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Investing for an Uncertain Future: Priorities for UK Energy and Climate Security

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Summary points

- The UK faces the most urgent and challenging energy policy environment of any developed economy, driven by increasing net fossil fuel imports, the need to replace obsolete generation plants and a commitment to deep reductions in greenhouse gas emissions.
- Securing the electricity supply presents the most immediate challenge for the new coalition government, since about a quarter of generating capacity will probably close by 2020. The gap can be narrowed with strong investment in energy efficiency and long-term low carbon infrastructure. But until uncertainties over policies and timescales are addressed, the utilities will turn to gas instead of lower carbon options.
- The UK cannot achieve either energy or climate security on its own. Britain's interests and international influence in areas affecting energy supply and access to low carbon technology will be greatly enhanced by helping to build coherent and forceful policies and action by the European Union.
- The UK must work with the EU, the US and key emerging economies to establish a successful international climate regime. Constant repetition of unmet intentions saps political will. Britain – with the EU – should also prioritize delivering the commitment of the Major Economies Forum to double low carbon RD&D and drive forward international technology partnerships for CCS and energy efficiency.
- Open markets are critical to the UK's long-term access to energy supplies and low carbon technologies. The UK should use the new 'Europe 2020' process to prioritize full liberalization of EU markets in energy and low carbon technologies, goods and services.

Introduction

The UK energy system has entered a period of unprecedented uncertainty. Across the country, ageing or obsolete plant, equipment, buildings and infrastructure need to be replaced. At the same time, the government is committed to establishing a low carbon economy by 2050. Meeting these two objectives in the energy sector alone will require around £20 billion of private investment per year until 2020, three times greater than the current level of clean energy investments. Of the developed economies, the UK faces the most urgent and challenging combination of increasing net fossil fuel imports, the need to replace obsolete generation plants and an ambitious decarbonization commitment.

Britain cannot achieve either energy or climate security on its own. Climate security depends on global action to reduce greenhouse gas emissions. The UK's actions are framed by EU policy for the environment and the internal European market, and its leverage on global issues can be enhanced by its ability to shape the EU agenda and by working with the EU and its member states. Britain's oil and gas resources are rapidly depleting, and energy supply must therefore be secured by UK access, including via the EU, to a diversity of global sources and advanced technologies.

This paper is organized in four main sections. The first section describes how the global landscape on energy security is in a state of flux. It will be decades before any country's energy system is independent of fossil fuels, but additional resources are increasingly costly to produce, and the era of cheap oil may never return. The geopolitics are also changing: the global oil market is moving into a period when Asia-Pacific countries need more oil in total than can be exported by the Middle East. In parallel, unconventional gas and liquefied natural gas (LNG) supplies are transforming energy markets, not least in the United States.

The second section focuses on the global climate challenge. To date, there is no global consensus on the scale, pace and distribution of action to reduce greenhouse gas emissions. But even moderate climate-related impacts could trigger a broad range of security risks from state instability to border conflicts and energy and food security. If uncontrolled, climate change would undermine UK national interests in international trade, investment and stability. The section argues that, for any global climate regime to be sustainable, key non-governmental constituencies (investors, companies, taxpayers, energy consumers and citizens) must see it as legitimate, credible and effective. This means that the design and status of any global climate agreement will be as important as its targets and commitments. Meeting climate goals also requires an acceleration of the development and diffusion of technologies far above the current rate.

The third section assesses the UK's current energy mix and future needs. Securing the electricity supply presents the most immediate challenge for the new coalition government, since about a quarter of generating capacity is likely to close by 2020. Before the 2010 general election, all the political parties recognized the need to reform the electricity market to provide clearer incentives, in particular for investing in low carbon power generation and energy efficiency. Until uncertainties over policies and timescales are addressed, however, the utilities are likely to turn to gas instead of lower carbon options, such as renewables, nuclear power and coal with carbon capture and storage (CCS). Whatever the shape of longer-term market incentives, therefore, there will be some increase in gas demand for electricity generation.

The fourth section offers a set of priorities for UK policy-makers at three levels – domestic, EU and international. In the UK, how should the government achieve policy objectives on climate and energy security within a liberalized and privatized domestic market? At the EU level, how should the government pursue greater energy and climate security institutionally and bilaterally with other member states in order to defend UK interests? Issues with an important European dimension include establishing emission targets and trading arrangements, more effective internal EU energy markets and innovation policies, and new energy trade-related policies and measures. At the international level, how should Britain deepen relations with non-EU countries that are important

for the supply of energy or technology? In international forums potential priorities include advancing low carbon technology cooperation among major economies, promoting lower fossil fuel subsidies and finding new ways of delivering climate finance to developing countries. On these questions the UK also has scope for national bilateral initiatives, but would often work more effectively through initiatives with other EU member states and arising from the EU itself.

The paper concludes by calling for a new direction in UK energy and climate policy. Britain cannot plan for the world, but it can have a strategy for its actions in the world. With the exception of managing climate change in the UN negotiations, it currently does not have such a strategy. To achieve its security objectives it needs to develop one together with the private sector and its European partners.

Delivering this agenda will provide multiple benefits for the UK in terms of increased economic security, reduced dependence on unpredictable suppliers, new jobs and export opportunities, and strengthened European neighbourhood security. However, achieving these positive outcomes requires significant investment of political, diplomatic and financial capital in order to maximize the benefits – and reduce the risks – of these radical transitions.

An uncertain global context for the UK

The end of Britain's self-sufficiency in oil and gas means that its energy policy must become more proactive internationally if it is to achieve economic, climate and energy security. By 2020, 44% of UK oil consumption and 45% of UK gas consumption are likely to be imported, even after reductions in demand resulting from the government's Low Carbon Transition Plan (LCTP).[1]

The global landscape on energy and climate security is in a state of flux. There are four main reasons for this, related to the future of oil and gas, the low carbon economy and energy investment challenges.

The first major factor is that the return to high and volatile oil prices after 2005 has raised concerns about security of supply and markets among consumers and producers, and has led to an enhanced dialogue in the International Energy Forum (IEF) of energy ministers. Some of the underlying causes for concern, such as the concentration of oil resources in a handful of producer countries, resemble those of the 1970s. Others are different, including a sharp rise in demand from newly industrializing economies, a less responsive supply side as a result of declining cheap reserves and investment in many countries, and uncertainties over the effect of climate policies on demand for conventional sources of energy. The May 2010 accident at the Macondo well in the deepwater Gulf of Mexico also illustrates the technology and safety challenges for oil exploration in technologically extreme environments.

At the global level, there is as yet little sign that oil demand will fall in the near term. Under its reference scenario, the International Energy Agency (IEA) forecasts a 40% increase in global energy consumption by 2030.[2] Energy markets remain tight and rigid. Oil prices moved from $12 per barrel in 1998 to a high of nearly $150 per barrel in mid-2008, before collapsing and then recovering to the present $80 per barrel. Demand keeps rising, yet there is underinvestment in energy production and supply infrastructure.

There remains a huge question mark over the exact future of oil in the global economy. Will demand growth be diminished by high prices before supply itself is limited by resource constraints? One Chatham House report suggested that the world will experience a serious oil supply crunch within five to ten years unless there is a collapse in oil demand.[3] Another argues that in the next decade oil production will level off in the major Middle East oil-exporting countries because of depletion policies designed to conserve oil for future generations.[4] In other exporting countries, resource limits will become

1 Malcolm Wicks, *Energy Security: A National Challenge in a Changing World* (London: DECC, 2009).
2 International Energy Agency, *World Energy Outlook 2009* (Paris: IEA, 2009), http://www.worldenergyoutlook.org/docs/weo2009 /WEO2009_es_english.pdf.
3 Paul Stevens, *The Coming Oil Supply Crunch* (London: Chatham House, 2008), http://www.chathamhouse.org.uk/files/11937_0808oilcrunch.pdf.
4 John V Mitchell and Paul Stevens: *Ending Dependence Hard Choices For Oil-Exporting States* (London: Chatham House, 2008), http://www.chathamhouse.org.uk/files/11844_0708oildependence.pdf.

apparent unless there are continued programmes of successful exploration – in which foreign companies will play a necessary part. In all cases, exports will decrease as domestic consumption in the oil-producing countries continues to grow, encouraged by low fuel and electricity prices. This will prolong an increasingly tight global oil market as global consumption rebounds.

The era of cheap oil may never return, as the growth in other low-cost oil supplies may not be sustainable beyond 2020. The UK Energy Research Centre's meta-review of studies on global oil production concluded (from 500 available studies) that maximum oil production is likely to occur before 2030, with the risk that it will fall before 2020,[5] though the rate of decline after 2020–30 is uncertain and contentious. It will depend on the outcome of recent discoveries and exploration efforts in the very deep Atlantic, and on how much oil the world is prepared to produce from tar sands and oil shale.

The fallout from the Macondo well disaster will delay these developments and increase their cost under tighter regulations. It may also restrict them to very large oil companies capable of internalizing rather than outsourcing operations over which they need close safety and environmental control, and whose balance sheets can stand the risks of things occasionally going wrong. With some of these companies based in the UK, Britain can play a role in global oil developments beyond its diminishing importance as a producer of North Sea oil and gas and as a static – and eventually declining – energy market.

The geopolitics of global oil are also changing, affecting the UK as a future oil importer. The global oil market is at a turning point because demand from the Asia-Pacific region will in future absorb all the surplus oil from the Middle East (see Box 1). This means that the key axis of the global oil trade will run between Asia-Pacific consumers and Middle East producers. European and US markets and investors will matter less to Middle Eastern oil exporters. Instead, West Africa, Central Asia, East Siberia and northern Iraq, with their various economic and political challenges, will be the pivotal zones where companies compete for supplies to consumers from the Atlantic and Pacific regions.

The second major factor in the current state of flux is that, unlike oil, most gas is supplied internationally from domestic production and intra-regional trade. This will be true for the UK, even as imports of LNG grow in importance, and the timing of this change is fortuitously favourable. The outlook for global gas supply has changed to the advantage of consumers and importers owing to the successful application of new technologies to extract gas from US shale. This has diminished the probability, at least in the medium term, of increasing scarcity in the international gas trade. The development of domestic shale gas reserves may mean that, in the medium term at least, countries in the Atlantic basin, including Britain, need not look to increasing imports of expensive Russian gas or monopolistic Middle Eastern supplies.

Thirdly, the transition to a global low carbon economy will bring additional multiple domestic and international challenges for the UK. Despite the failure to reach a global climate change agreement in 2009, national mitigation policies in all major economies are set to accelerate. Britain has made specific domestic and international legal commitments in moving towards a carbon-neutral energy economy by 2050. It will need not only to manage its energy and climate plans but also to work with others – including emerging epicentres of growth in energy demand and hence carbon emissions – to establish a viable global climate regime to ensure its long-term climate security. The UK does not have the capacity to develop the most competitive technologies across the vast range needed to deliver climate goals.[6] It is therefore in its national interest to maximize its future access to vital technologies from outside the UK on normal commercial terms, with due regard for intellectual property protection, through international processes and standards. None of this will be easy.

5 UK Energy Research Centre, *Global Oil Depletion* (London: UKERC, 2009), http://www.ukerc.ac.uk/support/tiki-index.php?page=Global+Oil+Depletion.

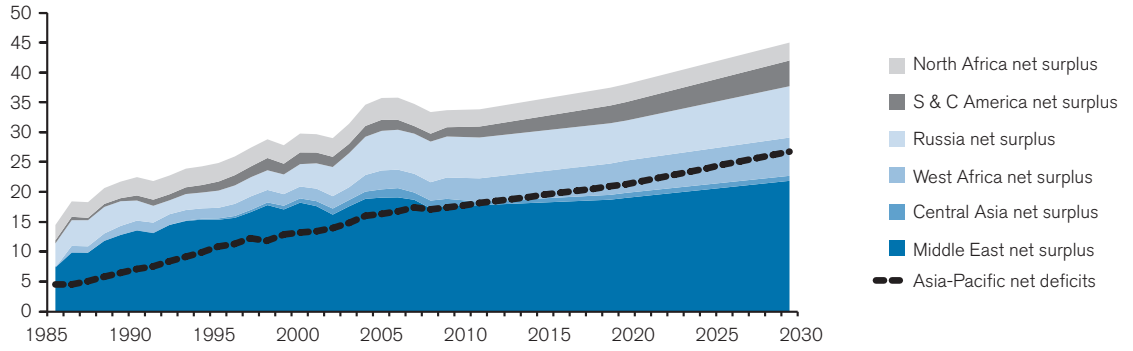
6 Including Sudan.

Box 1: The eastern oil axis

The axis of world oil trade is shifting because consumption in the Asia-Pacific is not matched by increases in production. Already some 60% of Middle East exports go east, and this percentage will increase as trade reflects the underlying surpluses and deficits of the two regions. These are roughly in balance already, but Asia-Pacific deficits are projected to increase by 4 million barrels per day (mbd) by 2020, and a further 5 mbd by 2030. Only half of these increases are matched by projected increases in oil surpluses from the Middle East.[a]

As a result of these trends, the world oil market is moving into an era when Asia-Pacific countries need more oil in total than can be exported by the Middle East.

Figure 1: Global oil balances, 1985–2030



Sources: US Energy Information Agency, *International Energy Outlook 2010;* International Energy Agency, *World Energy Outlook 2009* (450 ppm scenario); *BP Statistical Review 2010*; authors' calculations.

By 2010, nearly 15% of the Asia-Pacific deficit will have to be met from outside the Middle East. This will need to be supplied by West Africa, East Siberia and Central Asia. These areas, together with northern Iraq, are already becoming 'pivotal suppliers', where exporters will try to balance interests between Eastern and Western importers. The key to the future security of oil supplies for the UK and Europe is therefore the diversity of new sources in the Atlantic region. These include the Gulf of Mexico, West Africa, northern Iraq and, more controversially, the tar sands of Venezuela and Western Canada. Currently, private-sector companies based in North America and Europe are responsible for most oil trade and development (outside the Middle East). They now face competition from Asian companies, whose bids are frequently supported by investments in infrastructure and loans from their government agencies and development banks. While they may offer more technical expertise, Western companies cannot match such packages. Chinese investment is characterized by a 'no strings attached' approach: no interference in the governance or human rights situation in the resource-owning countries. However, China is likely to find itself increasingly drawn into the local politics of countries in which its state oil companies are active (as has happened in Sudan).

a See report on critical climate technologies at http://www.tonyblairoffice.org/climatechange/news-entry/new-report-from-tony-blair-sets-out-practical-technology-solutions-to-tackl/.

Fourthly, the UK faces huge energy investment challenges. It needs to renew an ageing energy infrastructure while aiming to decarbonize the whole energy system by 2050. Most of this investment will fall to the private sector. The Green Investment Bank Commission estimates that £800 billion to £1 trillion of investment is required by 2030 to replace, upgrade and decarbonize the UK's infrastructure. Meeting the UK's energy policy commitments alone will require over £200 billion of investment between now and 2020, a requirement that dramatically outstrips current UK clean energy investments of £6–7 billion per annum.[7] Large parts of Britain's generating capacity are owned by foreign companies which will compare UK investment demands with opportunities elsewhere. Internal policy must be robust enough to deliver domestic investment in the face of growing external sources of uncertainty. The potential scale and speed of these changes should not be underestimated.

7 Green Investment Bank Commission, *Unlocking Investment to Deliver Britain's Low Carbon Future* (London: Green Investment Bank Commission, 2010), http://www.climatechangecapital.com/media/108890/unlocking%20investment%20to%20deliver%20britain's%20low%20carbon%20future%20-%20green%20investment%20bank%20commission%20report%20-%20final%20-%20june%202010.pdf.

Meeting the global climate challenge

The scale of the challenge

As the Copenhagen conference in December 2009 demonstrated, there is still no global consensus on the scale, pace and distribution of action to reduce greenhouse gas emissions. Investors may believe in the inevitability of action to reduce carbon emissions, but are asked to bet on the detail and timing of future targets which will materially affect their business decisions. Given such uncertainties, delay is an attractive strategy for investors, but it increases both energy and climate security risks for the UK.

Over the coming decades, the fight over global and national climate goals is likely to be driven by the visibility of climate change effects. The next Scientific Assessment Report by the International Panel on Climate Change (IPCC), to be published in late 2013, will also have a significant impact. Governments of the major global economies have barely managed to agree on a goal of limiting average global temperature rise to 2°C above pre-industrial levels, and we have already experienced a 0.9°C rise. However, even this challenging target entails significant climate security risks. Recent estimates put the lower thresholds for many high-impact climate system tipping points (e.g. monsoon shifts or large-scale Amazon rainforest dieback) at a global average temperature rise of 3–4°C.[8] Uncertainties in our understanding of climate system behaviour mean that stabilizing concentrations of greenhouse gases at levels which give a 50:50 chance of keeping temperature rise below 2°C still leaves a 20% possibility of entering the 3–4°C range this century.

Britain faces significant domestic risks from uncontrolled climate change and the potential for a strong deterioration in the global security environment. Projections of uncontrolled climate change in the UK by 2080 suggest rises in mean summer temperatures of 2–6°C and reductions of 50–70% in rainfall in the south of England.[9] Extreme conditions will greatly exceed these mean levels. These temperature changes would cause significant levels of economic damage (through flooding, damage to infrastructure, trade disruptions) and increase food insecurity for the country.

Security analyses carried out by governments in the UK, US and other major countries highlight climate change as an important threat multiplier in the short to medium term based on mid-range climate projections.[10] Even moderate climate-related impacts could trigger a broad range of security risks, from state instability to border conflicts and energy and food insecurity. If uncontrolled, climate change would undermine UK national interests in international trade, investment and stability. Beyond 2030, temperature rises of 3–4°C could become a significant driver of large-scale migration and conflict in the most vulnerable regions of Africa, the Middle East, Central and South Asia and many island nations.[11] Uncertainties in projections and climate system 'tipping points' suggest that actual outcomes could be far more severe than these estimates.[12]

The world can emit another 500 billion tonnes of CO_2 before reaching the 2°C limit (an amount roughly equivalent to total global emissions to date since the beginning of the industrial revolution). However, this requires global CO_2 emissions to peak before 2020 and decline by 60–80% by 2050. Developed countries will need to shift to an effectively zero carbon energy system by mid-century, with emerging economies following quickly behind.

The 2°C scenario requires about $10 trillion of additional investment before 2030 (above the $26 trillion investment in the reference scenario[13]) to replace fossil fuel use with capital-intensive clean technologies. Energy savings will outweigh investment costs if future oil prices are above $100 per barrel, but every year of delay could increase costs by $500 billion.

8 See Ian Allison et al., *The Copenhagen Diagnosis 2009: Updating the World on the Latest Climate Science* (Sydney: UNSW Climate Change Research Centre, 2009), http://www.ccrc.unsw.edu.au/Copenhagen/Copenhagen_Diagnosis_LOW.pdf.

9 UK Climate Impact Programme, *UK Climate Change Projections* (Oxford: UKCIP, 2009), www.ukcip.org.uk.

10 For example, see US National Intelligence Council, *The Impact of Climate Change to 2030* (Washington, DC: National Intelligence Council, 2009), http://www.dni.gov/nic/special_climate2030.html.

11 For 4°C scenario see http://www.metoffice.gov.uk/climatechange/news/latest/tackling-temps.html.

12 E3G, *Facing the Climate Security Threat* (London: E3G, 2010).

13 IEA, *World Energy Outlook 2009*.

The strategic importance of a global climate regime

For any global climate regime to be sustainable, key non-governmental constituencies (investors, companies, taxpayers, energy consumers and citizens) must see it as legitimate, credible and effective. This means that the design and status of any global climate agreement will be as important as its targets and commitments. Most critical will be the development of strong and transparent international systems for measuring, reporting and verifying commitments under the regime, both for reductions of greenhouse gas emissions and for the provision of financial and technical support. Without national and international support any agreement will fail to achieve its goals, and in the worst case could collapse under mutual recriminations of inequity, inefficiency, corruption and non-compliance.

Without a credible global climate regime, it will be difficult for governments and businesses to manage uncertainties efficiently; they may be forced to make strategic assumptions about other countries' future behaviour. The perception of unfair competition from countries with weaker carbon constraints (such as China) has increased the calls for trade-related measures to prevent the risk of 'carbon leakage' across borders. Under pressure from unions, such measures have already been included in draft US climate legislation and are supported by France and Italy in the EU. These measures are likely to prompt trade-related retaliation, especially from the emerging economies. Major energy-consuming countries need to cooperate to avoid a damaging outcome for global trade.

Meeting climate goals also requires an acceleration of the development and diffusion of technologies far above the current rate. To hedge against some technological failures, greater investment is needed today to create a wide portfolio of commercially available options for low carbon and adaptation technologies by 2020.[14] Although it makes sense for countries to share the costs of developing these technologies, cooperative technology development – except on basic research – is the exception rather than the norm, not least owing to competitive pressures. Enhanced collaboration would therefore imply significant changes to business-as-usual practices.[15] Many of the needed technologies are already commercially available or near to market; they must be deployed globally in the next 20–30 years to avoid missing the next great energy investment wave. Indeed some estimates suggest that the rate of technological diffusion will need to double at least.[16] This will require stronger policies and new public–private mechanisms to accelerate 'natural' market diffusion rates.

Managing new energy and climate politics

At the global level, OECD countries are expected to decarbonize at a faster pace than emerging economies (except perhaps China). This would reduce the importance of traditional trade and investment relationships for both oil and gas imports for the UK and other countries in the EU. In the high renewables use scenarios developed by the European Climate Foundation and McKinsey, by 2035 gas imports for domestic use could be eliminated and those for the power sector could fall by 80%.[17] The possibility of concerted policy measures that will reduce the available market is inhibiting investment in ongoing supplies of fossil fuels. This is a particular challenge for Russia. Its relatively high-cost oil supplies are committed to Europe through pipelines with a long lifespan, all of which need substantial investment in renewal and extension. Current uncertainty over the pace of European decarbonization makes a productive and frank conversation with Russia over such investment very difficult.[18] Although UK imports of oil and gas from Russia are likely to be a very small fraction of supply for the EU in the

14 For analysis of technology pathways see http://www.e3g.org/programmes/climate-articles/e3g-report-launch-innovation-and-technology-transfer-framework-for-a-global/.

15 For technology cooperation priorities see http://tonyblairoffice.org/2009/07/tony-blair-sets-out-practical.html.

16 Bernice Lee, Ilian Iliev and Felix Preston, *Who Owns Our Low Carbon Future? Intellectual Property and Energy Technologies* (London: Chatham House, 2009), http://www.chathamhouse.org.uk/files/14699_r0909_lowcarbonfuture.pdf.

17 European Climate Foundation (ECF), *Roadmap 2050* (The Hague: ECF, 2010); result for 80% renewable energy scenario.

18 For an example of current Russian expectations of EU–Russia deals, see Tatiana Mitrova, *European Gas Import Requirements and Russian Gas Export Potential: Looking for the Balance* (Moscow: Russian Academy of Sciences, 2008), http://www.batory.org.pl/doc/Presentation%20Mitrova.pdf.

future, domestic gas prices would be affected by any scarcity in Russian supplies (on which Germany and central and east European member states depend).

Relations among the main energy-consuming countries are also critical, especially over the development, use and trade of low carbon energy technologies. Currently, OECD companies own over 80% of patents in major low carbon sectors,[19] and developing countries – including major emerging powers – have argued for their removal. Meanwhile, both China and, to a lesser extent, India are investing heavily in low carbon research, development and deployment (RD&D), promoting national champions and technology transfer and purchasing companies that are global technology leaders.

As energy consumers, major economies including the UK would benefit from an open global market in low carbon technologies and collaborative RD&D programmes to accelerate global technology development. The fear of losing competitiveness is stimulating increased public spending on RD&D even where no climate legislation has been passed (e.g. in the US and China). But strategic competition leading to closed markets and subsidies to national champions would be likely to slow the process of decarbonization and make it more expensive, as well as causing considerable friction in trade and investment.

Increasingly, climate and energy policies cannot be separated from broader trade, investment, technology and finance policies. They lie at the heart of the disputes undermining political agreement on a global climate regime. The following questions sum up these dilemmas:

- Can emerging economies both subsidize energy and ask developed countries to finance their decarbonization?
- Should climate finance be conditional on reductions in wasteful subsidies, or are the social and stability objectives of subsidies to farmers and the urban poor a legitimate part of countries' development strategies?
- Is it legitimate for developed countries to aim to protect the trade competitiveness of their energy-intensive industries through subsidies and/or trade measures?
- Is the different 'shadow carbon price' between developed and developing countries a legitimate source of international competition, given previous uncontrolled use of fossil fuels by OECD countries (an argument put forward by India)?
- If the strict application of critical principles of 'non-discrimination' and 'common but differentiated responsibilities' undermines political support in developed and developing countries for more ambitious action on climate change, a more nuanced deal must be forged. Can political forums such as the G20 reduce the tensions inside the UN Framework Convention on Climate Change (UNFCCC) and World Trade Organization agreements?

The starting point for the UK

At the domestic level, securing electricity supply presents the most immediate challenge for the new coalition government. Many new investments by energy suppliers and consumers are not expected to lead to operational change for decades. Infrastructure and systems, not built to withstand changing environmental conditions and usage modes, will become increasingly expensive to operate and/or become redundant. At least 25% (22.5 GW) of UK electricity generating capacity will probably close and as much as 20 GW will need to be built by 2020 (of which 13.6 GW will be gas-fired[20]), with another 10 GW by 2030.[21] Before the 2010 general election, all the main political parties recognized the need to reform the electricity market in order to provide clearer incentives for this investment. The UK's gas and electricity market regulator OFGEM proposed various options for consultation,[22] and a policy process to decide on new market structures is

19 Lee et al., *Who Owns Our Low Carbon Future?*

20 National Grid (NG), *Gas Transportation 10-Year Statement 2009* (Warwick: National Grid, 2009), http://www.nationalgrid.com/NR/rdonly res/E60C7955-5495-4A8A-8E80-8BB4002F602F/38866/TenYearStatement2009.pdf.

21 Department of Trade and Industry (DTI), *Meeting the Energy Challenge: A White Paper on Energy* (London: The Stationery Office, 2007), 5.1.1 and 5.1.2. These legislated closures may squeeze reserve capacity margins in 2026.

22 OFGEM, *Project Discovery: Options for Delivering Secure and Sustainable Energy Supplies* (London: OFGEM, 2010).

likely to be initiated in 2010, followed by a White Paper by spring 2011. Meanwhile, there is an array of policies intended to achieve the UK's climate policy objectives.

The UK's Low Carbon Transition Plan envisages renewables providing 31% of electricity generated by 2020 (up from 6% today). The economics of wind power and other renewables are supported by the renewables obligation (RO) on generating companies and feed-in tariffs for distributed generation, although support mechanisms for new generation after 2020 are not in place. Uncertainty about the viability of carbon capture and storage technology has delayed investment in new coal stations. The EU policy of licensing new coal stations only if they are 'ready' to apply CCS to all components of their operations leaves technical and commercial questions unanswered. The UK's demonstration programme bringing online four large-scale CCS demonstration plants by 2017–20 will provide some additional capacity, although their final size will depend on government co-financing. New nuclear plants, with uncertain economic viability, are proposed but have yet to be approved. They are unlikely to be commissioned before 2020.

Given these uncertainties, the more risk-averse utilities are likely to turn to gas. The infrastructure already exists for a substantial increase in imports of LNG to the UK, and in the medium term Atlantic basin LNG prices should be moderated by the expansion of US shale gas exploitation. Gas capacity, based on flexible LNG supplies, would in any case have a longer-term role as a back-up for new supplies from intermittent generation from wind and solar power. Whatever the shape of longer-term market incentives, there will be some increase in gas demand for electricity generation. This is because even though efficiency improvements will lower the demand for gas in industry and in homes by 2020, this saving will be (at least partly) offset by a growth in gas demand for power generation.[23]

Box 2: UK energy mix challenges

Oil

Britain's indigenous production of oil is declining. Despite new investment in known resources, it will halve, subject to prices and taxes, by 2020.[a] The UK is thoroughly integrated into the international oil market. About 70% of the crude oil run in UK refineries is imported, the net import figure being around 15%. (Britain will continue to be an exporter of crude, which has a higher value in overseas refineries.) The UK's return to being a net importer is more a question of degree than a structural change.

The LCTP will hold oil consumption more or less stable, leaving the UK to import around half of this. In the power and domestic sectors consumption is insignificant, while renewables deployment will not affect national dependence. But substitutes in transport (currently 74% of oil consumption) and industry (20%, including petrochemicals) will make a difference. Electricity seems the most likely substitute in the transport sector in the medium term, although radical breakthroughs in third-generation biofuels could also contribute. As electric vehicles become economically viable and a system for recharging them is developed, direct dependence on oil for transport will be replaced by increased dependence on the fuels for electricity generation. Achieving this will require faster growth in low carbon technologies. A recent study showed that across the EU complete decarbonization of light vehicles by 2050 would require 20% more low carbon electricity production.[b]

a ECF, *Roadmap* 2050.
b See http://ec.europa.eu/environment/climat/pdf/com_2010_86.pdf.

Gas

By 2020, around 20–30% less natural gas will be available from UK production.[a] Imports, mainly from Norway, are likely to rise from a third to around 70% of gas consumption (84% in the EU as a whole).

But the prospect of an imminent global gas 'shortage' has given way to a surplus. 'Unconventional' gas (coal-bed methane and shale gas) already supplies over 40% of US natural gas production, displacing LNG imports to the US and creating a worldwide surplus. Shale gas reserves are very large, in the US and worldwide, and of long potential duration. Exploration is under way across Europe, including in many of the states in Eastern Europe that are dependent on coal and lignite (and are the most dependent on gas imports from Russia). Despite environmental and cost challenges, security concerns about gas imports need to be revised.

23 NG, *Gas Transportation 10-Year Statement 2009*, p. 28.

There is no shortage of gas import infrastructure in the UK. Four pipelines and six LNG plants (two under construction) give an import capacity for the UK 40% greater than its total forecast consumption to 2020. According to the National Grid, LNG is forecast to fulfil 25% of UK consumption, with Norway accounting for a further 35%. This would leave about 10% to be supplied through the EU pipeline system, ultimately from Russia and Central Asia, and 30% from domestic production.[b]

The UK's access to Norwegian gas is secured under bilateral treaties, Norway's membership of the European Economic Area, and the WTO. Transit through the European system from Russia is secured under EU gas directives. The Russian Nordstream and Southstream pipeline projects, under the Baltic and Black Seas respectively, will avoid transit through Ukraine to northern and southern Europe.

The global LNG market is open and competitive, with fourteen supplying exporters (five in the Atlantic basin). Even before the potential of shale gas emerged, the Atlantic region was projected to import less than 10% of its gas imports from outside the region; shale gas capacity reduces this percentage even further.

Storage is the obvious source of security against supply disruptions, with additional flexibility provided by a range of interruptible supply contracts, which protect the residential sector. Britain has gas storage capacity equivalent to about 5% of annual consumption. It has planning permission for another 5%, but this total would still be less than in other major European consuming countries; for instance, Germany has storage equivalent to 20% of consumption, which is owned by the system operators. The UK must decide on both the optimal level and the appropriate ownership structure for its medium-term storage requirements.

European countries and systems operators were shown to have poor information, coordination and limited ability to respond when Russia cut gas supplies in its dispute with Ukraine in 2008.[c] In July 2009, the European Commission proposed a regulation requiring each member state to develop plans which would ensure cover for 100 days' loss of supply from the largest single supplier to its system. New gas interconnections qualify for EU financial support under the 'Trans-European Network' scheme. Britain and other EU countries should question whether the proposed Gas Security Directive is sufficient to provide real solidarity for East European member states.

a Oil and Gas UK (United Kingdom Offshore Operators Association), 2010 Oil and Gas UK Activity Survey, Figure 7.
b NG, *Gas Transportation10-Year Statement 2009*, Table 4.8A, p. 78.
c Commission Staff Working Document SEC/2009/0977.

Renewable energy

The UK, through the EU's Renewable Energy Directive, is committed to increasing the share of renewable energy to 15% by 2020. This would reduce overall fossil fuel demand by around 10%, but will require a sevenfold increase in its use over 2008 production volumes. According to the Department for Energy and Climate Change (DECC), meeting this target will require £100 billion in investment and will create up to half a million jobs.

It is envisaged that the renewable energy target will not be uniformly spread across the energy sectors. Electricity will take on the most aggressive target, requiring penetration by renewables of around 30–35% overall (as opposed to today's 5.5%), including a 12% target for heat and cooling (compared to a negligible contribution today), and 10% of transport energy (as opposed to the current 2.6%). Within the power sector it is expected that at least 25 GW of new, offshore wind power will be needed by 2020, along with onshore wind, wave and tidal power and biofuels. Given the offshore wind resource available to the UK, this area can play a key role in meeting the renewable energy target as the costs come down and technology matures. Britain can also become a major player on the world market.

After 2020 these growth trends are expected to continue and are therefore expected to enable renewable energy, particularly in the power sector, to be one of the most (if not the most) significant energy sources in the UK.

Nuclear power

There are 19 reactors in operation in the UK, providing around 15% of its electricity. The last nuclear reactor, Sizewell B, was completed in 1995. Many of the reactors are scheduled for closure, as they reach the end of their nominal design lives in the coming decade, but life extension procedures are prolonging operation in some cases. (Without these extensions only Sizewell B would have been operational after 2023.)

With planning and licensing issues still not resolved, it is unlikely that new reactors will be in operation before 2020. Government support for nuclear power has increased since 2005 and a number of companies and six utilities have declared an interest in and/or intention to build new reactors. However, the new coalition government has stated that no public subsidy will be given for the construction of nuclear power plants, which will be subject to normal planning processes for major projects.

Coal

UK coal consumption has stabilized at around 60 million tonnes a year since 2000, but is projected to fall as coal-fired power stations are closed as a result of the EU's Large Combustion Plant Directive (2001/80/EC). By 2020, according to the Low Carbon Transition Plan, consumption will be half what it is today, with half of that being met from imports (Russian low-sulphur coal is the principal source of supply today). After 2020, future demand for coal depends on whether CCS technology is successful and economically viable under UK conditions. Supply will be influenced by how far this technology is applied in Russia – and how far Russian policy promotes the use of its low-sulphur coal domestically rather than for export.

Developing UK policy

The UK's energy and climate challenges are closely related, and have a common origin. But the connection between solutions is more complex. Some energy options (coal without CCS) are inconsistent with decarbonization. Many climate-friendly options, such as offshore wind, are too costly at current prices. Unless government support matches that in other countries the UK economy will be at a competitive disadvantage. This means that Britain has no choice but to seek solutions through alliances. The EU is the obvious, ready-made alliance, despite its complex decision-making structures and sometimes weak consensus in these areas.

Three distinct challenges confront UK policy-makers:

1. ***The domestic dimension:*** achieving government policy objectives on climate and energy security within a liberalized and privatized UK market.
2. ***The EU dimension:*** achieving greater energy and climate security cooperation across the EU in order to defend UK interests internationally.
3. ***The international dimension:*** deepening relations with other countries that are important for the supply of energy or technology.

Elements of the strategies outlined below have been part of the UK policy debate for a decade. However, action has been fragmented, incoherent and rarely sufficient to deliver real change. There has been an unwillingness to make radical changes to market frameworks and approaches that were developed in the 1980s in a very different context and aimed at solving a very different set of problems. Institutional barriers inside and outside government, between energy and climate policy and between domestic and international action have also hampered progress. This is changing with the creation of DECC, the Climate Change Committee and a recognition of the need for market reform from OFGEM. Changing so many entrenched attitudes and institutions remains both crucial and extremely challenging.

Inside the UK

Energy efficiency

The 2050 Roadmap for decarbonizing the UK – an annex to the energy market assessment in the March 2010 UK budget – highlighted the vital importance of improving energy efficiency if decarbonization targets are to be met. A low carbon path would mean a reduction in total UK energy demand of 25% by 2050 even with strong economic growth.[24] Estimates that the cost of decarbonization will be only 1–2% of GDP by 2050 depend on efficiency savings offsetting much of the high costs of investing in low carbon energy supply.

Unfortunately, despite recent high fuel costs and a plethora of government policies, UK residential carbon emissions rose in 2008. To reverse this, tougher programmes of regulation and government incentives for the residential sector will be needed to mandate energy efficiency in the residential as well as small and medium-sized enterprise (SME) sectors. The new UK Green Infrastructure Bank could provide innovative finance and release the £200–300 billion needed to fund the significant residential energy-efficiency retrofits,[25] as KfW – a German government-owned development bank – has done in Germany.

24 HM Treasury, *Budget 2010: Annex to Energy Market Assessment Initial Findings from the 2050 Roadmap Analysis* (London: The Stationery Office, 2010).
25 E3G, *Delivering Energy Efficiency to the Residential Sector: The Case for an Accelerated National Energy Efficiency Scheme* (London: E3G, 2009).

Electricity generation

It is still uncertain which low carbon generating technologies will offer the most cost-effective and technically practical solutions. Large-scale integrated CCS or second-generation biofuels may not come to market for another five to ten years; similar challenges surround the timing or success of battery/electric vehicles. Energy efficiency and renewables reduce some of these risks in the short term, but energy security imperatives require clearer signals for the period after 2020. A failure to provide clear direction will discourage investors, who will be forced to factor in a premium for policy uncertainty.

The coalition government will have to take, and is already taking, some risk away from private investors in order to attract more private capital. Major new low carbon power investment in the UK is being driven by the renewables obligation (the costs of which will be met by electricity consumers), not the carbon price set by the EU emissions trading system (ETS). Government funding will pay for CCS demonstrations, and government policies will influence energy demand in most sectors through energy-efficiency programmes and appliance regulations. However, the current need for fiscal stringency may put the scale of this governmental support in doubt.

Ad hoc approaches are insufficient to drive an efficient decarbonization process. The coalition government has acknowledged the need for market reform and has said it will make proposals in early 2011. In its June emergency budget, it committed to establishing a UK Green Investment Bank in 2010 to support low carbon investment and innovation. Greater government intervention will be required in the electricity sector, whether through setting a floor price for carbon, capacity auctions, low carbon obligations or direct government purchase of power capacity.

Underlying these technical choices are political questions. How will costs be allocated to consumers and taxpayers? Are consumers in the EU willing to bear higher energy costs when other countries fail to implement comparable carbon policies? How will implicit subsidies be made transparent? How should the most efficient options be chosen? Will the additional infrastructure and generating capacity required to provide resilience for energy supply be mandated, subsidized or negotiated? Despite all their economic benefits, any mandatory intervention will be highly sensitive politically and could potentially be seen as intrusive by the public.

In addition, the UK will be mainly a 'technology taker' with costs driven by global, not local markets. Government support for investment should be rationalized and concentrated on areas where Britain has high resource potential (wind and wave power) or an existing skills base (biotechnology). Here, the scale of activity can reach the critical mass needed for success. But beyond this, the UK must look outward, ensuring that external conditions favour its access to all the low carbon energy technologies it needs.

The UK should resolve the current uncertainty created by the freeze on much long-term power sector investment by agreeing a market reform package by the end of 2011 and giving a clear framework for ongoing government intervention and support in the sector.

The UK should provide incentives or mandates for gas companies to increase their natural gas storage capacity towards European levels.

The EU dimension

The UK cannot deliver global climate policy objectives solely by its own actions. Many mitigation policies fall within the competence of the EU (with qualified majority voting). Externally, all EU member states must coordinate their position in international negotiations into a collective EU stance on emissions reduction targets and policies such as the Clean Development Mechanism.

The UK has strongly promoted the EU as a leader of global climate policy. Despite the perception that the Copenhagen conference was a failure for the EU, Britain needs continued European commitment to ambitious policies in order to have the best chance of influencing other emitting nations. Although the policies of other member states have generally been ahead of the UK with stronger investment incentives (renewable energy targets and vehicle standards for example), East European member states and Italy are increasingly

reluctant to accept more ambitious climate change targets. Britain needs to build a stronger progressive coalition in the EU if continental targets are to support its domestic commitments under the UK's Climate Change Act of 2008. It also needs to understand the motivation behind certain member states' reluctance to accept higher targets.

Resistance to some low carbon energy options also persists in parts of Europe. Objections to nuclear energy remain strong in Germany and Italy. Public acceptance of onshore CCS storage is not assured. Incumbent generators and local populations have repeatedly halted efforts to strengthen EU grid interconnections. Even under the Lisbon Treaty, member states can exempt themselves from EU-wide policies on the structure of their energy supply and the exploitation of their natural resources. Divergence of national views stops the European Commission from arguing strongly in international forums in favour of some technologies and from proposing controversial solutions.

Delivering a 30% emission reduction target

In July 2010, ministers from the UK, France and Germany jointly announced an initiative to push towards a 30% reduction target.[26] Moving to this target across the EU will create stronger incentives for private investment, and most analysts agree that this goal will now cost less than estimates made in 2008 to deliver the current 20% reduction (with only a minor impact on competitiveness).[27] The recession should give several years of lower materials costs. This, together with the need for new jobs in Europe, will generate more favourable conditions to attract major investments in efficiency, innovation and renewables. Even under conservative fossil fuel price assumptions, investment in energy efficiency can reduce European energy costs by 2020, despite the costs of additional low carbon energy.[28]

The UK should support the move to a 30% greenhouse gas emission reduction target, provided it is based in a realistic appraisal of the practicalities and costs of implementation.

Building a low carbon Single Market

Britain will only maximize the benefits of stronger EU targets if there are open markets for low carbon technologies, goods and services throughout the EU. This will lower costs, increase innovation and maximize opportunities for UK companies. Many sectors with the greatest need for low carbon investment (including construction, infrastructure, energy generation and transport) are dominated by large national incumbents with opaque public purchasing and/or regulatory requirement in traditionally national markets.

The UK should use the new 'Europe 2020' process[29] to prioritize full liberalization of EU markets in energy and low carbon technologies, goods and services.

Benefits of building an EU supergrid

Under most credible scenarios, the UK will continue to need a pan-European energy infrastructure and coordinated storage policies. Shifting investment from a focus on gas pipelines to the construction of an EU Super Smart Grid (moving 'from pipes to wires') can be a viable and sustainable option. A North Sea grid and CCS pipeline partnership has already been agreed. There is also progress – albeit slow – towards building solar-based Mediterranean grid connections. The ability to develop a 'supergrid' should be seen as a strategic investment in European competitiveness. Of the major economies, only China and Brazil have the regulatory structures to deliver supergrids; indeed the US and India are struggling to modernize their infrastructure coordination structures.

26 Chris Huhne, Norbert Röttgen and Jean-Louis Borloo, *Joint EU Climate Change article by Chris Huhne, Dr Norbert Röttgen and Jean-Louis Borloo,* 14 July 2010, www.decc.gov.uk/en/content/cms/news/EU_CC_article/EU_CC_article.aspx.

27 For a summary of analysis on the EU target, see E3G, *30 Percent and Beyond* (London: E3G, 2009), http://www.e3g.org/images/uploads/E3G_30_Percent_and_Beyond_Nov_09.pdf; European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage* (Brussels: European Commission, 2010), Sec(2010) 650, http://ec.europa.eu/environment/climat/pdf/2010-05-26communication.pdf.

28 ECF, *Roadmap 2050.*

29 See 'Europe 2020: A New European Strategy for Jobs and Growth', European Council Conclusion 25–26 March 2010, EUCO 7/10.

Building an optimized European grid requires relatively small but focused investment (one estimate puts this at less than 10% of total power system capital costs[30]). If successful it could greatly lower costs and increase European energy security, enabling all of Europe's low carbon energy sources to be exploited effectively, including the large renewable energy potential of neighbouring areas in Ukraine, Norway and North Africa. By 2050, the UK could have ten times its current level of connection to the European system and be a major exporter of clean energy to the European grid, while relying on cheap summer solar power from Spain to complement its own wind resources.[31]

Only a strong, progressive coalition of EU governments can promote a European supergrid. Britain can play a leading role in facilitating this discussion. Upcoming debates on the EU 2050 Low Carbon Roadmap and the EU budget will provide an opportunity to allocate more resources to Europe's power infrastructure. This will form the basis for the greater cooperation and coordination needed to optimize the use of European low carbon energy.

The UK should promote agreement on a coordinated design study for building an effective Europe-wide supergrid for low carbon power, supported by new EU budget lines from 2013.

Cooperation on strategic technologies

The EU also provides one of the major platforms for the UK's technological cooperation. The size and openness of the common market can be leveraged for goods, services and capital. EU-wide standards should be defined, where these do not already exist, in the context of driving better international standards. The 2008 agreement to provide major EU funding for 10–12 CCS demonstration plants (backed by agreed common regulatory standards on environmental integrity and safety) is a first example of what could be achieved at the European level. The lesson from the policy process to deliver EU CCS demonstration is the need for active advocacy by member states – and a strong pan-European case – to drive forward large-scale European technology cooperation.

The EU Strategic Energy Technology (SET) plan provides a framework for wider technological cooperation but is at present mostly unfunded. There is an opportunity in 2011–12 to redirect part of the EU budget towards this area. The UK would benefit from focusing on a high-priority subset of the SET plan including smart grids, electricity storage, electric vehicles and low carbon high-energy industrial solutions (for steel, chemicals, cement and construction).

Non-EU countries are also important sources of technology and markets for technology deployment. EU–US collaboration will matter, for example, and it is critical to create conditions for ever broader, common low carbon open markets. Despite a joint commitment to develop the world's first CCS demonstration plant, however, the EU and China have a disappointing record of bilateral cooperation. Partnerships with India, Brazil and South Africa are even more underdeveloped.

Current commercial competition between European exporters undermines broader international energy policy goals, reduces strategic influence and causes wasteful fiscal competition. The Lisbon Treaty arrangements provide an opportunity for a more strategic approach, focused on open access to key technologies (e.g. from the US) and markets (e.g. China). This has started with the proposed review of the five-year EU–China strategy, headed by Baroness Ashton, Vice President of the European Commission and High Representative for Foreign Affairs and Security; but it needs a wider focus, based on the geography of the technologies. This could use the strength of the common market to produce more progress on climate finance, low carbon trade and investment barriers, co-development projects and intellectual property rights issues.

The UK should prioritize EU funding for critical areas of the EU Sustainable Energy Technology plan,[32] including smart grids, electricity storage, electric vehicles and low carbon industrial solutions.

30 ECF, *Roadmap 2050.*

31 Ibid.

32 European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Investing in the Development of Low Carbon Technologies* (Brussels: European Commission, 2009), http://ec.europa.eu/energy/technology/set_plan/doc/2009_comm_investing_ development_low_carbon_technologies_en.pdf.

The international dimension

The UK has the capacity to pursue a variety of international initiatives to support its climate, energy and security objectives. But some of these could be significantly strengthened if they are supported by key EU member states and by the EU at an institutional level.

An effective global climate regime is critical to Britain's long-term climate security. Negotiations will continue in the UN and in parallel through several informal processes. But the formal process, though vital in setting overall ambitions, is only part of the regime. There are other ways in which the UK can promote the international economic frameworks for efficient global decarbonization.

Whether working nationally or through the EU, the UK should integrate governance processes for managing future climate change policies into every forum and relationship. This means, for example, addressing the climate resilience of transboundary water regimes in Africa; supporting mandatory disclosure of corporate carbon liabilities at the OECD;[33] and supporting further work on energy subsidy removal in the G20.

The UK should encourage international initiatives in the following areas. Each of these would be strengthened by gaining the support of the EU as a whole and of other member states:

- ***Advancing low carbon technology cooperation among major economies*** through the Technology Action Plans developed in the Major Economies Forum (MEF) process in 2009. This could begin with CCS and appliance efficiency, including pursuing and implementing the commitment to double global RD&D by 2015 and quadruple it by 2020.
- ***Supporting the G20 process to record and reduce harmful energy subsidies.*** The G20 could be the principal forum to address systemic low carbon transition issues: liberalization in low carbon goods and services (currently stalled in the Doha round), low carbon investment rules (including the limits of state aid) and financial regulation of corporate carbon liabilities and risks.
- ***Facilitating a coalition of willing countries to lead the development of innovative climate finance mechanisms,*** including sector-based initiatives, use of carbon finance generated from emissions trading, and public–private financing mechanisms such as issuing green bonds as well as carbon accounting standards.

Leveraging a credible EU climate strategy

The UK should support, and help shape, an EU initiative to build elements of a new UN regime based on parts of the Copenhagen Accord. This will require working first in partnership with a range of like-minded countries and delivering input to the formal UN process. Europe must avoid taking action for action's sake. Momentum should be maintained, but the fate of the Doha round shows that constant repetition of unmet intentions saps political will.

The EU's post-Copenhagen strategy is emerging but incomplete.[34] In 2010, the EU should decide whether to register its unilateral target for 2020 as a second commitment period under the Kyoto Protocol. Some countries see this as a costless unilateral measure to increase trust with developing countries; others as a needless concession that should be subject to other developed countries making the same commitment. Europe's political strategy towards a legally binding climate regime depends on this decision.

The passage of a US Climate and Energy Bill could provide additional political impetus to the climate negotiations in Cancun in December 2010. Without such a bill, it seems unlikely that major progress will be made. The EU should play a balanced game, therefore, building a firmer international political foundation and preparing for swift action when political conditions improve.

33 Nick Mabey, *Down But Not Out? Reviving the EU's Political Strategy after Copenhagen*, (London: E3G, 2010).

34 See http://ec.europa.eu/environment/climat/pdf/com_2010_86.pdf.

Bilateral and regional climate cooperation

The $30 billion of 'fast-start' finance pledged at Copenhagen for 2010–12 should be directed towards countries that showed the political will at Copenhagen to develop low carbon growth plans, and that supported ambitious global action. Sectoral frameworks (consistent with the reformed Clean Development Mechanism being developed by the EU) should be used to encourage genuine low carbon transformation in selected developing countries. The UK – with the EU – should also prioritize delivering the MEF commitment to double low carbon RD&D and drive forward international technology partnerships for CCS and energy efficiency.

Rapid progress needs to be made towards an international process for innovative climate finance, defining the architecture of the Green Fund and completing work on technology mechanisms; detailed elements of practical measurement, reporting and verification (MRV) systems (starting with MRV for finance and technology cooperation); and building consensus on reforms to the UN process and strengthening the UNFCCC secretariat.

Britain is well placed within the EU to drive international cooperation on the analysis of climate change threats to international security and development cooperation, and to invest in climate change diplomacy, especially with the BASIC countries.[35] The EU's association agreements and partnership agreements can offer vehicles for this, similar to the EU–China economic dialogue. The renewal of the EU–Russia partnership agreement involves critical energy security issues for the EU (they are less critical for the UK), as well as issues important to any global climate regime (treatment of forests, mechanisms for measurement and verification).

The UK should work with European partners to undertake a rapid strategic review of its low carbon international cooperation, strengthening relationships with progressive countries such as China, Mexico, Indonesia and Brazil.

Border tax adjustments are strongly advocated by a number of European governments including France but rejected by other major economies and most of European industry. They are also regarded with great suspicion by the emerging economies. Some want to follow the US Congress, seeing border measures as a means to punish emerging economies for not agreeing to the EU's agenda at Copenhagen; others regard them as an ineffective policy likely to produce a harmful backlash and undermine progress on both climate change and trade agreements. The uneasy European compromise satisfies the aims of neither side and should be resolved by the end of 2010 within the review of EU 2020 targets.

The UK should work for resolution of an EU position on border carbon measures that avoids damaging global trade outcomes.

Maintaining open markets

The UK has always believed in strengthening rules-based markets for all energy sources. But the current global trend towards energy trade with and investment in regions where there is strong state control as well as politically controlled markets seems unlikely to be reversed soon. Britain cannot alter this trend. On the other hand, key countries' membership of the WTO, and the desire of others to join (including Russia, intermittently), provide processes there and through the General Agreement on Trade in Services (GATS) that enable the UK to protect its access to energy trade on a non-discriminatory basis. Open trade would enable UK companies to share in the service and investment opportunities in energy-exporting countries. Recent government 'green stimulus' packages favouring national firms in China, US and Europe have closed low carbon markets, not only slowing decarbonization but reducing export opportunities for UK firms.

Energy should be better incorporated into the UK and the EU trade agendas.

35 The BASIC countries comprise an alliance of four large developing countries – Brazil, South Africa, India and China – formed by an agreement on 28 November 2009 ahead of the Copenhagen Summit.

Strategic energy cooperation

UK energy security depends on maintenance of open world markets in oil and gas, and their further development. EU policy has focused on bilateral relations, especially with neighbouring countries, or on specific large-scale infrastructure projects such as gas pipelines, while individual member states pursue their own objectives on behalf of their national companies. This is a particular weakness in areas such as West Africa, Iraq, Central Asia, and Russia. Here, European companies compete with each other, and with Chinese and other Asian companies which are backed by governments offering related aid and development support without governance-related conditionality. The EU should recognize this challenge for EU foreign policy, and develop cooperation between member states regarding such issues, especially in Africa.

Even if the UK cannot match the offers from China and elsewhere, the size of the EU markets can provide some leverage. Access to the EU market for non-oil (as well as oil) exports, technology and investment opportunity is critical for these regions needing to diversify their economies.

The UK should focus its oil-related foreign policy on the 'pivotal' regions, such as West Africa and Central Asia. This focus should be incorporated in new EU foreign policy arrangements, given similar interests among other members. The UK should also explore, as an energy component of EU foreign policy, the scope for integrating development assistance in these pivotal regions.

In the increasingly important International Energy Forum, the UK should pursue objectives for cooperation that would benefit the stability and diversity of its growing energy imports.

The UK, unlike the EU's Central and East European member states, is looking to the Atlantic basin LNG market as the source of supply for its growing gas imports. Equity for investments in LNG liquefaction plants and trains is more important to Britain than pipelines from Central Asia or Russia. Further development of the LNG trade and its facilities would increase the flexibility and resilience of gas supply for all importing countries. LNG supplies 28% of the global gas trade, and compared with pipelines it offers greater diversity of markets to exporters, and greater diversity of supplies to importers. Smaller project sizes and the fact that there are no transit problems make incremental growth in LNG trade more achievable. An increasing proportion of this trade is either uncommitted to long-term contracts or committed to contracts with the downstream affiliates of the (mainly private-sector) producing companies.[36]

There are, however, risks to the private-sector investors who will be responsible for most of the development of this trade in the Atlantic basin. These risks might be reduced by an international protocol designed to:

- avoid discrimination between trading and investing partners;
- minimize restraints on trade in LNG and on equipment and services imported to build and operate liquefaction plants and LNG terminals; and
- offer some protection against political risk (e.g. expropriation by host governments) and provide a standard menu of dispute resolution processes.

A protocol focused precisely on the LNG chain (from liquefaction plants through shipping, terminals and re-gasification plants) would avoid many of the problems of sovereignty and transit that have limited gas exporter membership of the Energy Charter Treaty (ECT).

The UK should explore the possibility of an international protocol for LNG.

Saudi Arabia maintains excess production capacity as a matter of policy (and has used it during past disruptions). OECD governments maintain strategic stocks of 90 days' imports, and the IEA has its Emergency Response Mechanism (ERM). OECD imports are only just over half of world oil imports, and

36 Energy Charter Secretariat/Jensen Associates, *Fostering LNG Trade: Developments in LNG Trade and Pricing* (Brussels: Energy Charter Secretariat, 2009).

this share is declining. This is problematic because there is no formal agreement with China, India or other developing countries for responding to temporary supply interruptions.

The UK should support a global emergency response mechanism on oil security. The UK and other importers should press for an agreement between the IEA and major non-OECD importers as part of a broader and more inclusive strategy towards emerging major importing countries. The possibility of formalizing understandings with key exporters can also be pursued through the International Energy Forum.

Conclusions

The UK needs to renew its energy system in a way that contributes to achieving not only its future energy needs, but also its 2050 low carbon economy objectives. It cannot avoid the effects of external events in the oil and gas markets. Within the EU, the UK is bound by agreed common objectives and policies, and has the opportunity to develop support for its international energy and climate-related objectives. All this has to happen within a context where Britain's energy industries are almost entirely in the private sector and many critical enterprises are owned by foreign companies.

The Low Carbon Transition Plan published by the Labour government in July 2009 sets out an array of objectives, policies and measures to deliver statutory 'carbon budgets' on a trajectory to a reduction of greenhouse gas emissions to 80% of 1990 levels by 2050. However, plans will change as more is known about the potential and costs of new technologies and the effectiveness, costs and benefits of the various measures. Evaluation of these will require an idea of a long-term carbon price. This may prove as elusive as of the idea of a stable long-term oil price: uncertainty, and the division of risks between the state and the private sector (including consumers), will remain an endemic issue.

There are many areas where additional action and policy are needed. These include faster retrofitting in buildings at acceptable costs to consumers and taxpayers; reforms of the electricity market; rationalizing and evaluating the varieties of support for new technologies and markets; and incentives for private-sector investment in spare gas transmission and storage capacity.

There is, moreover, a wider set of policies that are not to be found in current plans. These concern what the UK government can do in Europe and internationally to advance and protect its energy and climate security. Britain cannot plan for the world, but it can have a strategy for its actions in the world. With the exception of its approach to managing climate change in the UN negotiations, the UK does not have such a strategy. To achieve its security objectives it needs to develop one together with the private sector and its European partners.

This paper has outlined the elements of such a strategy: promotion in the EU of more ambitious emission targets and efficiency measures; full liberalization of trade and investment in energy and related technology; a strategy for a European electricity 'supergrid'; rationalization of support for areas of the EU Sustainable Energy Technology plan that are critical to the UK; and a coordinated EU-wide approach to trade and investment relationships with critical energy oil and gas exporters. Internationally, the UK would increase its impact by working with the EU on energy issues through the G20, WTO and bilateral relationships. This external strategy should include strengthening open markets for energy and climate technologies, including a possible protocol on LNG, reducing energy subsidies, and finding incentives to induce major emitting countries to strengthen their participation in global climate measures.

Policy priorities, 2010–15

In the UK:

- Introduce aggressive programmes of energy-efficiency retrofitting in the residential and SME sectors as the fastest, most cost-effective way to reduce emissions and enhance energy security, financed through the UK Green Investment Bank. Aim to have all UK properties retrofitted by 2025–30.
- Resolve the current uncertainties for much long-term investment in the power sector by agreeing a market reform package in 2011 and giving a clear framework for ongoing government intervention and support in this sector.
- Rationalize UK energy innovation support around a set of priority technologies and markets where the scale of activity can reach the critical mass needed for success.
- Create incentives for the private sector to invest in spare capacity and gas storage.

In the EU:

- Agree to raise the EU CO_2 reduction targets to 30% by 2020, including a new package of mandatory efficiency measures.
- Prioritize full liberalization of EU markets in energy and low carbon technologies, goods and services in the 'Europe 2020' strategy for jobs and growth.
- Promote agreement on a coordinated strategy to build an effective Europe-wide 'supergrid' for low carbon power, supported by new EU budget lines from 2013.
- Prioritize EU funding for areas of the EU Sustainable Energy Technology plan, including smart grids, electricity storage, electric vehicles and low carbon solutions for steel, cement and chemicals.
- Seek EU support for initiatives to enhance access to international energy resources through trade and investment-related cooperation.

Internationally:

- Work with EU and other developed-country partners to deliver the financial commitments made in the Copenhagen Accord as the basis for increasing global cooperation on developing and diffusing low carbon and energy-efficient technologies. Prioritize critical areas for enhanced technology cooperation with developed and emerging economies.
- Develop an UK and EU strategy for strengthening open global markets for energy and climate technologies through the G20, WTO and EU bilateral relationships, including action to reduce harmful energy subsidies. Negotiate LNG protocols to improve conditions for investment in expanding LNG trade.
- Work with European partners to develop a new EU political strategy focused on creating incentives for the major emitting countries to strengthen the global climate regime with the aim of reliably limiting global temperature increase to 2°C above pre-industrial levels. This should include an examination by the EU of the risks and benefits of using trade-related measures to promote global climate change action.
- Focus diplomatic efforts (coordinated within the EU External Action Service if possible) on managing changing relations with fossil energy suppliers to maintain energy security during the low carbon transition, including stronger relations with regions that can easily switch between the Atlantic and Asia-Pacific oil markets.

Rethinking the UK's International Ambitions and Choices

This major Chatham House project is assessing the UK's international priorities and the policy choices it faces in matching its ambitions, interests and resources. It is led by Dr Robin Niblett, Director, with the support of Alex Vines OBE, Research Director, Regional and Security Studies, and Dr Paul Cornish, Carrington Professor of International Security and Head of the International Security Programme.

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