TOUCH STONE

PAMPHLET#5

Unlocking Green Enterprise

A Low-Carbon Strategy for the UK Economy

The green economy will be one of the biggest global growth sectors in the 21st century. The UK economy needs to play a major part if it is to emerge from the current economic crisis. However, the UK's environmental sector trails countries like Germany and Denmark. This study draws on international comparisons and interviews with leading experts to understand how the UK can replicate this success. For the first time, a straightforward policy programme is presented to unlock green enterprise in the UK.

This pamphlet was researched and drafted by Impetus Consulting Ltd (www.impetusconsult.co.uk), an environmental consultancy specialising in climate change and sustainable construction.

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Foreword

by Brendan Barber, TUC General Secretary

Every day we become more aware of the depth of the economic crisis stalking the globe. No-one can now doubt the seriousness of the situation. And if there is one lesson to learn from the financial crisis of 2008, it is that this is no time for faint hearts or muddled thinking. If the UK and the world are to begin exiting this storm within the next twelve months, policymakers will need to tear up the old economic rulebook and take bold and innovative action.

That is why I believe this pamphlet is so significant. It shows that if the green economy is to play a central role in the UK's recovery and future growth, then the boldness and imagination that was applied to the banking crash will also need to be applied to the environmental sector.

This is an enormous challenge to the UK; not just because our green economy lags so far behind others, but because the mindset in government for the last 30 years has been to leave the market to deliver. As *Unlocking Green Enterprise* shows this is emphatically not how Germany or Denmark have created world-beating green businesses. In these countries, the state has played a central role in boosting environmental markets. The old arguments that such approaches are too costly or too interventionist cannot stand.

It is enormously significant, therefore, that the Department for Business under the leadership of Peter Mandelson is now talking enthusiastically about developing an "active industrial strategy" for the UK. It is equally significant that the Government has been very clear about the central role the green economy will play in that strategy. The trick now is to move from the headlines to practical policies. That is precisely what this pamphlet delivers.

Thanks to Joanne Wade, Kelly Lee and all at Impetus Consulting, to Noel Botha of Orion Innovations LLP, and to David Lemon and Jonathan Murray of Sustainable Transport Solutions for producing such a well-informed and straightforward framework for future policy. This is a framework that could not only secure the UK's green future, but could well secure its economic future as well.

Executive summary

The UK economy is in recession. There has been a great deal of discussion about why and how this has occurred and about how to stem the worst of the current rise in unemployment. But there has, as yet, been limited debate about how the UK can restart growth. One focus must undoubtedly be the opportunities offered by the 'green economy'. The reason is simple. The green economy has grown enormously in the last decade, both across the world and in the UK, and is projected to grow even more rapidly in coming years. The Environmental Goods and Services sector alone was worth $548bn globally in 2004 and is projected to reach $800bn by 2015.

Of course, the current global slowdown may affect such projections in the short term but the long-term significance of the green economy cannot be doubted given the historical trend for the rising cost of fossil fuels and the growing political will to address carbon emissions. Of course, the economic and political implications of the green economy have only been strengthened by the fact that the world's largest economy is now governed by a president with a clear political commitment to cutting carbon emissions. The opportunities for the UK as one of the United States' closest trading partners cannot be underestimated in this regard.

The UK has certainly benefited from the growth of the green economy but we lag well behind European neighbours such as Denmark, Germany, the Netherlands and Spain. This is particularly evident when the employment records of the sectors in different economies are compared. To take just one example, Germany has managed to generate half a million jobs in its renewable energy sector alone, while the UK languishes on 7,000. The green economy as a whole employs 1.5 million people in Germany, compared to 400,000 in the UK. At a time of rising unemployment these are figures that cannot be ignored.

Government clearly has a key role to play in setting the right policy framework, both for the reduction of carbon emissions and to ensure that UK businesses are best placed to take advantage of the national and global transition to a low-carbon economy. The Government has been active in addressing three key barriers to the growth of the green economy: the low price of environmental impacts; weak investment and demand for green products and services; and system failures that slow the rate of green transformation. Important policies such as the Climate Change Levy, the Carbon Reduction Commitment, the renewables obligation and reforms of the planning system, plus a host of smaller initiatives, are

significant attempts to address these barriers. However, the clear message from industry figures and experts, and from the study of our more successful national competitors, is that greater ambition is needed both in terms of creating a policy framework to cut emissions and to unlock green enterprise.

Four headline policy directions are needed from Government to meet this greater ambition.

Commitment to delivery of environmental policy

The policy framework being developed through legislation such as the Climate Change Act and Energy Act and through developments in areas such as waste management policy, local authority performance evaluation and national planning policy will not in itself be sufficient. Business needs to be convinced that the current emphasis on greening the economy is something that will remain on the policy agenda for a significant period of time. Emissions targets need to be clear and firm and need to reach into a variety of sectors beyond the very high level Climate Change Act targets. Progress towards targets should be reported upon by lead departments and also monitored independently. The Government must be prepared to act swiftly when any shortfall against targets is identified, otherwise credibility will be lost.

A central role for the state

Our competitor economies recognise that the state has a central role in stimulating the green economy. This is not about 'picking winners' but having the boldness to set clear direction and incentives to kick-start a key sector. This is particularly the case with regard to the creation of adequate demand for green products and services. Five policy areas are important in this regard.

Firstly, the purchasing power of the public sector is often underestimated. Coherent and consistent inclusion of environmental criteria in procurement decisions throughout the public sector will help to transform the markets for a wide range of products and services towards greener options.

Secondly, existing financial incentives are too weak to encourage a wide uptake of green products and services. Government needs to make a greater commitment to such incentives. The Government decision to adopt the use of a feed-in tariff is an important step in the right direction in this regard if the detail of the initiative is sufficiently bold.

Thirdly, provision of green information to consumers must be stepped up, constantly reinforced and accessible to all. The roll-out of smart energy metering and innovations like the London Green Concierge Service (which provides a full year of energy efficiency improvement advice to homeowners) are key.

Fourthly, where an existing market framework does not support the development of the optimal environmental solution, Government should be willing to consider intervening to redefine the boundaries of the market. Redefining the energy market to promote competition based on something other than unit price of fuel is one possibility.

Finally, the Government must be prepared to accept that in some cases the market simply will not deliver the transformation required. In these situations, it must be prepared to introduce regulation to require environmental change and thus stimulate green growth.

Increased support for innovation and research and development

Levels of investment in technology, research and development and green innovation in the UK lag behind those in other countries.

The detailed targets mentioned above must be developed on the basis of high-quality analysis of the technical options so that when they are implemented, green innovators and their investors can have confidence that they will be adhered to and that they are meaningful.

The Government also needs to make far greater use of Forward Commitment Procurement schemes to stimulate innovation that will provide solutions to environmental problems. The mechanism has been used successfully in other countries such as Sweden for many years and could become a useful tool to increase the pace of technological development in areas where the UK could take the lead in international markets.

In addition, public sector investment in innovation is far lower in the UK than it is in competitor countries. The Government needs to at least match, and perhaps exceed, the investment levels of countries where the green economy is already growing strongly.

Ensuring we have the necessary skills

Relying on the market to identify skills gaps and develop solutions to them is causing delays in the transition to a green economy. The Government should not be afraid to anticipate future skills needs and to intervene to ensure that these are met. It is welcome that the Secretary of State at the Department for Innovation, Universities and Skills has indicated that skills policy will progressively be moving in this direction but there is a need for more urgent action by Government to rapidly develop a strategic skills strategy to support transition to a green economy.

With a framework based on these key policies, the UK economy will begin to take advantage of the growth opportunities provided by the development of a green economy and the current economic problems will ultimately prove shorter and shallower than may otherwise have been the case.

Introduction

The threat of climate change is driving a transition to a green economy and there is a broad political consensus, in the UK and in Europe, on the need for change.

Increasingly, the potential economic benefits of strong and early action are being recognised. Such action is not only the route to minimising the costs associated with tackling climate change, it is also the way to ensure that UK workers have the opportunity to participate fully in a new, green economy.

The potential is recognised by the UK Government. Speaking at a UK Low Carbon Economy Summit in June 2008, Prime Minister Gordon Brown stated:

> *By 2050 the overall added value of the low carbon energy sector could be as high as $3tr per year worldwide and it could employ more than 25 million people. So my goal is simple: I want Britain to achieve a disproportionately large share of these new global jobs.*

But Government is not providing the ambitious and consistent policy framework needed to ensure that we take full advantage of the opportunities on offer. We have failed to capitalise on past developments and so do not now have the thriving onshore wind or solar photovoltaic industries that we might have had. Our competitors invest far more to support innovation and the development of new technologies and in new skills for their workforce.

During the last decade of consistent economic growth in the UK, the lack of this framework was a concern to trade unions, environmentalists and others. As we enter a period of possibly prolonged recession, the failure to grasp the growth opportunities presented by the green economy will prove a case of serious governmental neglect that should concern us all.

However, this is a policy area of multiple initiatives, competing prescriptions, bewildering technologies and overlapping responsibilities and imperatives. Based on desk research, interviews with 22 leading experts and international comparisons, this pamphlet cuts through the complexity to create a straightforward overview of the area and a series of four headline policy proposals designed to maximise the Government's impact to ensure that the UK emerges from this recession not just with a healthier economy, but also with a greener one.

The growth potential of a green economy

Defining the green economy

Defining the environmental goods and services (EGS) sector is a difficult task. Not only is there a series of clearly delineated sectors that offer these goods and services, there are also many products and services from within other sectors that should be considered as part of a 'green' economy.

The UK Centre for Economic and Environmental Development (UK CEED) report *Emerging Markets in the Environmental Industries Sector* (Selwyn, 2006) provides an overview of the competitive environment of the UK EGS sector and, except where otherwise stated, the facts and figures in this section are taken from this report.

The report defines EGS as the following sectors and sub-sectors:

- air pollution control
- cleaner technologies and processes
- decommissioning/decontamination of nuclear sites
- environmental consultancy
- environmental monitoring, instrumentation and analysis
- energy management/efficiency
- marine pollution control
- noise and vibration control
- remediation and reclamation of land
- renewable energy
- waste management, recovery and recycling
- water supply and wastewater treatment.

There are some emerging sectors in which the UK has taken a leading global role that are not considered in this definition, such as carbon markets and carbon financing. In addition, there are some industries that are not considered as being in the EGS sector, for example the automotive industry. This industry now has elements of the EGS sector within it, such as the development and production of low-carbon vehicles.

Size of the sector

Green industries are growing contributors to wealth on a national and global scale. The economic opportunities offered by the sector can be simply illustrated by the projections for its growth.

The green economy is already a significant contributor to wealth generation and employment. The core of this economy, the EGS sector, was estimated to be worth $548bn globally in 2004, with 94 per cent of this value residing in the EU, US and Japan.[1] In the UK, the size of the sector in 2005 has been estimated at £25bn.

This contribution is expected to grow. Globally the sector is projected to increase to $600bn by 2010 and just under $800bn by 2015. In the UK, the sector is expected to expand by over 40 per cent between 2005 and 2010, and by 84 per cent between 2005 and 2015, when it is projected to generate £46bn.[2]

Employment

The EGS sector in the UK alone presently employs 400,000 people, a figure that could more than double in the next few years.[3]

There are no estimates of employment levels at the global level, but some indication of the numbers of people involved can be gleaned from data on elements of the sector. For example, the current global renewable energy generation products market is estimated to provide employment opportunities for 1.7 million people, a figure that rises to 2.3 million when supplier industries are included.[4]

Employment benefits are not just about numbers of jobs. A shift to a green economy could also bring advantages in terms of the range of skills required within the UK workforce. As well as new jobs that require individuals educated to degree level, such as designers and engineers, other jobs – in installation and maintenance of renewable energy technologies, for example – will require more vocational qualifications.[5]

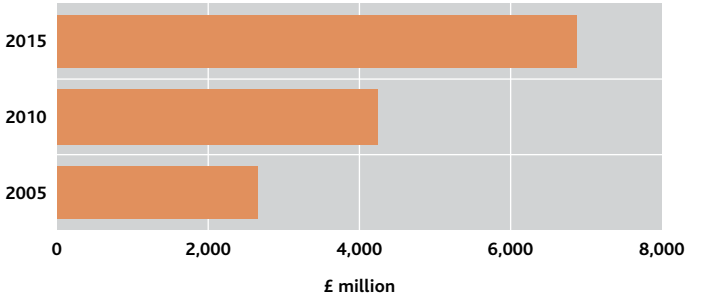
Rapid growth within the green economy

There are a number of key sectors within a green economy that are forecast to grow most quickly. Two of the sectors with particularly strong potential are energy management and renewable energy.

Energy management

The UK market for energy management[6] in 2005 was estimated at £2.65bn and this is projected to grow by 60 per cent by 2010 and 160 per cent (to £6.87bn) by 2015. This growth will be in response to increased regulation and market demand, arising from mounting concerns over climate change.

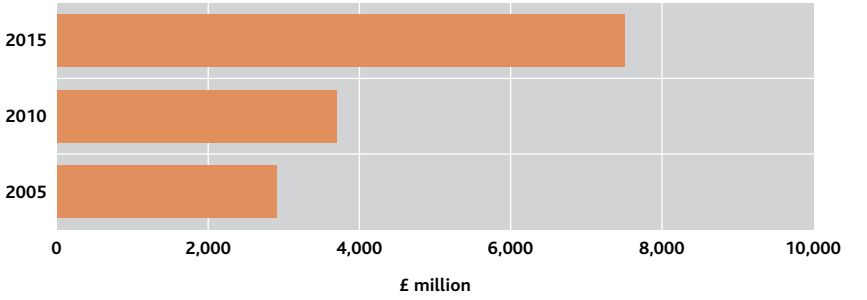
Projected market growth for the energy management sector for the period 2005 – 2015.[7]



Renewable energy

The UK market for renewable energy technologies in 2005 was estimated at £2.90bn. Very rapid growth to £3.7bn by 2010 is forecast, with a further doubling to £7.5bn by 2015. This will be driven by the need to meet domestic and EU renewable energy generation targets.[8]

Projected market growth for the renewable energy sector for the period 2005 – 2015.[9]



Costs of the transition to a green economy

It is often claimed that the costs to businesses and the wider economy of meeting environmental goals are unsustainable but in truth these are less than the cost of failing to act. For example, the Stern Review[10] concluded that: "the evidence gathered by the Review leads to a simple conclusion: the benefits of strong and early action far outweigh the economic costs of not acting".

Key issues include ensuring that international policy is developed to avoid firms relocating away from nations that are taking a lead in greening their economies, and also working to develop greener elements within sectors that bear much of the costs of the transition if the policy framework is not right.

Greener road vehicles

Road vehicle design, manufacture and sales is one example of a sector that could bear the costs of a transition without the right framework. But it is also one that could seize great opportunities if encouraged to develop new options at a fast enough pace.

The importance of ensuring that the transport sector takes advantage of opportunities linked to greening the economy is illustrated by its current size;[11] it generates an annual turnover of £200bn; and it supports 200,000 manufacturing jobs and a further 580,000 jobs in sales, servicing, refuelling, maintenance and other service-related activities.

The King Review[12] notes some of the opportunities that are available to the sector: "There are opportunities for the UK to develop further in both licensing and supplying low-carbon technologies to the mass-market manufacturers, and as a leader in some areas of the electric vehicle market. Long term, with the right approach now, the UK could play a strong role in future electric systems, novel battery and energy storage solutions and in other areas..."

This potential also applies to public transport incorporating rail and bus systems. The opportunities to generate jobs and growth through modal shift to the public transport system and to transform that system into a low-carbon sector through electrification of rail to European standards are great. The recent call by the Independent Committee on Climate Change to include public transport in the carbon budgeting process associated with the Climate Change Act is an early indication of the role that the sector could play in both cutting emissions and boosting the economy.

Of course, many of these projections were made in a different economic environment, one in which growth had become so well established that it was almost taken for granted. Now the UK economy is in recession and this will certainly have some impact on these projections and the prospects for the environmental sector as a whole. The exact contours of this impact are difficult to predict at this stage but it is important to recognise that the new economic circumstances do not negate the importance of the shift to a low-carbon economy. Indeed, in the search for sectors that have the potential to perform well in the future and thus pull the wider economy out of recession, there can be few sectors with global prospects quite as clear and firm as the environmental sector.

Government policy and the barriers to a green economy

The growth projections for the UK green economy will become reality – and their realisation translated into economic benefits for the UK – only if a series of barriers to the transition to a green economy are overcome. Based on the interviews and research conducted for this pamphlet, three key barriers to green growth in the UK have been identified:

- the low price of environmental impacts
- weak investment and demand for green products and services
- system failures that slow the rate of green transformation.

This section will show how the Government is seeking to address these barriers before concluding that much greater ambition is needed to really overcome the obstacles to green growth.

The low price of environmental impacts

Prices of goods and services do not at present fully reflect their environmental impacts. Hence there is a fundamental market barrier to development of options that reduce these environmental impacts.

Government policy may attempt to overcome this, by putting a price on the impacts (either explicitly through taxation or tradable permits or indirectly through the application of regulation) or by compensating for the lack of a price signal with the use of other policies to support innovation and the development of markets for green products and services.

There has historically been a range of government activity to indirectly incorporate the cost of environmental externalities into the market through the use of regulation. More recently the policy focus has shifted to a more explicit inclusion of environmental costs through taxation and, most recently, emissions trading schemes. Examples of both indirect and direct pricing policies are given in the following table.

Indirect pricing	• energy efficiency in the building regulations • air quality standards • motor vehicle exhaust emissions limits • a wide range of product standards (for example, minimum energy efficiency or absence of harmful chemicals)
Direct pricing	• differential vehicle excise duty • the landfill tax • the Climate Change Levy • carbon emissions trading • the Carbon Reduction Commitment

Weak investment and demand for green products and services

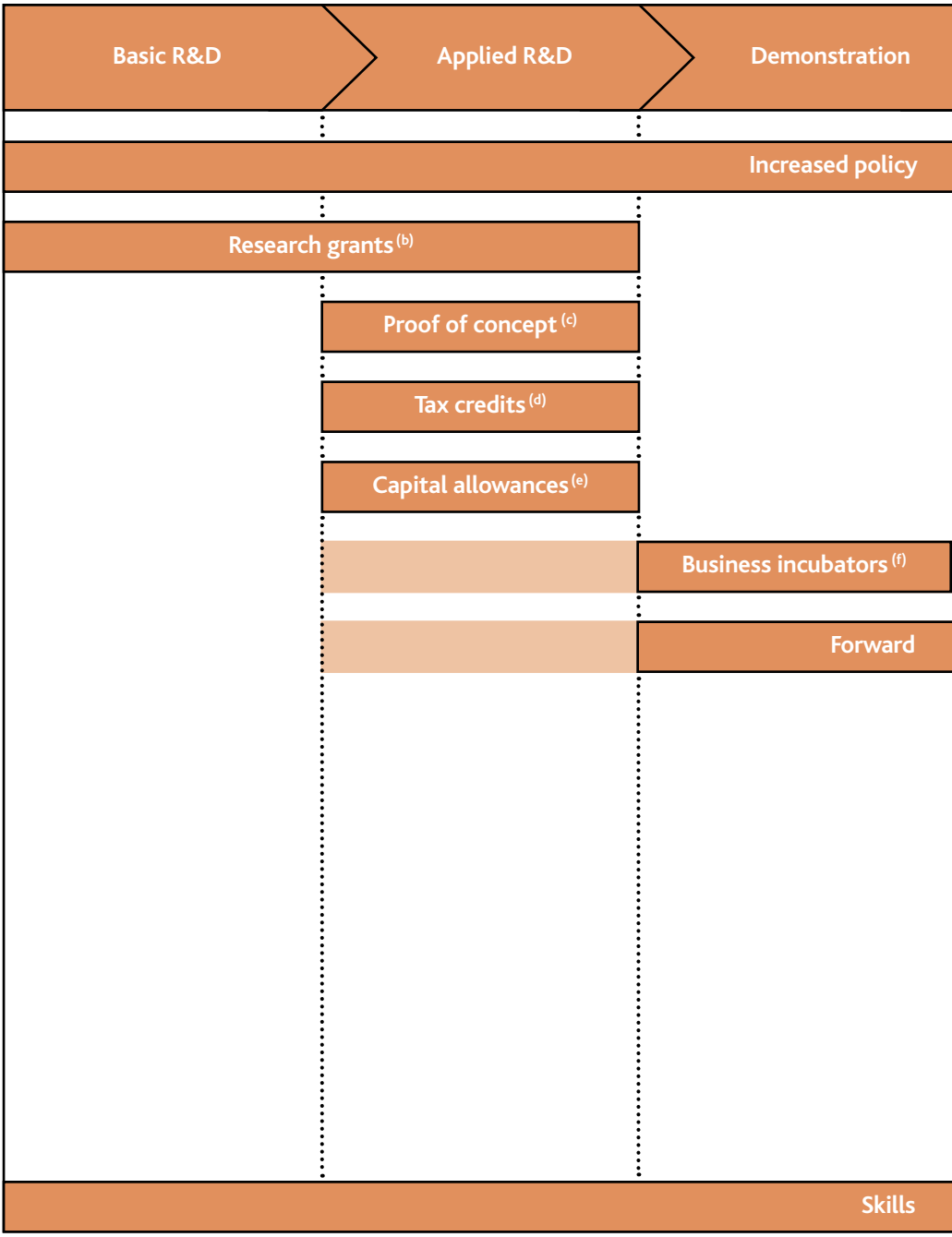
The need for government action on prices or other compensatory measures means that the market signals offered to producers and consumers alike are dependent on government policy and therefore can be viewed as uncertain. This 'policy risk' lowers the tendency for the private sector to invest in new products and services.

Also, investment in new business models may be stifled by the way that the market in a particular area has been defined by policy. For example, the energy market was shaped around a focus of maximising the efficiency of the supply system: the job of the energy regulator (Ofgem) is to ensure that the market functions properly to achieve this aim. This has led to a focus on the unit price of fuels, rather than on the costs of energy services. Thus there is little incentive for existing or new market participants to invest in the development of energy services offerings.

Linked to this problem is the issue of low demand for green products and services. Any tendency for the pricing of environmental impacts to be too low or too uncertain, or a shortfall in other compensatory policies, leads to a lack of demand for green products and services. This can be exacerbated by a number of other barriers, including:

- lack of information (on the best options available and how to access them)
- lack of access to finance (when investment is required)
- competing uses for available money
- split incentives (for example, a landlord investing in energy efficiency measures and the tenant benefiting from reduced energy bills).

The Government has responded to this problem by providing support for new products and services throughout the innovation chain, from initial research and development through to development of market demand, as the summary diagram overleaf illustrates.



a. For example, using the landfill tax escalator and the future plans for zero-carbon new buildings. More overall confidence may be provided by the Climate Change Act and the revisions to the EU Emissions Trading Scheme from 2013.

b. Provided through a range of channels including the research councils and economic development agencies

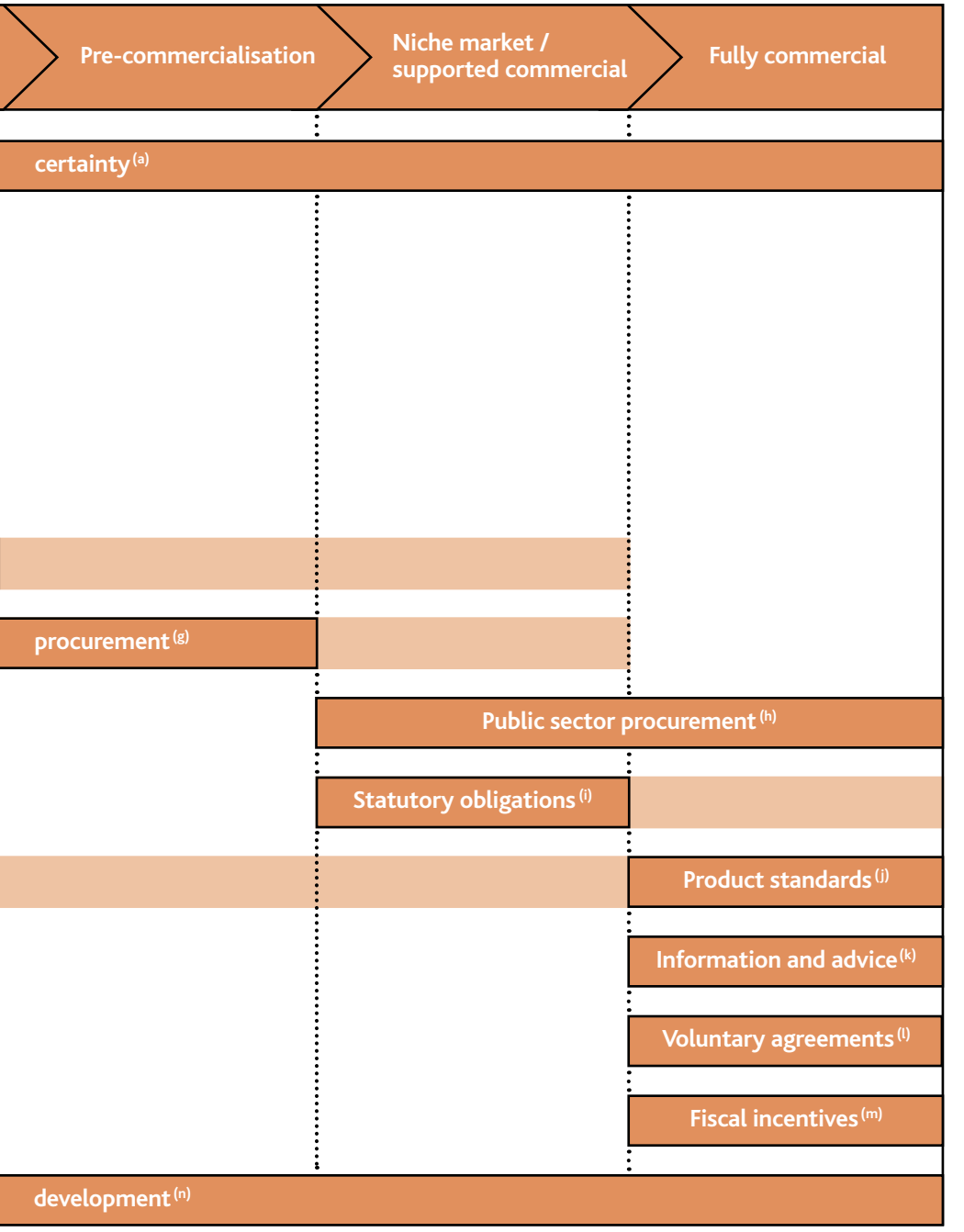
c. These provide finance to help bridge the gap between initial advances and full-scale laboratory demonstration or prototyping.

d. Including research tax credits for SMEs

e. Available for R&D equipment.

f. Such as that run by the Carbon Trust, helping businesses with promising carbon-saving innovations to raise the investment needed to grow their business.

g. The Low Carbon Vehicle Procurement programme, launched in March 2008, is an early example of the use of this instrument in the UK.



h. For example, the requirement for central government departments to demand buildings with top-quartile energy efficiency.

i. Such as the Renewables Obligation and the Carbon Emissions Reduction Target.

j For example, minimum efficiency standards for electrical appliances, building regulations, Decent Homes.

k. Including the activities of the Energy Saving Trust, the Carbon Trust, WRAP and the Environment Agency.

l. Such as that between the EU and ACEA (the European vehicle manufacturers grouping). Note that such agreements are often superseded by product standards if they prove ineffectual.

m. Including Enhanced Capital Allowances for energy saving equipment, Low Carbon Buildings Programme grants, fuel duty differentials and stamp duty exemptions.

n. New skills sets will be needed across the range. The Government recognises the skills shortages that exist and is beginning to take action, such as commissioning detailed skills gaps studies and overhauling the apprenticeship system.

System failures that slow the rate of green transformation

Where policies act to stimulate innovation, investment and a demand for new products and services, the rate of uptake can nonetheless be constrained by failures in delivery systems.

For example, the rate of uptake of small-scale renewable energy technologies and the rate of development of large-scale renewable electricity supply has been slowed by the nature of the planning system which was, until relatively recently, designed to presume against renewable energy developments unless a good case for each one could be made.

Equally, choice of vehicles operating on low-carbon fuels may at times have been discouraged by a lack of refuelling and maintenance infrastructure for these vehicles.

Finally, the delivery of new goods and services is dependent on the existence of a competent supply chain, able to gear up to the demands of a growing market. There are many instances where the skills needed by the workforce in these supply chains have not been developed sufficiently quickly.

Some of the failures in delivery systems are being addressed by Government. For example, changes to the planning system (including the introduction of Planning Policy Statement 22 on Renewable Energy and the climate change supplement to Planning Policy Statement 1, the proposals for an Infrastructure Planning Commission, and the General Permitted Development Order covering some small-scale renewable energy technologies) are intended to make the system far more favourable towards investment in renewable energy.

The need for greater ambition

Despite current government actions, the transition to a green economy is not occurring in the UK as swiftly as it is in some other countries, hence we are in danger of failing to gain from the economic benefits on offer.

The EU is a strong competitor in the global eco-innovation products and services sector with a market share of around 30 per cent, or €227bn, representing 2.2 per cent of the EU's GDP and resulting in around 3.4 million jobs. Across Europe, the benefits of greening the economy have been recognised,[13] and member states have each developed implementation strategies for the EU Environmental Technologies Action Plan.

However, the UK risks falling behind countries such as Germany, Denmark and Spain, where thousands of 'green collar' jobs and billions of pounds in revenue are being created from the development of the green economy. Germany, for example, has created a renewable energy sector employing almost half a million people with a turnover of €24bn, while in the UK – an economy with a workforce almost three-quarters the size of Germany's – the sector employs just 7,000, generating €360m.[14] Overall, the German environmental sector is estimated to employ 1.5 million people,[15] over three times the 400,000 employed by the sector in the UK.

Denmark provides another example of a country enjoying a significantly better rate of progress in a sector where government support has been focused. The Danish government's long-term planning for renewable energy generation has led to the development of a world-leading wind industry in the country. It is now the country's third largest exporter, has generated 20,000 new jobs (in a country with a workforce of under 3 million) and supplies nearly 17 per cent of the country's energy requirements. The environmental sector overall in Denmark employs approximately 60,000 people, some 2 per cent of the country's workforce.

So, despite a flurry of Government action on promotion of a green economy, much still needs to be done. The global marketplace is an unforgiving environment. Failure to create a thoroughgoing and ambitious policy framework to allow green enterprise to flourish in the UK will be ruthlessly exploited by other governments and economies. Given the importance that green growth could have to the UK's escape from recession, the UK Government must be tireless in its search for the ideal framework.

Creating a more ambitious policy framework

The Government appears to realise that more action is needed. It is developing a clearer policy framework around carbon emissions reduction and has a number of strategies in place for areas such as waste minimisation and management. In recent years there have also been a number of government-commissioned reviews of the situation, including the Commission on Environmental Markets and Economic Performance (CEMEP) and the King Review of the development of low-carbon cars.

The CEMEP report[16] offered 24 recommendations to Government, including the need for:

- increasing policy certainty
- a better framework of support for research and development
- improving support for bringing new innovations to market
- better provision of information – to business and by business – to allow resource-efficient purchasing decisions to be made
- a robust analysis of skills needs and the capacity of the present system to close any gaps identified.

Part II of the King Review[17] offers an example of how such a comprehensive policy approach could be applied in one sector, offering 40 recommendations that challenge the Government to take urgent action on many fronts.

The research undertaken for this pamphlet identified four broad policy shifts required for a comprehensive and timely transition to a low carbon economy:

- committment to delivery of environmental policy
- a central role for the state
- increased support for innovation, research and development
- ensuring the UK has the necessary skills.

Commitment to delivery of environmental policy

As part of the research behind this pamphlet, we sought the opinions of a number of experts in the renewable energy, energy efficiency and low-carbon vehicles sectors.[18] The policy framework being put in place by Government is generally supported by the people we spoke to, but the most consistent theme to emerge from their comments was the need for greater policy ambition and commitment to delivery:

> *There appears to be a lack of urgency, which needs to change if we are to meet our targets.* **Paul Ekins, Kings College**

> *We are starting to see some good policy; now we need action to deliver on policy aims.* **Gordon Edge, British Wind Energy Association**

> *We can green the economy but we need more of a lead from Government – there is no momentum at the moment.* **Ingrid Holmes, Climate Change Capital**

The more ambitious policy framework being developed through legislation such as the Climate Change Act and Energy Act and through developments in areas such as waste management policy, local authority performance evaluation and national planning policy will not in itself be sufficient.

People need to be convinced that the current emphasis on greening the economy is something that will remain on the policy agenda for a significant period of time. Stern[19] summarises this issue as follows: "...establishing credibility takes time. The next 10 to 20 years will be a period of transition..."

The inherent time needed to effect the transition to a green economy is perhaps extended by a well of scepticism about government targets, based on past performance. For example, the Government will not achieve its legally binding target to remove vulnerable households from fuel poverty by 2010. Why should climate change and other environmental targets be any different?

Any extension of the transition period not only risks failure to meet environmental targets, it also reduces the chances of the UK taking a lead in any of the newly developing elements of the green economy. Overcoming this scepticism will need Government to demonstrate consistently that it is willing to take the action necessary to deliver on targets. This will need cross-government commitment to implementation, development of strategic and innovative approaches to 'difficult' issues such as reducing the environmental impact of the existing building stock or reducing travel by car, and putting in place the mechanisms to ensure that good policies are fully and optimally implemented, a shift made all the more important given widespread speculation that recession will weaken the commitment of the UK and other governments to green transition.

Lehmann[20] suggests that the experience with the fuel poverty target "has significant implications for the Climate Change Bill with its statutory targets. The existence of a statutory fuel poverty target has made a difference, has secured more resources for improving the homes of vulnerable people and has resulted in more engagement across government. But it has not made enough difference and it will be important not to expect too much from the climate change statutory targets on their own. A great deal of additional work will be needed to put in place the actual measures required to meet these targets."

Progress towards targets should be reported upon by lead departments and also monitored independently, for example by the Sustainable Development Commission. Government must be prepared to act swiftly when any shortfall against targets is identified, otherwise credibility will be lost.

A central role for the state

Competitor economies have recognised that the state has a central role in stimulating the green economy. This is particularly the case in relation to creating adequate demand for green products and services.

The full costs of environmental impacts are not as yet reflected in market prices. This limits the extent of demand pull for green products and services. For example, low carbon prices to date have limited the success of carbon emissions trading in the UK and EU, though the evolving design of the scheme and the size of future emissions quotas are intended to address this.

The scale of product price increases that may be needed can be illustrated by the extra costs of motoring that would be required to induce changes in purchase decisions by UK car owners. On average the annual cost would have to rise by over £1,000 to induce decisions to switch to a smaller car or one with a smaller engine or different fuel system. For company car drivers the situation is more extreme, with increases in annual costs of over £2,000 required.[21]

Forcing the necessary scale of cost increases using policy will take time, and following this the market will need further time to respond fully. This means a reliance on the price mechanism alone will result in an extended transition period, during which the UK risks falling behind other economies and missing key opportunities for the growth of new industries.

During this transition period, Government must use additional policy options to stimulate the growth of demand for new products and services. Many of the options in the available policy toolbox are already being used, with varying levels of success. But action on a different scale is needed, together with new initiatives to address some key gaps.

Public sector procurement

One of the most straightforward options for Government is increased use of public sector procurement to provide the market scale that will encourage manufacturers to invest in full-scale production of new options and accelerate the growth in better established options:

> *For the private sector we need to use legislation or procurement to provide clear short-term targets.* **John Clough, eaga plc**

> *Government needs to use its procurement power to develop markets.* **Matthew Farrow, Confederation of British Industry**

The scale of the sector is such that the choices it makes can significantly influence the entire market for a product or service. This applies equally to entirely new products and improvements to existing offerings.

The regional level may be the most appropriate scale at which to develop markets for new options, the London low-carbon taxi procurement scheme being an example of this. Announced in June 2008, the scheme involves funding of £1m provided jointly by Transport for London and Cenex.

Commercial property offers a good example of how existing offerings can be influenced: not only is the public sector considered by the commercial property industry to be a desirable tenant, it is also the tenant that sets minimum standards – if office space is not good enough for the public sector, it is not good enough for anyone. Therefore any green requirements set by the sector have the potential to transform the offering to the whole market.[22]

There are good initiatives both at the national level and within local authorities to introduce green procurement specifications,[23] but these are often implemented in a piecemeal way and more needs to be done to ensure consistent use of environmental criteria in purchasing decisions. A key issue here is skills development for procurement professionals; this is discussed together with other skills issues later in this pamphlet.

Government can also encourage other buyer groups to make green choices. This action may be at a national or international scale, and could involve large buyers such as energy utilities, major retail chains, developers or housing providers. The mechanism has been used on a European scale in relation to energy efficient appliances[24] and is being employed by Ofgem to support the development of a market for solid wall insulation. The Government should consider targeting further application of such initiatives in areas where market growth would meet key environmental objectives and support the growth of UK companies.

Fiscal and financial incentives

Even with the impact of public procurement on technology costs, there may remain cost barriers to the take-up of green technologies. In addition, the combination of non-cost barriers and the high rates of return demanded in the private sector lead to less than socially desirable levels of investment in green options, even when these options are – in theory – economically attractive to purchasers.

Government at national, regional and local levels already employs a range of fiscal and financial incentives to encourage greater uptake of green technologies. But our experts tended to agree that these are too weak and/or small scale at present to have the desired effect:

> *It is quite clear that Government needs to increase expenditure [on incentives] to ensure that the housing stock is fit for purpose.* **Andrew Warren, Association for the Conservation of Energy**

> *The biggest boost [to the sustainable energy sector] would be better fiscal incentives to encourage those with capital and influence to invest in green technologies.* **John Clough, eaga plc**

> *The package of incentives for consumers is weak – there need to be stronger tax and other incentives to encourage low carbon choices.* **Greg Archer, Low Carbon Vehicle Partnership**

> *We need more financial carrots to address the existing building stock and more incentives for people to buy low carbon vehicles.* **Ingrid Holmes, Climate Change Capital**

One of the greatest criticisms of recent government fiscal support for investments in green technologies has been the lack of continuity in grant programmes. Levels of funding for Warm Front[25] fluctuate annually; levels of grant support for small-scale renewable energy technologies from the Low Carbon Buildings Programme were initially set too high and consequently the available money was regularly used up within hours of an application round opening, then the levels were reduced dramatically and uptake fell far too sharply; removal of the 'Powershift' grants for low-carbon vehicles stalled the market for these vehicles and no compensatory mechanisms have been introduced.

This lack of continuity must reflect either a lack of depth in the analysis underlying programme design or a lack of commitment to programme aims. The uncertainty generated prevents sustained changes in consumer decisions and is a major barrier to the development of manufacturing and delivery industries:

> *Fiscal incentives are critical for product positioning and currently encourage low-carbon cars. To enable manufacturers to develop low-carbon vehicles, changes to the fiscal framework should be announced five years in advance.* **Nigel Underdown, Energy Saving Trust**

> *We need clear and long-term incentives that will remain in place for a five to ten year timescale.* **Paul Everitt, Society of Motor Manufacturers and Traders**

The situation has to change, either through the use of better-designed programmes to which the Government commits fully or through a move to other types of fiscal and financial support.

Indeed, financial support for investment should not simply be about the provision of grants. For example, the Government recently announced its support for feed-in tariffs to support uptake of small-scale systems, an approach that has worked well in Germany.[26]

The idea has enormous potential, particularly if implemented as a classic feed-in tariff rather than as a grant system that in some way embodies the potential future income should such a tariff have been used. Not only will this type of system avoid consumer and industry distrust of grants based on their experiences to date, it will also have the benefit of reinforcing consumer awareness of energy use through the metering involved, and could offer business opportunities to companies involved in energy services. The concept will need to be amended to ensure that it fully supports renewable heat, which is not fed into a grid, as well as electricity generation, but this is not a difficult problem to deal with.[27]

However, at the time of writing, the Government's proposals on a feed-in tariff remain both vague and limited – lacking in the very ambition that this pamphlet is arguing is desperately needed to make green growth a reality.

In particular, the Government has expressed some concern that a feed-in tariff will not overcome barriers linked to initial investment costs. This is true, but there is a range of innovative financing mechanisms that could be used alongside the tariff. For example, Government could work with commercial finance partners to offer low- or zero-interest loans to cover initial investment costs, with repayments linked to income earned from the tariff.

These types of loans could also be used as a key supporting mechanism for the introduction of some types of regulation, discussed below. Both Germany and Austria are using similar types of initiative to fund investments in the existing housing stock.

The Kreditanstalt für Wiederaufbau (KfW) CO_2 reduction programme has been running in Germany since 2000. It offers low-interest loans for property renovations that meet a carbon emissions reduction target and since 2000 it has enabled 166,600 dwellings to be renovated. The budget for preferential loans was recently increased to €800m per year.[28] KfW is a bank owned jointly by the state and Lander governments, and works collaboratively with private sector banks to offer the loans to consumers. Investments stimulated by the programme in 2006 and 2007 were estimated to have supported 318,000 jobs.[29]

Information

Government has always been clear that part of its role is to ensure that consumers have sufficient information to enable green choices, and has funded the Energy Saving Trust, Carbon Trust, WRAP and others to provide this information.

However, in most instances, simple provision of information is not enough. The information needs to be reiterated and reinforced and accessible to all. Therefore it is disappointing that the Government seems reluctant to speed up the process of introducing smart meters into homes.

Evidence from other European countries suggests that the message reinforcement effect of smart metering will be an essential element of any strategy to change energy use behaviour. In Denmark, a combination of prominently positioned and easy-to-read meters plus comparative feedback information produced significant reductions in both heat and electricity use.[30] In Finland, billing feedback alone (based on accurate monthly meter readings) has been shown to lead to sustained reductions in consumption in Helsinki households.[31]

Information also needs to be given within the framework of a whole system that supports action. The introduction of pilots such as London's Green Concierge service[32] (which provides a full year of ongoing advice on energy efficiency adaptations to homeowners) is a step in the right direction but more has to be done in this area.

Taking the example of existing housing: what does not yet exist and needs to be offered is a comprehensive, reliable service that answers a homeowner's demand to 'make my house as energy efficient/water efficient/sustainable as possible'.

There are existing companies that could develop the capability to deliver this service, but they are unlikely to do so unless consumer demand for the service is evident, confidence in the companies offering the service can be built, and finance to fund the improvements is available.

The first role for government is creating the demand, a role that is discussed under 'Regulation' below. Second, Government can create confidence in the services on offer through accreditation of companies (which must be designed so that it does not prevent new entrants coming into the market). Finally, Government should ensure that low-cost accessible finance is available to all.

Innovative approaches like these may well be brought to market initially by small, new enterprises, and it is worth noting here that the greening of the economy will need to be accompanied by general Government support for start-up companies. Business incubation programmes, such as that operated by the Carbon Trust, should be as accessible to companies offering new business models as they are to those bringing new technologies to market. There will also need to be a focus on the development of the business skills needed within these companies, a matter returned to later as part of our general consideration of skills issues.

Changing market rules

In some cases the market may be seen to work well in a limited sense: for example, the energy markets have successfully delivered increased supply chain efficiency. However, Government should be asking itself whether the boundaries of the market are the right ones:

> *The [energy] market as it stands works well within a given framework, but this does not mean that it is the right framework; Government needs to realise that it can move the boundaries and therefore enable companies to compete on something other than price.* **Graham Meeks, Combined Heat and Power Association**

One possible option in the case of the energy market would be to re-frame utility regulation to encourage existing energy companies to develop energy services. However, previous incentives offered under the Energy Efficiency Commitment have not delivered appreciable levels of change and an Energy Saving Trust review of energy services in 2007 discovered limited energy supplier interest in such schemes.[33] This is unsurprising since the approach is so very different to that of their well-established supply business models.

Perhaps a better approach, therefore, would be to encourage the replication of community and local authority-led schemes, which may or may not include existing utility companies as partners. There are a number of such schemes in existence in the UK already. These are based on a wide range of ownership, financing and service delivery models and should offer a sufficient pool of practical experience to inform the more widespread uptake of this approach. Case studies on existing schemes within niche markets can be useful in helping to transfer an approach to the mainstream.[34]

Many existing energy services schemes were given government financial and advisory support in their early stages through a number of Energy Saving Trust programmes, and advisory support remains available to schemes involving local authorities.

However, energy services remains a much more widely used model in mainland Europe than it is in the UK. Experience from countries such as Denmark, Sweden and Germany suggests that Government's role in supporting the expansion of this approach is threefold: using the planning system to require new developments to consider community heating in preference to other options; offering subsidised loans to finance the initial capital investments required; and providing fiscal incentives to support the use of microgeneration.

The Government recently announced its support for a feed-in tariff to support small-scale renewable energy generation. This addresses one of the roles described above, and could support the development of community-based energy services companies, particularly if combined with low- or zero-interest finance for capital investment that could be repaid out of feed-in tariff receipts.

Prioritising community heating in new developments is just one of many issues linked to sustainable community development that planners in local government are getting to grips with at present. The barriers they face, and Government's role in helping them overcome these, are discussed in the 'Anticipating Skills Needs' section of this document.

Regulation

Taking into account all the options above for supporting and improving the operation of the market, Government must acknowledge that there will still be cases where regulation will be a more efficient and effective means of transforming the market for a particular product or service. It is time that the Government took some bold policy decisions in this area, to ensure that key changes happen. Improving the energy efficiency of existing housing stock would be a good place to start.

For example, the Government should urgently consider extending the regulation of the sustainability of buildings to cover the existing stock. The issue of whole-building application of regulations when significant refurbishment is undertaken has been under discussion for some time, and would go some way to meeting this need. However, we are suggesting a more comprehensive solution whereby sales and letting of buildings would be banned unless they achieved certain levels of environmental sustainability, levels that would increase over time so that eventually the existing stock was harmonised with new-build standards: in essence it should become impossible to sell buildings that are not 'fit for purpose' in a low-carbon world.

This approach may be radical and doubtless presents a political challenge, but it is what must happen if we are to meet our environmental targets, and the transformation of the stock will not happen without government intervention. The introduction of such regulation would need to be complemented by a range of supporting measures, perhaps most importantly the sort of low-interest loans described above. A transition period could be devised, where the onus was on purchasers to upgrade stock using loans arranged as part of a 'green' mortgage. This type of regulation could have the added benefit of continually reinforcing messages about the need to green the economy. It would clearly demonstrate government commitment to achieving environmental goals, and it would also create a greener home environment for increasing numbers of people that would reinforce and support other government messages about environmental choices.

The application of standards need not necessarily be restricted to buildings. The King review[35] recommended that the UK Government explore with other EU countries whether an EU-level prize could be developed to find low-cost solutions for retrofitting to existing cars to reduce their emissions. If this were successful, a requirement for the retrofitting to occur before, or immediately following, change of ownership would be an option that could be considered.

Increased support for innovation and research and development

Levels of investment in technology development in the UK lag behind those in other countries. UK R&D intensity is 1.78 per cent of GDP, whereas the OECD average is 2.26 per cent of GDP,[36] a point noted widely by the experts interviewed for this pamphlet as a serious barrier to green growth.

> *Compared to many other countries, the UK invests less per capita on new technologies.* **Jim Skea, UK Energy Research Centre**

> *Investment in research and development [in the UK] is one-third of that in other European countries.* **Matthew Farrow, Confederation of British Industry**

If we are to take a lead in the development of the green economy, this will have to change. Government should be looking to at least match the commitment of other governments in the development of the relevant sectors. And this will have to occur at a time when others are also likely to be stepping up their efforts: Stern[37] suggested (after noting that public spending on energy research and development had fallen significantly in the last two decades) that "there are likely to be high returns to a doubling of investments in this area to around $20bn per annum globally, to support the development of a diverse portfolio of technologies". The review also noted that the worldwide scale of deployment incentives should increase between two and five times to provide a powerful motivation for innovation across the private sector.

But a simple increase in the amount of money available will not be enough. A national innovation strategy with a long-term focus that provides co-ordination of research and development efforts is needed: overall targets set an objective, but there also needs to be a route map showing how they will be achieved.

There is a relatively large number of bodies involved in channelling government support into the technology development process, and these are now beginning to work more collaboratively to ensure that their efforts are complementary.[38] There needs also to be co-ordination at government level to ensure that the direction of technical development rolls through into other areas of government influence, such as skills development, and that requirements for international support are identified and acted upon:

> *We need significant commitment and government investment in demonstration projects, and for large scale technologies. We will need EU collaboration to compete with the massive amounts of investment in the United States.* **Jim Skea, UK Energy Research Centre**

Defining the route map does not have to be about 'picking winners', but it should take into account clearly defined opportunities where the UK has an advantage and could take a lead within EU and world markets:

> *The UK has the chance to become a market leader in offshore wind and carbon capture and storage, but high investments are needed for demonstration projects.* **Paul Ekins, Kings College**

> *Government needs to be more ambitious about investing in capital-intensive projects such as carbon capture and storage*. **Matthew Farrow, Confederation of British Industry**

> *The UK shouldn't waste time trying to catch up with technologies that are well established elsewhere; we would be better off focusing on gaining the edge in, for example, second generation photovoltaics*. **Jim Skea, UK Energy Research Centre**

A range of expert advisory documents already exists that fills in the detail of what Government needs to do within this framework of greater investment in, and co-ordination of, research and development effort.[39] Government should act swiftly to implement the recommendations of these advisory groups.

However, there is one key issue worth further discussion here: innovation occurs in response to a defined need and, in the environmental sector, it is often the role of government to create this defined need. This can be a two-step process, defining the problem sufficiently well and then developing the initial demand for solutions to it. Government in the UK needs to be more active in both these steps.

Defining the 'problem'

There are therefore many areas in which Government already translates environmental issues into defined problems. Two obvious examples are air quality legislation and local authority waste management targets. However, more needs to be done.

Targets need to be based on sound analysis, so that people have confidence in them:

> *What is missing is the analysis that would convince someone to take a risk – ambitious long term targets are set with little analytical substance behind them*. **David Fisk, Imperial College**

Government recognition of this is apparent in the formation of the Committee on Climate Change. However, this high-level attention is not at present carried through to more detailed target setting, as evidenced by the fiasco of the significant downgrading of biofuels targets in the Renewable Transport Fuel Obligation, less than three months after the original targets were announced.[40]

Greater engagement with technical specialists is needed when developing detailed targets, to ensure that analysis of sufficient depth and quality lies behind them. The effort should be worthwhile, as these more detailed targets are definitely needed:

> *There are no clear targets for greenhouse gas reductions from transport, or a coherent strategy to deliver these. This undermines innovation in the sector and puts overall targets for emissions reductions at risk*. **Greg Archer, Low Carbon Vehicle Partnership**

There are technical options that could reduce new car carbon dioxide emissions by 30 per cent that are close to market and could be standard within five to ten years,[41] and yet European car manufacturers are unlikely to meet their voluntary emissions reduction agreement. Despite this, the European Parliament Industry Committee is delaying plans for the introduction of mandatory standards.[42] The UK Government needs to act now to ensure that the sector can respond to clear and challenging targets. This applies in other sectors as much as in the development of low-carbon

vehicles. For example, the TUC argues in its response to the government consultation on the UK Renewable Energy Strategy that statutory targets for microgeneration would help provide policy certainty for investors.

Government can do this, as demonstrated by the introduction of the zero-carbon targets for new buildings.[43] Although there remains some debate about the feasibility of the targets, the Callcutt review concluded that "with the Government demonstrating strong leadership, direction and being firm in its commitment, the industry and its supply chain, including construction products manufacturers and energy suppliers, can meet zero carbon targets".[44]

Creating lead markets

Simply defining the problem will not necessarily lead to demand for solutions, and it is here that the Government has a second key role to play.

In particular, the Government urgently needs to make greater use of 'forward commitment' procurement initiatives, through a programme of targeted intervention, developed in consultation with technical specialists. Forward Commitment Procurement involves the drawing together of a procurement group of one or more organisations and defining a need that they have (for example, a more energy-efficient IT system) and requesting bids from firms to deliver a product or service that meets this need at a certain date in the future. The specification of the need will include a range of criteria that must be met and the procurement group commits to purchasing a minimum amount of the new product or service provided that these criteria are met. This minimum amount will be sufficient to justify the risk and cost of investing in the development required, and hence to attract interest from firms.

The timescale within which the new option will have to be delivered will depend on the procurement group's needs and whether the technical development required to meet the criteria is considered to be incremental or more radical. For optimal definition of the need to be met, and of the timescale allowed, it is vital that technical specialists are involved in the process.

The mechanism should appeal to Government as it does not require the specification of a particular technical solution and therefore allows innovation support without the need to 'pick winners'. It also effectively removes costs from the technology development process, by enabling companies to tool up for specific production of the new option earlier in the commercialisation process.

Indeed, Government has recently started to experiment with the technique. A Low Carbon Vehicle Procurement programme was launched in March 2008, providing an initial £20m of funding with a starting focus on low-carbon vans. Cenex is now working to develop the first procurement process with the Environment Agency, Transport for London, the Metropolitan Police, Her Majesty's Revenue and Customs, Royal Mail and the Government Car and Despatch Agency being potential members of the procurement group. If the initial procurement is successful, there may be a further £30m of government funding available.[45]

However, this scheme is relatively small scale and is also currently only concerned with bringing to market technologies that are already fairly well developed. The Government must now implement similar, but more ambitious, initiatives in other sectors. The resulting growth of domestic markets for new solutions will provide a springboard from which UK companies can compete for export markets. While there is as yet no evidence of success in this country, there are many examples of the use of this type of procurement in Europe and elsewhere, including the Swedish flex-fuel vehicle procurement programme on which the above initiative was based.

In fact, Sweden has a long history of using variations on forward procurement in other sectors. NUTEK (the Swedish National Board for Industrial and Technical Innovation) has developed procurement programmes for washing machines, refrigerators, efficient computer monitors, windows and electric vehicles.[46] For example, in the early 1990s a competition was launched for the design of a fridge-freezer that was significantly more efficient than any other on the market at the time. This was won by Electrolux, which offered a model that used 30 per cent less electricity than the most efficient model on the market. There was a small financial incentive (a prize of £60,000) but perhaps more importantly a supporting commitment from NUTEK to disseminate information that brought the new product to the attention of a wide range of purchasers, which encouraged other manufacturers to introduce models with similar efficiency. Over just one year average electricity use of the market's ten best models fell by 20 per cent.

Forward procurement has also been used in the US.[47] The Super Efficient Refrigerator Programme (SERP) was launched in 1992, with a prize of around £20m. The programme brought together energy utilities, which provided incentives to a single manufacturer chosen through a competitive bidding process to build and deliver up to 250,000 refrigerators that were 25–50 per cent more efficient than the federal appliance efficiency standards then in force. The prize was awarded on a combination of factors (time of delivery, number of units, and efficiency) so that the maximum value in terms of kWh electricity avoided was achieved. Energy utilities invested based on estimates of their avoided costs.

This latter example offers a mechanism that could work well in the UK situation, where energy utilities are under an obligation to improve efficiency and are incentivised to achieve this in the least costly way. At present the obligation is delivered simply through the installation of technologies that are already available on the market.

Ensuring we have the necessary skills

If the UK economy is to take full advantage of the opportunities available, Government must do more to ensure that we have the necessary skills base. There is a well recognised shortage of skilled professionals in areas such as science and engineering, and in the energy sector more specifically.[48] Government must act to solve this problem, otherwise we will not achieve either our environmental or our economic aims.

Anticipating skills needs

The Leitch Review[49] identified the general need for higher skills levels across the UK economy. It also noted that government expenditure should be focused in areas where there are market failures.

As mentioned earlier, many sectors of the green economy are already experiencing skills shortages, which suggests this is an area of market failure and hence one where Government should concentrate its efforts.

However, focusing on the skills gaps that are presently evident will not be sufficient. Leitch suggests that development of vocational skills "must be demand-led rather than centrally-planned". We disagree: if the transition to a green economy is to occur swiftly enough for the UK to meet its environmental targets and for it to access the full economic benefits of an early transition, the time lag between new skills needs developing and the market responding to this demand must be shortened.

It is welcome that the Government now appears to be modifying its skills policy in order to address the shortcomings of relying on the wholly demand-led approach (largely based on employer demand) that has tended to dominate policy thinking in recent years. In a speech to the CBI in October 2008 the Secretary of State for Innovation, Universities and Skills set out a new approach by calling for a "more effective demand led approach... so government policy can and should be a major influence on employer investment in skills".[50]

One of the key features of this new policy approach is the ongoing development of Sector Skills Compacts to support state-subsidised training provision (especially via the Train to Gain and Apprenticeship programmes) to better meet the strategic skill needs of particular industries and sectors. Aligned to this is the ongoing expansion of the network of National Skills Academies (NSAs), which is designed to enable specific industries to train up their workforces of the future.

Towards the end of 2008 there were a number of significant announcements on strategic skills relating to the green economy, including a new NSA for Power, which the Government says will be "critical to the delivery of a low carbon and resource efficient UK economy". In addition, the Government has also announced that there will be a new Sector Skills Compact for the nuclear, petroleum and oil and gas industries.

While these developments highlight the beginnings of a more strategic skills strategy, an ambitious policy framework with targets linked to delivering a green economy has to be based on a vision of what a green economy is. Armed with this vision Government should build on the multitude of existing skills needs reviews at the national and regional level to define the comprehensive set of skills that will be required as the transition to the green economy occurs. Government must then intervene to ensure that gaps between existing skills and those required are filled.

Education and sustainability

The national curriculum aims to raise children's awareness of their environment and secure their commitment to sustainable development. This is a vital part of ensuring that UK citizens demand the products and services of a green economy. However, it is not sufficient to encourage more active participation. Little is done in schools to promote careers in environmental industries or the potential environmental aspects of careers in areas such as engineering, and careers advisers do not as yet have a good understanding of the skills and qualifications needed for those wishing to pursue careers in environmental industries.

The UK faces problems regarding its number of science, technology, engineering and maths (STEM) graduates. In A-level physics in particular the UK faces a 20-year decline. To overcome this and to provide the technical expertise to support the green economy into the future, policy needs to focus on three areas.

- Teachers' pay must be addressed as education competes with higher-paying private sector occupations for the skills of science graduates saddled with student debt and an inability to get onto the housing ladder.
- Science lessons must be creative, stimulating and fun. Science is about discovery and lessons must reflect that fact. A focus on high standards is obviously important, but 'teaching to the test' can impede creativity and put students off science subjects.
- High-quality careers advice is important, to encourage children to consider careers in science and science teaching. Careers advisers must have sufficient knowledge of scientific disciplines and must avoid the trap of gender stereotyping.

With particular relevance to this final point, we urge the Government to follow the approach taken in Scotland through the Careers Scotland 'The Path is Green (tp:g)' initiative[51]. This initiative aims to enthuse young people, talking about the wealth of exciting new career opportunities opening as the green economy in Scotland grows, and then offering advice on the training and development that will enable people to access these opportunities.

This type of careers advice will help to direct people into jobs and careers that are central to a green economy, such as waste management and renewable energy systems development, manufacture and installation. If the economy is to become green, however, all sectors will have to improve their environmental performance and it is therefore important for everyone to develop relevant skills within their vocational training. Government should be working with the providers of further and higher education to ensure that sustainability concerns are incorporated into all training as appropriate.

The Higher Education Funding Council for England (HEFCE), Higher Education Funding Council for Wales (HEFCW) and the Scottish Funding Council evaluate the performance of universities, and also provide funding to support improvements in teaching and learning. HEFCE has recently consulted on an update to its strategic statement and action plan for sustainable development in higher education.[52] In this HEFCE states its view that "the greatest contribution that universities and colleges can make to sustainable development is through the skills and knowledge that their graduates learn and put into action". Government must work

with HEFCE and the other funding councils to ensure that this view is translated into action that supports and rewards inclusion of sustainable development into teaching in all subjects, not just those that are of most obvious relevance to environmental industries.

The green economy skills gaps that are being identified include not only high-level technical and engineering skills but also a range of mid-level skills to support the installation, use and maintenance of green technologies and systems.

The Government's strategy to support a significant expansion in apprenticeships was published in the spring of 2008[53] and the National Apprenticeship Service is developing plans for the delivery of the targets it contains. These are welcome developments: Government must now ensure that the apprenticeships on offer meet the skills needs of the green economy. This will require Government to work proactively with employers and in some cases – until the market gains confidence in the transition to a green economy – may need the support of additional financial incentives to encourage provision and choice of apprenticeships in priority areas.

For example, the Government could adapt the long-term approach it is currently developing for the construction sector via the establishment of a 'clearing-house' to ensure that where apprentices are at risk of redundancy because of the changing economic climate, they can be matched with employers needing new staff elsewhere. Such activity should be included in the implementation plan currently being developed.

Many sectors of the green economy include large numbers of smaller companies, rather than being dominated by a small group of large players. This will present a challenge to Government as these smaller companies may be less inclined to participate in apprenticeships than their larger counterparts in more established sectors. Here again, specific actions should be incorporated into the National Apprenticeship Service implementation plan.

Making the necessary jobs attractive

While the Government can to an extent drive the development of skills to meet needs, there also has to be interest in the careers on offer. Work in schools to make pupils aware of their options, is only one element of this. Some of the key jobs that will be needed are not presently viewed as attractive options by many people.

In particular, confidence in the employment and progression prospects within sectors needs to be developed. Many of the policies discussed elsewhere in this document will contribute to this process.

But Government must ensure that timetables for change are adhered to: the experience of the introduction of Energy Performance Certificates for buildings provides an example of how not to encourage skills development. A need for trained energy assessors was identified and courses were developed and launched. People began committing time and money to training themselves or their staff in energy assessment. Uptake was not fast enough and the Government panicked, delaying the implementation of legislative requirement for certificates to such an extent that there was not sufficient work for those who had already trained to deliver them.

The firms and individuals that had invested in early training are unlikely to respond as quickly to future government initiatives. This sort of muddled implementation should not be allowed to happen again.

Equally, Government needs to look hard at its implementation of funding programmes: grant schemes in the sustainable energy sector, such as Warm Front or the Low Carbon Buildings Programme, have a history of fluctuating in scale following government spending reviews or crises, and they regularly run out of money. Hence the demand for manufacture and installation of measures fluctuates, as does the demand for skilled workers. It is hard to promote the attractiveness of jobs in an industry where the workload is so uncertain.

In some cases, the status of key roles needs to be improved, and Government should work with partners to achieve this where necessary, particularly within the public sector. For example, the role of planners within local authorities is evolving to be much more central to the development of sustainable communities. As noted by the Communities and Local Government Committee,[54] building innovative local policy development depends on attracting talent into the local authority planning function, and attracting this talent will require an improvement in the status of planning policy officers within many local authorities. Government should work with local government representatives to define the best mechanisms to achieve this.

Continuing professional development

Development of the skills and knowledge to participate in a green economy is not just about initial training. Existing workers in relevant sectors need to keep up-to-date with developments in policy and practice:

> *Developing the correct skills within organisations will be key to dealing with climate change and turning it into a business opportunity. Organisations that undertake to develop their and their employees' skills will be much better equipped to embrace the challenge of a low carbon economy.* **Clare Hierons, Carbon Trust**

The need for continuing professional development is particularly acute in the many sectors within the green economy where technologies and techniques are developing quickly, and it is difficult for people to keep up in the course of their everyday work.

The research for this pamphlet identified two clear examples where additional professional development is needed; there are likely to be many others too.

Planning professionals, in both local government and the private sector, lack confidence in the implementation of sustainability policies because they find it difficult to keep up-to-date with best available technologies and techniques. Overcoming this problem will require the provision of appropriate continuing professional development (CPD) and sufficient resources to ensure that individuals have time to make use of it. Government needs to ensure that local authority performance is geared to effective delivery of planning policy, and not just to the development of appropriate policy statements. This will introduce a requirement for the organisations to ensure that their planning teams are able to maintain their professional competence in this key area.

Another important area where additional skills are needed and where the public sector can take a lead is in procurement:

> *We need to 'staff up' key in-house procurers with technical expertise so that they can share in the risk taking.* **David Fisk, Imperial College**

> *There is a need to train people working in public procurement as they are being asked to manage more complex information.* **Graham Meeks, Combined Heat and Power Association**

A green economy means additional complexity in the decisions that procurers take, as sustainability requirements are added to the list of evaluation criteria the procurement professional needs to be able to define and work with. Government can directly support the upskilling of people working in this area by ensuring that public sector procurement teams receive the CPD needed.

Helping private sector organisations become greener will require incentives for training and development, as this is not seen as a priority area by many firms, in particular smaller ones. As the 'Train to Gain' initiative is rolled out across the country, Government must ensure that sustainability is one of the key focus areas for the scheme, alongside more traditional subject areas such as IT, project management and sales skills.

It's not just about technical skills

There is one final point on skills needs that is worth emphasising. There is often a focus on the technical skills that will be needed for a green economy, whether they be in engineering, procurement or planning. However, there is a range of softer skills needs too, that should not be overlooked. The transition will need leaders who can communicate well, and build the delivery partnerships that will be needed. Innovations will become contributors to the economy only if entrepreneurs can turn them into viable and sustainable businesses. Therefore the development of leaders, of communicators, and of competent directors and managers for new businesses should be as much a focus for government policy as the development of engineers and planners.

Conclusion: What the Government must do

This pamphlet has discussed the gaps that Government must fill if the UK is to achieve a timely and economically beneficial transition to a green economy. While the specifics of the action needed will vary across sectors, the fundamentals are common to all:

- **High-level government environmental objectives must be translated into an ambitious and substantive commitment to delivery.**

- **There must be an acceptance that the state has a central role to play:**

  Public sector procurement should be used far more consistently to support market transformation towards greener products and services.

  Fiscal and financial incentives to support green choices by the private sector should be stronger and should be employed on a larger scale.

  The development of systems to support green actions should be prioritised.

  Government should be willing to move the boundaries of markets where existing ones act against the development of green industries.

  Some brave decisions are needed to introduce targeted regulations where the market does not work.

- **Levels of public sector investment in innovation and technology development must be increased significantly, to match or exceed those in other countries.**

  Government should define a route map for the achievement of environmental aims.

  Targets linked to this route map must be based on high-quality analysis and, once set, they must be adhered to.

  Forward Commitment Procurement should be used on a far greater scale.

- **Government must take an active role in anticipating skills needs in the green economy and ensuring that these are met.**

With a framework based on these key policies, the UK economy will begin to take advantage of the growth opportunities provided by the development of a green economy. The Government must do all it can to allow the natural spirit of enterprise that permeates our economy to become a driver of environmental transformation. It is clear that the market alone cannot deliver this. It is also clear that, with the UK in the depths of recession, any government that fails to take a lead in this area will be failing millions of workers and families across the country whose wellbeing relies on restarting growth.

Appendix: Acknowledgements

The research on which this paper is based included a number of interviews with experts in the renewable energy, energy efficiency, low carbon vehicles, skills and investment fields. These people are listed below, and we would like to take this opportunity to thank them for giving us the benefit of their knowledge and experience. Many of their ideas are included in this pamphlet and we thank them for these; any errors remain our own.

Greg Archer – Director, Low Carbon Vehicle Partnership
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Professor Paul Ekins – Professor of Energy and Environmental Policy, Kings College London
Paul Everitt – CEO, Society of Motor Manufacturers and Traders
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Dr David Vincent – Director, Projects, Carbon Trust
Andrew Warren – Director, The Association for the Conservation of Energy (ACE)
Malcolm Watson – Technical Director, UK Petroleum Industries Association

Notes

1 Unless otherwise stated, facts and figures in this section are taken from Selwyn J and Leverett B (2006), *Emerging Markets in the Environmental Industries Sector*, UK CEED.

2 In Selwyn and Leverett, op cit; based on updating a 2002 DTI Joint Environmental Markets Unit study.

3 According to Prime Minister Gordon Brown, speaking at the Prince of Wales May Day Business Summit in 2008.

4 Renner M (2008), *Jobs in Renewable Energy Expanding*, World Watch Institute; http://www.worldwatch.org/node/5821

5 An extensive study of employment impacts of energy efficiency investment in the EU supports this idea. See Wade J, Wiltshire V and Scrase I (2000), *National and Local Employment Impacts of Energy Efficiency Investment Programmes, Final Report to the European Commission, SAVE contract XVII/4.1031/D/97-032*, London: Association for the Conservation of Energy for more details.

6 Data are based on the Joint Environmental Markets Unit definition of energy management: "The supply of energy management and efficiency products and services such as energy audits, building energy management systems, energy efficiency products, combined heat and power plant and energy efficiency advice."

7 Source: Selwyn and Leverett, op cit.

8 The EU as a whole has agreed a legally binding target to meet 20 per cent of the region's energy consumption from renewable sources by 2020; the EU proposal is that the UK should meet 15 per cent of its energy demand from renewables by 2020, up from just 1.5 per cent at present.

9 Source: Selwyn and Leverett, op cit.

10 Stern N (2006), *The Stern Review of the Economics of Climate Change*, London: UK Treasury.

11 Figures from the Society of Motor Manufacturers and Traders; www.smmt.co.uk

12 King J (2007 and 2008), *The King Review of Low Carbon Cars, Part I: The potential for CO2 reduction and Part II: Recommendations for action*, London: UK Treasury.

13 For instance in the Lisbon Strategy for growth and employment; Kok W (2004), *Facing the Challenge – the Lisbon strategy for growth and employment*, Brussels: European Commission.

14 Data from the TUC Touchstone Pamphlet *A Green and Fair Future*

15 Federal Ministry of the Environment, Nature Conservation and Reactor Safety (2007), *Speeding Up Innovation – protecting the environment*, Berlin: Federal Ministry of the Environment, Nature Conservation and Reactor Safety.

16 CEMEP (2007), *Report of the Commission on Environmental Markets and Economic Performance*, London: Department for Environment, Food and Rural Affairs.

17 King J, Part II (2008), op cit.

18 Some of their key comments are included throughout the text, in italics, to illustrate points being made and a full list of the people we spoke to is included in the acknowledgements appendix. In addition to the quoted comments they provided many other thoughts and ideas that have informed this pamphlet.

19 Stern N, op cit.

20 Lehmann P (2008), 'Fuel poverty – social issues and sustainability', in *Housing, the Environment and Our Changing Climate*, Chartered Institute of Housing.

21 Morpace and RAC 2004 data as reported in Dr Ben Lane's presentation to the King Review, 2007; www.lowcvp.org.uk/assets/presentations/Lane.pdf

22 For more information see Wade J, Pett J and Ramsay C (2003), *Energy Efficiency in Offices: Motivating action*, London: Association for the Conservation of Energy.

23 Including Office of Government Commerce guidance for central government departments, work in individual local authorities and initiatives such as the collaborative work between the London Centre of Excellence and the London Borough of Camden.

24 Ostertag K (2003), 'Evaluation of the pilot procurement project in Germany', in *Time to Turn Down Energy Demand: Volume 2, Proceedings of the 2003 eceee Summer Study*, Stockholm: European Council for an Energy Efficient Economy.

25 The national energy efficiency investment programme targeting the fuel poor.

26 BERR (2008), *UK Renewable Energy Strategy Consultation Document*, London: Department for Business, Enterprise and Regulatory Reform.

27 The TUC recommends that Government adopts a Renewable Energy Tariff system that covers both electricity and heat, and is therefore not linked into feed-in to the grid.

28 Sunikka M (2008), 'Lessons from other European countries' in *Housing, the Environment and Our Changing Climate*, Chartered Institute of Housing.

29 Schönborn M (2008), *Energy Efficiency in the Residential Building Sector*, presentation to the Indo-German Symposium on Energy Efficiency, New Delhi, 16 May 2008.

30 Jensen OM (2003), 'Visualisation turns down energy demand', in *Time to Turn Down Energy Demand: Volume 2, Proceedings of the 2003 eceee Summer Study*, Stockholm: European Council for an Energy Efficient Economy.

31 Wade J and Hinnells M (1995), 'Chapter 2: Policy Initiatives', in Boardman B et al, *DECADE Second Year Report*, Oxford: Environmental Change Institute, University of Oxford.

32 www.londonclimatechange.co.uk/greenhomes/green-concierge-service/

33 EST (2008), *Review of Energy Services in the Domestic Sector*, London: Energy Saving Trust.

34 However, care must be taken that all the experience from within these schemes is fully understood. There can be a tendency to use existing schemes as a promotional tool for a concept rather than as an aid to learning and development. However, case studies do have a capacity to inhibit learning if they are presented in too positive a light and the negative lessons that could be learned from them glossed over. For more on this see Lovell H (2008), 'Evolution of policy and practice in low-energy housing', in *Housing, the Environment and Our Changing Climate*, Chartered Institute of Housing.

35 Op cit.

36 From *OECD Science, Technology and Industry Outlook 2008*, country notes: United Kingdom (http://www.oecd.org/dataoecd/18/51/41559425.pdf

37 Op cit.

38 For example, actors in the energy sector including the research councils, the Energy Technologies Institute and the Carbon Trust are working together to ensure that they are targeting different points on the scale of technology development from initial research through to business incubation and market development.

39 Including EIAG (2006), *Environmental Innovation: Bridging the gap between environmental necessity and economic opportunity, first report of the Environmental Innovations Advisory Group*, London: Department for Trade and Industry; CEMEP, op cit; James P and Selwyn J (2007), *Innovation in Environmental Services, report to NESTA and BERR*. Further, sector-specific reports are in preparation, such as the final report of the New Automotive Innovation and Growth team, expected in spring 2009.

40 This followed the Gallagher Review: Gallagher E (2008), *The Gallagher Review of the Indirect Effects of Biofuels Production*, London: Department for Transport and Renewable Fuels Agency, which considered the broader environmental and social impacts of a swift shift towards greater use of biofuels for road transport.

41 King J, op cit.

42 The European Trade Union Confederation supports implementation of the targets to the original timetable, and has called for an impact study of such legislation on employment.

43 New housing is expected to be zero carbon from 2016, and new non-domestic buildings from 2019. Non-domestic buildings constructed for the public sector will have to be zero carbon by 2018.

44 Callcutt J (2007), *The Callcutt Review of Housebuilding Delivery*, London: Communities and Local Government.

45 See www.cenex.co.uk/lcvpp/ for further details.

46 Wade J and Hinnells M, op cit.

47 Wade J and Hinnells M, op cit.

48 Cogent Sector Skills Council, Energy and Utility Skills, Engineering Construction Industry Training Board and the National Skills Academy for Nuclear (2008), *Energy Skills – Opportunity and challenge, a report to Government by the sector skills organisations responsible for energy*, London: Department for Business, Enterprise and Regulatory Reform.

49 Leitch S (2006), *Prosperity for All in the Global Economy – World class skills*, London: HM Government.

50 DIUS (2008), 'We'll fight to keep jobs for UK residents – £98 million of skills funding for targeted training in vital industries', press release, 24 October.

51 More information can be found on the Careers Scotland website: http://www.careers-scotland.org.uk/GreenJobs/About_tpg.asp

52 HEFCE (2008), *Sustainable Development in Higher Education: Consultation on 2008 update to strategic statement and action plan*, June 2008/18 policy development consultation, Bristol: HEFCE.

53 DIUS (2008), *World-class Apprenticeships: Unlocking talent, building skills for all. The Government's strategy for the future of apprenticeships in England*, London: Department for Innovation, Universities and Skills.

54 CLGC (2008), *Planning Matters – Labour shortages and skills gaps, eleventh report of session 2007–08*, House of Commons: Communities and Local Government Committee.

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