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Table of contents

1	Energy supply and delivered forms	3
2	National, regional and local government and energy responsibilities	5
3	Policy context	7
4	Energy efficiency	10
5	Renewable energy and microgeneration	12
6	Building standards and fuel poverty	14
7	Local authorities: current involvement in energy	16
8	Local authority planning system	19
9	Financial support mechanisms for renewables and energy efficiency	
me	asures	21
10	Promotion and information	26
11	Quality, labelling, training, accreditation, consumer confidence	28
12	Industry capacity, innovation and skills	32
13	Observations	33
14	Notes and references	34







1 Energy supply and delivered forms

- 1.1 Electricity in the UK is generated from gas-fired (46% of output in 2008), coal-fired (31%), and nuclear (13%) stations, with a small but growing component (<5%) from wind farms and other renewable electricity sources.
- 1.2 Electricity generation is currently undertaken by some 50 companies including those operating large CHP stations and windfarms, but not excluding many small independent generators. The major generation companies are mostly at least in part owned by international companies. The degree of competition has greatly increased since privatisation of the industry in 1990 and with subsequent changes to the industry structure and wholesale market system.
- 1.3 Scottish generation has a higher proportion of nuclear capacity and renewables, but the wholesale market operates throughout the UK and the relevant mix to focus on is that of the whole UK.
- 1.4 A complex trading system operates, with an increasing amount traded bilaterally between generators and major users, including the distribution companies, but with a significant role still played in the wholesale market by an agency that balances supply and demand.
- 1.5 Bulk electricity transmission is undertaken by a single agency. Operation of the UK's 15 regional distribution networks is formally separated from retail operations.
- 1.6 For a decade there has been in principle complete contestability in electricity retail markets, with users able to chose their retailer. Many residential consumers have changed from what had been their regional supplier to another. Electricity retail provision is intensely competitive and customers usually change for perceived price advantages, but a small percentage have done so to choose renewable supplies.
- 1.7 Until 2010, small generators not participating in the wholesale market, including householders with surplus power from microgeneration units, had to sell to the local distribution network and negotiate terms. There had been repeated attempts over several decades to legislate an obligation to accept feed-in, and either transparent pricing or guaranteed pricing, but the absence of suitable arrangements continued to be a deterrent to small generators or a hindrance to optimal sizing. A feed-in tariff scheme has now been introduced [9.18].
- 1.8 Natural gas is provided to most of populated areas through an extensive national network. In the over 90% of the population has mains gas supply, though in Scotland some 25% of homes do not. Again there are many supply companies most energy companies offer both electricity and gas intense competition largely on price, and complete retail contestability. Responsibility for bulk transmission is held by one company which also one of the major regional distribution companies.



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- 1.9 Generally the energy sector in the UK has for two decades been organised with an emphasis on disaggregation though this has not stopped some significant vertical reintegration through mergers and acquisitions market allocation, and competition at all levels. The regulator has been primarily concerned with these goals and with developing a smoothly operating and fully competitive system, partly in response to emerging developments and problems with the markets [3.5].
- 1.10 A small but growing proportion of electricity is supplied from renewable sources, particularly hydro in the northern part of Scotland, and onshore and more recently offshore windfarms. Many energy generators have portfolios that include renewables, and some companies specialise in one or more renewable forms. The number of biomass and waste generation projects is also growing.
- 1.11 Several retail companies offer 'green' electricity retail schemes, in which customers choose to take part or the whole of their supply from renewable sources sometimes for a significant premium charge, but sometimes at a price comparable to a normal tariff. Only a small percentage of customers have taken up these schemes, and there is no official accreditation or auditing scheme that inspects the claims and energy flows.
- 1.12 There is a limited amount of CHP in the UK though the proportion has always been small compared to other European countries. CHP plant ranges from large industrial installations either operated by the industry using the heat or by a contractor, through medium size plants supplying industries and a few urban DH schemes, to several thousand small usually gas-engine package units, and more recently a very small number of household micro-CHP units. Again, poor terms for selling surplus power, especially for smaller operators feeding into the local electricity network, have had the same adverse effects as for other decentralised generation [1.7].
- 1.13 Space heating and water heating in the UK are dominated by wet systems usually radiators but with some recent installation of underfloor piping based on gas boilers. There is an extensive gas network reaching all but remote rural areas in the country, and almost all dwellings with access to the gas grid are connected routinely. There is extensive competition keeping down the capital costs of installation and the cost of gas. Oil, electric (direct radiant or storage), wood/peat/coal/'smokeless' solid fuel, and bottle gas heating serve small markets, though it is not clear the extent to which electric radiant heating is used to supplement other heating.
- 1.14 There have been a number of community-led energy supply initiatives across the UK, often setting up small renewable generating systems. In some cases these generate revenue for the community and in others they displace an alternative energy form (e.g. a wind turbine used to heat a community hall more cheaply than using oil). Energy4All¹ helps communities set up co-operatives to develop energy initiatives across the UK, and is owned by the co-operatives it assists. Community Energy Scotland² is an independent charity (initially set up by Highlands and Islands Enterprise) offering advice,





grant funding (through Scottish Government funding programs) and finance for community renewable energy projects.

2 National, regional and local government and energy responsibilities

- 2.1 The UK has a largely centralised government covering England, Wales, Scotland and Northern Ireland, but each nation now has a devolved administration with responsibility for many areas of policy, particularly related to environment and housing.
- 2.2 Most aspects of energy policy however are handled by the UK Government, through the Department of Trade and Industry (DTI) and then the Department for Business, Enterprise and Regulatory Reform (BERR) until the recent formation of the Department of Energy and Climate Change (DECC).³ Central UK government thus retains responsibility for energy regulation, energy services, appliance labelling, mandatory obligations and energy services. Within the departments, there have been frequent changes in the units responsible for renewables, energy efficiency and heat; most recently an Office for Renewable Energy Deployment has been created. Devolved policies such as those related to environment are the responsibility of the Department for Environment, Food and Rural Affairs (defra) in England, and the Scottish Government (formerly Executive) in Scotland.⁴ Matters relating to housing and building are overseen by the Department for Communities and Local Government (CLG)⁵ in England, and the Scottish Government in Scotland. For some policies, such as the Enhanced Capital Allowance (ECA), the tax department, HM Revenue & Customs, is responsible.
- 2.3 The liberalised gas and electricity markets are regulated by Ofgem, a UK agency whose powers and duties are laid out in statute. Ofgem recovers its costs from the licensed companies it regulates. The UK Government has recently altered Ofgem's statutory remit: while safeguarding consumer interests by 'promoting competition, wherever appropriate' will still be central, the objectives of 'contributing to the drive to curb climate change and other work aimed at sustainable development' have been added.⁶
- 2.4 The Coalition Government (elected May 2010) has announced plans to abolish much (if not all) of the regional forms of governance in England that were developed by the previous administration. Significantly, Regional Spatial Strategies, which *inter alia* set regional targets for low carbon energy, have been revoked. Prior to this change, attempts to develop regional energy policies had been hampered by a lack of resources and powers, with renewable energy partnerships between regional bodies and stakeholders generally failing to attract energy business interests (whose activities are generally regulated at a national rather than regional level).⁷ Regional Spatial Strategies had included regional targets for low carbon energy based on research into regional technical potentials, though these targets were considered 'soft', attaching no clear lines of responsibility for meeting the targets or sanctions for failure.





However, some planners note that appeal to these targets often strengthened a renewable energy developer's planning application, and that without them fewer planning applications will be granted.⁸

- 2.5 Scottish regional governance is less complex than was English prior to the new UK government's reforms. Scottish Enterprise and Highlands and Islands Enterprise (non-departmental government agencies of the Scottish Government) perform similar regional economic development functions to the English RDAs. Scottish Enterprise focuses on developing energy industries (supporting innovation and business growth with grants) rather than developing regional renewable energy policies (the scope for this activity being limited by the devolution settlement).
- 2.6 The organisation of local government in the UK is particularly complex, with a long history of piecemeal modifications having been made in different areas.⁹ In England, some areas have a two-tier local authority structure with activities/responsibilities divided between County Councils and District Councils. In Wales, Scotland, Northern Ireland and some parts of England, this two-tier system was been replaced (mostly during the 1990s) with single-tier systems.
- 2.7 Local government in the UK is bound by the legal principle of *ultra vires* ('beyond the powers'). This means that, unlike local government in many other European countries, UK local authorities (LAs) are not able to do anything which has not been explicitly statutorily permitted.¹⁰ This principle has historically given LAs less autonomy from the centre than has been the experience in many European countries. Recently,¹¹ LAs have been granted a general power to concern themselves with 'overall economic, cultural and physical well-being of the community.'¹² This so-called well-being power moderates the *ultra vires* principle, purposefully allowing a flexibility of interpretation.
- 2.8 The Climate Change (Scotland) Act 2009 introduced a duty on public bodies¹³ to "act in the way best calculated to contribute to the targets"¹⁴ set in the Act. Compliance with the duty is a matter for the public bodies concerned, though Scottish Ministers are required to issue guidance. A public consultation on draft guidance is due to commence in summer 2010, and the duty to come into force on January 1 2011. In addition, the Act requires Local Authorities to establish council tax discount schemes for households which install energy efficiency measures.¹⁵
- 2.9 Spending by LAs in the UK has historically been tightly controlled and directed from the centre. In comparison with other European countries, a higher proportion of UK Local Authority spending is funded by central (rather than local) taxation.¹⁶ Two recent changes offer LAs more autonomy over their spending decisions: new 'prudential borrowing' powers allow LAs more freedom in the level of borrowing they can use for capital investment; and most budget ring-fencing has been removed, being replaced by 'outcome agreements' between local and central government (Local Area Agreements in England, Single Outcome Agreements in Scotland).







Two independent organisations, the Energy Savings Trust (EST) and the Carbon Trust, are responsible for administering many of the policies directly related to investment in carbon emissions reduction. They are funded in England by defra and DECC, and by the regional administrations – the Scottish Government, the Welsh Assembly Government and Invest Northern Ireland. They also receive private funding. The Carbon Trust is principally focused on innovation in low/lower carbon technologies and on promoting the commercialisation of these technologies though grants, business incubator schemes, and providing information and infrastructures for business. The Energy Saving Trust is more focused on the demand side, attempting to cut carbon dioxide emissions via the promotion of sustainable and efficient use of energy. It administers one of the grant schemes for small-scale renewables, runs networks of Energy Efficiency Advice Centres (EEACs), provides online information to consumers on microgeneration and energy efficiency, other policy advice, and acts as the UK representative on the European Énergy Network (EnR).¹⁷ Its principal focus for the next few years is building insulation, as the most cost-effective way of reducing carbon emissions. In the longer term it will also be concerned to develop the market infrastructure for large scale installation of microgeneration.

2.11 There are a range of private and charitable organisations that also develop regional and local policy advice and operate schemes and projects.¹⁸

3 Policy context

- 3.1 The UK has a wide variety of policies and strategies forming the governance context of local/regional energy planning and with direct or indirect influence on it. They work though a range of mechanisms, overlapping and interlinking in various ways, and have mixed aims. These policies are being continuously reviewed, revised and restated, particularly recently to integrate more fully energy and climate change policies.
- 3.2 We must consider here both the effects that general policies and stategies will have on SNIEs, but also the extent to which SNIEs and a local focus in general are recognised in them as contributing to general energy and environmental goals, and the measures contained in the strategies that explicitly encourage and support them.
- 3.3 General strategies for 'sustainable development' may be considered to form the highest level policy framework influencing energy planning. For the UK these are embodied in the document *Securing the Future: UK Government Sustainable Development Strategy*, and for Scotland in *Choosing our Future: Scotland's Sustainable Development Strategy*.¹⁹ It is questionable, however, to what extent these directly determine, and are consistent with, the more specific policies that we review here.







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3.5

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At the next more specific level, the principal policies relevant to SNEIs are energy, environment, house/building and social policies, and to a lesser extent industry policies.

Energy policies in the UK are principally concerned with energy security, access to energy, and energy supply regulation. More recently policies have been developed in relation to renewable energy, particularly latterly with the explicit goal of reducing carbon emissions. The 2007 White Paper thus poses two long term challenges: 'tackling climate change by reducing carbon dioxide emissions both within the UK and abroad; and ensuring secure, clean and affordable energy as we become increasingly dependent on imported fuel.' It suggests the following policy goals:

> to put ourselves on a path to cutting CO_2 emissions by some 60% by about 2050, with real progress by 2020; to maintain the reliability of energy supplies; to promote competitive markets in the UK and beyond; to ensure that every home is adequately and affordably heated.²⁰

- 3.6 Energy poverty is a powerful concept in the UK energy policy domain, and successive governments have favoured cheap delivered energy over any attempt to shape demand by increasing prices. This stems from a number of factors: poor housing stock, with low insulation and expensive heating systems; low social security payments, particularly state pensions, leaving many older people unable to pay for energy; and an *ad hoc* process of winter fuel payments for older people. These have created a politically sensitive issue that shapes much policy on energy supply and on investment in new domestic energy technologies. For example, energy supply firms are obliged to invest in demand-side reduction via the Energy Efficiency Commitment, but a substantial fraction, initially 50%, must be spent on the poorest households, rather than those that will save the greatest amount of energy or carbon emissions.
- 3.7 One of the most important UK policies on the environment is set out in the UK *Climate Change Programme*. This set targets of a 20% reduction in carbon dioxide emissions by 2010, and 60% by 2050, but these have since been amended. There are a range of sub-policies and initiatives, some on the production of energy as explained, and some around consumption, particular related to buildings. A major part of the policy is directed to building standards for both domestic and commercial buildings, and to the technologies used to generate heat in buildings. For example, the most recent target is a commitment for all new building in England to be 'zero-carbon' by 2016.
- 3.8 The UK *Climate Change Act 2008* builds on the *Climate Change Programme* and sets legally binding targets for carbon dioxide emissions reduction of 80% by 2050 compared to 1990 levels.²¹ The Act also sets out two sets of carbon budgets: the 'intended' budget includes a target of 42% reduction by 2020 and was to be adopted in the event of a global deal on emissions reductions; the 'interim' budget's 2020 target is 34% reduction and applies before any global deal.²² The Act followed from the proposed mandatory emission reduction targets set at the EU level in January 2008. It provides a long-term policy framework for the UK to achieve these reductions,

Stewart Russell and Dave Hawkey



by encouraging emission reduction activities or removing carbon dioxide from the atmosphere. Besides the targets, central to this framework are a carbon budgeting system capping emissions over five-year periods, and powers to introduce trading schemes.

- 3.9 The *UK Low Carbon Transition Plan* released in July 2009 brings together and supplements many of the measures announced under the more specific strategies for achieving emissions reduction targets through changes in energy provision in the built environment and transport.²³
- 3.10 The UK Energy Efficiency Action Plan set out policies and measures for promoting energy efficiency,²⁴ to meet the government's commitment then to a 9% reduction in energy use by 2016 under the EU Energy Services Directive. The measures focus primarily on changing demand in all sectors. Households are targeted though building regulations and the Code for Sustainable Homes, fuel poverty programmes, Energy Performance Certificates, and smart metering. In other sectors, the EU Emissions Trading Scheme, the Climate Change Levy and Climate Change Agreements are the main instruments, along with enhanced capital allowances on investment and Energy Performance Certificates. The public sector is also an important market for microgeneration, and policies to increase energy efficiency in hospitals, local government and in particular of schools²⁵ are likely to be important stimuli for these markets in the next few years.
- 3.11 The Scottish Climate Change Programme (SCCP), first published in 2000, set out an emission reduction target for Scotland. The initial targets were not ambitious. The subsequent Scottish Climate Change Act, however, introduced as a bill in December 2008 following consultation and passed into law in August 2009, sets more challenging targets in line with those of the UK Government a reduction of 80% by 2050 compared to 1990 levels, an interim target of a 42% reduction by 2020, annual reductions from 2010 at a rate of 3% per year after 2020 as well as a climate change commitment share (of the UK total). Measures for achieving the target included a significant increase of funding, up to £13.5 million a year by 2010-11, for community renewables and microgeneration, and a new renewables target of 50% by 2020 for electricity generated in Scotland.²⁶
- 3.12 Scotland's *Climate Change Delivery Plan* (2009) acts as a bridge to a 2010 report on policies and proposals (required under the *Scottish Climate Change Act*), setting out measures to achieve the 2020 and 2050 targets. The Plan identifies four 'transformational outcomes' needed to achieve the 2050 target: (1) a largely decarbonised electricity generation sector by 2030 primarily using renewables but also CCS; (2) a largely decarbonised heat sector by 2050 with significant progress by 2030 by reducing demand and 'a massive increase' in renewable or low carbon heating; (3) almost complete decarbonisation of road transport by 2050 with significant progress by 2030 through adoption of electric vehicles and decarbonised rail transport; and (4) ensuring that carbon is factored in to strategic and local decisions about rural land use.²⁷





- ³ The *Carbon Reduction Commitment* (CRC) (formerly the *Energy Performance Commitment*) was announced in the 2007 Energy White Paper. After a three-year introductory period starting in 2010, the UK government will impose a cap on carbon dioxide emissions from large, non-energy intensive private and public organisations such as hotels, large retailers and government departments.²⁸ The measure covers about 10% of UK-wide emissions not included in the EU ETS and Climate Change Agreements, and will facilitate the trading of allowances on a carbon market. The scheme will cover the use of electricity and other delivered energy forms and aims particularly to promote energy efficiency.²⁹
- 3.14 The UK Government's new *Heat and Energy Saving Strategy*, subject to public consultation in early 2009, aims to reduce greenhouse emissions from buildings to as close as possible to zero by 2050.³⁰ It proposes granting seven million homes whole-house 'energy makeovers' by 2020, and intends that all homes should be upgraded with energy efficiency measures and micro-renewables by 2030. A vareity of microgeneration options canvassed in the proposal. Responses to the consultation indicated support for the extension of CERT [4.3] but generally a need for more concrete mechanisms to achieve the targets.³¹
- 3.15 Scotland, with large state investments in biomass, is also developing a strategy for renewable heat. Following work by a Renewable Heat Strategy Group,³² a *Renewable Heat Action Plan* has been issued as part of a broader *Renewables Action Plan*.

4 Energy efficiency

- 4
- 4.1 The UK's performance on energy efficiency improvements has generally lamentably poor, despite limited efforts since the 1970s. Particularly during the period of low primary fuel prices in the 1990s, little attention was paid to energy efficiency or demand management. The UK's building stock generally has poor energy performance compared to other northern European countries.
- 4.2 The Energy Efficiency Commitment (EEC) and Carbon Emissions Reduction Target (CERT) could form one of the most important initiatives for the development of microgeneration market in the longer term, especially by encouraging retrofitting.³³ The EEC is a demand management scheme administered by Ofgem, aimed at gas and electricity suppliers, obliging them to promote improvements in domestic energy efficiency, as part of the UK Climate Change Programme. A fraction of the energy savings (initially 50%) had to be focused on vulnerable and low-income consumers. Suppliers are allowed to choose from a range of eligible measures, such as insulation, that have been allocated pre-established values for carbon saving. Almost all investment so far has been in insulation, which remains the most cost-effective way to reduce carbon emissions. The government claims 10 million households have benefited from the EEC.







- The third round of EEC, called the Carbon Emissions Reduction Target (CERT) or EEC3, running from April 2008 and now extended to 2012, aims to stimulate microgeneration, energy efficiency and consumer behaviour change, and measures benefit in terms of carbon reductions rather than energy saved.³⁴ Following a consultation on CERT/EEC3, the UK government decided, in maintaining its emphasis on measures to alleviate fuel poverty and in expanding its definition of 'priority' groups, to favour solid wall insulation and GSHPs.³⁵ Following a consultation process, the Government has decided to raise the overall sum committed under the scheme by 20%.³⁶
- 4.4 The subsequent round of EEC, from 2012, is expected to shift the focus more substantially to an obligation to invest in more expensive measures such as zero-carbon technologies.³⁷ Anticipating this longer term requirement should have the effect of further increasing the experimental and tentative work by some energy providers on microrenewables.
- 4.5 The first three rounds of the EEC have operated through electricity and gas suppliers. As an intended result, they have sought the cheapest ways of achieving carbon emissions reductions. This has resulted in somewhat uncoordinated delivery, a lack of clarity from the consumer's perspective,³⁸ and concerns that CERT spending in Scotland was below its pro-rata share. In the *Heat and Energy Saving Strategy Consultation*, the Government suggested that the successor to EEC3/CERT would be structured to encourage more coordinated delivery (e.g. whole-house approaches or targeting particular areas to achieve economies of scale).³⁹ The subsequent Household Energy Management Strategy [4.8] indicates that the new scheme will require cooperation between energy suppliers and LAs, if necessary through legislation, but the detail of the new obligation this will entail on energy companies has not yet been worked out.
- 4.6 The Community Energy Saving Programme (CESP), running from October 2009 to the end of 2012, aims to install energy efficiency improvements and low or zero carbon heating systems in domestic buildings in income deprived areas. In common with the EEC/CERT it operates as an obligation on energy suppliers, but also on electricity generators, and is a possible model for the successor to CERT.⁴⁰ The Government estimates the programme will deliver around £350 million on energy efficiency packages, spread over around 100 schemes or about 90,000 homes. Estimated savings are 2.9 mtCO₂/year.⁴¹
- 4.7 CESP aims to deal with some of the shortcomings of CERT, particularly disjointed, uncoordinated delivery. Obliged parties have to achieve a minimum 'score' (in proportion to the quantity of energy they supply or generate). The score of a particular measure is related but not necessarily proportional to the carbon it saves. 'Bonus' scores are available for installing multiple measures in a given house and treating multiple houses in an area, which in theory should make community-level, whole-house approaches more attractive to obliged parties.⁴² The Government intends that a 'community approach' (working in partnership with LAs and community groups)







4.8

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will be followed by generators/suppliers. District heating (DH) will be included as an eligible measure.⁴³

- In late 2009, DECC launched a Low Carbon Communities Challenge, providing finance and advice to 22 communities in England, Wales and Northern Ireland in a 'research programme designed to test delivery options for achieving ambitious cuts in carbon emissions at community level', with the intention of disseminating their experience more widely.⁴⁴
- 4.9 In 2010, the UK Government published a Household Energy Management Strategy, intended to meet its target of a 29% reduction in overall domestic energy consumption by 2020.⁴⁵ The strategy sets targets of installation of loft and cavity wall insulation wherever practicable by 2015, smart meters in all homes, and whole-house upgrades for up to 7 million dwellings by 2020. It proposes new standards and accreditation schemes for installers and equipment, and a loan scheme for household energy efficiency and microrenewables [9.24]. It indicates a greater coordinating role for LAs, and reasserts the need for local partnerships [4.7], envisaging a variety of forms, including energy initiatives as subsets of an existing local strategic partnership or entailing cooperation among several LAs. It also envisages a greater role for NGOs in energy partnerships, and a network of 'demonstrator homes' to show the benefits of energy efficiency measures. The strategy asserts the benefits of developing supply chains for equipment and materials, but does not appear to offer any measures to stimulate their development – other than the stability offered by its targets for expanded markets and a commitment to using government procurement.

5 Renewable energy and microgeneration

- 5.1 In 2009 the Government released an overarching *Renewable Energy Strategy* to consolidate its treatment of RE, and to gear its policies to the target set under the EU Directive by which 15% of its energy needs will come from RE by 2020.⁴⁶ While the Strategy claims to set out a 'comprehensive action plan', officials stress that it presents scenarios rather than prescriptions, and intends that markets determine the mix of technologies.⁴⁷ It envisages 12% of the UK's heating needs coming from renewable sources by 2020, compared to the current level of less than 1%. It proposes 'new, simple mechanisms to support investment by businesses, communities and householders in small-scale renewable heat and electricity generation'. The key mechanism proposed for heat is a Renewable Heat Incentive which will most likely take the form of a feed-in tariff for each unit of heat generated from renewable sources [9.20].
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- 5.2 The UK's approach to renewable energy rested until recently on three main instruments: a Renewables Obligation on suppliers to supply from eligible sources, with an associated tradeable certificate scheme (ROCs) []; a Climate Change Levy (CCL) a tax on the use of non-renewable energy in industry, commerce and the public sector, but not transport or households first introduced in 2001 and



intended in part to fund support for renewables []; and schemes for providing finance for capital grants and R&D in new and renewable energy.⁴⁸

- 5.3 The RO scheme is aimed primarily at encouraging large-scale renewables; few small installations generate sufficient ROCs to be worth trading, and the transaction costs are prohibitive. With the introduction of a FiT scheme in 2010 [9.18], small renewable generators may now choose between support under FiT or the RO.⁴⁹
- 5.4 Microgeneration had not until relatively recently been an important part of UK policy. The main piece of legislation supporting microgeneration for electricity and heat is the *Climate Change and Sustainable Energy Act 2006*, introduced as a private member's bill.⁵⁰ However, a UK microgeneration strategy published in March 2006 speculated that 30-40% of UK electricity demand could be met by microgeneration, with an emphasis on CHP.⁵¹ The specific actions recommended in the strategy have been implemented, though aside from the establishment of the MCS [11.1] and the revision of planning policies [5] these relate mainly to electricity generation rather than heat. The technologies most heavily promoted are wind and solar.
- 5.5 Arrangements for exporting electricity to the grid have been a problem for several decades. Under the *Climate Change and Sustainable Energy Act* suppliers can now be obliged to accept electricity exported from small generators, and under the *Energy Act 2008* the government obtained powers to set feed-in-tariffs [9.18 and 9.20]. In mid 2009 the Secretary of State for Energy and Climate Change exercised powers under the 2008 Act to take control over the process of reforming transmission charging arrangements. A 'connect and manage' scheme whereby generators would not have to wait for network reinforcements before they connect to the transmission grid is likely to be adopted.
- 5.6 The Scottish Government's *Renewables Action Plan* is intended to identify what needs to happen to achieve Scotland's renewable energy targets, and describes how the Scottish Government intends coordinate and facilitate these actions.⁵² The plan aims to become a 'live document', being updated every six months to focus on the immediate 24-month period. As such, it brings together a range of existing policies and programs covering development of supportive infrastructure, investigation of supply chain development, reform and development of energy consents and planning regimes, programmes to develop workforce skills, support for community energy initiatives and district heating schemes, and specific facilitative actions on hydro, hydrogen, wind and marine power.
- 5.7 Scotland's *Renewable Heat Action Plan* (RHAP) proposes actions to: make advice and information about action available by publishing case studies and targeting large heat users; support investment through government grant programs and the RO, by considering a loan guarantee scheme and by developing a consistent approach to heat mapping; develop Scottish supply chains (predominantly in biomass) through more accurate forecasting and development of long-term contracts; develop a skills base through training,



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qualifications and attempts to improve the attractiveness of the sector; and investigate the potential for energy from waste in Scotland. A steering group with representatives from of public and private bodies has been set up to monitor and coordinate delivery of the RHAP proposals.

- 5.8 The RHAP may be criticised for its cursory and seemingly confused treatment of district heating. The SDC's recommendation that renewable heat in district heating schemes would likely develop in small scale rural heat networks in the near term, only becoming a significant aspect of large urban district heating schemes after 2020⁵³ was translated in the RHAP into an understanding that district heating would be developed initially in rural areas and only later in urban areas.
- 5.9 Electricity transmission and distribution infrastructure may be seen as one of several dimensions to a degree of "lock-in" of centralised energy generation in the UK.⁵⁴ Ofgem has recently established a £500m Low Carbon Networks Fund to support Distribution Network Operators (DNOs) "to innovate and trial new technologies, commercial arrangements and ways of operating their networks."⁵⁵ Ofgem sees the fund as encouraging DNOs to use the period 2010-2015 to prepare for a role in developing and enabling low carbon generation.

6 Building standards and fuel poverty

- 6.1 The recently increased energy performance standards in Part L of the Building Regulations⁵⁶ in England and Wales are expected to be one of the most significant contributors to energy savings and carbon emissions reductions. The 2016 target for zero-carbon new-build homes may provide significant impetus for builders to install energy efficiency measures and microgeneration to meet these obligations, as long as there is an infrastructure to service the demand. It is evident that sections of the building industry are already evaluating candidate building techniques and materials in terms of the levels set in the new Code for Sustainable Homes and similar guidelines such as the AECB standards.⁵⁷ Some major companies are actively pursuing high Code level building designs for the mass market, joining a handful of smaller builders who have a track record in energy efficient building.
- 6.2 The Standard Assessment Procedure (SAP) for the Energy Rating of Dwellings provides a standard method for calculating the energy performance of buildings and is used to demonstrate compliance with the relevant sections of the building regulations.⁵⁸ The calculation methods are intended among other purposes to provide information for an Energy Performance Certificate (EPC) to be issued on completion of construction or at the point of sale or rental, as part of a Home Information Pack (HIP).⁵⁹ The systems are intended to align building standards more closely to the EU *Energy Performance of Buildings Directive* (EPBD), and updated versions are being introduced from October 2010⁶⁰ after the issuing of a new version of the EPBD in January 2008.



- 6.3 There is resistance to the idea of HIPs from some interests. The HIP scheme is being phased in, and is at different stages in the different regional jurisdictions. The format of the packs and the certificates is still being developed. EPCs for commercial properties were introduced in April 2008, again in line with the EU EPBD. One major issue is the need to train a large number of accredited Energy Assessors to carry out the inspections.⁶¹
- 6.4 EPCs for existing dwellings are now required when the property is sold or let. The Scottish Government is considering using regulation to improve the energy efficiency of existing dwellings, and some options relate to EPCs (e.g. requiring that dwellings achieve a minimum EPC rating before they can be sold).⁶²
- 6.5 Up to a point that is, until new buildings meet *Passivhaus* standards and the requirement for additional heating is minimal any measure that enforces more energy efficient buildings benefits the renewable heat market by improving the economics of small-scale installations. Building regulations and the local authority planning system [5] are therefore important parts of the policy background, and changes in them aimed at improving the energy efficiency of buildings and reducing carbon emissions will be one of the key areas of government intervention that will affect uptake.⁶³
- 6.6 There is a range of policies and programmes in the UK aimed at fuel poverty addressing households which have to spend more than 10% of their income on energy currently estimated at 3.5 million, and rising for the past five years after a marked decline from the mid 1990s. Initiatives to tackle this problem include the *Warm Front* and *Decent Homes* programmes in England and Wales, and Scotland's *Warm Deal* and *Central Heating* programmes (now amalgamated into the *Energy Assistance Package*). These generally focus on insulation, but recently microgeneration options have been included in pilot programmes [9.15].⁶⁴
- 6.7 EEC / CERT also contributes to fuel poverty reduction, and there are many programmes by LAs and housing associations related to heating in their own public housing stock. These programmes are likely to be important for increasing the installation of renewable heat in smaller developments, and for stimulating the supply capability of the industry.
- 6.8 The Scottish Government and the EST ran a £1m pilot project from April 2006 to June 2008 to examine the viability of including renewable energy technologies in future fuel poverty programmes.⁶⁵ Although installation costs were higher than expected, ASHPs were found to provide the greatest overall value for money in terms of households lifted from fuel poverty per £1m capital expediture. Levels of householder satisfaction increased, National Home Energy Rating (NHER) scores improved markedly, and annual carbon emissions were significantly reduced. The report of the project, issued in November 2008, concluded that when correctly specified and installed, and with adequate levels of support to help householders understand how to use the systems efficiently, certain microgeneration technologies can be an effective and cost-efficient way to tackle fuel poverty. It pointed to the need to reduce unit and





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Baseline Paper turned in June 2010 Revised June 2011

installation costs, but pointed out that the benefits would increase as energy prices increased.

Despite the growing use of electric air-conditioning systems particularly in southern England, the increased requirement of commercial buildings for cooling systems – and thus the likelihood of massively increased demand for electricity for this purpose – and the explicit intention of the EU *Renewable Energy Directive* to cover cooling, there has been disappointingly little consideration of the implications of increased cooling demands, and the possibilities for supplying it from renewable sources or using more efficient technologies, in the various energy and climate change policies and strategies in the UK. Thus, for example, the potential contribution of HPs in cooling mode, though increasingly being exploited in large installations for commercial and public buildings through techniques such as interseasonal heat transfer,⁶⁶ is barely acknowledged, for example, in the discussion of the RHI [9.20], with the claim that there is 'limited scope' for such.⁶⁷

7 Local authorities: current involvement in energy

- 7.1 For several decades the involvement of LAs in energy provision has declined. Since provision of electricity and gas were taken out of their hands by the nationalisation of these industries in the late 1940s,⁶⁸ LAs have had little expertise in energy provision. Attempts to take a more active role in supply, such as in the 'lead city' schemes for CHP/DH in the 1980s, have been severely constrained by central government opposition and lack of legal powers.
- 7.2 In addition, a series of changes to systems of local government, beginning in the early 1980s, have impacted on LAs' abilities to engage with service provision more generally. Various powers and responsibilities have been transferred from LAs to numerous other bodies.⁶⁹ LAs have also been obliged to put certain services out to tender (under various policies since 1988) with the consequence that, while statutory authority has remained with LAs, 'many councils' cleaning, catering, refuse collection, ground maintenance and vehicle maintenance services were effectively privatised.'⁷⁰
- 7.3 Throughout the 1980s, 1990s and early 2000s, a centralising trend in decision-making was discernable, with central government departments taking increasing control over decisions on local service spending. This trend has diminished the discretion of LAs, and has contributed to the entrenchment of 'silo-working' in which actors in LAs see their role in terms of the narrow core competence and role of their departments.
- 7.4 The transfer of powers and responsibilities from LAs to the centre and to other bodies has exacerbated the complexity and fractured nature of local policy-making and service delivery. Such fragmentation and dispersal introduces coordination and management problems which affect the degree to which programmes which cut across traditional divisions in LAs (such as sustainable energy planning, or specific initiatives such as district





heating) can be effectively designed and implemented. A second consequence of complex and fractured service provision is a reduction in the extent to which skills and expertise are held 'in house' by LAs. In particular, legal, commercial and technical skills required for developing energy initiatives may be lacking, and only large authorities are able to buy them in.⁷¹ A third consequence is that no clear focal point exists in local government or governance structures with which those elements of the private and third sectors wishing to engage with local energy initiatives can liaise.

- 7.5 In response to the fragmentation of local governance, a number of reforms have been introduced over the last decade in an effort to achieve 'joined up' local government. These aim to make policy and service delivery coordinated across the range of stakeholders, and to overcome problems of departmentalisation.⁷² LAs are required to form Local Strategic Partnerships (LSPs) to coordinate efforts, to coordinate investment in infrastructure planning, and to develop overarching strategies for service delivery. Equivalent organisations are Community Planning Partnerships in Scotland and Local Service Boards in Wales. Local areas are free to determine how these bodies/forums are structured.
- 7.6 One responsibility of LSPs is to produce a Sustainable Community Strategy (SCS). This document is intended to set out a 10-20 year vision of 'how to address difficult and cross-cutting issues such as the economic direction of an area, cohesion, social exclusion and climate change.'⁷³ An SCS, therefore, can be seen as a means by which a local authority in partnership with other stakeholders could establish a coherent approach to *inter alia*, sustainable energy planning. Darlow *et al.*⁷⁴ found that in LAs, cross-departmental awareness of their SCS was high, with many regarding it as the 'key' strategic document.
- 7.7 A significant omission found by Darlow *et al.* across SPSs was reference to spatial planning, a key aspect of energy planning which is dealt with in Local Development Frameworks (LDFs). In recognition of the split between SCSs and LDFs, LAs have recently been obliged statutorily to 'have regard to' the relevant SCS when preparing their LDFs.⁷⁵ These documents therefore provide a mechanism by which the kinds of coordination among and within LSP partners important to the success of a local energy project, such as a DH scheme, can be established. Recent guidance aims to highlight the impact LSPs can have on spatial strategies,⁷⁶ though whether this will bring more spatial issues into SCSs remains to be seen.
- 7.8 In Scotland, the equivalent of LSPs are Community Planning Partnerships (CPPs). In contrast with England, CPPs are not required to coordinate with Local Development Plans, though the Scottish Government's 'core script' on spatial and community planning expresses optimism that these processes will 'develop ways in which to work effectively together'.⁷⁷
- T.9
- While CPPs and LSPs are set up to focus on service delivery, the *Carbon Reduction Commitment* is likely to increasingly focus their



attention on energy-related carbon emissions and could help stimulate partnerships into pursuing sustainable energy projects.

- 7.10 LAs are obliged to make energy conservation strategies, and often have their own policies covering some aspects of renewable energy. An important piece of legislation is the *Home Energy Conservation Act* 1995 (HECA), which requires all UK Energy Conservation Authorities (that is, LAs with housing responsibilities) to annually prepare an energy conservation report covering both public and private housing with the aim of reducing energy consumption by 30% over a period of 10-15 years. This was intended to stimulate knowledge transfer between LAs.
- 7.11 Some city and regional authorities in the UK have also developed their own energy and carbon strategies, and one that may be influential is that developed by the Greater London Authority to provide zero-carbon low-cost housing.⁷⁸ Many of the targets set by LAs are as ambitious as the national and regional targets. Edinburgh, for example, aims to have a carbon-free economy by 2050.79 Other locally focussed energy and sustainability initiatives, some now under the banner of 'transition towns', present another vehicle through which the uptake of microgeneration and renewables is likely to be encouraged.
- 7.12 There are several central government initiatives to stimulate and support LA energy activities. Support schemes include the Housing and Planning Delivery Grant scheme (from 2007), which has included renewables installations and low energy homes. Each of several rounds of allocation has typically given out about £100m to several hundred councils for specified projects.
- 7.13 More specific subsidies include the DECC Bio-Energy Capital Grants scheme for biomass-fuelled heating and CHP. Several rounds have provided up to £500k for each project for schools, businesses and hospitals.⁸⁰
- 7.14 DECC has published a standardised methodology for English regional authorities to assess the potential for renewable and low carbon energy.⁸¹ The methodology is intended to assess potential under energy resource, technical accessibility, planning and regulatory constraints. These assessments could be used by public or commercial bodies designing SNEIs. While low-carbon heat is described in the methodology document, no specific methods are indicated for assessing potential for district heating networks. Under the new coalition UK government's revocation of Regional Spatial Strategies and associated regional bodies, data generated at a regional level will now be made available to Local Authorities.⁸²
- 7.15 The *Electricity Act* 1989 prohibited Local Authorities from selling electricity, except where it is produced in association with heat. This prohibition has recently been relaxed, allowing Local Authorities to sell electricity produced from renewable sources.⁸³
- 7.16 The UK Government will pilot Local Carbon Frameworks, in which LAs set ambitious local carbon emission targets – to go beyond national targets – and delivery plans to achieve them. Instruments in the strategies will include local investment plans.





European Regional Development Fund



8 Local authority planning system

- 8.1 One important area is local planning control.⁸⁴ In a positive sense, planning permission for new developments is a crucial point at which LAs can actively encourage renewables and energy efficiency, but they vary in the extent to which they use this opportunity. The UK Government has encouraged more active involvement particularly through its *Energy Measures Report*.⁸⁵ Some active LAs in England and Wales have adopted the so-called Merton Rule, which requires the generation on-site of a minimum level of the energy requirements of new developments from renewable sources generally 10%.⁸⁶ Legislation for the Rule was introduced to the UK Parliament again via a private member's bill, and passed as the *Planning and Energy Act* in late 2008.⁸⁷
- 8.2 Renewables installations for domestic use are now 'permitted developments' that is, they do not require planning permission provided the installation is confined to the house and land.⁸⁸ Local planning authorities generally make this clear in guidance on microrenewable installations. For larger installations, planning regulators (under devolved powers) currently have to decide what size and types of installation can be installed without the need for planning permission. This might have an impact on the size of system installed.
- 8.3 The planning system in Scotland is organised around a hierarchy of planning documents. The Scottish Government's National Planning Framework was first introduced in 2004, and is intended to be updated every four years. The NPF provides an overarching vision of spatial development in Scotland and is produced; four Strategic Development Plans (SDPs) are produced by partnerships of local planning authorities in the four city-regions;⁸⁹ and local planning authorities produce Local Development Plans (LDPs). SDPs and LDPs must have regard to the NPF, and those LDPs which relate to an area covered by a SDP must have regard to the latter. This multilevel system was instituted by the Planning etc. (Scotland) Act 2006, but Strategic Development Planning Authorities were only set up in 2009 and so generally have not yet produced SDPs yet. The legislation and regulations governing the process of creating SDPs place a strong emphasis on consultative processes, both with identified key stakeholders and with the public in general.
- 8.4 In comparison with England's planning system, Scottish planning takes a relatively proactive approach to renewables, particularly wind developments. Scottish Planning Policy 6 (SPP6, issued in 2007) requires planners to identify areas where constraints on wind development apply and areas where proposals are likely to be supported. This strategic approach, which allows developers early appraisal of likely planning outcomes, contrasts with guidance given in England (under Planning Policy Statements 22, PPS22) which prevents planning authorities from identifying sites suitable for wind development unless a developer has already indicated an intention to apply for planning permission.⁹⁰







At a UK level, government is (in early 2010) consulting on National Planning Statements (NPSs) which will form the context within which a new Infrastructure Planning Committee will make decisions on large energy infrastructure developments in England, and which will guide local planning authorities in their decisions. As energy policy is a reserved matter, Scottish planning authorities will also have to treat the six energy NPSs as relevant considerations in deciding planning applications. The draft NPSs have been criticised for failing to allow the planning system to consider the current and projected energy mix when considering planning applications,⁹¹ and through their focus on large centralised generation which arguably closes down opportunities for innovation.⁹²

- 8.6 SDPs will include a vision statement outlining the development expected in the area including changes to energy supply infrastructure and changes in how that infrastructure is used. In addition, the main issues a SDP will cover are left open and should be developed through consultation. This may offer an opportunity for some element of energy planning to be put on SDPs' agendas.
- The Second National Planning Framework for Scotland (NPF2) sets 8.7 out a strategy for Scotland's development to 2030, and is intended to address the role of the planning system in responding to climate change.⁹³ Planning is one way in which Scotland can influence energy systems (while regulation of energy is a reserved matter). Planning authorities are required to take NPF2 into account when preparing development plans, and the framework is a material consideration when determining planning applications. The framework does not set out a clear vision for heating and electricity systems in 2030, and offers little impetus to planning authorities to engage actively with energy planning, rather than considering proposed developments one-by-one. The exceptions to this are onshore natural gas extraction and heat networks. Planning authorities are instructed to consider the potential for both of these when preparing development plans, and potential heat networks should also be examined when considering major development proposals (§165). NPF2 is broadly supportive of decentralised energy systems and community energy projects (the latter contributing to the development of the former as well as being opportunities for rural regeneration), but offers little guidance as to how planning authorities may practically encourage or support these developments.
- 8.8 NPF2 also identifies certain developments which are designated as national developments. Decisions on whether these projects receive planning approval are taken by Scottish Ministers rather than the relevant local planning authorities. These projects are seen by the Scottish Government as essential for Scotland's long-term development. Several energy-related developments are included in the list, including:
 - a new power station and transhipment hub at Hunterston;
 - new non-nuclear baseload capacity at other existing power station sites;





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electricity grid reinforcements.

Through these powers, the Scottish Government recently approved the controversial Beauly-Denny line intended to transmit power from the North of Scotland, where there is large potential for several renewable technologies, to the Central Belt, where demand levels are high.

9 Financial support mechanisms for renewables and energy efficiency measures

- 9.1 The *Climate Change Levy* (CCL) is a tax on certain forms of energy (including electricity, gas and coal but excluding oil) delivered to industrial and commercial users. It is intended to incentivise carbon emission reductions through energy efficiency and switching to renewable sources. Renewable-based electricity and 'good quality' CHP schemes are exempt. Revenues fund a number of initiatives including The Carbon Trust.⁹⁴ Energy intensive industries can obtain an 80% exemption from the CCL by agreeing to reduce their GHG emissions (according to terms set out in individual *Climate Change Agreements*, CCAs).⁹⁵ One source of criticism of the CCL is that because different energy sources are penalised roughly equally (per unit energy) it does not encourage fuel switching between carbon emitting sources (as a carbon tax would), and it has been suggested that this feature of the CCL was politically motivated by a desire not to further harm the UK coal industry.
- 9.2 The UK's current primary support mechanism for large-scale renewable electricity generation is the *Renewables Obligation* (RO).⁹⁶ As in many other countries, the RO scheme has had two components: an obligation on energy suppliers to source an increasing amount of their electricity from renewable sources, and a system of tradeable certificates. One *Renewable Obligation Certificate* (ROC) is issued to an accredited generator for 1MWh of eligible renewable electricity. The obligation was until recently specified in terms of a fraction of electricity sourced from renewables; this had increased steadily from 4% in 2004 to 10%. The obligation is now set as a number of ROCs to be shown – currently 11.1 ROCs per 100 MWh supplied.⁹⁷ Suppliers can make up any shortfall (or even entirely discharge their obligation) by paying a buy-out price for each obliged ROC not presented.⁹⁸ Buy-out payments are recycled to suppliers in proportion to the number of ROCs they present. Suppliers pass the costs of the RO onto consumers (the buy-out mechanism effectively puts an upper-limit on the total cost).
- 9.3 The RO was originally designed to reward all renewable generation equally (offering one ROC per MWh), thereby avoiding 'picking winners' and in theory finding the least-cost combination of technologies to meet the obligation.⁹⁹ However, concerns that the RO was over-subsidising established technologies and failing adequately to support less established technologies have prompted the introduction of ROC banding, whereby the number of ROCs issued per MWh generated is technology-dependent.¹⁰⁰ Banding weakens



the link between the level the obligation is set at and the quantity of renewable electricity generated, though modelling has been used to try to ensure that under banding approximately one ROC is issued for each MWh of renewable generation.¹⁰¹

9.4 Separate orders cover the issuing of ROCs in England and Wales (*Renewables Obligation*, RO), Scotland (*Renewables Obligation Scotland*, ROS) and Northern Ireland (*Northern Ireland Renewables Obligation*, NIRO). ROCs issued under each order may be traded with ROCs issued elsewhere, and all are equally acceptable as evidence of supplier compliance (set at a UK level). The three administrations are able to set different ROC bands for generation within their territories.¹⁰² Prior to banding the three orders did not differ significantly.¹⁰³

- 9.5 In addition to criticisms that the pre-banding system failed to support less established technologies, it has been argued that the RO is a relatively expensive way of expanding renewable generation. As the value of and demand for ROCs are uncertain, renewable generators are required to offer relatively high rates of return to investors to compensate them for taking on these risks,¹⁰⁴ though the introduction of "headroom" (whereby the level of the obligation is set at a fixed percentage above the expected number of ROCs to be issued in a given year) is designed to mitigate some of this volatility by avoiding an over-supply of ROCs.¹⁰⁵ In addition, intermittent renewables suffer balancing penalties for under- or over-producing which would be socialised under a feed-in tariff scheme.¹⁰⁶ The various risks associated with the RO favour large institutions with the (financial) capacity to deal with them, and in comparison with countries where Feed in Tariffs support renewables, the UK has seen few significant market entrants.¹⁰⁷ In 2009 Ofgem reported that dealing with small generators amounted to 50% of the administrative costs of the RO, though these generators represented less than 0.2%of generating capacity.¹⁰⁸
- 9.6 For small scale energy renewables and other microgeneration installation, high capital costs, and resultant long pay-back times, are still a deterrent to more widespread uptake. It is unlikely given the volume of existing production in Europe that microgeneration unit costs will decrease significantly, though being able to import units in larger numbers, and demand for multiple installations from collective customers like social housing providers, may lead to reductions. Installation costs can be expected to decrease as the market grows and as more suppliers and installers enter it. In particular costs could be brought down if installations were more concentrated; at present the scattered pattern of installations makes each more expensive.¹⁰⁹ While this basic cost structure cannot be completely overcome, then, it can be improved marginally.

9.7



The cost structure has been addressed through subsidies. The principal source of grants for microgeneration in England in the four years to 2006 was the DTI *Clear Skies* programme, which applied to the whole of the United Kingdom. The *Clear Skies* scheme was replaced in 2006 by the £80m *Low Carbon Building Programme*, part of BERR's Microgeneration Strategy, covering the whole of the UK.¹¹⁰



This offers grants towards the costs of low or zero carbon technologies, and was run by the Energy Saving Trust and BRE. Phase 1 of the programme supported householders in Stream 1 and SMEs in Stream 2, and was intended to run from 2006-2008. Householders could get different levels of grant depending on the technology. There was a cap on the grant to each household. Grants were allocated 'on a first come first served basis as long as funds last[ed]'. It is difficult to assess what fraction of would-be applicants succeeded in getting a grant. As the funding set aside for householders was not fully allocated near its end date – some £10m was still available at March 2008 – the scheme was extended to June 2010.¹¹¹ Stream 2A offered grants to SMEs of £100k or 40-50% of total costs; Stream 2B offers £1m or 40-50% of total costs. A new Phase 1, with a total of £10m available, was proposed for July 2010 onwards.

- 9.8 Phase 2 of the LCBP began in December 2006 and was operated by BRE for DECC (originally BERR). It closed in February 2010 to new applications for electrical microgeneration grants, but was then extended to April 2011 (when the RHI will begin, see §9.20) for grants for heating-only installations. It had a total fund of £80m, and supported public sector buildings, including schools, hospitals, housing associations and LAs, and charitable bodies. Phase 2 required applicants to engage one of a limited number¹¹² of 'Framework Suppliers' providing one or more of the technologies. There was criticism of the way the scheme favoured particular firms.
- 9.9 The LCBP scheme was abruptly cancelled in May 2010 under a programme of major cuts to public sector spending under the new Conservative/Liberal Democrat UK government.¹¹³ By that time it had allocated around 20000 grants.
- 9.10 Scotland and Northern Ireland also run independent programmes. In Scotland the Scottish Government invested £18m up to March 2008 in the Scottish Communities and Householder Renewables Initiative (SCHRI), which offered grants to householders and communities for small scale renewable technologies. Though the level of support to individual installations remains unchanged, the scheme was split in 2009 into the Communities and Renewable Energy Scheme (CARES), managed by Community Energy Scotland, for community projects, and the Energy Saving Scotland home renewables grant scheme for households.¹¹⁴ The schemes currently include grants for householders of 30% of costs, up to £4000, and for community projects of up to £100 000. The total value of this support is £13.5m per year in 2010-11.¹¹⁵ Both grant schemes have closed early due to higher-than-anticipated levels of demand,¹¹⁶ and the Scottish Government is investigating the possibility of establishing a revolving renewables loan fund.¹¹⁷
- 9.11 The Scottish Government's £27m *Climate Challenge Fund* has supported grassroots initiatives in around 250 communities. These cover a wide variety of issues from local food production to sustainable transport, but around a third involve some form of community-based energy efficiency programme and a smaller proportion involved feasibility for micro- or small-scale renewables.

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Emission abatement estimates provided by the funded community organizations total around 700,000 tonnes of CO_2 .

- 9.12 There are two main tax initiatives relevant to the installation of microgeneration. First, a reduced level 5% VAT on grant-funded heating appliances is now applied to ground-source heat pumps, air-source heat pumps and micro-CHP. Second, from October 2007, homes meeting the zero-carbon standard and costing up to £500,000 pay no stamp duty, and zero-carbon homes costing over £500,000 have stamp duty reduced by £15,000.
- 9.13 Under the *Enhanced Capital Allowance* (ECA) scheme, the UK government offers one year 100% tax relief on energy-saving equipment for businesses (compared with a 30% standard allowance). A list of eligible products is continuously updated.¹¹⁸
- 9.14 A further subsidy scheme in England, the *Community Sustainable Energy Programme*, is administered by BRE and provides grants to non-profit community organisations for energy efficiency and microgeneration projects. The funding, from the national lottery, totals £8m for installations and £1m for project development feasibility studies, and has been allocated in quarterly rounds from May 2008. Grants are available for up to (the lower of) 50% of the costs or £50 000. Installers and equipment must be accredited with the MCS.¹¹⁹
- 9.15 Subsidies for microgeneration are now also becoming available under fuel poverty initiatives. The UK Government's Warm Front programme for England and Wales is now to include solar thermal heating and ASHPs: eligible householders will be able to get grants of up to £3,500 if they have access to gas mains, or up to £6,000 if they use oil heating systems.¹²⁰ The Scottish Government's Energy Assistance Package is also a fuel poverty initiative which supports installation of various insulation and heating measures including ASHPs. The Scottish Government's *Home Insulation Scheme* is an area based energy efficiency program, focused on loft and cavity wall insulation which directs households towards CERT-subsidised measures. A new universal insulation scheme in 2010-11 will run alongside the original scheme but offer households (in other areas) free loft and cavity wall insulation. The schemes combined represent £25 million of Scottish Government spending (with additional energy company spending through CERT) and target around 200,000 homes per year.¹²
- 9.16 There are mixed views of the microgeneration subsidy schemes that have operated so far, and differing interpretations among UK commentators of overseas experience of subsidies. Some argue the UK systems so far have been confusing, opaque and inadequate in the amounts of money made available. Commentators point to a marked decline in take-up not long after the schemes were introduced in the case of LCBP when the maximum grant was reduced.¹²² There does seem to be a consensus that they have not in themselves had, and cannot have, a significant effect in building the microgeneration market other than by encouraging early







installations as demonstrations, and that they are not the ideal long-term solution for the imbalanced cost structure.

- 9.17 Both the UK and Scottish governments have reviewed the arguments and evidence on microgeneration and renewable heat support mechanisms. Ernst & Young's review in 2007 for defra/BERR considered a continuation of support through grants and CERT to be the best option, but called for a more coherent approach and better alignment between the two. For commercial applications it suggested a heat obligation or heat feed-in tariff, noting the different arguments for the two.¹²³ In 2007 the Scottish Government issued a review of energy efficiency and microgeneration advice and support in Scotland, assessing the impact and effectiveness of the policies in the domestic, business and public sectors.¹²⁴ Several commentators make the point that in assessing the merits of alternative support schemes and setting the level of support, they may be justified in terms of helping to build an industry as well as on their current relative costeffectiveness.
- 9.18 From April 2010 a feed-in tariff scheme – 'Clean Energy Cash Back' – operates for small-scale electricity generation, set up under powers in the 2008 Energy Act.¹²⁵ This is undoubtedly the most important government stimulus for investment in microgeneration; it will replace existing subsidy schemes for microrenewables and be the main mechanism for overcoming their cost structure. Providers are paid an element for each unit of energy generated and an element for units exported. The rates and the period of payment vary according to type of technology and size of installation. Rates for each installation are fixed – as well as inflation-linked and tax-free – for the payback period, but the rate available to a new installation declines with time, removing any inventive to delay installation. The two payback elements, plus the avoided cost of purchased electricity, mean that a typical home PV installation might thus repay about 10%of the installation costs each year, substantially improving the economics of microgeneration for the householder. The costs of the scheme are borne by the electricity companies.¹²⁶
- 9.19 The Coalition Government has stated it intends to expand the feed-in tariff scheme, making it available to some larger renewables, though details on these reforms have not yet been announced.¹²⁷
- 9.20 The Renewable Heat Incentive (RHI), due to be introduced in 2011¹²⁸, will provide subsidies to suppliers of renewable heat for each kWh of useful renewable heat generated from solid biomass (except where used in stoves), biogas (including injection into the gas grid), heat pumps (ground, air and water source) and solar thermal collectors. Tariffs will be banded by technology and scale, and are designed to offer a 12% rate of return (6% for solar thermal). District heating schemes which are constructed or extended to supply renewable heat will be eligible for extra funds (at a level not yet determined) though whether additional criteria must be met (such as supplying otherwise hard-to-treat buildings) has not been resolved. The Government has not yet announced how the RHI will be funded.¹²⁹



9.21 For district heating, and large industrial installations, RHI payments will be based on metered heat use. At small and medium scales,

Stewart Russell and Dave Hawkey



space and water heat demand will be deemed on the basis of the building's characteristics (to avoid the incentive to over-produce heat). Deemed heat demand will be calculated on the assumption that lofts and cavity walls are adequately insulated (whether or not they actually are). The technique for deeming heat demand has not yet been settled, but the UK's Standard Assessment Procedure (SAP) may well form the basis. SAP does not account for differences in ambient temperature and so would make the RHI more attractive in warmer than in colder regions.

- 9.22 The RHI may be criticised for failing to address the balance between individual and communal heat provision: potential anchor loads may adopt individual renewable heat installations on the basis of RHI support, reducing opportunities for developing heat networks (which may initially use non-renewable heat sources but reduce the carbon emissions of larger numbers of heat users and build in future flexibility of heat provision).
- 9.23 At least one energy retailer has anticipated the scheme by offering subsidies for solar thermal installations, funded by a premium on its customers' gas bills, and at least one other has set up its own general subsidy scheme for microgeneration.¹³⁰
- 9.24 Loans have been suggested as a better mechanism than subsidies. In 2009, the UK Government started a limited trial in several cities of a Home Energy Pay-as-You-Save scheme for energy efficiency measures and microrenewables. Householders loan repayments are intended to be spread over a long enough period that repayments are lower than the predicted savings on their energy bills.
- 9.25 Among alternative mechanisms, Roy and colleagues among others have argued that council tax relief would be a better and more popular incentive.¹³¹
- 9.26 Among LAs, the Greater London Authority has announced subsidies for retrofitting microgeneration in public buildings under its 'Leading to a Greener London' proposals.¹³²
- 9.27 Among support initiatives by non-government groups, the Cooperative's Green Energy for Schools scheme, which has already funded solar installations in 100 schools around the UK since 2007, is now spending a further £1 million on solar panels, biomass boilers, wind turbines and GSHPs for 80 schools. The installations are cofunded with the LCBP scheme.¹³³
- 9.28 There appears to have been little systematic evaluation of microgeneration support schemes. In particular, BERR/DECC and the EST have not undertaken any detailed evaluation of *Clear Skies*. It is particularly difficult to gauge the level of unmet demand.

10 Promotion and information

10.1 Promotion of energy efficiency and microgeneration in the UK has been fragmented, and has mainly consisted of advertising by manufacturers/importers, consultants and installers, and information and advice materials from government and non-

Stewart Russell and Dave Hawkey



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government energy agencies, industry associations and lobby groups.

- 10.2 Government, quasi-government and non-government agencies, energy advice centres and auditors, and energy campaigning groups have provided information and publicity. This has taken the form of case studies, advice and information sheets, technology factsheets and guides, best practice guides, installer lists, phone advice, workshops, displays and informal contact. Several organisations are constrained to some extent to give technology-neutral advice, or choose to remain disinterested towards the options while listing impartially their advantages and disadvantages, and in practice their stance towards different technologies varies.
- 10.3 A variety of non-government agencies and prominent individuals recognise and promote microgeneration and renewable energy options. Among recent initiatives, Scottish Renewables published a report in March 2009 underlining the 'massive economic potential' of renewable heat in Scotland. It indicates that a massive growth in wood fuel, heat pumps and solar technology will be required to meet Scottish Government heat energy targets for 2020 and estimates the level of investment needed and the jobs that would be created.¹³⁴ At a Royal Academy of Arts lecture in February 2009, a former government initiative on renewable energy sources and for all new government buildings to be built with GSHPs.¹³⁵
- 10.4 Installation demonstrations continue to be important, increasingly in the context of attempts to meet the requirements of the Code for Sustainable Homes. Energy efficiency measures and microgeneration technologies are demonstrated *in situ* at sites including the BRE Innovation Park at Watford,¹³⁶ and owners of some installations accept visitors informally. Construction companies are also using demonstration eco-homes to show new technologies and materials.¹³⁷
- 10.5 While there has been some limited formal evaluation of various policy and market instruments, the more nebulous effect of general policies and declarations, publicity and awareness initiatives is currently evaluated only impressionistically.
- 10.6 Comments and claims on specific energy efficiency measures and microgeneration technologies are made in a variety of public forums on energy and building issues: conferences, workshops and presentations; internet forums on energy; and media reports. Particularly at a popular level, but even in policy discussions, misinformation, adverse claims and dismissals often go unchallenged. In particular, disputes continue over how energy, economic and environmental benefits of alternative heating and cooling options should be calculated.¹³⁸
- 10.7 It is also claimed that different options are being assessed unfairly for example, by basing the performance of condensing gas boilers on hypothetical efficiencies in the absence of long-term experience. Particularly when measures are enshrined in standardised calculation methods, whether in SAPs or the many calculators offered for quick assessments, such calculations continue to be





contentious and the resulting disputes a problem for consumer confidence and for policy makers and regulators. The National Home Energy Rating (NHER) software is widely considered to under-estimate the effectiveness of heat pumps.

10.8 There are still disputes within the industry and among experts over best practice in some detailed aspects of microrenewable system design and installation.¹³⁹ These may be creating confusion among users seeking advice and trying to assess the offerings and claims of different manufacturers and installers. It is unlikely that consensus will be reached on all of them, nor is it necessarily sensible to resolve these *a priori* through mandatory standards or even specific identification of best practice at a detailed technical level.

11 Quality, labelling, training, accreditation, consumer confidence

- 11.1 Accreditation of both microgeneration products and services in the UK is increasingly being rationalised under a single system, the Microgeneration Certification Scheme (MCS), which sets out standards for equipment and installers and is intended to maintain quality and enhance consumer confidence in the industry and technology.¹⁴⁰ The MCS issues Microgeneration Installation Standards for specific technologies.¹⁴¹
- 11.2 Microgeneration product certification is delegated to a number of agencies, including BRE and HETAS.¹⁴²
- 11.3 One major problem with all initiatives for energy efficiency and microrenewable energy, is a shortage of trained and experienced installers, and of professionals in construction and architecture with knowledge of the issues and technologies.
- 11.4 There are a number of unresolved basic issues concerning training and accreditation of installers, and differing views about the right course of action:
 - how best to fit both a basic introduction to these technologies and more specialised training into or onto the training and formal qualification structures of a number of occupations, and how to distribute and articulate the elements of training and accreditation among these levels;
 - similarly how these specialists qualifications should relate to the accreditation schemes in other industries;
 - who should provide training;
 - what the programme should comprise;
 - what level of training is appropriate.
- 11.5 Views on the last issue depend on different visions of the future of the system design process as the industry expands, especially for technologies that require complex site-specific design like GSHPs and systems that integrate several technologies like mechanical ventilation and heat recovery with exhaust-air heat pumps: whether



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the process remains highly complex and specialised, or can be simplified through codification of rules and calculation procedures to give installers a limited number of configurations that perform adequately. One resolution suggested is that design and installation are separated, so that provided they are adequately coordinated, the functions taken on by the installer, and the training required, could be kept relatively simple.

- 11.6 Among the difficulties that the microgeneration industry faces are that
 - it is building a system largely from scratch;
 - there have been no readily available schemes and syllabuses that could be adopted without much modification;
 - that careful structuring is needed, for example to balance the length and complexity of courses with their attractiveness;
 - that small companies and individuals seeking to offer a choice of heating or microgeneration technologies are deterred by the need for multiple expensive qualifications.

Industry associations have been working on these and other issues and seeking to influence the schemes and regulations appropriately on behalf of their industries.

- 11.7 Training is currently being provided by a range of interests:
 - by manufacturers, understandably largely confined to their own products;
 - by technical colleges, sometime supported by or in cooperation with specific manufacturers;
 - by major installers for their own staff or on a commercial basis;
 - more recently, by a number of private providers¹⁴³ often working in conjunction with colleges;
 - informally to tradespeople by individual builders, architects and others.

Generally the skills and qualifications for micro-renewables from these courses are seen as 'add-ons' to the general ones for heating, plumbing or air-conditioning.

- 11.8 The basic qualifications of the relevant trades for HP installation are National Vocational Qualifications /Scottish Vocational Qualifications (NVQ/SVQ) at a range of levels. It is currently debated
 - what competences these should include and whether basic training in microgeneration could be included in standard qualifications of a certain level;
 - how these could be supplemented with qualifications appropriate to specific technologies (as in the SKILLcard which indicates ancillary or specialist occupation linked to specific NVQ/SVQ);¹⁴⁴







- how these can best be indicated to employers / project managers.
- 11.9 The UK government department Communities and Local Government approves 'competent persons' schemes. These are a form of self-regulation of the relevant trades; they allow for selfaccreditation and, with the exception of CORGI for gas installations, are not compulsory. Organisations apply to set up CP schemes under the legislation.¹⁴⁵
- 11.10 Installers have to date been either encouraged or required to get accreditation under a number of schemes:
 - under specific industry associations
 - LCBP (formerly Clear Skies) and / or SCHRI
 - MCS

The requirements are increasingly being articulated and consolidated through MCS, and new training programmes are geared to accreditation through it. Certification of installers is still operated by other agencies approved under the MCS, many of them also providing the necessary training.

- 11.11 The Sector Skills Councils, particularly that for building services engineering,¹⁴⁶ are devising a training scheme for environmental technologies which would rationalise and integrate current offerings, providing pathways appropriate to specific technologies through a range of general and specialist modules at different VQ levels.
- 11.12 To be listed with the LCBP and SHCRI support schemes [3.6], and more generally to position themselves as qualified and reliable, installers have to get accreditation through the MCS [11.1], which entails signing up to a code for consumer protection.¹⁴⁷ DECC has accepted the Renewable Energy Association's *REAL Assurance Scheme Consumer Code* as the appropriate code. This requires installers to offer *inter alia* a complaints handling procedure and comprehensive performance prediction.¹⁴⁸
- 11.13 Introducing general awareness of energy efficiency and microgeneration, and training in system design and specification and the integration of energy systems in building design, entails influencing the education and training of a number of professions and inserting appropriate elements into their syllabuses at undergraduate, postgraduate and CPD levels: architects, engineers, energy consultants and managers. There are now also programmes aimed at architects, such as the SUST initiative in Scotland,¹⁴⁹ that have started to accredit architects with knowledge of sustainable building techniques.
- 11.14 General interest in, and pressure towards, sustainability, energy efficiency and renewables is increasing in the construction and building services industries and their policy and regulatory environment. While there is a growing range of new materials and technologies being offered individually, the integration of these into building design and construction to get optimal sizing of microgeneration, the combinations of technologies most appropriate







to the site, building and user requirements, and to get the most costeffective solutions – remains a problem. Architects, builders or project managers willing and able to take on this coordinated design role, sufficiently knowledgeable about the variety of technologies, and even sufficiently aware of their significance, are still relatively rare. The scope and responsibilities of each of these functions – and those of building services engineers and energy consultants – is often too tightly limited; the parts of the building process are often seen as separate and sequential, so that for example, the design of building services comes after that of the building envelope and is constrained by it; it is not clear who is responsible for integrated design; and the opportunities for design for optimal energy performance too often fall in the gaps. At least one microgeneration manufacturer is now systematically offering free advice to architects on 'eco-design'.¹⁵⁰

- 11.15 Several researchers and commentators have identified consumer confidence as a continuing problem for the microgeneration industry. There is strong demand from potential consumers for independent credible advice on the performance and economics of technologies, and scepticism about the information provided from interested sources. Information from manufacturers and installers is widely seen as indicating only theoretical or ideal performance, and consumers rightly assume that actual achievements will differ from this.
- 11.16 A householder survey on microgeneration undertaken by Halcrow for SCHRI noted:

4.15.3 A high degree of uncertainty and doubt about the benefits of these technologies, their efficiency, maintenance and cost effectiveness was reported in the survey. Respondents stated that this was mainly due to the limited availability of in-depth and detailed information and advice. The whole installation process is perceived to be very complex and many stated that they do not know where to start and where to obtain the adequate information on microgeneration technologies.

4.15.4 Where respondents had investigated some microgeneration technologies in greater depth, many had concluded that these were still not cost-effective and therefore not worth installing. There were also concerns that the systems were not as efficient as they were marketed. ...¹⁵¹

- 11.17 Roy and colleagues have conducted extensive work on the characteristics of pioneer microgeneration adopters and on the deterrents from their perspective to taking up the option.¹⁵² In particular, an absence of reliable and credible performance information from *in situ* monitoring rather than manufacturer claims and of payback times, are seen as a major obstacle.
- 11.18 Would-be users have made similar points, and have claimed that installers often do not offer the complete service covering design, installation, sub-contracting, etc., that many claim to. Users are thus





faced effectively with having to manage the project, coordinate different parties and find out for themselves the range of requirements and pitfalls entailed in the installation. A related deterrent, in part a consequence of this, is that enquirers find it difficult to assess the total cost of the installation and are afraid of hidden and unexpected extra costs: they claim they are sometimes not given a quote covering all the costs of the unit and installation, and either have to work out for themselves what additional expense is entailed, or have received an unwelcome shock when the total cost becomes clear.

12 Industry capacity, innovation and skills

- 12.1 In addition to programmes aimed at developing skills in the microgeneration sector, the UK and Scottish Governments recognise limitations in the UK's skills base, with a lack of engineers (particularly electrical engineers), people with skills in maintenance and other issues in relation to off-shore wind, and a general lack of skills in the marine energy sector (in part because the skills requirements in this emerging sector are unclear).¹⁵³ In part, the relative lack of skills in the sustainable energy sector is a reflection of a more general lack of Science, Technology, Engineering and Mathematics skills.¹⁵⁴ While the off-shore oil and gas industries employ many workers with skills that could transfer to off-shore wind, oil and gas are still more profitable than renewables and thus able to offer more attractive employment to experienced engineers.¹⁵⁵ Around 90% of manufacturing contracts for the London Array have been awarded overseas.¹⁵⁶
- 12.2 With little recent experience of district heating, the UK lacks developed supply chains and skills bases for heat networks. Costs for developing and deploying district heating schemes are correspondingly higher than elsewhere in Europe as materials and engineers have to be imported.¹⁵⁷ *Ad hoc* and short lived support mechanisms for district heating have not inspired sufficient confidence within the private sector to investment in district heating skills and manufacturing capacity.¹⁵⁸
- 12.3 The UK Low Carbon Industrial Strategy (LCIS) outlines Government plans to help develop low carbon industrial capacity in the UK. The strategy concentrates on offshore wind, wave and tidal power, nuclear power, low carbon vehicles, renewable construction materials, renewable chemicals and low carbon manufacturing.¹⁵⁹ The strategy introduces 'Low Carbon Economic Areas' (LCEAs) whose geography and industrial assets are identified as providing clear strengths in particular low carbon industries. LCEAs are intended to accelerate activity within these industries, coordinating public and private investment, developing partnerships to improve learning rates and building supply chains, and will be led by regional and LAs. However, the strategy lacks a clear framework for setting and justifying low carbon technology priorities, and does not include mechanisms of ongoing evaluation and review. These limitations open the possibility that the strategy may in future be





unduly directed by lobby groups (e.g. communities that develop around particular supported technologies may act to prevent funding being withdrawn even after development indicates the technology has low potential).¹⁶⁰

13 Observations

- 13.1 National policies and targets in the UK and Scotland provide a framework generally conducive to regional and local energy initiatives and indeed providing incentives and pressures that will increasingly force regional and local action, though there is still a widespread perception of ambivalence or insufficient commitment in central government towards sustainable energy goals.
- 13.2 Key problems however hinder the translation of admirable targets, goals and pronouncements into action at regional and local levels:
 - the traditional limited functions and weak powers of LAs, and their steady removal from involvement in energy provision, especially since the extensive privatisation and liberalisation of the energy sector in the 1990s;
 - disagreement and confusion over which agencies can and should take a lead role in energy strategies and initiatives at city and local level, particularly where coordination among agencies will be required and where different agencies are seen as having disparate goals;
 - a lack of political and strategic leadership, with for example important legislation still relying on private parliamentary members' bills;
 - a failure to coordinate policies affecting energy provision including regional and local development and planning – and to address contradictory influences on it;
 - differing levels of interest in energy issues and commitment to sustainability across LAs, and the legacy of some discouraging involvement in energy projects;
 - a lack of specific mechanisms in some areas to translate targets and general policies into practice;
 - in particular, the continuing disconnect between on the one hand energy market policies and regulation, their focus on competition, and their effect on industry structures, and on the other hand goals of sustainability;
 - inadequate means to overcome the typical cost structure of energy efficiency and renewables installations, and disagreement on the merits of different support mechanisms for tackling that;
 - limits on key capacities including energy expertise in relevant industries, a skilled design and installation workforce, energy advice, equipment and materials production capabilities and capacity nationally and in





particular localities, and hence a dependence on inputs from outside;

- limited public resources for infrastructure projects, especially in the current and near-term future economic climate, the need to rely substantially on private investment, and a lack of agreed business models – or a lack of awareness of available models – for public-private cooperation;
- problems raising awareness and acceptance of sustainable energy goals and measures among the variety of organisations whose cooperation is needed – for example, sections of the construction industry;
- inadequate accounting in economic appraisals of external and intangible costs and benefits associated with energy provision, especially a failure to internalise the costs of greenhouse gas emissions;
- poorly performing commercial, public and residential buildings, many of which are difficult to retrofit, and a continuing failure to take energy performance into account in building transactions, surveys and finance conditions;
- continuing disagreement at both expert and popular levels over best practice in both technical choices and economic and environmental assessment of technical options;
- national policy focus on large-scale and domestic renewables, generally missing meso-scale community and municipal energy opportunities;
- dominance of generation by large utilities with sunk investments in large centralised fossil plant, exacerbated by the advantages these companies have over new entrants under renewables support mechanisms and more general market structures, and the impact of this on the make-up of the political constituencies influencing energy policy;
- some remaining inconsistencies in, and inappropriate signals from, the regional and local planning systems and regulatory regimes in other areas.
- 13.3 We expect many of these observations apply to varying extents in other NSSEP partner countries, but several of the problems are particularly pronounced in the UK and Scotland.

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Stewart Russell and Dave Hawkey



Stewart Russell and Dave Hawkey

Page 35 of 44

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ENERGY

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ENERGY



Stewart Russell and Dave Hawkey



