House of Commons

Trade and Industry Committee

Local energy—turning consumers into producers

First Report of Session 2006–07

HC 257

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Footnotes

In the footnotes of this Report, references to oral evidence are indicated by 'Q' followed by the question number. References to written evidence are indicated in the form 'Appendix' followed by the Appendix number. Appendices 1-57 have been previously published as *The Government's Energy Review—Written Evidence*, HC 1443 of Session 2005-06. Appendices 58-69 are published as part of this volume.

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Summary

Local energy is capable of making a major contribution to the nation's energy requirements both through electricity and heat. There are no serious technical obstacles to its development but it is not a short term panacea. Conventional generating capacity, whether recently closed or due to close in the next few years, will need to be replaced urgently and the grid upgraded if we are to "keep the lights on".

Government policy could, and should, do much more to encourage the development and take-up by consumers of local energy. This will help create the mass market, which will reduce the costs of local energy systems for consumers. However, a major driver of take-up will also be if the relative price of energy from traditional fossil fuels increases in the long-run.

In the debate about localised energy production, there is too much emphasis on electricity production and not enough on the contribution that could be made by local heating schemes, whether household or community-based, to energy security and reducing carbon dioxide emissions.

The phrase "local energy" is more accurate, easier to understand and less restrictive in its scope than the word "microgeneration" or any of the other terms of art used to describe energy produced by individuals, businesses or communities for their own consumption. It should become the preferred phrase to describe the generic concept in all official documents to encourage its more widespread public adoption.

1 Introduction

1. Since January 2006, the Government has been conducting a comprehensive review of its energy policy in response to mounting evidence of the threat of climate change and increasing concern over the security of our energy supplies.[1] The next stage—an energy white paper anticipated in Spring 2007—should frame the UK's energy policy for decades to come. Due to the Review's broad scope, we have sought to focus our contribution to the debate on three specific issues, which we felt merited closer examination. These were "the particular considerations that should apply to nuclear" new build;[2] the implications of increasing dependence on imports of gas and coal; and the capacity of microgeneration and other forms of distributed energy to meet a substantial proportion of the UK's electricity demand in the medium and long term. This Report addresses the third of these topics.

Background

2. The Government's Energy Review report, *The Energy Challenge,* published in July 2006, underlined the fact that there is no single or simple solution to the issues of climate change and security of energy supply in the UK. Rather, the Government concluded that the answer lies in a multifaceted response, elements of which include much greater investment in renewable energy, new nuclear power stations, low-carbon transport, and a concerted effort to use energy more efficiently. Whilst there may be debate over the contribution each of these should make, there is at least consensus on the need for action on various fronts.

3. One area highlighted in the Review as having the potential to play a significant part in the UK's energy mix in the long term is the greater use of energy produced by individuals, businesses or communities for their own consumption, be it space or water heating, or electricity. Such 'local energy' encompasses a broad range of technologies that are capable of helping to reduce carbon dioxide emissions, either because they are renewable, or because they use fossil fuels more efficiently. Examples include roof-top wind turbines, solar-heated water, and household combined heat and power (CHP) systems that generate electricity in the home and use the resulting thermal energy for domestic heating. Whilst the primary aim of such energy production is for own-use there is also the potential for surplus generation to be sold for use elsewhere.

4. The concept of local energy represents a fundamentally different approach to the current centralised mode of delivery for energy used in heating and electricity in the UK. Historically, however, it is not a new idea. In the early part of the twentieth century the UK's electricity network was characterised by the same principle, with power stations built near to the source of demand and operated on local grid networks. In the 1950s and 1960s this approach was supplanted by the structure we have today, with most electricity produced by large power stations that connect to a high voltage transmission system. This, in turn, feeds the local distribution networks that supply homes and businesses. In so doing

1 Department of Trade and Industry, *Our energy challenge—securing clean, affordable energy for the long-term*, January 2006; and *The Energy Challenge*, July 2006

2 Trade and Industry Committee, Fourth Report of Session 2005-06, *New Nuclear? Examining the issues*, HC 1122

the system exploits economies of scale, reducing the unit cost of generating electricity whilst also, its supporters claim, increasing security of supply.[3]

5. In recent years, however, changes in technology have reduced the cost of smaller scale means of energy production and made it easier for the networks to manage the connection of a larger and more diverse range of generating units.[4] Coming at a time of heightened concern over climate change and energy security, the potential for individuals and communities to make a direct contribution to tackling these issues has captured the imagination of politicians and the general public alike. For instance, the past year has seen a step-change in the level of interest and take-up of Government schemes to support local energy, as companies such as B&Q have entered the market, offering to install roof-top wind turbines and solar water heating systems. These developments have received support from all the main political parties. In November 2006, Alistair Darling, Secretary of State for Trade and Industry, said that there "is huge potential for us to make energy a local issue, involving individuals, businesses and communities."[5] In turn, the leader of the Conservative Party, David Cameron, has said that "the future of energy is not top-down, it's bottom-up".[6] This suggests there is a growing political consensus about the potential long-run importance of local energy.

The scope of our inquiry

6. In both the written and oral evidence we received we were surprised, and at times confused, by the plethora of terms used in association with local energy. The Government's *Energy Challenge* document uses the term 'distributed energy', although elsewhere it is interchangeable with others, such as 'decentralised energy' and 'distributed generation'. In essence, distributed energy refers to the entire range of electricity generating technologies that are not connected to the transmission network, as well as all non-gas heat sources. This is not a helpful grouping for the analysis of policy because generating units as diverse as a 100 megawatt combined-cycle gas turbine, a 10 megawatt onshore wind farm, or a 1 kilowatt household solar thermal system, may all be classified as distributed generation. The contribution that each of these can make to reducing carbon dioxide emissions, or increasing energy security, may vary considerably, as do the barriers to their wider deployment.

7. The term 'microgeneration' is used to describe small installations for generating electricity (up to 50 kilowatts) and/or heat (up to 45 kilowatts thermal). It covers a range of technologies, set out in legislation, including fuel cells, hydro, solar, wind, biomass and geothermal energy.[7] The expression is somewhat misleading for the uninitiated, given its application to both electricity and heat producing technologies. The upper limits on capacity that define microgeneration are also rather arbitrary, since they preclude larger

3 Department of Trade and Industry, *Distributed Energy–A call for evidence for the review of barriers and incentives to distributed generation, including combined heat and power*, November 2006

4 Appendix 67 (Sussex Energy Group)

5 Department of Trade and Industry Press Notice, 'Government seeks boost for local energy', November 2006

6 Speech to the Local Government Association conference, July 2006

7 Climate Change and Sustainable Energy Act 2006, Section 26 (1-3)

scale community energy projects that may use similar technologies and operate under the same principle of energy being produced at the point of use.

8. **The focus of this Report is on the various ways in which individuals and communities can produce their own low-carbon energy. Hence, we have used the term 'local energy' to incorporate both microgeneration and community-level energy, whether electricity or heat, that has been produced for own-use. We hope that this more accurate and easier-to-understand term might command general acceptance and recommend that it be adopted in all official government documents.** In our Report we look at the range of available local energy technologies and the extent to which they may play a role in achieving the Government's energy policy objectives. Given the liberalised nature of the UK's energy markets, a significant expansion of local energy capacity will be achieved only if action takes place at all levels of society—the individual, the community, and as a nation. We examine what needs to be done in each of these spheres. We also consider the role of Government in creating the necessary industrial capacity to supply a long-term expansion in the level of local energy. Finally, we look at the implications of such a change in the energy mix for the future operation and management of the electricity grid network.

9. During our inquiry we took oral evidence from the Renewable Energy Association, the Micropower Council and the Energy Networks Association, which represent various aspects of the local energy industry. We also took evidence from the professional association, the Institution of Engineering and Technology; the advice body, the Energy Saving Trust; and Sussex Energy Group—an academic body specialising in energy policy. In addition to the 57 memoranda received as part of our work on the Energy Review, we received 12 pieces of supplementary evidence specifically on this inquiry. We would like to express our thanks to all those who have contributed to our evidence-gathering.

2 Local energy's potential

10. Most electricity and heat in the UK is produced from coal, gas or nuclear energy, with a small but growing contribution from renewables such as wind and hydro. A future energy mix where local energy made a significant contribution to our electricity and heating needs would, however, incorporate a much broader range of technologies. The majority of these would either be renewable or would make more efficient use of fossil fuels than do current large-scale power stations. Yet, if the UK is to produce a large proportion of its energy locally in the long run it must begin building capacity today from virtually a standing start. In this Chapter we outline the main technologies and fuel sources that come under the umbrella term of 'local energy'. We go on to examine the possible benefits that greater use of local energy might bring about, for example by reducing carbon dioxide emissions. Finally, we consider the long-term potential contribution that local energy could make to the energy mix.

The technologies

11. The different ways of producing local energy can be split into three categories: those which generate electricity alone, those which produce only heat, and combined heat and power (CHP), which enables the local use of the heat resulting from combustion-based electricity generation.

12. For electricity-only generation the two main technologies are wind and solar photovoltaic (PV) systems. Wind turbines vary in design, although the most common ones use three blades, mounted on a horizontal axis, which drive an electricity generator. There have been significant technical advances over recent years. One kilowatt units are now available for household installation, while the largest turbines can have a capacity of up to five megawatts. The second main technology, solar PV, generates electricity from sunlight using roof-top panels or tiles. The panels usually contain two or more layers of silicon, which produce an electrical charge when exposed to light. Solar power has been in use for more than half a century and in a variety of contexts, varying from pocket calculators to communication satellites.[8] A third, and rather more niche, form of local energy for producing electricity is hydropower. Here, the vertical flow of water is used to drive a turbine. Potential energy sources are, by definition, confined to wherever there is a flow of water from a higher level to a lower level, such as strongly flowing streams, river valleys or hilly areas.[9]

13. For heat-only local energy production there are three main technologies: solar thermal, heat pumps, and biomass. Solar thermal systems use roof-top tiles to capture thermal energy from the sun, which is used to heat water. About 8 m^2 of tiling can provide roughly two thirds of the hot water requirements for an average three bedroom home.[10] Heat pumps capture thermal energy stored in the ground, water or air to supply hot water for

8 Q 69 (Sharp UK)

9 Department of Trade and Industry, *Distributed Energy–A call for evidence for the review of barriers and incentives to distributed generation, including combined heat and power*, November 2006

10 www.solarcentury.com

heating purposes. They operate on the same principle as freezers or air conditioners, only in reverse. The term ‘pump’ is something of a misnomer as the system moves heat rather than pumps it. Finally, space or water heating can be generated from biomass stoves or boilers, which burn wood or other fuels such as energy crops (for example, willow or miscanthus). Whilst the technology for distributing heat produced in this way has advanced in recent years, the principle itself is clearly not a new one—for as long as humanity has been able to create fire, people have used it to keep themselves warm.

14. Finally, combined heat and power (CHP) units, also known as cogeneration, use either natural gas or biomass as a fuel to provide electricity and heating simultaneously. Whereas conventional large power stations emit heat into the environment as a by-product of electricity generation, CHP systems capture this thermal energy to use locally. There is nothing new in this idea. Some larger power stations, such as the old Battersea power station, delivered heat to local homes. Depending on the size and location of the plant, this may be purely for domestic use, in the case of micro-CHP, or to provide office or community heating through a heat distribution network. By-product heat can also be utilised in absorption chillers for cooling, in other words, for producing ‘cold’. This is known as trigeneration, examples of which are currently operating in Woking. Lastly, fuel cells also offer the potential to provide CHP in the long-term. These devices generate electricity from the reaction between a number of chemicals, without the need for combustion and without producing noise or gaseous pollution. Those which use natural gas could offer greater efficiency gains than conventional CHP, although the technology appears still to be a long way from being commercially viable.[11]

15. **Local energy can be produced in a variety of ways, using either renewable or fossil-fuel sources. Each has the potential to generate energy, whether in the form of electricity or heat, at or very near to the point of consumption. In many cases these are not new energy sources. Indeed, humanity’s use of biomass, wind, and hydro energy pre-dates the use of fossil fuels. What is new today is the technology available to harness these sources of energy and the way in which their use in a modern context presents newly perceived benefits by reducing carbon dioxide emissions and contributing to energy security.**

Benefits of local energy

16. In the evidence we received, proponents of local energy described various advantages in shifting away from our current centralised energy infrastructure towards one based increasingly on local energy. The Government’s Energy Review report, *The Energy Challenge*, states that “we now face two immense challenges as a country—energy security and climate change”. In various ways, local energy has the potential to contribute to tackling both of these issues, as well as presenting possible additional economic benefits, for example in reducing fuel poverty.

11 Appendix 36 (Micropower Council)

Reducing carbon dioxide emissions

17. There are three main ways in which increasing the UK's local energy capacity can help to reduce carbon dioxide emissions. First, it can do so directly by offsetting the use of fossil fuels in large-scale power stations, or by using fossil fuels more efficiently. Many local energy technologies, such as wind, solar and hydro, are renewable. For example, the installation of a roof-top wind turbine at a site with reasonable wind speeds could reduce carbon dioxide emissions by 10 to 15% for an average household.[12] There would be some emissions associated with the life-cycle of the generating equipment (such as in its production and installation) but these are not significant compared to the emissions that arise from either gas or coal-fired generation.[13] There are some local energy sources, namely CHP, which do use fossil fuels. The most common forms of micro and small-scale CHP currently run on natural gas. Here, carbon dioxide savings may arise by making use of the heat produced during electricity generation, rather than emitting it into the environment, and reducing the need to use further electricity or gas to produce heating separately in homes or businesses. In so doing, CHP can increase the overall efficiency of fossil fuel use to more than 75%, as opposed to around 40% for conventional large-scale electricity generation.[14]

18. Achieving the type of efficiencies for CHP often quoted by advocates of the technology requires a consistent local source of demand for the heat produced. Yet, in many settings, heat and electricity needs do not always coincide. For example, in a household fitted with micro-CHP, demand for heating will be fairly low during the summer months and high relative to electricity demand during winter. For larger-scale systems, such as community or commercial schemes, this is less of a problem because the demand for heat and electricity is steadier. Trigeneration technologies are also suitable in these settings because they allow waste heat to be transformed into cooling energy.

19. Most research on the estimated carbon dioxide savings of micro-CHP is theoretical. For example, a report by the Sussex Energy Group suggests that micro-CHP which offsets electricity from combined-cycle gas turbines, produces 10% less in carbon dioxide emissions. This rises to 30% if coal-fired generation is displaced.[15] By contrast, there is relatively little empirical evidence on the actual carbon dioxide savings of micro and small-scale CHP. One study by the Carbon Trust has reported mixed results.[16] For domestic micro-CHP its interim findings suggested: "there is unlikely to be a significant carbon emissions reduction opportunity from wide deployment of the technology at this stage in its evolution". On the other hand, the Trust reported a much stronger performance for small-scale CHP in businesses, where it found clear evidence of emissions savings. The contrasting results stem partly from the differing pattern of energy use in homes as opposed to firms, but also from the lower technical efficiency of micro-CHP for producing electricity relative to small-scale generating plants. While it is worth noting that many of

12 Q 10 (Sussex Energy Group)

13 Parliamentary Office of Science and Technology, 'Carbon footprints of different electricity sources', July 2006

14 Department for Environment, Food and Rural Affairs, *The Government's Strategy for Combined Heat and Power to 2010*, April 2004

15 Sussex Energy Group et al, *Unlocking the Power House*, October 2006

16 The Carbon Trust, *The Carbon Trust's Small-Scale CHP field trial update*, November 2005

the technologies trialled in the study are still in their infancy, the results to date suggest that the carbon dioxide saving potential of CHP is highest in settings where there is sustained and simultaneous demand for the heat and electricity produced. This will be primarily the case for community schemes, commercial centres or larger dwellings. In many households CHP has the potential to lower electricity demand, but only when the boiler is producing heat and mainly during the winter months.[17]

20. The second way in which local energy has the potential to reduce carbon dioxide emissions is by decreasing electricity network losses. When electricity is transported across distances the laws of physics dictate that a proportion of it is lost as waste heat. Overall, this amounts to 7.5% of electricity generated in the UK. About 1.5% of losses occur in the transmission system and 5.7% on the distribution networks, with the rest attributed to meter fraud or theft. In 2005, UK losses amounted to over 30 terawatt hours of electricity—roughly equivalent to the output of Drax, the country's largest power station.[18] Electricity produced on-site, at or very near to the point of use, does not come via either the transmission or distribution networks, and so the argument is that local energy has the potential to reduce the amount of energy wasted through network losses.[19]

21. Clearly, the exact level of any carbon dioxide savings from reduced losses is dependent on the type of local energy generation in place, its location, and the kind of large-scale electricity source it displaces. One study by the DTI, looking specifically at household-based local energy, estimated that achieving a capacity of almost 8 gigawatts by 2020 could reduce annual network losses by about 0.8 terawatt hours.[20] In itself, this would be a significant carbon dioxide saving if it offset fossil fuel-based electricity. It would, however, only represent a 3% reduction in network losses over current levels, because even a very large expansion of local energy capacity will not preclude the continued need for electricity supplied through the transmission and distribution networks. So long as most local energy sources are unlikely to perfectly match local demand, for example when it is overcast or there is no wind, households will need to import electricity from the distribution networks. Similarly, there will be times when local energy generators are exporting excess electricity to the networks.[21] Overall, while local energy offers some potential for reducing network losses, it is misleading to suggest such losses would be very significantly reduced. Indeed, the Energy Networks Association outlined plausible situations where network losses might actually increase as a result of greater local energy capacity.[22]

22. The third means by which local energy may reduce carbon dioxide emissions is through the potential it has to raise energy awareness amongst those who install systems on their premises, therefore acting as a catalyst to changing the way consumers view their energy. For example, there is evidence that households that install local energy schemes alter their behaviour in other ways, adopting additional energy saving measures, such as

17 Appendix 47 (RWE npower)

18 Department of Trade and Industry, *Digest of United Kingdom Energy Statistics*, 2006; 1 terawatt hour = 1,000 gigawatt hours = 1,000,000 megawatt hours

19 Appendices 2 (Airtricity), 3 (Association for the Conservation of Energy) and 16 (EDF Energy)

20 Department of Trade and Industry, *System Integration of Additional Microgeneration*, September 2004

21 We discuss network effects further in Chapter 7

22 Q 316 (Energy Networks Association)

insulating their homes properly and turning off lights. One industry representative cited evidence from Germany of households adopting this behaviour, and reducing their energy usage by between a quarter and a third.[23] Where individuals have actively acquired local energy systems, such complementary behaviour is hardly surprising. What is interesting is the reaction of households that have obtained such technologies passively, for example where social landlords have fitted them to their properties. Research conducted by the Sustainable Development Commission has shown that, in these situations, people often demonstrate greater energy awareness than comparable households that have not had such systems installed. The limited evidence in this area, however, suggests this change in behaviour is by no means universal amongst passive adopters, often because of a lack of understanding of the equipment that has been fitted.[24] This highlights the importance of educating users at the time of installation—an issue which we discuss further in the next Chapter.[25]

23. Whilst local energy can contribute to reducing carbon dioxide emissions it must also be emphasised that it is not the only way of doing so, nor is it necessarily the most cost effective. As we noted in Chapter 1, the Energy Review concluded that a multi-pronged approach to tackling the causes of climate change is necessary with action on various fronts, including energy efficiency measures and potentially through new nuclear build. In the future, carbon capture and storage or fusion power may also present viable solutions instead of, or in addition to, local energy.[26] Although we should not think of any of these options as being mutually exclusive, in developing policy it is important for the Government to bear in mind the underlying cost per tonne of carbon dioxide saved for any measure targeted at the causes of climate change. For example, in terms of local energy's ability to reduce carbon dioxide emissions cost effectively, it almost goes without saying that energy efficiency offers better value-for-money, since many measures have little or no cost attached to them.[27] Several witnesses emphasised that, as a starting point for tackling the causes of climate change, energy efficiency measures were the 'low hanging fruit', potentially able to reduce the UK's carbon dioxide emissions by 20% with comparatively little cost.[28] The difficulty is in persuading energy users to realise this.[29] On the other hand, evidence we received does suggest that the capital cost of a large-scale deployment of local energy could be significantly less than an equivalent amount of nuclear power, which is also a low-carbon energy source.[30] In a liberalised energy market, however, it may still be easier for the Government to provide incentives for the construction of relatively few nuclear power stations than to change the behaviour of millions of UK households.

23 Q 81 (Sharp UK)

24 Sustainable Consumption Roundtable, *Seeing the light: the impact of microgeneration on the way we use energy. Qualitative research findings*, October 2005

25 Q 283 (Energy Saving Trust)

26 See for example, Trade and Industry Committee, Sixth Report of Session 2005-06, *The work of the NDA and UKAEA*, HC 1028; and House of Commons Science and Technology Committee, First Report of Session 2005-06, *Meeting UK Energy and Climate Needs: The Role of Carbon Capture and Storage*, HC 578

27 Appendix 68 (Sussex Energy Group)

28 Qq 134 (Micropower Council), 214 (Institution of Engineering and Technology) and 231 (Energy Saving Trust)

29 Q 11 (Sussex Energy Group)

30 Appendix 3 (Association for the Conservation of Energy); Trade and Industry Committee, Fourth Report of Session 2005-06, *New Nuclear? Examining the issues*, HC1122

24. **Local energy has the potential to reduce carbon dioxide emissions by displacing the use of fossil fuels, decreasing network losses, and increasing energy awareness amongst users. The scale of these benefits, however, is dependent on the types of technology used and their location. For domestic installations, local heat production such as solar thermal systems or ground source heat pumps will often be just as beneficial as electricity generation. There are some situations involving micro-combined heat and power (CHP) where local energy systems will not necessarily lead to a reduction in carbon dioxide emissions. Moreover, local energy must be considered as part of a multifaceted effort to tackle the causes of climate change, in which there are other means of reducing emissions. In particular, energy efficiency measures offer better value-for-money in the short run. As such, the Government should remain mindful of the underlying cost per tonne of carbon dioxide saved in developing policies to ensure that its approach is cost-effective.**

Promoting energy security

25. Local energy could enhance the security of the UK's energy supplies by increasing the diversity of sources from which it can produce electricity and heating. The UK is set to become increasingly dependent on gas imports in future years as North Sea reserves diminish. Although imported gas comes from a number of countries, including Norway, the Netherlands and Qatar, an energy mix that draws from a range of different fuel inputs inevitably enhances the security and stability of our system.[31] For example, a reduced role for gas in the production of electricity would decrease the impact gas prices have on the market price of electricity. That said, the extent to which energy security is strengthened is dependent on the type of local energy source adopted. Wide scale take-up of micro and small-scale CHP, powered by natural gas, would contribute less to reducing our dependency on gas imports than would renewable forms of local energy.

26. While we received evidence highlighting the potential for local energy to provide baseload generation and backup in the event of distribution failure,[32] we also took evidence that suggested increased use of local energy might act to reduce overall energy security.[33] For example, some renewable technologies, such as solar and wind power, are intermittent. What is more, their output is difficult to predict, being largely dependent on the weather. This means that backup capacity must be available for situations where owners of local energy systems have to import energy. Yet, a big expansion of local energy capacity may actually create a disincentive for the market to invest in new large-scale generating capacity that would mostly operate on standby. This would reduce the availability of flexible generators able to balance supply with demand in the system. While this is a potential risk, it is worth remembering that larger-scale renewable technologies pose the same problem, as does the inflexibility of baseload nuclear energy.[34] In other words there are possible system costs attached to most forms of low-carbon energy. Also, energy security within a more modular, decentralised energy system will, to a large extent, require network

31 Appendices 2 (Airtricity), 20 (Environment Agency), 58 (EDF Energy) and 59 (Energy Networks Association)

32 Appendices 16 (EDF Energy) and 63 (National Grid)

33 Appendices 5 (British Energy) and 11 (BNFL plc)

34 Q 7 (Sussex Energy Group)

operators to engage in more active and intelligent management of their networks. We return to this issue in Chapter 7.

27. **Greater use of local energy could, prospectively, increase the security of the UK's energy supplies by drawing on a more diversified range of fuel sources, many of which are renewable. It will still, however, require the presence of backup capacity when local supply fails to meet local demand, and for the time being, this is likely to use fossil fuels. In the future more active network management of the UK's energy systems will be necessary to balance supply and demand and ensure that both small and large-scale generating assets are able to operate cost-effectively.**

Economic benefits

28. In addition to reducing carbon dioxide emissions and increasing security of supply, local energy presents some potential economic benefits. For example, we received evidence from Ofgem, National Grid and the Micropower Council suggesting that it can help alleviate fuel poverty.[35] This is because, in the case of renewable technologies, such as solar thermal energy or wind-generated electricity, once installed, running costs for these systems are comparatively low. CHP, in settings where it offers a more efficient use of fossil fuels than, say, a condensing boiler, can also reduce domestic fuel costs. Local energy systems can also help those people who have otherwise hard to heat homes, and those not able to be connected to the gas or electricity grid.[36]

29. We note, however, that at present most local energy technologies are associated with large initial capital costs. This makes it unlikely that households suffering from fuel poverty will have the resources to make such investments. There are schemes in place to reduce the costs of local energy for consumers, though few of these are targeted specifically at those experiencing fuel poverty. There is scope in some areas though, for example, where innovative social landlords might install local energy systems for their tenants. If local energy is to make a significant contribution to the UK's energy mix in the long-term, it can only do so by engaging all parts of society, including those in fuel poverty.

30. A second, although relatively minor, potential economic benefit from greater use of local energy could be through the avoidance or deferral of electricity network investment.[37] This would be brought about through a reduction in peak demand and average annual demand across the networks. A study by the DTI estimated that, for a scenario where microgeneration produced just over 39 terawatts of annual generation in 2020 (equivalent to 10% of UK electricity supply today), the net benefit of deferring network investment and system operation costs could be around £35 million per annum.[38] Although this estimate is subject to a number of assumptions, it is not large relative to the billions of pounds worth of investment required in the UK's energy networks during the coming years.

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35 Appendices 36 (Micropower Council), 63 (National Grid) and 64 (Ofgem)

36 Appendix 36 (Micropower Council)

37 Appendix 59 (Energy Networks Association)

38 Department of Trade and Industry, *System Integration of Additional Microgeneration*, September 2004

31. **Local energy presents additional economic benefits in terms of tackling fuel poverty and reducing network costs. The extent to which those in fuel poverty can capture these benefits is uncertain, though, because of the current high capital costs of local energy systems. Also, estimates of the total savings on network investment and operating costs are small, and do not of themselves provide a rationale for encouraging local energy.**

Current capacity levels

32. As a proportion of the overall energy mix, the contribution of local energy is very small, but growing. Table 1 below shows the number of local energy installations in buildings currently in operation in the UK. To date, solar thermal is the most widespread, accounting for roughly 77 gigawatt hours of domestic heat generation and 172 gigawatt hours for swimming pools and other applications in 2005. The use of solar heating has risen by 165% in the last five years.[39] Total solar PV capacity amounted to just 10.9 megawatts in 2005, up from 8.2 megawatts the year before.[40] However, capacity figures across other technologies, such as micro-hydro and micro-wind, are still negligible. The story is only slightly more optimistic when we look at larger-scale CHP. Here, the UK has 5,792 megawatts of electricity capacity across 1,532 schemes, with a heat capacity of 12,396 megawatts in 2005. However, growth in this sector has stagnated in the past five years. Also, the vast majority of CHP is in industrial use—take-up amongst residential or commercial users is currently quite small. That which is installed in communities, in settings such as hotels, leisure facilities and hospitals, amounts to just 6% of total CHP capacity.[41] Table 2 provides a breakdown of CHP in non-industrial use.

Table 1: UK local energy installations in buildings (2005)

Technology	Number of installations
Micro-wind	650
Micro-hydro	90
Ground source heat pumps	546
Biomass boilers (pellets)	150
Solar water heating	78,470
Solar photovoltaic	4,301
Micro-CHP	990
Fuel cells	5
Total	**82,202**

Source: Department of Trade and Industry

39 Department of Trade and Industry, *Distributed Energy–A call for evidence for the review of barriers and incentives to distributed generation, including combined heat and power*, November 2006

40 Department of Trade and Industry, *Digest of United Kingdom Energy Statistics*, 2006

41 *Ibid.*

Table 2: Number and capacity of CHP schemes installed in non-industrial use by sector (2005)[42]

	Number of schemes	Electrical capacity (MWe)	Heat capacity (MWth)
Leisure	419	45.7	71.9
Hotels	302	38.9	62.6
Health	212	117.9	210.0
Residential group heating	45	42.9	97.5
Universities	36	42.7	85.7
Offices	26	20.0	22.7
Education	21	10.2	18.0
Government estate	14	12.2	18.1
Retail	12	2.6	4.1
Other	5	14.8	22.8
Total	**1,092**	**347.9**	**613.3**

Source: Department of Trade and Industry, Digest of United Kingdom Energy Statistics, 2006

33. **Overall, local energy currently contributes a very small proportion of the UK's supply of electricity and heat—less than 1%—reflecting the highly centralised structure of our energy system.**

What can be achieved?

34. Despite the fact that the UK's installed capacity of local energy systems is very low, there is potential, in theory, for it to contribute a large proportion of the energy mix in the long-term. For example, the Renewable Energy Association noted a study suggesting that if the UK were to cover the facades and roof spaces of its existing buildings with photovoltaic (PV) panels it would generate enough electricity to meet all the UK's existing demands.[43] The UK is also quoted as having the best wind resource in Europe.[44] In addition, roughly 1.3 million homes change their gas boilers each year.[45] Centrica estimate that micro-CHP systems could displace as much as 30% of this turnover by 2015.[46]

35. Be that as it may, most forms of local energy have characteristics that are not suitable for all locations or consumption profiles.[47] For example, micro-wind power's potential is

42 MWe = megawatts of electricity capacity; MWth = megawatts of thermal power

43 Q 68 (Renewable Energy Association)

44 www.bwea.com (British Wind Energy Association website)

45 Q13 (Sussex Energy Group)

46 Centrica, *Response to "Our energy challenge—securing clean, affordable energy for the long-term"*, January 2006

47 Appendix 47 (RWE npower)

better suited to rural areas than built-up sites, because of the likely screening of turbines.[48] Indeed one witness told us the technology was "in danger of being oversold".[49] Elsewhere, solar photovoltaic and thermal systems operate best on south-facing roofs or walls, which are not overshadowed, while, as noted earlier in this Chapter, micro-CHP is better suited to larger dwellings with high and consistent heating needs. This suggests that, while the overall potential of local energy is large, not every technology is appropriate for all homes, businesses and communities.

36. Crucially, it must also be borne in mind that most local energy technologies are either too expensive for most consumers, or not even market-ready.[50] As with all new technologies there will always be a number of early adopters who choose to install local energy systems simply because they are new, or because they wish to 'do their bit' for the environment.[51] But until costs come down, or the price of energy from other sources rises markedly, local energy systems will only attract a niche market.[52] It is for this reason that much of the evidence we received predicted, at best, incremental growth in the UK's installed capacity of local energy for the foreseeable future.[53] This finding is important because the UK faces a serious capacity gap in the short to medium-term as around 30% of its large-scale generating capacity will disappear in the next 20 years as the current nuclear fleet is gradually decommissioned, and the EU's Large-Scale Combustion Directive brings about the closure of many coal-fired power stations.[54] Given the current slow rate of growth in the UK's local energy capacity, it is highly unlikely that local energy alone will be able to plug the gap, which will appear in the coming years. Indeed, there are already signs that new large-scale combined cycle gas turbines and coal-fired power stations will provide the bulk of the UK's new generating capacity in the near future.

37. Nevertheless, even with only gradual growth, over the long-term it could still be possible to achieve a sizeable increase in the amount of local energy, given certain conditions. The Energy Saving Trust (EST) has attempted to estimate the contribution household local energy technologies could make to the energy mix over the next 50 years.[55] Its analysis models the interaction of market growth and potential declining costs for local energy over time. This is combined with assumptions about government implementation of a number of policy interventions to support the take-up of local energy by households. These include regulatory changes (for example with regard to planning), capital grant support, and the introduction of an electricity pricing regime such that households receive an equivalent price for electricity they export to the network to that which they pay for electricity they import. Under these conditions, the EST estimates that domestic local energy systems could deliver all household electricity needs, with excess being exported to the grid, as well as more than half of household heating demand by 2050. This would be

48 Q 226 (Energy Saving Trust)

49 Q 13 (Sussex Energy Group)

50 Appendix 61 (Energy Saving Trust)

51 Q 19 (Sussex Energy Group)

52 We discuss the issue of costs further in Chapters 3 and 5.

53 Appendices 32 (Institution of Engineering and Technology), 47 (RWE npower) and 58 (EDF Energy)

54 Department of Trade and Industry, *Our Energy Challenge: Securing clean, Affordable energy for the long-term*, January 2006

55 Energy Saving Trust, *Potential for Microgeneration Study and Analysis*, November 2005

equivalent to 30 to 40% of the UK's electricity needs. The main contributors would be micro-CHP, followed by micro-wind and photovoltaics. Achieving this level of penetration would reduce our annual carbon dioxide emissions by 15%. Interestingly, the Trust's analysis estimates that local energy installations in homes could account for 20% of UK electricity generation in 2050 without any government intervention at all, simply on the basis of these technologies becoming more cost-effective over time.

38. The EST's estimates have been criticised by commentators, including EDF Energy and the Energy Networks Association, for being too optimistic.[56] For example, the analysis assumes a constant demand for electricity over time. Its assumptions about the extent to which the cost of local energy production may fall over time might also prove unrealistic. As one witness told us, with regard to how costs might evolve, "it is very, very difficult to tell because there are so many unknowns".[57] Nevertheless, the Trust's 30-40% estimates should not be interpreted as a prediction of what will happen in the future. Rather, it gives us an idea of what might be possible if action were taken to tackle the various barriers to local energy take-up. This is the subject of the next Chapter.

39. Looking at a community level, there is less evidence available of the potential for larger CHP schemes. A significant proportion of the UK population lives in high-density urban areas, the steadier heat demands for which make community-CHP schemes more viable than in rural settings. For example, over a quarter of the estimated potential for existing buildings is in London, with 12 other major UK cities accounting for another 60%.[58] Even in cities, however, retro-fitting existing buildings with district heating schemes would prove very expensive. This suggests that the greatest potential for community-scale projects is in developments of new construction, where systems can be built in from the start. Long-term projects such as the Thames Gateway offer a clear opportunity in this regard.[59] There may also be scope for retro-fitting schemes in some high-rise flats. These constitute almost a million dwellings in the UK. Overall, estimates of what can be achieved vary significantly. One study suggested the cost-effective potential of community-CHP could be around 2,300 megawatts of capacity by 2010.[60] However, given that over 80% of current homes are either houses or bungalows, the majority of the potential for heat through local energy sources would seem to be through household micro-CHP, provided the technology can prove itself an effective means of reducing carbon dioxide emissions.[61]

40. **Local energy systems, such as CHP, wind and solar photovoltaics, are suited only to certain locations or consumption patterns. In addition, most local energy technologies are not yet cost-effective, reducing the potential for dramatic take-up in the near future. For community-CHP projects, assessments of the potential vary. Though a large number of urban dwellings would suit this technology, cost-effective implementation is likely to be limited to developments of new build. However, the UK's potential resource**

56 Appendices 16 (EDF Energy) and 59 (Energy Networks Association)

57 Q 15 (Sussex Energy Group)

58 Carbon Trust and Energy Saving Trust, *Community heating for planners and developers*, December 2004

59 Q 78 (Renewable Energy Association)

60 Department of Trade and Industry, *Distributed Energy–A call for evidence for the review of barriers and incentives to distributed generation, including combined heat and power*, November 2006

61 Q 270 (Energy Saving Trust)

of local energy is large. If costs fall, and/or prices of energy from other sources rise, and certain government interventions are put in place, local energy could contribute a sizeable proportion of the UK's energy mix in the long run. One estimate, looking specifically at household installations, puts this in the range of 30 to 40% of our electricity needs by 2050. Local energy is a developing concept with real potential, but it cannot make a significant contribution in the next decade to closing the capacity gap created by the decommissioning of coal-fired and nuclear power stations—local energy is not a panacea that will 'keep the lights on'.

3 Tackling barriers to household take-up

41. Local energy technologies have been available to households for a number of years, yet to date, take-up in the sector has been very low. This is because individuals face a number of hurdles when it comes to the purchase, installation and operation of local energy systems. As one witness put it, for households to overcome these barriers they are "likely to require the entire skill set found in a specialist renewable project development company".[62] The various obstacles are well-documented.[63] Last year's Energy Review report, *The Energy Challenge*, bracketed these into three categories—practical barriers, relating to issues such as planning and grid connection; information barriers; and cost constraints. In this Chapter we examine the Government's progress in tackling each of these.

Practical constraints

42. Households face a range of practical barriers that inhibit their ability to adopt local energy technologies. At the outset, acquiring planning permission and gaining consent from the distribution network operator to export surplus electricity can prove excessively costly. Even when a system has been installed and connected there remain issues surrounding payment for exported electricity and any other rewards the owner may be entitled to. This suggests that there is significant scope for a simplification of current rules concerning local energy and for commercial energy suppliers to play a larger role in encouraging greater take-up.

Acquiring planning permission

43. Under current law, households must receive planning permission before they can install a local energy system, such as a solar panel set or wind turbine, to the exterior of their property.[64] This can cost up to £250.[65] Industry representatives told us that, taking into account also the time needed to navigate the planning process, this requirement is proving a significant deterrent for potential purchasers.[66] The Government recognised this fact in last year's *Climate Change and Sustainable Energy Act*, in which it made provisions for a review of development orders in England, with a view to granting local energy 'permitted development' status.[67] This would allow property developers and private individuals to fit solar panels or wind turbines without obtaining planning permission, in the same way that they can currently erect satellite dishes. The Department for Communities and Local Government has completed this review, and intends to consult on its proposals in 2007.

62 Q 97 (Renewable Energy Association)

63 See for example, Department of Trade and Industry, *Power from the people – Microgeneration Strategy*, March 2006

64 Planning permission is not required for internal microgeneration systems such as micro-CHP.

65 Q 276 (Energy Saving Trust)

66 Q 76 (Sharp UK)

67 Climate Change and Sustainable Energy Act 2006, Section 10

44. **The requirement of planning permission is a significant deterrent to households wishing to install local energy systems to the exterior of their properties. We welcome the Government's commitment to grant household local energy installations 'permitted development' status and hope there will be no significant delay in agreeing a sensible implementation of the proposal once the consultation is complete.**

Connecting to the electricity network

45. Once they have overcome the planning barrier, households can have electricity-producing local energy systems installed without prior approval from the company that provides their electricity grid connection (known as the distribution network operator, or DNO). The aim of this is to provide a 'plug-and-play' approach for consumers.[68] Nevertheless, installers do have a duty to notify the network operator when they have fitted new systems. At the moment, there is no charge for household connections because network operators are able to accommodate the change in domestic consumption patterns that local energy systems bring about. However, where larger installations require modifications to the local network that incur costs to the distribution company, these may be passed on to the owner.

46. All large-scale generators that connect to the distribution networks face use-of-system charges, which cover the ongoing cost of operating the networks. Currently, most of the distribution companies do not impose these charges on households with local energy installations. In the previous Chapter we saw how local energy generation can lead to a reduction in the required level of network investment by decreasing the demands placed on the transmission and distribution systems. As such, because it cuts network costs, distribution network operators should have an incentive to see more microgeneration connecting to their systems. It seems anomalous, then, that until very recently two distribution companies did impose use-of-system charges on households that exported electricity, albeit at a relatively low level. Under pressure from Ofgem these companies have now agreed to drop these charges. Nevertheless, the network operators still face conflicting incentives to encourage local energy. While it may reduce demands on the networks, at the same time the network operators' revenues are partly determined by the amount of electricity they distribute. Because local energy can lower network flows, this could act as a disincentive for network operators to promote forms of generation that reduce their income.[69]

47. **Conflicting incentives to encourage local energy indicate that there is further work for the regulator in ensuring that households receive equitable treatment within the regulatory framework. Ofgem has committed itself to considering these issues as part of the next distribution price control review, to apply from 2010. The importance of this issue will increase, however, as more households seek to export electricity to the grid.**

68 Ofgem, *Microgeneration: next steps*, October 2006

69 *Ibid.*

Receiving payment for exported electricity

48. We have noted already that, for most households, there will be times when domestic supply outstrips demand—for example when a house with PV panels is empty on a sunny day—and in these instances excess supply will be exported back into the distribution network. For many owners this is one of the advantages of installing such systems as it can increase the payback they receive on their investment. Ofgem reported recently, however, that most "operators of domestic small-scale microgeneration often encounter difficulty in obtaining any kind of price offer from any buyer".[70] Those distribution companies that do pay for exported electricity appear to do so as a gesture of good will: paying customers without registering the electricity, because the transaction costs of doing so exceed the value of the generation.[71] This informal approach would not be sustainable were the overall level of household generation to increase significantly.

49. Much of the evidence we received emphasised the importance of households receiving a 'fair price' for their electricity exports if the technology is to have mass market appeal.[72] Last year's *Climate Change and Sustainable Energy Act* acknowledged this in setting a requirement for distribution companies to purchase electricity exported onto their networks.[73] It gave commercial energy suppliers one year to propose a suitable scheme, which would provide this service for consumers. If they fail to do so, the Act gives the Government powers to impose a scheme. As such, the industry has a strong incentive to develop a proposal for consideration in 2007, with implementation thereafter. We note that the industry also has a strong interest in designing a scheme that suits itself best, rather than the consumer. It is surprising, therefore, that the Government has not shown greater leadership in this area, by itself proposing options for consultation with the sector.[74]

50. In developing a scheme for pricing electricity exports, consideration will need to be given to the 'buyer groups' for locally generated electricity. While this Chapter is concerned primarily with households, provision will also need to be made for the community and industrial sectors, both of which could potentially export electricity. In practice, these groups may require different tariff arrangements.[75] It will also be important to reach an agreement on what is meant by a 'fair price'. We received a range of evidence on this issue. The general approach taken by countries such as France, Germany, Italy and Japan has been to set a feed-in tariff rate above the market price for electricity. This has proved highly successful in expanding the level of capacity in these markets.[76] In the UK, Powergen already operates a similar scheme, offering to buy the exported electricity from households' PV panels.[77] Ofgem has said, however, that it is against a regime that guarantees prices for consumers, favouring instead an approach that reflects the real value of electricity

70 *Ibid.*

71 Appendix 36 (Micropower Council)

72 Qq 40 (Sussex Energy Group) and 103 (Renewable Energy Association); Appendices 22 (E.ON UK), 32 (Institution of Engineering and Technology), 36 (Micropower Council) and 61 (Energy Saving Trust)

73 Climate Change and Sustainable Energy Act 2006, Section 7

74 Q 42 (Sussex Energy Group)

75 Appendix 32 (Institution of Engineering and Technology)

76 Qq 103 (Renewable Energy Association) and 235 (Energy Saving Trust)

77 www.powergen.co.uk

exports.[78] Even then, there remains the question of whether a market price should mean the wholesale or retail price of electricity. For example, the Energy Saving Trust argues that energy export equivalence—in other words, the retail price—would be vital if household-produced electricity were to achieve its estimate of 30 to 40% of UK needs by 2050.[79]

51. **If the Government is serious about expanding the level of local energy capacity in the UK it must provide consumers with confidence that distribution companies will purchase exported electricity at a reasonable price. We recommend that the Government itself by 1 August 2007 put forward options for consultation. Thereafter, if commercial suppliers fail to make an acceptable, household-friendly proposal for rewarding exports in 2007 the Government and Ofgem should use their powers under the *Climate Change and Sustainable Energy Act 2006* to enforce an appropriate scheme post haste. We acknowledge the regulator's preference for a market-based approach to pricing, and the need to keep low transaction costs for commercial suppliers and consumers. However, depending on its level, a feed-in tariff could be used to encourage the development of local energy.**

Rewarding carbon dioxide savings

52. In Chapter 2 we showed how local energy can play an important role in lowering carbon dioxide emissions. However, as we have previously stated, if the Government wishes low-carbon energy, such as nuclear power or local energy, to contribute a significant proportion of the energy mix, then it must provide a framework that puts these sources on a par with users of fossil fuels, principally by developing a more reliable way of pricing carbon dioxide emissions in the long term.[80] For renewable energy the main way in which generators are currently rewarded for their carbon dioxide savings is through the Renewables Obligation (RO). The RO is a traded certificate scheme, paid for by electricity consumers, which requires commercial electricity suppliers to purchase a growing proportion of their electricity from renewable sources. The current market price of Renewables Obligation Certificates (ROCs) is about £40, representing one megawatt hour of electricity generated from renewable sources.[81]

53. Although the RO was initially designed to encourage the expansion of large-scale renewables, households with renewable local energy installations are also eligible to receive ROCs. A typical roof-top wind turbine may produce enough electricity in a year to entitle its owner to one Certificate.[82] The Micropower Council told us, however, that under the current rules and regulations, the transaction costs of administering the scheme for households can be greater than the value of the ROC. For example, owners must complete a 19 page accreditation form to register with Ofgem for RO eligibility. Also, to claim their Certificates, they must provide meter readings to Ofgem within an eleven day window covering the end of the financial year—a period that often coincides with the Easter

78 Ofgem, *Microgeneration: next steps*, October 2006

79 Appendix 61 (Energy Saving Trust)

80 Trade and Industry Committee, Fourth Report of Session 2005-06, *New nuclear? Examining the issues*, HC 1122

81 www.smartestenergy.com

82 Q 140 (Micropower Council)

holidays. Factors such as these are a significant disincentive for households to claim any ROCs to which they are entitled.[83]

54. The DTI has recently consulted on possible changes to the RO, which will reduce the administrative burden on small-scale and microgenerators.[84] One proposal is to permit 'agents' to act on behalf of a number of households, allowing them to undertake all parts of the administrative process for claiming ROCs. In this scenario the agent would receive the ROCs. It would then be a matter between the agent and the generator as to what happened to the value of the Certificate. For example, the DTI consultation suggests that the agent could be the commercial electricity supplier, or a company that has installed the local energy system itself. In these situations, payment of the value of the ROC to the generator might be bound up either in their electricity prices or installation costs.

55. Another proposed reform to the RO is the removal of the requirement of 'sale and buyback' arrangements for microgeneration. Under the current system, renewable generators that consume their own electricity are only able to claim ROCs if they have first entered into an agreement to sell that electricity to their supply company, then purchase it back. The proposal to do away with this requirement was welcomed in several of the memoranda we received.[85]

56. Our discussion so far has focused on rewarding the carbon dioxide savings arising from electricity-producing local energy installations. It is important to note, however, that both micro and small-scale CHP and those forms of local energy that produce only heat, such as solar thermal systems and ground source heat pumps, are not eligible to receive ROCs.[86] Instead, the main scheme under which the carbon dioxide value of these technologies is recognised is the Energy Efficiency Commitment (EEC). Under the EEC, commercial electricity and gas suppliers are required to meet targets for improving energy saving in the household sector. They can achieve this through efficiency measures such as cavity wall and loft insulation, installing energy efficient boilers, or simply by changing light bulbs. In addition, suppliers must meet at least 50% of their targets through measures aimed at low-income households. The EEC is now in its second phase, which runs from April 2005 to March 2008. Under the current phase, micro-CHP, solar thermal heating, and ground source heat pumps have been included as eligible efficiency measures for commercial suppliers to introduce. In so doing distribution companies are able to claim a 50% credit from the value of the energy savings for such installations, to count towards their targets. This is designed to increase the incentives for energy firms to install micro-heat systems, although few have chosen to do so thus far. This is because, even with the 50% uplift, most of these technologies are still not as cost-effective as energy efficiency measures.[87]

57. Overall, the returns for producing low-carbon heat under the EEC are much smaller than those for generating low-carbon electricity under the Renewables Obligation. Indeed,

83 Appendix 36 (Micropower Council)

84 Department of Trade and Industry, *Reform of the Renewables Obligation and Statutory Consultation on the Renewables Obligation 2007*, October 2006

85 Appendices 36 (Micropower Council) and 58 (EDF Energy)

86 For CHP plant using a biomass fuel source, the electricity output is eligible for ROCs, though not the heat output.

87 Appendix 61 (Energy Saving Trust)

for households the incentives for installing low-carbon heat are lower still, as the EEC is incumbent upon commercial energy suppliers to implement. Some of the evidence we received was critical of the Government's apparent neglect of incentives to promote low-carbon heat generation, especially given the fact that it accounts for over a third of our primary energy consumption.[88] We return to this issue in the next Chapter.

58. **To date, it has been difficult for households to be rewarded for the carbon dioxide value of installing local energy systems. Although individuals who fit renewable micro-electricity systems, such as wind turbines, are eligible under the Renewables Obligation to receive a reward for the carbon dioxide savings their generation brings about, the transaction costs of doing so exceed the potential benefit. We welcome changes to the Obligation that will make it easier for households to receive the full value of this reward. We note, however, that the carbon dioxide savings brought about via other forms of local energy, for example non-renewable CHP or micro-heat, are not valued in the same way. We recommend the Government brings forward proposals to amend this anomaly.**

Introducing smarter metering

59. In order for households to sell their electricity back to the supply company, or claim Renewables Obligation Certificates, they must have an electricity meter that measures exports as well as imports from their home. Most traditional meters are designed simply to record the flow of electricity into a property, using technology that dates back to the 1960s. It is possible for these meters to operate in reverse when electricity is exported, but this only provides a net figure for household electricity consumption. Increasingly, though, 'smart meters' are becoming available, which offer customers clearer information about the energy they are using including gross measures of household electricity exports and imports. They also have the potential to let users know the value of the electricity and gas they are using, their consumption patterns and the resulting carbon dioxide emissions. In addition, more advanced meters are able to communicate directly with the commercial energy supplier, conveying real-time information of customers' energy usage. The technology is still at an early stage, and available meters vary significantly in their cost and the amount of information they provide.[89]

60. Smart metering offers several potential benefits. By providing households with more information about the cost and pattern of their energy usage, they are better-placed to manage both how much electricity and gas they consume and when. This makes it easier for homes to introduce energy efficiency measures and see the real-time results of doing so in their meter reading. Evidence from other countries has shown that consumption can fall by over 6.5% in households that have smart meters installed.[90] Indeed, the Government estimates that take-up of more innovative metering could reduce the UK's annual carbon dioxide emissions by around 400,000 tonnes by 2020.[91] Elsewhere, smart metering also

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88 Appendices 36 (Micropower Council) and 65 (Renewable Energy Association),

89 Ofgem, factsheet 62, 'What is a smart meter?' May 2006

90 Energywatch, *Response to 'Our energy challenge—securing clean, affordable energy for the long-term'*, January 2006

91 Department of Trade and Industry, *Energy metering and billing–Changing customer behaviour*, November 2006

offers potential benefits to commercial energy suppliers. Where meters are able to communicate directly with suppliers, this avoids the cost of manual meter reading—an activity which is conducted, on average, twice a year. In addition, commercial suppliers may benefit from the reduced customer service costs associated with estimated billing. Also, smarter metering can reduce the possibility of theft through meter tampering. Finally, real-time monitoring of energy usage would allow energy companies to offer more innovative time-of-use tariffs, the effect of which may be to shift some consumption to off-peak periods, thus reducing the level of capacity investment needed to meet peak demand.[92]

61. Despite the various advantages that using smarter meters could bring about, there remains the disadvantage of their cost. This can be up to £150 compared to around £10 for a standard meter.[93] Whereas the current meter stock costs in total around £800 million to read and maintain, a national roll-out that replaced all 49 million electricity and gas meters in homes would cost in the range of £5-8 billion.[94] Some research conducted by Ofgem suggests that, despite the costs of installing smart meters, the estimated benefits could make the investment worthwhile. However, because customers rather than energy companies are the main recipients of these benefits, this currently reduces the incentive for firms to implement a mass market deployment of smart meters of their own accord. This could change, though, in the next five to ten years as technology costs fall and if energy companies begin offering services to customers which capture some of the benefits of the reduced energy consumption brought about by smart meters. In addition, there may already be some customer groups where commercial suppliers would experience greater benefits from installing new meters, such as where consumers are situated in hard to reach sites.[95]

62. Another reason why the take-up of smart meters by commercial energy suppliers has been slow to date is because the technology is still developing, with a range of different meters available and continuing debates about interoperability and the common standards smart meters should adhere to.[96] Some countries, such as Italy, have already instigated a national roll-out of smart metering technology, and a few witnesses we spoke to were keen to see the UK Government adopt a similar approach: for example, by compelling the replacement of old meters at the end of their operational life, or by installing them as a matter of course in all new buildings.[97] Ofgem is, however, committed to a market-led approach as the most cost-effective way in which to encourage the adoption of smart metering.[98] As such, amongst other activities, it is working with the industry to agree common standards for new meters. It will also consider barriers to take-up as part of its supply licence review due to be completed later in 2007. Additionally, Ofgem is working with the Government on a pilot study that will look at the various ways in which

92 Ofgem, *Domestic metering innovation*, February 2006

93 Qq 53 and 55 (Sussex Energy Group)

94 Department of Trade and Industry, *Energy metering and billing – Changing customer behaviour*, November 2006

95 Ofgem, *Domestic metering innovation*, February 2006

96 Q 506 (Ofgem) in Trade and Industry Committee, Fourth Report of Session 2005-06, *New Nuclear? Examining the issues*, oral evidence, HC 1122

97 Qq 48 (Sussex Energy Group) and 78 (Renewable Energy Association); Appendix 58 (EDF Energy)

98 Ofgem, *Domestic metering innovation: Next steps*, June 2006

consumers can be helped to manage their consumption better, including through more innovative metering. The study will consider the costs and benefits of smart metering vis-à-vis other options, such as better billing. It should also provide information on the scope for different tariff structures, which could reduce peak demand and energy consumption overall.

63. **If households wish to receive payment for their electricity exports and earn Renewables Obligation Certificates, they must have a meter installed that provides both import and export information. The replacement of meters for households installing local energy systems provides the opportunity for them to install more innovative meters, which also have the potential to promote domestic energy efficiency measures. This could present a possible win-win situation for households fitting local energy systems. Commercial energy suppliers would also benefit from the installation of smart meters in customers' homes, and Ofgem is committed to a market-based approach to their take-up, led by these companies. The UK has no national roll-out of smart metering, unlike other countries, such as Italy. Therefore, whilst encouraging commercial suppliers to offer a choice of innovative metering packages to their customers may be the most cost-effective way to promote usage, this approach will not necessarily lead to a rapid adoption, which is desirable in order to cut carbon dioxide emissions. Hence, we recommend that the Government set a deadline of 1 July 2008 for agreement with the industry on standards and interoperability, in default of which the Government should legislate.**

Providing energy services

64. We have seen already in this Chapter how practical constraints such as connecting to the grid, receiving payment for exported electricity and Renewables Obligation Certificates (ROCs), and replacing meters, can all act as inhibitors to people wishing to install and run local energy systems. One approach, which presents a possible solution to all of these problems, is the concept of commercial energy suppliers offering households local energy systems as part of a package of energy services. In so doing, the customer would, for example, enter into a contract with the company to install some form of local energy and smart metering. The supplier could agree to a tariff for purchasing any electricity exports, or these might be bound up in the overall price paid by the consumer for their services. The company could also act as an agent, administering any ROCs for which the household might be eligible.

65. The idea of commercial energy suppliers moving towards a model that focuses them on providing services, rather than simply selling electricity or gas, is potentially revolutionary.[99] In the current market, however, energy companies have little incentive to adopt such an approach. If the concept is to take off, it will require measures from the Government.[100] There is already some evidence that policy is developing in this direction. For example, the Government has proposed the inclusion of all local energy technologies within the third phase of the Energy Efficiency Commitment (EEC) to run from 2008 to 2011, as well as measures that would bring about behavioural changes among consumers,

99 Q 24 (Sussex Energy Group)

100 Q 100 (Renewable Energy Association)

such as smart metering.[101] In practice, DEFRA does not expect the take-up of local energy within the EEC to be high because it is still too expensive relative to energy efficiency measures, such as cavity wall and loft insulation. Elsewhere, Ofgem has proposed removing its requirement that commercial energy suppliers should allow consumers to terminate supply contracts at 28 days notice (known as "the 28 day rule"). This has been seen as a barrier to firms offering more sophisticated and innovative supply arrangements to their customers because of the difficulty and cost of removing assets, such as local energy systems or smart meters, if the customer chooses to change energy supplier.[102] Ofgem will be considering other ways in which it can encourage energy companies to be more innovative in the services they offer as part of its supply licence review, due to be completed later in 2007.

66. **Many of the practical barriers faced by households could be overcome if commercial energy suppliers were to offer local energy systems as part of a package of energy services to their customers that also included energy efficiency measures. We support the moves made to encourage suppliers to offer such services. However, because energy efficiency measures are currently a more cost-effective means of reducing demand and, therefore, carbon dioxide emissions, local energy is unlikely to form a significant part of these services in the near future if they evolve within the framework of the Energy Efficiency Commitment. In the short term, however, changes in such areas as the '28 day rule' and administrative arrangements for the Renewables Obligation could encourage commercial suppliers to offer services specifically for those households wishing to install local energy systems.**

Information constraints

67. We were told that part of the reason why energy consumers do not consider installing local energy technologies is because many are simply unaware of the option as a means of both reducing their energy bills and making a contribution to reducing their carbon footprint.[103] Of those who do wish to install local energy systems, many are overwhelmed by the complexity of the market—the choice of technologies, as well as the rules and regulations they must adhere to. Hence, in this section we consider the role of Government in raising awareness of the sector and supporting the provision of impartial advice to potential customers, in addition to engendering user confidence in the local energy industry more generally.

Creating awareness

68. Evidence we received from several organisations highlighted a general lack of awareness amongst most energy consumers as a factor affecting the uptake of local energy.[104] However, the level of interest in the sector has increased in the past year, in part due to the sharp rise in energy costs, reflecting higher gas prices. This has prompted many

101 Department for Environment, Food and Rural Affairs, *Energy Efficiency Commitment April 2008 to March 2011, Initial Consultation*, July 2006

102 Appendix 64 (Ofgem)

103 Appendices 20 (Environment Agency) 61 (Energy Saving Trust) and 65 (Renewable Energy Association)

104 Ibid.

energy users to consider ways in which they can reduce their consumption or offset the amount they have to purchase from commercial suppliers.[105] In the future, fossil fuel prices are likely to prove one of major drivers of local energy take-up. 2007 could be a crucial year for testing continuing public interest in the local energy sector, as retail prices are predicted to drop substantially.

69. Be that as it may, most households that have purchased solar panels or wind turbines have tended to be those early adopters who are not necessarily motivated by a rational cost-benefit-analysis of local energy, given that it is still a relatively expensive technology. They are instead motivated by other factors. For example, they may simply be technology enthusiasts who are keen to own the latest environmental innovation. They may also wish to feel they are 'doing their bit' in making a contribution to reducing carbon dioxide emissions. These individuals are therefore more likely to invest the time in finding information on what is available in the sector.[106] Consumers are also motivated by other non-economic reasons such as developments in current affairs. One witness, based in the solar energy industry, told us there had been a large upsurge of interest in their products last year, following the news of Iran's uranium enrichment programme and rising concern over increasing European dependence on Russian gas imports.[107] The reporting of this kind of news does play a role in leading consumers to consider how they might increase their energy self-sufficiency.

70. The early adopter group is important for the local energy industry. It is this group that will help build a market for the sector and, in the long-run, reduce prices, thus making the technologies available to a larger pool of consumers.[108] Also, as one industry representative pointed out, "those consumers who install microgeneration technologies are rather proud of them, they do like to show them off to their friends …".[109] This dissemination of information will play a role, too, in moving the technology towards a mass market. The Government cannot, however, rely on word-of-mouth alone to increase household awareness. It recognised this in last year's *Microgeneration Strategy*, one of the actions from which was to assess the feasibility of a communications and information campaign to raise the profile of the technologies available.[110] Indeed, evidence we received suggested it may be possible to target such communications specifically at those economic groups within the population who are most likely to be interested in, or can afford, the technology.[111] As one witness noted, there are groups "that have a fair amount of disposable income … but they would much prefer to spend it on another foreign holiday, a patio heater, [or] a plasma television".[112] Much of this kind of consumption actually increases our carbon dioxide emissions. It is these groups that the Government should be targeting in particular to alter their behaviour.

105 Q 177 (Worcester Bosch)

106 Q 79 (Renewable Energy Association)

107 Q 86 (Econergy)

108 Q 284 (Energy Saving Trust)

109 Q 136 (Micropower Council)

110 Department of Trade and Industry, *Power from the people – Microgeneration Strategy*, March 2006

111 Appendix 61 (Energy Saving Trust)

112 Q 40 (Sussex Energy Group)

71. **Awareness of the potential of local energy as a viable form of low-carbon energy is currently confined to a niche market. As the market grows, commercial motives will drive higher levels of information provision, but if rapid uptake is considered desirable, the Government will have to play its part in promoting the sector amongst the wider population, targeting initially those groups that are most likely to be able to afford and adopt the technology.**

Providing advice

72. It is not simply enough, however, to create greater awareness of the local energy technologies available to energy users—once engaged, many need advice and information in determining how they go about entering the market. The installation of local energy systems can represent a fundamental change in the way households view their energy, moving them from being passive consumers to operating as both consumer and producer of energy.[113] This shift creates complexity. Therefore, there are a range of areas in which households may seek guidance. These include information on the various practicalities, outlined earlier in this Chapter, such as receiving payment for electricity exports, gaining Renewables Obligation accreditation, and claiming Renewables Obligation Certificates.

73. Potential customers also need reliable support in advising them on what technologies their properties are best suited for. We have noted already that some forms of local energy operate best under certain conditions. For example, wind turbines are less suited for urban buildings, while micro-CHP is more appropriate for larger dwellings that have reasonably large heat requirements. Customers that are new to the market will not necessarily be aware of which technologies best match the needs of their homes.[114] This suggests an important role for the Government in ensuring the provision of reliable and impartial advice to assist customers' decision making. Indeed, research on consumers of solar hot water systems, conducted by the University of Sussex, has shown the information and guidance provided by an energy advice agency to be the single most important factor in helping customers make informed choices.[115]

74. We were told by a number of bodies that the current availability of reliable information and advice on local energy is inadequate.[116] Yet, there are various ways in which this constraint could be overcome. For example, the Energy Saving Trust is piloting a Sustainable Energy Network through the creation of Sustainable Energy Centres (SECs) in three parts of the UK. These build upon its existing infrastructure of Energy Efficiency Advice Centres, which now advise around 770,000 people every year.[117] The SECs will provide 'one-stop-shops' for advice on all aspects of energy efficiency in the home, as well as information on domestic local energy and energy use in road transport. They will also play a role in raising local awareness of sustainable energy issues. The Trust believes the centres will go some way towards filling the current gap in the provision of advice in these

113 Ofgem, *Microgeneration: next steps*, October 2006

114 Q 227 (Energy Saving Trust) and Appendix 65 (Renewable Energy Association)

115 Appendix 67 (Sussex Energy Group)

116 Qq 30 (Sussex Energy Group) and 227 (Energy Saving Trust); Appendices 20 (Environment Agency), 36 (Micropower Council), 61 (Energy Saving Trust), 65 (Renewable Energy Association) and 67 (Sussex Energy Group)

117 Appendix 61 (Energy Saving Trust)

areas. It hopes to have in place a nation-wide network of SECs by 2008-09, although it does not yet have funding for this from DEFRA.[118]

75. In addition, the Energy Saving Trust has highlighted other ways in which the Government could support the provision of information for consumers. These include publication of a simple guide, setting out the practical requirements—technical, commercial and regulatory—associated with household-based local energy, as well as providing an information sheet comparing the electricity export and import prices that commercial suppliers offer their customers.[119] Another witness pointed to the important role that installation engineers can play in providing on-site advice to domestic consumers on what energy systems, be they local energy or otherwise, may best suit their needs.[120] In this regard, adequate training for the installer is necessary for them to provide such advice. We examine this issue further in Chapter 5.

76. **For households to make the right choice of local energy system for their home, and gain the full benefit of investing in new technology, they need to have reliable and impartial advice. We support the Energy Saving Trust's move to establish a Sustainable Energy Network to advise households on all aspects of their energy use. If the pilot advice centres prove a success, we recommend that the Government ensures a national roll-out of this service by 31 December 2009.**

Engendering confidence

77. In addition to raising wider awareness of the potential of local energy, and providing consumers with guidance on what systems may suit them best, customers also need confidence that, in making investments, they will receive a good level of service from the equipment manufacturers and their installers. As one witness said to us, "it is very important that we do not let the cowboys in, especially when we are talking about putting moving-part objects on people's roofs, such as wind turbines".[121] To this end, it is essential that standards for products and installation are in place and that companies and their installers are accredited for fitting local energy systems.[122] Confidence amongst customers in the quality of service from installers will also help promote greater awareness of local energy possibilities through word-of-mouth. This is vital, too, if the industry is to break into the mass market.

78. As part of the list of actions in its *Microgeneration Strategy*, the DTI committed itself to implementing a new accreditation scheme for the local energy sector, covering products, installation and a Consumer Code. The Renewable Energy Association has taken the lead in developing the last of these, taking a self-regulatory approach through its REAL Assurance Scheme, which will help ensure good service at all stages in the customer's dealings with installers. Elsewhere, the DTI is working with the Buildings Research

118 Q 227 (Energy Saving Trust)

119 Appendix 61 (Energy Saving Trust)

120 Q 135 (Worcester Bosch)

121 Q 177 (Micropower Council)

122 Appendices 20 (Environment Agency), 32 (Institution of Engineering and Technology), 61 (Energy Saving Trust) and 67 (Sussex Energy Group)

Establishment to develop installer accreditation and product certification schemes, which will build on the existing accreditation schemes the Department already had in place.[123]

79. **We support the use of a self-regulatory approach by the Renewable Energy Association in developing a Consumer Code, as well as the work of the Buildings Research Establishment on installer accreditation and product certification, and recognise their importance in engendering confidence amongst consumers entering the sector for the first time. We recommend that the Government's new accreditation scheme, with its Consumer Code, be in place by 1 July 2008.**

Cost constraints

80. The third main barrier to the uptake of local energy by households, and indeed local energy generally, is that of cost. We have already noted that if consumers wish to reduce their fuel bills, and in so doing, cut their carbon dioxide emissions, then energy efficiency measures are an easier and cheaper way of doing so. Even when homes have exhausted their potential for energy efficiency, and are just looking to get the best deal on their electricity or heating, they will still find most local energy technologies far more expensive than simply purchasing energy from their local commercial supplier. In this section we look at the cost levels within the local energy sector and the potential for reducing these in the future.

Current cost levels

81. The capital cost of local energy varies according to the technology. In a blaze of publicity and media interest last year, B&Q began offering roof-top wind turbines and solar thermal heating panels at a starting price of around £1,500 including installation.[124] We heard that ground source heat pumps can cost between £7,000 and £10,000,[125] PV panels have capital costs of around £9,000 for a 1.5 kilowatt array,[126] while E.ON UK's WhisperGen micro-CHP unit costs about £500 more than a standard boiler.[127] In contrast, electricity supply for homes does not require a capital investment and the cost of a combination gas boiler can be in the region of £1,500. The DTI's *Microgeneration Strategy* stated that, with the exception of biomass heating (compared with electricity) and, in the near future, ground source heat pumps, most local energy technologies are still too expensive to be cost-effective.[128]

82. In much of the evidence we received, attention was given to the 'payback' period that local energy technologies required. This is the length of time needed for purchasers of such systems to recover the cost of their investment. It is one way of measuring the cost-effectiveness of different technologies. For local energy, the payback occurs through various routes—by reducing energy bills, and through payment for electricity exports and

123 www.realassurance.org.uk

124 www.diy.com

125 Q 161 (Worcester Bosch)

126 Appendix 67 (Sussex Energy Group)

127 Cogen Europe, Micro-CHP Factsheet – United Kingdom, March 2005

128 Appendix 61 (Energy Saving Trust)

Renewables Obligation Certificates. We received in evidence a variety of estimates of payback periods. For example, a few organisations quoted DTI's own figures of 120 years for PV panels, 80 years for solar thermal systems (in a property originally heated by gas) and 29 years for wind turbines.[129] In most cases, these estimates actually exceeded the operating lifetime of the equipment. Industry representatives we spoke to, however, were more optimistic about the current payback for local energy technologies, suggesting around 13 years for solar thermal systems, and 5 to 7 years for micro-wind turbines.[130] Calculation of payback requires a number of assumptions, regarding both the costs and benefits of the various technologies. This makes it very difficult to gauge accurately the period over which consumers will break even on their investment.[131] In addition, it may be the case that the presence of low-carbon installations in properties raises their market value relative to less energy-efficient or self-sufficient homes, especially given the recent legal requirement for energy efficiency certificates to be provided by anyone offering a home for sale in the UK. If this is so, the payback period could be substantially reduced if the capital investment is mirrored in the asset value of the house, although this benefit could in turn be offset by a change in the council tax and/or stamp duty banding of the property, both of which are currently re-assessed when a home is sold to a new owner.

83. **Most local energy technologies are currently too expensive to have mass market appeal compared to other means of supplying domestic energy needs. Calculation of the payback periods on these technologies is fraught with difficulty and likely to give misleading figures. We are concerned, however, that the published Government figures, particularly for solar water heating panels, are far more pessimistic than any other estimates quoted to us.**

Reducing costs for consumers

84. Because the costs of most low-carbon sources of heat and electricity are so high, there is, rightly, a consensus around the need for these to fall, or the cost of other energy sources to rise markedly, if the technologies are to become cost-effective and have mass market appeal in the long run. There are potentially two main drivers to reducing costs. First, costs may fall as a result of improvements in the technology itself. For example, PV panels currently capture only 15% of the energy in sunlight—this might improve with scientific advances.[132] The second source of lower costs, and the one on which greater emphasis is placed by commentators, is through the economies of scale that will arise from producing and installing these technologies for a mass market, through, for example, improved manufacturing processes. Here, there is a potential feedback effect between rising demand for local energy systems and falling costs as the market expands.

85. The Government recognises the role it can play in providing 'seed-corn' or 'pump-priming' funding for the industry so as to stimulate early growth in the market. It has provided support for local energy technologies since 2000, with annual funding under its

129 Appendices 11 (BNFL plc) and 32 (Institution of Engineering and Technology); Department of Trade and Industry, *Strategy for the promotion of Microgeneration and the Low Carbon Buildings Programme – Consultation*, June 2005

130 Qq 143 (Worcester Bosch) and 146 (Micropower Council)

131 Q 182 (Institution of Engineering and Technology)

132 Q 183 (Institution of Engineering and Technology)

Solar Photovoltaic and Clear Skies capital grant programmes, peaking at £13.5 million in 2005-06. In 2006, the DTI replaced these schemes with the Low Carbon Buildings Programme (LCBP). This is set to run over three years, with capital grants allocated in two phases. Phase one provides £28.5 million for household, community and commercial projects, while phase two has £50 million of funding for local energy projects in the public and charity sectors. Within the household stream of phase one, applicants can receive a grant of up to 30% of the capital cost of new installations, depending on the technology used.

86. In the first few months of the LCBP, take-up from households has been much higher than anticipated. So far, £6.4 million has been allocated to 4,370 projects. Yet only £6.5 million out the £28.5 million of phase one funding was originally set aside for the household sector. The DTI responded to the high level of demand by re-allocating to the household stream an additional £6.2 million from elsewhere in the phase one budget. This gives total capital grant funding for households of £12.7 million from 2006 until the summer of 2008. With almost half of this allocation already committed, the programme's manager, the Energy Saving Trust told us that "there is a serious risk of shortfall".[133] As another witness noted, this means "there is a danger of serious disappointment amongst consumers" if funds run dry before the scheme is scheduled to close.[134] Not only that, but this kind of 'feast or famine' approach to supporting the sector also potentially undermines the industry's ability gradually to build up capacity.[135]

87. A number of organisations argued that, in the long run, there were approaches other than capital grants that the Government could use to encourage growth in the sector. One of the key themes was that of fiscal policy and, in particular, the tax treatment of local energy vis-à-vis larger energy producers.[136] For example, investment in large scale power stations can be written off against companies' tax bills over time. In addition, businesses that invest in energy efficiency and local energy measures can now receive enhanced capital allowances that allow them to write-off the whole cost of their investments in their first year.[137] Yet households are not able to do this, having to purchase installations out of post-tax income.[138]

88. Elsewhere in the fiscal system, we were told council tax and stamp duty are areas where reform could provide strong incentives for investment in local energy.[139] Because local energy installations can increase property values, such investments could push homes into higher council tax or stamp duty bands—thus largely, or entirely, offsetting any income benefit from the installation. Council tax is an area in which there is scope for innovative local authorities to provide incentives for local energy. British Gas is currently working with around 40 councils, offering households a £100 rebate on their council tax bills if they

133 Q 250 (Energy Saving Trust)

134 Q 23 (Sussex Energy Group)

135 Q 40 (Sussex Energy Group)

136 Appendices 19 (Energy Saving Trust), 22 (E.ON UK), 36 (Micropower Council), 65 (Renewable Energy Association) and 67 (Sussex Energy Group)

137 www.eca.gov.uk

138 Q 48 (Sussex Energy Group)

139 Q 169 (Micropower Council); Appendices 3 (Association for the Conservation of Energy) and 61 (Energy Saving Trust)

invest in home insulation from the company. Schemes such as these could be extended to local energy. We are encouraged, also, by the Chancellor's announcement in the 2006 Pre-Budget Report, of the introduction of a time-limited stamp duty exemption for the vast majority of new zero-carbon homes. We welcome too the commitment to enact legislation exempting households from income tax on the earnings from any exported electricity they produce.[140] However, the Government still needs to address the wider treatment of local energy within the fiscal system if it is to provide a fair reward for all forms of low-carbon energy.

89. **The expansion of the local energy industry is the key to reducing costs. The Government has in place a popular capital grants scheme, which is in danger of running out of funds before it is due to close in summer 2008. The Government should continue to monitor take-up of the scheme with a view to either rationing of funds, or increasing the available monies for the household stream. A stop-start approach to funding could be damaging to the sector's growth. The Government should also conduct a comprehensive review of the way in which local energy is treated within the fiscal system, both at a national and local authority level, with a view to rewarding investment by households, businesses and large-scale generators in low-carbon energy. However, the Government's efforts to encourage households to invest in reducing their carbon dioxide emissions could be undermined by the law of unintended consequences: if improving energy efficiency raises property values, then households may be subject to higher council tax. As a result, we recommend that any increases in property value due to energy efficiency measures, or local energy installations, should not be considered for purposes of re-assessing homes for council tax.**

140 HM Treasury, Pre-Budget Report 2006 – Investing in Britain's potential: Building our long-term future, December 2006

4 Engaging communities

90. We have concentrated, so far, on the ways in which households can take individual action to reduce their carbon dioxide emissions through the use of local energy. But a greater proportion of our energy needs could also be sourced within communities. This can take a variety of forms, from providing combined heat and power (CHP) for housing developments or town centre offices, to installing solar panels and wind turbines in schools. Local leadership is the key driver for this through, for example, the practical implementation of planning guidance, and by inspiring communities to adopt new technologies. In this Chapter we examine the part local government can play in promoting local energy, and then look specifically at the support Government may provide in encouraging a greater role for community-level CHP.

The role of local government

91. While climate change has risen up the political agenda within central Government over recent years, there has also been a steady increase in awareness within local government of the need to cut carbon dioxide emissions. In response to this, some local authorities, pioneered by the London Borough of Merton, have begun to use the planning laws to promote greater use of local energy in new developments. Other authorities, such as Woking, have gone further still by seeking to revolutionise their communities' energy sources. This section looks at the examples of Merton and Woking, and the ways in which their success can be replicated elsewhere.

The 'Merton rule'

92. In August 2004 the Government published its Planning Policy Statement (PPS) on renewable energy, known as PPS 22.[141] For the first time, this required local planning authorities to give due regard to the Government's targets for renewable energy—10% by 2010 with an aspiration of 20% by 2020—in their planning decisions. In particular, PPS 22 confirmed the legal right of councils to "require a percentage of the energy to be used in new residential, commercial or industrial developments to come from on-site renewable energy developments".[142]

93. The London Borough of Merton, which had campaigned for the inclusion of target-setting in PPS 22, was the first local authority to adopt this approach in setting a target for all non-residential developments above a threshold of 1,000 m^2 to incorporate at least 10% of their energy needs from renewable energy equipment.[143] The first development required to meet the target was a 4,500 m^2 set of industrial units. There, the developer installed ten micro-wind turbines and nine kilowatts of solar photovoltaic capacity. The Council has been surprised by the response of construction companies to its policy. Whereas some detractors had argued that it would drive away developers, put off by the cost of meeting the 10% rule, in fact the opposite has proved the case. Companies building in Merton have

141 Office of the Deputy Prime Minister, *Planning Policy Statement 22: Renewable Energy*, August 2004

142 *Ibid.*

143 Appendix 62 (London Borough of Merton)

seen the policy as providing them with an opportunity to "get ahead of the game in designing, constructing and marketing low carbon buildings for the future".[144] This is because many companies see the widespread uptake of Merton-style rules as inevitable. In addition, the extra construction costs of less than 3% resulting from the policy can be offset by the ability of the developer to sell the units at a premium because of their energy-saving technologies.

94. The 'Merton rule', as it has become known, has grown in popularity, with more than 80 other local authorities following suit.[145] However, this still leaves around 330 local authorities that have not set targets. Last year, the Government conducted a review of take-up of the Merton rule and found that just under half of those that could reasonably have been expected to adopt a target—i.e. those that that had revised their local plans since PPS 22 came into force—had not done so.[146] Part of the reason for this may be that local authorities do not understand the technologies, or the potential impact of adopting a target for on-site renewables.[147] Several of our witnesses praised the example set by Merton Council,[148] although the Micropower Council told us the language of the guidance was still not strong enough as it failed to compel all local authorities to adopt targets for on-site renewables.[149] In fact, some authorities are finding it difficult to implement their own Merton rules simply because current planning policy is not stringent enough.[150]

95. In December 2006, the Department for Communities and Local Government (DCLG) published its consultation paper for a draft Planning Policy Statement on climate change.[151] If implemented, this will expect new developments to optimise their carbon performance and make the most of existing and planned opportunities for local renewable and low-carbon energy supplies. The new Statement would supplement, rather than replace, PPS 22 (as well as various other Statements), but would aim towards a more comprehensive approach to reducing the carbon footprint of future developments, of which local energy would be just a part.

96. **The London Borough of Merton has set a clear example of how local government can show leadership in promoting the use of local energy in new developments. However, many authorities have failed to follow its lead. The Government should increase pressure on those councils to implement targets for on-site renewables in new developments, with a view to all local authorities having such targets in place by 31 December 2009. This would create consistency for developers and councils across the country. Progress in this area is crucial if local government is to demonstrate its**

144 *Ibid.*

145 Speech by Ian Pearson MP, Minister of State (Climate Change and the Environment), Climate Change Conference, October 2006

146 Q 138 (Micropower Council)

147 Q 247 (Energy Saving Trust)

148 Qq 63 (Sussex Energy Group), 74 (Renewable Energy Association), 95 (Sharp UK) and 138 (Micropower Council)

149 Q 139 (Micropower Council)

150 Appendix 69 (Wellingborough Council)

151 Department for Communities and Local Government, *Planning Policy Statement: Planning and Climate Change—Supplement to Planning Policy Statement 1*, December 2006

capability to respond to any future policy instruments for tackling the causes of climate change, such as new planning guidance.

The experience of Woking

97. Since the early 1990s, long before the introduction of PPS 22 and the Merton rule, Woking Borough Council has been at the forefront of developing local energy systems. Under the policy pioneered by Mr Allan Jones MBE, Woking has incrementally expanded its local energy capacity over the past 15 years, funding growth of that capacity by re-investing money saved through its energy efficiency projects. Since 1999, local energy development in the town has been taken forward by Thameswey Energy Ltd (TEL)—a public/private joint venture energy service company, wholly owned by the council, allowing it to operate outside the capital controls of local government. TEL provides local energy, including cooling, heat and electricity to all Woking's institutional, commercial and residential customers.[152] In 2002, Woking was the first local authority to adopt a comprehensive Climate Change Strategy, aimed at meeting the Royal Commission on Environmental Pollution's target of a 60% reduction in carbon dioxide emissions by 2050.[153] The town has now built up a network of over 60 local generators, including cogeneration and trigeneration units, photovoltaic arrays and the UK's first hydrogen fuel cell station.[154] In so doing, the council has reduced its own carbon dioxide emissions by around 77% and those of the borough as a whole by 17%. Importantly, it has achieved this using its own funds, without financial support from central Government.

98. One of the key features of the Woking example is that its energy system runs on a local private wire network. This is where a single party runs its own network off the licensed distribution network, allowing a certain amount of unlicensed generation and supply to take place outside the main electricity market.[155] In the case of Woking, Thameswey Ltd runs the private wire network, providing connections for the whole town. Under this set-up, because the operator is unlicensed, it is able to avoid costs such as the Renewables Obligation, Climate Change Levy and the Energy Efficiency Commitment. This helps promote the financial viability of the more expensive low-carbon energy sources used in Woking. There are disadvantages, however, to the use of private wire networks. Customers are not protected in the same way as those supplied by licensed energy companies, and cannot easily switch energy supplier. These networks are also still dependent on the external public networks for backup power, when necessary.[156] Nevertheless, there is increasing support for the use of private wire networks and these are a key feature of future plans for energy supply in London.

99. **The experience of Woking demonstrates the importance of leadership at a local level, with individuals having an ambitious vision of how they can directly contribute to reducing their communities' carbon dioxide emissions. Other local authorities should**

152 www.chpa.co.uk

153 www.theclimategroup.org

154 Appendix 27 (Friends of the Earth)

155 Department of Trade and Industry, *Distributed Energy–A call for evidence for the review of barriers and incentives to distributed generation, including combined heat and power*, November 2006

156 *Ibid*.

seek to learn from Woking's example in developing and implementing their own strategies for tackling the causes of climate change.

Delivering local energy to London

100. Many of the lessons learnt from Woking and elsewhere are now being transferred to London. For example, the Mayor of London's *Energy Strategy* commits him to using his planning powers to help achieve a 20% reduction in London's carbon dioxide emissions by 2010, relative to their 1990 level. All new developments are to consider CHP and heat-fired absorption cooling, and to produce at least 10% of their energy needs from on-site renewables.[157] The Strategy requests London boroughs to set targets consistent with this, following the example of Merton, although the Mayor does not have the power to compel them to do so.

101. Another feature of the *Energy Strategy* is the Mayor's request for each London borough to identify at least one potential site for a zero-carbon commercial or housing scheme by 2010, and for councils to use their powers as landowners or partners to bring about its development. Underpinning this recommendation is the experience of the Beddington Zero Energy Development, known as BedZed, near Wallington in Surrey. Completed in 2002, and consisting of 178 homes, BedZed was designed to be the UK's first totally carbon-neutral community, powered by PV panels and wood chip-fuelled CHP.[158] However, the CHP plant has faced expensive operational difficulties and has been abandoned for the time being, so that around 90% of the development's electricity needs are now drawn off the local distribution network. Nevertheless, many aspects of the project have been successful, including its energy efficiency measures, which mean residents pay less than £400 a year for power and water.[159] The experience from this development will provide valuable lessons for future schemes of the same nature.

102. Modelling the approach taken by Woking, the Mayor has established the London Climate Change Agency—a commercial company, wholly owned by the London Development Agency—whose aim is to help reduce London's carbon dioxide emissions. Its delivery arm is the London Energy Services Company (ESCO), a joint venture with EDF Energy, which will design, finance and build new local energy infrastructure across the capital. The first tranche of projects includes 170 megawatts of community-CHP capacity, using natural gas to start with, though with the potential to use biomass, once a fuel supply chain has been established. Other projects include an eight megawatt wind farm, and solar photovoltaic schemes at City Hall and the London Transport Museum, with total investment for the first phase reaching around £100 million.[160]

103. **The high level of energy consumption in London makes it an important leader in spearheading the greater use of local energy systems in urban areas. The London Climate Change Agency looks set to play a major role in exploiting this potential. We believe the UK's other large cities should seek to adopt similar strategies for tackling**

157 Mayor of London, *The Mayor's Energy Strategy*, February 2004

158 www.peabody.org.uk

159 Daily Telegraph, 'Zero Carbon dream home is little more than hot air', 8 December 2006 , page 16

160 London Climate Change Agency; Appendix 58 (EDF Energy)

the causes of climate change, learning lessons from current experience in London, while also working to develop their own innovative approaches to reducing carbon dioxide emissions.

Encouraging community-CHP

104. Despite the fact that space and water heating accounts for a third of the UK's energy consumption, only 1% of it is produced from renewable sources.[161] The scope for carbon dioxide savings in this sector is therefore enormous. In Chapter 2 we noted that there is some potential for community-level CHP to make a contribution in this regard, particularly in urban areas for new build developments. Although current CHP stations mostly run on fossil fuels, they still produce lower carbon dioxide emissions than would the separate provision of electricity and heating. Also, once the technology is ready, fossil-fuel based plants could fairly easily be replaced with systems using renewable fuels, without affecting the attached heat distribution network. In some cases it would simply be a matter of switching fuel.[162]

105. There are several barriers to the wide scale development of community CHP. Because the initial capital cost of CHP stations is higher than for electricity-only plants, this means their economic viability depends on the ability to locate a stable demand for the heat generated. Communities are seldom able to co-ordinate themselves to take advantage of the potential for using CHP in their areas, or are simply unaware of the possibility. As one witness noted to us: "Somehow our culture seems to have lent itself less to these communal solutions …".[163] As we have seen with the example of Woking, it often requires the leadership of particular individuals to bring about change. With regard to renewable sources of heat, there is the added difficulty of securing a supply chain of biomass—an industry which is still in its infancy in the UK. The Government is currently developing a strategy for biomass, which is due to be published in the middle of 2007.[164]

106. Some of the evidence we received was critical of the level of support available for encouraging community and business-level CHP.[165] Businesses have access to enhanced capital allowances as well as exemption from the Climate Change Levy, but few have made use of these incentives. This is partly due to a lack of awareness, but also because firms are unlikely to look at their energy sources beyond the 20-year replacement cycle of their existing equipment. Funding is also available under the Low Carbon Buildings Programme for community and commercial projects, but the total level of support is not large or long-term enough to have a big impact on the level of take-up.

107. There was no clear consensus among our witnesses as to what would be necessary to see greater use of renewable heat within community-based schemes. The Renewable Energy Association (REA) told us it would like to see in place a long-term revenue support

161 Department of Trade and Industry, *Distributed Energy–A call for evidence for the review of barriers and incentives to distributed generation, including combined heat and power*, November 2006

162 Appendix 65 (Renewable Energy Association)

163 Q 21 (Sussex Energy Group)

164 For more information on bioenergy see: House of Commons Environment, Food and Rural Affairs Committee, Eighth Report of Session 2005-06, *Climate change: the role of bioenergy*, HC 965

165 Qq 86 (Renewable Energy Association), 117 (Econergy) and 271 (Energy Saving Trust)

mechanism in the form of a Renewable Heat Obligation, providing a similar level of support for heat derived from renewable sources as the Renewables Obligation currently does for electricity.[166] Indeed, it seems perverse to us that a CHP station using a renewable fuel can receive Renewables Obligation Certificates for the electricity it produces, but no equivalent reward for its heat, despite the fact that this, too, contributes to reducing carbon dioxide emissions. This must act as a disincentive for the use of CHP in favour of electricity-only biomass power stations.[167]

108. A Renewable Heat Obligation, the REA argues, could be placed on suppliers of fossil fuels for heat, using data already collected from them as part of the requirements under the Climate Change Levy. In terms of cost per tonne of carbon dioxide saved, the REA believes such an Obligation for heat would cost only a third as much as the equivalent scheme does for electricity.[168] The Energy Saving Trust was, however, doubtful of the feasibility of such an approach. It argued that heat provision is more decentralised than for electricity, and it would therefore be more difficult to place an Obligation on 'heat suppliers' in a similar way to commercial electricity suppliers.[169] As a result, any such scheme would be far more costly to administer, and smaller scale heat producers might face the same difficulties in benefiting from it as households currently do for electricity under the Renewables Obligation. The Trust's preference was to raise awareness and use capital grants to stimulate the sector.[170]

109. **There is some scope for reducing carbon dioxide emissions by encouraging greater use of community-based combined heat and power (CHP). However, while the current schemes to support such systems require a pro-active approach by communities to take advantage of them, a lack of awareness and co-ordination prevents many from doing so. Also, the reward for producing low-carbon heat is much less than that for low-carbon electricity. We accept the potential difficulties of implementing a Renewables Heat Obligation. Nevertheless, we recommend that the Government should look at other ways in which it can provide incentives for local areas to move towards community-based low-carbon heating, where it is appropriate for them to do so. Current policy places too much emphasis on the role of local electricity generation and not enough on the production of heat. Renewable, low-carbon heat production is the Cinderella of energy policy and this attitude must change.**

166 Appendix 65 (Renewable Energy Association)

167 Appendix 36 (Micropower Council)

168 Q 93 (Econergy)

169 Appendix 61 (Energy Saving Trust)

170 Q 272 (Energy Saving Trust)

5 Developing manufacturing and skills capacity

110. If local energy is to make a significant contribution to reducing carbon dioxide emissions in the long-run, then the cost of the various technologies available has to fall for them to appeal to a mass market. Yet, the industry faces a catch-22 situation in that it cannot drive costs down until mass market demand for its products exists. Hence, there is a role for Government in providing confidence that it supports the long-term development of the sector and sees local energy as playing an important role in the UK's future energy mix. Supported by the right incentives, the industry can then invest in the manufacturing and installation processes that will reduce costs. The ultimate aim should be for the sector to provide products that are able to compete with other energy sources without Government support. In this Chapter we look at the current state of the local energy industry, and examine what the Government can do in addition to the measures already discussed. We also consider the skills capacity of the sector and its ability to respond to increased demand.

The current state of the sector

111. The size of the UK's local energy industry is tiny. The Energy Saving Trust estimates total annual turnover for the sector as £10-20 million, employing between 200 and 600 people (excluding micro and fuel cell CHP).[171] Most of these are involved in installation: currently 275 installers, 64% of which are in the solar industry. The fuel cell and micro-CHP sectors are different, involving a much smaller number of large companies employing a large number of staff mainly engaged in research and development.[172] In terms of equipment manufacturing, relatively little of this takes place in the UK. For example, ground source heat pumps are mostly imported from Sweden, and solar thermal systems primarily from Germany. This reflects the fact that the market for these products is much larger in the source countries than it is in the UK. The relatively small size of the UK market for local energy systems currently makes it more cost-effective to import them than to manufacture them here.[173]

112. The number of companies operating in the local energy sector has risen significantly in recent years on the back of Government grant support for the industry. For example, the number of firms installing PV panels has increased from 15 to 50 in just four years. Although most of the businesses in the industry are small, employing up to 30 people, there is evidence that larger companies are starting to move into the sector. For example, British Gas has signed an agreement with WindSave to make roof-top wind turbines available to households.[174] Elsewhere, Worcester Bosch have recently entered the solar water heating and ground source heat pump markets, promoting them alongside their high-efficiency condensing boilers as part of an overall energy and carbon dioxide saving package, and

171 Energy Saving Trust, *Potential for Microgeneration Study and Analysis*, November 2005

172 *Ibid.*

173 Qq 149 an 152 (Worcester Bosch)

174 Centrica, *Response to "Our energy challenge—securing clean, affordable energy for the long-term"*, January 2006

capturing 20% of the market for solar panels in the space of 12 months.[175] It is worth noting that this expansion has taken place without the use of grants from the Government.

113. **The UK's local energy industry is small and focused primarily on installation, with manufacturing occurring mainly abroad. As a result of Government grant schemes, there has been significant growth in recent years, albeit from a very low base, and there are now signs that larger energy companies are beginning to take an interest in the sector.**

Moving towards a mass market

114. We have seen already that the various local energy technologies available are all at differing stages of development. Some, such as biomass heating and ground source heat pumps, are already cost-effective. Other technologies, however, including solar photovoltaics and micro-wind turbines, are still too expensive to be commercially viable for the mass market. Indeed, fuel cell CHP is still in its research and development phase.

115. Because of the relative immaturity of some technologies, there is significant scope still for technical advances and innovation, which will drive down costs in the long-run. Here, the Government can play a role by providing R&D support for the sector. The Energy Saving Trust told us, however, that not enough of the DTI's available funding for emerging technologies was being targeted at local energy research—less than 3% of the £320 million available to business over the period 2005-08.[176] In its *Microgeneration Strategy*, the DTI argued that there are sufficient funds for carrying out R&D in the sector, available not only from central Government but also through generous tax reliefs, and through the Research Councils, Regional Development Agencies and European Union. One example is the New and Renewable Energy Centre (NaREC), funded by the One NorthEast Development Agency, which has provided an initial investment of £10 million. The DTI has agreed to produce a map outlining all the available funding sources, in response to evidence from its strategy consultation that there is not sufficient information about where businesses can seek support.

116. Other changes will occur in the wider energy market over the coming years that could promote the viability of local energy. These include the possible adoption of smart metering; improved power flow management on the grid; and improved small-scale energy storage capabilities.[177] Changes in fuel availability and prices could also be important drivers, as proved in 2006, with increased interest in local energy systems in the UK resulting from higher electricity and gas bills.

117. The consensus within the industry, however, is that the key driver for reducing costs in the long-term will come about through the scaling up of production and by investing in installation infrastructure so that the sector is able to supply a mass market.[178] In order to achieve this, the local energy industry told us the Government needs to signal its

175 Q 135 (Worcester Bosch)

176 Q 264 (Energy Saving Trust) and Appendix 61 (Energy Saving Trust)

177 Appendix 36 (Micropower Council)

178 Qq 165 (Micropower Council) and 90 (Renewable Energy Association); Appendices 36 (Micropower Council) and 61 (Energy Saving Trust)

commitment to the sector and the long-term contribution it can make to the UK's energy mix, while backing this up with a credible effort to provide incentives for growth in the industry.[179] They claim that only this approach will enable firms to develop business plans for the long-term, and attract investment to carry them out. In this regard, the *Microgeneration Strategy* has been generally welcomed by the sector as a demonstration of the Government's support.[180] The local energy industry was sceptical, however, about the Government's stated intention in last year's Energy Review Report, *The Energy Challenge*, to implement the strategy "aggressively", given the limited human resources currently dedicated to local energy in the DTI.[181]

118. The industry says that one area in which the Government could further demonstrate its support for the local energy sector is through the setting of a national target for its contribution to the energy mix.[182] Such a move, the local energy industry argues, would send a clear signal to investors of how the Government expected the market to develop in the medium to long-term. The *Climate Change and Sustainable Energy Act 2006* gave the Secretary of State for Trade and Industry powers to set a national target specifically for microgeneration from November 2008, provided the Government believes it appropriate to designate one at that time.

119. However, we have previously stated the Government should not seek to pre-determine the proportion of the mix that any energy source should contribute—be it gas, coal, nuclear or renewables, large or small. Rather, if its aim is to reduce carbon dioxide emissions, it should establish a level playing field that equally rewards all forms of low-carbon energy, and allows the market to determine the energy mix.[183] Yet there may be a case for treating certain low-carbon energy sources differently if it is believed that investment in them will, in the long run, reduce their cost per tonne of carbon dioxide saved. If the Government wishes to set a target for local energy it should therefore only be on the basis that it would play a significant role in the sector's transformation from niche market to full cost-effectiveness, backed up by credible incentives for its achievement. Before then, it would also be necessary for the DTI and industry to conduct robust market analysis on the growth potential of the market so that any target could be both stretching and achievable.[184]

120. Underpinning any target-setting should also be the final objective of tapering the industry's dependency on capital grants as the technologies become more cost-effective. As noted already, one key aspect of the sector's current and past growth has been the presence of government grants. Under previous schemes, the Micropower Council argues, the Government failed to set a clear expectation of how the sector should develop, and what cost reductions it anticipated. As a result, the industry ran into difficulties as soon as there was uncertainty about the continuance of support.[185] The Low Carbon Buildings

179 Q 90 (Renewable Energy Association) and Appendix 36 (Micropower Council)

180 Q 165 (Micropower Council)

181 Qq 96 (Renewable Energy Association) and 163 (Micropower Council)

182 Q 111 (Renewable Energy Association); Appendices 36 (Micropower Council) and 61 (Energy Saving Trust)

183 Trade and Industry Committee, Fourth Report of Session 2005-06, *New Nuclear? Examining the issues*, HC1122

184 Appendix 36 (Micropower Council)

185 *Ibid*.

Programme has funding to run until mid-2008, by which time the Government expects some of its "wider measures to promote microgeneration should be taking hold, facilitating the uptake of these technologies".[186] This could suggest that the Government expects to have weaned the industry off grants by this time, although it seems to us a very short period in which to expect the industry to have built sufficient capacity. More likely, the closure of the current scheme in 2008 reflects the end of the Government's current Spending Review period. It will therefore not be known whether there will be more grants available, or indeed a department to allocate them, until the next Spending Review settlement is announced.

121. **Key to the uptake of local energy systems in the long-term will be reductions in their cost so as to secure a mass market. Achieving this requires the Government to demonstrate credible support for the sector to give the industry sufficient confidence to invest in scaling up its activities. Recent policy developments, such as the *Microgeneration Strategy* and the *Climate Change and Sustainable Energy Act 2006*, have gone some way to achieving this. However, the small number of staff responsible for policy implementation in this area at the DTI, and the lack of clarity as to the future of capital grant support beyond 2008, suggest to us there is more to do if the Department intends to fulfil its commitment to support the sector "aggressively". A national target could help achieve this, but should only be used if there is a clear justification for its role in making the industry cost-effective, and if it is underpinned by incentives for its achievement.**

Ensuring the industry has the skills

122. While local energy systems allow households and communities to produce their own energy, as one witness told us, "they are not DIY technologies".[187] This is why many of the companies currently operating in the sector offer installation services as part of their product packages. We noted in Chapter 3 the importance of trained and accredited installers in order to strengthen customer confidence in the reliability of local energy products, for example, to ensure health and safety. Therefore, as demand for these systems grows, so too will demand for skilled technicians able to fit them.[188] However, given the industry is expected to experience, at best, incremental growth in the coming years, the DTI's *Microgeneration Strategy* argued the sector should be able to respond in developing the skills necessary as demand grows. It cites recent work by the Energy and Utility Sector Skills Council, which shows there are no major skills shortages in the renewable energy sector. However, this piece of work is now over three years old, and was focused then primarily on the needs of the larger-scale renewables industry.

123. If the sector is to respond to growing demand for installers as the industry grows, companies will need to ensure they invest in the skills of their employees. Here, our evidence identified two skill sets as being important. Not only is the technical know-how required to fit local energy systems, but also installers need marketing skills to ensure the

186 House of Commons, *Official Report, Written Answers, 1893W*, 25 October 2006

187 Q 177 (Worcester Bosch)

188 Q 206 (Institution of Engineering and Technology); Appendices 16 (EDF Energy), 32 (Institution of Engineering and Technology) and 61 (Energy Saving Trust)

products they sell best match the needs of their customers.[189] We have seen already that some local energy systems are not appropriate in some circumstances, for example, micro-CHP in small dwellings with a low heat demand. This is why the accreditation of installers is important for instilling confidence amongst customers that recommendations made to them are in their best interest. The Energy Saving Trust told us about work it has done in collaboration to develop a qualification regarding energy efficient central heating boilers and control systems. It argues that a similar approach could be used for developing skills and training in the local energy sector.[190] The Micropower Council also called for a Government-promoted training course for installers.[191]

124. **Growth in the local energy industry is likely to be gradual enough for the sector to be able to respond to increased skills needs. The Government's accreditation scheme will help ensure consumers' confidence provided they are aware of it. It is then incumbent on the sector to regulate itself to ensure all its installers are trained and accredited. We recommend that the Government's role should be focused on wider workforce concerns, such as tackling the perceived stigma attached to vocational skills and qualifications.**

189 Q 43 (Sussex Energy Group)

190 Appendix 61 (Energy Saving Trust)

191 Appendix 36 (Micropower Council)

6 Further action by central Government

125. The Government has made various recent policy interventions, which have gone some way to overcoming the barriers both to household and community take-up of local energy. These policy developments have sought primarily to influence the actions of others. However, there are ways in which central Government can change its own behaviour, reducing its carbon footprint by making greater use of local energy systems in addition to energy efficiency measures. In so doing, it can play an important role in helping to grow the industry and reduce costs in the long run. In this Chapter we look at the role public procurement can play in supporting local energy, and the Government's new *Code for Sustainable Homes*, which will apply to all homes built by the public sector.

Public procurement

126. Government purchasing power has the potential to leverage enormous support for the local energy industry. Around £150 billion of expenditure each year is defined as public sector procurement, with central Government alone spending £13 billion on goods and services.[192] Last year, the Sustainable Procurement Task Force recommended that the Government should commit to being amongst the leaders within the EU for sustainable procurement by the end of this decade.[193] To achieve this would require a step-change in its current approach. In evidence to us the Minister for Energy supported this approach, and gave the example of the Government's current schools investment programme as an ideal opportunity to build in local energy systems at the start. This approach has the added benefit of enabling schools to engage children in climate change and sustainability issues, and demonstrating how individuals and communities can take action to reduce their carbon dioxide emissions.[194]

127. There is some evidence that the public sector is at long last beginning to integrate local energy systems into its buildings. For example, five new schools in Gateshead being built under the Private Finance Initiative will incorporate solar energy and micro-wind technologies.[195] The Environment Agency's new offices in Wallingford, Oxfordshire, have incorporated around 200m^2 of PV panels, which will provide 20% of the building's electricity needs.[196] In last year's Energy Review report, the Government also pledged itself to achieve carbon neutrality across its office estate by 2012. This is not likely to be achieved without incorporating some forms of local energy.

128. **Government procurement is potentially a powerful lever for implementing its energy policy and can demonstrate its commitment to tackling the causes of climate change. We recommend that, as a first step, procurement policy should seek to**

192 Scottish and Southern Energy, *Response to "Our energy challenge—securing clean, affordable energy for the long-term"*, January 2006

193 Sustainable Procurement Task Force, *National Action Plan*, June 2006

194 Q 573 (Minister for Energy) taken from Trade and Industry Committee oral evidence on the UK's dependency on gas and coal imports, 10 October 2006

195 Scottish and Southern Energy, *Response to "Our energy challenge—securing clean, affordable energy for the long-term"*, January 2006

196 Appendix 20 (Environment Agency)

maximise energy efficiency opportunities. But where appropriate and cost-effective, it should additionally aim to incorporate local energy systems in its infrastructure investment programmes. Public buildings and schools, for example, provide an ideal setting in which to showcase local energy technologies, demonstrate public sector leadership, and help engender greater awareness of the need to reduce carbon dioxide emissions.

The Code for Sustainable Homes

129. One way in which Government can make a direct contribution to promoting the use of local energy is through its housing stock. In December 2006, the Department for Communities and Local Government launched its *Code for Sustainable Homes*. This is designed to set a national standard to guide industry in the design and construction of sustainable homes. It places certain requirements on new build, covering nine design categories including energy use, carbon dioxide emissions, waste, materials, pollution and water conservation. Under the Code, new homes will be given a 'star rating' to indicate their environmental impact. The rating runs from one to six stars. The lowest is a standard that has been set above the current Building Regulations requirements; the highest reflects an exemplar development in sustainability terms. For energy use, the highest star rating will be awarded to homes which are carbon dioxide neutral.

130. The Code is intended as a successor to the Building Research Establishment's EcoHomes rating scheme, which is currently used to assess around 30,000 homes a year. At present, the Code is voluntary for the private sector. Housing built with public money, however, must achieve at least level three of the Code. Under the new conditions, this requires homes to achieve carbon dioxide emissions at least 25% lower than the Target Emissions Rate set out in the 2006 Building Regulation Standards. This could still be achieved through energy efficiency measures in the home. But higher star ratings are likely to require some use of local energy installations.

131. The Government intends the *Code for Sustainable Homes* to act as an indicator of the future direction of Building Regulations, which have themselves been gradually tightened in recent years to require better standards of energy efficiency. In addition, the *Climate Change and Sustainable Energy Act 2006* amended the *Buildings Act 1984* to allow the Government to require local energy systems in all new build in the future, should it choose to do so.[197] These developments should send a clear signal to the construction and local energy industries of the Government's intentions, allowing them time to prepare and increase capacity. Indeed, as costs fall for local energy technologies, this should also be used as an opportunity to tighten energy requirements under the Code.

132. Evidence we received was broadly supportive of the Code, though there was some concern about the transition from voluntary participation of the private sector to enforcement under the Building Regulations. One way of helping the industry to achieve this could be to establish a 'Builders' Obligation' under which large-scale builders would be required to construct a fixed percentage of their homes to meet Code standards each

197 Q 139 (Micropower Council)

year.[198] Additionally, the Micropower Council argues that the Department for Communities and Local Government should set a timetable for incorporation of the Code's standards into the Building Regulations in order to further demonstrate the Government's intentions on future policy for new homes.[199]

133. **The *Code for Sustainable Homes* provides a welcome demonstration of the Government's intentions for future Building Regulations. Standards under the Code should promote greater energy efficiency for all new homes built with public money. Further tightening of the Code in the future should also provide a lever for greater use of local energy installations in new build. We recommend that if costs for local energy technologies fall significantly, relative to energy efficiency measures, or relative to the cost of energy from other sources, the Government should then establish a framework for the incorporation of local energy into future Building Regulations, and that any such framework must place more emphasis on the role of local heat production than has been the case so far.**

198 Appendix 3 (Association for the Conservation of Energy)

199 Appendix 36 (Micropower Council)

7 Adapting the electricity networks

134. For more than half a century Britain has had a centralised electricity network, fed by large power stations. However, in recent years we have seen a growing number of smaller-scale generators connecting to the grid network, locating closer to the point of demand. If local energy capacity increases significantly in the coming years, instead of tens of power stations providing our electricity needs, potentially hundreds of thousands of generators will be connected to the networks. There has been some debate over the implications of such changes for the future of Britain's transmission and distribution systems. Would a significant expansion in local energy capacity do away with the need for a national grid? Could the distribution networks cope with a large number of local energy installations exporting their surplus generation? In this Chapter we look at the origins of the electricity network infrastructure we have today and the current issues it faces. We go on to analyse the implications of greater levels of local energy for both the distribution and transmission systems, before considering the role of long-term planning for network infrastructure.

The origins of our current system

135. In the early decades of the last century, Britain's network infrastructure consisted of a number of geographical zones in which electricity demand was met through localised generation. The foundations for our current network were laid in the 1930s when these zones began linking together to supply each other when in need. This process accelerated following nationalisation of the industry after the Second World War, resulting in the system we have today. Now, 85% of total electricity generation is connected to a high voltage transmission network, which enables electricity to be efficiently transported around the country. From this, electricity flows into lower voltage distribution networks, which then supply electricity to connected customers. The transmission network is operated by National Grid in England and Wales, and by Scottish and Southern Energy and Scottish Power in Scotland. In total, seven companies operate the 14 distribution networks that cover Great Britain.[200]

136. Two underlying economic drivers explain why our network developed in the way it has. First, it allowed central planners to take advantage of economies of scale in generating capacity. In the 1960s and 1970s, larger power stations offered a lower cost per megawatt of capacity than did smaller-scale units. As a result, this period saw the construction of a number of very large power stations, including Drax (3,280 megawatts), Cottam (2,008 megawatts), Didcot (1,940 megawatts) and Longanett (2,304 megawatts), amongst many others. The second main driver for centralisation was the economies of system offered. By supplying all electricity through one transmission network, planners were able to provide greater security of supply, as a lack of capacity in one part of the system could be more easily accommodated by generation elsewhere. As such, the model provided the most cost-effective means of meeting demand.[201]

200 CE Electric UK, Central Networks, EDF Energy, Scottish and Southern Energy, Scottish Power, United Utilities, and Western Power Distribution.

201 Qq 5 (Sussex Energy Group) and 181 (Institution of Engineering and Technology)

Recent developments

137. In recent years, however, changes have occurred, which have begun to challenge the current centralised approach. Technical advances and privatisation have made it cheaper and more advantageous for firms to build smaller power stations better able to respond to demand fluctuations, many of which connect directly to the distribution networks. The same is true with the growing number of onshore wind farms and other large-scale renewables. And, in recent years, policymakers have become aware of the growing potential of local energy sources to contribute a significant proportion of the energy mix in the long-run. These developments have been enabled by advances in network control and information technologies, which have made it easier for distribution network operators to manage generating capacity being connected directly to their systems.[202] In so doing, these changes are beginning to unravel the distribution networks' traditional, essentially passive function.

138. Two further factors underline why this current period could represent a turning point in the development of our energy networks. First, around 30% of the UK's large-scale generating capacity will disappear in the next 20 years as the current nuclear stations are gradually decommissioned, and the EU's Large-Scale Combustion Plants Directive brings about the closure of many coal-fired power stations.[203] Unless the UK implements significant energy efficiency measures in the coming years, this gap will have to be filled. The second major development is the fact that much of the UK's electricity network infrastructure is coming to the end of its design life. The Energy Networks Association estimates that about two thirds of the network will need to be replaced in the near future.[204] Indeed, Ofgem acknowledged this necessity in the most recent Distribution Price Control Review, in which it allowed network operators to increase capital investment by 48% over the five years to 2010. Many commentators, including the Energy Networks Association, argue the current situation provides a unique opportunity to begin installing new technology, which will reduce losses, increase efficiency, and allow more intelligent and 'active' management of distribution networks.[205] In so doing, the system will be better able to respond to a range, and potentially multitude, of new energy sources connecting to it in the future.

Implications for the distribution networks

139. The potential for much greater levels of local energy capacity in the future is one of the primary reasons why operators have begun to think about different approaches to running their distribution networks, which transport electricity from the national grid and supply it to customers. As noted already, the existing structure is based on the assumption that "energy [is] poured in at the top … and simply flows through an ever-branching system until it gets to the final end user".[206] However, local energy systems turn households and

202 Q 5 (Sussex Energy Group)

203 Department of Trade and Industry, *Our Energy Challenge: Securing clean, Affordable energy for the long-term*, January 2006

204 Appendix 59 (Energy Networks Association)

205 Appendices 1 (ABB) and 59 (Energy Networks Association)

206 Q 193 (Institution of Engineering and Technology)

communities into producers as well as consumers of electricity. As such, there will be times when local generation exceeds local demand and the surplus is exported back into the distribution network. This prospect of power, at different times, flowing either way poses a challenge for networks that have, to date, been based on the assumption of electricity moving in only one direction.

140. Because the number of local energy installations is still very small relative to the total level of generating capacity, distribution network operators have been able to accommodate the installations with little difficulty.[207] Concern arises with regard to the possibility of far more local energy systems connecting to the grid in the future. The Energy Saving Trust's recent analysis of the potential of microgeneration has sought to determine the ability of the distribution networks to cope with much higher levels of penetration.[208] It investigated a number of possible areas in which technical difficulties could arise, such as through voltage variation or reverse power flow. The Trust found, however, that while the response to these challenges would require network modifications, there were recognised solutions to all of the issues. In other words, there is no fundamental technical barrier to the expansion of local energy capacity—a view endorsed by Ofgem.[209]

141. Adapting the distribution networks could still come at a cost, though, depending on the level of expansion. For example, the Energy Saving Trust's work estimates that for households installing up to 0.5 kilowatts of generating capacity, it is unlikely that substantial network reinforcement will be required. Above that level, some costs may be incurred, but, it argues, these are much lower than the cost of the actual equipment purchased by the household.[210] These costs will also vary depending on local circumstances. The Energy Networks Association note that where new housing developments are built with local energy systems ready-fitted, their electricity networks can be specifically designed to address any technical issues. Difficulties and costs would mainly arise where there is a high level of local energy take-up in existing buildings where the networks have not been designed for bi-directional power flow.[211]

142. The majority of costs that distribution network operators would incur in accommodating greater levels of local energy relate to increasing their capacity to manage their systems intelligently and more actively in order to balance supply and demand.[212] Since any growth in local energy capacity is likely to be incremental, at least in the short to medium term, this provides scope for the network operators to incorporate active management processes gradually.[213] This should enable companies to experiment with innovative approaches, while also reducing the risk of large investments being stranded because the energy mix has evolved in a way that was not expected. In the 2005 Distribution Price Control Review, Ofgem introduced a number of incentives, which were

207 Q 298 (Energy Networks Association)

208 Energy Saving Trust, *Potential for Microgeneration Study and Analysis*, November 2005

209 Q 505 (Ofgem) in Trade and Industry Committee, Fourth Report of Session 2005-06, *New Nuclear? Examining the issues*, HC 1122; Appendix 42 (Ofgem)

210 Appendix 61 (Energy Saving Trust)

211 Q 308 (Energy Networks Association) and Appendix 59 (Energy Networks Association)

212 Qq 192 (Institution of Engineering and Technology) and 320 (Energy Networks Association)

213 Appendix 32 (Institution of Engineering and Technology)

aimed at encouraging network operators to innovate, and also at facilitating the development of more localised generation. However, take-up of these has to date been slow.[214] This is likely to change, though, if an increasing number of households and communities seek to install local energy systems, and network operators are forced to respond.

143. **The distribution networks have been designed as passive systems, taking electricity from the transmission network and supplying it to customers. Local energy technologies go against this traditional approach because they have the potential to export electricity back into the system. Yet, even for significant levels of market penetration, the evidence suggests there are no technical barriers, with regard to the distribution networks, to the expansion of local energy capacity. However, to accommodate such a change in the energy mix, network operators must invest in new technology to develop more active network management. This will require a significant change in how the distribution networks operate, but the expected incremental growth in any local energy capacity should give the network owners time to respond effectively.**

Implications for the transmission network

144. Consideration of the long-term potential of local energy has led some commentators to speculate about the implications it would have for the transmission network. At face value, an energy system in which all electricity needs were sourced locally would suggest a diminished role for a transmission network for transporting large quantities of electricity over distances. However, as National Grid note this would only be the case were there no need to exchange power between local networks (i.e. they were self-sufficient in all situations) and if there were minimal differences in the cost of producing electricity in each area.[215] This is not likely to be the case even with a very large expansion of local energy capacity. We have seen already in Chapter 2 that particular types of technology are only suited to certain locations. As Dr Jim Watson told us: "even if everybody in the country had a CHP boiler and a PV roof they are not always going to generate at times you want the energy".[216] Combined with the intermittency of some renewable sources and the need for large-scale back-up capacity, this means there will still be a need for a transmission network for balancing demand and supply across the system.

145. National Grid's conclusion is based on analysis of the potential energy systems the UK would need to have in place by 2050 if it were to meet the Royal Commission on Environmental Pollution's target to reduce carbon dioxide emissions by 60%. In its report, the Commission outlined four possible scenarios for meeting the target. In each of these it assumed a major renewables programme, including a significant role for PV panels, and domestic and district-CHP. For all four scenarios, National Grid found that the transmission network remained as necessary as it is today, if not even more so. This conclusion has significant implications. Some of the debate over energy policy in the past year has focused on the apparent choice the UK faces between adopting a centralised or decentralised energy system. National Grid's finding suggests that, in fact, these two

214 Appendix 67 (Sussex Energy Group)

215 Appendix 63 (National Grid)

216 Q 17 (Sussex Energy Group)

approaches are not mutually exclusive. As the Energy Saving Trust said to us: “it is too simplistic to have an either/or”.[217] In other words, new large-scale power stations would not preclude the possibility of a big expansion in local energy capacity at the same time.

146. The continued importance of the transmission network reflects the fact that, although cost reductions for local energy systems may in the future negate the economies of scale for larger power stations, the network is still required to provide economies of system. It enables the diversity between different generation sources to be exploited, and minimises the need for flexible back-up capacity.[218] This is not to say that a large expansion of local energy would not have any impact on the transmission network. For example, National Grid suggests that within-day flows of electricity between the transmission and distribution systems might change from their current pattern, thus requiring the operator to perform its role in a different way from at present. Also, in Chapter 2 we noted that there was some potential for savings from the reduced need for network investment, estimated at £35 million a year by 2020, were local energy to contribute around 10% of the UK’s electricity supply by then.[219]

147. **The UK will still require a transmission network even if there is very large growth in the level of local energy capacity. This is because local energy supply is rarely likely to match local demand exactly. Hence there will be a continued need for a transmission network that can balance electricity flows across regions and maintain security of supply. The capacity needs of the network will depend on the sources of electricity, although some research suggests local energy can make a small contribution to reducing the cost of maintaining and operating the network.**

Planning for the long-term

148. The scale of investment required to replace the large proportion of the infrastructure currently coming to the end of its design life suggests to us the importance of long-term planning to ensure sensible and timely investment. The Energy Networks Association told us that Ofgem needed to place greater emphasis on long-term thinking, and that the structure of the current distribution and transmission price control reviews, every five years, was not necessarily conducive to encouraging companies to look beyond the short-term.[220] In its evidence, Ofgem told us that it did produce 20 to 25-year forward-looking studies at the time of its price control reviews, which it took into consideration in the latter, but admitted that it did not always make it clear that it had done so.[221] The industry has welcomed Ofgem’s commitment in the 2006 Energy Review to publish long-term scenarios of the network implications of different types of generating capacity, including new nuclear build and local energy.[222]

217 Q 244 (Energy Saving Trust)

218 Appendix 63 (National Grid)

219 Department of Trade and Industry, *System Integration of Additional Microgeneration*, September 2004

220 Q 339 (Energy Networks Association)

221 Q 499 (Ofgem) in Trade and Industry Committee, Fourth Report of Session 2005-06, *New Nuclear? Examining the issues*, HC 1122

222 Appendices 58 (EDF Energy) and 59 (Energy Networks Association)

149. **Developing an understanding of the long-term implications for the network infrastructure of different energy technologies, including local energy, is important for ensuring timely and cost-effective investment. This is particularly the case given the potentially long lead times for new grid capacity. We welcome Ofgem's commitment to publish long-term scenarios of network development, and hope the industry will make use of these in planning its investment programme.**

150. **The argument made by some lobby groups, however, that local energy production either renders investment in renewing the grid unnecessary, or will be frustrated by such investment, is not one we accept. Local energy has a potentially important role to play in meeting the UK's carbon dioxide reduction targets and enhancing security of energy supply, but it will take many years to fulfil its potential.**

Conclusions and recommendations

What is 'Local energy'?

1. The focus of this Report is on the various ways in which individuals and communities can produce their own low-carbon energy. Hence, we have used the term 'local energy' to incorporate both microgeneration and community-level energy, whether electricity or heat, that has been produced for own-use. We hope that this more accurate and easier-to-understand term might command general acceptance and recommend that it be adopted in all official government documents. (Paragraph 8)

2. Local energy can be produced in a variety of ways, using either renewable or fossil-fuel sources. Each has the potential to generate energy, whether in the form of electricity or heat, at or very near to the point of consumption. In many cases these are not new energy sources. Indeed, humanity's use of biomass, wind, and hydro energy pre-dates the use of fossil fuels. What is new today is the technology available to harness these sources of energy and the way in which their use in a modern context presents newly perceived benefits by reducing carbon dioxide emissions and contributing to energy security. (Paragraph 15)

3. Overall, local energy currently contributes a very small proportion of the UK's supply of electricity and heat—less than 1%—reflecting the highly centralised structure of our energy system. (Paragraph 33)

Potential of local energy

4. Local energy has the potential to reduce carbon dioxide emissions by displacing the use of fossil fuels, decreasing network losses, and increasing energy awareness amongst users. The scale of these benefits, however, is dependent on the types of technology used and their location. For domestic installations, local heat production such as solar thermal systems or ground source heat pumps will often be just as beneficial as electricity generation. There are some situations involving micro-combined heat and power (CHP) where local energy systems will not necessarily lead to a reduction in carbon dioxide emissions. Moreover, local energy must be considered as part of a multifaceted effort to tackle the causes of climate change, in which there are other means of reducing emissions. In particular, energy efficiency measures offer better value-for-money in the short run. As such, the Government should remain mindful of the underlying cost per tonne of carbon dioxide saved in developing policies to ensure that its approach is cost-effective. (Paragraph 24)

5. Greater use of local energy could, prospectively, increase the security of the UK's energy supplies by drawing on a more diversified range of fuel sources, many of which are renewable. It will still, however, require the presence of backup capacity when local supply fails to meet local demand, and for the time being, this is likely to use fossil fuels. In the future more active network management of the UK's energy systems will be necessary to balance supply and demand and ensure that both small and large-scale generating assets are able to operate cost-effectively. (Paragraph 27)

6. Local energy presents additional economic benefits in terms of tackling fuel poverty and reducing network costs. The extent to which those in fuel poverty can capture these benefits is uncertain, though, because of the current high capital costs of local energy systems. Also, estimates of the total savings on network investment and operating costs are small, and do not of themselves provide a rationale for encouraging local energy. (Paragraph 31)

7. Local energy systems, such as CHP, wind and solar photovoltaics, are only suited to certain locations or consumption patterns. In addition, most local energy technologies are not yet cost-effective, reducing the potential for dramatic take-up in the near future. For community-CHP projects, assessments of the potential vary. Though a large number of urban dwellings would suit this technology, cost-effective implementation is likely to be limited to developments of new build. However, the UK's potential resource of local energy is large. If costs fall, and/or prices of energy from other sources rise, and certain government interventions are put in place, local energy could contribute a sizeable proportion of the UK's energy mix in the long run. One estimate, looking specifically at household installations, puts this in the range of 30 to 40% of our electricity needs by 2050. Local energy is a developing concept with real potential, but it cannot make a significant contribution in the next decade in closing the capacity gap created by the closure of coal-fired and nuclear power stations—local energy is not a panacea that will "keep the lights on". (Paragraph 40)

Barriers to take-up: Planning and Regulatory

8. The requirement of planning permission is a significant deterrent to households wishing to install local energy systems to the exterior of their properties. We welcome the Government's commitment to grant household local energy installations 'permitted development' status and hope there will be no significant delay in agreeing a sensible implementation of the proposal once the consultation is complete. (Paragraph 44)

9. Conflicting incentives to encourage local energy indicate that there is further work for the regulator in ensuring that households receive equitable treatment within the regulatory framework. Ofgem has committed itself to considering these issues as part of the next distribution price control review to apply from 2010. The importance of this issue will increase, however, as more households seek to export electricity to the grid. (Paragraph 47)

Barriers to take-up: Receiving full value for energy produced

10. If the Government is serious about expanding the level of local energy capacity in the UK it must provide consumers with confidence that distribution companies will purchase exported electricity at a reasonable price. We recommend that the Government itself by 1 August 2007 put forward options for consultation. Thereafter, if commercial suppliers fail to put forward an acceptable, household-friendly proposal for rewarding exports in 2007 the Government and Ofgem should use their powers under the Climate Change and Sustainable Energy Act 2006 to enforce an appropriate scheme post haste. We acknowledge the regulator's

preference for a market-based approach to pricing, and the need to keep low transaction costs for commercial suppliers and consumers. However, depending on its level, a feed-in tariff could be used to encourage the development of local energy. (Paragraph 51)

11. To date, it has been difficult for households to be rewarded for the carbon dioxide value of installing local energy systems. Although individuals who fit renewable micro-electricity systems, such as wind turbines, are eligible under the Renewables Obligation to receive a reward for the carbon dioxide savings their generation brings about, the transaction costs of doing so exceed the potential benefit. We welcome changes to the Obligation that will make it easier for households to receive the full value of this reward. We note, however, that the carbon dioxide savings brought about via other forms of local energy, for example non-renewable CHP or micro-heat, are not valued in the same way. We recommend the Government brings forward proposals to amend this anomaly. (Paragraph 58)

Barriers to take-up: Metering

12. If households wish to receive payment for their electricity exports and earn Renewables Obligation Certificates, they must have a meter installed that provides both import and export information. The replacement of meters for households installing local energy systems provides the opportunity for them to install more innovative meters, which also have the potential to promote domestic energy efficiency measures. This could present a possible win-win situation for households fitting local energy systems. Commercial energy suppliers would also benefit from the installation of smart meters in customers' homes, and Ofgem is committed to a market-based approach to their take-up, led by these companies. The UK has no national roll-out of smart metering, unlike other countries, such as Italy. Therefore, whilst encouraging commercial suppliers to offer a choice of innovative metering packages to their customers may be the most cost-effective way to promote usage, this approach will not necessarily lead to a rapid adoption, which is desirable in order to cut carbon dioxide emissions. Hence, we recommend that the Government set a deadline of 1 July 2008 for agreement with the industry on standards and interoperability, in default of which the Government should legislate. (Paragraph 63)

Barriers to take-up: Lack of incentives for commercial energy suppliers

13. Many of the practical barriers faced by households could be overcome if commercial energy suppliers were to offer local energy systems as part of a package of energy services to their customers that also included energy efficiency measures. We support the moves made to encourage suppliers to offer such services. However, because energy efficiency measures are currently a more cost-effective means of reducing demand and, therefore, carbon dioxide emissions, local energy is unlikely to form a significant part of these services in the near future if they evolve within the framework of the Energy Efficiency Commitment. In the short term, however, changes in such areas as the "28 day rule" and administrative arrangements for the Renewables Obligation could encourage commercial suppliers to offer services specifically for those households wishing to install local energy systems. (Paragraph 66)

Barriers to take-up: Lack of information

14. Awareness of the potential of local energy as a viable form of low-carbon energy is currently confined to a niche market. As the market grows, commercial motives will drive higher levels of information provision, but if rapid uptake is considered desirable, the Government will have to play its part in promoting the sector amongst the wider population, targeting initially those groups that are most likely to be able to afford and adopt the technology. (Paragraph 71)

15. For households to make the right choice of local energy system for their home, and gain the full benefit of investing in new technology, they need to have reliable and impartial advice. We support the Energy Saving Trust's move to establish a Sustainable Energy Network to advise households on all aspects of their energy use. If the pilot advice centres prove a success, we recommend that the Government ensures a national roll-out of this service by 31 December 2009. (Paragraph 76)

16. We support the use of a self-regulatory approach by the Renewable Energy Association in developing a Consumer Code, as well as the work of the Buildings Research Establishment on installer accreditation and product certification, and recognise their importance in engendering confidence amongst consumers entering the sector for the first time. We recommend that the Government's new accreditation scheme, with its Consumer Code, be in place by 1 July 2008. (Paragraph 79)

Costs for consumers

17. Most local energy technologies are currently too expensive to have mass market appeal compared to other means of supplying domestic energy needs. Calculation of the payback periods on these technologies is fraught with difficulty and likely to give misleading figures. We are concerned, however, that the published Government figures, particularly for solar water heating panels, are far more pessimistic than any other estimates quoted to us. (Paragraph 83)

18. The expansion of the local energy industry is the key to reducing costs. The Government has in place a popular capital grants scheme, which is in danger of running out of funds before it is due to close in summer 2008. The Government should continue to monitor take-up of the scheme with a view to either rationing funds, or increasing the available monies for the household stream. A stop-start approach to funding could be damaging to the sector's growth. (Paragraph 89)

19. The Government should also conduct a comprehensive review of the way in which local energy is treated within the fiscal system, both at a national and local authority level, with a view to rewarding investment by households, businesses and large-scale generators in low-carbon energy. (Paragraph 89)

20. However, the Government's efforts to encourage households to invest in reducing their carbon dioxide emissions could be undermined by the law of unintended consequences: if improving energy efficiency raises property values, then households may be subject to higher council tax. As a result, we recommend that any increases in property value due to energy efficiency measures, or local energy installations, should not be considered for purposes of re-assessing homes for council tax. (Paragraph 89)

The role of local authorities

21. The London Borough of Merton has set a clear example of how local government can show leadership in promoting the use of local energy in new developments. However, many authorities have failed to follow its lead. The Government should increase pressure on those councils to implement targets for on-site renewables in new developments, with a view to all local authorities having such targets in place by 31 December 2009. This would create consistency for developers and councils across the country. Progress in this area is crucial if local government is to demonstrate its capability to respond to any future policy instruments for tackling the causes of climate change, such as new planning guidance. (Paragraph 96)

22. The experience of Woking demonstrates the importance of leadership at a local level, with individuals having an ambitious vision of how they can directly contribute to reducing their communities' carbon dioxide emissions. Other local authorities should seek to learn from Woking's example in developing and implementing their own strategies for tackling the causes of climate change. (Paragraph 99)

23. The high level of energy consumption in London makes it an important leader in spearheading the greater use of local energy systems in urban areas. The London Climate Change Agency looks set to play a major role in exploiting this potential. We believe the UK's other large cities should seek to adopt similar strategies for tackling the causes of climate change, learning lessons from current experience in London, while also working to develop their own innovative approaches to reducing carbon dioxide emissions. (Paragraph 103)

Community Heating

24. There is some scope for reducing carbon dioxide emissions by encouraging greater use of community-based combined heat and power (CHP). However, while the current schemes to support such systems require a pro-active approach by communities to take advantage of them, a lack of awareness and co-ordination prevents many from doing so. Also, the reward for producing low-carbon heat is much less than that for low-carbon electricity. We accept the potential difficulties of implementing a Renewable Heat Obligation. Nevertheless, we recommend that the Government should look at other ways in which it can provide incentives for local areas to move towards community-based low-carbon heating, where it is appropriate for them to do so. Current policy places too much emphasis on the role of local electricity generation and not enough on the production of heat. Renewable, low-carbon heat production is the Cinderella of energy policy and this attitude must change. (Paragraph 109)

Developing manufacturing and skills capacity

25. The UK's local energy industry is small and focused primarily on installation, with manufacturing occurring mainly abroad. As a result of Government grant schemes, there has been significant growth in recent years, albeit from a very low base, and there are now signs that larger energy companies are beginning to take an interest in the sector. (Paragraph 113)

26. Growth in the local energy industry is likely to be gradual enough for the sector to be able to respond to increased skills needs. The Government's accreditation scheme will help ensure consumers' confidence provided they are aware of it. It is then incumbent on the sector to regulate itself to ensure all its installers are trained and accredited. We recommend that the Government's role should be focused on wider workforce concerns, such as tackling the perceived stigma attached to vocational skills and qualifications. (Paragraph 124)

Further action by central Government

27. Key to the uptake of local energy systems in the long-term will be reductions in their cost so as to secure a mass market. Achieving this requires the Government to demonstrate credible support for the sector to give the industry sufficient confidence to invest in scaling up its activities. Recent policy developments, such as the *Microgeneration Strategy* and the *Climate Change and Sustainable Energy Act 2006*, have gone some way to achieving this. However, the small number of staff responsible for policy implementation in this area at the DTI, and the lack of clarity as to the future of capital grant support beyond 2008, suggest to us there is more to do if the Department intends to fulfil its commitment to support the sector "aggressively". A national target could help achieve this, but should only be used if there is a clear justification for its role in making the industry cost-effective, and if it is underpinned by incentives for its achievement. (Paragraph 121)

28. Government procurement is potentially a powerful lever for implementing its energy policy and can demonstrate its commitment to tackling the causes of climate change. We recommend that, as a first step, procurement policy should seek to maximise energy efficiency opportunities. But where appropriate and cost-effective, it should additionally aim to incorporate local energy systems in its infrastructure investment programmes. Public buildings and schools, for example, provide an ideal setting in which to showcase local energy technologies, demonstrate public sector leadership, and help engender greater awareness of the need to reduce carbon dioxide emissions. (Paragraph 128)

29. The *Code for Sustainable Homes* provides a welcome demonstration of the Government's intentions for future Building Regulations. Standards under the Code should promote greater energy efficiency for all new homes built with public money. Further tightening of the Code in the future should also provide a lever for greater use of local energy installations in new build. We recommend that if costs for local energy technologies fall significantly, relative to energy efficiency measures, or relative to the cost of energy from other sources, the Government should then establish a framework for the incorporation of local energy into future Building

Regulations, and that any such framework must place more emphasis on the role of local heat production than has been the case so far. (Paragraph 133)

Adapting the electricity networks

30. The distribution networks have been designed as passive systems, taking electricity from the transmission network and supplying it to customers. Local energy technologies go against this traditional approach because they have the potential to export electricity back into the system. Yet, even for significant levels of market penetration, the evidence suggests there are no technical barriers, with regard to the distribution networks, to the expansion of local energy capacity. However, to accommodate such a change in the energy mix, network operators must invest in new technology to develop more active network management. This will require a significant change in approach in how the distribution networks operate, but the expected incremental growth in any local energy capacity should give time to respond effectively. (Paragraph 143)

31. The UK will still require a transmission network even if there is very large growth in the level of local energy capacity. This is because local energy supply is rarely likely to match exactly local demand. Hence there will be a continued need for a transmission network that can balance electricity flows across regions and maintain security of supply. The capacity needs of the network will depend on the sources of electricity, although some research suggests local energy can make a small contribution to reducing the cost of maintaining and operating the network. (Paragraph 147)

32. Developing an understanding of the long-term implications for the network infrastructure of different energy technologies, including local energy, is important for ensuring timely and cost-effective investment. This is particularly the case given the potentially long lead times for new grid capacity. We welcome Ofgem's commitment to publish long-term scenarios of network development, and hope the industry will make use of these in planning its investment programme. (Paragraph 149)

33. The argument made by some lobby groups, however, that local energy production either renders investment in renewing the grid unnecessary, or will be frustrated by such investment, is not one we accept. Local energy has a potentially important role to play in meeting the UK's carbon dioxide reduction targets and enhancing security of energy supply, but it will take many years to fulfil its potential. (Paragraph 150)

Formal minutes

Tuesday 16 January 2007

Members present:

Mr Peter Luff, in the Chair

Roger Berry
Mr Brian Binley
Mr Michael Clapham
Mr Lindsay Hoyle
Mr Mark Hunter
Miss Julie Kirkbride
Judy Mallaber
Mr Rob Marris
Anne Moffat
Mike Weir
Mr Anthony Wright

The Committee considered this matter.

[Adjourned till Thursday 18 January at 12.00 noon

Thursday 18 January 2007

Members present:

Mr Peter Luff, in the Chair

Roger Berry
Mr Brian Binley
Mr Michael Clapham
Miss Julie Kirkbride
Judy Mallaber

The Committee considered this matter.

Draft Report (Local Energy—turning consumers into producers), proposed by the Chairman, brought up and read.

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

Paragraphs 1 to 150 read and agreed to.

Summary agreed to.

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

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

Ordered, That the Appendices to the Minutes of Evidence taken before the Committee be reported to the House.

[Adjourned till Monday 22 January at 3.15pm

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Mr Philip Wolfe, **Renewable Energy Association**, Mr Chris Miles, **Econergy**, Mr Andy Paine, **Renewable Energy Systems UK Ltd** and Mr Andrew Lee, **Sharp UK** Ev 11

Tuesday 23 October 2006

Mr Dave Sowden and Mr Neil Schofield, **Micropower Council** Ev 22

Prof John Loughhead, **Institution of Engineering and Technology** Ev 31

Tuesday 30 October 2006

Mr Brian Samuel and Ms Victoria Wiltshire, **Energy Saving Trust** Ev 38

Mr Nick Goodall, Dr Dragana Popovic and Mr Andy Phelps, **Energy Networks Association** Ev 47

List of written evidence

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