

**BERR** | Department for Business  
Enterprise & Regulatory Reform

**MICROGENERATION STRATEGY**

Progress Report

JUNE 2008

## Foreword by Malcolm Wicks

It is just over two years since The Microgeneration Strategy was launched. Since then climate change and renewables have jumped to the top of the global and political agendas. Consequently, it is more important than ever that reliable microgeneration offers individual householders the chance to play their part in tackling climate change.

In March 2006, there was limited knowledge in the UK about the everyday use of microgeneration technologies, such as solar thermal heating, ground source heat pumps, micro wind or solar photovoltaics. Much has changed since then. Thousands of people have considered installing these technologies or have examined grants under the Low Carbon Buildings Programme. Many have installed microgeneration and, in doing so, will have helped to reduce their demand for energy, thereby cutting both their CO<sub>2</sub> emissions and their utility bills.

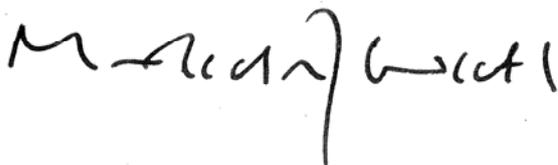
The Government's aim in the Strategy was to identify obstacles to creating a sustainable microgeneration market. I am pleased that the majority of the actions have been completed and this report sets out the excellent progress we have made.

As a consequence of our work over the last two years, we have benefited from a deeper understanding of how the microgeneration market works and how it can make an important contribution to a 60% reduction in CO<sub>2</sub> emissions by 2050. Building an evidence base, for example, from research into consumer behaviour, from tackling planning restrictions and from tracking capital costs, means that we are now in a better position to take forward work on building a sustainable market for microgeneration in the UK.

Delivering the Strategy has meant a great deal of hard work in this and other areas, and means that we are now better equipped to develop and analyse policies which carve out a long-term place for microgeneration in our overall energy strategy. For example, the Heat Call for Evidence has shown that microgeneration heat technologies clearly have a key role to play in decarbonising domestic heating. Other positive outcomes include all electricity suppliers now rewarding exported energy and consumer information in the form of a certification "mark", which covers the whole range of microgeneration products and installers, and will help to build consumer confidence.

We are consulting in the summer on the Renewable Energy Strategy, and later in the year on energy efficiency and all aspects of heat. These consultations will help inform our decisions on how we should support microgeneration going forward...

Finally, BERR's own headquarters is moving towards installing microgeneration, possibly solar thermal and some PV. It has been a steep learning curve for BERR in identifying the real obstacles which can impede these installations, but I look forward to the day when BERR joins the ranks of people and organisations that are generators of energy, as well as consumers.



Malcolm Wicks MP  
Minister of State for Energy

## **Microgeneration Strategy: Progress Report**

The Microgeneration Strategy<sup>1</sup> was launched in March 2006, with the objective of creating the conditions for microgeneration to become a realistic alternative or supplementary source of energy generation. It contains 25 actions to tackle the barriers to widespread uptake of microgeneration.

A steering group was established towards the end of 2006 to drive forward the implementation of the strategy, with membership from across government and industry. They agreed a timetable to complete all actions by Spring 2008.

To date, 21 of the 25 actions have been completed and three have been closed as they were overtaken by other events or measures. The one that remains open will be completed later in 2008.

With the majority of the strategy now fully implemented, and many of the barriers to microgeneration removed, microgeneration policy will more easily be taken forward by the forthcoming Renewable Energy Strategy, Heat Strategy and ongoing policy development.

### **Prior to the strategy**

As outlined in Annex A of the strategy, there were already several measures in place to support microgeneration, including reduced VAT (i.e. 5% rather than 17.5%) on most microgeneration products, capital grants for householders and communities and PPS22 establishing that local authorities may set targets for onsite renewable energy.

However it was clear that there were still a number of barriers. This cross-government strategy drew together individual policy initiatives to ensure a properly co-ordinated approach to taking things forward.

The strategy as a whole was broadly welcomed by Industry when published, and acknowledged to help remove many of the barriers for microgeneration uptake. Bryan Gray of the Micropower Council said the strategy "marks a turning point for industry" that will see microgeneration "contribute significantly to energy policy in the future".<sup>2</sup>

However, there was also some criticism that the strategy didn't go far enough to bring microgeneration into the mainstream. In particular that many of the actions were simply commitments to further study or reviews<sup>3</sup>.

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<sup>1</sup> <http://www.berr.gov.uk/energy/sources/sustainable/microgeneration/strategy/page27594.html>

<sup>2</sup> ENDS report, 30 March 2006

<sup>3</sup> ENDS Report 375, April 2006, pp 44-45

## **Success of the Microgeneration Strategy**

The majority (24) of the 25 actions are now complete or closed. The remaining one is expected to be successfully completed later in 2008.

Some of the key achievements include

- Most household microgeneration installations are now permitted development, and the rest, where permitted development is linked to the Microgeneration Certification Scheme, will follow suit once the process of notification to the EU Commission is satisfactorily completed (i.e. removing the need for specific planning consent)
- The Microgeneration Certification Scheme has recently been launched and, should provide consumers with independent certification of microgeneration products and services and a route for complaints
- The big six energy suppliers, as well as some of the smaller ones now offer export tariffs for excess electricity sold back to the grid. As outlined in Budget 08, Ofgem, EST and energy supplier have committed to providing impartial advice to consumers on obtaining the best financial rewards
- Removal of all the technical barriers identified
- Easier access to Renewable Obligation Certificates (ROCs)

See below for a more detailed discussion of all 25 actions.

There are approximately 100,000 microgeneration installations in the UK, up from an estimated 82,000 at the end of 2004. Since April 2007 there has been a large increase in the number of microgenerators accredited under the Renewables Obligation (RO), from 410 units to 1,329 by 31 March 2008, of which 1047 are represented by an agent.

The strategy as a whole has been largely successful in addressing the barriers to microgeneration – particularly planning and technical barriers. Most individual actions have been successfully delivered. Although there have been some concerns with how a few of the actions have been delivered (e.g. delay in permitted development changes, Certification scheme), the overall objective of these actions is widely welcomed. The Micropower Council recently said “The microgeneration strategy contains many of the policies necessary to help bring about market transformation if they are successfully implemented”<sup>4</sup>.

However, there is still work to be done to ensure that the conditions for microgeneration being a realistic option are improved – especially in ensuring good information provision, and further work to address the costs of microgeneration (both upfront costs and ongoing rewards). This is in part due to some of the actions not going as far as they could, for example, there was a commitment to assessing current consumer communications, but there was no commitment to developing a communications package. However the

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<sup>4</sup> Micropower Council. State of the Nation report, Nov 07

strategy has laid the groundwork in these areas. For example, the LCBP is helping with upfront costs; easier access to ROCs and better export tariffs provide ongoing support. In addition, work to understand current information gaps and better understand consumers' information needs have been useful in developing EST's Act on CO2 advice service. There is further discussion below of how these areas of work will be taken forward.

### **Other Developments**

Since the microgeneration strategy was launched in March 2006, the idea of microgeneration has caught the public attention and there have been a number of other developments to support microgeneration, alongside the strategy:

- Building Regulations are a potentially useful tool for encouraging the incorporation of microgeneration technologies in new build. The Government announced in 2006 that all new homes will be zero carbon by 2016 with a major progressive tightening of the energy efficiency building regulations - by 25% in 2010 and by 44% in 2013 - up to the zero carbon target in 2016. The definition of a zero carbon home will be agreed by end 2008 following a consultation
- As announced in budget 08, all new non domestic buildings will be zero carbon by 2019 and all new public sector buildings to be zero carbon by 2018. This is in addition to Government's earlier commitment that all new schools be zero carbon from 2016. Government is looking at extending permitted development rights to non-domestic buildings and will consult on this in the summer
- Under the Energy Bill microgeneration support will increase from 1 to 2 ROCs per MWh of renewable electricity generated
- The Energy White Paper confirmed our commitment to ensuring a comprehensive picture of all the options, costs and benefits. The Energy Saving Trust's Act on CO2 advice service includes microgeneration alongside other carbon saving information and advice for householders including energy efficiency, transport, water and waste
- As announced in Budget 08, Government will be working with Energy Saving Trust, Ofgem and energy suppliers to provide this information impartially to consumers on obtaining the best financial rewards from microgeneration
- Microgenerators do not have to pay tax on any income they get from the sale of surplus electricity back to the grid or from Renewable Obligation Certificates
- Zero carbon homes of value up to £500,000 are exempt from stamp duty payments, and certified microgeneration installations benefit from a reduced rate of VAT
- Government also announced at pre-Budget report 2007 that, subject to state aid clearance, microgeneration investments will not be included in ad hoc re-assessments of business rates liability from 2008

## **Next steps**

Much has been achieved through the delivery of the Microgeneration Strategy. However, more can be done to further encourage uptake. Two of the biggest remaining barriers are cost and lack of information, and these issues are being considered by the Renewable Energy Strategy and subsequent consultations and the EST Act on CO2 advice service.

We will publish our new Renewable Energy Strategy (RES) in Spring 2009 following a consultation this summer, and will be consulting further in the autumn on low-carbon heat within the context of energy efficiency and distributed energy. The RES will focus on measures needed to meet the UK's share of the EU target of 20% renewable energy by 2020, but will also consider our longer term renewable and carbon targets. The strategy will consider a range of renewable technologies, including microgeneration. This will be a great opportunity to embed microgeneration in overall renewable energy policy and increase its prominence as an important part of the UK's energy generation mix. The Autumn Heat Strategy consultation will focus on potential low-carbon solutions to decarbonising heating and cooling usage, in particular, on CHP, district heating, surplus heat and the role of heat in a carbon market. Results of the autumn consultation will feed into the development of a Heat Strategy to be published alongside the RES Strategy.

The EST Act on CO2 advice service was launched on 2<sup>nd</sup> April 2008. The service includes microgeneration alongside other carbon saving information and advice for householders including energy efficiency, transport, water and waste. This service represents a step change from the original energy efficiency advice centres. In addition to expanding the scope of advice the centres offer, they will provide a much more comprehensive proactive service. Each centre will conduct detailed market analysis of their territories and will allow more proactive targeting, in-depth support and local promotional activity. They will also work with local and regional government, local businesses and community groups.

Although these programmes take work forward to address the main remaining barriers, there may be other things that could be done to help increase the uptake of microgeneration. For example, following on from the inclusion of microgeneration in CERT, work continues on development of the Suppliers Obligation (SO, which replaces CERT from 2011) and how that will accommodate microgeneration. As mentioned in action 21, Government is committed to making a decision by 1<sup>st</sup> November 2008 about whether or not to designate microgeneration targets.

The momentum gained from the microgeneration strategy and the knowledge and expertise shared in the bringing together of key government officials and representatives from the microgeneration industry will be invaluable in taking forward individual actions not captured by the Renewable Energy and Heat Strategies, as they arise.

**Progress of the 25 actions**

	<b>Action</b>	<b>Complete / closed</b>	<b>Expected completion date</b>
	<b>Cost constraints</b>		
1	Research into consumer behaviour and what drives early adopter purchase decisions	Complete	
2	BERR to publish details of how the extra £50m LCBP money will be spent	Complete	
3	Clear guidance covering ROCs, LECs and REGOs, including the benefits of each and how to claim them	Complete	
4	BERR to respond to two reports published by the DGCG on the accrual of ROCs, LECs and REGOs		2008
5	Energy suppliers to develop a scheme to reward microgenerators exporting excess electricity	Complete	
6	Defra to look at including electricity generating technologies in EEC	Complete	
	<b>Information constraints</b>		
7	Development of Certification scheme	Complete	
8	Review of consumer information	Complete	
9	Investigate possibility of microgeneration on BERR estate	Complete [although now re-opened]	
10	Information needs of planning officers	Complete	
11	Energy measures report for local authorities	Complete	
12	Communications package for construction industry	Complete	
	<b>Technical constraints</b>		
13	Networks able to cope with more microgenerators exporting electricity	Complete	
14	Contracts with electricity companies not hindering take-up of microgeneration	Complete	
15	Wiring regulations not forming a barrier to take-up	Complete	
16	Investigate possibility of field trial for smart meters	Closed [didn't happen, but links with other trials developed]	
17	Examine recommendations in report on technical barriers	Yes	
	<b>Regulatory constraints/opportunities</b>		
18	View about facilitating microgeneration in General	Complete	

	Permitted Development Order (GPDO)		
19	Urgent review of local plans for inclusion of PPS22 policies	Complete	
	<b>Other</b>		
20	Develop a scheme for installing microgeneration in schools	Closed [didn't happen but LCBP phase 2 includes focus on schools]	
21	Research into future potential of microgeneration to help inform decision on targets	Complete	
22	Map of R&D funding	Complete	
23	Route maps for each technology	Complete	
24	Explore with Sector Skills Councils what more can be done to ensure skills base develops	Complete	
25	Ofgem decision document on their consultation	Complete	

## **Completed Successfully**

Action 1: Research into consumer behaviour and early adopter purchase decisions

Action 21: Research into future potential of microgeneration to inform decision on whether microgeneration targets are required; and BERR, as part of a consortium including RDA's, NGO's and elements of the microgeneration industry commissioned research into these areas which was launched on 2<sup>nd</sup> June. The research examined barriers and drivers for uptake, and modelled the impact of different policies<sup>5</sup>.

The aim of this research and analysis was to provide a robust evidence base to inform the future direction of microgeneration policy. The market for microgeneration is changing rapidly, and up to date analysis of consumer demand, costs and the supply potential is needed in order to inform policy decisions. We also have a statutory commitment to consider by November 2008 whether or not to set microgeneration targets and this research will form a key part of the evidence base.

Defra published some research on public understanding of sustainable energy consumption in the home in 2007<sup>6</sup>. It found that most people were open to the idea of microgeneration in principle but very few had much knowledge, and that cost was the biggest obstacle.

A joint Energy Saving Trust / Open University study on early adopters found that they were driven by CO2 savings, the desire to use low carbon energy and savings on fuel bills<sup>7</sup>.

Action 2: Low Carbon Buildings Programme Phase 2

Just before the microgeneration strategy was published, an extra £50m was announced in Budget 06 to supplement the original £30m Low Carbon Buildings Programme, to help fund the installation of microgeneration in a range of public and third sector buildings. The strategy committed to publishing details of how this will be spent. LCBP Phase 2 was launched in December 2006 with full details on the website<sup>8</sup>. Take up of grants has been slower than anticipated, with approximately £10m committed to date. However, after identifying that upfront costs still remain a barrier to the installation of microgeneration technologies, grant levels for all technologies were increased to 50% in April 2008. Through higher grant levels and a nationwide promotional campaign from April to June 2008, we expect an increased uptake in grants.

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<sup>5</sup> [www.berr.gov.uk/energy/microgenerationresearch](http://www.berr.gov.uk/energy/microgenerationresearch)

<sup>6</sup> <http://www.defra.gov.uk/environment/business/scp/research/themes/theme3/sustain-consump0607.htm>

<sup>7</sup> Yimby Generation - Yes in my Backyard!

<http://www.energysavingtrust.org.uk/uploads/documents/aboutest/OUESTmicrogen.pdf>

<sup>8</sup> [www.lowcarbonbuildingsphase2.org.uk](http://www.lowcarbonbuildingsphase2.org.uk)

Action 3: Clear guidance on green energy certificates including the benefits of each and how to claim them

Renewable Obligation Certificates (ROCs), Levy Exemption Certificates (LECs) and Renewable Energy Guarantee of Origin (REGOs) are the three types of green energy certificates that generators of electricity from renewable sources are entitled to claim subject to eligibility. A brief guide summarising the main differences and benefits of these was published mid 2007<sup>9</sup>.

Action 5: Energy suppliers to develop a scheme that will reward microgenerators for exporting electricity

The Climate Change and Sustainable Energy Act gives Government powers to ensure that energy suppliers offer a price to microgenerators wishing to sell excess electricity to the network; the window for using this power is open from 21 August 2007 until 21 August 2009. The decision whether or not to step in will be considered with the broader picture of financial support for renewable technologies as part of the Renewable Energy Strategy.

All six major energy suppliers now provide and have published export tariffs, as have some smaller companies. We are seeing tariffs offered of up to 18p/kWh for solar PV.

In the 2007 Budget, the Chancellor requested Ofgem to review the effectiveness of the market for exported electricity from microgeneration. This review<sup>10</sup> was published alongside Budget 08 and finds that suppliers are offering fair value export offers for households wanting to sell back surplus power, given the infancy of the market, but would be improved by better provision of information to help customers find the best deal to suit their circumstances and easier access to financial incentives. The Government will be working with the Energy Saving Trust, Ofgem and energy suppliers to provide this information impartially to consumers.

Meanwhile, government has made a number of changes to make it easier for microgenerators to claim ROCs and proposed that microgenerators will be able to claim 2 ROCs for every 1MWh of renewable electricity generated (see Action 4).

Action 6: Consider the inclusion of electricity generating microgeneration technologies in the next phase of the Domestic Supplier energy efficiency obligation.

Through the Climate Change and Sustainable Energy (CCSE) Act, the Energy Efficiency Commitment (EEC) was modified to allow suppliers to consider carbon reduction rather than energy efficiency, thus allowing microgen technologies to play a role. The third phase of EEC, known as the Carbon

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<http://www.berr.gov.uk/energy/sources/sustainable/microgeneration/strategy/implementation/certificates/page39834.html>

<sup>10</sup> <http://www.ofgem.gov.uk/Sustainability/Environment/Policy/SmallGens/DomsScMicro/Pages/DomsScMicro.aspx> and [http://www.ofgem.gov.uk/Media/FactSheets/Documents1/microgenupdate\\_march08.pdf](http://www.ofgem.gov.uk/Media/FactSheets/Documents1/microgenupdate_march08.pdf)

Emissions Reduction Target (CERT)<sup>11</sup> will run from April 2008 to March 2011. CERT aims to deliver cost effective and equitable carbon reductions in the household sector through an obligation on energy suppliers to reduce carbon emissions from their customers. CERT encourages the promotion of the installation of microgeneration by a ring-fence for demonstration and market transformation actions of no more than 6% of a supplier's obligation. However, where a supplier promotes microgeneration measures as part of its market transformation action and microgeneration accounts for at least 2% of a supplier's obligation, the overall ring-fence is increased to 8%. Through this, CERT looks to demonstrate the potential of microgeneration technologies and to stimulate the market by driving up demand which in turn will lead to price reductions, making it more accessible across the board.

There are some concerns that CERT will not provide support to a number of microgeneration technologies, in particular wind and PV, and that CERT will not provide equivalent support for some technologies when the Low Carbon Buildings Programme finishes. With CERT expected to deliver £3.7 billion of investment over three years, 2% of this would mean £74 million for microgeneration technologies. Defra, BERR and EST are committed to work with energy suppliers to ensure that they take advantage of the opportunities CERT provides to promote microgeneration.

The 2007 Energy White Paper reaffirmed the Government's commitment to maintain some form of obligation on household energy suppliers until at least 2020, with an ambition level at least equal to that under the Carbon Emissions Reductions Target.

We are still exploring how the post-CERT Supplier Obligation will operate and as part of this we will consider what these options mean for microgeneration

#### Action 7: Development of Microgeneration Certification Scheme (MCS) for products and installers

The Microgeneration Certification Scheme (MCS) is designed to provide consumers with independent certification of microgeneration products and services and a route for complaints. It is seen as a key plank in building a sustainable industry for microgeneration. It was originally intended that MCS would be in place by the end of 2006 but, due to difficulties in bringing together key stakeholders to move the work forward, this deadline was missed and the scheme started accepting installer registrations from mid 2007.

There are currently over 400 installers registered. Of these, approximately 180 have been assessed and over 50 certificates issued. New products have been assessed since February 2008. MCS installers will have to sign up to a Code of Practice which meets guidelines set by the Office of Fair Trading's (OFT's) Consumer Code Approval Scheme. The REAL Assurance Scheme (Renewable Energy Assurance Limited) is the only such code operating in the

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<sup>11</sup> <http://www.defra.gov.uk/environment/climatechange/uk/household/eec/index.htm>

sector at present, and has completed Stage 1 of the OFT's consumer codes scheme and is working towards stage 2. The scheme's purpose is to ensure that contractors offer consumer protection including complaints handling and a comprehensive performance prediction for products to prevent mis-selling.

BRE Global were appointed as developers and technical managers of MCS, following an EU wide tender process. There have been a number of challenges in getting to this stage including engaging the industry, issues around cost and the complexity of the scheme and transition from the previous certification schemes. However, stakeholders are broadly supportive of the intent of the Scheme and continue to work with BERR through the MCS Steering Group to address the outstanding issues.

BRE Global has now achieved UKAS accreditation for MCS, covering installers, solar collectors, solar photovoltaic panels, micro and small wind turbines and heat pumps. BRE Global is applying for biomass to be added. The Scheme's mark is currently being registered in the UK for use by installers and manufacturers.

Membership continues to grow and MCS will be a core part of the consumer promotion activities going forward. The scheme is a key element of Low Carbon Building Programme (LCBP) grants, the Carbon Emissions Reduction Target (CERT), General Permitted Development Order (GPDO) and wider policy measures. For instance, permitted development of micro wind turbines and air source heat pumps are being linked to the Certification Scheme

MCS anticipates the draft EU Renewables Directive which will require Member States to set up national harmonised microgeneration certification schemes and training courses for installers, to ensure free movement of goods and services

Action 8: Review of existing consumer information to assess effectiveness and identify gaps, and assess feasibility of a communications campaign

A review of website information was conducted in early 2007, confirming lack of comprehensive and user-friendly information on microgeneration. Some, such as comparative information and advice across technologies does not exist, and where useful information is available it is not comprehensive or can only be found by searching a variety of places. These findings mirrored the responses to the consultation prior to the microgeneration strategy and were supported by the results of the Distributed Generation Review call for evidence.

These findings fed into our Energy White Paper commitment to ensuring that improved information on distributed energy, including microgeneration, provides a comprehensive picture of all the options, costs and benefits to help accelerate the take up of the technology and realise the benefits that it can bring.

The Prime Minister announced in 2007 that EST's Act on CO2 advice service would be rolled out nationally from April 2008 and would be expanded to include microgeneration information and advice to householders alongside other carbon saving information energy efficiency and advice for householders including energy efficiency, transport, water and waste. Discussion is ongoing to shape this service.

Action 9: DTI (now BERR) will actively investigate possibilities for installing microgeneration on BERR estate

Insolvency Service in Bloomsbury Square (part of the BERR family) has 25.4kW PV installed. Recognising that government departments are in a good position to lead the way in demonstrating microgeneration technologies, BERR commissioned a feasibility study for installing microgeneration on its own estate. This study by the Carbon Trust and Future Energy Solutions was completed in Autumn 2006 and suggested that solar water heating or wind turbines could be a viable option, subject to technical and economic considerations, on the main BERR building. The Carbon Trust is updating the feasibility study and BERR is assessing quotes for installing solar thermal and solar PV panels on the roof. In addition, wind speeds are being looked at to assess the feasibility of installing wind turbines.

We continue to work with other government departments to encourage them to take advantage of grants available through phase 2 of the Low Carbon Buildings Programme. The central government estate has a target of being carbon neutral by 2012.

Action 10: Identify and assess the information needs of planning officers, and develop a communications pack if required

A formal assessment of the information needs of planning officers was not carried out. It was agreed that information should be designed to coincide with the changes to the General Permitted Development Order (GPDO) in early April 2008. The planning portal<sup>12</sup> is the main tool, as it is a primary source of information for planning officers, and also where consumers can find out more about planning permission and access application forms. Interactive guidance showing what is acceptable as permitted development for the different technologies has been produced for householders. Some local authorities are running events to inform their planning officers about these changes and about microgeneration more generally. The Micropower Council and CLG will shortly roll out a joint industry and government roadshow which will promote permitted development changes and other relevant aspects of planning and new build policies, in combination with an introduction to the technologies.

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<sup>12</sup> [www.planningportal.gov.uk](http://www.planningportal.gov.uk)

Action 11: DTI (now BERR) and other government departments to publish an energy measures report for local authorities published

This report entitled 'Energy measures report - Addressing climate change and fuel poverty: Energy measures information for local government'<sup>13</sup> was published in September 2007, in compliance with the Climate Change and Sustainable Energy Act 2006. It sets out the steps that local authorities can take to improve energy efficiency, reduce greenhouse gases, increase levels of microgeneration and other low carbon technologies and reduce the number of households living in fuel poverty. The act also requires that local authorities must 'have regard' to the report when exercising their functions. The report pulls together existing sources of help and advice to local authorities on climate change and fuel poverty into one single document and provides good practice case studies.

Action 12: Communications package for the construction industry developed if needed to help develop a knowledge base within the construction industry

Brainstorming sessions were held in June 2007 with representatives from the industry about whether there was a need for further information about microgeneration for the wider construction industry. There was unanimous agreement that much information already exists (for example through SAP and EST documents) and that the zero carbon homes policy and certification scheme would fill many of the gaps.

Another significant area of work to successfully target the construction industry is the Carbon Trust promotion of LCBP phase one larger scale projects such as housing associations, schools and commercial organisations. The aim is to develop case studies for each of the 23 larger scale projects, beginning with short documents capturing the aspirations, and progressing to full case studies on building completion and even capturing post occupancy behavioural changes. These will focus on the business case for energy efficiency and microgeneration and can form part of the programme being developed to imbed the joint industry / Government Strategy for sustainable construction launched on 11 June. It is anticipated that initial summaries will be on the LCBP website soon, with full case studies for all projects completed in 2010. Phase 2 of LCBP will also be looking at a range of case studies, in community settings such as schools, housing associations and charitable organisations and in public buildings. These will also be completed in mid 2009 and published on the LCBP website.

Although there was consensus amongst these sessions and with the steering group that these measures would address the majority of the information gap, it was agreed that there is still a need for basic guidance and information in digestible form, onsite information for installers and specific information for the retrofit/non-domestic markets. Although lack of resources meant that this information stream was not progressed here, information for

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<sup>13</sup> <http://www.berr.gov.uk/energy/environment/measures/page41270.html>

the construction industry in being looked at as part of the Renewable Energy Strategy.

Action 13: Work to ensure network and market systems able to cope with growing numbers of microgenerators exporting electricity

'Accommodating Distributed Generation' was published alongside the Energy Review in 2006<sup>14</sup>. This found that 18% domestic penetration of microgeneration could be easily accommodated. In basic terms, as long as distributed generation uptake happens gradually, networks can be upgraded accordingly. The Distributed Generation (DG) Review published alongside the 2007 White Paper will take forward any further work in this area<sup>15</sup>.

Action 14: DTI (now BERR) will continue to work with Ofgem, the distribution network operators, energy suppliers and the microgeneration industry to ensure Network connection contracts aren't hindering the take-up of microgeneration

When the strategy was written, there were still a significant number of contracts in existence between domestic customers and their electricity supplier which required permission from the Distribution network Operator prior to connecting. This was despite previous changes designed to make this easier. This issue was resolved in 2006 through the Electricity Networks Strategy Group<sup>16</sup>.

Action 15: BERR to work with Ofgem, the distribution network operators, energy suppliers and the microgeneration industry to ensure that wiring regulations do not form an unnecessary barrier to take-up of microgeneration  
Guidance for electricians about connecting microgeneration equipment was published at end June 2007 on the Electrical Safety Council website<sup>17</sup>. The most recent edition of the wiring regulations<sup>18</sup> was published in January 2008 and will become mandatory for electrical installations in July. The regulations were informed by the guidance and include significant additional regulatory guidance on the connection of generators into existing installations in parallel with the mains supply.

Work continues to ensure further developments are supportive of microgeneration.

Action 17: Examine recommendations in a report on technical barriers to connection and assess desirability of their implementation

The Small Generator Connection Survey published in 2006, looked at the difficulties being faced by small generators when connecting to the distribution network<sup>19</sup>. The report made 6 recommendations to overcome the barriers. Four of these were taken forward by Work Programme 4 (WP4) of

<sup>14</sup> <http://www.berr.gov.uk/files/file31648.pdf>

<sup>15</sup> <http://www.berr.gov.uk/files/file39025.pdf>

<sup>16</sup> <http://www.dcusa.co.uk/Public/Default.aspx?ReturnUrl=%2fDefault.aspx>

<sup>17</sup> Best Practice Guide - [http://www.electricalsafetycouncil.org/pdf/BPG3\\_08.pdf](http://www.electricalsafetycouncil.org/pdf/BPG3_08.pdf)

<sup>18</sup> BS7671:2008 (The Requirements For Electrical Installations) The 17<sup>th</sup> Edition of the Wiring Regulations

<sup>19</sup> <http://www.berr.gov.uk/files/file29963.pdf>

the Energy Networks Strategy Group. The other two were already being taken forward by other BERR workstreams.

Action 18: ODPM (now CLG) work under the Housing Development Consents Review will provide a response to the Climate Change and Sustainable Energy Act's requirement to form a view as to what provision would be made to facilitate the installation of microgeneration

Since April 2008 most household microgeneration installations which have little or no impact beyond the host property will be permitted development (i.e. removing the need for specific planning consent). No official figure for the numbers of microgeneration applications held up in the planning system exists, however information provided by trade associations suggests that is that this is a substantial barrier and this change is well received. CLG's impact assessment (IA) suggested that these changes will save approximately £875 per installation<sup>20</sup>.

Due to concerns about noise and vibration issues, permitted development for micro wind and air source heat pumps is being linked to the Microgeneration Certification Scheme. As a result the General Permitted Development Order (GPDO) Statutory Instrument for these technologies needs to be notified to the EU Commission under the technical standards directive. We expect this to be completed later in the year.

These changes are acknowledged to have gone beyond what was originally expected in the strategy and have been very well received. These changes have been implemented as soon as practicable once it became clear that further technical and legal work was needed in connection with micro wind and air source heat pumps.

Action 19: ODPM (now CLG) to undertake an urgent review of local plans to determine whether there is a problem with emerging plans that do not fully incorporate PPS22 policies

In June 2006 Yvette Cooper reported on an examination of plans which had come forward since Planning Policy Statement (PPS) 22 was published to establish how many contained a policy expecting a percentage of the energy to be used in new residential, commercial or industrial developments to come from on-site renewables. 39 out of the 69 plans which could reasonably have been expected to include such a policy did so. Subsequently, the Town and Country Planning Association (TCPA) published their own survey highlighting, "an impressive surge in onsite renewable policies". This suggested that more than 170 local authorities were "working up policies to require developers to generate clean, safe energy onsite in new developments." Policies vary in their scope and the scale to which they are applied.

Building on the policy in PPS 22, the review of plans incorporating PPS22 policies (including the TCPA survey of local planning authorities), and a wide-

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<sup>20</sup> <http://www.communities.gov.uk/publications/planningandbuilding/microgenerationia>

ranging consultation on a draft PPS, the government published in December 2007 new planning policy on climate change<sup>21</sup>. This puts tackling climate change at the centre of what Government expects from good planning and challenges councils to do more to support delivery of local renewable or local low-carbon energy. Supplying new developments with local renewable and low carbon energy is given a boost through its 'Merton-Plus' policies. These expect all local planning authorities to have a council-wide target (like existing Merton rules) for decentralised and renewable or low-carbon energy to supply new developments and, additionally, tailored targets for sites where there is greater potential for using decentralised energy. Targets should be flexible enough to consider community schemes (for example, wind turbines serving more than one site or CHP schemes such as in Woking town centre) as well as building specific technologies.

Action 22: R&D Funding map and guidance for applying

Funding sources that could potentially be used for microgeneration R&D were compiled into a guide and published<sup>22</sup> on the BERR website at the end of 2006 and most recently updated in December 2007. It is recognised that funding streams change, so the document remains general and links to other sources of information. There has been limited feedback, but that received has been positive.

Action 24: Work with Sector Skills Councils (SSCs) to ensure development of skills base

The government worked with SummitSkills, one of the SSCs, to develop National Occupational Standards (NOS) for Environmental Technologies, which includes microgeneration, and this work was completed at the end of March 2008. As a result, we now have standard competences for microgeneration technologies, which can be integrated into existing qualifications and, where necessary, new Scottish and National Vocational Qualifications.

The Microgeneration Certification Scheme has fed into that work to align MCS product and installation standards with NOS. Also the Department for Communities and Local Government is working on Minimum Technical Competences for microgeneration to amend and update assessment certification processes for Competent Person Schemes. There are a number of activities taking place and we hope to see a step change as these work streams come together over the next few months.

As committed in the Energy White Paper, all Regional Development Agencies (RDAs) are working with partners, including Sector Skills Councils, to support the development and delivery of the skills needed for the wider deployment of sustainable energy technology and services, including microgeneration. While all regions are making progress, the level of support for microgeneration skills and the current priority given to microgeneration

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<sup>21</sup> <http://www.communities.gov.uk/publications/planningandbuilding/ppsclimatechange>

<sup>22</sup> <http://www.berr.gov.uk/files/file36323.pdf>

support *per se* varies across the RDAs. For example, some RDAs are reviewing energy skills, and others are developing training programmes.

Other achievements to date include the SummitSkills report identifying the extent of microgeneration training for installers and system designers, with several accredited courses now available<sup>23</sup>, SSC development of Sector Skills Agreements and actions to address skills gaps.

Action 25: 'Ofgem and Microgeneration: Next Steps' document published  
Ofgem held a consultation in 2005 on some of the regulatory aspects of how microgeneration technologies interact with the existing energy system. In the microgeneration strategy, Ofgem committed to issuing a decision document on this consultation and other regulatory barriers raised in the strategy. The report 'Ofgem and Microgeneration: Next steps'<sup>24</sup> was published in October 2006, outlining a number of areas where they felt action needed to be taken to remove regulatory barriers to microgeneration.

Many of these things have now been progressed, including simplifying the process for connections, removing Use of System (UoS) charging on domestic scale microgeneration exporting back onto the local network:

- The Distribution Connection and Use of System Agreement (DCUSA) introduced in October 2006 supports the plug-and-play solution for domestic scale microgenerators to connect to the network without advance notice or any requirement to seek permission.
- Use of system charges were introduced for new generators in 2005. However, for domestic microgeneration, distribution companies do not have charges (or credits) for exporting units.

### **Closed because overtaken by other events/asures**

Action 16: Investigate possibility of a field trial of smart meters and microgeneration

A trial specifically looking at smart meters and microgeneration was not undertaken due to lack of funding. However a BERR/Ofgem energy demand research study is looking at smart meters alongside billing, real time display and energy efficiency information. The trials are currently underway in 42,000 households of which 16,000 have smart meters and 8000 have real-time display units. Although this study is not looking specifically at microgeneration, such as monitoring exported electricity, many of the issues are relevant to microgeneration. The results should provide information on behavioural changes and their durability, a breakdown of observed reductions in consumption (e.g. between those that are due to the way people use heating, lighting etc, and those due to other energy efficiency measures) and an assessment of the impacts on different households. The trials will last

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<sup>23</sup> <http://www.summitskills.org.uk/renewables/344>

<sup>24</sup> <http://www.ofgem.gov.uk/Sustainability/Environment/Policy/Documents1/15691-MicroOctFINAL.pdf>

around two years, with final reporting complete in 2010. Interim results will be available on the BERR website<sup>25</sup>

Action 20: Development of scheme for installing microgeneration in schools

One of the most effective ways to engage the interest of children in the energy agenda is through interaction with new technologies and the Microgeneration Strategy recognises the importance of educating and engaging children through their schools. Development of a targeted scheme especially for schools was explored, although due to difficulties in engaging with industry a new scheme with this particular focus was not developed.

However, phase 2 of the Low Carbon Buildings Programme makes £50 million available to public sector and charity organisations, including schools, to install microgeneration products. Proposals to proactively target and work with schools formed part of the requirements for inclusion in the phase 2 framework suppliers. We have seen particular successes with matched funding opportunities under phase 2, and following the announcement that all technologies will receive 50% funding (1 April 2008) we are confident that more opportunities will arise. For example, Solar Century formed a partnership with the CoOp Bank to provide free solar PV installations to 130 schools across the UK. Nearly a quarter of applications to LCBP Phase 2 to date are from schools.

In addition, large and small scale renewable energy systems are being installed as the government's schools capital programme is rolled out. The government's aim is to rebuild or refurbish all secondary schools and 50% of primary schools over the next 15 years, and has set an immediate target to reduce carbon emissions from all new school buildings by 60%. Further, the Department for Children, Schools and Families' Children's Plan, which was published in December 2007, set an ambition for all new school buildings to be zero carbon by 2016 and a taskforce will be established to advise on how this can be achieved.

Action 23: Route maps developed for each technology

The strategy committed to a route mapping of all technologies. The aim of the route maps exercise was to set a clear vision for each technology (including R&D), identify current status, look at the challenges to moving forward and possible actions to tackle them.

We kicked off this work on technology specific route maps for wind, ground source heat pumps, solar thermal, PV, biomass and small scale hydro at the REA conference in May 2007. The micro CHP industry initiated a separate process in January 2008 to begin work on a route map for that technology along similar lines to the REA conference, which is due to report in the summer 2008. It will benchmark the micro CHP industry status and

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<sup>25</sup> <http://www.berr.gov.uk/energy/environment/smart-metering/demand-project/page45556.html>

identify issues and risks going forward. This work will support engagement with stakeholders and development of a workplan to move the micro CHP industry forward.

We did not include air source heat pumps or fuel cells in the work on route maps, although there was a route map developed by Fuel Cells UK in 2005, which needs updating.

As a result of the initial work at the REA Conference, we have 6 technology specific documents setting out the barriers to sector growth and proposals for action. These documents have been pulled together in a report<sup>26</sup>, which draws out generic issues and summarises the findings. It will be used to further inform the Renewable Energy Strategy. It is acknowledged that this work presents only a start and further considerations are required with a greater focus on R&D.

### **Not yet completed**

Action 4: DTI (now BERR) to investigate all the suggestions outlined in two DGCG reports on accrual of green energy certificates and publish a formal view by end 2006

Two reports on the accrual of ROCs, LECs and REGOs were published in 2005<sup>27</sup>. The reports identify the difficulties faced by microgenerators wanting to claim ROCs, LECs and REGOs and suggest possible options for change – one report focussed primarily on administrative burdens, and the other considered deeming of ROCs – where generators are deemed to have generated a specific amount of generation without having to take a meter reading.

The majority of the recommendations in the report on administrative burdens have now been implemented and a government response to this report published although this was some time after the original deadline of Dec 2006<sup>28</sup>. These changes along with others include a simplified accreditation form, allowing monthly or annual ROC claims, the introduction of agents to represent microgenerators and allowing these agents to amalgamate the output of data of many microgenerators for the purposes of claiming ROCs thus enabling the microgenerators to obtain a better price. We have also announced that under proposed reforms to the RO, microgenerators will be able to claim 2 ROCs for every 1MWh of renewable electricity generated. The Government intend to introduce these changes from 1 April 2009, thus doubling the support they receive through the RO to the highest level available.

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<sup>26</sup> See Annex

<sup>27</sup> The reports can be viewed at <http://www.berr.gov.uk/energy/sources/sustainable/microgeneration/strategy/implementation/certificates/dgcg-responses/page44517.html>

<sup>28</sup> <http://www.berr.gov.uk/energy/sources/sustainable/microgeneration/strategy/implementation/certificates/dgcg-responses/page44517.html>

In response to the report published by the Distributed Generation Coordinating Group (DGCG) the Government published its initial view on the issue of deeming in the consultation on Reform of the RO published in October 2006<sup>29</sup>. Due to a number of concerns set out in the consultation document, the Government was not minded to take forward the proposals in the DGCG report but set out that it would welcome views on this issue as part of the responses to the consultation and in particular how these concerns could be addressed. There was no clear consensus in the responses received on the way forward. We have committed to looking at options to encourage the uptake of microgeneration as part of the Renewable Energy Strategy and it would be appropriate to consider this issue further in that context.

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<sup>29</sup> <http://www.berr.gov.uk/files/file34470.pdf>

## Annex: Summary of initial work on Microgeneration Technologies Routemaps

The barriers to the greater uptake of the following six technologies were considered at a series of workshops held at a meeting in Manchester in May 2007:

- **Biomass**
- **Heat Pumps**
- **Hydro**
- **Microwind**
- **Solar Photovoltaic**
- **Solar Thermal**

The barriers identified for each are detailed in Annex 1, but the generic factors shown in Table 1 apply to all technologies to a varying extent.

<b>Market Enabling Factors</b>	
Planning Permission	
	<ul style="list-style-type: none"> <li>• <i>Consistency and speed of decision making</i></li> </ul>
	<ul style="list-style-type: none"> <li>• <i>Establish permitted development rights</i></li> </ul>
	<ul style="list-style-type: none"> <li>• <i>Review of electrical connection code</i></li> </ul>
Certification, accreditation, quality issues	
	<ul style="list-style-type: none"> <li>• <i>Upskilling of installers</i></li> </ul>
	<ul style="list-style-type: none"> <li>• <i>Accreditation of competent installers</i></li> </ul>
	<ul style="list-style-type: none"> <li>• <i>Harmonisation with EU schemes, use existing bodies and schemes</i></li> </ul>
	<ul style="list-style-type: none"> <li>• <i>Identification of quality products</i></li> </ul>
	<ul style="list-style-type: none"> <li>• <i>Policing of schemes</i></li> </ul>
Marketing	
	<ul style="list-style-type: none"> <li>• <i>Clear messages, with transparent and consistent information</i></li> </ul>
	<ul style="list-style-type: none"> <li>• <i>Education of specifiers, architects and other decision makers</i></li> </ul>
	<ul style="list-style-type: none"> <li>• <i>Awareness and education campaigns</i></li> </ul>
Energy Assessments	
	<ul style="list-style-type: none"> <li>• <i>Standardisation of energy estimation methodologies</i></li> </ul>
<b>Financial support</b>	
	<ul style="list-style-type: none"> <li>• <i>Installation grants</i></li> </ul>
	<ul style="list-style-type: none"> <li>• <i>Feed in tariffs and net metering</i></li> </ul>
	<ul style="list-style-type: none"> <li>• <i>A stable long term framework</i></li> </ul>

The following sections briefly outline the current status of the technologies.

## **Biomass**

Biomass consists of material of biological origin which can be burned in order to generate heat and/or electricity. Biomass includes materials grown specifically for fuel and residues or by-products of other activities such as forestry. Biomass fuel is considered to be effectively carbon-neutral as the CO<sub>2</sub> taken up as the material is grown is released back into the atmosphere when it is burned. It is therefore important that replanting takes place in all areas where biomass has been extracted. However, there is an energy cost in planting, harvesting, processing and transporting biomass. Transport is probably the largest of these costs so biomass is most efficient when used (burned) close to its source. There is a need for greater transparency regarding the embodied energy of fuel transport.

Biomass can be used to generate heat and/or electricity at a very wide range of scales, from small wood fuelled stoves and heaters in domestic situations to medium-sized CHP plant through to large centralised power plants supplying the national grid.

The principal applications of biomass technology that fall under the heading of micro generation are:

- Wood or pellet-fuelled heating in houses, larger residential buildings and offices.
- Wood or pellet-fuelled CHP in larger residential buildings and offices.

In the domestic sector the most common type of biomass energy is probably logs burned on open grates or in wood burning stoves, some of which have back boilers to provide central heating or hot water. Fuel tends to be sourced informally and statistics are not available. The other common bio-fuel in the domestic sector is wood pellets. Pellets are made from compressed sawdust and have the advantage that they can be burned in stoves or boilers that have an automatic feed mechanism and push button ignition. It has been estimated that the annual consumption of wood fuel in the domestic sector in the UK is roughly 800 to 900 kte, including informally sourced log fuel. Domestic wood boilers can be over 80% efficient.

In larger buildings where space is less constrained, such as blocks of flats, sheltered housing, office buildings, community and leisure centres, larger centralised heating plant or CHP can be installed. Wood chip is more commonly used in these applications as it can be burned more efficiently in larger plant. Wood chip is cheaper than pellets because it does not require such specialised plant to produce it, but it does need more advanced equipment for combustion and more space for storage as chips are less

dense than wood pellets so they have a lower energy content for a given volume.

The most important barriers to the wider use of bio-fuels in the domestic and commercial buildings sector are technical considerations such as space constraints, the availability of a local supply and ventilation requirements. Space constraints often arise because the equipment needed to burn the fuel is larger than conventional heating appliances such as gas boilers; space is also needed to store the fuel. For new developments or major refurbishments, greater use of Section 106 powers could ensure that space is built in for biomass at the outset and biomass-fired district heating may become more viable. However, the increased heat efficiency of new buildings may result in such a low heat demand that the capital cost of the system means that it becomes unviable.

Many urban areas are designated as Smoke Control Areas but a range of wood and pellet stoves are available which are designated as "exempt appliances" and approved for use in smoke control zones. There is a need for harmonisation of emissions standards between the UK and the EU and better-validated emissions data would help inform installation.

Biomass stoves require more maintenance than fossil fuel boilers, both in the collection and storage of fuel and the removal and storage of ash, although ash produced by pellet stoves is minimal. It is also worth noting that the installation of a heating appliance must be carried out in accordance with building regulations and that building control consent is obtained unless the work is carried out by a "Competent Person".

In addition to providing grants towards the capital cost of biomass technology, options for increasing the uptake of biomass might include increasing the support available to other links in the biomass supply chain, such as the production and processing of the fuel.

There are several means by which the supply chain can be strengthened:

- Introduction of fuel quality standards and certification scheme.
- Strategic management of resources, linking demand and potential supply.
- Greater support for infrastructure.
- Establishment of local supply support teams, developing long term partnerships.
- Accreditation of boilers and installers.
- R&D is still required in order to improve the supply chain.

The development of heat based ROCs would also help to boost the uptake of biomass.

## **Heat Pumps**

Heat pumps use electrical energy to concentrate heat from low-grade sources into more useful high-grade heat for use in space and water heating.

The European Performance of Buildings Directive requires that the economic feasibility of heat pumps is taken into account before the construction of new buildings over 1,000m<sup>2</sup>. Although the use of heat pumps is more common in Europe, increasing numbers are being installed in the UK.

Ground source heat pumps with horizontal collection loops require considerable land to install the ground loop. This may have an environmental impact in itself. Vertical loops may be installed via boreholes but this is a technical challenge in many situations. In both cases the costs of the pump and the installation are high and this constitutes the principal barrier to the wider installation of ground source heat pumps.

The second main barrier to the installation of heat pumps is the cost of the electricity required to run them. Compared with the cheapest fossil fired heating technologies, a heat pump can have a higher operating cost as well as a higher capital cost and may therefore never pay back the initial investment.

If a heat pump is powered by electricity generated from a renewable source, then it can be regarded as "magnifying" the heating effect of that electricity, enabling it to supply a larger heating duty than it could through simple resistive heating.

Calculation of the energy and CO<sub>2</sub> savings is complex and depends on the efficiency of the heat pump, the temperature of the heat source (ground or air) and the required heating duty. There is at present a lack of independently verified information on the performance of heat pumps in the UK and we are largely reliant on manufacturers' claims or data from overseas. The Energy Saving Trust is currently commissioning the first nationwide trials of heat pumps and the results from these trials are expected to be available by the end of 2009.

The third main barrier to the installation of heat pumps is the type of distribution systems commonly used in the UK. Heat pumps work most efficiently when the gap between the temperature of the heat source and the temperature of the heat output is minimised. Radiant heat distribution systems (radiators) run at a higher temperature than underfloor heating systems. If underfloor distribution systems were to become more common, as in continental Europe, this would remove a barrier to their installation.

In theory, heat pumps can also be run in reverse to provide cooling in summer, although many current models in the UK do not offer this feature. Where this feature is enabled, and where there was previously no cooling,

the introduction of an additional energy-consuming system in properties may therefore result in an increase in energy consumption and CO<sub>2</sub> emissions.

At present, the greatest scope for development of the UK heat pump market is in newly-built properties which are off the gas network and where land is available.

## **Micro Hydro**

Unlike many other forms of micro generation such as PV or wood burning heaters, Hydro cannot be installed at all locations. A source of moving water such as a river or stream is needed and this limits the number of places where it could be implemented.

The potential barriers to the implementation of small hydro schemes are:

- Cost
- Legislative compliance
- Access rights to the land and use of the water.

The cost can be broken down into the following elements:

- Generating equipment
- Civil works
- Construction and installation work
- Professional advice, including feasibility studies and assessments
- Maintenance of the equipment, once operational.

Hydro is a mature technology, there is therefore little scope to reduce costs further. Government has funded R&D projects over the past decade to investigate novel forms of low-head hydro with the aim of achieving lower capital and operating costs. To date, however, radically novel technologies don't appear to have been taken up.

All potential micro hydro sites need a feasibility study, but the cost of this can be a deterrent to the site owner as, if there are technical or planning reasons why the scheme cannot go ahead, then the cost cannot be recouped.

Various measures could help with this:

- Offering grants or rebates on the feasibility study for successful applications.
- Encourage smaller companies or consultants to enter the market for small systems which are traditionally ignored by larger companies.
- A centralised database that identifies possible / undesirable locations based on initial screening of suitable river catchment areas, protected species etc.

- The above database could be used by Agencies/Government to identify in a simple manner potential locations.

The process for gaining planning permission varies across the country, with often differing requirements. A single agency appointed to do this would reduce this complexity.

Although there are known to be several consultants operating in this area, it is difficult to identify them. A central database would overcome this problem. This database should also make clear the size of system they are skilled in, and also if they work in the restoration of old systems, which requires a very different set of skills.

In many cases, potential micro hydro schemes are not pursued because the construction would involve co-operation between owners of several properties. While there is good precedent for shared private power supplies run through ESCOs for CHP and wind turbines in particular, there is a need for a standardised system so that landowners can co-operate with confidence and reduce risk.

## **Micro Wind**

The UK has a good wind resource however micro wind technology is a relatively recent entrant to the small-scale renewable energy market.

The principal barrier to the wider uptake of micro wind turbines is their performance in urban locations. Efficiency is highly dependent upon the available wind resource at the location. Turbulence from trees, chimneys or neighbouring buildings also has a significant impact on output. As a result, micro wind technology is not commonplace in areas with a high density of buildings.

There is a shortage of independently verified UK-based data on the output of micro wind turbines in urban locations. The Energy Saving Trust is carrying out trials at present in order to assess their performance. The trials are scheduled to report in the summer of 2009. In parallel there is a related trial across around 30 sites managed by Encraft and supported by Pilkington, the Micropower Council, BERR, EST and Warwick District Council.

The provision of accurate performance data and labelling will help develop public confidence in the technology. The inappropriate installation of turbines in urban locations has led to poor performance in some situations and obscured the debate - on a good wind speed site the payback on micro wind turbines is significantly shorter than PV or solar water heating. As wind speed varies so much in the UK, there is a need for a simple tool to establish in principle whether any particular location in the UK would be technically and

economically suitable for a wind turbine, including an assessment tool for turbulence in urban locations if relevant.

There are other technical issues to consider such as the suitability of many domestic buildings to receive the additional structural loads imposed by the installation of wind turbines. R&D may be needed to resolve these issues. Net metering is required to measure and be paid for exports to the grid. Two-way metering is rare at present although it is likely to be a standard feature if smart metering is introduced. The system of ROCs was not designed for a domestic market and may at present constitute a barrier to deployment if ROCs contribute significantly to the financial viability of micro wind turbines.

Planning permission is currently required for wind turbines and they are not covered under "permitted development" rules. Planning decisions seem increasingly likely to take into account the environmental benefits of the technology, once fully verified, together with the impact on the surrounding area. If planning officers are conversant with the noise and visual issues and aware of the performance of the technology in terms of delivering planning policy on renewable energy (if any), this will not constitute a barrier to development but standardised planning packs could be used to simplify the procedure.

Between commercial generators and domestic micro-turbines there is a third category of turbines. Small-scale wind turbines (e.g. 5kW) need to be mounted at considerable height and so usually serve a property with substantial land or shared between several properties via an Energy Services Company (ESCO). Such small-scale turbines are situated in areas where there is a good wind resource so their performance is not such an issue. The principal barriers to the wider adoption of small wind turbines would appear to be related to planning, as the visual impact is significant and the piecemeal site-based approach to planning in the UK does not allow for linkage of areas of settlement with areas of good wind resource.

## **Solar Photovoltaics**

Solar photovoltaic systems are produced in high volumes globally, and so can be regarded as a mature technology. Photovoltaic panels are available from several reputable manufacturers, and are very reliable with warrantied lives up to 25 years and little degradation over time. Design and Installation is relatively simple for most systems, with many trained installers in the UK able to undertake the work. As there are no moving parts, the cost of ongoing maintenance is low. There is currently over 16MW of installed capacity in the UK, generating over 13 GWh pa. There are adequate sites for a huge increase in this capacity.

By far the most significant remaining barrier to the greater uptake of photovoltaics both in the UK and globally remains the cost, which is typically

£6k/kWp installed. Without generous financial support, solar photovoltaic will not become more popular.

Another difficulty is that of obtaining net metering arrangements. There will inevitably be times when the output from PV panels exceeds demand from the building they serve, and the excess capacity is normally exported to the grid. Many energy suppliers do not offer net metering arrangements (also known as two-way metering) or offer a very low price for any exported units. In addition, the procedure for claiming ROCs is not designed for the domestic market. If the procedure were to be simplified then consumers would be encouraged to claim ROCs and the payback period would be improved significantly.

Crystalline silicon (based on "wafer" technology) is dominant, and has commercial efficiencies of 14-18%. However it remains unclear how far and fast the incremental product development associated with these growing volumes will be able to reduce the cost. Some types of thin film photovoltaics are becoming cost competitive with crystalline silicon, but there is still much scope for further R&D. Third generation technology, such as organic polymers or dye sensitised cells, are still at the research stage, but one or more of these might in the future challenge existing types for cost/performance.

Planners are increasingly aware of the technology and its benefits. Simplified planning packs would make the process simpler for retrofit and photovoltaic "slates" are also available which can be substituted for the normal roof covering, providing a saving to offset the cost of the technology and reducing the visual impact of the installation.

### **Solar Water Heating**

Solar water heating systems generally consist of a solar collector mounted on the roof and a heat exchanger in the hot water tank. Water flows through the collector, picking up heat and transferring it to the building's hot water supply system.

There are two common designs of solar collector - flat plate collectors and the slightly more efficient evacuated tube collectors. The size of collectors varies according to the hot water demand of the building but in domestic situations 2-4m<sup>2</sup> is common. They require an unobstructed south-west to south-east facing area of roof and the optimal pitch of 35 degrees is well suited to typical UK roof pitches.

Most solar water heating systems are indirect, so the solar loop transfers its energy to the water heating system by means of a heat exchanger, rather than having the water to be used flowing through the solar collector. This has the advantage of allowing antifreeze to be added to the solar loop, an

important consideration in UK climate. As solar energy is unreliable in the UK, a backup means of water heating will always be required. Twin coil hot water cylinders are therefore normally installed so that one coil (heat exchanger) is used to warm the water in the tank by solar energy and the other coil can be linked to a backup boiler – normally the fossil fuel boiler which also carries out the space heating duty. In most systems, the water is pumped around the circuit using an electric pump, which reduces the energy saving, although some systems are available that use the thermo siphon effect and others are powered by solar electric pumps (powered by a small PV panel).

The use of solar collectors for space heating in the UK is limited by the fact that peak demand for space heating coincides with the smallest solar input, whereas demand for hot water is much flatter. Space heating can be linked up to solar collectors in situations where the heat demand is low and underfloor distribution systems are used as these run at a lower temperature than radiant heat distribution systems.

The principal barrier to the greater use of solar water heating is the relationship of capital cost to savings that can be achieved. A typical domestic system costs between £2,500 and £4,000 (depending on the size of house, type of collector, etc.) and produces around 1,500 to 2,000 kWh of heat annually. A significant proportion of the cost is due to the need to replace the hot water cylinder with a twin-coil model. Where combination boilers are already in place it is at present impossible to add solar water heaters, as most combination boilers are not capable of adjusting burn rates to allow for pre-heated water. Houses built with combination boilers may lack space for the addition of a water cylinder and the costs of boiler replacement would be prohibitive.

Even though the price of gas and fuel oil to domestic customers has risen dramatically over recent months, the cost saving to the householder offered by solar water heating is small, principally as most energy consumed domestically is for space heating rather than water heating. Even with grant support the financial payback period is presently in the order of 50 years, not allowing for any maintenance required. It is not yet certain that the life of the technology will exceed the payback period at current rates. ROCs for heat would improve the payback period for solar water heating.

Cost savings can be achieved through installation during construction, especially if several houses are being built at the same time. For existing houses, DIY installation can also help to reduce costs although this renders the installation ineligible for grant support as only systems put in by approved installers are eligible for grants under the LCBP (see below). Work on heating systems is also subject to regulations and this may effectively prohibit DIY installation. VAT is also lower (5%) for accredited professional installations as opposed to DIY installations (17.5%). Costs of installation could be reduced if all new cylinders were twin-coiled and therefore future-proofed to a degree

but it is vital that collectors and heat exchangers are sized appropriately to avoid the risk of overheating.

Planning and conservation can be a barrier to the installation of solar water heating. It is worth noting that flat plate collectors are available which have been designed to look like conservation rooflights, in order to minimise the visual impact of the technology in conservation areas.

The market for solar water heating in the UK is well developed. There is a good range of companies competing to supply solar water systems and the Solar Trade Association has been in operation for over 30 years in the UK. Take-up may be improved if installers of conventional heating equipment were more aware of the technology and received training in the proper installation and design of these systems. Clear independent information from a single source on the performance of solar thermal systems is also needed. There is a particular need for a supplier/installer certification/accreditation scheme in order to help to counter some of the bad publicity that poorly installed systems have attracted. Efficiency ratings of products would also help the consumer to make a better-informed choice.

Despite the significantly higher grants available, in the commercial sector the take-up has been low. Many commercial organisations have a limited demand for hot water but hotels and hospitals, for example, have a much higher demand. Solar water heating therefore needs to be factored in at the design stage in commercial buildings.

## **Grant Support for Micro Renewables**

### *Low Carbon Buildings Programme (BERR): Phase 1 - Householders*

**Biomass:** For wood pellet stoves It awards grants of up to £600 or 20% of installed cost, whichever is the lower. For wood pellet boilers the maximum grant is £1,500 subject to an overall 30% limit, exclusive of VAT.

**Heat Pumps:** Up to £1,200 for ground or water source heat pumps, subject to an overall 30% limit, exclusive of VAT. Grants for air source heat pumps are under consideration and an announcement is expected within the next few months.

**Micro Hydro:** Up to £1,000, subject to an overall 30% limit or £2,500, exclusive of VAT

**Micro Wind:** Up to £1,000 per kWp, subject to an overall 30% limit or £2,500, exclusive of VAT

**Photovoltaic:** Up to £2,000 per kWp, subject to an overall 50% limit or £2,500, exclusive of VAT

Solar water heating: Maximum of the lower of £400 or 30% of eligible costs.

*Low Carbon Buildings Programme (BERR): Phase 2 is open to community groups and not for profit organisations*

Grants are available of up to 50% of capital cost subject to a maximum of £1m for all qualifying renewable technologies.

*Scottish Community and Householder Renewables Initiative (SCHRI)*

This scheme is managed jointly by the Energy Saving Trust and Highlands and Islands Enterprise on behalf of the Scottish Government. Funding for householders for all micro-renewables is set at 30% of installed cost up to £4,000. This scheme also awards grants towards the cost of professional advice and capital costs.

*The Community Sustainable Energy Programme*

This is a programme run by BRE on behalf of the Big Lottery Fund and awards grants to community organisations for the development of micro generation projects. Grants are awarded towards the cost of feasibility studies (up to the lower of £5,000 or 75 per cent of the study cost) and the lower of £50,000 or 50 per cent of project capital costs. It has a total budget of £1m for feasibility study grants and £8m for capital grants, to cover all micro generation technologies. Only not-for-profit community based organisations are eligible for support.

## Annex 1

### Barriers and Issues Identified by Participants in the Renewable Energy Association 'Mass Market Renewables' Workshops held in Manchester in May 2007

#### Biomass Sector

Improved supply chains	
1.	Establish fuel quality standards and certification system (EU system?)
2.	Training for practitioners, installers and across whole supply chain
3.	Establish local supply support teams, developing long term partnerships
4.	Strategic management of resources, linking heat demand & potential supply
5.	Accreditation of boilers and installers – establish energy label
6.	RDA campaign/support
7.	Make transparent embodied energy within transport
8.	R&D on whole supply chain
9.	Support for infrastructure

Cost of services	
1.	Establish life cycle costing mechanisms
2.	Generate volume – e.g. bulk buying clubs, govt/public sector purchasing
3.	Price carbon out of market
4.	Soft loans
5.	Encourage innovation in support mechanisms e.g. VAT/council tax etc
6.	Incentive for UK manufacture
7.	Zero VAT rating on biomass equipment

Funding and support	
1.	Generate heat based ROCs – heat support mechanism
2.	Equalise/balance grant mechanisms – provide long term support
3.	Support for supply side of projects-generate incentives
4.	Revenue support for training, installers, architects, fuel suppliers
5.	Simplify application procedures
6.	Appropriate funding according to need
7.	Encourage business support through RDAs
8.	Address stop start nature of grant schemes
9.	Increase focus on UK technology/manufacturing development

Confusion and lack of understanding within market place	
1.	Develop and promote the Biomass Energy Centre
2.	Better dialogue between industry and government
3.	Develop integrated marketing strategy
4.	Training for consultants/specifiers/architects/building energy managers
5.	RDA campaign
6.	More funding to independent advisors e.g. CRI/EEACs
7.	Support for practitioners self help groups e.g. Woody network

8.	Focus on public education and advice
9.	Provision of warranties
10.	Joined up schemes across government

Impact of legislation	
1.	Update/address relevant legislation – sort out smoke control exemptions
2.	Develop a working group between industry and government
3.	Better validated data to help inform installation
4.	Upskill inspectors, EHOs
5.	Join up emission standards UK to EU
6.	Developing top down support/championing at ministerial level
7.	Support for businesses re accreditation
8.	Personal carbon allowance
9.	Filter supplied with kit
10.	Grants/tax breaks for smoke control measures

Storage of fuel	
1.	Promote mini district heating schemes
2.	Effective system design particularly within new build addressing access as
3.	well
4.	Acceptance of alternative storage methods for retrofits
5.	R&D
6.	Incentives for storage methods and/or link to district heating networks
7.	Link with business rates
8.	Balancing S106 planning priorities
	Training for specifiers and architects and planners

## Heat Pump Sector

Lack of education and skills	
1.	Create trusted information sources and develop an impartial campaign (jointly between government and industry) to raise public awareness
2.	Integrate training into existing professional qualifications, CPD and networks (e.g. plumbers)
3.	Carry out independent trials to establish verifiable CoP and SPF of heat pumps in the UK.
4.	Provide widespread, approved, affordable training for designers & installers
5.	Establish accreditation body to set minimum training standards
6.	Establish clear link with renewable sources of electricity to run heat pumps, using National Grid where necessary

High cost/perceived cost and lack of finance, grants or incentives	
1.	Create financing solutions e.g. carbon pricing and incentives, long term finance packages, soft loans, as long as technology proves to be efficient.
2.	Offer tax relief and incentives e.g. zero VAT
3.	Establish clear, concise, consistent and long term policy on grants and EEC
4.	Create heat pump tariff/special rate

Certification, accreditation and quality issues	
1.	Create nationally recognised quality mark/industry standard
2.	Establish affordable clear accreditation schemes with long life that are simple, effective & cheap for installers
3.	Create independent body to police/monitor standards
4.	Set minimum standards for training

How heat pumps are treated by SAP	
1.	Update SAP methodology via Appendix Q
2.	Address knowledge needs of planning and building control officers (relax procedures for heat pumps)
3.	Introduce option to link to renewable electricity where possible.

Integration with building stock	
1.	Improve thermal comfort and performance of building stock
2.	Address options for underfloor distribution systems
3.	Offer council tax adjustments/rebate for energy efficiency
4.	Improve energy efficiency in EEC, EPC and building regulations
5.	Provide more resources for efficiency improvements
6.	Develop high efficiency high temp pump technology

## Hydro Sector

Planning – multiple agencies required for consent	
1.	Single agency should manage approvals process and channel all enquiries
2.	Each agency should have consistent (across UK) method of dealing with enquiries and information requirements.
3.	Better market information of who to speak to and what the process is (and what it is likely to cost). Need to make process less complicated.

High installation cost	
1.	Capital cost is an issue but feasibility studies are the prohibitive cost initially and lead to most schemes being never considered. Needs to be recognised.
2.	Ensure grant funding for feasibility studies – or a scheme of recouping cost if the hydro scheme goes ahead?
3.	A centralised database where some initial scoping has already been done i.e. which river catchments suitable and which are not likely (due to protected species etc) would eliminate need for up front costly feasibility for unfeasible sites. Would also speed up approvals process (see above)
4.	Note that many hydro sites are existing and it should be a fairly simple matter for agencies/government to identify the sites that currently exist in some form (i.e. channels and leats) in low sensitivity areas by cross checking with above proposed database and publishing results.
5.	Grant funding is available but patchy – make this consistent year on year or at least manage expectations
6.	Most installers are larger and either will not quote for smaller schemes or

	else quote feasibility costs that are prohibitive as they cannot reduce. Encourage smaller companies and register consultants for smaller hydro, not just installers.
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Lack of single point of Government Management	
1.	Provide one single well publicised point of contact where information can be obtained. Remembering that many enquirers are not professionals and terminology will need to be simple i.e. 'waterwheel' not 'hydropower'
2.	Little or no training is provided particularly on the small scale side, applies both to professionals, advisors and consultants. Needs industry and governmental support working together.

Lack of R&D and commercialisation of technologies i.e. Microhydro	
1.	Lack of investment by industry in small scale hydro limiting commercialisation. Needs investment to support and stimulate this element of the market.
2.	Stimulating small hydro market through grant funding, tariff structure will also stimulate new technology uptake.

Lack of installers (small scale)	
1.	Consultants are not registered on the approved installers list, as the first stage is to identify if a site is feasible and whether it is worth the next step, consultants should be registered. There appear to be many out there operating regionally but finding them is mainly by anecdote and word of mouth.
2.	List of technology available by scale i.e. small scale, large scale and relevant installers and consultants at each scale.
3.	Installers are not interested in smaller sites, market stimulation should focus on small hydro and encouraging update of installers and manufacturers in this market.
4.	Training and education should be implemented across the board.
5.	Note that restoration projects are entirely different in set of skills required to new and need specialist people and training i.e. finding/recreating old engine parts and modifying existing systems to work with elements of new system.

### **Micro Wind Sector**

Knowledge and understanding	
1.	Independent verifiable case studies / monitoring or existing projects
2.	Provision of accurate customer information / labelling
3.	Public awareness, marketing and education initiatives
4.	Clarity on technology expectations (distinguish between "play" and "serious" wind)
5.	Knowledge transfer forums

Lack of Skills and Service support	
1.	Fiscal support for training providers

2.	Consistent government support
3.	Wind power modules for electricians, C&G, NICEIC
4.	Application of standards
5.	Installer training
6.	Maintenance guidance, extended warranties etc.

Impact of locational constraints	
1.	Standard procedure for resource assessment (particularly in urban areas)
2.	Reliable urban wind data
3.	Review of G83
4.	Responsible marketing guidelines
5.	Fund assessments

Planning Permission	
1.	Training/guidance for planners on technology and application of regulations
2.	Standardised planning packs for wind
3.	Guidance for public
4.	Establish permitted development procedures
5.	Develop procedure for linking development sites with wind sites

Cost and support mechanism	
1.	Establish feed-in tariff
2.	Coherent government support and strategy
3.	Explore different/innovative funding mechanisms, tax breaks, soft loans etc
4.	Simplification and access to ROCs
5.	Stable long term framework
6.	Capital grant programme

Availability of proven technology and R&D	
1.	Government strategy and support for R&D/product development
2.	Establish independent testing, accreditation and marketing procedures
3.	Standardised performance and product data
4.	Independent field trials across built environments
5.	Set up test centre

## **PV Sector**

Lack of feed in tariff	
1.	Legislate ASAP to bring in a (generous) feed-in tariff
2.	Net metering
3.	Fund supported metering (export)
4.	More openness from Gov't in discussing feed-in
5.	Compulsory/obligation on purchase
6.	Cheap import/export meters
7.	Raise awareness of German model/learn lessons from EU

High cost/perceived cost and lack of finance	
1.	Create/increase financing incentives e.g. mortgages, low interest loans
2.	Provide incentives that offer a simple reward for green energy (e.g. VAT & council tax relief, value of power generated)
3.	Apply whole life costing methodology to PV schemes using consistent CO2 emissions factors
4.	Provide regulatory support for ESCOs
5.	Improve manufacturing processes and support R&D
6.	Create economies of scale
7.	Create consistent demand (e.g. 1M PV roofs in 10 years)

Inconsistent support from Gov't	
1.	Provide a clear consistent grant system and increase level of grants
2.	Level playing field between RE technologies and conventional (fossil and nuclear) across market sectors
3.	Provide clear consistent and long-term cross government support mechanisms and regulations
4.	One place (i.e. Department of Energy) that provides information/support on all issues (VAT, grants, case studies, etc.)
5.	Require utilities to provide assistance and support (e.g. feed in tariff)
6.	Provide support structure and clear direction for regional and local Gov't
7.	Accelerate public procurement

Lack of education and skills	
1.	Standardise information and provide clear, transparent and consistent information
2.	Provide education/advertising campaign for public/consumers
3.	Provide education in schools
4.	Ensure high quality training is available/provided across the UK
5.	Disseminate information in construction industry
6.	Fund EEACs to include RE
7.	Include PV skills in conventional FE training
8.	Fiscal support for training providers

Inconsistent planning regime	
1.	Roll out consistent interpretation of "Merton Rule" nationally and immediately
2.	Clear rules for PV to be permitted development for all buildings
3.	Policy based not on thresholds but rising targets
4.	Accelerate code (CSH) level 5 & 6 before 2013
5.	Require PV on all new buildings
6.	Enforce building regs/support enforcement
7.	Building regulations for new and refurbishment
8.	Improve understanding of planners/officials on technology

## Solar Thermal Sector

Marketing	
1.	Encourage consumer acceptability before regulation – let customer know benefits/raise profile
2.	Incentives/rewards
3.	Good practice needs dissemination to media
4.	Reduce emphasis on cowboys
5.	Impartial information sources
6.	B2B different from B2C
7.	Control of energy
8.	Get on public buildings – start with children procurement, make politicians aware through government estates
9.	Stimulate commercial sector/heating companies
10.	Green image promote

Lack of understanding of technology	
1.	Energy advice centres – where to go for advice? Advice fragmented = confusion
2.	Input into tertiary education (trades, engineers, professionals, planners), also school education
3.	Skills training
4.	Provide practical/educational installations
5.	Solar Trade Assoc need coherent PR/communication strategy and funding for this
6.	Describe in simple terms – benefits and case studies
7.	Efficiency rating on products, better branded standards for consumers

Costs/payback	
1.	Invest in (boost) UK Manufacturers with bigger manufacturing base – better spread
2.	Provide standard information and data
3.	Address fuel prices and provide security – feed in tariff needed
4.	Aim to harness economies of scale – co-operatives working together in areas?
5.	Provide soft loans – mortgage extension with low interest?
6.	Price carbon
7.	Consumer incentive/subsidy i.e. council tax, stamp duty, carbon allowance
8.	Reduce cost before regulation
9.	Encourage training and skills in areas with big population/more demand

Planning Permission	
1.	Educate and train planners
2.	Must be included in local planning documents
3.	Permitted development rights (retrofit)
4.	Building Control – duty to inspect

Reputable installers/maintaining quality standards	
1.	Certification/accreditation system in conjunction with industry/legislation (single, affordable scheme)
2.	Prosecution of rogue traders (through Trade Associations?)
3.	Training facilities – widely available training of specifiers i.e. architects, M&E contractor
4.	Learn from existing European schemes
5.	British standards/Building Regulations
6.	Harmonisation of standards i.e. UK, EU, Global

Government Policy	
1.	Put money where mouth is i.e. commit to the sector and renewables i.e. market support like Europe
2.	Allow councils to move faster than National Policy
3.	Incentives to encourage councils, encourage sharing of good practice across councils
4.	Improve PPS22
5.	Retrofit regulation i.e. refurbishment of offices etc (longer term)
6.	Tax carbon and re-invest
7.	Lead by example
8.	More certainty 10% +
9.	Heat ROCs
10.	Ensure policies coherent across all government sectors