading, it may be advisable to focus our efforts in advocating the potential benefits of systems that would be internationally compatible (for example the EU ETS); the Guangdong ETS seems to be one such system. At the national level, the development of a climate law presents an opportunity to put the necessary legal infrastructure in place, which the UK is well-equipped to support. (Paragraph 33)
6. It appears that the question of whether individual emissions trading schemes will be linked together, or replaced by a national scheme, is undecided. There will need to be careful consideration of how to draw together the different pilots with sectoral initiatives. The UK has particular experience of integrating a pilot system with a broader scheme, having run the UK ETS alongside the EU ETS. This experience may be relevant for the successful integration of China’s pilots. (Paragraph 34)

7. At the moment, UK businesses enjoy a precious opportunity to capitalise on China’s low-carbon ambitions. However, to benefit from low-carbon cooperation, the UK must maintain its low-carbon competitiveness. The financial crisis must not cause the Government to take refuge in short-term fixes, such as markets in carbon-intensive fuels, without regard for the development of markets that offer growth and competitiveness in future. Our ability to compete in international markets also depends on our domestic policies: if British companies are to remain low-carbon leaders, our own decarbonisation efforts need to keep encouraging innovation. HMG should seek to maximise opportunities for joint ventures and should actively consider how to help UK businesses access Chinese markets and attract Chinese investment. (Paragraph 46)

**Structuring bilateral cooperation**

8. We commend the work of UK civil servants in China. The people we met on our visit had built productive relationships and organised a number of impressive projects on a relatively modest budget. This relationship-building is vitally important at a time when China is more open to external engagement than ever before—representing an opportunity to make the most of UK leadership to leverage major emissions reductions abroad. While we recognise the economic constraints, we are disappointed that 10% of the very limited project funding for China is being cut. However, we acknowledge that in the current tough economic climate funds are limited. It is therefore essential that maximum value for money is obtained from the resources that are available. (Paragraph 57)

9. The UK Government must adopt a clearer set of high-level objectives with regard to low-carbon cooperation with China. These objectives should then be used to frame the programmes of work that are delivered by individual departments. Decisions about the specific design and delivery of programmes are best made by staff on the ground with an understanding of the Chinese context. It may be possible for Ministers to agree a set of high-level objectives through continuing to meet on an ad hoc basis. However, if this proves impossible, the UK Government should set up a formal cross-departmental committee with the remit of delivering a high-level strategy for low-carbon cooperation with China. (Paragraph 58)

10. There is scope for better alignment of funding opportunities and joint research ventures. The UK Government should make the most of the resources available for projects in China by agreeing schemes for match-funding and for collaborative work. It should investigate the possibility of institutional solutions for knowledge-sharing and coordinating funding, following the example of the UK-China low-carbon research institute, the Royal Society, the Zero Emissions Power Programme or the Energy Technologies Institute. (Paragraph 59)
11. Practical demonstration carries considerably more weight than a policy idea. The UK Government must take stock of the promises and agreements that have already been made between China and the UK and focus its efforts on the delivery of these initiatives. The UK’s ability to influence policy in China and to compete for business in low-carbon development depends on the reputation of the UK as a credible leader. In this context, we welcome the new CCS Roadmap, but the UK Government must set a more challenging objective for the first operational project with an explicit start date of 2016 or earlier. (Paragraph 85)

12. British expertise is not widely recognised and the UK is sometimes seen as failing to match its rhetoric on climate change with real action. The small size of projects currently promoted by UK Government in China is hampering their effectiveness. This could be improved without extra cost by focussing on strategic interventions. The key criterion for the overall assessment of projects should be the extent to which an intervention will enhance the possibility of success of China’s low-carbon growth policy. Projects should be tailored to appeal to Chinese priorities and to build on UK strengths. For policy, this means a focus on key themes, like carbon pricing and accounting, where the UK has experience to offer. In the business area, this means identifying UK comparative advantage. In the next twelve months, the UK Government should undertake a systematic assessment of the sectors where the UK has a comparative advantage and develop a strategy for their promotion and deployment in China. We recommend that in future, project funding should be directed toward these strategic areas, in a smaller number of large-scale projects. (Paragraph 86)

13. We are not convinced that UKTI’s High Value Opportunities represent the best areas to focus on. As a key decarbonisation technology in which we enjoy some leadership, carbon capture and storage should certainly be added to the list. As a technology with substantial export potential to coal-dependent countries like China, the development of CCS expertise in the UK is both a environmental imperative and a commercial opportunity. With this in mind, the UK Government should be aware of the international applicability of projects that it funds. The UK can learn from greater collaboration across research, development and deployment on CCS with China and should consider coordinating demonstration projects. (Paragraph 87)

14. Chinese exploitation of shale gas reserves presents an environmental and commercial opportunity, but brings its own environmental risks. The UK is building a reputation as an innovative but responsible player in the unconventional gas sector. The UK Government should seek a dialogue on gas with the Chinese Government, looking at the ways in which the economic and environmental risks of exploitation can be handled. This may involve coordinating standards for gas exploitation and planning for mitigation measures, such as carbon capture and storage for gas. (Paragraph 88)

15. Chinese urbanisation presents a prime opportunity for locking in low-carbon development. The UK Government has helped to promote the concept of low-carbon cities through its Ecocities and Sustainable Cities initiative, but could do more to encourage effective implementation. We recommend that UKTI coordinates a British Sustainable Buildings project, which combines exemplar buildings with
demonstrations of British expertise in other aspects of urban planning. The core of the project could be a platform for engagement between UK companies and Chinese developers, setting out a comprehensive menu of British talent. (Paragraph 89)
Annex I: terms of reference

- What progress has been made in deepening cooperation between UK and China in achieving the low-carbon transition and how should this cooperation be taken forward?

- What progress has been made in implementing UK-China Low-Carbon Cooperation Action Plan?

- How can the UK contribute further to the development of China’s climate change mitigation policies, such as emissions trading?

- How can bilateral cooperation with China contribute to success in multilateral climate change negotiations?

- How can UK and China better collaborate to develop the technologies needed for the low-carbon future, while managing intellectual property issues?

- What scope is there for increasing regulatory alignment between the EU and China such as the development of common low-carbon standards for specific industries and land use and planning options?

- Is there scope for shared low-carbon policies between China’s seven Strategic Emerging Industries and emerging industries in the UK?

- Would low-carbon sectoral linkages, such as sector-based cap-and-trade, allow participants to increase their decarbonisation ambitions?
Annex II: list of witnesses

i. Professor Corinne Le Quéré, Tyndall Centre, UEA

ii. Professor Trevor Davies, Tyndall Centre, UEA

iii. Professor Samuel Fankhauser, Grantham Institute, LSE

iv. Nick Mabey, Chief Executive, E3G

v. Felix Preston, Research Fellow, Chatham House

vi. Baroness Bryony Worthington, Sandbag

vii. George Yu, Sandbag

viii. Richard Baron, International Energy Agency

ix. John MacArthur, Vice President CO₂ Policy, Shell

x. Alistair Guthrie, Global Sustainable Buildings Design Leader, Arup

xi. Peter Budd, Vice Chairman, China-Britain Business Council, and Director, Arup

xii. Greg Barker MP, Minister of State, Department of Energy and Climate Change

xiii. Henry Bellingham MP, Parliamentary Under Secretary, FCO

xiv. Officials from DECC, the FCO and DfID.
Annex III: visit note

Participating members:

Mr Tim Yeo, in the Chair
Ian Lavery
Dr Phillip Lee
Christopher Pincher
Sir Robert Smith
Dr Alan Whitehead

Monday 13 February 2012

Briefing with UK Embassy

Attendees:

- Ambassador Sebastian Wood
- Prosperity (Climate Change, Energy, Science, Knowledge Economy) Counsellor David Concar
- UKTI Counsellor Brian Gallagher
- Chris Chalmers, head of DFID Beijing.

Summary of discussion

Prosperity Counsellor, David Concar, briefed the Committee on energy and climate change policy in China.

The British economy was suited for partnership with developing countries at a particular stage of development. UK services would be needed and the UK would be a valuable export market for Chinese diversification.

China was able to experiment in policy in a lot of different areas. The Chinese government was willing to cooperate on policy development, especially if some project funding was available.

Carbon capture had been underway in Beijing, with capture costs covered by selling CO2 to the drinks industry. China was able to capture carbon more cheaply than elsewhere. The only major storage project was a coal-to-liquids venture in Inner Mongolia, which was costing about $40/tonne. There was an increasing number of consultancies active in China, such as urban architects. British companies were more successful in the built environment than in the energy sector so far.

China’s plans for offshore wind were highly ambitious and would be followed by exports around the world.
EU and Chinese building standards were fairly similar, but there was a problem with enforceability.

Agriculture contributed 20% of emissions in China and there was a lot of low-hanging fruit available. For example, use of fertilizer was very wasteful, with more nitrogen fertilizer wasted each year than the US used in total. DFID was running a project to improve the sustainability of agriculture. There was scope for trilateral cooperation, with the UK helping to ensure that China’s projects in other countries were sustainable.

China had shifted from being a small player in the global oil market to being one of the biggest, alongside Sudan, Iran and Saudi Arabia. China was securing new supplies through open market and through bilateral deals. The UK was encouraging the open market approach and encouraging China to become a full member of the International Energy Treaty.

Meeting with NEA Deputy Administrator Qian Zhimin

Attendees:

- Qian Zhimin, Deputy Director
- Hu Weiping
- Wu Guihui
- Li Fulong
- Pan Huimin, Division Director, International Cooperation Department

Summary of discussion

Mr Qian set out the direction of energy and climate change policy under the 11th and 12th FYP. There was broad agreement that the current development path was unsustainable. There had been a 19.1% improvement in energy intensity in the last five years, achieved by a combination of market and administrative measures.

By 2020, China would reach 15% of non-fossil fuel in the energy mix. The 12th 5 Year Plan aimed for 11.4% (by 2015). The dirtiest coal had been replaced. China’s total installed wind capacity was the largest in the world (60GW) and there would be rapid development of nuclear energy.

The ambition is to reduce per capita CO2 emissions by 17% by 2020. Three key areas for achieving this are:

- Cutting coal consumption and encouraging the use of clean coal (IGC);
- Improving the efficiency of electricity generation and increasing the use of renewables; and
- Improving the efficiency of energy intensive industries, through the better use of market instruments as well as executive measures.
A comprehensive view of development was needed. Total energy consumption would be calculated at the local and national level and targets would be set.

Administrative measures tended to be temporary. The 12th 5YP marked a shift to market measures to improve the economy while going green.

Mr Li explained that once national level targets had been set, the next step was to agree a set of local level targets. Almost all provinces have now accepted energy intensity and carbon intensity targets.

Mr Yeo asked whether CCS would be necessary to achieve China’s carbon targets. Mr Qian said that the technology was still in the development stage, but that the 12th FYP would help to develop the technologies. CCS is still uneconomic and the biggest problem is where to store CO2, but there have been promising developments in enhanced oil and gas recovery. China was in close cooperation with the US on CCS.

Mr Yeo asked whether wind power required incentives in China or whether the Government could use executive measures to increase the proportion of wind in the energy mix. Mr Qian said that the costs of wind had fallen from more than 2 RMB/kWh 10 years ago to 0.6RMB/kWh last year. This compares with a cost of RMB0.4-0.5/kWh for traditional thermal generation, so wind has now approximately reached market parity. A carbon tax would make wind economically favourable to thermal power. However, transmission costs were a problem for wind because the resource is generally located a long way from demand. One exception is offshore wind in the South East of China, where resource and demand are close together.

Dr Whitehead asked what plans there were for the development of the grid to deal with increased levels of renewables. Mr Qian said there were several plans underway to develop the grid and that China was leading on the use of ultra-high-voltage cabling.

Dr Lee asked how intentions to reduce per capita emissions fitted with restructuring the Chinese economy. Mr Qian agreed that the industrialisation process would make the target challenging. However, the government considered all sectors when setting the target (so the target should be achievable).

Sir Robert asked about the split between market measures and executive measures in delivering energy efficiency objectives. Mr Qian said that executive measures were useful for achieving short-term outcomes, but that the preference was to use market measures to establish the long-term direction. The NEA does not have responsibility for fiscal policy, so is not able to issue these types of policy.

Mr Pincher asked about China’s strategies for ensuring energy security, particularly securing imports of fossil fuels. Mr Qian explained that energy security was paramount for China, with 1.3billion people. The preference was to be energy independent, but the current dependence rate was around 12%.

Mr Yeo closed the meeting with a description of UK energy policies.
Meeting with SPF project implementers

Attendees:

- Shelley Nania, Programme Manager, Prosperity Programme, British Embassy Beijing
- Dr Li Bu, Development Research Centre of the State Council
- Jiang Kejun, Energy Research Institute
- Professor Zou Ji, Beijing People’s University and Head of WRI Country Office
- Dr Yang Fuqiang, Natural Resources Defence Council
- Terry Townshend, GLOBE International

Summary of discussion

Ms Nania gave an overview of the FCO’s prosperity fund in China [known as China Prosperity Strategic Programme Fund (SPF) in China]:

- The Prosperity Fund offered £5 million in ODA funding for sustainable growth in 2011-12.
- Three key strands (out of a total of six) under the fund were energy security, low-carbon/climate change and green investment.
- The programme brings together UK policy expertise and funding and is focused on enabling policies.

The benefits for the UK were about engaging China in climate change mitigation and involving China in the international community. Commercial returns for UK companies was not the core focus for Prosperity Fund, however projects draw upon British low carbon commercial expertise where possible, and provide an excellent platform for future commercial collaborations. Now is the ideal time to fund projects in China because it is in the process of shifting to a low-carbon economy. In addition, it is middle income country, and China’s choices represent a model for other developing countries.

The project implementers outlined their individual SPF projects, and the policy impacts they had achieved:

Terry Townshend: In 2010, China had announced its plan to bring in a climate change law. GLOBE International had been working on study visits and international symposia to help China learn from experiences around the world. The law was expected to take 3–4 years to develop, with a first draft in 2012. With less than 2% of global emissions coming from the UK, anything that could be done abroad would increase the value of domestic policies. The UK Climate Change Act 2008 was about leadership.

The draft law was expected to be economy-wide with emissions trading and a carbon tax. The national government was working with provinces to develop local implementing laws.
There was a wariness of consumption-based reporting because it could lead to protectionism and border adjustment measures.

Dr Yang: Dr Yang’s project involves creating low-carbon development tools and software for industrial parks. He suggested several areas where there was potential for emissions reduction:

- China could learn from the EU on public transport, which was responsible for 55% of particulate emissions.

- There was expected to be 1,500–1,800GW of installed electricity generation capacity in China by 2020. Policies were needed in order to decouple electricity growth from carbon. These should include first, increased energy efficiency, second, a system of “clean dispatch” to prioritise green energy grid access and third, power companies could be required to source a certain proportion of power from green sources.

- A ‘bottom up’ approach was needed if China was going to exceed its agreements to cut emissions

- 3.3 billion tonnes of coal had been consumed in China in 2010, amounting to 50% of global consumption. A cap on coal was required.

Dr Jiang: Dr Jiang’s project involves a study of the design of emissions trading systems. A sector-based approach to emissions trading was likely, along the lines of the Californian model. A key challenge was how to create credible baselines and transparent emissions data. A major obstacle was that the government regulated the price of electricity.

Dr Li Bu: After 2008 there had been a shift to market mechanisms in China. There would need to be a way to convert from intensity caps to absolute caps. The top 1,000 companies emit 67% of GHGs.

Prof Zou: Professor Zou’s project involves working with two provinces and two cities to help develop blueprints for low-carbon development. There had been a great shift in the response to climate change in China in recent years. It was now accepted that local governments should have targets. Financial support and knowledge from the embassy had been useful.

**Dinner with project implementers and analysts**

**Summary of discussion**

Over dinner, it was suggested that because the NDRC set the price of electricity, an emissions trading scheme could not work effectively in the energy sector. A shift to market prices would lead to about 20% increase in prices.

One option would be an increasing cap on energy by province with local trading within the cap. Provinces would develop their own accounting systems. A potentially large market would be fragmented if separate systems matured.
The lifespan of a building in China was about 30 years. New building was a serious challenge and improvements could be based on EU low-carbon building regulations. There was a lot of money for investment, with investment moving faster than growth.

There was still climate scepticism in China, which was growing with the introduction of serious mitigation policies.

Chinese per capita emissions were more than France’s and would equal UK per capita emissions in 2013. Without a cap on coal, emissions would continue to grow very quickly. There was about $4.5 billion paid in subsidies for fossil fuel production each year.

There was large potential for natural gas, but hydro power resources in China were beginning to decline and their environmental impact was increasing.

Nuclear was expected to increase from 40–60GW by 2020, when 4th generation nuclear technologies would be available and capacity could be increased more quickly.

China was motivated by restructuring the economy for sustainable growth. The present use of resources could not last. Future growth required efficiency improvements.

**Tuesday 14 February**

*Business breakfast*

Attendees:

- Dr Xavier Chen, Vice President, BP China
- Jan Van der Ven, Country Manager, China, Carbon Trust
- Mark Hewlett, Associate, Low Carbon & Sustainability Urban Planning & Consultancy, Atkins
- Professor Bernard McNelis, Co-founder and Managing Director, IT Power

*Summary of discussion*

Participants gave suggestions for the areas in which low-carbon co-operation between the UK and China could be particularly beneficial:

- Dr Chen suggested that UK expertise could be valuable in supporting the development of emissions trading schemes and in ambitions to increase the use of natural gas.
- Professor McNelis said that support in policy implementation would be valuable, for example providing demonstration projects.
- Mr Van der Ven highlighted the Carbon Trust’s work in transferring policy best practice from the UK, for example in developing carbon footprinting standards for
products and low carbon company standards. He also said that there could be opportunities in the health sector to transfer knowledge from the NHS.

- Mr Hewlett suggested that the biggest opportunities were ‘on the ground’ and that practical guidance at the local level would be beneficial.

There was agreement among participants that the UK could do more to raise the profile of its low-carbon work in China. This could be achieved by focusing on bigger scale projects (such as the Eco City projects supported by countries like Singapore, Denmark and Finland, or constructing ‘showcase’ buildings to demonstrate how energy savings can be achieved in practice). Professor McNelis also drew attention to events hosted by the German Ambassador, which have helped to raise Germany’s profile in China. He suggested that the UK could benefit from a similar approach.

Mr Yeo and Sir Robert asked about consumer attitudes towards climate change and energy prices in China. Mr Van der Ven explained that there was less scepticism about the science but that there was sensitivity about energy prices. He explained that other concerns may push consumers in a ‘green’ direction. For example, concerns about food safety may lead to more consumers choosing organic food because it is seen as safer.

Dr Chen spoke about perceptions of the UK in China; the UK is seen to talk a lot but act little. Therefore delivering concrete outcomes would help boost the UK’s image. He proposed a number of ideas for the UK to consider:

- Try to identify areas where the UK and China could usefully combine their individual strengths (such as British design and Chinese manufacturing capability).

- ‘low-carbon’ is important for the UK, but in China the concept of ‘low emissions’ is paramount. It is worth considering other emissions as well as carbon when designing projects.

- What kind of credibility does the UK want – to shift the leadership or the system? Is there scope to do something with coal?

- Industrial energy efficiency is a key area – the focus to date has been on achieving energy efficiency in buildings but no one is working with industry. This would help address China’s competitiveness concerns and would fit well with UK engineering skills. In China there is a lack of capability because universities do not offer training in this area. In addition, the transaction costs are seen as being too high.

- There could be opportunities to work with energy conservation centres that are being established in each province, city and county. BP would like to see these centres consolidated.

- Mr Van der Ven suggested there might be an opportunity to make links between universities in the UK and China to share courses on energy efficiency/energy conservation engineering.

- Building capacity for energy policy in the NEA for example, there are very few people working on analysis and modelling of policy at the moment.
• UK has strong expertise in oil and gas – there is scope to support China meet its targets on increasing the proportion of gas in the energy mix (to increase from current level of 4% to 7.5% by 2015.

Sir Robert asked whether CCS was another potential area for collaboration. Dr Chen said this was not an area that BP was working on and that making CCS commercial was likely to be very difficult.

National People’s Congress (NPC)

Attendees:

• Chairman Wang Guangtao, Chairman of the Environmental and Resources Protection Committee

Summary of discussion

Chairman Wang gave an overview of the latest climate change and energy policy developments in China and the role of the NPC:

• China is now adopting market measures to promote the use of renewable energy and to reduce carbon emissions.

• Integrating renewables with the grid is challenging for many countries. However, the NDRC is moving forward in this area.

• The Government has introduced a carbon emission standard for electricity generation companies. The key will be to continuously raise standards, to set a market mechanism and to increase inspection to ensure compliance.

• The committee has recently submitted a draft for a climate change law, which Chairman Wang is confident will be reviewed and passed.

• The NPC will continue to provide supervision to the Government for the implementation of targets and will hold government to account for any failure of implementation.

• A number of research projects on carbon trading are under way in various cities. One problem that has been encountered is how to quantify and measure emissions across all sectors (a problem that is not unique to China). It would be useful to hear about the UK’s practices and to work together on this issue.

• 2012 is an important year with the Rio+20 conference taking place in June and COP 18 in Qatar in November. Chairman Wang hoped that a set of common guidelines would be developed through GLOBE so that countries could work together successfully.

Mr Yeo described the UK’s Climate Change Act 2008, how it was being implemented through setting carbon budgets and the role of the Committee on Climate Change. He agreed that there could be difficulties in measuring emissions and suggested that selecting
the right industries was the key to achieving a manageable emissions trading system. He also gave Chairman Wang an invitation on behalf of GLOBE to attend a world summit for legislators.

Sir Robert asked whether consumers were concerned about the costs of moving to a low-carbon economy in China. Chairman Wang explained that these concerns were part of the reason that China was providing subsidies to consumers for products such as energy saving lightbulbs and had waived taxes for home appliances if an old appliance was traded in. He said that in his view, giving subsidies directly to consumers was a more effective way of influencing business production activities. When subsidies had been given directly to businesses in the past, they were not passed on to consumers.

Mr Pincher asked about the implications of the Fukushima accident for plans to build new nuclear power plants in China. Chairman Wang explained that the State Council had held a special conference on the development of nuclear in response to the accident, which made three decisions: to comprehensively review existing nuclear facilities; to set new safety standards for nuclear power stations; and that new nuclear plants can only run once it has been confirmed that they are compliant with these standards.

A member of Chairman Wang’s Committee asked the Committee why investment in renewables in the UK had declined. Mr Yeo set out the UK’s Government’s ambition to be the ‘greenest government ever’ and that it was important to catch up with other countries that had a higher level of investment. He also emphasised the importance of demand side measures and initiatives like the Green Deal to deal with existing housing stock.

**Chinese Academy of Social Sciences**

Attendees:

- Professor Pan Jiahua, member of the National Expert Panel on Climate Change and National foreign Policy Advisory Committee

**Summary of discussion**

Mr Yeo opened the discussion by asking how attitudes towards climate change might change in China once its per capita emissions reached UK levels. Professor Pan responded that China would have to find a new path for development rather than following the track developed countries had taken to date. If the UK (and others) can demonstrate new ways of working, then China will follow. For example, zero emission building developments in London are now being replicated in China.

Professor Pan also described some of the initiatives the Chinese Government had taken to reduce emissions, such as the 1:3:5 principle for public servants whereby journeys of 1km should be made on foot, 3km by bicycle and 5+km by public transport.

Professor Pan envisages a peak in Chinese energy consumption in 2020 – material life has significantly improved and will reach saturation point soon.

Mr Yeo asked whether the fact that some of the targets in the 12th FYP were less ambitious than those in the 11th FYP was because the ‘easy wins’ had already been achieved.
Professor Pan explained that yes, some of the most carbon intensive industries had already been closed in order to meet the 11th FYP targets, but that the targets in the 12th Plan were nevertheless still very ambitious.

Dr Lee asked whether there was desire to use consumption-based rather than production-based emissions reporting in China and whether the moves towards a less export-led economy might increase China’s emissions on a consumption basis. Professor Pan said that although there was some debate about this within China (because some provinces export products and electricity to other provinces), it was not something that was being looked at on an international level. While it is true that urban dwellers have more energy intensive lifestyles, it is not a big issue yet.

Sir Robert asked what the UK could do to assist China in making a low-carbon transition. Professor Pan set out four main areas:

- Developing institutions such as assisting with technical aspects of establishing carbon trading (like MRV).
- Climate change legislation – the UK’s Climate Change Act sets an example
- Establishing global level frameworks between China and the UK – that utilise China’s South-South collaborations, for example to promote low-carbon technologies in Africa.
- Low-carbon housing – support in building technology, controls and materials can help ensure heating and cooling systems are not wasteful.

Dr Whitehead asked whether it would be possible to move from carbon intensity targets to absolute caps on emissions. Professor Pan noted that not all of the factors that contribute to the level of carbon intensity are within direct government control. In particular, changes in global markets can affect China’s GDP. He suggested three ways of tackling this problem:

- Set an absolute fossil fuel energy cap for provinces;
- Pursue structural change to reduce heavy industry and increase service industries; and
- Agree an anticipated rate of growth for each region. This would result in an effective cap on total emissions permitted over the same period; a “semi cap”.

Mr Lavery asked how China’s energy mix was likely to change by 2050. Professor Pan described the challenge of urbanisation, which will require significant levels of energy to sustain. He suggested that for both climate change and energy security reasons, the transition to non-fossil fuels in China must start now. By 2030 non-fossil fuels should make up at least 30% of China’s energy mix and more than 50% by 2050.

Mr Pincher asked which low-carbon renewables were most appropriate for China. Professor Pan highlighted the potential of the different options:

- Nuclear should be viewed as a transition technology, but not something that should be relied upon in the long run. There is potential for up to 80GW of nuclear. (Nuclear is not a long term option because uranium will have to be imported from other countries;
because there are significant safety concerns associated with the ‘human factor’ of running nuclear power stations; and because of the problems of dealing with nuclear waste.)

- Hydro could be increased from the current 200GW installed capacity to 350GW.
- Wind is an option, but will require system management to deal with intermittency.
- Solar has huge potential, in particular there is scope for solar heating to make a big impact, even though there are no support schemes for this technology currently in place.
- Unconventional gas and coal bed methane could be big sources of energy too.

Sir Robert asked about the potential for CCS. Professor Pan said he was not in favour of CCS for a number of reasons:

- The energy cost of capturing and storing CO2 is at least 20% of output – in a country where there are already power shortages it does not make sense to use energy for nothing.
- We can’t be confident that CO2 won’t leak out of geological storage sites.
- The financial cost is high.
- The long transportation distances involved for some plants may make CCS impractical.

Professor Pan asked the Committee what their views were on the controversy around the decision to include aviation in the EU ETS and suggested that the EU’s unilateral approach had ignored differences in national circumstances. Mr Yeo said that it was important to tackle emissions from aviation and shipping and noted that countries with equivalent measures would be exempted from the EU scheme. Professor Pan also asked how the UK’s carbon budget was designed. Mr Yeo explained the role of the Committee on Climate Change in this regard.

**Lunch with Foreign Missions and Donors in China**

Attendees:

- Erica Thomas, US Embassy
- Geoffrey Lyon, US Department of Energy
- Heidi Hiltunen, EU Commission
- Trevor Holloway, Australian Embassy
- Deborah Seligsohn, World Resources Institute
- Gailius Draugelis, World Bank
- Rasmus Kristensen, Danish Embassy
Summary of discussion

The participants gave a brief introduction to their work in China.

The discussion covered a range of topics, including the benefits of carbon trading versus carbon taxation, the opportunities for developing common standards between China and other countries, the prospects for CCS and the infrastructure requirements associated with increased use of renewables.

National Development and Reform Commission (NDRC)

Attendees

- Sun Cuihua, Deputy Director General, Department of Climate Change, NDRC

Summary of discussion

Mme Sun outlined China’s energy and climate change policies under the 12th FYP, including carbon intensity targets. She noted that progress towards the 2015 targets was not going as well as hoped but that everyone was committed to strengthening efforts to catch up over the next four years. The use of market instruments will be useful in achieving targets. Specific areas included:

- Carbon trading - China has studied other carbon trading schemes, including the EU ETS in order to learn lessons from these experiences. Seven provinces have been given emissions caps and are developing pilot trading schemes. It is hoped that a nation-wide scheme will be implemented in 2016.

- Carbon tax - Research is on-going.

- Certification and labelling – it is hoped that rules for low-carbon product standards will be published this year.

- Energy mix – it is hoped that reliance on coal can be reduced by increasing the use of renewables and nuclear, although there is still some debate over the use of nuclear (following the accident at Fukushima).

- Economic restructuring – greater development of low-carbon sectors will help to reduce carbon intensity. There is a specialist department within the NDRC that is focusing on restructuring.

Mme Sun also talked about cooperation with the UK through the FCO’s SPF projects and suggested that financial support should be provided to Chinese institutions rather than EU or other foreign institutions.
**Wednesday 15 February 2012**

**SPF project roundtable event**

Attendees
- Prof Zhao Daiqing, Vice President, Guangzhou Institute of Energy Conversion
- Dr Zhao Xikang, Director of Centre for Environmental Economics and Policy Research, Guangdong Academy of Social Sciences

**Summary of discussion**

Professor Zhao gave an overview of her work on identifying a feasible carbon trading system for Guangdong and suggesting suitable industries to take part in a trial (which is funded by the FCO’s Prosperity Fund). She highlighted three big challenges:

- The concept of low-carbon and how to understand it is a controversial issue
- New technologies and industrial structures are needed to improve energy efficiency this includes the development of a greenhouse gas (GHG) inventory system
- Human resources development is required – not only in the energy sector but economists, legal experts and development experts will also need to be involved.

Professor Zhou outlined five areas she was working on:

- Drafting a low-carbon development plan
- Developing a provincial GHG inventory system
- Low-carbon product standards
- Pilot trading programme
- How to devolve targets to cities and assess whether they have been completed

Factories that introduced efficiency measures successfully were guaranteed power.

There was no transparent data disclosure, only the government could collect and distribute data. Data was often analysed well, but not verified. MRV could be a very sensitive subject in China.

The Guangzhou Institute of Energy Conversion had helped to organise a provincial low-carbon workshop in February.

In 2008, the Party Secretary had indicated that low-carbon development was a priority. At that time, public awareness of climate change issues was low, so a low-carbon roadmap had been developed to build capacity and understanding.

CCS and emissions trading projects were being supported by SPF funding, as well as a project on designing a GHG inventory system. Development of a robust inventory would be a major challenge during the period of the 12th 5YP.
The Guangzhou Institute of Energy Conversion was undertaking a strategic study of Guangzhou’s development plan, including a forecast of emissions reduction potential, with priority sectors and technologies. Industrial pollution was significant, so it was important to identify the most prolific polluters. Guangzhou had a unique combination of emerging high-tech and conventional industries. Moving up the value chain could be encouraged through emissions trading.

The plans for emissions trading as a way of achieving an efficient transition had met with broad approval from academics.

- Guangdong’s carbon trading exchange had already been established.
- Dr Zhao believed that it would be advisable to begin with a voluntary system before moving to a quota-based system.
- There had been close contact with international counterparts looking at emissions trading and verification programmes.
- At this stage, a cap had not been set. However, Dr Zhao believed that intensity-based targets could still achieve a useful carbon price. It was possible to predict from economic growth the amount of allowances that would be needed.
- Allocation would be based on production capacity and technology.
- The system would probably cover the power sector; ceramics; concrete; and building materials industries.
- The intention was to take a cautious approach in order to avoid harm to industry.

Very good carbon consultancy firms had emerged in China through experience of the Clean Development Mechanism.

There had been difficulties convincing the public about the need for climate change mitigation. The hunger for growth was not easy to reconcile with environmental imperatives.

A “Chinese argument” could be made for a low-carbon transition, based on the need to move away from an unsustainable growth pathway and from reliance on fossil fuels for energy security reasons. The transition could also be viewed as an opportunity.

Dr Zhao outlined three challenges for emissions trading in China:

- Poor quality of MRV in China
- A lack of legislative framework
- The “Chinese characteristics” of governance

Different institutions would monitor different emissions, with three different reporting systems:
• The Economic Industrial Commission (EIC) would cover energy saving
• The Department for Environmental Protection (DEP) would cover SO₂ and NOₓ
• The Development and Reform Commission (DRC) would cover CO₂

These institutions had different levels of power. The DRC, for example, would have power to make rules, but not to take enforcement action (which falls to DEP and EIC).

Information sharing systems and joint law-enforcement mechanisms would be desirable.

Four supporting systems would be necessary:

• An inventory
• Information tracking
• Third party auditing and verification
• Award of allowances and punishment for non-compliance

One success of the US RGGI system had been a strong tracking system. China should set up its own criteria for MRV to an internationally acceptable standard.

One option would be to require that if a business intended to be an Energy Saving Enterprise, it would need to submit fuel use data and illustrative emissions profiles.

**Briefing on urban development in Guangzhou at the IFC Tower.**

The Committee visited Guangzhou’s Zhujiang New Town.

Arup said that they were legally obliged to work with local construction companies, but there was fairly open competition for architecture and design contracts. UK companies were heavily involved.

Although there were important low-carbon aspects to the development (such as a district cooling system), there were also energy-intensive elements. The car-based model remained. Designs in Tianjin, which were a couple of years behind, incorporated more sustainable elements.

Residential areas did not have a green focus, but the Planning Bureau would check that developments were in compliance with building regulations.

UKTI reported that UK companies and UKTI had focused so far on first and second tier cities, but were looking to enter third and fourth tier cities.

**Meeting with the Director of Guangdong DRC**

Attendees:

• Mr Xiulu Lu, Deputy Director, Development and Reform Commission of Guangdong Province
Summary of discussion

Mr Lu reported that over the previous decade, Guangdong’s GDP had been top in China every year. In 2011, per capita GDP was c.$7,000, across a population of 100 million (the greatest in China). The province had 21 prefecture level cities. However, Guangdong still lagged behind the West in terms of GDP and sustainable development.

The Party Secretary had commented that if China did not take the initiative to adjust industrial structure, it would be adjusted by the industry itself. Therefore the province was prioritising energy saving and GHG reduction to achieve sustainable development and international commitments.

In the last Five Year Plan period, Guangdong had achieved a 16.4% energy intensity reduction and planned to achieve an 18% energy intensity reduction and a 19.5% carbon intensity reduction in the 12th 5YP period.

The Director said that the intention was to increase high-tech industry in the province. In 2010, the industrial structure was roughly 5% primary industry; 49% secondary industry and 45% tertiary industry. The plan was to increase tertiary industry to 48% by 2015 – every 1% increase delivers a significant decrease in emissions. National energy intensity per unit of GDP was already five times higher than that of Guangdong. Stringent targets would be introduced for the key sectors, such as concrete and petrochemicals. They would need to retrofit or face closure. 50 million tonnes of cement and 110 GW of coal-fired generation had already been phased out.

Mandatory targets would be based on reduction potential. National targets were devolved to provincial level, then again to regions and cities.

Over the next year, Guangdong would build a sound inventory of GHGs. Caps and allocations for an ETS were further away. The mechanism for emissions reductions should be sustainable as well, so a cautious approach was necessary.

Meeting with Governor of Guangdong

Attendees:

- Mr Xiaodan Zhu, Governor, Guangdong Provincial Government

Summary of discussion

Governor Zhu suggested that three decades of development had been carried out at the expense of the environment, with damage to land, air, water and the atmosphere.

He expressed his intention that high-emitting industries should be replaced by higher value businesses and services, with development in strategic low-carbon industries. The goal was to achieve balance between development and the environment. There was already some collaboration with the UK on this agenda and Governor Zhu expressed his desire for further cooperation on developing Guangdong’s trading scheme. He also identified energy management systems and energy efficiency practices as an area where UK expertise could
be beneficial. In conclusion, he believed there was a large potential for future collaboration between China and the UK.

Governor Zhu suggested three areas where UK support could speed up progress:

- Learning lessons from the EU ETS – Governor Zhu will ask DRC colleagues to go on a study visit to the UK and Europe to do this.

- Business to business cooperation – it would be useful to invite eligible low-carbon organisations from the UK to communicate and exchange views with their counterparts in Guangdong.

- Promoting exchanges between research institutes and academies to explore the possibility of cooperation in high end technologies such as shale gas and marine energy.

Mr Yeo said he would be happy to promote business to business dialogue and to promote dialogue between think tanks and academies.

**Thursday 16 February**

**DfID Adapting to Climate Change in China projects**

Attendees:

- Dr Rebecca Nadin, DfID
- Dr Du Yaodong, Chief Expert, Climate Centre, Guangdong Meteorological Bureau
- Dr Yumin Zeng, Assistant Director, Centre for Environment and Policy Research, Guangdong Academy of Social Sciences
- Ma Wenjun, Deputy Director, Guangdong Institute of Public Health

**Summary of discussion**

Dr Nadin gave a brief introduction to climate change impacts in China and DfID’s Adapting to Climate Change in China programme. The project aims to develop evidence-based policy approaches to climate resilience. Three project partners described the findings of their work to date.

- Dr Du set out his work on sea level rise. The impacts in China include: increased probability and magnitude of storm surges; waterlogging in coastal cities; coastal erosion; damage to mangrove and coral reef ecosystems; and an increased need for coastal engineering. Sea levels around China are projected to rise 73–127mm in the next 30 years. A rise of more than 300mm would result in serious disasters in the coastal area of Guangdong and would have a severe impact on regional planning and industrial layout (among other things). Guangzhou city is one of the high risk areas in the province.
• Dr Yunmin described his work on vulnerability and risk analysis to climate disaster (such as typhoons, precipitation and flooding). This includes the development of an indicator system and forecast system to assess risk.

• Mr Ma outlined his work on climate change and health in Guangdong, which incorporates work on capacity building, risk perception, health impacts, vulnerability and adaptation planning.

Mr Yeo asked to what extent policy is informed by knowledge of climate impacts. Dr Du and Mr Ma explained that the Government has adopted research recommendations in the 12th FYP and national adaptation strategy.

Sir Robert asked whether a focus on adaptation might lead to a belief that mitigation measures were not necessary. Dr Du replied that both aspects were covered in the 12th FYP but that adaptation was seen as more pressing because the impacts are already being seen. Mr Ma felt that more effort on adaptation was needed, particularly in the area of health.

Mr Pincher asked what impact climate change might have on the economy and economic growth. Dr Yunmin said it was having an impact, but that this had not been quantified. A clearer picture might emerge as more data was collected, although he warned that it can be difficult to attribute some impacts (e.g. typhoons) directly to climate change.

Dr Lee asked whether the studies on the impacts of climate change on health had controlled for other factors such as stress or obesity. Mr Ma explained that his research had followed WHO guidelines.

Visit to an industrial park in Guangzhou Development District (GDD)

Participants:

• Cui Xinyu, Deputy Director of GDD Administrative Committee
• Yao Dong, Deputy Director of GDD Development and Reform Bureau
• Fu Wenbo, Deputy Director of GDD Economy Development Bureau
• Qui Zhiyang, Foreign Direct Investment Promotion Office of GDD
• Wang Chulong, Environmental Protection Division of GDD Construction and Environmental Management Bureau
• Huang Zongchao, GDD Development and Reform Bureau
• Li Yuanfeng, Chairman, Valuda Group Co. Ltd.
• Wei Rui, Valuda Group Co. Ltd
• Wang Dawei, Wide China Industry Co. Ltd
Summary of discussion

Mr Fu gave an introduction to Guangzhou Development District (GDD). GDD is a leading development zone on both economic development and low-carbon enterprises. The GDD has set a standard for new projects setting up within the zone.

Ms Li gave a presentation about Valuda, a waste and recycling company. She said that Valuda chose to locate in GDD because it provided good access to the market and supply chains. Valuda is building an ‘2050 environmental future’ museum within its Circular Economy Demonstration Park, which will be open to members of the public and demonstrate how a zero carbon world might look.

Mr Wang gave a presentation about Wide China Industry, a business that has developed an energy efficient and water saving air conditioning system.

Mr Cui suggested that the proposed carbon trading scheme would make environmental protection economically viable. Mr Yeo stressed that such a scheme could provide opportunities for low-carbon industries to make profits.

Visit to Dongguan Research Centre of the Vanke Property Development Company

Participants:
- Yu Liang, President, China Vanke Co. Ltd
- Wang Yun
- Zhang ji Wen
- Shi Yu

Summary of visit

The committee was given a tour of Vanke’s R&D centre and saw various aspects of the research work, including development of pre-fabricated concrete for use in buildings, the housing experiment tower for high-rise and super high-rise building drainage performance research, earthquake-resistance testing, a new ‘small housing unit’ (a 15m² apartment), insulation testing and a constructed wetland for water treatment.

Vanke is leading on the development of green buildings. All new Vanke properties achieved at least a 1 Green Star (the Chinese green building standard) rating, and 54% of all the highest rated (3 star) buildings in China were built by Vanke. Vanke’s own offices have achieved high standards – the Vanke Centre in Shenzhen was one of the first LEED platinum rated buildings in Southern China and the Beijing office was awarded BREEAM level ‘excellent’. Vanke’s research into green buildings includes work on energy efficiency, water saving, botany and new building materials.

134 Leadership in Energy and Environmental Design (LEED) is an internationally recognised green building certification system developed by the Green Building Council in the USA. Buildings are certified either silver, gold or platinum.
Vanke recently signed an MoU with the Building Research Establishment to set up a low-carbon R&D centre in Beijing, which will showcase the best of British and Chinese sustainable home technologies.

Sir Robert asked whether consumer demand or regulations had motivated Vanke to move towards building green buildings. President Yu explained that actually it was neither of these things— the current regulations are not very demanding and not all customers are ready to pay extra for a more environmentally friendly property. However, Vanke’s mission is to be a respected company and believes that in future, the building industry will become more sustainable in its thinking, particularly since the Chinese Government is now focusing more closely on green buildings.

Dr Whitehead asked whether Vanke was licensing out the new technologies it had developed. President Yu said they were happy to share their technology at zero cost because there would be significant benefits to society as a result. Although Vanke has developed some energy saving technologies for existing buildings, their focus is really on new buildings because they are building so many.

Mr Lavery asked what level of demand there was for the small housing unit. President Yu explained that there was a huge demand in China for housing, especially among graduates. The 15m² property was being launched in 5 cities and he was confident that there would be a market there.

Visit to Arup office, Shenzhen

Participants:

- Man Kang, Leader of the Shenzhen office. Arup International Consultant (Shanghai) Co., Ltd. Shenzhen Branch
- Henry Li, BYD

Summary of discussion

Mr Man Kang gave a presentation on Arup’s work in China. Arup has been involved in a number of green building projects, including the Vanke headquarters in Beijing and the Parkview Green development in Beijing. These buildings have incorporated a number of ‘green’ features, including energy saving measures, rainwater and greywater recycling, natural ventilation systems and green roofing.

Mr Li gave a presentation on BYD’s work on electric vehicles. BYD has developed an e-bus, with a range of 250km. Electric buses do not contribute to air pollution and are also have lower running costs than conventional buses (in China).

Mr Li advocated using subsidies to support the use of electric vehicles in the public transport sector (i.e. taxis and buses) because they would provide a greater return on
investment in terms of reduced air pollution. This is because buses and taxis have a much higher daily mileage than privately owned vehicles.

**Friday 17 February 2012 (Hong Kong)**

*Environment Bureau, HKSAR Government*

Participants:
- Mr Donald Ng, Acting Deputy Secretary for Environment
- Mary Tsang, Assistant Director of Environmental Protection

*Summary of discussion*

The discussion focused on climate change policy in Hong Kong, including the carbon intensity reduction target, energy efficiency in buildings, transport, power generation and emissions from industry. District cooling, carbon trading and adaptation were also covered.

*Legislative Council Members*

Participants:
- Tanya Chan (Civic Party)
- Audrey Eu (Civic Party)
- Ms Cyd Ho Sau-lan
- Mr Lee Wing-Tat

*Summary of discussion*

The discussion focused on some of the key climate change and energy issues in Hong Kong at the moment, including reliance on electricity, nuclear energy, carbon trading, energy efficiency, emissions reduction targets, green building standards and district cooling. In addition, there was discussion of some of the political dimensions of tackling climate change, including public opinion and the impact on businesses.

**Lunch with HM Consul-General and leading UK businesses**

Participants:
- Mr Andrew Chan, Arup Group Deputy Chairman
- Ir Daniel Cheng, Deputy Chairman, Federation of HK Industries
- Mr Graham Cottingham, Executive Director, AirconMiser
- Mr Philippe Lacamp, Head of Sustainable Development, John Swire and Sons
• Ms Beata Tang, Head of Assessment Delivery Service and Training Business, British Standard Institution Hong Kong

The discussion covered a wide range of topics relating to climate change and business, including some examples of new business opportunities in the low-carbon sector as well as areas where policy had led to greener business practices on the ground. There was also some discussion of carbon trading and perceptions from the business world of the carbon market.

**Civic Exchange**

Participants:

- Christine Loh, Chief Executive, Civic Exchange

**Summary of discussion**

The discussion covered a range of areas relating to climate change mitigation and adaption. In particular, the ideas of ecological restoration as a form of compensation and common but differentiated responsibility within countries were covered. There was also some discussion of the policy challenges for Hong Kong including, the use of nuclear power and energy efficiency in buildings.

**International financiers and analysts**

Participants:

- Ms Rebecca Wright, General Manager, ASrIA
- Mr David Lunsford, ESSO
- Mr Evan Li, Director, Regional Head of Renewable Energy, Environment & Utilities, Standard Chartered Bank.
- Mr Michael Friedlander, Chief Risk Officer, APG Asset Management
- Mr Jake Astor, First Eastern Investment Group
- Mr Wai-Shin Chan, Director, Climate Change Strategy, Asia-Pacific, HSBC Market (Asia)

The discussion explored the perceptions of the financial community of climate change mitigation efforts and associated investment opportunities. Topics covered included carbon trading, the use of carbon targets, energy efficiency, CCS, electric vehicles, LED lighting and energy storage.
## Annex IV: Analysis of HMG departmental initiatives

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<th>Initiative</th>
<th>Low-carbon standards and labelling</th>
<th>Low-carbon markets and trading</th>
<th>Other low-carbon policy (including capacity building)</th>
<th>Low-carbon planning/urban development</th>
<th>Low-carbon buildings</th>
<th>Renewable energy (including offshore wind, marine and solar)</th>
<th>Low-carbon transport</th>
<th>Civil nuclear</th>
<th>Cleaner fossil fuels (including CCS and CCUS)</th>
<th>Smart grid</th>
<th>Reducing emission from agriculture</th>
<th>Reducing emissions from businesses/encouraging low-carbon businesses</th>
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Formal Minutes

Tuesday 17 July 2012

Members present:

Mr Tim Yeo, in the Chair

Dan Byles
Barry Gardiner
Ian Lavery
Dr Phillip Lee
Albert Owen

Christopher Pincher
John Robertson
Laura Sandys
Sir Robert Smith
Dr Alan Whitehead

Sir Robert Smith declared the following interests:

Shareholding in Rio Tinto; mineral extraction and Shell Transport and Trading; oil-integrated.

Mr Tim Yeo declared the following interests:

Director of ITI Energy Limited; suppliers of gasification equipment; Director AFC Energy; company developing alkaline fuel cell technology; Director Eco City Vehicles plc; and Chairman of TMO Renewables Limited. Shareholdings in AFC Energy (share option) and Eco City Vehicles plc.

Mr Tim Yeo also declared a non-pecuniary interest as the President of the Renewable Energy Association.

Draft Report (Low-Carbon Growth Links with China), proposed by the Chair, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 94 read and agreed to.

Annexes and Summary agreed to.

Resolved, That the Report be the Third Report of the Committee to the House.

Ordered, That the Chair make the Report to the House.

Ordered, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

Written evidence was ordered to be reported to the House for printing with the Report (in addition to that ordered to be reported for publishing on 31 January 2012, in the previous session of Parliament, and 10 May 2012).

[Adjourned till Tuesday 4 September at 10.00am]
Witnesses

Tuesday 6 March 2012

Professor Samuel Fankhauser, Grantham Institute, London School of Economics, Professor Trevor Davies and Professor Corinne Le Quéré, Tyndall Centre, University of East Anglia

Nick Mabey, Chief Executive, E3G and Felix Preston, Research Fellow, Chatham House

Baroness Bryony Worthington and George Yu, Sandbag and Richard Baron, International Energy Agency

Tuesday 13 March 2012

John MacArthur, Vice President CO2 Policy, Shell, Alistair Guthrie, Global Sustainable Buildings Design Leader, Arup, and Peter Budd, Vice Chairman, China-Britain Business Council, and Director, Arup

Gregory Barker MP, Minister of State, Department of Energy and Climate Change, Henry Bellingham MP, Parliamentary Under-Secretary of State, Foreign and Commonwealth Office, James Hughes, Head of International Climate Change Strategy, Energy and Analysis, Department of Energy and Climate Change, John Ashton, Special Representative for Climate Change, Foreign and Commonwealth Office, and Gregory Briffa, Low Carbon Team Leader, Department for International Development

Written evidence

1 Department of Energy and Climate Change (DECC) Ev 38
2 Foreign and Commonwealth Office and DECC Ev 42
3 Shell Ev 44
4 Grantham Research Institute, LSE Ev 47
5 University of East Anglia, Tyndall Centre for Climate Change Research, and Low Carbon Innovation Centre Ev 52
6 Anthony Day Ev 59; Ev 68
7 Carbon Capture & Storage Association Ev 63
8 Global Action Plan Ev 65
## List of reports from the Committee during the current Parliament

The reference number of the Government’s response to each Report is printed in brackets after the HC printing number.

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Oral evidence

Taken before the Energy and Climate Change Committee
on Tuesday 6 March 2012

Members present:

Mr Tim Yeo (Chair)

Dan Byles
Ian Lavery
Dr Phillip Lee
Albert Owen

Christopher Pincher
Sir Robert Smith
Dr Alan Whitehead

Examination of Witnesses

Witnesses: Professor Samuel Fankhauser, Grantham Institute, London School of Economics, Professor Trevor Davies, Tyndall Centre, University of East Anglia, and Professor Corinne Le Quéré, Tyndall Centre, University of East Anglia, gave evidence.

Q1 Chair: Good morning. Thank you very much for coming in. We will just crack straight on. We have about 40 minutes, I think. We have two other panels of witnesses in later on.

As you may know, quite a few members of the Committee were in China last month and had some useful exchanges there. There is obviously a great deal of low-carbon activity taking place in China now, and a great deal of interest—in my judgment considerably more interest than there was even four or five years ago. They seem to be very much more focused. Where do you think the greatest scope is for co-operation—hopefully, for mutual advantage—between the UK and China on this whole agenda?

Professor Le Quéré: I think there is recognition that the UNCCC process is going rather slowly at the moment, so the benefits are in bilateral collaboration. The UK is really leading in international negotiations, but the UK’s emissions are relatively small. China has very big emissions but it is not joining in the international negotiations, so I think if the UK can develop a bilateral agreement with China—I have a few ideas how that can happen—then there are benefits to both countries.

Professor Davies: I think there is scope in some areas on the basis of our experience, particularly in the area of building. As you will know, there is an enormous urbanisation programme. In many of the buildings the energy standards are relatively low by UK standards, although they are increasing, and some of our work where we have collaborated around real projects could be of significant benefit to the UK and to UK businesses.

Professor Fankhauser: Let me add one or two points. Some of these areas of collaboration are predictable; some are perhaps a bit more surprising. Among the surprising ones that I deal in, in my work at LSE, is collaboration on policy. The Chinese are very interested in the way the UK has structured its low-carbon regulatory framework, with the carbon budgets, with the Climate Change Committee and so on. The Chinese are also very interested in carbon trading and want to learn those policy lessons, so that is clearly an area where collaboration is possible.

Another area where collaboration is possible is probably research services—the intellectual side of the low-carbon economy—just because the UK is a service-based, research-based economy; but then there are the more manufacturing areas, which are a smaller part of our economy, but a large part of the Chinese economy. In some areas the UK has perhaps a comparative advantage—in engines, for example, aeronautics, the Rolls-Royces of this country—where collaboration also is possible.

Q2 Albert Owen: I did not go to China last month, but I did go about four or five years ago and I went to some of these manufacturing areas that you talk about and, quite frankly, some of the Chinese officials were saying, “We can’t learn much from you in Britain because you messed up, albeit a long time ago, and you are only a small player.” You have just mentioned we are a tiny population with tiny emissions. What is the official line from China towards Britain? Do they see us as interfering or do they see us as genuinely a nation that can help?

Professor Davies: There is genuine interest in our experience. They do want to learn from our mistakes. The UK is regarded as one of the leaders in terms of policy development, and certainly we and, I know, LSE have been involved in discussing training courses, where the thrust from organisations like the Ministry for Environmental Protection has been in learning from our policy experience. It takes a long time to build up trust, and if we are going to have an influence, to be able to impart our experience on policy, we clearly have to do it by working directly with Chinese colleagues, rather than assume we can go initially at high level. One way forward might be to evaluate UK policy in collaboration with Chinese colleagues.

Professor Le Quéré: I think the Chinese see the British as very inspirational because Britain was the first industrial country, and the Chinese see that Britain can provide some leadership for being the first post-industrial country as well. One area where Britain can lead is international negotiations, as I mentioned before. I think there is a problem both in the UK and in China in terms of national policies with respect to targets. In the UK, the targets are based on
terrestrial emissions, which are emissions that are only produced in the UK, but they do not account for consumption emissions, which are emissions from products produced in China but then consumed in the UK, and that makes a huge difference in the budget. In China, the problem is that the targets are not absolute targets for carbon reductions, but targets for carbon intensity. So both countries have a problem with respect to national targets, and it would be possible for the UK to say, “We will go consumption emissions if you go absolute emissions in your targets,” and thus provide leadership in the international scene for negotiations.

Q3 Sir Robert Smith: Clearly on the policy development engagement, the benefit would be China, as a major player in the world, being able to engage more effectively in the policy framework. Would there be any commercial benefits to the UK of such an engagement?

Professor Le Quéré: If we can grab the opportunities. In China, things go very quickly and in the academic environment we constantly face the situation where there is a huge interest of benefit to us but it has to happen straightaway—next month people have to be in place. If there is a very big policy oriented for low-carbon development, then people from the UK have to be in place in China to grab the opportunities as they arise. The opportunities do not come to us. We have to go in place and develop them in the territory.

Q4 Chair: What do you think the benefits are to the UK of doing this?

Professor Fankhauser: There is an almost flippant answer to that, which is there are very few places on the planet that double their GDP every 10 years and grow at 7% annually, and that is the size of the Chinese economy. Just in sheer demand for goods and services, whether it is low-carbon or any other type of commodities, it is very hard to ignore China. The trick is to find the niches where the UK can have a sustainable comparative advantage, not just a temporary comparative advantage.

Q5 Chair: Where do you think those niches might be?

Professor Fankhauser: We have done some analysis at LSE. In a sense, the way we thought about it is that there are two factors that have to come together for the UK to be sustainably good at something. The first is that we have to have a good starting point. Today we can already see evidence of comparative advantage and you can measure that with the share of exports, for example, that the UK has relative to the rest of the world. Secondly, one would need evidence of green innovation—the ability of UK firms to come up with new products that are genuinely low-carbon and genuinely green, and you can measure that with things like the number of green patents. If you put those two together you find a pattern. The first thing you find is that the UK is much less strategic than China in combining those two factors. The Chinese are quite good at going green in areas where they have a comparative advantage. In the UK it is far more scattered, but there are some areas where the two come together: I mentioned aircraft engines before, but there are some surprising things like mining equipment, mining machinery, agriculture and forestry machinery. Those are the sectors that jump at us from the data. The bit we have not done yet is to go out to talk to those industries and dig a little bit deeper and see what that stuff means, but some of them are intuitive. We know Rolls-Royce and the Midlands manufacturing base are very good at what they are doing. They are increasingly green, so you can see areas of comparative advantage there.

Professor Davies: There is a hunger for low-carbon innovation in China, and I think the UK does have a good record in low-carbon innovation, so an attractive approach would be to partner with China in certain areas, such as mining equipment and building, to develop the innovations together, to bring them to market in China—a very, very big market—and to plan for continuing investment in British R&D to continue these low-carbon innovation developments.

Q6 Dr Whitehead: When a number of us were in China we talked about, among other things, the National Energy Administration. We were told that the actual policy analysis and development arrangements within the administration look pretty limited. Is that your understanding in terms of what resource China is putting into low-carbon policy development?

Professor Davies: My apologies, I didn’t hear that very well.

Dr Whitehead: Sorry, I will paraphrase it. It was rather a long question.

Q7 Dr Whitehead: When a number of us were in China we talked, among other things, about the capacity of the Chinese National Energy Administration, for example, to deal with issues of policy formation as far as climate change is concerned. Is it your understanding that there is potentially an issue with the extent to which they are genuinely able to work on policy development in, for example, the 12th plan?

Professor Davies: That does not surprise me. There is an issue of capability generally in a number of low-carbon areas, including policy, which is why I think it is an attractive prospect that this country could work in collaboration with China over policy development.

Professor Fankhauser: There are two ways of looking at that. I am not close enough to judge just how big the capacity is, but one way to look at it is the Chinese policymakers’ appetite for learning and the interest in understanding this issue, and that appetite is really very big. That is something we see almost daily, certainly weekly, at LSE. We are approached by Chinese groups who want to know, want to learn and want to be taught, so the interest is certainly there. The base level of capacity is perhaps low, but I think they are on a very steep learning curve with a lot of enthusiasm to learn.

Professor Le Quéré: There is also a big disconnect between the policymaking and the monitoring of the policies themselves, which is far more difficult. Policies tend to be done by the central government...
but are implemented at the provincial level, and to monitor what is happening there is very difficult to do. We had a discussion with the Chinese Academy of Transportation and they did not know how to capture the emissions from transportation, for instance, in their intermediate-sized cities. This is an expertise that we have in the UK. We are able to state the emissions, breaking down by sector, how we monitor them and what sort of data we need, and we can bring this expertise on board to China.

There is also an issue that things are going extremely fast in China. The cities are growing very fast and the policies are developing equally fast, so it is very difficult to keep up with the governance, with the policies they have locked at the central level.

Q8 Dr Whitehead: They are looking at—I am talking about policy from the centre—drafting a climate change law. I appreciate the issue that we looked at in terms of the transmission of measures relating to the law and what the provincial administrations may do about it—for example in the 11th programme, I think, reaching their intensity targets by closing certain factories down for several weeks. Clearly they are looking for far more sophisticated ways of relating policy to implementation. What do you think the UK could best do to support and develop those sort of measures and their implementation in China, particularly in terms of the development of a climate change law?

Professor Le Quéré: I think the UK capacity in these areas is very important. We have a lot of information—a lot of model-based information—and the systems and infrastructure can be modelled in the UK to assist the policy development and implementation. China has a really big hunger and need for that sort of information.

Professor Fankhauser: In terms of the knowledge base that we have in the UK—the number of experts, the models, the policy experience—the capacity is clearly there to engage with China and do some larger scale teaching. The question is more one of the channels through which that teaching happens. There are probably bottlenecks in terms of making sure that the UK expertise finds its way into China. I think the Foreign Office does a very good job in China. They keep inviting us over there and we do talk to large groups of people. The problem is not necessarily the expert base in the UK; the problem is, despite the FCO efforts, to channel that expertise into China.

Q9 Dr Whitehead: I was just thinking of the Prosperity Fund of the FCO, which has been supporting Chinese learning visits, for example, to the UK, and the development of a 2050 pathways calculator. Do you have any evidence of the effectiveness of those sorts of arrangements, or any feedback on how those are working?

Professor Fankhauser: I can only give anecdotal evidence, as nobody has done a proper evaluation of those programmes to my knowledge. The anecdotal evidence is that these things are really of interest to the Chinese, they are being used, and you get very detailed, very concrete questions or tiny little technical queries that somebody asks and would only ask if they had put effort into understanding the tool and the model. We get a lot of that sort of level of questioning.

Professor Le Quéré: One way to improve the efficiency in these instruments would be to align the funding opportunities in China and the UK at the same time. We have found that the Chinese will get funding opportunities through the FCO and through other means, and they get projects built up that depend on our expertise and we have the difficulty of aligning funding for developing projects with them. If our funding is rejected in the UK, submitted in parallel to the Chinese, it damages the relationship rather than helps. For the FCO and for other funds, if this was made more strategic—aligning a fund in the UK and a fund in China for working together, both countries chipping in their part of the funding—it would be far more efficient.

Q10 Albert Owen: Professor Davies, you are co-director of a centre that has established a partnership with Fudan University in Shanghai. What were the motivations for this, and can you tell me what the partnership has delivered to date?

Professor Davies: There were a number of motivations. One is that with China then about to become the biggest greenhouse gas emitter, clearly local decisions, local knowledge, local research within China and decisions made in China were going to impact the world. From a research point of view, there are some very interesting academic questions to be asked, which would have knock-ons to the real world, around behavioural differences, the role of behaviour change around low-carbon innovation in China. From a more prosaic point of view, there is the fact that there are large R&D budgets available in China, and the prospect of being able to lever funding for collaborative work—notwithstanding the point that Professor Le Quéré has just made that if the funding opportunities are not aligned and if they are not aligned over some continuous period of time, then that non-alignment can be positively damaging rather than just neutral.

Q11 Albert Owen: What have you delivered to date? What has the partnership delivered?

Professor Davies: It is still in its early days, but it has delivered some existing collaborative research programmes, funded mainly from the Chinese side. Had there been a little bit more funding from the UK side, that would have released even more funding from the Chinese side. We have existing programmes around high-emitting groups—the fact that there is a group of increasingly influential people in China who will drive opinion and possibly decision-making in China. We also have some other research-based programmes around nitrous oxide emissions and water security and management, and we are about to get off the ground a collaboration on new energy materials with one of the Chinese national key laboratories. That academic activity has also led to a collaboration with one of the more commercially oriented parts of Fudan University, which is an enormous university. This is to do with the design, development and
delivery of low-carbon buildings and possibly low-carbon research parks in China, again of a massive scale. We are currently in the early phases of this, but we are involving UK companies in some of this work—at a relatively modest level so far, but there is real benefit to UK business, and we hope that that greater benefit will be realised over the next two or three years.

Q12 Albert Owen: When you mention funding, you are not just talking about Government funding; you are talking about attracting it from industry as well, yes?
Professor Davies: Yes, Government and industry funding.

Q13 Albert Owen: Do you honestly feel that it is more beneficial to Britain if these partnerships exist that facilitate, in the way that you have said, other things happening, or if Governments have a direct link with China themselves? Why should we channel it through establishments like yours when Governments could have direct contact?
Professor Davies: It is important, particularly in the area of negotiations, that the officials—the people who do the work, the people who do the monitoring, the people who do the assessment and the people who do the groundwork for negotiations—work together and there is a level of trust building up. One of the reasons it has taken a long time for us to come to this position in our relationship with Fudan—we have been working on this for three or four years—and with some other universities is the necessity to build up trust. I think that trust needs to be deep and it needs to be quite expansive.

Q14 Albert Owen: In your opinion, should there be individual universities having contact with each other, or do you think there should be a British delegation promoting Britain out in China as much as getting this research? Are you not going to be in competition with other universities? That could easily be—or could conceivably be—within a framework. To come to our own example, the Fudan Tyndall Centre, we are also talking with other top research centres in China about the prospect of building up a mirror Tyndall Centre consortium in China. In the UK it consists of eight universities, and I think a similar arrangement in China has a number of attractions. Clearly, if that were in a framework of an interdisciplinary research programme, supported Government-to-Government, then that would be helpful.

Q15 Albert Owen: Do you think that is counter-productive in some ways?
Professor Davies: To build up trust and to develop active, vibrant research programmes, some of which would lead to commercialisation opportunities, I think it is inevitable that that has to start off on an institute-by-institute basis. That could easily be—or could conceivably be—within a framework. To come to our own example, the Fudan Tyndall Centre, we are also talking with other top research centres in China about the prospect of building up a mirror Tyndall Centre consortium in China. In the UK it consists of eight universities, and I think a similar arrangement in China has a number of attractions. Clearly, if that were in a framework of an interdisciplinary research programme, supported Government-to-Government, that would be helpful.

Q16 Albert Owen: Moving on to the Grantham Institute, you have advocated a China research group within DECC. How do you think that would work and what do you think it would achieve?

Professor Fankhauser: The idea behind it was that China is one of maybe two countries that can have an active influence over global greenhouse emissions; the US is the other. It therefore makes sense to engage with China in particular, to understand China, to understand Chinese emissions, and to understand the potential of how quickly those emissions can come down. It is a question that you get asked a lot: what is the point of the UK having all those carbon targets if the world does not follow? The answer to that, in a sense, is that through example the UK can leverage other countries to do similar things, but that does not happen on its own. That needs a certain amount of engagement; it needs a certain amount of understanding what the other side does and how the other side ticks.

Q17 Albert Owen: Why do you think DECC is the best place for it? That was the crux of my question.
Professor Fankhauser: It could be in the Foreign Office, it could be in DECC, it could be in any number of places. Our reading of the situation—you will see probably a better sense of the institutional environment—is that a lot of what needs to happen requires technical skills. It requires an understanding of greenhouse gas and energy issues, as much as it requires an understanding of China issues.

Q18 Albert Owen: A difficult question for you: do you think that expertise exists within DECC?
Professor Fankhauser: I would be worried if it did not exist within DECC.

Albert Owen: Okay—fair question, fair answer.

Q19 Dr Lee: When we were in China I was quite struck by how individual academics were probably the most open people that we met in conversation, and yet the people to whom they were essentially answerable were the most closed people that we met. I remember a fantastic meeting at the NDRC; the kindest way I can describe it is that it was dry. I note the UEA submission says with regard to intellectual property that, “China intends to strengthen its law applying to submission says with regard to intellectual property”. I guess what I am saying is that no Chinese education system has a history of being based on plagiarism and rote learning. Can we trust them?

Professor Davies: A Chinese scientist has not won a Nobel Prize yet, but I think that with the enormous funding going in, Chinese science it is becoming stronger and stronger. It is actually very good in some areas. IP will continue to be an issue. My own view is that a good way of approaching this is to work in genuine long-term partnership with Chinese institutions, so both have a significant stake in the development of a piece of science research and also...
in the commercialisation of that research. One thing that we are exploring on a very small scale is the notion of a low-carbon innovation fund. We have some experience of that at UEA, where we have identified, managed and funded some rather innovative partnerships between a number of UK universities and business.

Q20 Dr Lee: Yes, but are you confident that, having used British money, be it taxpayers’ or private income, you are actually going to get a return on that? At the NDRC, we had to endure one person saying that she will not entertain any foreign agency inside Chinese borders checking on their environmental standards. Those things do not go hand in hand, do they?

Professor Davies: We have also had meetings with the NDRC, together with Chinese colleagues, and they have been apparently open and welcoming and said that they would be very interested and open to advice from the Fudan Tyndall Centre. It is important to have Chinese academics involved, rather than British or any other country’s academics or Government officials working directly with NDRC. It is partnerships with the Chinese which I think are important. Let me briefly finish the point about an innovation fund. If it is possible to develop partnerships of UK universities and UK businesses with Chinese universities and Chinese businesses in innovation and developing particular bits of technology and then commercialising them together, that is a possible way forward.

Q21 Dr Lee: In theory, that sounds absolutely fantastic, but my point is: where is the evidence that we are not just suckers in all of this?

Professor Le Quéré: On the issue of trust, we—at least I—have had the same experience as you did. At the level of the academics there is a lot of trust and then as soon as you go above, it becomes quite confusing. Who do the Chinese trust? They trust their own academics; they do not trust the UK. So in order to build trust with China we have to do the groundwork. It is not something where you can say: “Have trust, we will do something this year and then next year it will pay dividends.” With China you have to go in the long term and build the ground trust with the people on the ground—in our case the academics—and then have them speak to their policymakers, because the policymakers in China will trust people on the ground. The same is true in industry. You have to go and do the groundwork first.

Q22 Dr Lee: Finally, is there evidence that you are making progress on this? Is there actually tangible evidence that there has been an innovation or an exchange of knowledge where a British company or a British university has benefited directly from the relationship, or are we still in the stages of just wondering whether they are going to honour the agreement?

Professor Davies: There is evidence. In our own case, British companies are receiving contracts from China as a result of our collaboration—the joint venture that we have formed with Fudan University.

Professor Le Quéré: We publish every year annual carbon emissions for all the countries of the world, and this year for the first time the Chinese ran a press conference with us to release the evidence on global and regional CO₂ emissions in China. I think this is a direct result of our collaboration.

Q23 Sir Robert Smith: One of China’s challenges will be the fact that it has great coal reserves, growing shale gas discoveries and a huge and growing demand for electricity, so the carbon emissions that are going to come from that are a major threat. Obviously, they are starting down the road of trying to see if CCS is a solution, and in your submission you make the point that there is a huge opportunity for collaboration. Can you describe how this opportunity could be realised?

Professor Davies: At the Tyndall Centre, we do not do CCS work directly ourselves, but I think it is difficult to believe that there is not an opportunity when China has something like a third of the global active CCS pilot projects and is seeking to build international partnerships. Almost certainly this would have to be around a real demonstration project, and of course there has been funding allocated for a demonstration project here in this country. I think there is also scope for CCS around some biomass-generated electricity, since there are enormous potential sources of agricultural waste in China. Of course, if successful, then one moves into the realms of negative emissions.

Q24 Sir Robert Smith: But in your studies, you do not actually have any concrete suggestions as to what the UK could be doing to encourage these initiatives?

Professor Davies: No, we have not looked at that directly.

Q25 Sir Robert Smith: The other challenge for domestic carbon reduction is that if CCS is going to deliver in the UK, it very much has to work on gas as our primary likely fuel. If we are looking to get into the Chinese market, should we still be looking at coal as well?

Professor Davies: China is planning an enormous investment programme in its shale gas. The current estimate is that it has 50% or 60% more shale gas than the United States reserves, so China will be developing an interest in CCS around gas.

Professor Le Quéré: Nevertheless, it is very difficult to envisage that China will not exploit its huge coal reserve, because it is such a cheap source of energy, so I think CCS with coal will be necessary.

Professor Fankhauser: There is a bigger picture point that should not be lost, which is that the Chinese have a very ambitious target, relative to their growth rate, of bringing down their carbon intensity. I think by 2020 they want to bring down their carbon per unit of GDP by 45% or something like that. If you unpack that number, most of it is based on reducing energy use and energy intensity, rather than the carbon intensity of energy, so there is an untapped potential to decarbonise energy use. The Chinese have mostly focused on energy efficiency; they could go so much
General Committee: Evidence

6 March 2012 Professor Samuel Fankhauser, Professor Trevor Davies and Professor Corinne Le Quéré

Examination of Witnesses

Witnesses: Nick Mabey, Chief Executive, E3G, and Felix Preston, Research Fellow, Chatham House, gave evidence.

Q26 Christopher Pincher: A very quick question about buildings and building regulations. If you wander down to Canary Wharf you will see buildings springing up all over the place—perhaps you could talk about the standards of energy efficiency in buildings. I think that the Government can help to promote the use of BREEAM standards within China, particularly outside the big cities. There was some question raised about the building standards that are applied to those buildings. What is Chinese building regulation like compared with British building regulation requirements?

Professor Davies: They tend to follow the sort of standards, but are some way behind. I think there are issues about compliance in China with the existing building standards within China, particularly outside the big cities. This is one area where there is significant scope for working with the Chinese and this is what we are doing on a number of our projects—persuading some of our collaborators to design and build exemplar energy-efficient, low-carbon buildings. I think that the Government can help to promote the use of BREEAM standards within China. They tend to use the lead standards when there is a—

Q27 Christopher Pincher: When you say “Government”, do you mean the Chinese Government or the British Government?

Professor Davies: The British Government, yes.

Q28 Christopher Pincher: What are the roadblocks to the enforcement of the standards, which you say follow behind British standards but which are not being enforced? What is the reason for their not being enforced?

Professor Davies: There is still a lack of awareness within China of how one goes about delivering high-efficiency buildings to spec. This will involve in the pre-planning and the design phase everybody involved in the construction—the architects, the designers, the M&E engineers, and so on. This does not happen as a matter of course in China. I think there is also a relative lack of understanding about post-delivery management of energy, even within relatively energy-efficient buildings that have been handed over in China.

Q29 Christopher Pincher: If one way of doing that is to build state-of-the-art business parks that show the Chinese what can be done if British architecture, skill and know-how can be brought to bear, do you feel that you get enough support from the British Government to bring those skills to China?

Professor Davies: There could be more support. There is this enormous appetite in China for low-carbon innovation. We make the point in our submission that other countries’ low-carbon experiences tend to be more high profile than those of the UK, but I think the delivery of truly exemplar buildings and truly exemplar developments will help. I have been struck by the fact that there are major low-carbon developments, low-carbon sites and parks, which are joint ventures between China and other countries. The German Government are the most prominent there. The Chinese would welcome a UK-China low-carbon science park.

Chair: Thank you. I’m afraid we have run out of time, but thank you very much for your attendance. There might be some issues that we would like to follow up in writing with you, if we may.
key sectors. I see that as the future. I think the UK has been really important, with a number of other countries, in working with China on some of the key nuts and bolts of different bits of the economy, but how the bits link together is now the key.

**Q31 Chair:** You suggested fast-track, low-carbon technology demonstration opportunities should be identified. Do you have any particular technologies in mind?

**Felix Preston:** I think the sensible place to start is with the seven strategic emerging sectors China has identified in the 12th five-year plan. As some of the research institutes in China are proposing, those seven should account for about 15% of China’s GDP in 2020—a rapid ramp-up from about 5% or 6% now. Some of those key sectors are sectors that the UK has an interest in too, particularly electric vehicles and biotechnology, but the UK has a particular interest in a range of others, including new and advanced materials science. It would make sense to me, from a low-carbon point of view, a Chinese industrial transition point of view and a view of where the UK’s interests are, to start in those places.

**Nick Mabey:** I would back that up. When looking at these areas, our experience from working on CCS is that we have not really decided the balance between short-term commercial interests as defined by firms,— and longer-term economic interests as defined by HMG and the UK economy as a whole, in terms of engagement with China and how that relates to broader strategic interests in energy and climate security. That rather muddled set of objectives often gets in the way of the type of bold engagement the Chinese appreciate, and which they get from other partners like the Japanese. China is a complicated country. Their civil servants are incredibly overloaded with the bits link together is now the key. Coming back to our CCS objective, we need to identify the highest levels of priority. Does it look like we have prioritised it in terms of funding and resources? No. Again, we need to deliver in some of these areas we have opened, like CCS, or where we have the skills, rather than launch another 15 initiatives we will not back up with real resources.

**Q32 Chair:** Specifically on CCS, though, is there now a difficulty, because since 2005 it looks as though the priority in the UK should really be CCS for gas rather than coal? We are going to suddenly burn much more gas and much less coal, so putting money into a coal project may be rather a lower priority for the UK now.

**Nick Mabey:** When we set that the CCS project up, it was not linked to the UK’s energy issues. The UK was instrumental in getting the European CCS demonstration programme, which has perhaps six to eight projects, which will cover lignite and coal. If we look at that as the source of domestic demonstration essentially across the EU, there is quite a lot to share and engage with the Chinese on. We will see if we can get a gas demonstration in that space. However, the aim of the co-operation with China was really about solving China’s problems. When it was initiated, it was not really about solving the UK’s energy problems, but the Chinese were very sceptical about talking to us about technology we were not deploying at home. That is a very typical engagement with the Chinese—"Are you doing it? Show us you have done it then we will learn the lessons and then adapt it to our local situation."

**Q33 Sir Robert Smith:** There has clearly been a move in China’s stance in the international negotiations on climate change. How much of that has been because of bilateral engagements by countries like the UK, and how much is China identifying that it is going to be affected by climate change and that because it is a big part of the problem, it has to be part of the solution?

**Nick Mabey:** As in any country, it is a mix—a mix of motivations and a mix of coalitions inside the Chinese Government, ranging from the economic modernisers to people looking at climate impacts to geopolitical positioning. The area where the UK in particular, operating through the EU and bilaterally, did make a huge impact is pushing the idea of a low-carbon economy. We just took some DRC and Ministry of Science technology officials to Turkey to discuss Turkey’s low-carbon economy issues and how they related to China’s experience. It came across over and over again that a lot of the intellectual framework, the policy framework and the confidence to move forward on a low-carbon economy came from engagement with the UK and other European partners. It would not have spontaneously sprung from China. When we started discussing it with them six years ago they were quite resistant to the agenda, so I think we can say it has been a really important part of a much broader set of conversations in China.

**Felix Preston:** I want to pick up on one component of that. It is certainly true that there are all kinds of pieces in the puzzle helping that process move forward, but one of the key areas where the influence has taken hold is where the technical work and the ambition—whether it is framed as low-carbon economy or green growth or something else—have been connected. A detailed Chinese domestic policy objectives in key strategic areas, for example, moving up the value chain in key industries, or differentiated regional development to boost the western regions. Where the broader ambitions and perhaps global ambitions can be connected down to the language that local officials are measured by and understand, I think that is the bridge that has been the most profitable.
is necessary if you want to succeed in such a big country as China. If you cannot find leverage on domestic politics, your money is just frittered away. Too often, money is programmed at a technical level, without any consideration of those broader concerns, so you do nice projects but they have very little leverage on the Chinese definition of their national interest, which was actually the original aim of some of this work.

**Q34 Sir Robert Smith:** The key thing is to identify how you fit into their national interest and then sell it back. Is there anything we should be doing differently as a country in terms of motivating China on the international negotiations?

**Nick Mabey:** I think UK engagement and European engagement as a whole have drifted back in the last few years. Due to changes in government and changes on the ground in China there is far less co-ordination, there is far less clarity of purpose, which perhaps the Copenhagen conference gave, and there is a real need to come back and develop strategies on delivery. The EU has just launched an EU urbanisation project with China at the EU-China summit, but there is no money or staff to deliver it. Around trade and investment, there is a huge bundle of issues that have yet to be sorted out, and no European country has a strategy on how to manage this issue with China. As for the whole issue around impacts and energy and resource security, the Chinese have now opened a door and are willing to talk to Europe about energy security and resource security, and climate change obviously wrapped around that, but again we do not see signs of a joined-up response to engage. We think there is a huge need to join up and then back it with real resources—the UK has reduced its funding in China recently, not increased it. Even though we have created the conditions where it could have massive leverage on Chinese positions, we are reducing funding rather than supporting extra action.

**Felix Preston:** As well as that political engagement level, I think that plays out on the ground in terms of EU co-ordination in the key areas in which many European countries have interests—energy and environmental issues, obviously—in China. Very often on the ground there is a lack of general awareness, transparency and interaction between all the different Governments in terms of who is investing. Whether it is urbanisation or desertification or whatever, even a simple mapping exercise can be quite challenging. Efforts to make that more transparent, to link it up and ideally to connect it to the strategic objectives, such as the new urbanisation strategy, are very important and could benefit everyone concerned.

**Q35 Sir Robert Smith:** Has the change you detect happened because the economic climate has changed, or is it something more fundamental in the thinking of the EU?

**Nick Mabey:** It is partly because you go through periods where you have high co-ordination and then people change and move on—entropy. It is much easier to do things on your own. So it is partly just natural dropping away. Also, the economic crisis means that people have been focused on different issues. I think it is clear from the EU-China summit that there is an opening to go back in and increase the co-operation—for example, the EIB is spending billions in China on low-carbon projects. However, there is no strategic input from any of the shareholders of the EIB to focus that on areas that you think would have the highest impact, such as the low-carbon zones we spent years trying to set up in China. So in some ways what we need to do is very simple: we need to focus our energies on places where they can make a demonstrable difference, because by making a demonstrable difference will persuade the Chinese a low-carbon economy is possible and that is one of the biggest elements we need to shift their political position. It is quite simple political logic but it gets lost in the bureaucracy of allocation, because there is no core UK or European strategy around this issue.

**Q36 Christopher Pincher:** You said that China is much more open to engagement now as a result of governmental and political negotiating there, and we heard from the previous panel that there are things that the Government can do to help diffuse low-carbon technologies beyond the developers to the wider community and users. What do you think the Government should do next, and what are the roadblocks in the way of further engagement to diffuse those low-carbon innovations through China?

**Nick Mabey:** Are you talking about the problems in China rather than our engagement?

**Christopher Pincher:** What stands in the way of the British Government becoming more engaged in helping to diffuse those ideas?

**Nick Mabey:** The roadblocks in China are very much about the broad systemic issues as they move from a command-and-control model to a more bottom-up, market-driven economy, which is a very difficult thing to do. That creates a lot of opportunities for the UK to give its experience on things like emissions trading—we were doing a workshop just last week in China—and electricity market reform, where we have been discussing with DRC the lessons from the current UK EMR. They are very interested. The real blockage of doing that on the UK side is there are no people and there is no priority. The international climate change division of DECC has been cut by 30% or more. It is not clear what priority they should place on engagement with China, especially on the ground. That is where they have least resource. So again, it virtually needs a UK-China taskforce to pull the resources in Whitehall into something a bit more coherent, rather than a lot of individual engagements, sometimes with an EU partner, sometimes without, that don’t get above the threshold of impact, which I think is where we are at the moment. If there is to be no more resource, which there probably isn’t, the question is how to use the resource we have more effectively, and outside-Government resource, which is very strong.

**Q37 Christopher Pincher:** What about the fear of loss of IP? Do you think there is a sufficient system of law to ensure that in any joint venture—as long as it may have gone on for and as worthy as it may well
appear to us—the IP that is brought to bear by British companies and academics is protected? Nick Mabey: I think the IP situation has changed a lot in the time we have worked in China. The Chinese system has got better. Foreigners are better at using the Chinese system, which they were often very lax at doing, and there have been more bilateral agreements. There is much more bilateral agreement with China about enforcing IP with European capacity on the ground to help companies do it properly, and essentially give priority redress, because the Chinese know it is a strategic issue. Thirdly, that the Chinese care more about protecting their own IP now than they did. Chatham House has done a lot of work on Chinese IP generation, which the Chinese want to stop Vietnam, Thailand, Brazil and India from stealing. If you have a company that is competitive, take an appropriately jaded view of your partner and choose your partner properly in China—you can protect your IP. That involves quite a lot of human capacity and knowledge on the ground, and we could probably have more of that. We have worked on how you can get more support for SMEs in particular so they feel comfortable with that. It is doable—not easy, you can get more support for SMEs in particular so they feel comfortable with that. It is doable—not easy, but moving in the right direction.

Q38 Christopher Pincher: How enforceable is it? It is all very well to have a set of laws that courts are meant to enforce, but if the courts don’t enforce them or you are perhaps encouraged not to apply to the court, how easy is it to enforce? Is enforcement patchy? If they will be applicable in Guangdong, for example, but is it as easy to protect your intellectual property in the western provinces?

Nick Mabey: I think the numbers were that 80% of foreign claims were approved by the Chinese court—Felix Preston: Yes, albeit perhaps the appeals court. I am not an expert in the local situation of the Chinese IP legal system, but I have got it is changing fast and Chinese officials will quite happily discuss where the improvements are being made and where the weaknesses are. The reality is that companies are still investing in China, taking risks and presumably taking benefits. IP is one of a set of issues that companies will be very concerned about, but I don’t think it is necessarily a deal-breaker across the sectors that we were talking about.

Nick Mabey: One very practical thing we have been doing is around a low-carbon industrial zone we have worked with the German Government on in Nanjing. We developed the pilot to look at where the Chinese want to bring European medium-sized enterprises in to work with Chinese state-owned enterprises and large firms in the low-carbon sector. We worked on the idea of a specific IP support centre there, basically to hold people’s hands and go through the process, and a separate agreement with the local government and national government to protect IP. We understand the Japanese have done a similar thing. You can lock in extra safeguards, especially when you are doing large bilateral engagements, as the Germans are doing in Nanjing to large German commercial investment, because that is where half of European investment goes. Nanjing are very keen to keep that going and not to be underbid by other places in China with investment incentives. I think you are right to say that we don’t have a map of the local application, but there are certainly places that are working very hard to give reassurance and work more productively on enforcement.

Felix Preston: The temptation is always to focus down on to the latest advanced pieces of kit and technology. Certainly from a UK point of view, we would be just as interested in many services, whether that is the software associated with the smart grid, a lot of the systemic changes, or the accounting required to track environmental performance. The IP issues are quite different in these areas, and I would imagine these are some of the key areas for UK potential growth in China in a low-carbon dimension. The carbon accounting and resource accounting areas are potentially huge, but are often underappreciated about.

Nick Mabey: In terms of trade issues, perhaps there is a tension over China wanting to grow its consulting services, investment banking and these types of soft services—an area we are very strong in. There are lots of restrictions, even though Arup and others have strong practices in China, and on a joint trade and investment agenda, services and investment access is probably more important than IP in terms of getting value out of the Chinese low-carbon economy for the UK and Europe. You can manage IP contractually a lot more tightly than you can some of those opening issues. Trade is pretty open, but investment and services could be opened up far more.

Q39 Albert Owen: Concentrating on the UK Government’s existing low-carbon programmes with China, what is your assessment and how could they be improved?

Felix Preston: With Nick’s caveat that in some areas backing up promises would be important, and taking a longer view, I think the UK had a very positive impact. If anything, perhaps the UK and the Japanese are perhaps the most advanced in some of these areas. China agencies. In a suite of areas, whether it is energy standards and labelling, climate change adaptation, low-carbon zones and so on, I think there is quite a good story to tell. I think UK Departments are less well co-ordinated elsewhere than they are in China—it can be quite good, although of course it can always be better—but in some parts of the world we have benefited from funding from the Foreign Office, such as though the Prosperity Fund, which you mentioned. In some of these key areas we also work with DFID and sometimes, of course, with DECC as well.

My concern is not really the way that the UK interacts with itself, but whether it is in a position to look at some of the more transformative, ambitious systemic changes in China. It was fine and the right thing to do five years ago to focus energy on, say, the way to measure the carbon emissions of a product. Such things are still important, but increasingly, looking at some of the broader issues—price reform, for
example, which is a really key issue moving forward—China has a big circular economy agenda which to my knowledge is about cleaner industrial systems and cleaner production and consumption. That is a big area where the UK could make a big impact. The natural tendency is to invest in shorter-term projects with measurable carbon emissions benefits over a short time horizon, and while that can be laudable, we should keep in mind the perhaps slightly riskier but more ambitious projects that have the potential to deliver big changes and match Nick’s criteria—he emphasised the importance of getting the attention of Chinese officials on the big ideas and connecting with those, not just doing bits and pieces. If that can be addressed and the focus maintained, then it is not—

Q40 Albert Owen: Would you agree that is a fair assessment, and could you add what you think could be improved?

Nick Mabey: I think that if you take the last 10 years, the UK has been probably the best engager with China at a strategic level on this issue and has set frames with certain producers. It does lack the capacity on the ground.

Q41 Albert Owen: What evidence do you have to say that?

Nick Mabey: We work with the US. When the Obama Administration came in, they took the work we and Chatham House and China’s Academy of Social Science did on interdependencies and used it to write the briefing for the Obama Administration that shaped the first US-China summit, and we know a lot about—

Q42 Albert Owen: What about its near neighbours though?

Nick Mabey: The slight enigma is the co-operation with Japan; that is very hard to find out about. My inkling is that there is an EU-Japan-China triangle, particularly after Fukushima, around clean energy markets and technology, which could be a very powerful driver. On Japanese co-operation it has proved to be very difficult to find out as much detail as we would like—as much we know about Australia, the US, France and Germany—to how is an area we are currently thinking of trying to dig into.

As I say, the weakness of the UK is on the ground and in financial investment terms. We do not have the type of network the French and the Germans or even, to be honest, the Dutch have on the ground in terms of delivery, and that is a weakness when China is starting implementation. We have been better in the past on trade, especially when Peter Mandelson was trade commissioner. He used to carry high-level messages on low-carbon trade into the economic fora. That has fallen back because of a lack of engagement. In the areas I would highlight—the nexus of energy security, resource security and climate security—we have a lot of engaged interest. The UK is in a prime position to lead that dialogue because we are kind of the leading thinker P5 country on that issue and, as I said, China has started to open up to it. It would not have talked about it a few years ago, but now it might. The systemic issues on policy, electricity market reform, low-carbon finance issues, emissions trading systems—that is an open door to engage on. DECC does not have the capacity to do that at the moment.

Q43 Albert Owen: You say DECC doesn’t have the capacity to do that, so my next question is: are the Departments working together? Do you think the collaboration between the Departments is sufficient, or are they working in silos?

Nick Mabey: Half-al dente.

Albert Owen: Half a silo?

Nick Mabey: Yes, half. There is quite good co-operation between DECC and the Foreign Office and it has been building up; less so with UKTI and BIS—we used to have strange things happening on the trade promotion side. But is there a proper UK strategy, driven at Cabinet level with clear objectives? No. Do we need one to get best value and impact? Yes.

Albert Owen: Okay, that is a good answer.

Felix Preston: Yes, and I totally agree with that. It is not perfect, but I think if that strategy was in place, because the institutional architecture is a lot better in China, UK-wise, than it is in other parts of the world, it would not be impossible to deliver real change on the ground. I think Nick is right; perhaps all countries are better at different bits of the picture, and the UK is better at the policy and strategic end than it is on, say, the real project engineering side on the ground. It might be a question of reprioritisation, but it is just as much a question of reconnecting with the other European and other international partners in China, because they can bring this bit.

Q44 Albert Owen: That is my question, but before I move on, do you think it is BIS that is the weak link? Do you think that DECC and the Foreign Office have a good working relationship and that BIS is—

Nick Mabey: BIS is the weakest partner in the conversation.

Q45 Albert Owen: Okay, fine. Then just specifically—you have touched on it, both of you—what can we learn from other countries? Are there any specific programmes that the UK could say, “Yes, we could do that, but do it better.”?

Felix Preston: Not that we can necessarily track it, but as Nick has mentioned, some of the Japanese engagement is having real impact, or at least having real influence. The Top Runner Standards programme, which is a major energy efficiency programme in Japan, is being looked at very seriously in China and would have a very big impact. There are clearly areas where other countries are doing important things—France is very active in urbanisation of buildings, for example. Whether it is a case of copying that, though, is doubtful. Probably we should be allowing or building on that in different ways rather than trying to replicate it.

Q46 Albert Owen: Learning from it rather than copying it?

Felix Preston: Yes. The difficulty is often that you have a multiplication effect, where one country finds a good way to engage and then five other countries do something similar in a different way. That can be
beneficial, but obviously it can be quite wasteful too. One thing that I—Chatham House—have been heavily involved in is something called the China Council for International Co-operation on Environment and Development. This is a Chinese organisation, which had its 20th anniversary in November. It brings together senior Chinese experts and officials with international experts and officials from a whole range of countries. The UK has been involved in that, but it has had a lower profile than, for example, some of the Scandinavian countries, Canada and Australia. My experience of that is that it is a very rewarding and engaging process and I would strongly recommend the UK Government Departments to engage more in it.

Q47 Albert Owen: Mr Mabey, anything to add? 
Nick Mabey: Our advice has always been you need to align the major European countries. They have much more capacity than the Commission, for example—although the Commission has a lot of convening capacity—to make the most of this. In late 2007–2008, the UK used to host a “friends of low carbon zones” group, of about eight European countries. It was a low-carbon zones group, which looked at both diplomatic engagement on the low-carbon economy and also practical co-operation. That has fallen away, partly because of commercial pressures—the French sometimes like to keep French things to themselves, whereas the Germans are more open to co-operating. But all the people doing implementation on the ground find co-operation a bit irritating, and they need a push from the top to say, “Let’s take the Wuhan model of building retrofit that the French are developing and have been working on for several years, and put it in other areas.” The question is how we make the most of our small but potentially high leverage inputs in China. A push to force the downstream bit of Europe to work together better to get best value would give us all more commercial and other opportunities. There is a bit of a short-term beggar thy neighbour that is killing off a larger, more strategic opportunity.

Q48 Albert Owen: Thank you. A final question to Mr Preston. From your previous work, what do you think are the pros and cons of this type of co-operation between the NGOs? We know you have worked in, what was it, CCICED?
Felix Preston: Chatham House is not a classic NGO; it is an independent research institute. I can’t speak on behalf of the likes of Oxfam and Greenpeace—the classic NGOs. In general, I think NGOs bring an important part of the puzzle.
Albert Owen: I am not asking you to speak on behalf of NGOs, but just to give us your opinion.
Felix Preston: I am not sure quite what the question is.

Q49 Albert Owen: What are the pros and cons of this type of work that you are involved in for NGOs? Are NGOs a good vehicle for collaboration in the future?
Felix Preston: They are a very important piece of the ecosystem, if you like, of trying to create policy change. Of course they can be more on the front foot, more of an advocacy type of body.

Q50 Albert Owen: I will be clearer. We have governments, we have institutions such as those represented by our first panel of witnesses, and we have NGOs. Are some being crowded out? That is the gist of my question. 
Felix Preston: I think it is a complicated question in the China context, because we have international NGOs there, we have NGOs that are more Chinese national NGOs, and then a lot of the international NGOs are halfway houses, so I don’t think I can give you a clear answer on that.
Albert Owen: Okay.
Nick Mabey: There is a big difference between types of NGO. There are advocacy-based NGOs that are trying to build a civil society in China and help Chinese civil society, which is an incredibly important task from the bottom up. Foreign money in support is a very mixed blessing in that circumstance because of their sensitivity, as you found out when you visited China. But China is very open to ideas, much more so than India in terms of foreign ideas, and the impact of more people with policy experience. Having previously been a Government person going to China, you get a much better conversation going in as a non-Government person—you know what that is like. You can get into the world of ideas that is a kind of substitute for politics in China in many ways, and that is a very powerful piece. I don’t think we are leveraging our intellectual resource as much as we could. That makes a huge difference in China—it can change policy debates in ways that are very hard to do in democracies, many of which are much less open to ideas than China is.

Q51 Ian Lavery: In terms of policy development, looking at the policy development between the UK and China, I think it is generally said—some of the submissions suggest it anyway—that in terms of development and implementing low-carbon and climate change policy, the UK has considerable expertise. I am sure you would agree with that, but development is completely different, as are policy and implementation. In which policy area do you think that there is greater scope for sharing the methodologies and best practice with China?
Nick Mabey: The Chinese respect UK policymaking. They see that our implementation record is not as good as other people’s—they were very clear about that in my discussions last week with senior officials. They particularly look to the UK on issues like liberalisation, energy system reform—electricity market reform is key for them—and the emissions trading system. They have taken some of the work on low-carbon road maps—I am not sure how much. I don’t think they think our energy efficiency policy is anything near world-class—they will probably take that from Sweden. So they are very pragmatic and have quite ruthless judgments on what we are good at and what we are not good at, but particularly electricity market reform and liberalisation, ETS, are seen as kind of UK strengths, as opposed to perhaps...
some of the other more industrial policy areas, where they would look to the Germans or the Swedes. Greenhouse gas and energy calculations, tracking, monitoring and modelling, as well as climate modelling, are the technical areas where Chinese officials and experts tend to be very interested. Another component of this is that they are interested in how the UK sets and allocates its targets across Departments or across parts of the economy, so even though they may be sceptical about our ability to deliver in some key areas, they are very interested in how targets from a broader sort of Climate Change Act down are broken out into different departmental responsibilities and so on. I think that when they talk about that area of UK policymaking, that is what they are really asking.

**Q52 Ian Lavery:** There are different ways and different means of sharing the policy expertise. We were in China two or three weeks ago, and there are learning visits, UK delegations to China, Chinese delegations to the UK and the provision of written guidance. What do you think is the best way of communicating? What is more effective in terms of guiding the Chinese in policy development?

**Nick Mabey:** It is different at different levels. At the top level, my experience is the Chinese like to hear from the people who ran a policy. When I was in the Prime Minister’s Strategy Unit, we used to talk to the Communist Party Strategy School as well as the DRC, and they just wanted to talk about, “How do we get departments to join up? How do you get coherent policy?” It was all about the real frontline mechanics of getting things done and talking to someone who has had the experience of driving through a policy. That is about sending your policy leads to China in small groups, well-articulated with key decision-makers. They will drain them dry of that practical, pragmatic information.

At the local level, because they have lower capacity and they are not as cutting edge as the central Government, it is much more a matter of education and supporting demonstration and co-design. That means taking your experts in and designing an emissions trading system with the local government, adapting it to the local circumstance or designing a low-carbon zone with them—it is the kind of co-design work which requires parties to engage for a longer period of time, not just visits—and then taking it through the implementation obstacles, which takes a lot of work. In China, if you can show it works, it is worth 1,000 times more than a million policy papers. They have enough paper in their own system; they want to see things work, so you have to invest enough to get it across the line, not just say you had a nice visit. Felix, you worked in Jilin, you may have a view.

**Felix Preston:** Oh, wow, yes. Nick is alluding to some of the detailed technical work where we have engaged in Jilin in the north-east and also in Chongqing in the west. Chongqing is one of the low-carbon pilots and also an emissions trading pilot area. Coming back to my earlier experience, I think you need to build relationships with agencies at multiple levels. The work we did in Jilin could not have been done without direct engagement with the best people in Beijing and the most relevant experts, but it also required the technical experts in the local area, as well as the political backing, or at least the evolution of political backing, in that area over time. Those things can come together and you end up with some level of policy change, one hopes. I have seen that happen a couple of times in China. Once you get the policy change, you can have very rapid change on the ground, but it is about demonstration and, as I mentioned before, connecting it to what China really cares about, not what the UK really cares about.

**Nick Mabey:** In practical terms, that means a scattergun approach, purely driven by who puts applications to the embassy in Beijing, is not a good way of allocating resources, because you are not sure you are going to get enough focus on the thing to have even a chance of getting above the bar of success. You may get lots of nice little pieces and it doesn’t mean you don’t open up the doors for innovative ideas, but it does mean you choose a few and back them with your political and your diplomatic and your financial resources, rather than just come back with lots of nice projects. That for me is a complete waste of taxpayers’ money and a complete waste of time, because it has no chance of success, no matter how good the people you back are. You are condemning them to failure at the beginning, and that is a lesson we have learnt the hard way through many years working in China.

**Felix Preston:** Just one very small almost technical point, a lot of projects I have seen fall over did so because they didn’t bring in the different organisations on the Chinese side. It is important to engage multiple departments at once; otherwise you fall into the trap that all governments suffer from. You can push siloisation on the Chinese side, if you like. From the very early stage, in the political engagement before a big project happens, it is important to bring in multiple departments, all the relevant departments to the greatest extent possible, because that ensures that there will be an interest in seeing the political delivery in those different departments at the end of the project.

**Chair:** Good. I am afraid we have another panel, so we have to move on. Thank you very much indeed for coming in. It has been very helpful for us.
Examination of Witnesses


Q53 Chair: Good morning, and welcome to the Committee, particularly those of you who have not given evidence to us before. We appreciate your coming, but our time is limited, so I won’t delay with long introductions.

We want to talk about emissions trading. Do you think that if China develops an emissions trading system, it would encourage other major emitting countries—naturally the USA, of course—to develop their own system?

Richard Baron: I think there is already a trend in the USA at the local level, first of all, to develop emissions trading systems in a way that would be consistent with an international mechanism; they are also seeking to conduct projects, including in China, to create offsets there, so the pressure already exists in the US. Certainly if there is a price of carbon in China, part of the opposition in the US on competitiveness grounds will fall apart, which might facilitate decisions on that score there.

Baroness Worthington: I second that. I would add that if China is serious about developing emissions trading, it will have a very great effect on its immediate neighbours, which probably will happen ahead of the US nationally moving—I am thinking about Japan, Korea and Australia in particular. If those countries all came together to create a sort of regional trading scheme, that would be hugely significant for the region.

George Yu: Yes, and look at how the Chinese have been doing domestically, especially on this new five-year plan, which has been described as the greenest five-year plan. It is trying to move from quantitative growth to a qualitative growth. Also, four of its seven strategic emerging industries are related to environmental protection. The Chinese have putting in a lot of effort to improve their environmental record. I would say that China’s domestic actions are coherent with what it has been stating internationally, especially its target of a 40% to 45% reduction in carbon intensity from the 2005 level.

Q54 Chair: Recognising there is some sort of bottom-up trend in the US, it is difficult to see at the federal level a great deal of movement on that. It looks to us as though perhaps the biggest influence China would have is in the region, rather than more widely. Do you think it is practical to look ahead to a time when there is going to be international linking of different emissions trading systems?

Richard Baron: I think there is a clear possibility there. First of all, one question is whether China and its system will allow offsets from the international system to come into its regime. If the Clean Development Mechanism, which was agreed for continuation in Durban, indeed delivers tonnes that will be used in China, there would be a de facto linking between systems elsewhere that also rely on CDM. Secondly, provided that China has a robust system—one where all others recognise that a tonne is a tonne—the likelihood of linking certainly increases from where it is now, but this will have to go through a number of hurdles in China and it will be quite some time before we get there. I don’t think it is a next-year issue. It might be for the next five years.

Baroness Worthington: I agree. The focus will be on getting a domestic system up and running for its own internal purposes, and I suspect the Chinese will be hesitant to link in the near future, just as the EU has been. I think it is all a question of getting our own schemes up and running and functioning before we consider how you would link them and the effects of linking them, which might not always be positive.

George Yu: Emission trading is in it’s very early stages in China. System is brimming. Currently how the project is going to run—probably in the next five years—so there are likely to be a few points that people have to bear in mind when they start to trial and error all these projects. Low-carbon development—and emissions trading especially is a relatively new concept in China, and people, especially those who participate, are not really sure what this concept will be, so it might be very helpful to have sort of a universally accepted concept.

Q55 Chair: Does it look as though the way that the Chinese systems are being designed takes account of the experience elsewhere, particularly in the EU?

Richard Baron: Yes, in full. I believe that a recent decision that was taken by NDRC to indicate to the provinces that they should use hard caps for the allocation to their industry in various sectors is a clear indication that they have looked at what the EU in particular has been doing, and have drawn some lessons on that when it comes to the difficulty of measuring industrial output and also the certainty that a cap-and-trade system brings. That is one piece of evidence. Other evidence is the number of meetings and workshops and exchanges between Chinese experts and EU experts in general, including the UK, on questions related to MRV and so on, where there has been an intense discussion and willingness to learn. However, I don’t think that they are in a position to apply it exactly as we have done. We are engaged with the power generation sector in particular, and because they are not operating a deregulated power generation sector—these are largely state-owned enterprises and a lot of planning goes into power generation—they cannot strictly apply what we have seen in the EU to that sector.

Baroness Worthington: Yes, I agree with what Richard has just said. I suspect that we taught them a lot—by accident—about how not to run emissions trading schemes. It certainly won’t be for want of trying. We have engaged and put forward the lessons learnt from the EU and I think that has been well received. I have had informal correspondence with Chinese officials who have said, “Well, there is no point in doing it unless we are ambitious with it, because we don’t want to be bedevilled with the same problems as the EU has had.” I think they are in a much stronger position to make a functioning market work in some senses, because their growth is sustained and isn’t going to experience the sort of wild fluctuations that their European counterparts have.
fluctuations that we have over the last few years. I think they are looking at what has happened here and applying it to their own circumstances, and I am quite hopeful that they will come forward with something that shows they have learned the lessons that we need to learn.

George Yu: A particular example is one of the pilot projects in Guangdong province, where there has been a lot of co-operation with the British Government, who have provided funding through the China Prosperity SPF programme. A lot of funds have been provided to local academic institutes for undertaking a lot of pilot studies. I think the Guangdong province is particularly interested in the EU scheme.

Q56 Chair: Is the Partnership for Market Readiness an effective way of building capacity for emissions trading in China?

Richard Baron: I am one of the experts of the PMR, so I can testify first-hand. It is at the beginning, of course—it has been operational for less than a year. I believe that the exchange there and looking at how it has been done is fairly technical and we see a lot of engagement from countries really far from the negotiation stance that you would see in the UNFCCC, for instance. Countries around the table are really eager to learn how specific implementation details were solved by the countries that have implemented ETS and how it could apply to their own situation, so it is effective in that sense. Also through the collaboration that is South-South, if you will, you have countries with similar problems trying to solve them at the same time. When it comes to thinking about linking in the future, it is very promising to see all these countries working together at the technical level and exchanging views towards that goal. Having said that, there are countries in the PMR that are considering project or sector-based crediting mechanisms and others that are considering emissions trading systems. China is one of those.

Q57 Sir Robert Smith: Previous witnesses have talked about the speed with which China can go from a demonstration to a full implementation in other areas. They were embarking on these pilot projects. How quickly do you see them being able to take the lessons from the pilots to roll out a China-wide system?

Baroness Worthington: They are aware that they can only go as fast as they can go, but there is a definite desire to move as quickly as possible. They have already talked about the fact that not all of the pilot projects will be successful in transferring to a national scheme. The pilot projects are there to inform their learning and to get people prepared for a market, but in parallel, they are going to have to choose probably one particular design and work that up for a national scheme. That in itself is a slightly separate task to running the pilot projects. I don’t think it will be that the pilot projects have to come to an end and then they will consider a national scheme. I think the pilot projects will continue and they will be learning by doing, and there is already process to develop a national scheme in parallel.

Richard Baron: I think very much that they could be developing those two in parallel and learning the lessons, in particular when it comes to data gathering and building the system from the bottom up—virtually from scratch, one should admit—at the provincial level, and seeing what sort of system they could envision nationally to be able to expand. One different route they might take, for instance, is to try to apply a system to their state-owned enterprises—the fairly large emitters, which they monitor well—because they might find out that at a provincial level the work has shown that you have way too many entities and that the monitoring and reporting and verification at that level is much too onerous. So there might be a way for them to develop a system and expand it thereafter, but starting from state-owned enterprises that they know fairly well, that they control fairly well and for which they have very accurate data.

Q58 Sir Robert Smith: We are going to come to monitoring in a minute, but what are the main institutional building blocks that China needs to develop to have a fully developed trading system in place?

Richard Baron: There is a range of those. Looking at the power generation sector, which I know best, one area is clearly verification. There is a long and very rich stream of data produced by the power generators and sent to various institutions at official level—the provincial statistical bureaus as well as the China Electricity Council. The data is coming. The verification, however, is maybe not done at a level that would make EU ETS operators comfortable. I think that is one important element.

Secondly, although they have enforcement mechanisms and penalties and the like, there ought to be some clear thinking through that and how that is going to be done. I have heard, but I am not 100% sure, that there are issues relating to the trading aspect—how entities might trade emission rights and how to build that. There is no precedent for that in China. I am not sure that the Security Commission has been engaged in this discussion yet, so that has also to be built.

Q59 Sir Robert Smith: Is there more the UK could be doing to create co-operation that would help build the institutions and the trading structures?

Richard Baron: Yes, I am sure that on the last score—the issue of how financially to address this and how the accounting system might be adapted to allow for trading—there are issues that sound technical but are critical for the development of the system. Surely some experience that has developed in the UK and in the EU could be useful there.

George Yu: There is a very recent report by the Development Research Centre of the State Council. The report basically identified five areas that have to be resolved before the ETS can be run. They are the allowances allocation, the trading regulations and rules, the market behaviour, the responsibility of different parties and the legal infrastructures for carbon trading. These are the issues that have already been identified by the Chinese, so they will be the areas for the UK in terms of co-operation.
Baroness Worthington: Of those, the ones where the UK in particular has something to offer are on the regulatory side. If there were a third, it is probably the IT infrastructure—how you create secure financial software packages that are compatible across different states and different provinces and how you make those robust so that they are impervious to fraud and other activities. I think we have a lot to offer there. If we could duplicate the Environment Agency and send it to China that would be an enormously helpful thing to do. Those are our areas where I think we have expertise. I am less concerned about the development of trading desks and brokerage facilities and the financial instruments. I think they will come naturally as the market starts to develop.

Q60 Dr Whitehead: We have touched on the question of monitoring, reporting and verification. If China did enter into a national trading system, all the signs suggest that this would not be very robust in terms of the differentiation in agencies monitoring the top-down reporting through provinces, and the reluctance at the moment of China to admit any sort of international verification arrangements. Do you have any thoughts on that, or do you think the opportunities and the groundwork may be there to bring all those factors into line?

Richard Baron: I think we have clearly to distinguish what is known as the MRV issue in the international negotiations from the issue of the data that would be needed to support an emissions trading system in China for its domestic purposes. Of course, when it comes to discussing linking with such a system the robustness of that and how it is being done will be critical. It will be the roadblock if that is not the case. However, I think China has the capacity to collect the data and is very often already collecting it. Regarding the speed at which they can do that, the issue will be where they draw the line about which entities they decide to include in their system and which ones will be excluded. There might be some questions as to whether some leakage might appear to take place if that is done without full care. Transparency—how China reports to the rest of the world on its action—is one question; MRV, when it comes to domestic emissions trading, is another, and I think there it is a question largely, in my view, of verification.

Baroness Worthington: I suspect before emissions trading was introduced in Europe, you could have looked across Europe and said, “Hang on, there might be some problems here with regard to varying levels of robustness, of verification and monitoring,” and yet we have overcome them, I hope. That is not to say we should be complacent, and international vigilance on emissions trading has yet to become the focus that it should be, especially when we start to think about linking. There is going to have to be a set of common standards and almost a carbon inspectorate or police force that can help us to give the robustness to all these schemes once they start linking. I don’t really detect China would be against that—in fact, at a national level, they may find it useful to have another body that they are able to turn to to help police the system as it is implemented domestically. I don’t detect anything unique to the Chinese opposing this kind of regulation, because it will be necessary. If we are to get the benefits of linking, we have to subject ourselves to greater scrutiny at an international level, and I think they understand that.

Q61 Dr Whitehead: As far as verification is concerned, one of the issues that was brought to our attention in China is that yes, there is a great deal of information available—increasing amounts of data are available—in China, but essentially it is fed in from provinces, collated by central government and therefore checked by other agencies only very rarely. I think this is precisely Bryony’s point on the extent to which you may almost see this as a precursor of some of the European issues in terms of differences in reporting standards. It may well be that there are very different differences in data production and verification between provinces and no immediate instruments to put that right. Is that your understanding, or do you think maybe a rather more optimistic view might be taken?

Richard Baron: I think there are international standards that can be used for verification procedures in particular which, if the Chinese companies were to apply them, would give reasonable confidence to the rest of the world as to the quality of their data.

Baroness Worthington: It is sort of chicken-and-egg, isn’t it? Obviously without high levels of confidence that a tonne is a tonne, a market will find it hard to take off; equally, though, once you create a market, suddenly you have a whole new set of players who are interested in the fact that that tonne is a tonne. If you get a market up and running, the pressure increases on governments to standardise and make sure that what they are trading is genuine. That is the theory, and I think there is definitely truth to that. If you start to apply a financial value to something, the desire to make sure it is what it is becomes greater. Introducing emissions trading will help China to become more standardised in its verifications.

George Yu: Yes, I agree. There is probably not much awareness in the Chinese companies about regularly taking and recording data about their emissions. Also, there is probably not too much international pressure on them to submit all this data, so basically I think they are just told by the national agencies to submit the data and that is it—there are no following steps.

Q62 Dr Whitehead: I mentioned the problem they had—well, not the problem, but the methods adopted in the 11th plan to reach intensity reduction targets. Closing down plants and what have you in order to reach the targets which suggested a rather odd, shall we say, understanding of how that might be done under the existing arrangements. The 12th plan is looking at a transition from quantity to quality. Are you confident that that is going to work? Are there other things that need to be done to make that happen?

George Yu: To make the transition from quantitative growth to qualitative growth, a lot of things that have to be changed. The existing economic growth model that they have had in China to boost its economy for the last 30 years has to be changed as well. The people at the top have already recognised those facts, and that
is why in the five-year plan there are a lot of new changes. I am sure there will be many new standards and new, more stringent rules coming out in the future, but it might take some time.

**Richard Baron:** I was wondering, looking at the decision to introduce emissions trading in the 12th five-year plan, whether that was not coming from some of the very difficult steps that some provinces had to take to achieve the energy efficiency target. In other words: is emissions trading a way to provide some flexibility in the system where there was none when it came to achieving goals? The transition from a system where you have CO₂ intensity targets at the provincial level now to a system where those provinces might trade CO₂ and tracking compliance with those domestic engagements, is complicated, but then you need to avoid putting some flexibility where there was none before and seeing whether that will bring cost efficiency as well as less hardship in achieving the goals.

Q63 **Ian Lavery:** The design of the ETS is critical—
I think you said that, Mr Baron. There is a number of different types of trading schemes. There is the absolute cap, which we use here in the UK and throughout the EU, and there is a relative cap, often known as a soft cap. Is an absolute cap on Chinese emissions feasible, or indeed necessary?

**Richard Baron:** I think it is necessary and I think it is feasible. The reason why people have introduced or thought about soft caps—those that grow with the economy—will be more for the uncertainty that one has about future economic growth. In the case of China, the most pressing issue when introducing the ETS is how they will treat new entrants, but you might very well conceive of a system where new entrants—a new company that opens a new site, a new source—it given a hard cap and yet there is some flexibility as to when, if ever, new entrants would be allowed to come in in the future, and you deal with the uncertainty that way.

Another issue that is less political but very important when it comes to implementation of those so-called soft caps or intensity caps, is that you need not one set of numbers but two to implement it. You need the absolute cap, which we use here in the UK and throughout the EU, and there is a relative cap, often known as a soft cap. Is an absolute cap on Chinese emissions feasible, or indeed necessary?

**Baroness Worthington:** I would agree with all of that. I think an absolute cap is necessary and definitely feasible. It is the simplest to introduce, requires the least amount of data, and creates a market where at least one thing is certain and that is the supply of the allowances. Within that, though, there is a myriad of design elements that you can introduce to provide flexibility. We use some of them—we have offsetting limits and the like. California has introduced in its legislation another sort of hybrid soft element to the cap, which is to put aside a strategic reserve of allowances and allow those back into the market under certain conditions. It is not an either/or; you can get many of the elements that you want from a flexible cap within an absolute cap if you design it correctly. I hope those are the sorts of discussions that the Chinese are now getting into in considering exactly how they design their scheme. All the signs are they will go for an absolute cap even though, because they understand that is the simplest.

**George Yu:** I think an absolute cap, in terms of practicality, is probably too early for the Chinese to think about. The 12th five-year plan is the first time they have introduced carbon intensity targets, so they might not have too many experiences of collecting all the data and all the relevant measures and practices. It might come, but will probably have to wait until the next five-year plan, I think.

**Baroness Worthington:** Even that is quite quick.

Q64 **Ian Lavery:** What kind of a soft cap is possible to create a carbon price and limit emissions and at the same time allow for growth in the economy?

**Baroness Worthington:** There is an ex-post adjustment model where you create a cap but within that you allow for the redistribution of allowances according to the production that occurred in the period. You do not allow the cap to be breached but you allow adjustments so that where production is down allowances are handed back, and where production increases you receive more allowances. It is something that the industry in Europe has been proposing but, as Richard has pointed out, it relies absolutely on having accurate data for production levels; otherwise you can’t do the adjustment. That is filled with problems—there is no standard collection of this data and there are competitiveness concerns about releasing the data. One simple way to provide a soft cap is an absolute cap, but you can use the strategic allowance reserves to provide some flexibility for policymakers to adjust in the event of very high prices or very low prices.

**Richard Baron:** If I may come back to the previous question, I think we need to distinguish the intensity targets that have been established for the provinces from the pilot markets that are being built there, which are not going to encompass, in most likelihood, all of the sources in the region. I believe that, as I indicated before, if there is a proper allowance for the new entrants reserve, they might manage to meet both their intensity target and have a system with a hard cap operating under the provinces. It is a different issue from saying, “When is China ready to take a hard cap as a country?” but I still believe you can operate a hard cap system even inside a country that has taken intensity targets, and implementation-wise I also think it is simpler.
Q65 Ian Lavery: When we were in China, we heard that the inclusion of the energy sector in the potential Chinese ETS would not be feasible because the NDRC sets the price of electricity. Would you agree with that?

Richard Baron: Well, it depends on how rigid the pricing of electricity is going to be in the future. In the work we are doing in collaboration with the NDRC Energy Research Institute, we have looked very closely at this issue. Our first message to the Chinese is going to be that if you want to cap CO₂ emissions from power generation, even if it is a growth cap, you will have to incur a cost; and if that cost is not somewhat reflected in the price you will face, you will face the situation you faced just recently, where coal plant operators are stopping operations and essentially entering into negotiation with the Government, setting blackouts against an increase in electricity prices, and winning. We would like a system where the CO₂ price and the CO₂ cost could be limited by a fair amount of the allowances being given for free to the power generators, but maybe a system where the electricity price would increase or be adjusted annually to reflect the actual CO₂ cost on average to the coal plants. I believe that if you do not pass any of the cost through, the coal generators are going to have considerable troubles with the implementation of the scheme. We heard first-hand from the NDRC Department of Climate Change that this is a scenario under which the local provinces would reject the systems out of hand. Therefore, they want to engage the pricing department of the NDRC on this issue very soon, and we are providing information to that goal.

Baroness Worthington: It is absolutely possible to have a price-controlled market and an emissions trading scheme as long as, as Richard said, you take into account the fact that there will be a cost internalised that is not already there, so prices are going to go up. But rather than necessarily going down the free allocation route, an alternative approach is to use auctioning and then to use the revenues from the auction to ensure that, if you are worried about the unit cost of electricity going up, people are using less electricity as a result of you helping them to invest in efficiency. So you get over the political barrier of the prices rising by making sure that people understand that, while the unit cost is going up, their overall use of electricity can still go down if they increase their efficiency. That is another way, through the design of the emissions trading scheme, of making the two completely compatible.

Q66 Ian Lavery: Do you expect the emission allowances to be auctioned or do you think they will be given away?

Baroness Worthington: Well, I don’t think anyone knows at this stage. I think they will try to auction some, as we did, because it is a very good way of learning by doing and seeing whether this can be used in the future as the primary way of allocation, because it is the simplest.

Richard Baron: I think the trouble with auctioning from a political economy perspective in China is you raise all of a sudden the question of who is going to take that money and do what with it, which might not simplify implementation. I think, for reasons related in particular to the recent troubles they had with the electricity prices, if the system were applied to electricity, we would argue more in favour of a free allowance to start with. Then, looking at the experience in the EU and elsewhere, once the price of CO₂ goes up, there will probably be a natural transition towards auctioning, provided there is a good sense of how the money is going to be used. We are talking about a system that currently emits in power generation 3 billion tonnes annually and is growing rapidly from there. When you do the numbers with a price of €10 per tonne of CO₂, it starts adding up quite a bit, and there might be an issue as to what to do with this.

Baroness Worthington: In a sense, China is in a lucky situation because it doesn’t need the auction revenues as much as we did. It can afford to do the decarbonisation investment and allow for its allowances to be handed out for free if it chooses to. It is just a question of whether that complicates the allocation methodologies, because you then need either benchmarks or grandfathering.

Ian Lavery: Do you agree with that, Mr Yu?

George Yu: I think they could try to have a sort of auction; the problem is the price. They will have to determine that. That is a very important issue. It is very difficult to say at the moment and it depends on how the officials would like the ETS to serve their purposes in terms of going low carbon.

Q67 Sir Robert Smith: Would those be provincial auctions or would they be a China-wide auction?

Baroness Worthington: I don’t think anyone knows.

Sir Robert Smith: In terms of recycling the money, obviously.

George Yu: I don’t know either.

Baroness Worthington: Well, they could do what we have done in Europe and use it to help, because they have in their 12th five-year plan an aim of redistribution of wealth throughout the country. They are aware that the growing disparities in the regions are not healthy for stability. I am sure they have picked up from all the literature that is available that you can use allocation methodologies to help alleviate those regional disparities, as we have done in Europe. Hubei and Guangdong are not too different from Germany and the UK and Eastern Europe in terms of their position in development. We have used our allocation to help smooth those differences and China could do exactly the same thing if it chooses to.

Richard Baron: It would be very interesting to see how the provinces handle this, because if they start with a system in which they raise revenues from the system, moving to a national system that would take that away from them might be an issue.

Q68 Chair: Just very briefly in conclusion, why do you think aviation emissions are so contentious an issue?

Richard Baron: I do not work on aviation.

Baroness Worthington: It is because it transgresses the principle of common but differentiated responsibility. Here is the EU acting unilaterally to
impose a common burden on everybody outside of the EU. It upsets them on many levels. They are making an awful lot of noise about it and we should not dismiss it, it is a serious issue, but I think there is a recognition at the very highest political levels that China does not wish to see this escalate into anything more than a spat at the moment, and that it won't trigger off a huge trade war between Europe and China. That is at least the analysis I have heard, and I hope it is true. It is hard to sustain the argument that this is a real breach of common but differentiated responsibilities because, in any analysis, bringing in a price on aviation emissions does not hit the poorest in China's society. While they think it may be the thin end of a wedge, I think Europe is right to stick to its guns and can justify its actions.

**Q69 Chair:** The EU has said that if a country develops its own measures to tackle aviation emissions—they call them equivalent measures—they can negotiate a sort of opt-out from the ETS. Is China likely to be able to do that?

**Baroness Worthington:** If it wanted to, I am sure it could. It has everything it needs—well, it certainly has the offsets. We have just heard today that China is looking at forestry credits potentially going into an emissions trading scheme. They are doing huge amounts of afforestation. They have already shown that they can deliver huge volumes of low-cost industrial offsets, so all they need to do is create a domestic market for it in their aviation industry. And it is money recycling in China, so the Chinese aviation industry pays for afforestation in China and they meet the European requirements and are freed from the obligations. They have the potential. Politically, whether they would do that and feel that they have been required to do it by Europe is another question.

**George Yu:** Personally, I would say that, in practice, all the airlines have already submitted data to the EU, so although on the surface they are debating, we haven't seen any defaulting or measures taken by politicians to trigger any trade war yet. Also, only a very small number of Chinese airlines have been involved. How much that would damage their profits—they quoted 800 million Chinese currency—is another question.

**Chair:** Thank you very much indeed. It was a very interesting session for us and we are grateful to you for your help.
Tuesday 13 March 2012

Members present:
Mr Tim Yeo (Chair)
Ian Lavery
Dr Phillip Lee
Albert Owen
John Robertson
Sir Robert Smith
Dr Alan Whitehead

Examination of Witnesses

Witnesses: John MacArthur, Vice President CO2 Policy, Shell, Alistair Guthrie, Global Sustainable Buildings Design Leader, Arup, and Peter Budd, Vice Chairman, China-Britain Business Council, and Director, Arup, gave evidence.

Q70 Chair: Good morning. Thank you very much for coming in. Do you want to say who you are, first of all, so that we know? I think we do know, but it might be helpful if you introduced yourselves, please.

Peter Budd: My name is Peter Budd. I am Deputy Chairman of China-Britain Business Council. I am also a colleague of Mr Guthrie’s at Arup.

Alistair Guthrie: I am Alistair Guthrie. I am a Director at Arup, and I am responsible for our global buildings practice sustainability strategy.

John MacArthur: I am John MacArthur. I am Vice President for CO2 Policy for Shell, and I am also on the board of the UK’s Energy Technologies Institute.

Q71 Chair: Thank you very much. Perhaps you could start by telling us where you think the best low-carbon opportunities are in China, from a business perspective.

John MacArthur: If I can start off, I would draw some parallels with the UK, particularly gas and power. As we have seen before, there are significant opportunities, if you have a coal-dominated power centre, to replace that with gas and reduce emissions substantially, up to between 50% and 70%. Like the UK, China also has more gas opportunities than perhaps a company like Shell thought 10 years ago. We have seen the Shell Gas unconventional, coalbed methane and tight gas opportunities in China grow over recent years, to the point where the International Energy Agency says it is substantially materially more than the US even, where we have seen abundant gas being added over the last few years. So certainly, in a heavily coal-dominated power sector—as China is—and is continuing to be—gas offers significant opportunities.

Peter Budd: If I could say a little about the initiatives that CBBC has been involved with. It is widely known that there is going to be a huge migration of population to the urban areas in China, so the demands on infrastructure, city infrastructure in particular, are absolutely huge. We have been supporting UKTI in shaping the UK offering into this huge investment of infrastructure. The Chinese Government are taking this whole matter extremely seriously—the matter of policy—and therefore there are opportunities for designers, for equipment and for product manufacturers, in what is becoming a huge opportunity that will continue to develop over the next 10 or 15 years. I think we have only touched the surface of what we can achieve.

You may be aware that there has been a joint initiative with the Chinese to look at four city developments—Wuhan, Hangzhou, Chongqing and Changsha—where there are frameworks set up, which identify particular opportunities where the UK has expertise to offer. We have mapped the UK skill set in this area, and it is actively being promoted through CBBC’s offices and our Foreign Office colleagues in post. I think there is a huge opportunity in the built environment.

Q72 Chair: When we were in China last month, it was suggested to us that in some cases the experience that we have already had in the UK is giving businesses an edge when we go to China. Is that your experience? Is that your view?

Peter Budd: Yes, it is. This initiative is in its infancy. It was kicked off two years ago, and it is probably timely that we sit back and see how much business has come out of it. That would be one of the actions that could be usefully pursued before pushing out into other areas.

John MacArthur: Yes, we would agree. We have seen some recent initiatives from UKTI for carbon events in China, where it fosters these relationships. Even a large company like Shell, which has a history in China and some very good relationships, always benefits from that different dynamic, support and partnership within that Government context as well. I would agree very much on the different levels of where we see the opportunities. First of all, there is the international level. We have seen the progress from the UK’s leadership there in Durban and the movement of the Chinese. Then you get down to the country-by-country sort of bilateral, all within the sort of clean energy ministerial-type level. That is really very supportive to progressing some of the things we want to do. Then within China of course the thing you learn when you go there—and what I was surprised by—is this dynamic between the different regional and provincial-type diversity within the country. So it is not only that we should treat China homogenously there as well.

There are 666 cities in China of significant size, and the way of doing work together from city-to-city partnerships is something we could explore too: certainly the smart freight gateway work that we have been doing about how you work with cities to distribute freight within cities, and have a bespoke-type model in Shell. The future cities piece is...
something we have been working closely with the Government in China on too.

**Alistair Guthrie:** Yes, I would just add to that. I think the biggest challenge that we have, from a building and a development point of view, is to continue to provide demonstration projects, which we have done quite a bit in the past but where we think there is a huge amount of potential to do, particularly in what is known as the second-tier cities.

**Q73 Chair:** UKTI has identified wind, smart grids and civil nuclear as three particular opportunities. Are those good? Are those important, and can the Government help to capitalise on those?

**Peter Budd:** I think they are good. Government is hugely important in China, in driving things forward, in relationship creation and in supporting the environment in which business is done. China is probably unique in that respect. If the Government in China decides that something will be implemented, then it will be so. So the Government-to-Government interface is hugely important, and I just go back to the cities initiative. Without the Chinese Government supporting a city being included in that programme, it just will not happen, so we have a role in supporting cities in China that are trying to be identified as having green status and helping to lobby through MOFCOM to make things happen.

**John MacArthur:** One of the things that grabbed me the last time I was in Beijing is that when you look around, as in Tiananmen Square, you see little electric vehicles going around. In the five-year plan we see greater emphasis on things like much more non-fossil fuel-type energy sources, but also to explore the role of gas. As we said here before in other Committee meetings, we see carbon capture and storage as being one of the things we would add to that list. That is something where the UK Government has set itself as a role model. We look forward ourselves—in Shell in the UK—to finding a way to proceed with a Peterhead carbon capture and storage project when the new competition comes up. We are chomping at the bit to do that. From a technology position, the UK has an opportunity now to work with the Chinese to also explore carbon capture and storage as an important technology for countries that have access to gas power. For countries that wish to produce their coal resources cleanly, that carbon capture and storage can help to do that.

If I was going to pick out two key things that I think the UK has taken a leadership position on that have a natural fit with China, it would be carbon capture and storage, and the development of carbon markets themselves and the policy frameworks that support those two.

**Q74 Chair:** We will come back to carbon capture and storage in a moment, if we may. The Grantham Institute has identified other industries where the UK might have an advantage, such as aircraft, mining equipment and so on. Do you think those are promising areas?

**Peter Budd:** I am really not in a position to comment on that.

**Q75 Chair:** Okay. You said there was an important role for the Government. I just want to enlarge on what the Government should be doing. Should it be encouraging British business to develop expertise in certain low-carbon areas, in order to exploit the Chinese market, or is it more introductions or just showing China that the Government is backing certain industries and businesses?

**Peter Budd:** The Government intervention is helping to structure the UK offer, setting up frameworks, all of the MOUs that have been signed in the Green Building Initiative. There have been Government-to-Government MOUs that are then filtered down to municipal governments and the UK companies’ offering. So there is more to do in that respect.

Another area that I know is being explored at the moment is joint research funding, from Chinese institutions and British institutions where joint research projects can be set up, funded jointly with a view to exploiting existing technologies or, indeed, refining existing technologies. The Royal Society is looking at that model at the moment, with a view to moving it forward.

**John MacArthur:** I would add there are a variety of different things that are already being done that are good examples that we could take forward. First, to give credit where credit is due, there are a lot of good things already happening between China and the UK: I pick out the China-UK Near Zero Emissions Coal Initiative, and the corporate action with CCS between China and the EU. There are a number of facilitating frameworks and models already. We need to continue to emphasise and share those, and get industry partners to be involved with them.

As to the kind of models I think would perhaps change the game a little bit, I really like the Energy Technologies Institute’s model, which brings industry and Government together to co-fund cleantech-type work, everything from plug-in vehicles to some carbon capture and storage technology as well. It is not always within that group that Shell gets what it wants. So we are together with EDF, E.ON, BP, Shell, Rolls-Royce and Caterpillar, and with the Government, and we have a great model, an energy systems model, called ESME, which has been really helpful for DECC. Sometimes these things can be helpful for collaborating with other countries as well. China is a country that comes to mind. Shell is actually helping China at the moment with its future energy scenarios. The Energy Technologies Institute model looks at how things are going to develop in future in energy and the choices you might want to make, as well as the industry co-funding with Government to explore some of those technologies and to mature them. The technology maturation is somewhere where I think those kinds of partnerships really work. Where the technology is already mature and commercial, then UKTI and others help to bring those introductions.

There is a piece a bit earlier in that chain, which is the development of the technology to fund it, together with industry, of which ETI is a good example. At a European level, there is the zero emissions power programme for carbon capture and storage, which advises the European Commission on how to
implement CCS, together with Governments, together with NGOs and together with industry. This knowledge-sharing platform is something we could promote more between countries, not only in the EU but perhaps within the UK and China as well. I can see both those models—the ETI TECH model and the ZEP model—having relevance in a bilateral country-to-country context as well.

Q76 Sir Robert Smith: First of all I should remind the Committee of my entries in the Register of Members' Interests, especially to do with the oil and gas industry and a shareholding in Shell. We have heard some comment that British companies have struggled to win contracts in the energy sector. Is that something you would agree with or have a different view?

John MacArthur: Sir Robert, I was actually near your constituency offices recently when I was up in Aberdeen. I know that one of the great advantages for the UK is having an indigenous oil and gas industry, and let's not forget the technology and investments we have made over the last 40 to 50 years. That is something that we should take the opportunity to exploit and develop, to create jobs and continue our technical skills wherever we are in the world. Shell has a long history of working partnerships with countries all over the world. In China we have terrific international co-operation. We tend to work in partnership. I ran our operations in Egypt before this, in partnership with the Egyptian Government company, so we tend to work as an Egyptian company in Egypt or an Omani company in Oman. Similarly in China, we work very closely with PetroChina. That international co-operation with Chinese partners to bring energy into China—we are the largest importer of liquefied natural gas, for example—is facilitated by that relationship-focused approach, so that has been successful for us. We are now developing unconventional gas resources in China as well. We have a number of promising positions. We have been operating in Changbei in the Ordos Basin for many years, and we have brought great new technology there—the longest multilateral wells that have been done in the country and so on. That is the sort of business end to that. We have the expertise that we bring in. There are two other things that have a parallel for Government, which is the R&D and technology cooperation. We have good relationships with Chinese institutions, like the Chinese Academy of Sciences. Through the universities we have two projects on biofuels with Tsinghua University and so on. That has also been done by the UK Government with Edinburgh University, for example, and CCS partnerships in China just now. The second piece is taking the Chinese enterprise itself overseas as well. I was in Australia last year helping to advocate for the carbon tax and carbon market there, and one of the things I did was go to visit the big coalbed methane plant in Arrow. We got into Arrow together with PetroChina, and the technology follow-up for this is you are going to need thousands and thousands of wells for coalbed methane-type developments, and you have to do that in a sustainable way. You also have to do that in a very cost-effective way, so we are working with China and their manufacturers to figure out how you can do a lot of these low-cost wells and come up with different mindsets for thinking about that kind of technology. As you see around the world, this is a growing area for manufacturers to be involved in. Clearly, in the UK as well, this is an exciting new area for resources. I have been asked before about the gas prospects in the UK. I would be delighted if we found anything like the size of the 200 tcf that has been quoted by Cuadrilla before. Because, once again, we have expertise, we are internationally exporting expertise within this country already, around the country, not just in Aberdeen or around that area, which would benefit greatly from opportunities. If we can do that with China we can also do that with the UK.

Q77 Sir Robert Smith: That is a positive view from Shell. Do you have a view from the China business?

Peter Budd: China is such a vast market. It is becoming so influential globally that you just cannot ignore it. What we have seen is a huge growth in both investment in the low-carbon area, in planning, which we don't see tailing off; we see it building up. A lot of the Shell experience, collaboration with the institutions, with the academic community, is a third leg to the stool. At CBBC we currently have 11 offices in China, in 11 cities, and we are going to be adding another two. Each one of those cities has opportunities in this area for UK companies, so it is a fertile market.

Q78 Sir Robert Smith: That is a good view from Shell. Do you have a view from the China business?

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Q79 Sir Robert Smith: What about the fear or the risk that you get sucked dry of all you have to offer, and then you find your partner has got all the skills they need?

John MacArthur: Yes. You might make the same argument wherever a private company operates with a public company. You would say that, wherever you can be in the world, we have found the national oil companies and Governments to be a very sophisticated partner. Intellectual property is something that you would always want to—and do your best to—continue to protect, and working with Governments to do that. The best protection is to be a continually innovative and inventive company and again to continue to move forward. I am not saying that intellectual property is not a concern. We have lots of patent lawyers and people like that in Shell, but I am saying that the secret to success, certainly for UK industry, has always been investing in science, investing in new ways of doing things, and innovation. If I was going to say there was one place where I would always like to see more investment as industry, it is in the universities, in academia and in the commercialisation of technologies. The more technology push programmes we can have in place, for carbon capture and storage
or new gas technologies, or more efficient vehicles or biofuels, the better.

Q80 Sir Robert Smith: You mentioned carbon capture and storage earlier, and we were getting some impression in China that American companies were perhaps ahead of the game there, in terms of engagement on carbon capture and storage. Is there more that could be done by the UK to catch up?

John MacArthur: In terms of the different elements of the carbon capture and the storage, and so on—

Sir Robert Smith: Or use in that case.

John MacArthur: Yes. We are in a strong position in the UK that we are looking to demonstrate. The real value of this is not being able to go and sell technologies but to be able to show you can operate them, that you can do them at least cost and that you can do that in a publicly acceptable way. We have been doing capturing of CO₂ in Shell for many years. As I said, in my job I have removed CO₂ from gas fields many times. Earlier on in my career I was the Groningen Production Engineer at a large Norg and Grijpswerk onshore storage field in northern Netherlands, so we can pump gas under the ground as well and we do those things safely and securely. The question now is: can you do that with a power station? Yes. In China there are some pilot plants going on with capture. In Norway, in Mongstad there are capture programmes going on. The really critical piece is to demonstrate we can do this with gas power, in particular, from our perspective. I am not in a position where I think that anybody is really leading that game yet. The window of opportunity to become a leader there remains. The foresight of the UK Government to have money set aside for that is something that must be leveraged. That is something that Shell is very positive about contributing to.

Q81 Sir Robert Smith: We do need to get on and do the demonstration if we are going to keep up with it.

John MacArthur: Yes, and we are very ready and positive we are doing that.

Q82 Sir Robert Smith: There seems to be a growing scepticism about the cost base of CCS from a lot of commentators.

John MacArthur: I wouldn’t characterise it in the same way as that, but it is certainly important to demonstrate the new technology aspects of it, applying it to a gas-fired power station to make sure you do understand the cost base. Yes. This is one of the things about the zero emissions power platform. It is not really a proprietary thing for us. We are not looking to dominate—as Shell—the capture part of the carbon capture and storage. We want to have the carbon capture and storage available to society, so that if you become a “grow your gas” business, and also grow the gas into power, that when you need the carbon capture and storage it is available to reduce 95% of your emissions in gas.

The one way to do that is you must demonstrate the technology, and there are two things you need to do in demonstrating that technology: show what the cost really is and bring that cost down, because the more you do the more you learn. Also being able to demonstrate to the public that it is acceptable, it is safe and it is secure. We know all those things, but telling people isn’t the same as showing them.

Q83 Sir Robert Smith: Finally, on the shale gas boom, the US has already had an understanding with China since 2008. Are we behind the curve on shale gas?

John MacArthur: I cannot comment. I don’t know the industry position. From a Shell perspective, I know we are in a good position and there is a terrific opportunity. I would characterise it as more than just the shale gas; there is also tight gas and there is coalbed methane. To give you some numbers off the top of my head, it is about 1,200 or 1,300 tcf, depending on the type: shale gas is about 1,200 tcf and coalbed methane is about 1,300 tcf, according to independent reports that there are technically accessible resources in China.

To put that in perspective, the North Field in Qatar is 900 tcf, so they have one and a quarter or two Qatari North Fields in gas potential in that country. This is a significant material opportunity for a global energy company like Shell. We have been involved in China for some years now, and we are working very hard in those areas. Together with the UK, and other heartland countries we are involved with, including the United States, we see the opportunity to bring the technology that we have developed—for example, the tight gas technology that we developed in Pinedale in the United States—to somewhere like China. Equally, for us, it is bringing that kind of technology to our partners that really adds value.

Q84 Sir Robert Smith: While the switch to gas will reduce CO₂ emissions in China, the reality is that coal is still going to be a very dominant source of electricity for many years to come in that mix that they have.

John MacArthur: Of course, forecasts are what might happen. The forecasts say that 50% will be coal in China by the middle of this century and so on. What I have seen, when I have spoken to the Chinese stakeholders and Government, is that they are reviewing many options at the moment to see whether or not that outcome will be there or not. If I look at the change I have seen, I visited one of the trading exchanges in Beijing when I was over there, and I would say at the time that was almost experimental. But with that ratification of the currency of credibility that comes from the five-year plan to now properly testing these things out, I can see cap and trade moving very quickly in that country. I would like to see the international collaboration I have talked about moving into country-to-country collaboration, maybe even city-to-city cap and trade drivers. There are many different levels that may work on, but ultimately what we are looking for is invest in all cleantech, whether it is wind, solar, carbon capture and storage or, for that matter, biofuels, is that you need to have a globally fungible carbon price. We have seen with the clean development mechanisms how those connections can work through the international frameworks.
I would like to see New Zealand, Australia and the Chinese markets in several years potentially being connected, and that fungibility of their price also, with the same kind of carbon accounting standards being linked to the EU Emissions Trading Scheme. I see that the Chinese have much more emphasis on those kinds of policy frameworks than they did before in the last five-year plan, so if we can support that—when I say "we," I mean industry and progressive ETS-supporting Governments, like the UK Government—then that could have benefits to help with the coal.

I would add that the more that we encourage low carbon-type technology incentives, which is what having an Emissions Trading Scheme does, you get your environmental outcome. It should be outcome forced because the cap comes down over time. Within that, if you reduce your carbon you can sell your allowances and make money and, therefore, it is an incentive for you to reduce carbon. By creating these kinds of incentivised programmes we will get more low-cost and low carbon-type solutions, so we will have more carbon capture and storage. If carbon capture and storage gets down to an affordable price—an acceptable price because the carbon price is high enough—then the Chinese are going to do more of it, just as the rest of us are.

Chair: We will move on to buildings.

Q85 Ian Lavery: As I am sure you will agree, urbanisation in China is increasing rapidly: 290 million new urban residences were added between 1990 and 2007, another 380 million new urban residences are expected between 2020 and 2030, and two more mega-cities with populations of 10 million or more are expected by 2030. It is absolutely huge. Looking at the issue with the buildings, the EU and China recently agreed a partnership for sustainable urbanisation. What practical steps does the Government need to take to make sure that this project is a success, in terms of decarbonisation and in terms of winning contracts for British companies?

Alistair Guthrie: If I may, I will answer that. British companies have the know-how and the understanding, in terms of developing eco-city strategies. That has been demonstrated or is beginning to be demonstrated. The difficulty is making that universal, on the sort of scales that are required with the urbanisation that is projected in China. This is where the British Government can support and help the pushing forward of the guideline works and the assessment works—the sort of works that set strategies for decarbonising the urban environment.

In the end, the area that I am concerned with is demand reduction rather than energy supply. In the demand reduction area, particularly in terms of integrated total design strategies for cities, for areas, the UK has a lot to offer and leads in that area, not in the detailed technologies but in the integration of those technologies into the built environment, and that is where support of those sort of programmes would be beneficial.

Q86 Ian Lavery: The UK helped to pioneer the idea of low-carbon zones in China. You probably refer to that.

Alistair Guthrie: Yes.

Q87 Ian Lavery: Has this programme helped the UK low-carbon building projects to take off in China?

Alistair Guthrie: The answer would probably be "yes" and "no" and, Peter, you can support this. It has helped in some cases and it has helped to push some projects forward where we are beginning to see some urban developments, which have strong green guidelines and they have been set up. Then the danger is that, when they get set up and pushed forward and the local government, the local cities take over, they tend to get watered down, because the cost of development or the ethos behind it tends to be watered down. There is a good push there. It needs support into full implementation.

Peter Budd: There are a number of specific projects in China, which have been identified as being pushed forward by the Chinese Government as exemplars. We do know where they are. A formalised agreement, between the development authority in these areas and the UK at the highest level, is an imperative to securing downstream work and opportunity for British companies. I know our initiatives in Wuhan and Hangzhou have both yielded frameworks where there are lists of opportunities that have been identified by the Chinese partner, and there is a proactive engagement to ensure that British companies get exposed to the opportunities and present their credentials and their skills to the potential clients. The British Government can help very significantly by engaging with the Chinese Government in setting up these frameworks, and then we can do our job at CBBC and make sure that the appropriate companies are brought to the water.

Q88 Ian Lavery: Do you think that the development of these exemplar low-carbon buildings is the best way to encourage a more sustainable build sector in China?

Alistair Guthrie: It is one very important way. We have seen that in the development of the UK, and we have seen exemplar projects tend to lead the way and bring other people behind them. That is really important. We should do that, not just on an individual building basis but on a development area basis and on an eco-city basis.

Q89 Ian Lavery: Recently we have heard the criticism that the UK is very good at coming up with ideas, like the low-carbon cities, for example, but is not as effective at following through with implementation. Would you agree with that?

Peter Budd: There is always room for improvement. We are as good as anybody at following through. I mean we always strive to do better, to answer your question.

Q90 Ian Lavery: Do you agree with the criticisms?

Peter Budd: Sorry?

Ian Lavery: Do you agree with the criticisms that we are probably better at talking about it than we are at implementing policy?

Alistair Guthrie: We can find examples where that criticism is valid, yes. But equally there are examples
where things happen. Certainly on an individual building basis, we have built some of the best examples of low-carbon buildings in China; they are built, completed and operating.

Peter Budd: In doing my research before coming here, I came to the view that with low carbon in the built environment there is a lot of talk about it, and it is not just the UK doing that, it is globally. With our Chinese colleagues we have a lot of high-level agreements, and the challenge is to push that down into real projects, real activity. That is not just a challenge in China. It is something you could identify elsewhere in other markets.

John MacArthur: So that is why carbon pricing, carbon markets and incentives—the outcome target I talk about, which is the greenhouse gas reduction target that you would have to be right across the economy, and that is what drives change. We would advocate for stronger building standards in this country to help that, to improve the energy efficiency, because there has to be action in every single sector to achieve that one major reduction goal.

Q91 Dr Lee: Good morning, gentlemen. Turning to co-ordination between Government Departments and China, are you familiar with any UK Government bilateral programmes with China and, if yes, which ones have you come across?

Peter Budd: There have been a series of MOUs, which have been executed around the eco-city and green building agenda. I specifically referred to the arrangements that have been formalised with the four cities, Wuhan, Hangzhou, Chongqing and Changsha. So we are very much aware of those initiatives, and have been an active supporter of turning the MOU format into things actually happening on the ground. I am also aware of the MOUs on low-carbon cooperation which have been signed between DECC and NDRC, although I am not sure what has come out of that agreement. It is only relatively recent, in that I think it was executed during Vice-Premier Li Keqiang's visit in January, and I guess the China climate change dialogue is another area where collaboration has been discussed. Again, I am not sure how much has turned into hard business outcomes.

John MacArthur: From our perspective, the DECC-NDRC MOU signed in January 2011 is relatively recent, but we have been positive, practical cooperation around low-carbon development continuing. That has been good for momentum, particularly in low-carbon planning and the use of market mechanisms. You probably heard from me already today that I think it is quite an important element. We welcome the continued efforts in the UKTI, the 2011–12 sustainable cities mission, which is already mentioned here, and the low-carbon investment in Asia events as well, which brings people together to talk about the opportunities. Also we hope it resulted in the creation of a new Asia investment group on climate change to fund some of these things as well. You bring some of the people that are looking to do the low-carbon investment together with the opportunities, and the Low-Carbon Fair in Guangzhou in 2011 was also very useful from our perspective as well.

Q92 Dr Lee: In your experience, is there co-ordination between different Government agencies in China?

John MacArthur: Just a small personal anecdote is that I found when I came here today, there is a chap from the FCO in the audience here who knows Alex, who is our China person, who works in the Beijing office. I have always found the FCO, the UKTI and DECC, and all those different bodies, to come with one voice and a pretty integrated approach, from our perspective.

Q93 Dr Lee: Fine. I have my notes here from a rather interesting business breakfast we had on the Tuesday morning, in which someone said, “Britain’s approach is not joined up; they never sing from the same hymn sheet. Singapore is much better. It should be more about UK plc”. Then one chap said, “The UK talks a lot and does little. When they talk about bigger products, the Chinese say, ‘We always think German first’”. Your comments please.

Peter Budd: Well, okay. There is always room for improvement. When I look at the performance of our representatives overseas, I have seen a marked improvement in performance over the last five to 10 years. There is no doubt that other countries have, I would say, a more joined-up approach. I operate in the aviation sector—as part of my day job—and it is not uncommon for us in China to be competing with the French. The French will turn up with a Minister at the head of the delegation, and he will commit to providing a French team to execute a project in its entirety. That is something that we do not do from the UK because we are fiercely competitive, not just with our foreign friends but also within our own organisations ourselves, so to actually make that offer is very difficult. That has been something that has confused the Chinese over many years, the fact that we cannot—as the UK—turn up with a single offering, and the best offering in our pack, and compete against French, German or Americans on that basis. It is philosophically a diverging path that we—as the UK—take in terms of our competitive attitude.

Similarly, I would certainly like to see a more joined-up approach to the Chinese market where we get regional interest, pursuing a particular opportunity often in competition with another region in the United Kingdom. Historically we have had a mixed bag of missions going out to market, some from regions, some centrally, some business-focused, some generally focused. If we can add some more clarity to that we will become far more effective, and we would probably save a bit of money as well.

John MacArthur: I am not going to be drawn into the nationalistic comparison of things. I would say Shell is an international company, foremost. As a UK listed company, I would argue that, if you look at our performance in those markets—take the massive Nanhai petrochemicals plant, the other areas, such as shale gas, the unconventional that I described—we are doing very well and competitive with others in the sector.
Q94 Dr Lee: Do you think your business would be aided by a more joined-up approach from Government Departments?

John MacArthur: It is not so much the joined-up approach; it is the emphasis on what I have said. We really must have a carbon price because that is the tide that lifts all the boats in terms of cleantech and low carbon. We need to have carbon capture and storage—and we have had a little bit of a conversation about that today, and how important it is to demonstrate that technology—and also to recognise that in the next 20 years gas is the fastest way to decarbonise the power sector, and then you have to have the CCS as well. Whether there is sufficient momentum behind that or not, I think we all wish that we had a carbon capture and storage project already running in the UK to demonstrate, and we need many more as well.

From that point of view, I would not necessarily describe it as being an issue of communication between Departments, but certainly we all want industry and Government to make a success of those things as soon as we can.

Q95 Dr Lee: Finally, at that meeting and at another. It was suggested that, rather than delivering lots of small projects across a range of sectors, we should go for a few strategic big ones, and one suggestion was the eco-city comments.

Peter Budd: Yes. I agree with that. UKTI has been pushing a new initiative: the high-value opportunity mechanism, where projects or clusters of projects are being identified, and the full force of the organisation and other Government Departments is brought to bear to secure a large British component in them. Although it is in its infancy, it is extremely promising. We are seeing projects of that nature being identified in China and in other markets, and resource applied to them—first, to establish exactly how much value there is in it for UK plc, and secondly to strategise how to get the largest piece of the pie.

John MacArthur: I have my Energy Technologies Institute hat on now as well as my Shell hat. I host Shell’s Springboard Cleantech Awards where we invest £40,000 each year, with no strings attached, in 30 small entrepreneurs. So I don’t think it is an “or” question; I think it is an “and” question. I would do the big project—I agree with eco-cities—and Shell is involved in energy efficiency, working with the Shanghai Government and so on, so those kinds of projects are important. Especially with a new city of 1 million people every week for the next 30 years, it is essential to get involved in that. If I go back to my earlier point on invention and innovation, the ETI sponsors not only large projects but small things as well. The Technology Strategy Board does that too.

To give one example, one of the runners-up for the Shell Springboard Awards last year, Naked Energy, is a small company with great ideas. They are now working with Imperial College here in London. They have come up with a solar thermal technology. They have the patent locked in as well. They are a small company, and when they went to the Chinese through a connection through Imperial, Professor Childs, the Chinese were extremely interested in this, as a major project in future. The reason I say it is an “and” is because we should continue to help bring some of our inventiveness and our technologies, which might not seem very big today, into major markets like China.

Chair: We will have to move on in a moment; just quickly, Albert.

Q96 Albert Owen: Mr MacArthur, you mentioned city-level partnerships earlier on, very briefly, and in Shell’s submission you talk about Singapore and China. How effective are these levels of collaboration, and how do you think Britain can learn from it?

John MacArthur: I was thinking about this myself as well. You think about the twinning of cities, the relationships and the force thing, and I know MPs go to different countries to meet people as well. The first thing is the connection between people, talking about the real problems and what you are going to do practically about something. I have a great example; I was talking with Shell’s Springboard winner this year, a lighting company have come up with a cheaper way to light your streets. The fact that they are doing it already for Norfolk Council really makes it come home to you what this cleantech stuff is about, so that is why we focused with the Shanghai City Government on the freight gateway and low emissions, bitumen for their roads and things. It just makes it that much more tangible and real rather than the high level. Everything has to come together.

The whole carbon issue is not necessarily going to be resolved at the global level, although that is critical. The common platform for Durban was a big step forward and so on, but we are seeing this fragmentation. People say that there is no carbon pricing in particular countries, but there is a carbon market in California, and the Japanese Government are looking at them now. The Australians, who are a resource-intensive country, have brought those things in as well. So there is regional fragmentation to some extent, but you are also seeing within countries, such as the US, that many cities have carbon reduction caps and programmes, even if at the federal level they don’t.

Q97 Albert Owen: So, other than Singapore, there are American cities as well working together at that level and you think Britain should emulate that in a sense?

John MacArthur: Yes. It may be a way to refresh the low-carbon cities initiative you are mentioning. I am not an expert in that field anyway, but those kinds of relationships can bring something new to those.

Q98 Albert Owen: A final point. What bilateral relationships are there with other countries that we could learn from? To Mr MacArthur.

John MacArthur: From our perspective, of course, China is significant because of the size of the market, and the impact on alternative missions as well. There are many different countries that are making efforts in this area. As I said, it is not necessarily just the country level you have to look at; you also look at particular cities or particular regions. Take the Californians with their carbon market and carbon
trading system, how they have managed to get that through. I look at the way the Australians have come up with a system that takes into account the needs of their particular kind of industry as well, with emissions allowances and so on, but the relationship between the UK and the US is important because the US is another major player in this debate. I also think that is one of the major reasons for China and the UK. As I said earlier, the UK has taken a leading role, even within Europe, in achieving a strong carbon price before we had any EU ETS and so on. So we have a lot to share. That is where I would emphasise that we have a lot to bring rather than to be able to receive, in terms of the knowledge sharing on—

Q99 Albert Owen: You have given us specific examples. Any other countries that you think we can learn from?

Peter Budd: I don’t think we can emulate it, but the German Chamber of Commerce mechanism, where the Chamber of Commerce is funded essentially as a tax on every company in Germany, gives them huge resources to deploy. That is one of the reasons that you see a much more joined-up German offering in second markets than perhaps we are seen as offering, but to make that change I think would be a real leap of faith.

Chair: John, just very briefly from you.

Q100 John Robertson: Yes. I had a lot of questions about the bilateral relationship between the UK and China. Do you see that as a way forward? I was just writing a wee note to myself there, and I was wondering—you mentioned the US—what is more attractive to the Chinese? Is it the UK in a bilateral relationship, or is it the UK as part of Europe in a European relationship, or does the US have it sewn up?

Peter Budd: I don’t think the US has it sewn up by any means. In fact I would suggest the Chinese do see the Americans as competitors, whereas we are seen as much more collegiate. We confuse the Chinese because we are such a very small nation, which has such a big voice. In many areas I think we are actually ahead of the Americans, and long may it be so.

Q101 John Robertson: Are we better being seen as part of Europe?

Peter Budd: I think China would like to see Europe acting as a single entity, and we are seen as a friend of China within the European context.

Q102 John Robertson: Does that mean the Germans are streets ahead of us? They really are getting the advantage of being the main player in Europe?

John MacArthur: As I said earlier, I don’t really see that the Germans have that advantage that has been described, not from our industry perspective. I do believe that there are a number of different ways that we would be wise to engage. It is not purely bilateral, but I think bilaterally we do have a lot to offer. As I said before, within Europe we have seen leadership from the UK, irrespective of which party was in power over the last decade, and certainly we have built up considerable knowledge and expertise in areas that do offer benefits to others.

Q103 John Robertson: Do you think UKTI are doing a good job in relation to that? There have been many complaints, and particularly in political circles, that they do not inform people well enough of what is going on. Governments get attacked all the time, but if they are not told what is happening then how are they supposed to help?

John MacArthur: The anecdotal thing I would say on that is—since we mentioned Germany—I was aware that a large German manufacturer was approached by a global logistics company, because the global logistics company had been to China to ask about electric vehicles, and went to the large German manufacturer and said to them, “How many electric vehicles could you do?” and was told the market was very small and nobody was building on that scale, whereas the Chinese had several assembly plants of electric vehicles already running.

For all partners with China it is really important to do as the Committee has done and visit China and understand what is on the ground. There is an advantage to be had from making sure that China has opened up and people understand the opportunities that are there. Whether it is UKTI, or other countries that need to do more to do that, I don’t think you can do enough.

Q104 John Robertson: The UKTI’s relationship with Government?

John MacArthur: The Shell perspective is positive with all the different Government Departments that we work with. I don’t think we are one of the people who are complaining.

Chair: That sounds like a good moment to move on to the next panel. Thank you very much indeed for coming in. We have had a very helpful session.
Examination of Witnesses

Witnesses: Gregory Barker MP, Minister of State, Bellingham MP, Parliamentary Under-Secretary of State, Foreign and Commonwealth Office, James Hughes, Head of International Climate Change Strategy, Energy and Analysis, Department of Energy and Climate Change, John Ashton, Special Representative for Climate Change, Foreign and Commonwealth Office, and Gregory Briffa, Low Carbon Team Leader, Department for International Development, gave evidence.

Q105 Chair: Good morning. Welcome to the Committee. Thank you for making time to come and talk to us. I think we know who you all are. Do you want to do any introductions? We are familiar with all of you, except perhaps Mr Briffa, as it is your first visit to us. 

Gregory Briffa: Yes. Thank you. I lead DFID’s low-carbon work in the Policy Division, which I have been doing for the last four and a half years.

Q106 Chair: Could you tell us how much priority the Government attaches to contributing to decarbonisation in China, and to improving opportunities for British low-carbon businesses in China?

Gregory Barker: Yes. Good morning, Mr Yeo. For the last decade it has been a real priority. It is one of the key strategic elements of our relationship with China because, on this agenda, China really does see the UK internationally as a partner of choice. I was listening carefully to the previous witnesses saying that in many areas they feel that other nations have a march on us. On the low-carbon agenda, there is a recognition that we have a great deal to offer and, although it is only a nascent relationship on low carbon, that we are taken very seriously indeed by China. I know that the former Secretary of State, Chris Huhne, who led on China for the Department, and appropriately so—I apologise, I am not as informed as I should be—tackled a great interest in seeking to deepen the UK’s relationship with China. Chris was last there in September 2011 for the Carbon Sequestration Leadership Forum’s ministerial meeting, and met a whole range of ministerial counterparts there. During all of his engagements, Chris offered UK support, on the broadest possible basis, to encourage the Chinese Government’s efforts to bring on significant renewable and low-carbon energy capacity and to deepen the relationship. Although I have only been to China once, I do regularly meet with Chinese opposite numbers. I would like to think I have begun to build a good relationship with Minister Xie, the Chinese Climate Change Minister, who I probably see, over the course of the UNSCCC negotiations, four times a year. I would think on average, and now have a good understanding of the UNSCCC negotiations, four times a year, I probably see, over the course of the UNSCCC negotiations, four times a year. I would think on average, and now have a good understanding of the UNSCCC negotiations, four times a year.

Henry Bellingham: I would like to add to that, that obviously our bilateral relations with China are of immense importance. As part of our network shift there are going to be 61 new FCO jobs in China, both local and UK-engaged. We are going to be opening a new consulate as well, in addition to the four we have already; we obviously have Shanghai, Chongqing, Hong Kong and Guangzhou. Within the UKTI team—and the UKTI team in China is our strongest anywhere in the world—we have a team of 35 in China, and four of them are dedicated to a low-carbon agenda. So we see an alignment here. First of all, we see China as a very important partner in the climate change talks, going forward, and in the whole wider climate change movement. There is an alignment in terms of the commercial diplomacy agenda, because obviously there are big opportunities for the UK. We see our role very much as that we have a network. We have the one team in the country representing the whole of HMG. We do the diplomacy, the statecraft, and obviously we are able to open the doors for people like DECC who are the experts on the detailed negotiations. I should just add that, in this context, Ambassador Ashton, who is the Secretary of State’s climate change envoy, is a crucial person in the FCO, as well as the Foreign Secretary. The Foreign Secretary went to China, and he had the chance to meet State Councillor Dai Bingguo. Ambassador Ashton was in China last June and will be visiting again in the near future.

Q107 Chair: Could you show examples of how the UK-China MOU on low-carbon co-operation, which was signed last year, has benefited British businesses? 

Gregory Barker: John, do you want to make some comments on that?

John Ashton: First, I have a point partly informed by the conversation we were listening to earlier. As a Government, there are two distinct dimensions of the strategic support that we need to give our businesses. One is the downstream support that UKTI and its network are on the frontline of, engaging with specific deals and contracts and supporting wherever we can. But there is a deeper thing that is closer to what the MOU can hope to achieve, which is that for the UK to have a successful export-led recovery we need to engage with the deep forces that are shaping the nature of the global economy. Chinese choices—more than anybody else’s choices, actually—are building the new global economy, the post-2008 global economy. As to the Chinese growth narrative, they talk—and I am sure you heard on your visit—a lot about low-carbon development, and they accept that they are building their current development narrative is not adequate for China’s purposes going forward. Understanding the way in which China’s choices are going to shape the markets in which British companies will be operating globally is a very important part of our commercial support. There are various instruments that we use to provide commercial support, but the MOU can help to do that and it can help to influence those choices in the direction of higher ambition, a faster progress towards a low-carbon economy in China, which is also a strategic requirement for British prosperity.

James Hughes: Chairman, perhaps I can add that the MOU covers the wide range of activity that the UK Government has with China in lots of different areas. Some of those areas are more about sharing experience and expertise, rather than commercial opportunities necessarily. However, in a number of the projects that we undertake in China, either with the

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Prosperity Fund, or indeed with some of the limited funding that DECC has, there is often a UK company that may collaborate with those projects. I know that the Climate Group, PwC, KPMG, the Carbon Trust, and various other UK companies have been involved in projects. UKTI, though, has identified three particular areas that it considers to be high-value opportunities. Those areas are civil nuclear, wind power and smart grid. Those are the three areas where UKTI is looking to support UK businesses, both in terms of identifying opportunities in China, being present at the various trade shows that go on there, and looking for opportunities to develop UK business. They estimate that there could be opportunities to the value of about £1.7 billion in those areas.

Q108 Chair: Just going back to the Foreign Office, there is a shift of emphasis, which I strongly support, and having been going to China for a number of years it is quite noticeable now it is already on the ground. How would you measure the success of this additional investment they are making there? Henry Bellingham: It is going to be difficult to measure in terms of maybe one or two years on, but it is the Foreign Office recognising that we have to put our footprint on the ground, and our resources in those countries that are growing at a rapid rate—those countries that are going to be absolute key partners in agendas, like obviously climate change. It is also a recognition by the Government that when we came into office the coalition Government—we decided that we would intensify bilateral relations with a number of key countries. By definition, that meant we would be shifting from some countries where, for example, we have a number of non-sovereign posts, which we feel in the EU perhaps are a luxury, they are surplus to requirements in some ways. But in a country like China, which is a vast country, where you have provinces there that represent the entire GDPs of many large European countries, increasing the level of involvement on the ground was absolutely essential. That is why we are going to open a new consulate-general, and that is why we are putting in more UKTI staff.

What I would be happy to do is perhaps come back—If we are all around in two years' time—and tell you whether it has worked. I mean this is an investment we are making for the future, and we are convinced that is the right decision.

John Ashton: Just to add one point to that. I think 2015 is going to be a critical year, because that is when the next stage of the climate negotiations comes to a climax. That negotiation will only succeed if by then the major economies are pretty much settled on a low-carbon growth model, that they have taken strategic choices that low carbon is the way to generate jobs, growth and competitiveness, and no economy matters more in that than China’s. If you wanted a simple success measure it would be to say, “Look at the Chinese economy in 2015. Look at the macroeconomic debate about how they are steering the Chinese economy into 2015. Is it clearly a low-carbon growth model?” and that will be success. Because if we don’t have that, that would do enormous damage to a very wide range of British interests, both in relation to prosperity and in relation to security.

Chair: That is a very helpful contribution, Mr Ashton. Would you like to send a copy to the Treasury here as well?

Q109 Albert Owen: Going back about the MOU that was signed by DECC and the National Development and Reform Commission. When it was signed it was stated that an action plan would be produced no later than March 2011. Has that action plan been published?

Gregory Barker: James?

James Hughes: Thank you. There is not a published action plan, but what has happened is there have been negotiations between DECC and—

Q110 Albert Owen: When do you expect the action plan to be published, Minister?

Gregory Barker: Do we have a plan? I don’t know if we have a plan to actually publish it, I think we are just getting on with it. I don’t think we—

Q111 Albert Owen: It was stated that it would be ready by no later than March 2011, so it isn’t. Okay. James Hughes: Can I just—

Albert Owen: Yes, go on.

James Hughes: We have been in discussion with the NDRC over what should appear in that action plan. The delay has been partly because we have been looking to also negotiate with them on kinds of projects that we might support with the small amount of money that we have available to support that MOU. Unfortunately, what happened last year was that the local DRCs and the provinces came up with their own kinds of ideas about what they would want to see appearing in that, and the NDRC in Beijing decided that they wanted to have a say in what went on, so those negotiations have taken longer than we anticipated. We are making some progress now. We have entered into contracts with a number of organisations in China to take forward a number of projects, and we will finalise that action plan with the NDRC shortly.

Q112 Albert Owen: Thanks for that. When this plan is produced I am sure you will send us a copy so we can look at it.

Gregory Barker: We will do that.

Q113 Albert Owen: Another thing that was to be established was the UK-China Low Carbon Co-operation Committee. Has that been established?

James Hughes: Sorry, could you repeat that?

Albert Owen: Yes. It is the UK-China Low Carbon Co-operation Committee.

James Hughes: Sorry, I think that is the working group that you are referring to.

Q114 Albert Owen: Yes, so it has been established?

James Hughes: The working group has been established. The working group has been meeting on an annual basis. The last time it met was spring last year; the intention is that it meets again later on this
year. That is a working group that is chaired at director level at this end, and at the moment within the NDRC by a gentleman called Su Wei who, among other things, leads for China in the climate change negotiations. We agree an agenda with the NDRC. We look at the issues that are current for us, and they come up with their own agenda items, and we take it in turns to host it in the UK and in China. This year it will be hosted in the UK. It usually lasts for about a day, or it could be over a day, and if the Chinese are coming over here we will try to do a programme for their visit over here. So there would probably be a day focused on the working group, talking about the collaboration and how it is going and what we need to do next. Then there would probably be, if it was here, some site visits to show them the sorts of things we are doing.

Q115 Albert Owen: Would it be fair to say that the relationship between DECC and the NDRC hasn’t been as effective as you thought initially? Some projects were identified that were going to happen. Have those happened?

James Hughes: Yes, and let me be clear about the fact that there are two MOUs. There is the framework MOU under which the working group operates, and that has been going for some years and then was renewed in the MOU that was signed last autumn. Then there is a second MOU, which is working with three of the low-carbon provinces that the Chinese have identified, and that was signed at the beginning of next year; sorry, last year.

Albert Owen: You are not that good.

James Hughes: No. The second MOU is the one that got off to a slow start because of the difference of opinion between the local DRCs and the NDRC. However on the framework MOU, that has been going for a number of years and, therefore, the working groups have been going on during that period of time.

Q116 Albert Owen: Funding has been approved for some projects; is that solely DECC’s money?

James Hughes: DECC does not have very much money. It has £200,000. We have £200,000 in this financial year and for the next two financial years, and we will have to see what happens after that in the context of future business plans and spending rounds. That money is being used this year to support four projects in those three low-carbon provinces. They will produce various reports by the end of this month, so within this financial year. There is one that is looking at the options for the establishment of pilot emissions trading schemes. There is one looking at identifying priorities for low-carbon development in the three provinces with which we have a relationship, which is Hubei, Chongqing and Guangdong. It is looking at identifying priority products for low-carbon product standards and labelling, and developing evaluation criteria for a low-carbon community demonstration area in Chongqing to help drive ambitious climate change carbon reductions.

The NDRC has said that what would very much help them are some projects that would help to provide some additional advice on where the focus should be going forward. So when those reports are finalised at the end of this financial year, then that will give us the basis on which to have some further conversations with the NDRC about what the results say, and what that might mean in terms of the further work that needs to happen within those provinces, and there may well be wider applicability.

Just going back to something that was said earlier on, we have seen a transformation really, over the last few years, in terms of the relationship that we have with the NDRC. The NDRC are now very open to working very collaboratively, and are very keen to look at every possible opportunity for addressing the challenge that they have in terms of reducing their emissions. I know that you have seen for yourself—having been out to China—the huge scale of the challenge that they have. You heard when you went out there that the Chinese have found it quite difficult to restrain the growth in consumption of energy, and so they are very much open to the help that the UK can provide. What will come out of these reports will hopefully then provide us with the next step forward.

Q117 Albert Owen: Just moving on to funding, you mentioned that from DECC’s perspective there was only a small amount of funding, but there are some projects in low carbon that many other Departments are involved with as well. How do you collectively, as different Departments, sit down and ensure that we are getting good value for money? Who is the lead partner on that? How does it work, because there are many of the same areas that different Departments are working in, and how do we ensure that we get the best value for money for the taxpayer?

Henry Bellingham: The FCO is in the lead on this and, as I mentioned, the idea is to have one platform covering the whole of the UK Government. Much of it is down to leadership, and what we have, which has been developed by the ambassador who, now, is the one in charge of a China country business plan, and that obviously takes account of input from all the different Departments. On the programme spend—although it is overseen ultimately by London, there is a local board that will decide on the particular projects, so—

Q118 Albert Owen: Sorry to cut across, Minister. At what level would DECC and the different Departments, BIS and so on, get involved?

Henry Bellingham: The ambassador would be the person in charge, overall, and there would obviously be senior people within the mission with a role in this. There will also be quite a lot of feedback to the people in London, and that would be at direct level and it may be at ministerial level.

Q119 Albert Owen: Are you confident that the work, which has been carried out on behalf of the UK, has been strategically aimed? Are different Departments working in silos or are there good cross-departmental workings on this? Again, we have heard from DECC that they have concentrated on smart grid on nuclear and on wind. Are the other Departments working separately, or is this across all that?

Henry Bellingham: It is worth bearing in mind that a quarter of the global pot of the FCO’s Prosperity Fund is being spent in China and, as you probably saw
when you were in China, this is supporting 52 policy-focused projects. You have heard about some of these, obviously. It is not just the actual projects that are very important. There are projects on low-carbon planning, on wind power, on raising the low-carbon ambition of Chinese cities and on tackling emissions from coal, to name but four. You then have what I would describe as the multiplier impact:—what these projects do. Many of the officers who are involved in the projects have also been trained in commercial diplomacy. You have the multiplier effect, in terms of the advantages and the opportunities that are opened up for UK companies, and then you have other outcomes. For example, as a result of these projects, China’s powerful banking regulator announced last month a new national Green Credit Guideline, which should well be very significant across China as a whole.

Secondly, the work on projects over a number of years has led almost undoubtedly to the Chinese Government’s decision to set up the low-carbon pilot zones. These are not just small projects; this is a national scheme set up by the Chinese Government. It is going to amount to a range of quite tough targets and policy experimentation, as you know, in eight cities and five provinces, amounting to 26% of China’s total population, so you have this multiplier effect and a virtuous circle.

Q120 Albert Owen: I understand, but the criticism has come from previous witnesses that there is a scattergun effect and there is no real strategy coming from the UK Government. How do you respond to that?

Henry Bellingham: I don’t accept that. There is no question, from my dealings with different countries, that the climate change low-carbon team we have in China is the envy of the world. There is no other country that has a team in place that is so effective. Furthermore the fact that we have made that alignment between the climate change agenda, UKTI and the business opportunities again is looked at and envied by a lot of other countries. John has had some experience of this, so maybe you would like to say something as well, John?

John Ashton: One should never be totally complacent about how one does this. This is a complex challenge and one can always make it better, but there has been quite a lot of learning over the years as the Foreign Office has got used to spending project money. I remember when it started, which was over 10 years ago, it tended to be a rather piecemeal approach and you couldn’t see much overall pattern to how the money was spent. From that experience we have learned a number of things. We have learned that, particularly in large economies like China, it makes sense to give maximum autonomy to the local network. They are the people who are on the ground and who can judge how you can spend money to the best effect, given a set of criteria that come from the centre about maximising commercial benefit for the UK, maximising political impact on Chinese choices and so on. That is a reasonably well-oiled machine now. There will always be people who say it should be this way rather than that way.

Quite an interesting indicator over the last year is that the Germans have decided that they are so attracted to our model that they are setting up something similar themselves. They have never had in their Foreign Ministry project funding before in the area of climate and low carbon and they are now instituting something based on the UK model. So that is quite a good validator.

The other thing I would say is about the art of it—and it really is something that is very difficult to get right. There are hundreds of different ways you can spend any additional chunk of money in a country like China, and lots of people who are bidding for your money. So how do you judge which of those ways is going to make more than a marginal difference? They will all make some marginal difference, but out of all of those possibilities which is the much smaller number of things you can do that potentially are transformational, that are potential game changers? For example, in the past, we have spent a certain amount of project funding on encouraging a movement in China that led to a decision to establish low-carbon pilot zones, and those now encompass 300 million people. It seemed to us that there was a potential game changer there. We have spent money on carbon capture and storage in China, which is an area where there are huge potential—

Q121 Albert Owen: My point is, were all the Departments in the UK fully aware that that was going on, were there regular briefings and was there no duplication from each Department?

John Ashton: I think nowadays they are. That may not have been the case when this started. In Beijing when I go there I am always struck by how difficult it is to distinguish between DECC, DFID and the Foreign Office. It really feels like a single team.

Gregory Barker: I would certainly say that in my experience of visiting various countries around the world, I am continually impressed by the way in which it interrelates to DFID. Those three Departments in the UK fully aware that that was going on, were there regular briefings and was there no duplication from each Department?

Gregory Barker: In BIS? Certainly UKTI, yes, but I would say of the three Departments—DFID, the Foreign Office and DECC—I have to say they work really well. I am sure there are ways in which they can be improved and I look forward to your report.
officers in commercial diplomacy, these guys are thinking not just about the low-carbon agenda, and what is happening within China and how we can get them on to a more ambitious end of the spectrum, but also looking for opportunities for UK plc.

**Gregory Barker:** It is fair to say that Lord Green is having a transformational effect on the impact of UKTI, so they are improving. You could interpret it that way.

Q124 Dr Whitehead: According to some of our witnesses overall we appear to be reducing funding in China, just at the moment when it could have some leverage as far as low-carbon development is concerned. Indeed when we were in China we observed what appears to be a quite substantially leveraging process. Is that a fair comment, do you think?

**Henry Bellingham:** We are spending more money in China because, as a result of a network shift, we are putting in 61 new jobs and we are opening a new consulate-general. As far as the Prosperity Fund is concerned, we worked and fought very hard to keep it at its total level but it is being reduced slightly from £20 million to £18 million, but a quarter will still be spent in China. That is £4.5 million, so the amount spent on these projects will be reduced from £5 million to £4.5 million. You also have to bear in mind, Dr Whitehead, that we are going to have more people on the ground. There will be more UKTI. There will be more people on the climate change side. There will be more diplomatic activity. I see this as part of an overall team effort, and the more experienced diplomats and locally engaged staff we have on the ground all working together the more impact we will make. It is not just about money for these projects.

Q125 Dr Whitehead: So do we or could we have available to us the funding overall that is available from the UK Government Department by Department for low-carbon development in China? That is FCO’s contribution, DECC’s contribution, DFID and BIS?

**Gregory Barker:** It is important to understand what we mean by projects and finance. As Mr Bellingham was saying, this is primarily about know-how. We are not in the business of financing the low-carbon transition in China.

**Dr Whitehead:** No.

**Gregory Barker:** We have quite enough on our plate at home. We are doing some really valuable work. We have hosted numerous ministerial and official delegations here in the UK, who have come to look at a whole range of different aspects of UK policy. There is a genuine interest in what we are doing and I come back to my opening point, I think we are seen as the country of choice, or destination of choice, for not just one particular section of the renewable energy economy but in terms of the holistic low-carbon transition.

To give you an idea, with this very small resource that we have available we are funding a report on options for the establishment of a pilot emissions trading scheme, we are identifying priorities for low-carbon development in three provinces, we are identifying priority products for low-carbon product standards and labelling, and we are developing an evaluation criteria for a low-carbon community demonstration area in Chongqing to help drive a whole range of low-carbon outcomes. Those are just some of the things that we are doing. There is a whole range of different projects. If you talk about financing, it gives the impression that we are putting in an investment in hard projects, when in fact we are putting our money in, in a much smarter way.

Q126 Sir Robert Smith: We still have to pay. It still has to be financed. It does not happen for free.

**Gregory Barker:** Those projects have to be financed, yes, but there is the know-how. What you are really talking about is the time of people and airfares. You are not talking about projects.

**John Ashton:** You could call it convening. You are building structured conversations to drive particular choices.

**Gregory Barker:** Giving access to expertise and experience.

**James Hughes:** It is not unreasonable, Chairman, that China, with the growing economy that it has, and the degree of help with capacity building and other things, could look to itself to try to find some of the funding that might be necessary for some of this work.

**Gregory Barker:** It is working with UK companies. For example, in one of our projects, setting standards for Chinese eco-cities, we have pulled together a network of 20 or more UK companies that are involved in a new project to develop and implement low-carbon standards for Chinese cities. In terms of standards and measurement, this is something where the UK has a global reputation and we can leverage it into new areas.

Q127 Dr Whitehead: The nub of my question really relates to the evidence we have heard about the extent to which Departments are working together very well in China, and there is certainly a concentration on low-carbon development and low-carbon advice and discussion in China. Therefore it could be very useful to look at what resources come in from whom. I think it would be very useful for us to have a note if possible as to overall—all Departments—what funding is going in, and the extent to which that perhaps can be used collaboratively.

**Gregory Barker:** I have to say, I queried the figure of how much we were spending because it just seemed out of all proportion to the amount of output that we had. We have a huge amount of projects and I was amazed it was only £200,000.

Q128 Dr Whitehead: Can I put this in a slightly different way? One of the very strong impressions we received on our visit to China was the question of how important personal relationships are in these arrangements. How does that funding translate to permanent members of staff from Government Departments posted in China and having a brief and, therefore, those personal relationships involving climate change mitigation? We have heard there are four from the UKTI particularly involved in the low-carbon agenda. Do we have a similar number for those people from FCO who are specifically involved in that...
agenda and other Departments with individuals posted in China on a permanent basis effectively? Henry Bellingham: What we can certainly let you have, Dr Whitehead—and I don’t have the figures absolutely to hand at the moment—is a list of the numbers of people and the cost of those people who are absolutely dedicated to the climate change low-carbon work. We would have to add to that a significant number of locally engaged staff who from time to time will be doing this work, the time of senior diplomats, including the ambassador and the consuls-generals, and the amount of work they are doing on it. For example, I think you met the Governor of Guangdong province and he said he wanted more business-to-business partnerships in the low-carbon sector. We are now following that up. So what the FCO is very good at doing is where there is an opportunity we can surge personnel, and I like to think that our diplomats and officials who pursue diplomatic excellence are very good. One minute they may be dealing with human rights or they may be dealing with some complex matter in the UN over the Sudan, but the next they can surge in another area and it could be the Chinese environment experts. It could be climate change for the low-carbon agenda. We will certainly let you have the number of people who are dedicated full-time on climate change and low carbon.

Dr Whitehead: That is very kind.

John Ashton: As somebody who started life as I guess a sinologist—a career diplomat in the Foreign Office, I was first posted to China in the early 1980s and I was the Science Attaché in our embassy then—I think you are absolutely right, I don’t think there is any country in the world where maintaining personal relationships is more important. One of the features of the China group within the Foreign Office is that they understand that; and they probably mostly make an effort to keep up personal relationships even in between postings. I am still in touch with people in China who I first got to know at that time in the late 1980s, and it is the right kind of culture to be fostering for dealing with a country like China where there are such big cultural barriers and where trust matters an enormous amount.

Q129 Dr Whitehead: Generally do the panel think that work of contacts could be useful—as was suggested to us—in influencing China’s work itself with other countries to promote sustainable development? So you could have a south-south axis as far as that was concerned, but beginning to be based on some of the influence that we might bring to bear? I think that role that you are seeking for those people who are engaged already in low-carbon transition in China, and would there perhaps be a Department that might have lead responsibility for that kind of work?

Henry Bellingham: It would be the FCO who would be in the lead, but again it would be a question of leveraging the expertise from other Departments, Mr Whitehead heading the work in this area. China is getting to be doing increasingly on the development front in developing countries, there is a role for DFID. I don’t know whether in your question you were hinting at the UK-China sustainable development dialogue, and also the Global Development Partnership Programme, which we are involved with. It might be helpful if Gregory Briffa just mentions something about that, if that is what your question was getting towards.

Dr Whitehead: I think we will be discussing some of that later on.

Gregory Briffa: Thank you. Yes, that is right. DFID’s focus is we no longer have a bilateral programme providing direct aid to China. Rather our focus is working on establishing a partnership with China and working to reduce poverty in third countries, and drawing on not only China’s highly successful domestic experience but China being seen as perhaps an alternative model to the model that we have, and also continuing to have a significant footprint in the countries in which we are very interested, where we are seeking to reduce poverty.

Q130 Dr Whitehead: Could I just briefly touch again on what I think is the successful intervention of the SPF programme, as far as the province-based pilot ETS systems are concerned? We agreed that our Chairman should be seconded permanently to the office of the Government of Guangdong, as far as the provincial emissions trading systems of Guangdong was concerned. The national ETS that is likely to be developed alongside the provincial schemes, is that something that the DECC resource is looking towards, in terms of assisting the Chinese to move towards a national ETS arrangement, or are there other resources that could be brought to bear on that?

James Hughes: Under the MOU, which we mentioned earlier, we are working with three provinces. Part of the work we are doing with them is looking at being able to share expertise and to help with some small projects, in relation to helping them to develop their pilot emissions trading systems. My understanding, having talked to various people in China, is that the Government in China, the NDRC, is trying different things. It is very much open to exploring what is going to work for China and so has effectively said, “Let’s use this 12th five-year plan as an opportunity to trial a few things within these low-carbon provinces and cities, let’s see what the results of that show us, and then let’s try to determine what is the right approach for China going forward and what kind of emissions trading system we might either roll out on a national basis”. The input we are giving at the moment is about sharing our knowledge and expertise in relation to the experience we have had with the EU ETS, so it is both under the MOU but there is also some work that we are doing under the Prosperity Fund to support the emissions trading system development as well.

There is action going on, on both counts, but obviously there is a huge challenge for the Chinese Government, not least because one of the things that they are going to have to try to get right is having a very effective system of accounting for emissions and monitoring, reporting and verification, in order to be able to be confident about what their emissions are, what sort of cap they might want to bring in, and being able to measure the effectiveness of whether they are succeeding in driving those emissions reductions that will be necessary, but we are working with them.
Q131 Dr Whitehead: Promoting UK companies with expertise in that field.

James Hughes: I don’t know the details. It may be that the Prosperity Fund projects have something along those lines, but I would have to check.

Q132 Dr Lee: Building on the discussion of the strategic co-ordination, in a previous evidence session a few suggestions were made on how the Government might co-ordinate its strategy, vis-à-vis China and low carbon. Establishing a China taskforce within Government was suggested or a Cabinet-level strategy to co-ordinate the work of DECC, FCO and BIS. What do you think?

Henry Bellingham: Dr Lee, as Ministers we obviously meet on a very regular basis, and so there would be an informal ministerial group anyway that would be overseeing this. Of course at official level you have this co-ordination on a day-to-day basis that I think is effective. I do not want to appear in any way complacent, but I think Ambassador Ashton is right when he says we have moved on a long way.

Since the FCO started getting involved with project funding, because we have had other Departments—including DECC—coming on to the platform and being actively involved in a particular campaign or agenda, the co-ordination has got better and better. Much of it is obviously down to leadership at the top, so what we will certainly do is we will take away from today some of the criticisms that were made earlier, constructive remarks by the previous witnesses, but I can assure you that there is ministerial oversight.

One of the things that we certainly could look at would be a China business oversight mechanism, but we already have it on an ad hoc basis with Ministers and we have it on a formal basis with officials. If there are lessons to be learned from your inquiry, we could certainly take those on board.

Gregory Barker: There is already the FCO-chaired High Level China Group meeting, which looks across Whitehall engagement with China at an official level. In DECC, under the MOU on climate change co-operation, there is the annual working group meeting already. As I said before, certainly between DECC and the FCO, there is very close co-operation. I would be interested to see what this Committee concludes, in terms of whether or not there is a need. I am always cautious about additional infrastructure, but in terms of streamlining and strengthening the oversight of the strategic policy aims that could be interesting.

John Ashton: Just to add one word. Having done this kind of work, both in London and in Beijing, my instinct would be to be cautious about the risk of micromanaging from London. I was the Science and Technology Attaché in Beijing in the early 1980s, and whenever I heard that London was going to do more co-ordination I knew that more inefficiency was going to result from that, because the different Departments in London can’t match the close-up view that you can get in Whitehall. I was one meeting at the Chinese Academy of Social Sciences where it was quite interesting that there appeared to be a movement with regards to territorial versus consumption-based measures of CO₂ emissions within China and that increasingly, as domestic demand goes up,
consumption-based patterns are going to change. The Committee will recall our presentation from DEFRA and DECC: there was a difference of opinion between British Departments on this. In China there seems to be a difference between provinces, and I wonder what your feeling on that was, in terms of interacting with provinces, in terms of forming policy, in forming low-carbon markets in the future and trading schemes and things, this seemed to be a developing area within China.

Henry Bellingham: I will ask Ambassador Ashton to comment in more detail, but certainly understanding the dynamics of this, Dr Lee, is very important. We worked very successfully with China in the run up to the COP17 in Durban, and part of our discussions with the Chinese were very detailed and complex, were based on understanding the dynamics at stake at the regional level and even at city level. Do you want to comment further on that, Ambassador?

John Ashton: Yes. There is a very lively debate going on in a lot of places about how exactly you account for carbon in the economy. Clearly that debate is developing in the Chintiemum in China as well. It is lively in Europe too. The fact is in the UN climate negotiations we have gone down the path of accounting, for carbon at the point of production. Whatever else happens in that debate I think that will continue in the UN climate change negotiations. We have an enormous interest in understanding the texture of the different views in China, of engaging with them and trying to build a shared perspective between the UK and China as our understanding of this very complex field develops.

Q136 Dr Lee: I guess my suggestion is that China may be more receptive to negotiating and signing deals if it was more consumption-based.

John Ashton: Yes. You could make that case, although a low carbon was very much what happened in the future with the Chinese economy, as they try to rebalance themselves and drive up their own consumption. To be honest, I have been surprised that they haven't made that case more strongly up until now. They have had plenty of opportunities to make it in the international negotiations and, as far as I can remember, they have never once said, "We should move to consumption-based carbon accounting in these negotiations".

Gregory Barker: Now that they have per capita emissions that are higher than France, it may be something that will have less and less interest to them.

Q137 Dr Lee: Finally, just at the business breakfast that I mentioned to the previous panel, it was suggested that the UK was in a really strong position to work together with the Chinese on improving their global reputation, the idea being that they used to counterfeit this, counterfeit that, mass production of this, mass production of that, nothing new, all copied, and that the Chinese were quite eager to develop a reputation for top-end, high-end technology and so on. Do you have any comments on that as an opportunity for Britain?

Henry Bellingham: I would say there are big opportunities. Certainly one of the things that we are keeping a close eye on are those companies who are at the cutting edge of transmission systems, of renewable energy technologies, who are very cautious about sharing some of their proprietary intellectual property with countries like China, until they improve protection of IP and their whole patent and copyright laws. There is an issue there, but having said that many of these companies want to work with China, they see China as an obvious partner and the potential is huge. We are doing some work, certainly in the mission, to engage the Chinese on this very important agenda to make sure they bring their laws in line with international norms.

Q138 Albert Owen: If I could just move on to some priority areas. I realise we are pushed for time, but the witnesses have identified a number of areas where the UK has expertise and knowledge, which can be developed. They suggested many of the things that we have raised here: wind, smart grids, civil nuclear, CCS, and areas like that. The Grantham Institute, in evidence to us, identified certain sectors where we could develop projects, such as aircraft and spacecraft engines and turbines. Is there a policy now on projects? I heard what you said earlier, Minister, that we are very good and we have a reputation that goes back decades of expertise in developing policies and strategies, but what about the big projects? I will put my cards on the table here: I am worried that we are very good at talking and strategy, but along come the French and the Germans, saying, as we heard previous witnesses say, "We can put a package together", and the benefits go to other parts of Europe and the world. Are there certain priority areas that the UK plc, of which I am a member, is focusing on?

Henry Bellingham: The answer to that is 100% yes. In the past it is fair to say that UKTI was perhaps too reactive in its approach. It would look at high-value opportunities when they came along, but one of the things that Lord Green has been absolutely emphatic about—and, as you know, he chairs the Cabinet Sub-Committee on Trade and Investment—is that we now have a structured, commercial, diplomatic strategy and plan for every country, and we have one for China.

Q139 Albert Owen: For every— Henry Bellingham: For every country, but particularly for the key target countries, for some BRICs. Within that zone UKTI will look at specific sectors, and not just specific sectors but specific UK companies. So what UKTI are working on for China on the energy low-carbon side, they will not just be looking at opportunities in China, which will obviously be coming down the track at a fast rate, they will be looking at UK companies that have expertise in that sector; indeed, not just the well known companies that we have heard of—the FTSE companies, the big power companies, some of the ones involved with wind energy—but some of the smaller suppliers down the production chain. So there is definitely a plan, not just for each country but for each sector, and it is now much, much more proactive. They are going out looking for those companies and trying to get them out there to see for themselves the opportunities.
Gregory Barker: I also sit on the Cabinet Sub-Committee on Trade and Industry, and one of the things that Lord Green has brought is focusing on big projects, so identifying what are the big infrastructure engineering projects.

Q140 Albert Owen: Give us some details here today because, with respect, I have been going to China even before the 1980s when I was in a previous occupation, and I have been back there over the last decade, and I have heard this said time and time again. We are at a critical edge here. We do have this expertise; we have had it for a long time. How does it translate into actual projects? I hear what you are saying in theory, the companies have been out there over the period and they have established themselves and they have respect. What are these priority areas, can you tell me?

Gregory Barker: I can’t, because it is not my Department, but only that—

Q141 Albert Owen: No, I am asking you and your Department, with respect, Minister—the wind, smart grid and nuclear. What are the big projects and exchanges that we are going to have and get results from very soon?

Gregory Barker: In terms of?
Albert Owen: The priorities that you have identified, which are wind, nuclear and smart grid.

Gregory Barker: We rely primarily on UKTI for commercial diplomacy overseas. We simply don’t have the resource in DECC to have a global industrial policy, and I see much merit in what you are suggesting but we have to be sensible about the resource that we have—

Q142 Albert Owen: I think I am being sensible as well.

Gregory Barker: What I was saying is what the Cabinet Sub-Committee will show is how the UKTI is identifying the big high-value opportunities, getting real detail on those and ensuring that the appropriate British companies—whether they engineering, or at whatever point they are in the supply chain—are aware of those, and proactively going after UK companies that would be relevant to those high-value projects in each given country, and I am sure that is the way that they proceed in China.

Henry Bellingham: What can I do, Mr Owen, is we can give you some examples. There is an example obviously around wind, where there is a cross-team initiative that I am looking in real detail as to what the Chinese Government will be doing in future. Certainly, on current predictions, between now and 2020 they are going to be installing the equivalent of 16 times our offshore capacity. So what UKTI do is they have a core team who are looking at this, they are also looking at how we can leverage the project work to buy more influence and to build up more contacts.

What we will do is we will select four particular sectors, and we will write to you and let you have full details of how UKTI and the seamless team we have in place are being proactive, how they are targeting companies, smaller companies. UKTI—one of the things that Lord Green is passionate about—and he has made very clear on his Cabinet Sub-Committee on Trade and Investment—is that it is not just a question of going out into these countries and leading trade delegations, using UKTI on the ground and our diplomatic network to identify opportunities, it is also going round Chambers of Commerce, CBI events, local city and borough councils and talking to businesses in the regions. So the businesses there know what UKTI is all about and when there is an opportunity they will be got hold of, but we will let you have some examples.

John Ashton: Just one word on one specific example, because if one had to identify one area out of all of the concrete choices we could make, one area where there was the greatest potential going forward over the next five to 10 years, I would say it is carbon capture and storage. You have to have a rapid acceleration in the deployment of carbon capture and storage, China if you want to have a successful global response to climate change. The carbon numbers just won’t give you success unless you do that. The UK has expertise, world class expertise, right across the carbon capture and storage value chain and so there is an obvious kind of fit there, and we—

Q143 Sir Robert Smith: Why is it not one of the three target areas?

John Ashton: It is certainly an area in which the UK plc has been working closely.

Gregory Barker: The reality is we have to do more domestically.

Q144 Sir Robert Smith: The UK target is civil nuclear, wind and smart grids.

Gregory Barker: I think because at the moment there isn’t a commercial CCS industry the onus is on us to develop our projects here in the UK first, and only when we have a domestic CCS industry, or a nascent industry, are we in a position to export it. All of our efforts at the moment are in driving the CCS programme here in the UK, but we can’t export something that hasn’t happened here.

Q145 Sir Robert Smith: You say we are driving it. In 2005 we started talking about having a competition and we are still—

Gregory Barker: Unfortunately we were not much further advanced when we came into office in 2010.

Q146 Albert Owen: Has it been delayed further now?

Sir Robert Smith: When is it going to start?

Gregory Barker: Has it been delayed? No, it hasn’t been delayed further, no.

Q147 Sir Robert Smith: Are the criteria going to be announced?

Gregory Barker: Sorry, the criteria for?

Sir Robert Smith: For the next round. They were going to call for competition.

Gregory Barker: I would have to refer; I didn’t prep on our latest position on CCS domestic competition when I came here. I wouldn’t want to mislead you by giving an inaccurate answer.
Q148 Sir Robert Smith: Given the huge potential for CCS and the crucial role a lot of the world is putting on it, it seems quite important.

Gregory Barker: It is, but at the moment it is really academic research and strategic engagement. What there isn’t, unlike civil nuclear, unlike the wind industry, unlike smart grids, is a shovel-ready export opportunity for CCS as there is for those industries. You can take a trade mission from Rolls-Royce and talk nuclear. You can take a trade mission from a number of companies that are very active in the supply chain and the smart grids. You can take a trade mission from a whole range of companies that are active in the supply chain for wind. You can’t do that on CCS at the moment because we are not at that stage of development; I expect that to change in the coming decade.

Q149 Chair: We understand that point, but it is difficult not to agree strongly with Mr Ashton about the potential for CCS.

Gregory Barker: We do agree very strongly.

Q150 Chair: What the Committee have trouble with is saying “Is that urgency reflected now in DECC’s handling of the CCS issue?” I know this is not primarily about that but it is an area we have a lot of interest in. We have had a lot of exchanges with you, and with your Department, and we have a concern that now the funding is drifting back to Parliament it has to wait until after 2014; the companies have been pulling out of experiments. There seems to be slippage—to put it no more strongly—on the CCS timetable, and it now raises the question that in the UK maybe CCS on gas is the priority but the market in China may be CCS on coal.

Gregory Barker: That is an interesting observation. We wouldn’t see it as being an either/or. It is not a binary choice. You are quite right to say that CCS on gas is increasingly important, certainly for the UK. Really we see it more either pre- or post-combustion CCS rather than just gas or coal. The CCS programme in the long term, as Ambassador Ashton said, is an absolutely vital tool, but in terms of our immediate priorities what we are able to get on with in terms of shovel-ready projects, it is just a question of timing. It is not a question of the overall role it is going to play in our strategic response.

Q151 Sir Robert Smith: Is there a feedback loop at all, say, in looking at UK developments in the low-carbon agenda and saying what are those areas where if we got our act together quickly we could steal a march in the global market?

Gregory Barker: Are you talking industrial gas? You are not talking about policy; you are talking—

Q152 Sir Robert Smith: When DECC is looking at policy for low carbon in the UK are we feeding into that the areas where it might be possible to steal a march on—

Gregory Barker: I think the most immediate is offshore wind. We are rapidly becoming the dominant player in large scale offshore wind. Going further into the future, we remain—but it is a nascent industry—the leading player in wave and tidal, and we have in put a lot of effort since coming into power. I have led the creation of the Marine and Energy Programme Board, and the creation of Britain’s first Marine Energy Park in the south-west. We are looking at the creation of another one in Scotland in order to speed the deployment, at scale, of a range of technologies in wave and tidal.

In the longer term, we think CCS is going to be a global beating industry with commercial opportunity for the UK. That is obviously a bit further out but there are three examples. Smart grids is something where we already have an economic advantage, and as we roll out what we like to call an electricity internet here in the UK that is going to give us a commercial advantage as we become a showcase for what is achievable. Energy efficiency—we are transforming the UK domestic market with the Green Deal. We believe our EMR proposals, which are going to bring in large-scale investment opportunities for interventions in industrial energy efficiency, will be a further spur to that market, so I think we have to see this as being the case across the whole clean energy space. You have to show a real appetite for these products in your own domestic market if you are going to get export share.

Q153 Chair: We take that point absolutely. Did you want to say something about CCS, Mr Ashton?

John Ashton: The Minister has covered everything that I would have said.

Chair: We are running right out of time now I think. Ian, can you just wind up?

Q154 Ian Lavery: Very briefly, the 14th China-EU Summit took place on 14 February this year, and a number of low-carbon initiatives were agreed at that summit. What do you think are the best initiatives that the UK is best placed to deliver or possibly contribute to?

Henry Bellingham: Is this the EU-China Summit?

Ian Lavery: Yes.

Henry Bellingham: Yes indeed. As you know, on the EU-China Summit, the idea was to upgrade the EU-China energy dialogue to a full high-level meeting. That is going to take place in June this year, which is important.

Q155 Ian Lavery: We are talking about a different summit. The 14th EU-China Summit, which was held in Beijing on 14 February.

Henry Bellingham: Yes, indeed.

Ian Lavery: It was held to discuss a number of initiatives with regard to low-carbon initiatives, which included carbon capture and storage.

Henry Bellingham: It does, and in fact there has been agreement to enhance the dialogue around domestic policies and share experiences of specific climate change legislation. We, the UK, have made a renewed commitment to co-operate on carbon capture and storage and also to look at practical co-operation on the emission trading system. One thing I would say, Mr Lavery, is that because we are seen in the EU as being probably the country with the closest contacts.

Q156 Chair: Mr Ashton, did you want to make a point about the Paris conference?

John Ashton: I don’t think I have any new points to make about the Paris conference.
with China, with a team in place that are making the biggest difference, this is one area of UK involvement with the EU where we are absolutely in the lead. That doesn't always happen, as you know, but we are regarded by our EU counterparts as being the country that is the one to turn to as part of the EU-China dialogue. That is important. What we will do is we will look at these specific commitments as part of the basis for evaluating bids for some of the practical projects going forward. Do you want to add anything to that, Ambassador?

John Ashton: One of the specific issues that were discussed in the EU-China Summit was China's interest in developing emissions trading, which we have touched on already. China rightly sees the EU as the leading example of an emissions trading scheme, which has had its ups and downs over the years and is by no means close to a perfect state yet. We, as Europe, can play a very important role in helping to give confidence to those in China who want to establish a cap and trade regime in China. The significance of that debate in China can't be overstated.

If you had asked five years ago whether China or the US would be first to set up a functioning national emissions trading scheme, most people would have noted that the politics in the US were difficult but they would have said China is never going to do it before the US. It is really significant now that you are seeing that China is ahead of the US in its consideration of emissions trading nationally, and there is a UK fingerprint and an EU fingerprint on that, and the work going forward under that EU-enhanced dialogue will be terribly important in that area.

Q156 Ian Lavery: Just very briefly, has there been any progress on the emissions coal agreement? Where are we with the project?

James Hughes: The UK initiated the near zero emissions coal project back in 2005, and the first phase was completed in 2009. That concluded that carbon capture and storage could provide a cost-effective option for emissions abatement in China. It then became something that the EU have run with. However during the last Spending Review the decision was taken that there wasn't funding in the UK to continue with further phases of that particular project, so we haven't been taking that forward.

John Ashton: May I add a word to that? What has happened in the meantime is that the Chinese have started to put really significant amounts of domestic funding into carbon capture and storage, and when that project was first conceived of there was no proposal to do carbon capture and storage even at a pilot stage in China. I was involved in it at the time. The purpose of it was to open up CCS as an issue. What you now have is half a dozen projects that are being funded largely by China itself, so the context has changed a bit for that project.

Q157 Ian Lavery: The agreement in 2005 was to develop and demonstrate CCS with China and the EU, and initially it was thought to have a demonstration plant by 2020, then it was revised to 2015. The question basically is, “Where are we at?” I am a little bit confused from what Mr Hughes says about that the Spending Review withdrew the funding for the project.

James Hughes: The UK's contribution to it. My understanding is that Norway is putting some money into that EU project, but I am not entirely clear what the timetable is for taking that further.

Q158 Ian Lavery: Would you be able to clarify that?

James Hughes: Yes.

Q159 Sir Robert Smith: They are coming a long way on emissions trading, but with five pilots the timescale for a national scheme doesn't seem to have enough feedback to learn from the pilots. Are they going to be able to get a robust emissions trading scheme that we can integrate with?

John Ashton: What we have learned from our own experience in Europe is that building an emissions trading scheme across a large economy is an enormously complex thing to do. It is dangerous to make absolute predictions. What we will do in the UK and what Europe will do is to do everything we possibly can to help them build a robust scheme, to the extent that they are interested in our help. We are all learning as we go along because we have never created a scheme like this from scratch, and there will be enormous challenges in China in making sure that there is enough learning in the way that they develop this nationally. In some ways, the proof of the pudding will be in the eating, but I think it is very encouraging that they know that and despite that uncertainty the momentum seems to be building.

Chair: On that upbeat note, let us conclude. Thank you very much indeed for your time, and we will take careful note of what you said when we produce our recommendations.
Written evidence

Executive Summary

The UK is committed to working with China to help tackle climate change and Government cooperation on low carbon activities has strengthened over the last few years. The UK Government continues to discuss low carbon policy options and objectives for the international negotiations with China’s leaders and actively shares UK experience on how to accelerate the transition to a low carbon economy.

The China-UK Working Group on Climate Change, established in 2006, has driven forward this bilateral co-operation and the signing of a Declaration on Climate Change in 2008 reinforced this collaboration. The UK has initiated and delivered various bilateral programmes and activities, both with the National Development Reform Commission (NDRC) and various Chinese organisations, which we believe have helped inform China’s policy research on tackling emissions. These programmes have also strengthened links between UK/China policy experts and think tanks and provide a solid foundation for future bilateral cooperation.

HMG MoUs on low carbon cooperation facilitate the range of interventions that the UK is undertaking with China, from DECC’s support for the development of carbon markets in China’s Low Carbon Pilot provinces, to the work being undertaken by UK Trade & Investment (UKTI) to support China’s Sustainable Cities initiative, ensuring that UK business expertise is part of China’s continued urban development. We will continue to look for ways in which we can further enhance our strong bi-lateral relationship.

Committee Questions

What progress has been made in deepening cooperation between the UK and China to achieve a low-carbon transition and how should this cooperation be taken forward?

1. There has been a continued deepening of cooperation between the UK and Chinese Governments across a range of low carbon areas over the last few years. Most recently, in October 2011, the UK and China signed a new five-year “Framework MoU” on UK-China Co-operation on Climate Change which was designed to enhance policy dialogue and practical co-operation between the countries on climate change, and provides a framework for engagement between the countries on low carbon issues. 2011 also saw the launch of more than 30 new climate change and energy projects in China under the FCO’s Prosperity Fund which is designed to promote sustainable global growth. Examples of projects funded in China include:
   - low-carbon planning;
   - promoting wind power;
   - creating the conditions for effective and robust carbon trading;
   - raising the low-carbon ambitions of Chinese cities;
   - low-carbon product labelling;
   - setting standards for Chinese eco-cities; and
   - tackling emissions from coal.

2. In addition to the immediate impact of individual projects, the hands-on approach the UK has been able to take, assisted by the significant funding made available has helped create an environment in which the UK is able to help influence Chinese policy making over a wide range of issues related to energy and climate change. The Economic and Financial Dialogue in September 2011 included over 20 deliverables based on China Prosperity programme projects. The ability to draw on this programme resource has enabled the UK to underpin its high-level dialogue on issues such as low-carbon development with offers of practical policy co-operation.

3. In addition, the FCO Prosperity Fund is supporting DECC’s work with the Energy Research Institute (ERI) of the Chinese Government to replicate/improve the 2050 pathways analysis. The aim of the work is to help influence Chinese policy making over a wide range of issues related to energy and climate change. The Economic and Financial Dialogue in September 2011 included over 20 deliverables based on China Prosperity programme projects. The ability to draw on this programme resource has enabled the UK to underpin its high-level dialogue on issues such as low-carbon development with offers of practical policy co-operation.

4. The UK is also supporting low carbon work with China by providing £7 million of International Climate Fund (ICF) money to the World Bank’s Partnership for Market Readiness (PMR) a fund designed to help middle income countries to develop and pilot market based policies to reduce greenhouse gas emissions. In 2011 the PMR agreed grants of $350,000 to nine countries (including China) to help them plan the design, piloting and eventual implementation of market-based policies for greenhouse gas mitigation. China is expected to submit its business case for funding early this year.

5. The first UK-China Energy Dialogue was held alongside the Prime Minister’s 2010 visit to Beijing and was chaired by the then Minister for Energy, ZHANG Guobao and the DECC Secretary of State, Chris Huhne. The Dialogue has provided an improved platform for exchanges and facilitated the visit to the UK last year of a delegation of Chinese wind power investors.
6. The UK-China Sustainable Development Dialogue (SDD), co-managed by NDRC with funding primarily from DfID and Defra, has delivered over 40 projects with China in areas including forestry, fisheries, agriculture, biodiversity, sustainable urban development, chemicals management, business resource use efficiency and environmental governance, with several overlaps with the climate agenda. For example, the UK/China Sustainable Agriculture Innovation Network under the dialogue (supported by FCO Prosperity Funding) is revealing that the manufacture and (over)use of nitrogen fertiliser in China accounts for up to 8% of China’s total GHG emissions, and that about 30% of this could be removed without any impact on food security (as well as reductions in other environmental pollution).

7. The Chinese Government’s New Energy Plan is a High Value Opportunity (HVO) for UK businesses and UKTI has identified Wind, Smart Grids and Civil Nuclear, as three areas on which to focus.

8. The UK-China Sustainable Cities Initiative was proposed at the 2007 Joint Economic and Trade Committee (JETC) in London and was part of the overarching BIS-China MoU signed that year. The Initiative encourages and seeks to maximise cooperation in trade and investment in the urban development and environmental sectors, between policy makers in government and government agencies in China and the UK and to stimulate business activities between enterprises, business organisations and professional institutions, through the identification of specific Chinese cities.

9. There has also been ongoing work with China on the transport sector and DIT has an existing MoU and Action Plan with China, the objective of which is to enhance cooperation in the transport sector.

10. The Chengdu Declaration (stemming from the 2nd Asia-Europe Transport Ministerial Meeting) also provides DIT with a useful vehicle to engage the Chinese and other Asian members on the green transport agenda.

11. The UK-China Eco-cities & Green Buildings Group was re-launched in its current form in March 2010 and brings together UK and China expertise to develop a road map for building sustainability and energy efficiency based upon international best practice.

12. DFID is working with China as part of its new Global Development Partnership Programme (GDPPP) which includes work on adaptation and low carbon development. DFID is also likely to support various smaller scale low-carbon activities, such as analysis of China’s investments in clean energy in developing countries, and support to China’s pilot carbon trading schemes, on the basis that they could become the model for many other developing countries. Finally, DFID has a comprehensive work programme until June 2013 for sharing with other developing countries China’s approach to adaptation.

13. Scientific collaboration too has an important role to play in improving international relations and strengthening the contribution of science to policy making. It has built trust in and developed a common understanding of the scientific evidence that underpins policy action to tackle climate change. The UK funds a number of collaborative science projects to further understanding of dangerous climate change and the action needed to tackle it. Flagship projects include the joint UK-Swiss-China project on Adapting to Climate Change (ACCC) in China, which is funded by DfID and DECC and managed by DfID, and the Avoiding Dangerous Climate Change (AVOID) programme on China’s technology options for meeting 2050 emissions targets consistent with the 2°C goal.

14. Looking ahead the Government is keen to build on the progress already made, strengthen its relationship with China at all levels, encourage trade and investment, engage with policy development and help support China where practicable in its delivery of its low carbon objectives in its current Five Year Plan (2011-15) and encourage greater ambition in the future.

What progress has been made in implementing the MOUs between the UK and China, including the DECC-National Development and Reform Commission MOU?

15. The Framework MoU between DECC and the NDRC (the latest of which was signed in October 2011) provides the umbrella for the full range of HMG activity on low carbon co-operation with China. The main development since October has been the new call for bids for low carbon projects which will receive FCO’s Prosperity funding. Later this year the UK will host a UK-China Climate Change Working Group under the Framework MoU and a UK-China Energy Dialogue, the first of which was held in 2010. The Energy Dialogue, as agreed in the 2011 MoU, has provided an improved platform for exchanges and facilitated the visit of a representative of the team responsible for producing the DECC 2050 Pathways model to China as well as an incoming delegation of wind power investors to the UK.

16. The DECC-NDRC MoU on Low Carbon Co-operation (signed in January 2011) was designed to boost China’s efforts to make its low carbon pilot zones a success. The pilots will be crucial in the generation of evidence that China can make a successful low carbon transition. The UK is currently the only country offering dedicated partnership to China in its low carbon pilot effort. Approval has recently been given under the MoU to fund scoping studies to identify low carbon projects covering emissions trading, low carbon development and product standards in Chongqing, Hubei and Guangdong; and a project to develop an evaluation system which will provide a basis on which to approve the construction of low carbon communities in Chongqing municipality.
17. The objective of DfT’s existing MoU with the Chinese Ministry of Transport (MoT) on Low Carbon Emissions and Technology is to enhance cooperation in the transport sector, to develop trade services in the areas of transport between China and UK by exploring business opportunities in all specified areas, collaborating over low carbon technologies and to regularly exchange information on policies, rules and regulations. Since its inception in 2009 developments have mainly centred around deepening our overall cooperation with China. This includes: strengthening bilateral relations; promoting commercial opportunities (High Value Opportunities) and sharing expertise on low carbon technologies. As a result, there have been two high profile Ministerial (DfT) visits to China in 2011 and we are looking to build on this in 2012 and beyond.

18. The UK-China Eco-cities & Green Buildings Group was re-launched in its current form in March 2010 on the basis of a new MoU between the Ministry of Housing & Urban-Rural Development and BIS. The Group brings together UK and China expertise to develop a road map for building sustainability and energy efficiency based upon international best practice. It is also working on an eco-city standards project funded by the FCO’s Prosperity Fund. The project will help China progress eco-city policies into mainstream practice, helping to achieve the balanced environmental, social and economic aims of the 12th Five Year Plan. The project will formulate eco-city standards, indicators and delivery strategies for eco-cities, an associated capacity building programme and a focussed communications and dissemination programme.

19. DFID is working with China as part of its new Global Development Partnership Programme (GDP). The GDP (formalised through the MoU signed during the Prime Ministerial UK-China Summit in June 2011) includes work on two specific work streams: on reducing greenhouse gas emissions from the agricultural sector, and on the potential for a “low carbon technology centre” in China to help address some of the market failures which are preventing the more rapid and widespread deployment of Chinese small and medium scale technologies which could deliver clean, low carbon energy in developing countries. The Adapting to Climate Change in China (ACCC) project focuses on linking climate change research with policy making and development.

20. The UK-China Sustainable Cities Initiative is part of the overarching BIS-China MoU signed in 2007 (and extended in November 2010 during the Prime Minister’s Summit visit). UKTI now has individual city MoUs and Project Action Plans in place with municipal authorities in four cities: Wuhan, Changsha, Chongqing and Hangzhou.

How can the UK contribute further to the development of China’s climate change mitigation policies, such as those policies governing emissions trading, carbon capture and storage and energy efficiency?

21. China is committed to piloting emissions trading during the current Five Year Plan, but there is a great deal of work needed to ensure that technical and regulatory mechanisms appropriate to China are put in place. The UK will consider what further help it can give on the basis of the results of some of the projects currently being undertaken and following assessment of new projects proposed for funding under the prosperity programme.

22. The action that China is taking on piloting emissions trading schemes with a view to a possible country wide system in future will require them to gather and share energy and emissions data to a greater extent. We will continue work towards developing a dialogue between experts in the UK and those institutions responsible for collecting emission data, carbon accounting and reporting in China. The dialogue aims to assess the progress in building capacity, identify urgent gaps, and put in motion new projects that would enable them to construct and strengthen the institutions during this Five Year Plan that will underpin a successful national carbon market.

23. The UK initiated the Near Zero Emissions Coal (NZEC) project with China in 2005 which was later incorporated in the EU-led NZEC Initiative. Phase I concluded in 2009 and concluded that CCS could provide a cost effective option for emissions abatement in China, that China has a number of suitable locations for CO2 capture and that further research would be required to determine the best way for China to move forward.

24. The FCO is currently supporting two projects on CCS through its Prosperity Fund. One project is looking at early demonstration of cost-effective CCS potential in non-power industrial sectors in order to address coordination problems that currently exist between the capture and storage sectors. The second project is carrying out feasibility studies for capture-ready projects on new power plants in Guangdong province in southern China, aiming to demonstrate cost-effective ways to develop CCS. The UK will consider the results of these projects once completed and any new proposals that come forward for funding under the prosperity programme.

25. Around 70% of China’s emissions come from the industrial sector. Efficiency gains in this area will be therefore be key in terms of shifting China to a low carbon development path. We are working with China on a number of projects related to industrial energy efficiency and supply chain efficiency. We are also working to share information on the UK’s approach to improving energy efficiency through a range of policies including the carbon reduction commitment, electricity market reform, and carbon pricing. As China expands its top 1,000 high emitting enterprises efficiency programme to 10,000 enterprises, there is an opportunity to deepen our co-operation through the MoUs that we have in place.

26. Our cooperation with the Chinese Government Energy Research Institute over developing a 2050 China Pathways Calculator builds on the UK’s experience. The methodology allows the testing of different energy
futures and highlights the resulting greenhouse gas emissions. The work will calculate and visualise different 2050 Pathways for China which should help their long-term national strategic energy development.

How can bilateral cooperation with China contribute to success in the UNFCCC?

27. Bilateral co-operation and collaboration with Chinese policy makers not only builds trust and understanding, but could also lead to frameworks and solutions of global relevance. Demonstrating the feasibility of tackling emissions strengthens countries’ confidence in their ability to engage under the UNFCCC.

28. We will continue to engage with China in taking forward implementation of all that was agreed in Durban, including negotiations on a single legally binding agreement and identification of additional global mitigation potential in order to help meet the objective of limiting global temperature increases to two degrees or less above pre-industrial levels.

How can UK and China better collaborate to develop the technologies needed for the low-carbon future, while managing intellectual property issues?

29. The UK’s Engineering and Physical Sciences Research Council (EPSRC) has invested £19 million into joint research with Chinese counterparts to develop the technologies needed for a low-carbon future, including solar energy, fuel cells and cleaner fossil fuels. Such partnership is deepening, with the next joint call for collaborative research to be announced imminently, focusing on smart electricity grids which are compatible with renewable energy sources. The UK Government’s Science and Innovation Network and Research Councils UK based in China also support our Universities and scientists to collaborate on low carbon technologies; in a recent example, University College London opened a Biomass Energy Development Laboratory in China in partnership with China’s Tianguan group (November 2011).

30. Weak enforcement of intellectual property rights in markets, including China, reduces companies’ willingness to transfer their most cutting edge technologies into those markets. To promote further co-operation on innovation and technology projects and to address technology transfer obstacles in the low carbon sector, in May 2009 the UK and China agreed to discuss how to create international model framework agreements for collaborative R&D projects. Alongside this the UK should continue to encourage China to strengthen its industry-academia links to complement the acquisition of overseas technologies. To help support the enforcement of intellectual property rights in China, in December 2011 the UK and China agreed to meet on a regular basis in an ongoing, multi-agency, high-level intellectual property dialogue. This dialogue will be used to help promote mutual trade and investment, by finding practical ways to overcome IP issues. The UK Intellectual Property Office recently posted its first IP attaché in Beijing to provide on the ground help for UK businesses with IP related issues. By managing these intellectual property issues, we hope to further encourage innovation by the UK and China in environmentally sound technologies.

What scope is there for increasing regulatory alignment between the EU and China such as the development of common low-carbon standards for specific industries?

31. Some work is being done to share some EU policies and standards with a view to seeing whether one outcome of the comparison of international policies could be the development of common product standards. Initiatives such as the IEA Efficient Electrical End-use Equipment (4E) Implementing Agreement, provide an international forum for governments and other stakeholders to share expertise and develop understanding of electrical end-use equipment and policies and facilitate co-ordination of international approaches in the area of efficient electrical end-use equipment. Various European member states, including the UK, participate in the agreement, and China has also provided data in relation to several products.

32. Similarly, the US-led Super-efficient Appliance Deployment Initiative (SEAD), in which the UK and Sweden participate, may lead to greater global harmonisation of testing standards for various products, which in turn should lead to reduced trade barriers and ultimately to common product standards.

33. Increased harmonisation between global eco-labelling schemes, such as the EU Ecolabel and its international counterparts could also help drive industry to improve product performance on a voluntary basis. These schemes set out criteria for products meeting the highest environmental standards and can also be linked to sustainable procurement measures to stimulate the market for greener products.

Would low-carbon sectoral linkages, such as sector-based cap-and-trade or common standards, allow participants to increase their decarbonisation ambitions?

34. Sectoral approaches using carbon market instruments such as sectoral crediting and cap-and-trade can help increase the emission reduction ambition of countries while using the carbon market to attract sources of finance.

35. For example, new market mechanisms have been agreed in Durban and will have to be designed in 2012. The UK and EU would like to target specific sectors and issue credits for emissions reductions that are beyond a baseline which is set at a level lower than business as usual emissions. This ensures that these countries are making their own contribution to the global emissions reduction effort and over-achievement against their pledges is incentivised by the possibility of earning sectoral credits. Such credits could potentially
be used in the EU ETS for compliance. Sectoral mechanisms could greatly reduce competitive distortions by incentivising an appropriate degree of "own-action" in the host country and contribute to creating a more level-playing field for internationally competitive industries. Similarly, countries could create cap-and-trade schemes like the EU ETS and link them to the EU ETS. By linking different cap-and-trade schemes, a broader range of emission reduction potential will be covered, which will promote cost effective abatement and decrease the overall cost of mitigation, which will therefore promote greater ambition. A network of linked ETSs would also achieve greater liquidity in the market and help avoid competitive distortions.

What scope is there to implement International Climate Financing to projects in China?

36. The 2010 Spending Review established an International Climate Fund (ICF) of £2.9 billion to enable the UK to help developing countries adapt to climate change and move to low carbon growth paths. The UK may consider multilateral climate finance projects that collaborate with a range of countries including China or projects in partnership with other donors where there is a very strong value for money case. The World Bank’s Partnership for Market Readiness Multi-donor Trust Fund which supports capacity building and piloting of market mechanisms in a range of countries, including China, is a good example of this. The UK recently contributed £7 million to this project.

37. The ICF’s work with multilaterals includes demonstrating that climate friendly private investments in developing countries are financially viable. We are working on two partnerships with the private sector for climate friendly funds. We and other public sector players will consider investing in these funds alongside private pension and sovereign wealth funds. The funds will invest directly in renewable energy projects and also in sub-funds to support investments in, for example, energy efficiency, renewable energy and clean technology innovations. One fund will focus specifically on Asia, which is likely to include investments in China.

How can DECC and HMG more effectively promote the strengths of the UK’s low carbon sector to China?

38. China and UK are both world-leaders in renewable technologies and both nations stand to benefit from bringing forward new energy technologies presenting significant opportunities to become partners for growth.

39. The UK also has expertise in areas such as industry and coal/gas power plant energy efficiency and there is scope to further increase consultancy in this area. China is therefore a priority market for UKTI’s green export campaign. The campaign includes promoting the UK’s low carbon strengths in China through trade missions, Ministerial visits, and media coverage, focussing in particular on sustainable cities, advanced engineering, and offshore wind.

January 2012

Supplementary written evidence submitted by the Foreign and Commonwealth Office and the Department of Energy and Climate Change

We were very pleased to appear before the Energy and Climate Change Select Committee last week and to have the opportunity to contribute to your enquiry on low-carbon co-operation between the UK and China. We were particularly interested to hear the questions which followed from your recent visit to China and hear about some of the conclusions which you drew. When we met last week, we undertook to write to you to clarify a number of points which arose during the course of the session; we are happy to address these here.

Staff Numbers

The FCO Climate Change and Energy Network in China is made up of seven UK-based staff and 25 locally engaged staff. This is an aggregate number as some staff do not work full time on climate change and energy. In London, there is one dedicated FCO officer covering China, actively supported by senior staff. Within DECC, there is a dedicated member of staff in the International Climate Change Engagement team responsible for working with the FCO on China, supported by a number of senior staff. There is also a member of staff in the International Energy and Technology team who is responsible for our engagement with China on energy technology issues, again supported by senior staff.

Programme Funds

The FCO’s Prosperity Fund spent £5 million on project work to support the climate change, energy and economic reform agendas in China in 2011-12 (a quarter of the total global pot of £20 million); this supported 52 policy focused projects including those you heard about at first hand when you visited China. In 2012-13, the overall Prosperity Fund will fall to £18 million, but a quarter—£4.5 million—will still be spent in China.

We have seen significant tangible outcomes from this type of project work. One example was China’s powerful banking regulator announced in February a new national green credit guideline, based on a guideline developed through a Prosperity Fund project. These guidelines will induce banks in China to back energy saving and environmental protection industries.
A second example is our work over a number of years on low carbon cities which contributed to China’s national low-carbon pilot zones initiative announced in August 2010. This amounts to a wide range of tough targets and policy experimentation in eight cities and five provinces, which cover 29% of China’s total population.

DECC’s International Climate Change team has £200k per annum for three years to help support selected projects in three of China’s low carbon provinces (Hubei, Chongqing and Guangdong) under the UK-China MoU on low carbon development. Other project interventions are developed with support from either the FCO Prosperity Fund, the S&I and RCUK network or the Embassy Bilateral Fund.

In this the first year of the MoU we are supporting projects that will:

— report on options for the establishment of pilot emission trading schemes;
— identify priorities for low carbon development in the three provinces;
— identify priority products for low carbon product standards and labelling; and
— develop an evaluation system that will provide the basis on which to design and construct a low carbon community in Chongqing.

These projects are managed centrally by DECC in collaboration with FCO Staff in China and all project work, whether supported by FCO or DECC funding, is undertaken in support of joint objectives.

**Carbon Capture and Storage**

You asked for further details of the UK’s efforts to drive CCS in China. As you are aware, the UK led the first phase of the Near Zero Emissions Coal project (NZEC). The project, an EU level initiative, has three distinct phases. Phase I, which sought to develop institutional knowledge and understanding of the potential role of CCS in China, concluded in 2009. Since then, the EC have been working to agree a work plan for Phase II and associated financial arrangements with Chinese partners. We understand that papers were signed by both parties in the late autumn of 2011 with the intent that Phase IIA will be completed by the middle of next year.

Though we are no longer leading the NZEC project, the UK continues to follow progress on NZEC and engage with China on CCS in a number of ways. These include through FCO funded Prosperity projects which look specifically at barriers to CCS, potential new sectors for CCS development such as non power industrial sectors, and steps needed for CCS readiness in China. There is joint research on CCS being funded by the Engineering and Physical Research Council (EPSRC) which involves both UK and Chinese scientists. In addition the UK works closely with China and other countries in the various multilateral fora including the Carbon Sequestration Leadership Forum (CSLF). The last CSLF Ministerial meeting was hosted by China in September 2011 and attended by the then Secretary of State for Energy and Climate Change, the Rt Hon Chris Huhne MP and provided an excellent opportunity for mutual learning and information exchange.

**UKTI**

UKTI has prioritised infrastructure, energy (wind power, civil nuclear and smart grid), and advanced engineering as sectors offering the greatest UK expertise for the current low carbon opportunities in China.

UKTI in the UK and overseas work in partnership with DECC, FCO climate change and energy attaches, and the Science and Innovation network to maximise these opportunities. They achieve this through commercial diplomacy. Recent examples of this kind of work include funding projects such as a database of UK low carbon capability in China to more easily identify and target potential partners, opening up opportunities for investment in offshore wind through policy exchange, business to business meetings and targeted training, or helping UK companies access high value projects with a face value in excess of £500 million.

Infrastructure sectors (construction, environment and water, and mass transport) can benefit from a number of opportunities from sustainable urban development in China and UKTI is driving forward two workstreams:

1. **Sustainable Cities Initiative:** In line with China’s 12th 5 Year Plan policies, the shared vision is to jointly foster sustainable urban development as a growth engine of bilateral trade and investment. This programme is driven by an overarching MoU between the Department for Business (BIS) and the Ministry of Commerce (MOFCOM), with UKTI as the executive authority for BIS. Under this MoU, UKTI now has individual city MoUs and Project Action Plans in place with municipal authorities in four major provincial capital cities—Wuhan, Changsha, Chongqing and Hangzhou.

   The city-level Project Action Plans focus on identifying and defining projects and then facilitating co-operation between UK business and the Chinese authorities or private sector entities in all areas of urban development. These focus particularly on delivering a low carbon approach to the built environment. For example:
   — cutting-edge planning and design for residential, commercial, retail and industrial buildings;
   — urban transportation (metro rail and airports);
— water and waste water management; and
— embedding energy-saving and environmental technologies in sustainable urban development programmes.

UK business engagement is delivered through an active programme of trade missions in both directions, seminars, business roundtable meetings, and an expanding communications network, including web-based and digital media. Numerous contracts have been won by UK firms as a direct result of this programme, including by urban planners, architects, consulting engineers, and environmental technology firms.

(2) Eco-Cities and Green Buildings Working Group: This Group, co-chaired by business and government was established in 2009. UKTI facilitates engagement with potential Chinese partners through annual sponsorship of a seminar to showcase UK capability at the Chinese Ministry of Housing’s flagship annual green building conference. Companies that are members of the group have enjoyed some significant successes, including BRE which is working with one of China’s biggest developers, Vanke, on the design and planning of a low carbon innovation park in Beijing.

For energy, there is potential business of up to £1.7 billion over the next few years for UK companies with wind power, civil nuclear and smart grid capabilities from the Chinese Government’s plan for new energy covering the period 2011–20. Our strategy is to help better position UK companies to pursue significant commercial opportunities in these three subsectors and UKTI has a programme of activity to highlight UK capability and develop relationships with key Chinese stakeholders in these areas, and bring UK companies into market through events and missions. We are finalising an important piece of research which identifies the top opportunities (for UK companies and Chinese stakeholders) and potential barriers. This will form an important basis for our engagement.

In February 2012, UKTI, FCO and the NEA (National Energy Agency) held a successful Offshore Wind Power Workshop bringing together UK and Chinese policy makers and companies to explore potential collaboration. This followed a successful visit to the UK by the NEA and over 30 Chinese Offshore wind business representatives in September 2011.

The UK’s advanced engineering capabilities in low-carbon technologies have been showcased through a series of UKTI activities in China in recent years. The long-standing Aviation Working Group (AWG), a sub-group of the UK-China JETCO, has had a considerable focus on sustainable aviation with trade body ADS presenting their sustainable aviation strategy. This materials focus has coincided with, and helped facilitate, a joint venture between GKN and COMAC on composites manufacturing. Alongside the AWG, UKTI and MIIT (Ministry of Industry and Information Technology) formed the UK-China Automotive Dialogue, which met for the first time in May 2011. A key topic of discussion was new energy vehicles and the UK’s low-carbon vehicle technologies initiatives. Discussions are underway to formalise this arrangement through a MoU. UKTI is also working on a clean and energy efficient production proposition and is engaging with China, who have this as a strategic objective in the current five year plan.

We believe that we have made very positive progress over the past few years on low-carbon co-operation with China on the basis of effective cross-HMG collaboration both in London and on the ground. We very much look forward to reading the report which your investigation produces and will be happy to consider any suggestions which you make. If you have any further questions during the course of your inquiry we would of course be happy to answer them.

Henry Bellingham MP
Parliamentary Under Secretary of State
Foreign and Commonwealth Office

Gregory Barker MP
Minister of State
Department of Energy and Climate Change
March 2012

Written evidence submitted by Shell International Limited

Summary

I. Shell has been engaged within both the oil and gas sector and on low carbon development in China for some time. As a result, we welcome the opportunity to respond to this inquiry on UK co-operation with China on low carbon development as we consider this to be an issue of considerable importance. It is clear that global efforts to mitigate climate change cannot succeed without co-operation with China.

II. Enhancing low carbon development in China efficiently and at a low cost will be helped by China developing its gas and power market and diversifying its energy mix so as to decrease the use of CO₂ heavy coal and reduce GHG emissions. As a result, development of China’s unconventional gas resources has an important role to play in China’s low carbon development.
III. Opportunities exist in research and development (R&D) and future technologies. Means of cooperation and technology sharing can be established through public-private dialogues and platforms for research such as the US-China Clean Energy Research Centre.

IV. Shell has good experience of R&D partnerships in China, with the China Academy of Science, CNPC, China University and others, that are making progress on information sharing and technology cooperation for low carbon development.

V. Both China and the UK should invest in demonstration projects and aim for rapid commercialisation of Carbon Capture and Storage (CCS) installations in order to make CCS cost competitive with other low carbon power technologies, which would help to deliver large emissions reductions.

VI. In the UNFCCC, bi-lateral relations between the UK (EU) and China are of real importance to moving the Durban Platform forward towards a new agreement, due to come into force by 2020. Bilateral cooperation helps to build trust between the parties and to demonstrate that decarbonisation actions can be taken that also allow the Chinese economy to continue to develop.

What progress has been made in deepening cooperation between UK and China to achieve a low-carbon transition and how should this cooperation be taken forward?

1. Deepening cooperation between the UK and China to achieve a low-carbon transition has encompassed a range of areas. Shell is working with China to help meet its energy needs with lower carbon fuels through the provision of natural gas, LNG and quality oil products. Shell currently operates five unconventional gas projects in China and continues to develop its clean coal energy business, whilst also providing products and services to customers and clients to help improve their energy efficiency and reduce emissions. Shell is also undertaking a joint study with the State Council Development Research Centre (DRC) examining China’s future energy scenarios and policy choices.

2. Shell appreciates the efforts of UK Trade and Investment (UKTI) in promoting low carbon business investments from the UK into China and vice versa. We welcome the opportunity of further UKTI support as well as similar means of cooperation and information-sharing. To further develop UK-China co-operation in this field the UK may wish to seek a follow-up dialogue to the November 2010 UK-China Energy Dialogue. The UK has an opportunity to further focus on unconventional gas in China, with cooperation to improve assessments of China’s unconventional gas potential and jointly explore regulatory proposals in more depth.

3. Within the field of Research & Development (R&D) cooperation, Shell cooperate with the China Academy of Science, CNPC, China University of Petroleum and Wilson, a private engineering company, covering unconventional gas development, heavy oil processing, new coal gasification technology, and new syngas conversion technology.

What progress has been made in implementing the Memoranda of Understanding between the UK and China, including DECC’s Memorandum of Understanding with the National Development and Reform Commission of China?

4. Since the DECC-NDRC MoU was signed in January 2011, practical cooperation around low-carbon development continues with much momentum, particularly around low carbon planning and the use of market mechanisms. Shell welcomes the efforts made by UKTI, with some of the more recent initiatives including: UKTI’s 2011-12 Sustainable Cities Mission focusing on second- and third-tier cities with potential for sustainable urban infrastructure development; the Low Carbon Investment in Asia events in 2011 resulting in the creation of a new Asia Investor Group on Climate Change; exhibiting and hosting a mission to the 2011 Low Carbon Fair in Guangzhou; and, highlighting China’s successful low carbon initiatives on high-level visits. On a more regular basis, there has also been much high-quality support, information and direction for UK companies looking to invest or expand in China. Shell is grateful to the UK for the support provided to various projects still in their early stages.

How can the UK contribute further to the development of China’s climate change mitigation policies, such as those policies governing emissions trading, carbon capture and storage and energy efficiency?

5. The UK Government should continue its good efforts in promoting CCS in the UNFCCC, building on its inclusion in the Clean Development Mechanism (CDM), by emphasizing continued efforts for adequately covering CCS in future agreements. China has a role in ensuring that climate agreements and policies lead to a conducive business environment for investments in CCS. China and the UK should both proceed to invest in demonstration projects and aim for a quick commercialisation of CCS installation in order to make CCS cost competitive with other low carbon power technologies. Early strategic planning of large scale carbon capture, transport and infrastructure will help to deliver large scale emission reductions. The UK and China should also aspire to establish a secure environment for long term CCS investment.

How can bilateral cooperation with China contribute to success in the UNFCCC?

6. Progress at the recent COP17 in Durban is welcomed with a pathway now in place to a new agreement involving all major emitters, including China. There is much work to be done before parties can negotiate a
new agreement by 2015 to come into force by 2020. Bilateral cooperation will support development of trust between parties to demonstrate that action is being taken. Working with the Chinese Government to implement decarbonisation policies will demonstrate that actions can be taken while allowing the Chinese economy to continue to develop.

7. The UNFCCC is consulting on a new market mechanism to be developed as part of the AWG on Long-term Cooperative Action. In the interim phase, the CDM which falls under the scope of the Kyoto Protocol will remain in place. It is essential that the common accounting methodology for measuring GHG reductions as developed for the CDM is kept as a single standard to allow for fungibility of carbon credits between countries and different trading schemes. Shell welcome China’s initiative in developing emission trading systems. As the Chinese schemes develop, and the international approach matures, China would have the opportunity to have certain sectors (cement, refineries, generation) linked into the international offset market allowing it to monetize any extra reductions it makes or buy in offsets to meet targets.

Would low-carbon sectoral linkages, such as sector-based cap-and-trade or common standards, allow participants to increase their decarbonisation ambitions?

8. China is considering levying a carbon tax within the next three years to tighten its regulations on polluting industries and put the economy on a greener path. A draft of a new system of taxation has been submitted by the Fiscal Science Research Center of the Ministry of Finance to the Ministry for review. The plan would impose a tax on emissions of greenhouse gases; the tax is likely to be charged at a rate of 10 Yuan ($1.59) for each ton of carbon dioxide that a business or other operation discharges. That rate is expected to increase gradually over time. The main targets of the tax will be large users of coal, crude oil and natural gas, and tax cuts will be given to companies that take steps to reduce their emissions, but in order to easily collect the tax, it is likely to be collected only from producers and wholesalers of fossil-fuel based energy. In order to encourage producers to reduce CO₂ emissions, the Chinese Government has already established Environment Exchanges in Beijing, Shanghai and Tianjin to undertake carbon trading. This initiative is much welcomed and will help the development of international carbon markets.

What scope is there to implement International Climate Financing to projects in China?

9. International climate financing in particular through the green climate fund is still being developed. This is will be a mix of public funding and private financing projects. China has a good track record of attracting international financing for its projects. The key to making decarbonisation projects financeable is to provide a signal to private sector investors that GHG emissions have a price. This can be done through a cap-and-trade scheme or a carbon tax. As China is taking steps to introduce carbon pricing, one can expect that it will be able to attract private sector flows to its projects when required.

Are there any other ways of building UK-China low-carbon cooperation that you think the Committee should consider?

10. An additional way to build UK-China low carbon collaboration is to support UK company low carbon business collaboration at the city level. China has 666 cities which account for most of China’s economic activity and in turn, the source of significant CO₂ emission. Other countries (such as Singapore) have chosen to focus on city level cooperation to promote their companies. While national level cooperation can sometime peter out when there is a lack of real projects—with a business collaboration objective, inter-governmental cooperation can provide the platform. A successful and innovative model would have the potential for replication in other cities. In addition, a Chinese Government commitment to review recommended policies that would support this cities level approach could lead to wider low carbon development.

11. Cooperation with China should be balanced between a focus on demand side management know-how and technologies and new “low carbon” supply technologies/products. The sectors where UK companies have particular know-how are transportation and mobility planning, infrastructure and urban planning, and industries related technologies, amongst others. As access to multiple cities is time consuming and costly for companies the UK Government could help by establishing the platform for engagement. The selected cities should have critical interests for multiple UK companies. The current US-China clean energy cooperation is regarded as a successful model in which inter-governmental cooperation provided a platform for US companies to develop business in China.

12. As an example of city level interaction, Shell has undertaken Low Carbon Cooperation with Shanghai Science & Technology Commission since 2005 on a range of topics, most recently:

- Low carbon road and road buildings, including the potential of Shell’s warm mix bitumen.
- How to control emissions (dioxins and others) on municipal waste incineration, given that there is no more scope for land fill use—using CRI SERT technologies.
- How to manage goods traffic in and out of cities, building on Shell’s thinking on Smart City Freight Gateways.

January 2012
1. Introduction

1.1 We welcome the enquiry and believe it is particularly timely given China’s rise and its commitment to constrain its emissions growth and accelerate its transition to low-carbon development, a commitment expressed strongly through its 12th five-year plan.

1.2 There are two fundamental reasons why it is firmly in the UK’s self-interest to engage strongly with China on climate change action and the transition to low-carbon development. First, China is now the world’s largest emitter of greenhouse gases, having overtaken the USA, and is likely to remain so in the years to come, accounting for a growing share of the available global carbon space. There is no country more central to global efforts to manage climate change; the success of future global action depends on China’s actions. Second, China is the driver of the world’s growth and the future of this growth is low-carbon. China’s 12th five-year plan and its low-carbon objectives represent major changes in strategy: they represent an ever stronger focus on low-carbon development and growth that aim to place China at the forefront of the low-carbon transition.

China’s actions have important implications for developed countries who must decide how to respond. The developed world, including the UK, needs new sources of growth if they are to repair their balance sheets and avoid further economic stagnation and crises. Helping China to accelerate its low-carbon growth and development plans is in the UK’s national interest as there are many opportunities to share in these new sources of low-carbon investment and growth.

The UK low-carbon goods and services sector is growing strongly. And low-carbon export opportunities are likely to expand over the coming decades as the UK demonstrates a good track record in green innovation in many industries where it also has a strong comparative advantage. Engagement with China in respective areas of comparative advantage could be mutually beneficial, enhancing bilateral trade and low-carbon investment between the countries.

There are many additional opportunities for engagement and cooperation with China on low-carbon development. These include providing assistance with the design and implementation of low-carbon policies such as emissions trading and carbon budgets, and collaboration on research, development and deployment of Carbon Capture and Storage (CCS).

There are major opportunities for research and education exchanges.

2. Helping China to restrain its Emissions Growth

2.1 China’s emissions have increased from around 3.8 billion tonnes of CO₂e in 1990 (around 10% of global emissions) to around nine billion tonnes today (around 20% of global emissions). In contrast, the UK’s emissions have decreased from around 780 million tonnes of CO₂e in 1990 to around 580 million tonnes today.

2.2 What are the future prospects for China’s greenhouse gas emissions? China has a goal to cut emissions per unit of GDP by 45% over the period 2005 to 2020. This would imply total emissions in 2020 of around 12 billion tonnes CO₂e (assuming a 7% annual growth rate). By 2030, a similar increase (as is likely from 2010 to 2020) of three billion tonnes could take total emissions to around 15 billion tonnes per annum.\(^1\)

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\(^1\) Source: Climate Analysis Indicators Tool (CAIT) Version 9.0. (Washington, DC: World Resources Institute, 2011).

\(^2\) Source: UNFCCC country data and DECC provisional emissions data, 2011.

\(^3\) Consistent with the World Energy Outlook 2011 CO2 emissions projections for China (see page 595).
Analysis by the Grantham Research Institute, LSE, indicates total global emissions in the year 2030 need to be around 30–32 billion tonnes for a path that will constrain the rise in average global surface temperatures, with a 50–50 chance, to less than 2°C (see Bowen and Ranger 2009). Therefore it is clear that on current trends China could quite easily represent around 50% of the total global emissions budget in 2030, with less than 20% of the projected global population in that year. This would leave around 15 billion tonnes of total carbon space for the remaining seven billion people likely to be on the planet in 2030.

2.3 These illustrative emissions projections make it very clear that if the world is to successfully manage the risks of dangerous climate change it is imperative that China, as part of wider global efforts, increases its ambitions and slows and then reverses its emissions growth as soon as possible.

2.4 There are also some very difficult questions here around equity. China has historically contributed less to the problem than developed countries and many hold a view that developed countries have “exported” much of their pollution to China. While this may lead some to argue that China could be allowed to emit more in coming years, the global carbon constraints, and the growing proportion of China’s emissions in the global total, represent a very stark and inequitable reality. It is important to consider these issues around equity; they provide another strong reason why the UK should engage with a rapidly developing country such as China.

2.5 This brief analysis clearly demonstrates that it is in all our interests to engage with China to help accelerate its low-carbon ambitions. Successful engagement may increase the chance that China achieves and/or adopts stronger emissions targets over the coming years. It may also encourage greater action from other major emitters. For example, if a clean technology trade block was formed between the UK and China, this could trigger greater action from otherwise reluctant parties, such as the US, who would quickly see the risks of falling behind in the high-tech low-carbon race.

2.6 China appears open to constructive advice and assistance from the UK. The UK should seize this opportunity and build on the many existing initiatives and projects currently underway, eg projects supported by the Foreign and Commonwealth Office Strategic Programme Fund.

2.7 Recent work by Lord Stern, Chairman of the Grantham Research Institute, LSE, provides an illustrative example of how the UK’s knowledge and analytical skills could assist China strengthen its emissions reduction ambitions: China could peak its emissions in the coming years and return to current levels of emissions by 2030, while maintaining a 7% per annum growth rate. This would represent a significant strengthening of current policy.

2.8 We illustrate how such an increase in ambition may be possible using the following emissions accounting identity:

\[
\text{emissions per unit of output} = \text{emissions per unit of energy} \times \text{energy per unit of output}
\]

2.9 The 12th plan has a target for a reduction in emissions per unit of output (emissions intensity) of 17% (see Table 2.1, column 3) and a target for a reduction in energy per unit of output of 16%. However, it has no target for emissions per unit of energy. Given the above accounting identity, some simple maths reveals that the implied target is -1.2%.

2.10 The lower half of Table 2.1 illustrates how more ambition, a 15% reduction in emissions per unit of energy (Table 2.1, column 2), while retaining the 16% target for energy per unit of output, would see the improvement in energy intensity strengthen from a 17% reduction to a 29% reduction. If a 29% reduction was achieved in each of the 12th, 13th, 14th and 15th five-year plans, China’s total annual emissions could be slightly lower than they are today in 2030 (Table 2.1, column 6), while maintaining a 7% per annum growth rate. Given China’s strong renewable energy targets and actions to increase the efficiency of their fossil-fuel electricity generation capacity, it could be possible for China to exceed a 1.2% reduction in emissions per unit of energy in the 12th plan.


6 For a discussion around how stronger “bottom-up” national actions and leading by example can encourage others to act and facilitate greater “top-down” collaboration and agreement, see Stern, N and Rydge, J (2012). The new energy-industrial revolution and international agreement on climate change, Economics of Energy and Environmental Policy 1 (1).


8 China has indicated a 7% annual growth rate over the period of the 12 plan. This will contribute to its overall target of a 45% reduction in emissions intensity 2005–20.

9 (1—0.17) = (1—X) \times (1—0.16). Therefore X = 0.012 (1.2% reduction).

10 (1—X) = (1—0.15) \times (1—0.16). Therefore X = 0.29 (29% reduction).
Table 2.1

<table>
<thead>
<tr>
<th></th>
<th>Emissions/ energy (tCO₂e/toe)</th>
<th>Emissions/ output* (tCO₂e/ '000 $US)</th>
<th>Energy/ output** (toe/ '000 $US)</th>
<th>Output 7% pa growth ($US trn)</th>
<th>Total emissions (bn tCO₂e pa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate for 2010</td>
<td>4.0</td>
<td>1.8</td>
<td>0.45</td>
<td>5.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Current targets:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12th plan</td>
<td>-1.2%</td>
<td>-17%</td>
<td>-16%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimate for 2015</td>
<td>3.95</td>
<td>1.49</td>
<td>0.38</td>
<td>7.0</td>
<td>10.5</td>
</tr>
<tr>
<td>Possible targets for each of the 12th, 13th, 14th and 15th plans:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each five-year plan</td>
<td>-15%</td>
<td>-29%</td>
<td>-16%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimate for 2030</td>
<td>2.09</td>
<td>0.46</td>
<td>0.23</td>
<td>19.3</td>
<td>8.9</td>
</tr>
<tr>
<td>Total change 2011–2030</td>
<td>-48%</td>
<td>-75%</td>
<td>-50%</td>
<td>287%</td>
<td>-1%</td>
</tr>
</tbody>
</table>

* Emissions intensity. ** Energy efficiency.


3. Collaborating with China in the Low-carbon Economy

3.1 China is the driver of world growth and low-carbon growth is the future growth story. There are significant trade and investment opportunities for developed countries, including the UK, in fast-growing markets for low-carbon goods and services, especially in China, so it is in the UK’s national interest to help China promote its low-carbon growth and development plans. There is also much competition for these new markets. Failure to engage with China and to exploit these new growth opportunities could see China move ahead and capture market share in these lucrative low-carbon markets, reducing the opportunity for the developed world and the UK to realise attractive and important new sources of growth.

3.2 China’s 12th plan prioritises seven strategic industries as part of its structural shift to a low-carbon, high-tech and innovative economy, including: energy saving and environmental protection; new energy; clean-energy vehicles; next-generation information technology; bio-technology; high-end manufacturing; and new materials. The target is to increase the share of these industries from around 3% of GDP today to 15% in 2020. Given China’s rate of GDP growth, this implies output in these industries is likely to increase by around a factor of 10 by 2020, creating a high-tech low-carbon group of industries worth around US$1.5 trillion. Such a rapid expansion could require somewhere in the region of US$5 trillion in investment. The implications for developed countries and world comparative advantage are profound.

3.3 Developed countries’ lead in lower-carbon high-tech industries will no longer be assured as China builds and exploits its capabilities in these industries. China will work hard to build a strong comparative advantage in these seven strategic industries, just as it has so strongly over recent years in traditional manufacturing. Furthermore, on-going economic crises and the prospect of a long period of economic recovery in developed countries may divert focus on, and support for, high-tech low-carbon industries and allow China to quickly capture significant market share. This may weaken important sources of future growth for developed countries and further accelerate the global division of skills, ie, skilled and secure jobs will increasingly shift to China.

3.4 High-tech manufacturing in the UK accounts for around 3% of GDP. Industries included in this OECD definition of high-tech more or less overlap China’s seven strategic industries (but not perfectly due to differences in industry classification codes). Therefore China’s plans, if successful, will clearly see it pull ahead of the UK and other developed countries in these lucrative industries.

3.5 How should the UK respond? The UK should not only help China promote its low-carbon development plans but also encourage investment in its own low-carbon industries, and more traditional industries that are transitioning to low-carbon, where it has a natural comparative advantage. Such a competitive strategy may see UK low-carbon export markets grow and may also attract Chinese investment in UK low-carbon industries where the UK has a clear comparative advantage. It will capitalise on China’s rise and tap into the world’s growth engine. The size of the total merchandise trade market between the UK and China is presented in Table 3.1. This illustrates a significant trade imbalance with China (the UK also exports a far lower share of its GDP than China). However, there is great opportunity to increase UK exports of low-carbon manufactures to China (and other countries) in areas where the UK has a natural comparative advantage.

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13 Ibid.
14 Industries included in the OECD definition of “high-tech” manufacturing include: Pharmaceuticals; Office, accounting and computing machinery; Radio, television and communication equipment; Medical, precision and optical instruments; and Aircraft and spacecraft.
Table 3.1

<table>
<thead>
<tr>
<th>UK &amp; CHINA MERCHANDISE TRADE FLOWS 2010</th>
<th>Value (US$ million)</th>
<th>Share of total UK exports/imports (%)</th>
<th>Share of total UK GDP (%)</th>
<th>Share of total China GDP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK exports to China</td>
<td>11,359</td>
<td>2.8</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>UK imports from China</td>
<td>52,649</td>
<td>9.4</td>
<td>2.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Total UK exports</td>
<td>405,666</td>
<td>2.7</td>
<td>18.1</td>
<td>-</td>
</tr>
<tr>
<td>Manufactures (%)</td>
<td>74.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total UK imports</td>
<td>560,097</td>
<td>3.6</td>
<td>24.9</td>
<td>-</td>
</tr>
<tr>
<td>Manufactures (%)</td>
<td>72.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total China exports</td>
<td>1,577,824</td>
<td>10.4</td>
<td></td>
<td>26.8</td>
</tr>
<tr>
<td>Manufactures (%)</td>
<td>93.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total China imports</td>
<td>1,395,099</td>
<td>9.1</td>
<td></td>
<td>23.7</td>
</tr>
<tr>
<td>Manufactures (%)</td>
<td>64.1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


3.6 The size of the global market for low-carbon environmental goods and services (LCEGS) market was around £3.2 trillion in the 2009-10 financial year.15 The UK’s share of this market was around £116 billion, spread across around 52,000 firms employing nearly one million people (£58 billion in low-carbon sub-sectors, £35 billion in environmental sub-sectors, and £24 billion in renewable energy).16 The UK currently has the sixth largest LCEGS market, behind the US, China, India, Japan and Germany. The size of the LCEGS market in the US is around £650 billion (20% of the market), followed by China at around £430 billion (13% of the market).

3.7 The UK is well positioned to be increasingly active in the LCEGS market and increase its market share. Growth of the LCEGS market in the UK during 2009-10 was 4.3%, compared to -0.5% in the US and 1.8% in China. Of the total UK LCEGS market of £116 billion in 2009-10, total exports were around £12 billion, while imports were around £7 billion. Of this exports to China accounted for around £840 million (7% of total UK LCEGS exports) and imports from China accounted for £460 billion (7% of total UK LCEGS imports).

3.8 Preliminary work on green comparative advantage by the Grantham Research Institute, LSE, demonstrates that the UK has a good track record in green innovation (measured by the number of green patents) in many industries where it also has a strong comparative advantage (measured by the relative trade share). See Table 3.2 for examples of these industries. There is strong potential for future UK low-carbon export growth in these industries.

Table 3.2

<table>
<thead>
<tr>
<th>UK SECTORS PULLING AHEAD IN THE GREEN RACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector Description</td>
</tr>
<tr>
<td>Aircraft and spacecraft</td>
</tr>
<tr>
<td>Engines &amp; turbines</td>
</tr>
<tr>
<td>Machinery for mining and construction</td>
</tr>
<tr>
<td>Service activities related to printing</td>
</tr>
<tr>
<td>Measuring/testing/navigating appliances</td>
</tr>
<tr>
<td>Agricultural and forestry machinery</td>
</tr>
<tr>
<td>Sawmilling and planing of wood</td>
</tr>
<tr>
<td>Lifting and handling equipment</td>
</tr>
<tr>
<td>Office accounting and computing machinery</td>
</tr>
</tbody>
</table>

Note: The numbers in Table 3.2 are normalised to the range -1 to 1. Zero represents the world average. A “ratio” of 0.5 means double the world average. A value of -0.5 means half the world average. In these industries/sectors the UK has both a green patent share and a trade share above the world average.

4. Opportunities for Cooperation

4.1 There are many ways the UK can engage and cooperate more strongly with China over the next few decades. Such engagement and cooperation may lead to greater climate change ambition from China and assist to accelerate both countries transitions to low-carbon growth and development.

4.2 As the world’s leader in climate change action, the UK has significant experience and expertise in designing and implementing climate change policies, with considerable success at decoupling emissions growth from GDP growth.17 A considerable depth of high-quality climate change research expertise and knowledge has also developed across our universities, other research bodies and within government.

4.3 There are some specific areas where UK and Chinese cooperation could focus. All have a significant potential for joint learning and exchange of information and views, with benefits for both countries.

4.4 Carbon capture and storage (CCS). There is great urgency for the successful development and deployment of CCS worldwide, especially in China.

4.5 The first priority for CCS deployment should be for coal given China’s current and likely future levels of coal-fired generation capacity. China’s electricity generation capacity is currently around 930 billion watts (GW) with around 70% of this capacity unabated coal-fired plant (IEA, 2011). On current plans China will double total generation capacity by 202018 which is likely to include over 450 GW of additional unabated (GW) with around 70% of this capacity unabated coal-fired plant (IEA, 2011). On current plans China will have around 600 GW of unabated generation capacity by 2020, equivalent to around 1000 GW if non-renewables are included (IEA, 2011). This is 20% of global unabated capacity.

4.6 However, by working unilaterally countries are finding it very difficult to fund expensive demonstrations of the necessary technologies, especially in the current economic climate, resulting in inadequate global levels of investment and very slow progress. In addition, the CCS challenge across the world is so large that no individual state is likely to be able to commit the necessary resources (or have the expertise) to successfully develop and deploy CCS on the scale and timeframe required. China has a number of demonstration projects at very early stages, for example, the GreenGen IGCC project in the Binhai New Area in Tianjin and the Shenhua Coal to Liquids Plant Project at Ordos in Inner Mongolia.19 The UK can learn much from greater collaboration across research, development and deployment on CCS with China and could possibly consider coordinating action to ensure demonstration projects in both countries are adequately funded and successfully completed.20 Funding for China’s projects from the UK’s £2.9 billion International Climate Fund may be appropriate here. This could be combined with support from the Chinese Sovereign Wealth Fund. Such action would build on more modest current CCS initiatives, eg the £2 million commitment from Research Councils UK and matching funding from China’s National Science Foundation. An initial cooperation objective could aim to accelerate our understanding of where CCS will work, first confirming it will work for coal and gas by ensuring current projects in China are completed, then moving to biomass, and finally assessing its scope for development and deployment across industry.

4.7 Climate change policy—legislated carbon budgets, carbon markets and finance for emissions reductions. UK climate change policy has consistently led the world and has delivered substantial emissions reductions since 1990, even after excluding the impact of the recent economic crises. The UK pioneered the statutory underpinning of target setting with the Climate Change Act 2008 and subsequent Carbon Budgets. These budgets help to prevent future governments from weakening commitments to emissions reductions. This learning and expertise would be of great relevance for China’s regions as they attempt to formulate and implement climate policy consistent with the top-down directions of the 12th plan and the central government. Also of great relevance would be the UK’s experience and knowledge on how to successfully implement climate change policy, for example, how to avoid overlap, negative interactions and perverse incentives and outcomes.

4.8 The UK also has considerable experience in designing and participating in market based mechanisms to reduce carbon emissions, eg the European Union Emissions Trading Scheme (EU-ETS). It is also pioneering innovative methods of financing for domestic energy efficiency investments through the “Green Deal” and plans to facilitate low-carbon technology investments, which attract a high cost of capital and would otherwise be overlooked by private investment markets, through the new Green Investment Bank. Lessons from the implementation of these market based mechanisms would be relevant for China as it develops its own market based policies, eg pilot carbon trading projects.

4.9 Research and education exchanges. There is considerable scope for both the UK and China to share research expertise and knowledge in our respective areas of strengths. There is evidence of growing research collaboration across research, development and deployment on CCS with China and could possibly consider coordinating action to ensure demonstration projects in both countries are adequately funded and successfully completed.20 Funding for China’s projects from the UK’s £2.9 billion International Climate Fund may be appropriate here. This could be combined with support from the Chinese Sovereign Wealth Fund. Such action would build on more modest current CCS initiatives, eg the £2 million commitment from Research Councils UK and matching funding from China’s National Science Foundation. An initial cooperation objective could aim to accelerate our understanding of where CCS will work, first confirming it will work for coal and gas by ensuring current projects in China are completed, then moving to biomass, and finally assessing its scope for development and deployment across industry.

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17 Over the pre-recession period 1990 to 2005, total greenhouse gas emissions per person in the UK fell, on average, by -0.8% per annum, while for the same period GDP per head grew at an annual average rate of over 2% (see Table 1 in: Bowen A and Rydge, J (2011) Climate Change Policy in the United Kingdom, Economics Department Working Paper No. 886, OECD Paris).
19 For more information on CCS and China’s pilot projects, including the GreenGen IGCC project, see the website of the Global CCS Institute: www.globalccsinstitute.com/projects
20 The International Energy Agency has called for greater cross-border collaboration on CCS. See: www.iea.org/roadmaps/ccs_roadmap.asp
links and exchanges between the UK and China. Lord Stern is a frequent visitor to China and his analysis of China’s economy and emissions reduction plans is highly regarded by leading Chinese academics and government officials (eg the research we have cited extensively throughout this submission, Stern (2011), was originally presented at the China Development Forum in 2011, and subsequently reworked and published in World Economics). There would also be merit in establishing a dedicated China research group, possibly within DECC or a leading university, to encourage learning, sharing of knowledge and expertise, and the undertaking of mutually beneficial work. This would complement the considerable work the Foreign and Commonwealth Office already does on the ground in China. China could benefit, for example, from exposure to the UK’s leading position in research, development and deployment of offshore marine and offshore wind technologies, while the UK would benefit from China’s leading position and experience in building interconnected and flexible high-voltage electricity grids. In other areas where strengths are more equal, such as discussed in the development of CCS, we could collaborate to accelerate progress beyond what would be possible by any individual nation state.

January 2012

Joint submission by The University of East Anglia, The Tyndall Centre for Climate Change Research and The Low Carbon Innovation Centre

Prepared by Professor Trevor Davies, 1 Professor Corinne Le Quéré, 1, 2 Mr Asher Minns 1, 2 and Dr John French3

1 University of East Anglia.
2 Tyndall Centre for Climate Change Research.
3 Low Carbon Innovation Centre.

(A) About the Author Team

(A)(1). The University of East Anglia (UEA) is ranked in the top one% of universities in the world and is consistently in the top ten for student satisfaction. It is a leading member of the Norwich Research Park, one of Europe’s biggest concentrations of researchers in the fields of environment, health and plant science.

(A)(2). The Tyndall Centre for Climate Change Research is an active and expanding partnership of eight UK Universities (Cambridge, Cardiff, Manchester, Newcastle, Oxford, Southampton, Sussex and UEA where its headquarters is located) and since May 2011 Fudan University in Shanghai. The Tyndall Centre represents a substantial body of the UK’s climate change expertise from across the scientific, engineering, social science and economic communities. It has advanced the fundamental analysis of emission reduction from all major energy sectors, greenhouse gas scenarios, climate impacts, integrated modelling, adaptation, and the governance of climate negotiations and policy making.

(A)(3). The Low Carbon Innovation Centre (LCIC) at UEA is a centre of excellence in low-carbon consultancy and innovation and has supported the development of strategic initiatives with China with particular reference to the built environment sector (for example through CRed Global). It also delivers innovation funding programmes. Building on the success of Carbon Connections it is now operating the Low Carbon Innovation Fund, a £30 million venture capital fund that has been created to support innovation in low-carbon businesses. The multi-partner collaborative project InCrops,21 also at UEA, supports the development of low-carbon economic growth through innovation in crop based bio-renewables. This low-carbon group of commercially facing UEA companies has provided and continues to develop UK-China business based developments at the cutting edge of new developments. It is now leading the development of a new Exemplary Low Carbon Building at UEA (£15 million funded project) for completion in 2014 in parallel with similar projects in China.

(B) Executive Summary

(B)(1). Strong collaborations already exist between the UK and China on low-carbon development that should be encouraged and expanded, including through the Fudan Tyndall Centre and CRed Global, both UEA-led efforts in Shanghai. These efforts engage many UK academics and businesses in the UK and in China. Establishing such collaborations takes years of efforts that are only beginning to pay off. DECC and HM G could help leverage the wider potential of these efforts by aligning funding opportunities in both countries to support ongoing activities and their expansion.

(B)(2). Exemplar low-carbon buildings can serve as catalysts for wider implementation of low-carbon development. China has and will continue to undergo changes in its built environment as a result of rapid urbanisation. CRed Global has helped to identify a number of low-carbon science park development

21 The InCrops partnership includes: Institute of Food Research (IFR), John Innes Centre (JIC), Norwich Research Park, Rothamsted Research, Buildings Research Establishment (BRE), National Institute of Agricultural Botany (NIAB), University of Essex, University of Cambridge Department of Plant Sciences, Renewables East, Easton College, Forestry Commission, University of East Anglia (UEA) School of Biological Sciences and the Low Carbon Innovation Centre at the UEA.
opportunities, which, if realised could benefit UK companies. There is an opening for some UK companies to use this type of link to move into an up-scaled production in China with its massive market. China is very keen to attract low-carbon techniques and practices, and an attractive model which we would like to pursue is continuing investment from China in earlier stage R&D in the UK, and then large-scale manufacture for the Chinese market from within China. DECC and HMG could support these projects by providing funding for R&D and collaboration.

(B)(3). Expertise needs to be built within China to support the Chinese policy process and low-carbon development. Advice from Chinese scientists is effective to influence the policy process and China’s contribution to the UNFCCC. Although many Centres and universities exist in China, the research is fragmented and little expertise exists on the interdisciplinary aspects of climate change relating impacts, mitigation and adaptation, and exploring the options, costs and financial benefits of low-carbon development. Collaboration between Chinese and UK researchers would help accelerate the development of local capacity in China, and would open dialogue routes to Chinese policy makers.

(B)(4). China’s CO₂ emissions need to be monitored and published annually, including the CO₂ intensity of their energy sector, the emissions associated with trade, and the emissions from the forest sector. Similar annual publications of global CO₂ emissions are under co-ordinated by the Tyndall Centre have proven powerful ahead of the UNFCCC COPs. An effort is under way to expand these budgets to countries, including China, and where possible provinces, cities and sectors. Such efforts should be sustained in time and supported by international collaborations. The UK Met Office internationally launched robust climate scenarios and impacts for 24 countries at COP17 in Durban. There is a similar need for high quality carbon-economy scenarios.

(B)(5). Overall more visibility for UK expertise on low-carbon development in China would benefit both countries. This could be accomplished by publicising the UK’s know-how in China, or more simply by establishing targeted activities on low-carbon development. An official formal agreement for a pan UK/China research institute on the interdisciplinary aspects of low-carbon following the model of the British Antarctic Survey would provide a focus for fruitful and long-lasting collaborations between the two countries. A number of EU countries have formal partnerships (eg the Sino-German low-carbon science park in Qingdao), and we would urge the UK government to consider such formal relationships.

Our more detailed input in response to the Inquiry’s specific questions is as follows:

1. What progress has been made in deepening cooperation between UK and China to achieve a low-carbon transition and how should this cooperation be taken forward?

1.1 Fudan Tyndall Centre, Shanghai

1.1.1 The Tyndall Centre has formed a partnership with one of the top universities in China—Fudan University in Shanghai. The Fudan Tyndall Centre is co-directed and co-managed by academic staff from Fudan University and from the UK Tyndall Centre. Professor Trevor Davies, Pro Vice-Chancellor of the UEA, who is a Deputy Director of the Tyndall Centre, has a similar position and status at Fudan University and co-directs the Fudan Tyndall Centre. The Fudan Tyndall Centre is advised by an International Board co-chaired by the previous Chinese Minister of Science and Technology and Professor Sir Bob Watson, the Chief Scientific Adviser at DEFRA and Director of Strategy for the UK Tyndall Centre.

1.1.2 The UK/Fudan Tyndall Centre partnership has high level political support in both China (nationally and at city-level) and in the UK, and good links are being made with China’s National Development and Reform Commission (NDRC), Ministry of Science and Technology, Ministry of Transport, and Ministry of Environmental Protection. Fudan University is investing many tens of millions of yuan over the next five years in the Fudan Tyndall Centre, and the allocation of resources will be decided by the Chinese and UK Co-Directors.

1.1.3 The partnership will allow Fudan University to rapidly build capacity in the policy relevant interdisciplinary research on sustainable options for climate change (including a major emphasis on low-carbon transitions) in which the UK Tyndall Centre excels. In turn, the UK Tyndall Centre has access to excellent discipline-based research at Fudan University, and the opportunity to participate in genuinely collaborative research and training with the world’s biggest greenhouse gas emitter.

1.1.4 The Tyndall UK-China collaboration could be expanded, solidified and distributed in several main cities and universities in China. Current plans are to include other excellent Chinese universities and research institutions (eg Chinese Academy of Sciences Research Centres) as a Chinese Tyndall Centre network to mirror the UK Tyndall Centre network. Some agreements-in-principle are already in place. An expansion of the Tyndall Centre in the UK is also under consideration.

1.2 CRed Global

1.2.1 As well as the academic research and training described above, the UEA has formed the joint venture, CRed Global LLP, with the Urban Planning and Architectural Design Institute (UPADI), a commercial consultancy with its headquarters in Shanghai. The UK Tyndall Centre is a key advisor and will support CRed Global, which aims to establish an office in China,

22 Latest annual publication of the Global Carbon Budget: http://www.tyndall.ac.uk/global-carbon-budget-2010
actions in low-carbon transitions. CRed Global will draw on the low-carbon expertise within the UEA and the LCIC, in collaboration with leading UK low-carbon design professionals. The long record of successful low-carbon innovation at UEA has built an excellent network of business, local government, and other organisational contacts which, together with relevant real-world experience, constitute an effective vehicle for a low-carbon innovation partnership in China.

2. What progress has been made in implementing the MOUs between the UK and China, including the DECC-National Development and Reform Commission MOU?

We do not have a contribution to this question.

3. How can the UK contribute further to the development of China’s climate change mitigation policies, such as those policies governing emissions trading, carbon capture and storage and energy efficiency?

3.1 Designing and Developing Exemplar Low Carbon Buildings

3.1.1 China has and will continue to undergo changes in its built environment as a result of rapid urbanisation (LBNL, 2011). This urbanisation and the related demand for infrastructure and commercial and residential energy services are (and will continue to be) important driving forces for future energy consumption in China. 290 million new urban residents were added from 1990 to 2007, with another 380 million new urban residents expected from 2007 to 2030 and a further 92 million to 2050. Two more mega-cities (with populations of 10 million or more) and over 50 second-tier cities with smaller populations are expected by 2030. All of these new urban residents need to be provided with housing, energy, water, transportation, workplaces and other energy services (LBNL, 2011).

3.1.2 China’s central government is providing a strong policy lead driven by its joint aims of sustainable growth, energy efficiency and climate change mitigation as well as its ambitions to adopt world-class best practice and demonstrate global leadership (China-Britain Business Council and UK Trade & Investment, 2011).

3.1.3 The UEA’s joint venture, CRed Global (referred to in paragraph 1.2.1 above) together with Fudan Forward, a Chinese developer with links to Fudan University, has identified a number of low-carbon science park development opportunities in major cities in China, some of immense scale by British standards. The signing of some of these agreements was witnessed by David Willetts at the UK-China Ambassador’s residence in Beijing in June 2011. Potential projects such as this, which are actively supported by the local governments, will have the effect of demonstrating world leading low-carbon design, showcasing UK specialist expertise, inspiring higher standards and in doing so generating repeat business and effecting a greater rate of change.

3.1.4 There are also agreements to design and build individual low-carbon buildings, including the new home for the Fudan Tyndall Centre on Fudan University’s new campus in Shanghai. Work undertaken thus far has already involved UK companies, and there is potential for this to grow considerably. There is an opening for some UK companies to use this type of link to move into an up-scaled production in China with its massive market. China is very keen to attract low-carbon techniques and best practices, and an attractive model which we would like to pursue is continuing investment from China in earlier stage R&D in the UK, and then large-scale manufacture for the Chinese market from within China.

3.2 Analysing the Wider Economic Co-benefits of GHG Policies

3.2.1 There have been concerns in China about securing reliable longer term energy supplies and undesirable environmental side effects of development such as water and air pollution, health effects and loss of biodiversity. China is increasingly making use of market based mechanisms and it is expected that there will be experiments with these new approaches during the 12th Five Year Plan (FYP) period, 2011–15 (Seligsohn, 2010). Though there are no detailed plans on carbon tax/trading schemes at this stage, they are expected to be introduced eventually.

3.2.2 The Tyndall Centre can uniquely contribute to understanding economic instruments and climate policies by examining co-benefits and trade-offs though the Cambridge Centre for Climate Mitigation Research’s seminal E3MG model (E3MG www 2011), led by Terry Barker and Annela Anger. Understanding co-benefits can be a strong incentive to support continued and strengthened climate change mitigations.

3.3 Exploring Governance

3.3.1 During the 11th FYP period, China established a range of regulatory bodies, including the Energy Conservation Leading Committee, the Climate Change Leading Committee, the National Energy Commission, and the National Climate Change Expert Pool, and corresponding local government organizations. A system of targets and accountabilities assess performance and holds local government and major enterprises accountable for implementing energy conservation policies and achieving targets (CPI, 2011). Effective governance of climate policy at different scales is a challenge to the EU and UK and such lessons and understanding could be applied to the Chinese context. Professor Andy Jordan and group at Tyndall Centre UEA are experts in EU environmental and climate policy governance who can contribute to Chinese researcher’s knowledge of policy evaluation and methodologies.
3.4 Low-carbon Development in the Water and Food Sectors

3.4.1 During the 12th FY P period, Hunan Huaihua City will invest CNY 30 billion in water works including flood control, farmland, water ecology and water use. Shanxi province also announced that it will invest CNY 1.5 billion every year in water works for the next five years. Such infrastructure needs to be resilient to the projected impacts of climate change as well as support low-carbon development. Knowledge is missing on the trade-off for water and energy of different policy decisions in the water and food sectors. Such questions are being examined by Professor Declan Conway, an expert in China’s water management for agricultural livelihoods and Dr Helen He, a Chinese Citizen and hydrological modeller/water engineer, both at Tyndall UEA, in collaboration with colleagues in China.

4. How can bilateral cooperation with China contribute to success in the UNFCCC?

4.1 Capacity Building for Shared Understanding

4.1.1 There is broad political consensus within China that measurement and reporting are crucial for ensuring domestic goals are met. The Chinese government has been working on these systems in preparation for its new Five Year Plan goals and there are demands for better systems coming not just from the central government officials charged with monitoring local performance, but from the localities that want to ensure they get credit for the changes they make. Acting on climate change is also closely linked to tackling concerns about environmental pollution and energy security; the co-benefits of these policies are in line with China’s principle “to address the climate change within the framework of sustainable development.” (NDRC, 2007). China is also vulnerable to the impacts of climate change, providing a further motivation for the Chinese government to take the issue more seriously than before. These factors perhaps explain why Wang and Watson (2009) (amongst others more recent) have noted an attitude change at recent climate negotiations.

4.2 At the Tyndall Centre we have found that the Chinese government will take advice and criticisms from Chinese scientists. At present, there is insufficient expertise in China on the interdisciplinary aspects of climate change, both for impacts, mitigation and adaptation. The UK needs to support and build interactions with those scientists to share the latest thinking and approaches. At the same time, technological diffusion in key energy technology in China (eg wind turbines and solar panels) has been much faster than in other countries, and the rest of the world can learn from this.

4.3 In addition to the motivation of addressing climate change, interest is strong in China because many see the opportunities from improving efficiency and investing in new technologies, rather than focusing only on the costs of emissions reduction (Price et al, 2011). In addition to the benefits that this brings, China appears to be orienting itself towards becoming a global technology innovator. R&D funding is set to increase dramatically, leveraging public and private sources from the current 1.7% to reach 2.2-2.5% of GDP (Posner, 2011).

4.4 Support for the Annual Publication and Analysis on Chinese CO2 Emissions

4.4.1 As stated in the Select Committee Announcement, China’s active role in the UNFCCC process is essential for controlling global emissions for the coming decades. China’s CO2 emissions need to be monitored and published annually, including the CO2 intensity of their energy sector, the emissions associated with trade, and the emissions from the forest sector. Annual data are not all available at present, and the most up-to-date statistics are usually more than two years out of date or poorly scrutinised by others. Annual publications would provide objective verification of progress, and maintain pressure on actions to control emissions growth. The CO2 intensity is required to verify progress against China’s own objective to reduce their CO2 intensity by 40-45% by 2020; emissions associated with the trade of goods produced in China but consumed in the west (27% of Chinese emissions) is required to ensure that there is equity in the allocation of the emissions and realistic estimates; emissions from the forest sector are required to provide due credit to China’s massive afforestation programme.

5. How can UK and China better collaborate to develop the technologies needed for the low-carbon future, while managing intellectual property issues?

5.1 As stated in the Select Committee Announcement, three of the seven Strategic Emerging Industries (SEIs) are directly related to clean energy technologies; these being (i) Energy Conservation and Environmental Protection, (ii) New Energy and (iii) New Energy Vehicles.

5.2 One example in relation to the Energy Conservation and Environmental Protection SEI is UEA’s joint venture, CRed Global, which together with Fudan Forward, a Chinese developer with links to Fudan University, has identified a number of low-carbon science park and headquarter development opportunities (referred to in paragraphs 3.1.3 and 3.1.4 above).

5.3 The UEA is responding to the demand for short low-carbon training courses, and has had discussions with the Chinese Ministry of Environmental Protection over the nature of such courses. The Chinese
government’s intentions for carbon reductions over the next few years will place much responsibility on government and city officials and staff.

5.4 A number of European countries have “formal partnerships” at Government-level in the few early planned low-carbon science parks in China (eg the Sino-German low-carbon science park in Qingdao). We would urge the UK Government to consider such a formal relationship. Another initiative could be a jointly operated low-carbon early investment fund linking UK and Chinese universities and businesses. The LCIC is in discussion with Fudan University over just such a possibility.

5.5 China reached an 8.3% share of primary energy from non-fossil fuel sources in the 11th FYP against the target of 10%. Challenges came from larger than predicted overall energy consumption and from delays in developing hydroelectric and nuclear power over the last five years. Current indications are that these technologies will now progress more rapidly with stronger government backing (Posner, 2011), as the Chinese Government aims to increase the share of non-fossil fuel in its primary energy consumption to 11.4%, with large investments expected in the nuclear, hydro and wind power sectors by 2015. China continues to invest heavily in wind, solar and nuclear power, as well as in experiments in carbon capture and storage. In 2010 China overtook the United States in total installed wind capacity (GWEC, 2011). The sheer scale of planned investment to achieve the FYP target should create opportunities for collaboration between the UK and China to develop the required technologies.

5.6 There is an emerging smart grid industry in China and a number of foreign companies are seeking to capitalise on this by, for example, increasing investments and providing technological support. The Chinese government is extremely supportive of this.

5.7 These rapid changes in China require in-depth understanding of energy futures, economics and policy pathways to inform policy and technology. Tao Wang and Jim Watson of the University of Sussex in 2009 published their Energy scenarios for China—this work should be revisited. Their work in China uses the powerful backcasting techniques for use by stakeholders developed in 2004’s Decarbonising the UK by Kevin Anderson et al at Manchester University. Jim Watson is an expert on China’s energy dimensions, low-carbon technology transfer, and low-carbon development, and Watson/University of Sussex is submitting a separate detailed response to this inquiry. Tao Wang, a Chinese National, is now working at the Carnegie-Tsinghua Centre for Global Policy in Beijing working on energy policy.

5.8 With regard to intellectual property (IP) issues, we would simply note that we are aware that China intends to strengthen its law (and enforcement thereof) applying to domestically developed IP, however it is currently uncertain as to whether this will extend to foreign entities operating in China (The Climate Group, 2011).

6. What scope is there for increasing regulatory alignment between the EU and China such as the development of common low-carbon standards for specific industries?

6.1 Regulatory standards would ideally go beyond the relativity poor standards of the EU, not merely align with them. China has the advantage that it is not transforming an existing locked-in energy market or retrofitting old building stock. With R&D, collaboration and investment, China could become the international exemplar of a low-carbon and effective economy. For example, with standards, the most efficient technology in the EU, such as a car, could be the worst available in China. On GHG production from energy, the efficiency of the technology is already transitioning to international standards because the technology is OECD derived. Collaboration could again work towards Chinese technology going beyond EU standards (and as standard utilise waste heat for district heating etc). There is also huge opportunity for collaborating on Carbon Capture and Sequestration (CCS) but there are currently no plans for any CCS power stations in the medium term, even though CCS R&D is a Chinese priority in 12th FYP (The Climate Group, 2011).

6.2 There is considerable scope for improving minimum regulatory standards in the built environment in relation to energy efficiency in building fabric and mechanical and electrical services. As an indication of scope, a study by Wang, Chang and Dauber (2009) comparing the Chinese Energy Conservation Design Regulation for Public Buildings, 2005 with UK Building Regulations “Part L”, 2006 found that potential energy savings of 29% could be achieved by enhancing the requirements of the Chinese regulation to the then UK level. The UK Building Regulations were improved in 2010 and will be further improved in 2013. The NDRC is expected to draft a new Climate Change Law together with associated energy conservation regulations during the current FYP period (The Climate Group, 2011), therefore there is an opportunity to influence the policy of the Chinese government which is seeking to emulate international best practice.

6.3 Exemplar low-carbon developments which exceed minimum regulatory standards and which are independently verified through third party environmental rating systems such as the Building Research Establishment’s BREEAM (the non-domestic equivalent of the Code for Sustainable Homes) have the potential to create a virtuous cycle, raising aspirations and stakeholder value and generating further business opportunities for UK specialist low-carbon professionals to assist in achieving exemplar standards as well as assist with the development of similar Chinese rating systems.

6.4 There is considerable scope for sharing best practice in the built environment between the UK and China. For example, through the CRed Global LLP, LCIC has been exchanging best practice with UPADI in China.
on low-carbon design and construction. Firstly, there has been an emphasis on developing a strategic integrated low-carbon design brief encouraging the collaboration of architects, engineers, cost consultants and contractors from inception—something that is not widely encouraged in China apart from for prestigious buildings. Secondly, the LCIC has encouraged sustainability in design through the use of BREEAM and Passivhaus rating systems and standards for mainstream commercial and residential buildings. These systems have the potential to transform China’s built environment, however at present the most widely adopted system in China is the USA developed LEED. The UK government could therefore support the wider take-up of BREEAM thereby generating business in China for the Building Research Establishment as well as UK registered BREEAM Assessors and Accredited Professionals.

6.5 There has been shared best practice in relation to the RIBA Plan of Work stages and the Chinese equivalent for design and construction projects. We can learn about the speed of construction and “can-do” attitude of Chinese companies, whereas the UK system has much to offer in terms of procurement, risk assessment/management and sustainability.

6.6 One important stage generally absent from standard Chinese practice, but encouraged by LCIC to its UPADI colleagues, is post occupancy evaluation. Very few buildings in China are monitored, as data collation and analysis of energy and other environmental performance metrics are in its infancy, thereby depriving occupiers, owners and future designers of valuable feedback to inform further improvements in design and actual performance. This is a particular area of LCIC’s expertise, and one where a valuable contribution can be made in China. For example, in the UK the LCIC is currently engaged in the Technology Strategy Board’s Building Performance Evaluation programme, and is collaborating with UPADI on all aspects of the project including, specifically, low energy lighting strategies.

6.7 The LCIC and UPADI have been working on a model of collaboration that capitalises on the best of UK low carbon design, project management and post occupancy evaluation with Chinese technical design and construction. This model, if successful, could pave the way for more UK companies engaging in China and for Chinese companies to develop low-carbon projects.

7. Would low-carbon sectoral linkages, such as sector-based cap-and-trade or common standards, allow participants to increase their decarbonisation ambitions?

7.1 Yes if the regulation is stringent enough, but not too stringent. A robust evidence-based answer to this question and the effects and feedbacks to the wider Chinese and global economy requires rigorous energy-economy analysis that exists in the modelling facility E3MG (referred to in paragraph 3.2.2 above).

8. What scope is there to implement International Climate Financing to projects in China?

8.1 Evidence from the established Clean Development Mechanism (CDM) suggests that bilateral climate financing is unnecessary in China. More efforts should be made to reinforce the original idea of CDM as a tool to channel sufficient direct technological and equity investment from the West into the developing world. China’s industrial and financial capacity makes it one of the few places with the domestic capacity for CDM criteria—on average four CDM projects have been approved at the national level each day, and China has established itself as the leading host country in the global CDM market. An often overlooked factor is that almost all the CDM projects are unilaterally implemented by Chinese companies, rather than Annex-1 bilateral parties. As one manager of a large state-owned wind farm builder stated (Shen 2011): “We don’t even need the banks because we have sufficient cash flow to take up some projects by our own.” When asked if the company, with such robust financial performance, really needed CDM revenue to support its operation, the manager laughed and said: “Carbon revenue is not a significant part of our income, yet we need to look at the future as the carbon market will eventually be a very attractive market and we need to move early.” This research was undertaken by Wei Shen, a Chinese National, who is a researcher at Tyndall UEA. A more effective use of climate financing with long-term benefits is the support for academic engagement and capacity building that we outline herein.

9. How can DECC and HMG more effectively promote the strengths of the UK’s low-carbon sector to China?

9.1 From looking at the companies involved in low-carbon deployment at scale in China (2011 Privately Commissioned Report), the Private Sector strengths of the UK’s low-carbon sector appear to be relatively unknown in China, in contrast to the examples of Alstom Grid’s China technology Centre, Siemens Ltd offices in Beijing and Shanghai, Hewlett Packard, IBC Solar, and the Chinese deploying solar plants in South Africa and Germany.

9.2 In addition to the “export” benefits from promoting the strengths of the UK’s low-carbon sector to China, the knowledge transfer and capacity building in research and development could flow both ways in these sectors, with Chinese industry having considerable expertise that could be deployed in the UK, particularly in relation to rapid diffusion and deployment of low-carbon technology. For example, the Chinese government aims to increase the nation’s current solar energy generation capacity from 5GW to at least 10GW during the current 12th FYP period. China is the world’s largest consumer of solar hot water systems, and is a major exporter of solar panels and modules (mostly to Germany). It also has ambitious plans to increase nuclear power capacity from the current 10GW to 80GW by 2020.
10 Are there any other ways of building UK-China low-carbon cooperation that you think the Committee should consider?

10.1 Knowledge Exchange

10.1.1 The main thrust of our representation is the dividends of supporting university capacity building and knowledge exchange between the UK and China’s research know-how, and the commercialisation of the same. This will lead to a long-term and consistent better understanding, improved performance, sharing and developing the evidence-base, technical and social innovation, and shared intellectual support for the UNFCCC process and ambitions, as well as the development of new and potentially sizeable export markets for specialist world-leading UK expertise.

10.2 Innovation Funding

10.2.1 We believe the financing of exemplary low-carbon businesses will be a key driver going forward. Scope exists to target UK businesses operating in and exporting knowledge and other services into China through the creation of a new low-carbon innovation fund to support UK-China business based innovation. The UEA wishes to expand UK-China cooperation by launching a new UK-China investment fund targeted explicitly at companies operating in the UK-China arena with particular emphasis upon new technology development and low-carbon technology adoption. This will both drive the exploitation of our research and technology based industries and also accelerate the rate of change in China. The Committee may be interested in receiving further details outside this submission on how the UEA would seek to approach this initiative.

January 2012

References


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Written evidence submitted by Anthony Day  

Summary

1. HMG energy and trade policies pick “winners” and “losers”. HMG has no policy to decarbonise UK gas supplies, or to support British gasification technology exports to China. HMG supports the export of advanced British coal preparation and combustion technology, despite coal no longer being a primary indigenous UK energy resource. Meeting EU/UK energy and environmental policy targets using coal combustion technology with CCS is complex and expensive.

China seeks to diversify its energy supplies away from excessive reliance on coal combustion, and Russian, Central Asian and Qatari gas, and is actively developing indigenous shale gas and SNG. British companies exporting gasification and SNG technology to China, India, Korea and Indonesia receive no support from HMG.

Coal combustion relies on CCS technology to meet EU/UK decarbonisation policy. Longannet demonstrated that coal combustion is a complex and expensive route to CCS. Commercial CCS has been operating in USA since 1984, using lignite gasification to co-produce Synthetic Natural Gas (SNG), electricity, fertiliser and chemicals. Producing pipeline quality SNG produces “free” CO₂ at zero capture cost. Cost benefit analysis for decarbonised SNG indicates costs of electricity and Carbon abatement 50% lower than for post-combustion fossil fuel CCS.

2. The 2001 UK-China MOU allowed for a wide range of “clean energy” technologies. In practise, the MOU has been used exclusively to concentrate on technologies to produce electricity: nuclear, coal, CCS and Hydrogen. The Hydrogen economy does not exist, whereas the international Natural Gas/SNG economy is highly developed. DECC’s Scientific Advisory Group supports Hydrogen, but not SNG. This is not economically or technically realistic.

Hydrogen is a difficult fuel due to its high flame speed, low energy content and tendency to blow back. Hydrogen embrittlement of welds, escape via gaseous diffusion and reactions with plastics are known hazards. SNG has higher calorific value, better combustion characteristics and fewer metallurgical and plastics problems. SNG is an ideal co-product, energy carrier and store, for Hydrogen produced by electrolysis using excess wind power.

3. Gasification is one of two main routes from Carbonaceous fuels to clean energy. In 2002, DTI withdrew support for the UK gasification industry, in favour of supporting the UK combustion industry, citing the lack of UK gas turbine (GT) manufacturing capability, followed Rolls-Royce withdrawal from the USA Futuregen Hydrogen IGCC in 2000, citing commercial reasons. The reason was technical. The combustor “cans” in R-R’s aeroderivative GT’s are too small for Hydrogen firing, and aeroderivative GT’s are too small for UK power utilities. No international market exists for Hydrogen fired GT’s. R-R does not manufacture industrial GT’s, albeit is currently working on a 100-MW We 2 + 1 aeroderivative CCGT, which will meet National Grid plc Frequency Reserve Requirements.

The “driver” behind Hydrogen IGCC’s is CCS, despite their being fundamentally uneconomic. It involves spending money and energy to remove one of the primary energy carriers, Carbon, from the process before
getting any energy out of it, thus involving a triple cost penalty. Decarbonised, or Carbon neutral, SNG is far more economical as all the chemical energy in the process is used to produce energy or saleable chemicals.

4. Industrial gasification is mainly used to convert low grade fossil fuels or process wastes into chemicals, fertiliser and fuels, including SNG. SNG is a primary route to clean, economic, flexible, storable, fungible energy, and is being developed in USA, India, China, Indonesia and Korea. China is investing in “clean” low grade coal and lignite gasification technologies and SNG, and is beginning to investigate waste gasification, in order to: improve gas supply security; reduce energy losses, from pressurising liquefied CO₂ from 60 to 150 bar for injection into a long distance CO₂ pipeline are much lower than for a large flue gas cleaning plant, highly diluted CO₂ chemical solvent looping energy losses, from pressurising liquefied CO₂ from 60 to 150 bar for injection into a long distance CO₂ pipeline are much lower than for a large flue gas cleaning plant, highly diluted CO₂ chemical solvent looping CO₂ emissions. Negative emissions from sequestered biogenic CO₂ offset emissions of fossil CO₂. This concept is called “carbon neutral SNG”.

An SNG plant produces 50% of pure CO₂ at 60 bar pressure at zero cost. CAPEX and OPEX, and parasitic energy losses, from pressurising liquefied CO₂ from 60 to 150 bar for injection into a long distance CO₂ pipeline are much lower than for a large flue gas cleaning plant, highly diluted CO₂ chemical solvent looping separation plant and 1 bar gas to 150 bar liquid CO₂ compression plant required for a fossil fuel 90% post combustion CCS plant. Smaller CO₂ flows reduce pipeline and sequestration costs.

The UK gasification industry is not represented in Whitehall. DECC’s “all electric” policy is more costly than the parallel de-carbonising of storable gas and electricity supplies proposed by Energy Networks Association’s Gas Futures Scenarios. My analysis, based on total supply of 75GW of 50% renewable electricity at 50 gCO₂/kWh at 50% plant load factor, 33% of which is provided by decarbonised SNG, will achieve large CAPEX and OPEX reductions compared with 105GW proposed by DECC. A joint “clean gas” policy will be of economic benefit to UK and China, and ensure the security and geo-political diversification of energy supplies.

REPORT

I am a private consultant. I have received no remuneration from the companies listed below. The companies have confirmed to me that they have received no assistance from HM G when selling UK gasification technology in China and India, and that I might use their names in this report.

DTI made an error, based on incorrect engineering and economic advice from the UK coal and boiler industries, when it withdrew support for the British gasification industry in 2002. I have received a great deal of technical assistance during a three year study of the engineering and economics of co-gasification, SNG and CCS. Reversing DECC’s over-reliance on electricity, for lack of any policy to decarbonise gas, would, if accepted and acted on by HM G, be of benefit to these companies. Nonetheless, they do not wish to challenge deeply embedded electrification policy for fear this might affect their other businesses.

From 1955 to 1992, UK was a World leader in gasification R and D. The advanced chemical and process engineering and design expertise inherited from British Gas has survived and enabled UK to maintain a small, but active international gasification industry reliant since 2002 on Chinese investment and USA DOE feasibility studies. If the Chinese decide to do the chemical analysis and process design themselves, and the UK/EU co-gasification market does not develop, the UK industrial scale gasification industry will probably disappear within the next three to five years.
There is a Worldwide resurgence of interest in gasification, SNG and CCS, led by China. The first of a new generation of British designed British Gas Lurgi (BGL) Oxygen blown slagging gasification plants in China and India is currently being tested and commissioned by British engineers, and will be in production next year. Other British companies are developing SNG plants in Korea, USA and China. These successes are largely unreported in UK.

In September last year, I invited DECC to meet a group of Chinese engineers and investors visiting the UK. I received no reply. I then wrote to DECC proposing that a planned fully instrumented BGL gasifier at a Research Institute in Beijing be used to test suitable UK renewable fuel mixes. I received no reply. The meeting with the Chinese identified three inter-related markets using the same core high efficiency co-gasification technology:

- India/China open commercial markets: Waste and coal co-gasification to produce storable fertiliser and “dispatchable” Town Gas.
- China state market: Coal to SNG with CCS.
- EU/UK regulated commercial markets: Hazardous and non-hazardous waste, biomass and coal co-gasification to produce storable SNG and “dispatchable” electricity.

Notes:
1. Chinese state owned SNG/Natural Gas pipelines not accessible to private enterprise.
2. Chinese state supports the development of SNG and CCS. Wind is a small part of total Chinese energy supply.
3. Numerous Chinese cities of up to 10 million inhabitants still rely on Town Gas. Town Gas has to be “dispatched” in order to balance supply and demand in local gas grids.
4. China and India possess large deposits of low grade sub-bituminous coal and lignite. Oxygen blown slagging gasification was developed in Germany in 1943 to utilise Italian lignite. Calorific value of briquetted lignite similar to mixed waste, biomass and coal.
5. Fertiliser is a profitable commercial product with state controlled price in China. Strong demand.
6. Waste is a negative price partly biogenic fuel. China has a large waste disposal problem.

For the last two years, I have been attempting without success to get DECC to recognise the case for decarbonised SNG, and the parallel decarbonising of the gas and electricity grids.

Last October, I attended a presentation by National Grid plc recommending the development of renewable biogas and SNG for heating purposes as peak Winter gas demand for heating is around four times greater than peak Winter electricity demand. Replacing gas for heating with electricity by 2030, as currently proposed in DECC’s 2050 scenarios, together with other forms of electrification, will involve largely abandoning UK’s gas grid, and injecting the size of the electricity grid by a factor of five to nine times. National Grid proposed injecting 700 PJ pa of decarbonised gas into the gas grid to balance peak heat demand. Professor Mackay listening, stated at the time, and subsequently to me in a private conversation, that he did not believe National Grid’s figures. I subsequently wrote to Professor Mackay, setting out the case for decarbonised SNG. I was promised a reply within three weeks, but heard nothing.

In December, I attended a joint DECC/Carbon Trust technology development workshop on Bio-SNG, at which I pointed out that the technology to co-gasify waste, biomass and coal to produce SNG at World-beating operational flexibility and net energy efficiency was fully developed, and required no R and D funding, but did require policy support for “clean gas”. Dr. Oakley of Cranfield University and Chris Manson-Whitton of Progressive Energy Ltd, supported this argument. It was clear that this message was not welcome, as the objective was to acquire funding for new “World class” R and D, creating potential future employment from 2030 onwards, not to support policy to commercialise existing completed R and D in order to generate profitable business now. Other experts on gasification agreed with my proposition that what would sell British technology was not intrinsic engineering excellence, but the ability to produce energy at lower cost than competitors’ technologies.

DECC/Carbon Trust tabled a report projecting renewable gas production commencing in 2030, ramping to 310 PJ pa by 2050, compared with current UK demand of 4000 PJ pa. This is equivalent to 10 million tonnes pa of mixed waste, biomass and coal (at 20 GJ/tonne and 75% conversion efficiency), 4% by 2050 of current UK production of 250 to 275 mtpa of energy bearing wastes, biomass and coal. DECC and Carbon Trust used an input fuel price of £4/GJ for biomass, reflected in the projected high cost, and low output, of SNG. This ignored the subsidy of £16/GJ for a typical 65% biogenic residual non-hazardous waste stream provided by...
Energy and Climate Change Committee: Evidence

UK possesses the World’s most fuel flexible and efficient large scale multi-fuel co-gasification, SNG and CCS technology, elements of which are currently being built in China. DECC’s “ears” are closed to the message. Without policy support for decarbonised SNG from DECC, UK energy utilities will not invest. The costs below are from a three year joint engineering and economic study, using information provided by:

- Jacobs Engineering Group Inc. (formerly Aker Solutions ASA): Capital and operational cost advice.
- Tetronics Ltd: Plasma waste processors.
- Expansion Energy Ltd/Timmins CCS Ltd: Process engineering, methanation and CCS.
- Claverton Energy Group. Energy “think tank”. Several ex-British Gas engineers have assisted.
- CNG services Ltd. Low carbon compressed Methane as a vehicle fuel.

Other companies are involved. The KATALCO family of catalysts developed by British Gas and ICI for use with the HICOM combined shift and methanation process, designed to complement the BGL gasifier, are owned by GL Noble Denton Ltd, licensed to Johnson Matthey plc and its subsidiary Davey Process Technology Ltd. Information on HICOM and its integration into a CCS scheme has been provided by ex-British Gas engineers at GL Noble Denton Ltd and Expansion Energy Ltd Ltd, not Johnson Matthey and Davey, who did not respond to inquiries. The combination of the BGL gasifier, HICOM methanation and Timmins CCS is the highest efficiency, fuel and operationally flexible, and lowest fuel cost multi-fuel SNG and CCS process available worldwide. Johnson Matthey is active in China, and stands to profit were HMG to return to its pre-2002 policy stance of supporting large scale Oxygen blown slagging co-gasification waste, biomass and coal.

**COMPARATIVE COST OF ELECTRICITY AND EMISSIONS FOR VARIOUS TECHNOLOGIES AND FUELS**

<table>
<thead>
<tr>
<th>Technology/fuel mix</th>
<th>LCOE £/MWh</th>
<th>Energy store included</th>
<th>Dispatchable to Frequency Reserve</th>
<th>Priority access required to grid</th>
<th>CO2 emissions gCO₂/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>De-carbonised SNG (waste/biomass/coal) in CCGT</td>
<td>£41.6</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>450</td>
</tr>
<tr>
<td>De-carbonised SNG with CCS in CCGT</td>
<td>£49.0</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>90 (Note 1)</td>
</tr>
<tr>
<td>Nuclear pressurised water reactor</td>
<td>£67.8</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td>Natural gas CCGT</td>
<td>£96.3</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>400</td>
</tr>
<tr>
<td>Natural gas CCGT with post combustion CCS</td>
<td>£102.6</td>
<td>No</td>
<td>? (Note 7)</td>
<td>No</td>
<td>50</td>
</tr>
<tr>
<td>Advanced Supercritical coal with CCS</td>
<td>£111.9</td>
<td>No</td>
<td>?</td>
<td>?</td>
<td>800</td>
</tr>
<tr>
<td>Advanced Supercritical coal</td>
<td>£133.2</td>
<td>No</td>
<td>?</td>
<td>No</td>
<td>90</td>
</tr>
<tr>
<td>Onshore wind (inc £14 to 60/MWh “add on” costs)</td>
<td>£100 to £145</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>0 (+ back up?)</td>
</tr>
<tr>
<td>Offshore wind (inc £21 to 67/MWh “add on” costs)</td>
<td>£145 to £180 (Note 4)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>0 (+ back up?)</td>
</tr>
</tbody>
</table>

Notes:
1. Conventional Selexol and compressor CCS. Timmins CCS Ltd low emissions high pressure CO2/Syngas solvent looping being costed.
2. LCOE for partly biogenic fuelled SNG excludes ROC’s worth £40/MWh. Including ROC’s gives net LCOE with CCS of £100/MWh.
3. Medium term LCOE projections based on Mott MacDonald, Parsons Brinkerhoff and Arup 2010-11 reports for DECC.
4. Intermittent wind “add on” costs provided by former National Grid plc Power Network Director using probabilistic methodology. Alternative “add on” cost estimates around £25/MWh, reducing the effective cost of offshore wind to £145/MWh. Decarbonised SNG backs up intermittent wind by using the gas grid as an energy store.
5. De-carbonised SNG data from feasibility study for biomass, waste and coal co-gasification energy from waste power station to replace Didcot A.
6. Effect of post combustion CCS on operational flexibility currently under debate. Schemes include amine solvent pre-heating, hot dirty flue gas storage and allowing additional “by-pass” emissions during plant start-up. Flexi-start post-combustion CCS schemes not yet engineered, costed or emissions estimated.

Due to the controversial nature of this response to the public consultation, and my privileged position as a private consultant having access to 50 years of UK, USA and EU state funded R and D, which is now private property, I have divided the Appendices into public access, and commercially confidential information. I would
ask the Select Committee to seek the written consent of the parties, who provided the confidential information, prior to any publication.

Information on the IEA led, joint UK/USA funded, British Gas Corporation gasification development programme is accessible at University of Texas via Fischer-Tropsch Organisation’s website. The same data underlies the Appended confidential process engineering analyses. Please let me know if you require any additional information.

Attachments (not printed):

Public Access Data

- One page summary of the costs and benefits of multi-fuel co-gasification to SNG and CCS. January 2012.
- BGL gasifier. Summary of energy balance (Sankey diagram) and operational criteria.
- Photos of British designed BGL gasifiers under construction in China. Summer 2010.
- DECC letter in response to my invitation to meet a visiting group of Chinese engineers and investors currently developing BGL gasifiers and fuel preparation and feed technology in China. November 2011.
- Timmins CCS process flow and chemical analyses, and presentations. Provided via Expansion Energy Ltd.

Plus Commercially Confidential Data.

January 2012

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Written evidence submitted by the Carbon Capture & Storage Association (CCSA)

The CCSA brings together a wide range of specialist companies across the spectrum of CCS technology, as well as a variety of support services to the energy sector. The Association exists to represent the interests of its members in promoting the business of Carbon Capture and Storage (CCS) and to assist policy developments in the UK, EU and internationally towards a long term regulatory framework for CCS, as a means of abating carbon dioxide emissions and combating climate change.

The CCSA has established a leading position in international as well as domestic affairs relating to CCS and its membership is poised to benefit from stronger growth links with China in this area. The CCSA has played host to a number of Chinese inward missions as well as being involved in a number of visits to China to discuss potential opportunities. Latterly, the CCSA Chief Executive co-chaired (with the Chinese host) the Stakeholder Forum at the Ministerial meeting of the Carbon Sequestration Leadership Forum.

General Comments on the Chinese situation

1. The fact that China has become the world’s largest emitter of greenhouse gases means that this country must represent a major focal point for emissions reduction into the future.

2. The IEA, in its World Energy Outlook 2011, states that coal demand in China was around 2,350 Mtce in 2010. It is expected to grow to over 2,850 Mtce by 2020 before stabilising at around 2,800 Mtce towards 2035 under the “New Policies Scenario”. Whilst this represents an enormous emissions problem it also represents a massive mitigation opportunity through CCS.

3. The largest amount of current emissions is produced from conventional pulverised fuel coal power plants. Whilst it is, potentially possible to retrofit CCS to existing plants there are several factors why this is a low priority. Many existing plants will be too old and/or inefficient to warrant major additional capital expenditure. Plants will be operating at capacity and therefore reducing capacity due to the parasitic load of the CCS plant will not be an attractive proposition. On the contrary, new plant offers the opportunity to build in capacity for parasitic load, optimise design for capital as well as operating costs and amortise all investment over a consistently long period. There is considerable interest to fit post-combustion CO2 capture on new-build power stations but currently no incentive to do so. In new-build situations both pre- and post-combustion capture will have a role to play.

4. In presentations and inward missions it is clear that a number of Chinese businesses are also keenly interested in poly-generation when it comes to the application of CCS. With abundant coal reserves, China is...
keen to utilise this resource in the domestic production of hydrogen for power generation and industrial feedstock, coal-to-liquids (CTL) for vehicle fuel and coal based chemicals production. Poly-generation is based upon coal gasification technology from which syngas/hydrogen is produced (with pre-combustion capture) as feedstock for these chemical processes. There is already a number of pilot and commercial scale gasification based processes in operation.

5. There is a particular emphasis in China on CCUS (Carbon Capture, Utilisation & Storage). There are various ways in which CO₂ may be utilised including as a component of industrial feedstock but the most potentially significant is for Enhanced Oil Recovery (EOR). With limited funding available to incentivise CCS in developing countries including China EOR will likely become a critical factor in the development of, at least, the earlier CCS projects.

6. Whilst the total CO₂ emissions from the power sector in China amount to about 1.4 Gt the total emissions from industrial processes, manufacturing and construction amount to the same figure. Within that mix there also massive opportunities for reductions using CCS especially in sectors such as steel, cement, refineries and chemicals where CCS is the only current decarbonisation option.

INTERNATIONAL FRAMEWORK FOR CCS PROJECTS IN CHINA

7. At the UNFCCC COP17 in Durban Parties agreed that CCS should be recognised for inclusion in the Clean Development Mechanism (CDM). Including CCS in the CDM by itself is unlikely to bring forward significant numbers of CDM incentivised CCS projects because of the weak credit price and uncertainty about long term carbon markets requiring early CCS projects to “blend” CDM revenues with other forms of climate finance. More importantly it has set a significant precedent that CCS must be a recognised part of any future agreement. It is significant that China positively supported this measure.

8. Also agreed at COP17 was the commitment that all Parties will agree globally binding targets by 2015 to be in place by 2020. This agreement must now include China. This means that China will be seeking to identify large-scale, cost-effective measures to meet future emissions reduction commitments. CCS is already considered a viable option.

9. A future climate agreement is likely to contain some element of credit for Nationally Appropriate Mitigation Actions (NAMAs) carried out under bi-lateral or multi-lateral arrangements. It is clear that CCS would qualify as NAMAs.

10. CCS is also named as a qualifying technology under the Green Climate Fund although there remains considerable uncertainty how the funds will be allocated, which countries will qualify and what commercial conditions may apply. If the ambitions stated in the agreement hold good then at $100 billion pa by 2020 the magnitude is appropriate for CCS.

BUSINESS INTEREST IN CCS IN CHINA

11. Chinese companies have a considerable interest in responsible investment as they seek to reduce domestic emissions, broaden their investor base and increase international portfolios. As an example the Huaneng Group, a major power generator with a total installed capacity of 113 GW (almost twice UK), has a major share of the Greengen project (a 250 MW IGCC project with EOR/CCS). Another example is Shenhua, the largest coal producer in the World, which has built a major CTL plant and is injecting CO₂ at a rate of 100,000 tpa into a saline formation.

12. International companies are already very active in China in pursuit of business and business partnerships. Many of these companies are members of the CCSA and are also engaged in project development in the UK. There is considerable scope for knowledge-sharing within partnerships to benefit all parties as the international CCS market develops. A recent example of technology cooperation is an agreement made between Alstom and Datong. Under the terms of the MoU, Alstom, together with Datong, will develop two CCS demonstration projects located in Heilongjiang province and Shandong province. Alstom offers three technologies for carbon capture: oxy-firing, chilled ammonia and advanced amines. A 350 MW coal-fired power plant in Heilongjiang will be equipped with Alstom’s oxy-firing technology and a 1,000 MW coal-fired power plant in Shandong will also adopt one of Alstom’s leading carbon capture technologies. Both CCS projects are scheduled for operation in 2015. Once completed, the two CCS demonstration projects will each be able to capture above 1,000,000 metric tonnes of CO₂ annually.

13. More difficult to establish is business cooperation at a level further down the equipment supply chain. A very good example of success is embodied in the UK head quartered company Howden which has established itself as a major supplier for Chinese coal fired power stations, manufacturing large fans and regenerative heat exchangers in China. Howden Hua was established in 1994 and is now actively supporting various CCS developments in China including the Huadian Xinjiang Weihuliang CO₂ CCS project and the Donguan pre combustion IGCC project. Further announcements regarding technology cooperation may be expected soon.

14. Many UK based consultancy operations are active in China in areas of environment (especially CDM), management, legal, financial and engineering services. This can often be a catalyst to business for...
manufacturing and contracting. One such example is Camco, a UK based AIM listed company active in climate change services and CCS.

15. Chinese companies have become well known for their interest in UK inward investment. In CCS this has not yet apparently been the case although anecdotally there have been preliminary discussions. It is notable that already the Huaneng-CERI Powerspan Joint Venture has been selected as one of the companies to participate in the technology qualification program for the Mongstad CCS project in Norway.

16. There has been a great deal of discussion about possible loss of IP to Chinese companies. It is clear that there is a great technology focus in a country that has much to gain from exploiting new development unencumbered by the bureaucratic regimes of the west. Most Western organisations now recognise the inevitable development of technical resource in China and seek to work with it rather than remain isolated.

UK Actions Needed to Increase Growth Links with China in the Area of CCS

17. The first thing and above all is that the UK should quickly proceed to install the first commercially sized CCS installations. This is not so as to demonstrate technology to the Chinese as was the pretext of the proposals for the UK’s first demonstration launched four years ago, now abandoned. On the contrary, this is to put the UK in the CCS club with China who meanwhile has delivered on pilot and demonstration scale plants.

18. In efforts to encourage knowledge sharing arising from publically funded CCS investment in the UK, Government should make China a particular focus for cooperation and joint venture. Government should align this activity with trade promotion through UKTI. Knowledge sharing activity must respect the protection of intellectual property.

19. China is already a target market for UKTI. DECC/OCCS should liaise with UKTI to develop a campaign to promote UK business interests in CCS.

20. Government should host selected inward missions on CCS technology with a view to technology partnering and also with a view to inward investment in the energy sector including CCS.

21. The UK Government played a very active role in getting CCS recognised in principle in UNFCCC processes. Now the emphasis needs to be to ensure that future agreements adequately cover CCS. Liaison with other Parties, particularly China, must be an essential feature of ensuring that climate agreements lead to a business environment conducive to CCS.

22. The UK Government has previously initiated and invested in the NZEC project aimed at developing a CCS proposal that might be later taken up as a commercial project. The project has not delivered on this objective and is anyway under the management of the European Commission. It is not recommended that any further resource be committed to NZEC and that, in future, resources should be focused on the measures outlined above.

The views expressed in this paper cannot be taken to represent the views of all members of the CCSA. However, they do reflect a general consensus within the Association.

January 2012

Written evidence submitted by Global Action Plan

1. Executive Summary

1.1 Global Action Plan is a charity that has been working in China since 2008. We have run three different programmes with the British Council China: Green Your Schools Programme, Climate Champions and the development of a range of teaching resources.

1.2 The programmes have been primarily focused within the education system however they have allowed greater learning from the close work with both young Chinese and their teachers. The key findings from our work in China are as follows:

— Achieving a low carbon economy needs societal change as well as technological and legislative change.

— Global Action Plan’s experience suggests that there are opportunities for building closer links between China and the UK in educational systems.

— There are huge opportunities but also challenges for working collaboratively on education projects. Opportunities include great grassroots passion for sustainability coupled with the scale achievable whilst challenges include culture and associated life pressures.

— Educational projects are essential to shift a growing perception within China that high carbon lifestyles are aspirational.

— The issue of who is responsible for growing carbon emissions is contentious and is an area where further discussion and agreement is required.
2. Introduction

2.1 Global Action Plan is an independent national charity that provides practical guidance to support sustainable development through a mix of facilitated behaviour change programmes based on measurable achievements and the promotion of sustainable lifestyles through web and paper-based publications.

2.2 We belong to an international family of Global Action Plan's which follow similar programmes, each tailored to its specific cultural milieu. GAP (UK) began in 1993 and over the last 10 years has developed a wealth of experience about how best to support changes in everyday behaviour to achieve reductions in the consumption of natural resources.

2.3 We achieve behaviour change by:

- expressing ideas and information clearly;
- promoting realistic, positive, simple actions whose effects can be measured;
- encouraging social interaction through support and feedback;
- demonstrating that individuals and small groups can make a real difference; and
- evaluating our programmes to improve their effectiveness.

2.4 In this submission, we present a brief overview of our programmes run in China and their auditable outcomes (Section 3); and follow this with an analysis of the lessons we have learned in how to engage the Chinese public to carry out specific changes in consumption practices in homes and schools.

3. Our Programmes

3.1 Since 2008 Global Action Plan has worked with the British Council China to develop climate change resources for use in Chinese Schools. This work has been divided across three main projects: Green Your Schools Programme, Climate Champions and the development of a range of teaching resources.

3.2 Green Your Schools Programme

The Green Your Schools Programme has involved training Chinese teachers in interactive teaching methodologies based around the subject of sustainability. During each visit to China by Global Action Plan around 10 workshops were run. Over the last two years of the project (2010 and 2011) Global Action Plan ran 19 workshops providing training to over 700 secondary school teachers. In an urban school there are between 2,000 and 5,000 pupils to whom the teachers took their training and knowledge from the workshops.

3.3 Climate Champions

Global Action Plan delivered training for British Council China Climate Champions (formally Youth Ambassadors) at 2009 and 2010 summer camps in Beijing and Hangzhou. The aim of this training was to enable the Climate Champions to run their own EcoTeam project in their community. Over the two years approximately 300 students took part in a week long camp educating them on climate change and the practical action they could take in their communities to help themselves and others live a more sustainable life. They then took this information and ran their own EcoTeam projects reporting back to the British Council China the environmental savings this had allowed them to achieve. Overall savings achieved by students reporting on completed projects are summarised in the table below.

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2009 &amp; 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average % reduction waste</td>
<td>12.3%</td>
<td>10.1%</td>
<td>11.2%</td>
</tr>
<tr>
<td>Average % reduction electricity</td>
<td>18.6%</td>
<td>18.9%</td>
<td>18.7%</td>
</tr>
<tr>
<td>Average % reduction gas</td>
<td>5.7%</td>
<td>12.3%</td>
<td>9.0%</td>
</tr>
<tr>
<td>Average carbon savings per household (kg/y)</td>
<td>582.5</td>
<td>565.2</td>
<td>573.8</td>
</tr>
<tr>
<td>Average carbon savings per EcoTeam (tonnes/y)</td>
<td>2.9</td>
<td>3.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Total carbon savings (tonnes/y)</td>
<td>41.1</td>
<td>77.8</td>
<td>119.0</td>
</tr>
</tbody>
</table>

3.4 Training Resources

As well as the hands on projects Global Action Plan have also been involved in the development and production of a vast amount of teaching resources for the British Council China to disseminate out to Chinese teachers and schools. Development included contributing to the resources on the British Council Climate 4 Classroom website, creating biodiversity lesson plans and developing active learning resources which were disseminated by the British Council China to hundreds of schools around China.
4. Learning

4.1 Education

From our project we learnt that in the education system in China there is massive competition to reach the top. From our discussions with students and teachers we found that how well they do in their exams is tied very tightly to what level of university they go to and ultimately what job they get. Only the very top percent of school students can expect to get the best jobs in the country. This can mean that the main focus for many students is the highly prized academic subjects like Maths, English, Chinese and Science, which often impacts on time to learn about social science based topics, such as sustainability. Global Action Plan has learnt that, like here in the UK, there is a real need to embed sustainability into the education system so it becomes a highly prized and essential subject that will provide the knowledge to create positive life opportunities for students. Working with the British Council China also works with local education partners to engage schools to their programmes and understand their curriculum needs and any curriculum research or change around climate change education. By extending this work and collaborating with the Chinese government on educational needs this could provide a key way to continue to engage the Chinese public in sustainability issues.

4.2 Cultural

4.2.1 The pressure to perform academically is only enhanced by many of the cultural and personal pressures that young Chinese face. From our close work with 1,000s of young Chinese and their teachers, Global Action Plan has found that there is added pressure on them to do well due to the one birth policy. There is a cultural expectation that they will look after and provide for the older generations and with the 4:2:1 phenomenon meaning one child often has two parents and four grandparents to support this pressure is further amplified. Although there is respect for climate change science and great understanding of the subject for young Chinese this can jar with the pressure to show success and provide for an ageing population. This needs to be understood better and only by working with the Chinese can we find the solutions.

4.2.2 From working first hand with Chinese citizens Global Action Plan has gained some understanding of the challenges when applying sustainability idealism to the context of a rapidly developing economy. With increasing urbanization and economic development the students we worked with highlighted that many Chinese young people aspire to a consumer driven lifestyle. The idea of a simpler, rural, more self sufficient life, often the romanticised ideal of the sustainable lifestyle to a UK citizen, is considered a much less desirable image. This is a key issue that may be unfamiliar in the UK sustainability movement and something we must be careful to work with and not against. There is an urgent need to make the sustainable lifestyle more attractive and core to the Chinese aspirational life themes.

4.2.3 In workshops we encountered discussion about the model the western world has set to become a “developed” country and the responsibility for China’s emissions. Some expressed the opinion that many of the emissions currently associated with China are produced through the production of goods for other nations and that there should be more consideration for this in global policies. As it stands it is easy and cheap for business to outsource production of goods to China as a way of making fast profit. This highlights the need these issues to be considered in UK policy making and business practice so the Chinese people and government are not left solely with the responsibility of emissions driven by UK consumer demand.

4.3 Scale

4.3.1 What became very apparent to Global Action Plan through working closely with the British Council China is the enormity of scale of impact that is possible through the Chinese education system. By engaging students and teachers and giving them the skills to take back to their community to create sustainable living it is possible to reach people on an extensive level.

4.3.2 What Global Action Plan has learnt from the time spent working with the youth and education system of China is that there is great enthusiasm and passion for sustainability at the grassroots level. We believe that the scope for reach through teachers and students in China is potentially enormous. For every one teacher trained they will reach 40 to 80 students per class and potentially 2,000 to 5,000 pupils per school. It could then be assumed that these pupils would share their new knowledge and learning with their families and reach. British Council China also works with local education partners to engage schools to their programmes and understand their curriculum needs and any curriculum research or change around climate change education. By extending this work and collaborating with the Chinese government on educational needs this could provide a key way to continue to engage the Chinese public in sustainability issues.

5. Summary

5.1 From the work that Global Action Plan has carried out in China alongside the British Council it is clear that there is great opportunity to continue to engage the Chinese people in the Climate Change agenda. As in the terms of reference China is not committed to emissions reductions as part of an international agreement and the solutions seem to be heavily focused on technology. Global Action Plan believes that policy and technology do not solely provide the answer. Building UK-China low carbon cooperation should not only come from a top down level but also from a grassroots level. Global Action Plan as an organisation believes that behaviour change on an everyday level, whether it is in the workplace, the home or in educational establishments can make tangible and significant achievements in the building of a low carbon and sustainable...
future. To work with China there has to be cultural learning from both sides. Sharing and learning between the
two countries needs to be core to whatever level of cooperation the UK has with China on low carbon
development.
January 2012

Further written evidence submitted by Anthony Day

Work is continuing to bring to market an updated version of British Gas Corporation’s proven multi-fuel to
Synthetic Natural Gas (SNG) technology, including economic Carbon Capture and Sequestration (CCS), which
was not a consideration at the time British Gas Corporation existed.

I attended a meeting last week between Johnson Matthey plc, GL Noble Denton Ltd and Timmins CCS Ltd
to continue the integration of the proven 1989 British Gas high pressure coal to SNG scheme with the Timmins
CCS scheme. During the last several months new information has come to light, which following that meeting
I would like to bring to the Select Committee’s attention:

1. British Gas Corporation planned to provide the whole of UK gas supply by SNG, and developed
the World’s highest efficiency SNG technology for the purpose. A 1985 HMG study predicted
the need for SNG would arise during 2010 to 2020. The detailed engineering of the final 1989
British Gas SNG scheme has been recovered from archive and is now available. Ex-British Gas
engineers have advised that scheme is well engineered. This has given confidence that the
projected net energy efficiency of 76% to SNG is deliverable.

2. The high temperature combined shift and methanation catalysts developed by British Gas on
which the 1989 SNG scheme was based are being used at Great Plains in Dakota. This is the
World’s largest SNG plant with CCS, and has been operating since 1984. The plant now
regularly achieves 92% plant availability.

3. Johnson Matthey is currently developing 5 SNG plants in China, the first of which came on
line last week. Jacobs Engineering Solutions Inc is also engaged in SNG development in China
and S. Korea. The first of a new generation of British Gas Lurgi plants designed by GL Noble
Denton Ltd started producing Syngas last week.

4. The 2010 to 2015 Chinese 5 Year Plan includes the development of between 80 and 110 bn
cub.m. pa of SNG capacity. This is equivalent to building the whole of UK gas supply in five
years. A similar phenomenon occurred in the 1970’s when British Gas licensed its very similar
oil distillate to SNG process. In a five year period sufficient SNG capacity was built in USA to
supply the whole of UK gas supply.

5. China plans to increase its domestic gas production by around 380 bn cub.m. pa during the
period 2010 to 2020. This is equivalent to building four times total UK gas demand in a 20
year period. Up to 30% of this domestic production will be from SNG.

6. The Chinese authorities have recognised that SNG is a cost-effective route to CCS as all SNG
plants are inherently Carbon Capture Ready. The Chinese authorities are also planning to
increase the minimum net energy efficiency for permitting SNG plants from 52 to 56%. (See
discussion below on energy efficiency).

7. The EU 2050 roadmap envisages the development of up to 240GW of gas fired electricity
generation with CCS by 2050. Much of this capacity could be economically provided by
supplying gas decarbonised at source to conventional downstream CCGT’s, which would
effectively be decarbonised at zero cost, and no loss of operational flexibility.

8. The potential total EU and China market for decarbonised SNG could be in the order of 250 to
300 bn cub.m. pa, around three times current total UK gas demand.

KEY TECHNOLOGY ISSUES: ENERGY EFFICIENCY, FUEL FLEXIBILITY AND EMISSIONS

The gasification business is driven by the added value of converting low cost low grade fuels into high value
energy vectors. The “key” technology issue is the net energy efficiency of converting solid and liquid fuels
into SNG with CCS. Increasing net efficiency reduces both costs and emissions, and is thus a “win win”
situation. This is discussed on more detail below.

The choice of input fuel and output energy vector is the biggest single technical and economic design issue
for gasification plants, and largely determines the choice of gasification technology. The choice of gasifier is
crucial. The World of large industrial scale gasifiers is split into two types: pulverised fuel and solid fuel
gasifiers. Solid fuel gasifiers are split into dry ash and slagging types. The British Gas Lurgi slagging gasifier
is not only the World’s highest efficiency gasifier, but is also the only industrial scale slagging gasifier capable
of co-gasifying waste, biomass and coal. Due to the high Methane content in the Synthesis Gas produced by
the gasifier, it is also particularly well suited to producing SNG.

Gasification plants are inherently cleaner than combustion plants, and slagging gasification plants are
inherently cleaner than dry ash gasification plants. All SNG plants are inherently Carbon Capture Ready.
It is difficult to obtain reliable Public access data on the key operational and economic criteria for SNG plants: Capital cost per unit thermal energy input, and net process energy efficiency. This information is normally commercially confidential. The comparison below has been acquired from disparate sources, requiring a good deal of manipulation to obtain the comparative "key" data, shown in the red box. This information should be treated with caution. On the other hand, I doubt that better information is available to the Committee.

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**Comparison of Capital Costs for SNG Projects, with and without CCS**

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Energy Input</th>
<th>SNG Output</th>
<th>Capital Cost (2012)</th>
<th>Type of Pressure</th>
<th>Type of Gasifier</th>
<th>CAPEX Cost/ GWth</th>
<th>CCR/CCS Cost/ GWth</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Gas 1986</td>
<td>Coal 2GWth</td>
<td>45.4mGJpa</td>
<td>£1.0b</td>
<td>BGL</td>
<td>HICOM</td>
<td>£1.0b/GW</td>
<td>75.90% CCR n/a</td>
</tr>
<tr>
<td>Worley Parsons 2007</td>
<td>Coal 0.232GWth</td>
<td>6.68mGJpa</td>
<td>£2.0bn</td>
<td>BGL</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Advantica 2007</td>
<td>Coal 0.696GWth</td>
<td>13.9mGJpa</td>
<td>£0.117bn</td>
<td>BGL</td>
<td>HICOM</td>
<td>£0.516bn/GW</td>
<td>60.40% CCR n/a</td>
</tr>
<tr>
<td>POSCO 2012</td>
<td>Coal 2.0mtpa</td>
<td>7.1mGJpa</td>
<td>£1.1b</td>
<td>BGL</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Worley Parsons 2011</td>
<td>Coal 0.66GWth</td>
<td>13.9mGJpa</td>
<td>£0.355bn</td>
<td>BGL</td>
<td>HICOM</td>
<td>£0.54b/GW</td>
<td>60% CCR n/a</td>
</tr>
<tr>
<td>POSCO 2012</td>
<td>Coal 1.8mtpa</td>
<td>27mGJpa</td>
<td>£1.8b</td>
<td>BGL</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>WEC 2011</td>
<td>Coal 3GWth</td>
<td>63mGJpa</td>
<td>£2.52bn</td>
<td>Siemens</td>
<td>TREMP</td>
<td>£0.84bn/GW</td>
<td>61.40% CCS £17.2bn</td>
</tr>
<tr>
<td>Timmins 2012</td>
<td>Coal 3GWth</td>
<td>63mGJpa</td>
<td>£1.2bn</td>
<td>Siemens</td>
<td>TREMP</td>
<td>£1.83bn/GW</td>
<td>76.90% CCS £17.2bn</td>
</tr>
</tbody>
</table>

**Notes**

1. Assume 200% average plant cost inflation 1986 to 2012. Combine RPI inflation 238% 1986 to 2012, and CEPCI inflation 185% 1986 (318) to 2011 (318) + (say) 3% inflation to 2012 = 190% total CEPCI inflation.
3. Coal calorific value not declared. S. Korea, low rank coal upgrade from <4500kCal/kg to >6000kCal/kg being investigated. 1 cal = 4.184J
4. Check assumptions: 1.8mtpa (which = approx 45GJpa = approx 1.5GWh/gas input) approx 60% efficiency
5. CAPEX disclosed on internet at $905m. Believed to be 'bare plant' cost. 2011 USA DOE/NETL/Worley Parsons SNG study indicates total 'as delivered' cost averages approximately double 'bare' cost. Use $1.8bn as total CAPEX
6. 415MWth as per cost benefit analysis enlarged to 666MWth scale to meet Frequency Reserve minimum requirement of 100MW on-site electricity generation for export for 14 hours per day, normal daily peak.

What is clear from the study, however, is that there is a clear advantage in terms of net process energy efficiency in all the schemes using the ex-British Gas HICOM combined shift and methanation technology and the British Gas Lurgi slagging gasifier. The additional revenue created by increasing process efficiency is effectively all clear profit. The British Gas SNG technology is believed to be the most profitable SNG technology available anywhere in the World. The inverse of high profitability is low output energy cost.

The two latest studies above indicate a Marginal Abatement Cost of Carbon of $16.70 and £17.50 per tonne of Carbon, excluding site specific transport and storage costs. These are of the same order of magnitude as the 2010 DECC study of industrial uses for CCS, indicating that gas processing is the lowest cost route to CCS.

**Figure 1: CCS abatement cost range - 2010-50 by sector [USD/tCO2 avoided]**

Despite the success of British companies selling Synthetic Natural Gas technology in the growing markets in India, China, USA and Korea, this critically important "key" technology route to the development of clean
energy, including the lowest cost route to delivering CCS, has received no policy or financial support from HMG since the British Gas Development Centre at Westfield closed in 1992.

My belief is that the focus of the 2003 Energy White Paper, and subsequent legislation, on delivering decarbonisation via electrification was a major policy error. On average three times more energy flows through the UK gas grid than the electricity grid, increasing to five times more in Winter. Gas is storable and provides the primary energy store for load balancing electricity generation. Gas is one third the cost per unit energy compared with electricity. Decarbonising gas is invariably cheaper than decarbonising electricity as gas processing is inherently Carbon Capture Ready. No comparative cost benefit analysis of the relative NPV costs of decarbonising gas and decarbonising electricity appears to have ever been published by HMG.

CCC recently advised that in order to meet decarbonisation targets gas fired electricity generation should not exceed 5% of total UK electricity supply in 2030. CCC has also recently advised that gas at 40 p/therm will not be economic at the 2030 Carbon floor price of £70/tonne. 40 p/therm is equivalent to £150/tonne of gas. 1 tonne of gas produces 0.75 tonne of Carbon. The £70/tonne Carbon floor will effectively increase the total cost of fossil Natural Gas from £150/tonne to £202.5/tonne, or from £3.85/GJ to £5.19/GJ.

The projected 2030 cost of wholesale low Carbon electricity is £100/MWh or £27.75/GJ. The cost benefit analysis on which this response to the Public consultation is based indicates that decarbonised SNG can be produced for 40 to 45 p/therm, with a Marginal Abatement Cost of Carbon of around £30/tonne including capture, injection, transport and storage costs. This is equivalent to around £181.8/tonne or £4.66/GJ. The effective cost per unit energy of storable decarbonised SNG, including CCS, is around one sixth of the cost per unit energy of low Carbon electricity.

<table>
<thead>
<tr>
<th>CCC PROJECTED 2030 ENERGY COSTS, INCLUDING £70/TONNE CARBON FLOOR PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy resource</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Fossil Natural Gas</td>
</tr>
<tr>
<td>Decarbonised SNG</td>
</tr>
<tr>
<td>Low Carbon electricity</td>
</tr>
</tbody>
</table>

What CCC is proposing is to tax a low cost energy vector out of the UK energy system, and replace it with a far higher cost energy vector, in order to achieve decarbonisation rather than decarbonising the low cost energy vector in the first instance. This is neither good economics, nor technology neutral advice to Government.

July 2012

Also attached, not printed: Powerpoint presentation to DECC engineers 23 May 2012, and subsequently to National Grid plc.