

# Our Energy Challenge

Power from the people



**dti**

**MICROGENERATION  
STRATEGY**

March 2006

*Photographs on pages 9, 13 & 31 – EarthEnergy Ltd*

*Photographs on pages 5, 8, 11, 17, 21, 29, 34, 36, 38, 40 & 43 – Energy Saving Trust*



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# Foreword

On hearing the latest scientific evidence about climate change, many of us are concerned, but might think there is nothing one person can do about it. Surely it is something for the UN, G8 or the EU, by definition a global matter for Presidents and Prime Ministers?

Very true, of course - up to a point. There is a developing international agenda. But as individuals we are far from powerless. Indeed

we are key players. Most of us, at the moment, are part of the problem, in terms of how we use and abuse energy in our homes and in modes of transport.

We need to recognise that tackling climate change is not just about government policies and technology. It also involves a battle for hearts and minds. The concerned but passive individual can become an active citizen on environmental issues - part of the solution. This is starting to happen. More citizens are active recyclers, are concerned about their local environment and understand the threat of climate change. Much can be done on a number of levels. Microgeneration, power from the people, is growing in importance.

In many respects microgeneration epitomises today's society. It is high tech

and can be tailored to individual taste. It provides freedom and independence to the user. These are themes that are encapsulated by some of the iconic products of the 21st Century - the iPod, the BlackBerry®. But take-up of microgeneration by the wider population is minimal in comparison to these bestsellers.

Our vision for 2020 as set out in the Energy White Paper acknowledged that microgeneration has a role to play in delivering sustainable, secure, affordable heat and electricity through competitive markets.

But since the publication of the Energy White Paper, the challenges we face in achieving our energy policy goals have been thrown into sharper relief:

- We have more evidence of the adverse impact of climate change
- The UK has become a net importer of gas sooner than expected, and is also becoming a net oil importer
- Energy prices have risen sharply, reversing some of the excellent progress we have made in reducing fuel poverty

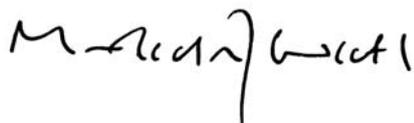


The Energy Review is examining the costs and benefits of options to make further progress towards meeting our White Paper goals. This microgeneration strategy provides an important contribution to that debate by highlighting the potential of microgeneration and plotting a path towards achieving this potential.

Our consultation in the Summer of 2005 explored the barriers preventing widespread take-up of microgeneration technologies. This strategy builds on information gathered during that consultation period and sets out a series of actions that will help address these barriers.

The objective of this strategy is to create conditions under which microgeneration becomes a realistic alternative or supplementary energy generation source for the householder, for the community and for small businesses. This is a challenging objective. To achieve it we will need to work in partnership across Government (both national and local), with Ofgem and with the industry.

But I am confident that we will meet this challenge and I look forward to a day when installations of different microgeneration technologies are seen on every street.



Malcolm Wicks  
Minister of State for Energy





## Executive Summary

Microgeneration is defined in section 82 of the Energy Act 2004<sup>1</sup> as the small-scale production of heat and/or electricity from a low carbon source. The suite of technologies caught by this definition includes solar (photovoltaics (PV) to provide electricity and thermal to provide hot water), micro-wind (including the new rooftop mounted turbines), micro-hydro, heat pumps, biomass, micro combined heat and power (micro CHP) and small-scale fuel cells. These technologies potentially have much to offer in helping us to achieve our objectives of tackling climate change, ensuring reliable energy supplies and tackling fuel poverty. As well as providing low carbon energy to homes and small commercial buildings, microgeneration can provide the same service to community buildings, such as leisure centres and schools.

In such premises, not only does the microgeneration installation help to reduce carbon emissions; it can also help to educate and inform communities about energy and, hopefully, persuade people to reduce their own carbon footprint.

In 2004 there were approximately 82,000 microgeneration installations in the UK. Yet a study commissioned by the DTI from the Energy Saving Trust (EST) suggested that by 2050, microgeneration could provide 30-40% of the UK's electricity needs and help to reduce

household carbon emissions by 15% per annum<sup>2</sup>. There is clearly some way to go to achieve this potential.

A range of constraints is currently affecting the wide-scale deployment of microgeneration. The upfront cost of an installation can be off-putting. And even where there is demand for some form of microgeneration inadequate promotion and poor information may be preventing that demand being converted into actual purchase. There is also a range of technical issues that mean that the installation of a microgeneration technology is not quite as straightforward as, for example, changing a boiler. They also mean that access to the rewards available for electricity generating microgenerators is more difficult than it should be. Finally, planning policy and Building Regulations both provide opportunities and can act as constraints.

The objective of this strategy is to create conditions under which microgeneration becomes a realistic alternative or supplementary energy generation source for the householder, for the community



<sup>1</sup> [www.opsi.gov.uk/acts/acts2004/20040020.htm](http://www.opsi.gov.uk/acts/acts2004/20040020.htm)

<sup>2</sup> [www.dti.gov.uk/energy/consultations/pdfs/microgeneration-est-report.pdf](http://www.dti.gov.uk/energy/consultations/pdfs/microgeneration-est-report.pdf)



and for small businesses. If this can be achieved we will start to see the level of growth in installations required for microgeneration to make the significant contribution to our energy goals that is its potential. To deliver this objective a number of actions are required to address the various constraints outlined above. These actions are listed on pages 42-44. A wide range of actions is required to address all areas, varying from the Low Carbon Buildings capital grant programme, improvements to existing communications activity, a review of the



permitted development regime to a pilot to assess the benefits of smart metering combined with microgeneration. Successful implementation of all the actions listed will require concerted action by Government, the Devolved Administrations, Regional Development Agencies, local authorities, Ofgem and the microgeneration industry.

Progress in implementing these actions will be assessed on a continual basis with a report published each year as part of the annual report on progress against Energy White Paper<sup>3</sup> objectives produced under the Sustainable Energy Act 2003<sup>4</sup>.

<sup>3</sup> [www.dti.gov.uk/energy/whitepaper/index.shtml#wp](http://www.dti.gov.uk/energy/whitepaper/index.shtml#wp)

<sup>4</sup> [www.opsi.gov.uk/acts/acts2003/20030030.htm](http://www.opsi.gov.uk/acts/acts2003/20030030.htm)





# The need for a microgeneration strategy

Readily available heat and power are taken for granted in developed societies. As we become less tolerant to fluctuating temperatures in our homes and more reliant on products requiring electricity, demand for heat and power is likely to grow even in the face of increasing strides being made in greater energy efficiency. Yet the context to this growing demand is one where the UK will no longer be a net exporter of oil and gas, where there is increasing urgency in the need to tackle climate change and rising energy prices are hitting the most vulnerable. Meeting these challenges will require a portfolio of measures, including energy efficiency, renewable energy and other low/zero carbon energy sources.



Microgeneration technologies have significant potential as a part of this portfolio. This chapter examines the overall policy context and the justification for greater efforts being made to promote the use of microgeneration.

## The policy context

The Energy White Paper set the framework for future UK energy policy. It set out four goals for energy policy:

- Putting the UK on a path to cut its carbon dioxide emissions by some 60% by about 2050, with real progress by 2020

- Maintaining the reliability of energy supplies
- Promoting competitive markets
- Ensuring every home is adequately and affordably heated.

This strategy is being written at a time when progress against these goals is being assessed and policies are being updated and strengthened in order to ensure that we achieve our short, medium and long term goals.

The current Energy Review<sup>5</sup> is examining progress against the Energy White Paper goals and will set out in more detail the long-term policies now considered necessary to achieve them. This Review will provide the long-term context for the microgeneration strategy. It is not possible to pre-empt this Review. But the microgeneration strategy has been written in consultation with the team working on the Review.

The Climate Change Programme Review<sup>6</sup> has assessed progress against our targets for reducing harmful greenhouse gas emissions and has led to an updated Climate Change

<sup>5</sup> [www.dti.gov.uk/energy/review/index.shtml](http://www.dti.gov.uk/energy/review/index.shtml)

<sup>6</sup> [www.defra.gov.uk/environment/climatechange/uk/ukccp/review.htm](http://www.defra.gov.uk/environment/climatechange/uk/ukccp/review.htm)



Programme, focusing on measures to achieve our interim 2010 target of reducing carbon dioxide emissions by 20%. That Review did not look in detail at microgeneration. The updated Climate Change Programme does, however, acknowledge the importance of microgeneration, particularly in terms of meeting longer term emissions targets, and this strategy for the promotion of microgeneration will form part of the updated Programme.

At the time of announcing the amendments to the Building Regulations that will come into force in April 2006, ODPM also announced a review to identify further measures that could be taken to address the sustainability of existing housing stock<sup>7</sup>. Among other things, this review will look at what could be done to

encourage homeowners to install microgeneration on existing buildings. Measures coming out of this review will be built into this strategy.

In October 2005 the Biomass Task Force led by Sir Ben Gill submitted its report<sup>8</sup> to Government proposing a set of recommendations to optimise the contribution of biomass energy to renewable energy targets and sustainable farming, forestry and rural objectives. A number of the recommendations have direct relevance to the promotion of small-scale biomass and measures adopted in this area will complement this strategy.

In Wales, the Sustainable Development Action Plan<sup>9</sup> states, as a top ten commitment, that the Assembly

Government and its agencies will encourage the development of an indigenous microgeneration renewable industry in Wales.

#### *Climate change - the imperative for action*

One of the major causes of climate change is the increase of greenhouse gases in the atmosphere. The concentration of CO<sub>2</sub>, the main greenhouse gas, has risen by more than a third since the industrial revolution from a pre-industrial level of around 280ppm to approaching 380ppm today. The rate of build-up is increasing and is currently around 2ppm per year.

There is no international consensus over what is an acceptable increase in greenhouse gas concentrations. For CO<sub>2</sub> a level of 550ppm, double the pre-industrial level, has been discussed. The EU has reaffirmed its view that the global average mean surface temperature increase should not exceed 2°C and that stabilisation well below 550ppm CO<sub>2</sub> equivalent is likely to be needed to achieve this<sup>10</sup>. The Royal Commission on Environment and Pollution concluded that for the UK, stabilisation implied cuts of 60% from 1990 levels by 2050 and 80% by 2100<sup>11</sup>. But more recently, the conclusions of the G8 Science Conference in



<sup>7</sup> [www.odpm.gov.uk/index.asp?id=1002882&PressNoticeID=1954](http://www.odpm.gov.uk/index.asp?id=1002882&PressNoticeID=1954)

<sup>8</sup> [www.defra.gov.uk/farm/acu/energy/biomass-taskforce/](http://www.defra.gov.uk/farm/acu/energy/biomass-taskforce/)

<sup>9</sup> [www.wales.gov.uk/themessustainabledev/index.htm](http://www.wales.gov.uk/themessustainabledev/index.htm)

<sup>10</sup> Council of the European Union, December 2004

<sup>11</sup> *Energy - the changing climate*, 22nd Report of the Royal Commission on Environmental Pollution, June, 2000



Exeter in 2005 concluded that a stabilisation of 450ppm is necessary to have a reasonable chance of remaining below a 2°C rise in the global mean temperature.

The built environment (domestic, commercial and industrial premises) accounts for around 47% of CO<sub>2</sub> emissions in the UK. Microgeneration technologies have the potential to reduce this figure by providing low carbon sources of heat and electricity to houses, buildings and small commercial premises. The EST study commissioned by DTI suggests that by 2050 widespread installation of microgeneration could be reducing household carbon emissions by approximately 15%.



Microgeneration also has a wider contribution to make in helping to win the battle for hearts and minds that is crucial in terms of encouraging people to change their behaviour and move towards reducing overall consumption of energy. A recent report by the Sustainable Consumption Roundtable<sup>12</sup> suggests that the “qualitative impacts of microgeneration technology can be substantial, presenting a living, breathing and emotionally engaging face to energy consumption”. The report also states that “some of our sample were only producing very modest levels of energy through their microgeneration technology, yet the behavioural impacts in terms of energy awareness and efficiency were often still considerable”.

### *Reliable energy supplies*

DTI projections see total final energy consumption in the UK increasing by about 13% between 2000 and 2020 with electricity generation increasing at a slightly lower rate (around 10%) to 381TWh in 2020 compared to 346.3TWh in 2000<sup>13</sup>. These projections also suggest that the UK will remain dependent on fossil fuels for most of its energy needs over this period. The direct use of natural gas is expected to account for 34% of final energy consumption by 2020 and 58% of electricity generation. The other major source of energy is oil, accounting for 47% of demand in 2020, mainly for transport applications.

With the UK no longer a net exporter of oil and shortly to lose that status in respect to gas it is clear that, in common with most countries, we will be reliant on external energy supplies for meeting our future energy demands.

If we could apply microgeneration technologies in a cost-effective way, this utilisation of our own extensive natural resources would reduce import dependence and benefit energy consumers. These technologies also have the advantage of producing heat and electricity close to the point of use, so avoiding the losses that occur in the transmission of gas and electricity.

<sup>12</sup> <http://sd-commission.org.uk/publications.php?id=239>

<sup>13</sup> DTI - *Updated Emissions Projections (Final projections to inform the National Allocation Plan)*, November 2004, [www.dti.gov.uk/energy/sepn/uep2004.pdf](http://www.dti.gov.uk/energy/sepn/uep2004.pdf) and [www.dti.gov.uk/energy/sepn/uep\\_addendum.pdf](http://www.dti.gov.uk/energy/sepn/uep_addendum.pdf)



### *Tackling Fuel Poverty*

Recent estimates suggest energy price increases might have increased the number of vulnerable households in fuel poverty (i.e. those which are spending more than 10% of their income keeping the house at a reasonable temperature) in England by up to one million between 2003 and 2006<sup>14</sup>. Many of these households are in homes that are not connected to the mains gas network (research has indicated that of 9,000 communities of 50 or more houses that are not connected to the gas network, 4,300 are more than 2km from a gas main and are therefore less likely to be economically viable for connection).

The 2004 Living in Wales survey<sup>15</sup> estimated that 130,000 Welsh households live in fuel poverty. A full report analysing the fuel poverty statistics by categories such as household age and composition, property age and type is being

commissioned by the Welsh Assembly Government. This report will update the fuel poverty figure to take into account increases in incomes and fuel prices since the property survey took place. The report will also model future fuel prices to produce scenarios of the number of households who might be in fuel poverty to 2010.

Local authorities are starting to look at microgeneration technologies as possible measures that could help to tackle fuel poverty, particularly for those households not connected to the grid network. For example the installation of ground source heat pumps can allow households to heat the

house at a cost lower than the Winter Fuel Payment - meaning that pensioners can effectively get free heating. This relies on the authorities bearing the cost of the installation. But with energy prices currently rising and the households remaining in fuel poverty tending to be the homes that are harder to treat through traditional methods, microgeneration technologies are starting to become a real option.

DTI's Design and Demonstration Unit will shortly begin two demonstration projects in partnership with the Regional Development Agencies in the North East and Yorkshire & Humberside. These projects will evaluate the efficiency and cost-effectiveness of a range of renewable technologies that can be deployed at the community level to provide cheap, sustainable energy for deprived communities. This will involve setting up new social enterprises<sup>16</sup>, which will be established as Community Interest Companies to ensure that they operate for the benefit of the community.

### *Community-scale microgeneration and renewables in schools*

Promoting microgeneration is not just about promoting installations in individual houses or small businesses. The installation of microgeneration technologies in a community setting, including



<sup>14</sup> This includes the effects of increases in incomes, but does not include improvements in energy efficiency as a factor

<sup>15</sup> <http://www.wales.gov.uk/keypubstatisticsforwalesheadline/content/housing/2005/hdw20051202-e.htm>

<sup>16</sup> [www.sbs.gov.uk/socialenterprise](http://www.sbs.gov.uk/socialenterprise)



social enterprises is also important - in terms of reducing carbon emissions and engaging the public in tackling climate change. Between the Clear Skies and Major PV Demonstration Programmes we have funded 617 projects demonstrating renewable technologies in schools and other community buildings. An attractive community installation can familiarise local residents with microgeneration technologies, demonstrate the potential for home generation and maybe even encourage people to change their own behaviour to be more energy efficient.

#### *Renewable Energy in Schools*

Education of the next generations in a way that energy efficiency and the need for cleaner energy become an integral part of their mindset can help to influence their future behaviour (and maybe even that of their parents) and move us towards the desired cultural shift. One of the most effective ways to engage the interest of children in the energy agenda

must be through interaction with new technologies. The installation of renewable technologies in schools can bring the curriculum to life in ways that textbooks cannot. With schools often being the focal point of communities, the installation of renewables could help to shape attitudes in the wider community.

The Low Carbon Building Programme will allocate some of its £80m for microgeneration

installations in schools. This will make some in-roads but is almost certainly not enough to meet demand. Which is why we will be working directly with industry on a Renewable Energy in Schools scheme. A number of companies have already committed to contributing funds, products or organisational expertise and we will be working with those companies, and any others which come forward, to develop a scheme that brings maximum benefit to schools.

**Action: DTI and DfES will work with industry and other key stakeholders to develop a scheme for installing microgeneration technologies in schools.**

#### *Microgeneration - the way forward*

It is clear that microgeneration has a key role to play in meeting our future energy needs in a way that is sustainable, reliable and affordable for all. Furthermore the visible and personal nature of many microgeneration technologies can also enhance the individual's interest in, and understanding of, energy consumption more generally. Its use in schools can create an enhanced underlying understanding of energy issues and climate change amongst future generations of consumers, helping to influence future behaviour patterns.



Other countries have already identified certain microgeneration technologies as having significant benefits.

In Germany around 150,000 people now work directly or indirectly in the renewable energy sector with an annual turnover of 12 billion euros and Germany's microgeneration strategy has played a significant part in this. The market incentive programme granted funding to nearly 300,000 applications in solar panels, small installations for burning solid biomass, heat pumps and energy saving measures in



buildings worth 550 million euros as well as setting ambitious targets through the '100,000 roofs programme' which promotes photovoltaic installations for electricity generation with the goal of reaching 1000 MW capacity at which point, Government subsidy will end. Japan has also led the way in PV, installing 200,000 PV rooftop systems by 2004 through its 'sunshine programme'.

Since the 1970s various policy instruments in Sweden have made heat-producing technologies competitive with fossil-fuel based methods and now over 10% of all households in Sweden use heat pumps.

Canada has done significant work on reducing the regulatory and technical barriers for wind turbines, fuel cells and household PV systems believing that uniform installation standards will allow for better market penetration, higher volumes, more research and more competition, all of which will drive costs down.

In the UK in recent years Government and Ofgem have taken a number of policy initiatives forward, in close association with key industry players (see Annex A). Including the commitment, between 2000-06 of £53.5m of funding for small-scale renewable installations. This money was split between three programmes:

- £10m has funded PV field trials through a domestic scale programme and a large-scale programme. This programme has run since 2000.
- £31m funded the Major PV demonstration programme which has run since 2002 and has currently provided grants to 1735 projects.
- £12.5m was allocated to the Clear Skies Initiative for household and community renewables projects. This programme has provided grants to 6434 schemes since 2003.

Our support for these technologies will continue through the Low Carbon Building Programme, which will provide £80m over 3 years between 2006 and 2009.

But it is clear that some barriers still remain, requiring further measures to ensure that this important new sector can fulfil its potential. We need to put in place measures that both develop the UK market and that help UK companies become better placed to compete abroad.



This cross-Government strategy will draw together individual policy strands to ensure a properly co-ordinated approach that also involves Ofgem, the microgeneration industry and other key stakeholders.

An Action Plan to reinforce these measures in Wales, and facilitate the uptake of microgeneration technologies, is being developed by the Welsh Assembly Government. This plan will be compatible with this strategy.

Later Chapters in this strategy examine in more detail the Government support required and what steps need to be taken to create a sustainable market in these technologies.

## Summary Box

- Energy policy in the UK is facing a number of challenges - an increasing urgency in the need to tackle climate change, rising energy prices hitting the most vulnerable and becoming a net importer of oil and gas.
- The Energy White Paper set the framework for future energy policy. The Energy Review, the Climate Change Programme Review, the Government response to the Biomass Taskforce Report will all build on this framework.
- Microgeneration technologies have the potential to make a significant contribution to our energy policy goals of tackling climate change, ensuring reliable energy supplies and tackling fuel poverty.
- Microgeneration installations in community buildings such as leisure centres and schools provide the opportunity to both reduce carbon emissions and engage the public in tackling climate change.
- Countries such as Germany, Sweden and Canada have identified certain technologies as having significant benefits and have specifically targeted them for support.
- It is important to put in place measures that develop the UK market and that help UK companies become better placed to compete abroad.





# The current status and prospects for microgeneration technologies

## What are the microgeneration options?

Microgeneration technologies provide heat and/or electricity from a low carbon source.

Examples include -

### Heat generation

- 
- Solar water heating - systems comprise solar collectors (evacuated tubes or flat plates) a heat transfer system (a fluid in pipes) and a hot water store (e.g. a domestic hot water cylinder). A 4m<sup>2</sup> collection area will provide between 50-70% of a typical home's annual hot water requirement.
  - Heat pumps - ground source heat pumps use the warmth stored in the ground to heat fluid circulating through pipes, a heat exchanger extracts the heat and then a compression cycle (similar to that used by refrigerators) raises the temperature to supply hot water for heating purposes. Air source and water source heat pumps operate in a similar fashion using temperature differentials in the air and water (these types of heat pump are not quite as efficient as ground source heat pumps).
  - Biomass stoves and boilers<sup>17</sup> - systems can provide space and/or water heating from burning wood (pellets, chips and logs) and non-wood fuels. The biomass fuels are derived from forestry products, energy crops (willow and miscanthus) and waste wood

products (sawdust, pallets or untreated recycled wood).

### Electricity generation

- Solar photovoltaic (PV) systems generate electricity from sunlight. Small-scale PV modules are available as roof mounted panels, roof tiles and conservatory or atrium roof systems. A typical PV cell consists of two or more thin layers of semi-conducting material, which is most commonly silicon. The electrical charge is generated when the silicon is exposed to light and is conducted away by metal contacts.
- Micro-wind turbines convert wind to electricity. The most common design is for three blades mounted on a horizontal axis, with the blades driving a generator (directly or through a gear-box) to produce electricity. Most systems are mounted on a tall mast, but building mounted turbines are now starting to come onto the market.
- Micro-hydro systems are typically used in hilly areas or in river valleys. Hydro power can be captured wherever a flow of water falls from a higher level to a lower level. This may occur where a stream runs downhill,

<sup>17</sup> Biomass systems for electrical generation and CHP can also be implemented at larger scale. These larger applications are covered by other policy statements.

or a river passes over a waterfall or man-made weir, or where a reservoir discharges water back into the main river. The amount of electricity produced is determined by how much water is available and how fast the flow is.

#### Combined Heat and Power

- MicroCHP - these technologies use natural gas as a fuel but provide electricity as well as heat. The two main systems use either reciprocating engines or Stirling engines. Fuel cells are also an alternative source of power.

Deployment of all these technologies in the UK is at a very low level (see table above), with the installed base being dominated by solar water heating.

Figure 1 shows the cumulative installations for each technology. It is clear from this graph that in most technologies the installation rate has flattened in recent years, indicating that further action needs to be taken to boost demand once more.

Technology	No. Installations
Micro-wind	650
Micro-hydro	90
Ground source heat pumps	546
Biomass boilers (pellets)	150
Solar water heating	78,470
Solar PV	1,301
MicroCHP	990
Fuel Cells	5
<b>Total</b>	<b>82,202</b>

### The deployment prospects for microgeneration

The early stage of the overall market for microgeneration technologies and the different stages of development of the various technologies make it difficult to accurately assess the future prospects for microgeneration. It is also a very different style of energy provision to the centralised generation assumptions that usually underpin models of future energy sources. And there are all the usual uncertainties relating to future patterns of economic development, social trends and the related demand for energy services. But we can make estimates to approximate the future potential of the different microgeneration technologies.

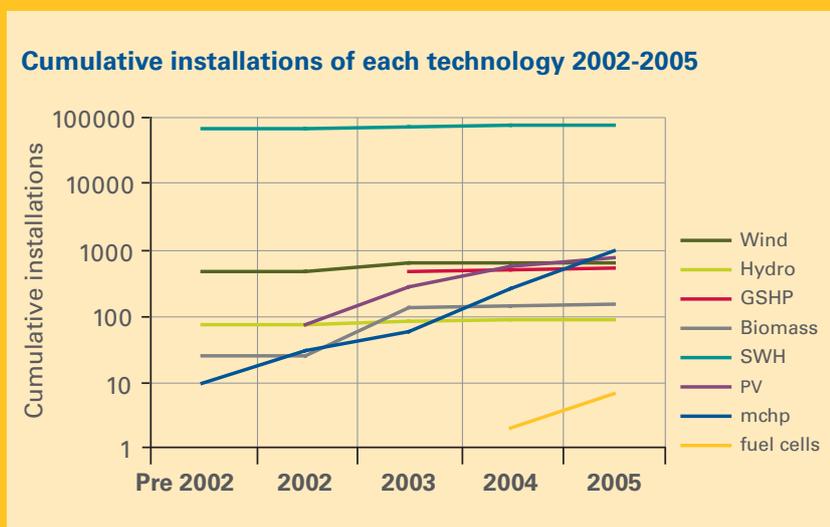


Figure 1 – EST Study: Potential for Microgeneration



We commissioned a study from the EST to do just that - predict future uptake, costs and benefits of microgeneration technologies. This provides a first step and as part of the implementation of this strategy we aim to update the study as more information is gathered (building on further analytical work carried out to inform the Energy Review).

Figure 2 shows a summary of expected breakeven points (the point where the price per kWh for the microgenerator is equivalent to today's domestic electricity prices) for different technologies. This figure demonstrates that there are some technologies that are currently cost-effective, but they are not being taken-up, indicating that there are factors other than cost-effectiveness that determine demand. For example, the figure shows Solar Water Heating as one of the last technologies to become cost-

effective, yet it accounts for 79,000 installations out of 82,000 and has one of the lowest upfront costs.

The study suggests that 30-40% of the UK's electricity demands could be met through microgeneration technologies, by 2050, with CHP (both fuel-cell CHP and Stirling engine CHP) leading the way, followed by micro-wind and solar PV.

The study projects that costs of all technologies should decrease over time. Particular improvements are made when demand reaches levels that push manufacturers to mass production.

**Summary of expected break-even points for different scenarios.**

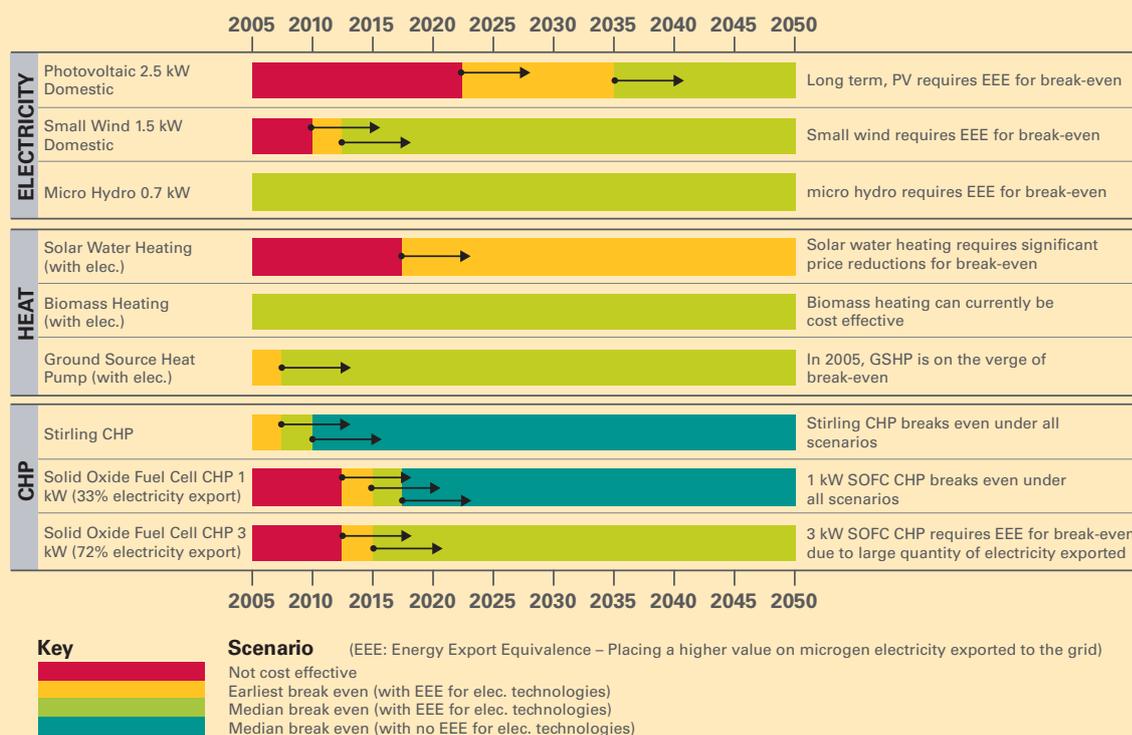


Figure 2 – EST Study: Potential for Microgeneration



## Summary Box

- Microgeneration technologies provide both heat and/or electricity from a low carbon source.
- Heat generating technologies include - solar water heating, heat pumps, biomass stoves and boilers.
- Electricity generating technologies include - solar photovoltaics, micro-wind turbines and micro-hydro systems.
- Combined heat and power technologies use natural gas as a fuel but provide electricity as well as heat. The two main systems use either reciprocating engines or stirling engines. Fuel cells are also an alternative system, although less well-developed for the domestic market.
- In 2004 there were approximately 82, 000 installations in the UK. Yet a study commissioned by the DTI from the Energy Saving Trust (EST) suggested that by 2050, microgeneration could provide 30-40% of the UK's electricity needs and help to reduce household carbon emissions by 15% per annum.





# Issues to be tackled

It is clear that both the market and the industries in that market are at a very early stage of development. This chapter looks at addressing factors that could constrain widespread deployment and that need to be addressed to encourage a sustainable market.

## Constraints

There is a range of constraints that currently affect the deployment of microgeneration technologies. These can be roughly divided into cost constraints, information constraints, technical constraints and regulatory constraints.



### *Cost constraints*

The lack of demand for microgeneration has restricted the extent to which the industry has been able to exploit scale economies and learning effects in their production and installation. This means that the costs of these products remain high enough to act as a deterrent to mass market demand, leaving the industry in a difficult situation - demand is low due to the high up-front costs, yet it is difficult to bring costs down without increased demand.

In most cases the natural development of a market will eventually lead to costs falling (as the EST report demonstrates) to a level where they become (theoretically) attractive to

consumers. But, without efforts to stimulate demand, this might not happen for many years meaning that we lose the opportunity in the medium term to gain the benefits that microgeneration has to offer in relation to sustainable and secure energy supplies.

### *Information constraints*

Even those technologies that are at the cheaper end of the spectrum are not being purchased to the extent that their lower costs might suggest. This indicates that there are other factors hindering take-up.

Inadequate promotion and poor information on microgeneration, and the lack of a widely understood accreditation system for products and installers, reduces the incentive for consumers to purchase microgeneration products due to insufficient signals regarding the quality and performance of these products. Even where there is a willingness to buy some form of microgeneration, prospective customers find it difficult to find independent sources of information about the suitability and quality of products and also the reliability of the companies involved. It is not just consumers that suffer from a lack of



information. Local authorities have a key role to play in relation to microgeneration, particularly with respect to planning permission for new developments and for the installation of some microgeneration technologies on existing buildings. The performance of local authorities in these areas that touch on microgeneration will be adversely affected by inadequate information.

Lack of robust product and performance information also makes it difficult to interest the construction industry and building designers in using microgeneration technologies in new build.



#### *Technical constraints*

There is a range of issues surrounding metering, connection to the distribution network and balancing and settlement arrangements that could be preventing widespread take-up of electricity generating technologies.

New metering technology is not a pre-requisite for the installation and operation of microgeneration technologies, although it is currently necessary under the Balancing and Settlement Code<sup>18</sup> if suppliers are to receive any credits for their customers who export power. Benefits in terms of reduced energy bills would be achieved with the existing system of one-way import meters, but in order to take advantage of the range of potential benefits on offer (access to Renewable Obligation Certificates (ROCs), payment for exported electricity) data on the import, export and generation of electricity will be required. The

cost of three separate meters and, more importantly, the cost of collecting the data may provide a further disincentive to the prospective consumer. Judicious use of profiles (similar to those that are currently used in the settlement of domestic consumption) could have a useful role to play, but there is presently a lack of data to cover all the various technologies. A report recently carried out for the DTI<sup>19</sup> into the difficulties being faced by small generators when connecting to the distribution network suggests that there are barriers still to be overcome.

At the moment, the penetration of electricity generating microgeneration technologies is low, so the amount of electricity exported into the distribution network has a minimal impact on the technical performance of the distribution network. However, as the number of microgenerators increases it will be important to ensure that the overall network performance is not adversely affected whilst at the same time the arrangements do not hinder the development of a sustainable market. This is unlikely to be an issue for many years, but we need to plan now to ensure future network stability.

The special incentives for innovation in Ofgem's last Distribution Price Control<sup>20</sup> were specifically to incentivise the distributors to respond to

<sup>18</sup> <http://www.elexon.co.uk/bscrelateddocs/BSC/default.aspx>

<sup>19</sup> <http://www.ensg.gov.uk/index.php?article=32>

<sup>20</sup> [http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/7615\\_14504g.pdf](http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/7615_14504g.pdf)



microgeneration (and other distributed generation) with efficient development and management of assets.

### *Regulatory constraints and opportunities*

There are areas where regulation can provide an opportunity to encourage the development of a sustainable market. In particular the planning regime and Building Regulations can have an important contribution to make.

There are two aspects to the planning regime that impact on microgeneration installations - the planning permission required for the installation of microgeneration on existing houses and the regulations governing planning requirements for new developments. In relation to existing buildings, concerns have been expressed regarding a lack of clarity as to whether specific planning permission is required, different interpretations of the rules by local authorities and the

sometimes complex process of seeking planning permission.

As for the positive contribution planning requirements for new build can make - see box that outlines the impact that positive planning policies in Merton and Croydon have had on the installation of renewable generation.



### **Trailblazers: Merton and Croydon**

London Borough of Merton set the standard for planning policy by introducing a requirement that all new non-residential developments would have to reduce predicted carbon emissions by 10% through the use of onsite renewable energy sources. Croydon Council followed the lead by including in their development plan an expectation that all developments (either new build or conversion) with a floor space of 1,000m<sup>2</sup> or more than ten residential units to incorporate renewable units incorporate renewable energy equipment to provide at least 10% of the predicted energy requirements. In total, approximately 70 local authorities have either included, or are looking to include, similar policies in their plans.

These policies have had concrete effects. In Merton, since the introduction of the policy 5 developments have been built or are under construction using a total of 10 Windsave rooftop turbines, 5 6kW Proven wind turbines, 18 Swift micro-turbines, 3 ground source heat pumps and 2 solar PV arrays.



## Summary Box

- There is a range of constraints currently preventing wide-spread uptake of microgeneration technologies
- Cost constraints - relatively high upfront costs constrain demand, demand needs to be stimulated to allow the industry to exploit scale economies and learning effects in production and installation.
- Information constraints - inadequate promotion and poor information regarding the costs, benefits and performance of the various technologies can hinder growth in demand and can also make it difficult to interest the construction industry and building designers in using these technologies.
- Technical constraints - including metering, connection to the distribution network and balancing and settlement arrangements
- Regulatory constraints/opportunities - the regulations governing planning requirements for new build, planning permission for microgeneration installations on existing build and the Building Regulations can provide opportunities for the microgeneration industry.





# Objectives and Actions

This Chapter considers the objectives for microgeneration strategy and looks at the actions needed to deliver these objectives.



## Objectives

There has been much discussion over the need for the Government to set a microgeneration target and the positive impact this could have. Achieving any such target would then be a key objective against which success could be measured. But even key players in the industry agree that it is too early in the development of a market to set a meaningful target. We need a clearer idea of the real potential of all the microgeneration technologies and, perhaps more importantly, an idea as to how consumers will react to the growing profile of these technologies (i.e. which technologies will prove more attractive).

Under the requirements of the Climate Change and Sustainable Energy Bill<sup>21</sup> (should it receive Royal Assent) we will be closely monitoring the development of the market, assessing future trends and will make a further determination, based on evidence collected, regarding the suitability of a target by November 2008.

**Action:** DTI will undertake such further analysis and research as is required, building on the EST study, to enhance understanding of the future potential of microgeneration technologies before making a decision on whether a microgeneration target is required.

The key messages to be drawn from the preceding chapters that justify a microgeneration strategy and direct its broad approach are:

- Microgeneration technologies could help Government deliver our long term objective of sustainable, reliable energy for all.
- There are many microgeneration technologies; each has particular characteristics that make it more effective in a specific setting. No single technology should be promoted above the others.
- The markets for all technologies are in the very early stages of development, which makes it difficult to make long term predictions regarding uptake.

<sup>21</sup> References to the Climate Change and Sustainable Energy Bill throughout this document are based on the premise that this Private Members Bill achieves Royal Assent.



- The UK has some level of representation in all microgeneration technologies but there may be a skills shortage if the market increases rapidly.
- Uptake of microgeneration technologies is currently constrained by the high cost of the technologies and a lack of reliable information.
- There are opportunities for local authorities to be more proactive in promoting the incorporation of microgeneration through sensible use of planning policies.
- There may also be opportunities to promote microgeneration through use of Building Regulations.
- Long term solutions are needed to ensure that when levels of microgeneration increase this type of energy generation fits into the wider energy system.

Guided by these factors, the objective for the strategy can be defined as “creating conditions under which microgeneration becomes a realistic alternative or supplementary energy generation source for the householder, for the community and for small businesses”

## Actions

To deliver the above objective a portfolio of actions is needed to remove the constraints outlined in earlier chapters.

### *Tackling cost constraints*

Although the upfront costs of most microgeneration technologies are possibly the most significant constraint on uptake, there are several ways in which these costs can be reduced for the end consumer or additional

revenue (from electricity generating technologies) can help the consumer to recoup the cost more quickly. We need a better understanding of consumer behaviour and the drivers of early-adopter purchase decisions in order to ensure that our support measures are correctly targeted. A greater understanding in this area will be of particular value when developing a communications package (as outlined in the next section).

**Action: DTI will undertake further research into consumer behaviour and, in particular, what drives early-adopter purchase decisions.**

Capital grants are the obvious method for reducing upfront cost. The Low Carbon Buildings Programme (covering the UK) encourages both energy efficiency and microgeneration technologies in buildings and will allocate £80m of grants over a period of three years (between 2006-09) through two streams.

The original £30m fund was supplemented by the announcement in Budget 06 of a further £50m to help fund the installation of microgeneration technologies in a range of buildings including schools, social and local authority housing, businesses and public buildings.

Stream 1 will provide grants to household and small community projects, whereas Stream 2 will fund larger-scale projects. Stream 1 will continue the support for



projects at the individual and community level that has been started under previous capital grant programmes (Clear Skies and the Major PV Demonstration Programme). The larger projects funded under Stream 2 will incorporate advice from the Carbon Trust on optimising energy efficiency and microgeneration technologies in buildings. The projects will help to raise the profile of microgeneration, bringing it to the attention to a wider audience. They will also encourage the construction industry to make use of microgeneration with a focus on projects that can be replicated, with the aim of helping to generate the levels of demand that will see costs fall. (A break down of how the original £30m will be spent can be found at Annex B and further details regarding the additional £50m will be published shortly). The scheme will be run by a consortium bringing together the Energy Saving Trust and the Buildings Research Establishment, and will be launched in April 2006<sup>22</sup>.

**Action: DTI to publish details (following consultation with industry) of how the extra £50m will be spent.**

For heat generating technologies, Government is currently considering mechanisms for supporting renewable heat in the context of

responding to the Biomass Task Force. For electricity generating technologies, additional revenue can be obtained through ROCs, LECs and REGOs. These are the three types of green energy certificates that generators of electricity from renewable sources are entitled to claim (see box). The DTI has already taken some steps to improve access to ROCs for microgenerators - the Renewables Obligation (RO) was amended in 2005 to allow



microgenerators (those generating stations with a net capacity of 50kW or less) to claim ROCs on an annual or monthly basis. Further amendments will be made to the RO through the Climate Change and Sustainable Energy Bill. These amendments will allow agents to act on behalf of microgenerators through the process of accreditation on claiming of ROCs, allow ROCs to be issued to agents and allow agents to amalgamate the output of microgenerators. All these changes are aimed at encouraging the development of a market where agents can remove the administrative burden of claiming ROCs, allowing microgenerators to claim the reward (less agents' costs) without needing to understand the administrative complexities of the RO. The Bill will make a further change to the RO that will remove the requirement for a sale-and-buyback agreement with an energy supplier, further reducing the administrative burden.

REGOs are of less immediate value but could become important if levels of electricity from microgenerators rise significantly and energy suppliers buying their electricity from these microgenerators are likely to want the REGO attached to the electricity for Fuel Mix Disclosure purposes. It would therefore be sensible to assess the benefits that could accrue to

<sup>22</sup> Further details can also be found at [www.lcbp.co.uk](http://www.lcbp.co.uk)



## REGOs/ROCs/LECs.

### ROCs

The Renewables Obligation (RO) is an obligation, administered by Ofgem, on licensed electricity suppliers to provide a specified and annually increasing proportion of their sales from renewable sources. Generators can claim 1 Renewable Obligation Certificate (ROC) for every 1 MW of eligible renewable electricity generated. These are then sold to suppliers who can meet their obligation by presenting ROCs or by paying into the “buy-out fund” or a combination of the two. At the end of an obligation period the buyout fund is recycled pro rata to all suppliers who presented ROCs.

Specific arrangements apply for microgenerators (those with a capacity of 50kW or less). In order to be issued with ROCs the microgenerator must first gain accreditation from Ofgem by completing a questionnaire, although ROCs will be issued for data which has been submitted prior to accreditation being obtained. In order to receive ROCs on an ongoing basis, generators must submit output information to Ofgem. Microgenerators have the option to submit their data on either a monthly or annual basis. ROCs are awarded on the basis of electricity generated. 500kWh - 1499 kWh earns 1 ROC, 1500kWh - 2499kWh earns 2 ROCs, and so on. These ROCs can then be sold to electricity supply companies to help them meet their obligation. The price of a ROC is subject to the market and is affected by different factors for example, the level of renewable generation or expected generation, but microgenerators could currently expect to receive £20-£30.

### REGOs

An EU Directive on the promotion of electricity from renewable energy sources requires that Member States ensure that a Guarantee of Origin is issued, on request, in respect of electricity produced from renewable energy sources. These renewable energy Guarantees of Origin (REGOs) are issued by Ofgem. A microgenerator can obtain REGOs by completing the appropriate section of the same questionnaire they complete in order to gain accreditation before claiming ROCs.

REGOs became particularly important from 1 July 2005. After this date all suppliers must hold REGOs as evidence of renewably generated electricity in the mix of fuels supplied to customers. In addition an Ofgem consultation in 2005 on revised Green Supply Guidelines proposed REGOs as a potential method for demonstrating the origin of renewable energy for green supply under the green electricity tariffs that are becoming increasingly popular.

At the moment there is no formal arrangement for REGOs to be traded (although there is no legal barrier to prevent trades occurring), so they are unlikely to provide monetary value for microgenerators. However, because of the fuel mix disclosure arrangements generators may find that increasingly suppliers will want to purchase renewable electricity with a REGO.



### LECs

Renewables Levy Exemption Certificates (LECs) are issued to accredited renewables generators at the rate of one LEC for every MWh of output that reaches the utility (i.e. is not consumed within the home). These LECs are sold on with the electricity and allow the supplier to 'badge' the electricity as free of Climate Change Levy. Each LEC is worth a nominal £4.30.

microgenerators as a result of acquiring REGOs, and also LECs, and whether there is a real need to simplify the process for claiming these certificates as well as ROCs.

The arrangements for claiming these certificates is complicated, with the benefits sometimes opaque to the uninitiated.

**Action: DTI and Ofgem will produce a clear guidance document covering all three types.**

This document will set out the benefits of each certificate and explain whether and how microgenerators would need to go through the process of applying for each.

More radical options for simplifying access to the benefits of these certificates have been raised in the consultation that preceded this strategy and in work carried out for the DTI under the Distributed Generation Co-ordinating Group.

**Action: DTI will investigate all the suggestions outlined in the two reports published by the DGCG on the "Accrual of ROCs, LECs and REGOs"<sup>23</sup> and publish a formal view by end 2006.**

Electricity generating microgenerators who export excess electricity already have the option of entering into an agreement with a willing energy supplier in order to receive

payment for that electricity. This extra income can help tip the balance in the decision-making process of an interested consumer, or perhaps create an additional revenue benefit for a supplier interested in providing microgeneration through a so-called "Energy Services" contract. The main obstacle to making progress in this area is that electricity suppliers face disproportionately high transaction costs when dealing with very small quantities of exported power from individual consumers. As a consequence, there is very little incentive, and may even be a financial disincentive, for electricity suppliers to offer export tariffs. In turn, this situation largely exists because the detailed rules and codes allied to the Balancing and Settlement Code were never designed to accommodate large numbers of relatively small power exports.

There is a good case for the settlement rules that result in these difficulties to be addressed to allow microgeneration customers a fairer reflection of the value their exported energy has. Energy suppliers



<sup>23</sup> [www.distributed-generation.gov.uk/wstreams.php?action=project\\_detail&f\\_ws\\_id=4&f\\_project\\_id=37&f\\_ws\\_no=4](http://www.distributed-generation.gov.uk/wstreams.php?action=project_detail&f_ws_id=4&f_project_id=37&f_ws_no=4)



themselves are best placed to propose and bring about the necessary changes within the industry to make this happen. The Climate Change and Sustainable Energy Bill includes a clause that is designed to encourage suppliers to develop a scheme that will lead to microgenerators having the confidence that their exported electricity will be acquired.

**Action: Energy suppliers to develop a scheme that will reward those microgenerators exporting excess electricity.**

If suppliers do not develop a suitable scheme within a year the Bill gives the Government the power to make modifications to supply and distribution licences to impose a scheme on the industry.

Under the Energy Efficiency Commitment (EEC), electricity and gas suppliers are required to achieve targets for improving household energy efficiency. In the second phase of EEC (running between 2005 and 2008) there is an incentive for innovative action - where a supplier carries out an innovative action, Ofgem is required to attribute an increase in energy efficiency to that action of 50% more than it would have otherwise. This incentive can apply to no more than 10% of each supplier's target. MicroCHP is specified as a technology that benefits from that incentive, and ground source heat pumps and solar water heating could potentially be

incentivised through this mechanism. But other electricity generating microgeneration equipment is not currently included.

While the EEC targets placed on suppliers are achievable, we recognise that they present a challenge. As a result, we intend to consider with all stakeholders how to provide as much flexibility as possible in the range of measures that can be employed

to meet EEC targets, for example microgeneration, all forms of smart metering and behavioural measures. Legislative amendments currently being considered as part of the Climate Change and Sustainable Energy Bill would allow the Government more flexibility in extending the range of measures suppliers could use to meet obligations in the household sector. The provisions would only be implemented following full analysis and consultation on the practical implications, potential benefits and disbenefits of such an approach, and would be included in our consultation process for the next phase of the EEC.

**Action: DEFRA to look carefully at the possibility that electricity generating technologies (other than microCHP) could be included within the framework of the 3rd phase of EEC (or, if the enabling powers in the Climate Change and Sustainable Energy Bill are used, carbon emission reduction target framework).**

#### *Tackling information constraints*

It is difficult to create demand in a market that is unaware of a product or has minimal understanding about the benefits and drawbacks of that product and no clear idea of where to get advice. The two overarching issues in relation to information are - that not enough people



know that microgeneration exists and those that do have no clear idea of costs and benefits or where to go to find this information (which is usually critical for the purchase decision).

An accreditation scheme covering products, installers and manufacturers can move some way towards filling this information gap (providing such a scheme is well known) by providing consumers with an independent indication of reliability and a route for complaints. A scheme covering the product installation and a

code of conduct, will be introduced building on the existing Clear Skies and Solar PV accreditation schemes. It will be supported by DTI initially with the objective of the industry itself taking over the responsibility in due course.

**Action: DTI will work with the winner of a tender exercise to develop such a scheme with the aim of having it in place by end 2006.**

Advice and information for consumers on microgeneration is currently available from a wide range of sources - the Carbon Trust, Energy Saving Trust, Trade Associations, local authorities, etc. Whilst there are some excellent examples of advice provision and guidance offered to consumers, the vast majority of respondents to the consultation indicated that there was a lack of co-ordination and clarity that needed to be addressed. The consumer also has to know where to look (a simple search on Google for 'microgeneration' turned up 70,400 hits, most of which appeared to be related to policy or scientific documents rather than practical advice). Potential consumers (both householders and community organisations) should be able to easily find reliable

sources of information regarding microgeneration technologies and the process of installation.

**Action: DTI will undertake a thorough review of existing activity in this area to assess effectiveness and identify gaps. We will then assess the feasibility of a communications/information campaign that raises the profile of microgeneration technologies, signposts consumers to reliable sources of information and highlights the accreditation scheme outlined above.**

This report will link into the framework of incentives and powers that already exist for local authorities by way of Sustainable Community Strategies (which will evolve from the existing Community Strategies) and the well-being power. The strategies will set out, amongst other things, what local action will be taken to minimise climate change and the well-being power enables local authorities to facilitate or co-ordinate local activity. ODPM held a public consultation<sup>24</sup> (between December 05 and March 06) on the future of Local Strategic Partnerships (LSPs) and this included a section on the evolution of community strategies into Sustainable Community Strategies. Pending the outcome of the consultation, ODPM aims to revise guidance later this year in discussion with representatives of local authorities and LSPs among others.

<sup>24</sup> [www.odpm.gov.uk/index.asp?id=1162320](http://www.odpm.gov.uk/index.asp?id=1162320)



Government Departments are in a good position to lead the way through demonstration of these technologies. The current re-working of the Sustainable Framework for the Government Estate will aim to establish fewer but more stretching outcome-focused targets that add real value to the four priorities for immediate action (including climate change and energy) detailed in the UK Sustainable Development Strategy "Securing the Future" (March 2005)<sup>25</sup>. Further details of these targets will be available later this year when the revamped Framework is published. Some Departments and Government agencies have already made significant steps towards reducing their impact on the environment (see box for details of Environment Agency office).

**Action:** DTI to actively investigate the possibilities for microgeneration on its own estate.

There are also other information constraints that may be impeding development of a market. Planning regulations have an important role to play in encouraging or discouraging the take-up of microgeneration; equally important is the application of those regulations. Yet if officers in the planning departments of local authorities do not have easy access to relevant information regarding the characteristics of the various technologies they may unintentionally prevent installations even where this is not the intent of the regulations.

### Red Kite House : Wallingford

One of the most environmentally friendly offices of its kind was officially opened in June 2005 as part of the Environment Agency's World Environment Day celebrations, demonstrating the Environment Agency's commitment to sustainable building. The office will be used to promote best practice and showcase sustainable building for the 21st Century.

20% of the estimated electricity demand will be met through photovoltaic cells. These cells clad the south-facing canopy, which is designed to provide shade as well as power. Solar thermal panels have been placed on the roof and will satisfy around 40% of the demand for hot water. Both the solar installations were part-funded by the DTI's Major PV Demonstration Programme and are expected to save a combined total of 13.6 tonnes of CO<sub>2</sub> each year.

Wind turbines have been installed on the roof to help draw air through the windows and upper floor of the building. Together with other design features these turbines mean that the office does not require an air-conditioning system.

Overall the building is expected to produce 25% less CO<sub>2</sub> than the DEFRA benchmark of good practice.

<sup>25</sup> [www.sustainable-development.gov.uk/publications/uk-strategy/index.htm](http://www.sustainable-development.gov.uk/publications/uk-strategy/index.htm)



The companion guide to Planning Policy (PPS22)<sup>26</sup> offers practical advice to Planning Authorities in England as to how PPS22 can be implemented on the ground and includes a technical annex, which has specific advice on the range of renewable technologies covered by PPS22. In Wales, Technical Advice Note (TAN) 8 provides technical advice on planning for renewable energy. This supplements the policy set out in Planning Policy Wales<sup>27</sup> and a Ministerial Interim Planning Policy Statement on Renewable Energy.

Yet it is possible that further information may be useful to officers in planning departments.

**Action:** DTI will work with ODPM and planning officers to identify their information needs, assess whether these are being met adequately and, if not, develop a communications pack specifically designed for planners including information packs and workshops.

Local authorities have the potential to play a wider role in promoting microgeneration. There are many examples of local authorities implementing innovative policies that help to reduce greenhouse gas emissions and also tackle fuel poverty. But there is more that Government can do to help other local authorities learn from exemplars. The Climate Change and Sustainable Energy Bill places an obligation on the Secretary of State to publish a report on ways in which local authorities can improve energy efficiency and levels of microgeneration installations, reduce greenhouse gas emissions and alleviate fuel poverty. The aim of the report is not to impose new burdens on local authorities but rather to support them in developing their own approaches to reducing

carbon emissions and alleviating fuel poverty, giving them the flexibility to adopt the best local solutions for their communities. Hopefully the report will help local authorities to achieve more cost effective ways of addressing climate change and fuel poverty.

**Action:** DTI to lead work with other Government Departments and local authorities to publish a report on measures that local authorities can take to improve energy efficiency and levels of microgeneration installations, reduce greenhouse gas emissions and alleviate fuel poverty. This report will be published within 12 months after the commencement of the relevant section of the Climate Change and Sustainable Energy Bill.

The construction industry is a key target for information. This industry has a pivotal role to play - the inclusion of microgeneration technologies on all new housing estates, for example, would have a significant impact on demand for these technologies, raising the profile of microgeneration technologies and helping to turn them into a routinely used product. But the industry has not yet moved in this direction - primarily due to cost and a lack of demand from consumers, but also because the industry remains unfamiliar with the technologies. Introduction of the

<sup>26</sup> [www.odpm.gov.uk/index.asp?id=1143908](http://www.odpm.gov.uk/index.asp?id=1143908)

<sup>27</sup> <http://www.wales.gov.uk/subiplanning/content/planningpolicy/planningpolicy-e.htm>



Low Carbon Buildings Programme will go some way to address this lack of familiarity. The Government will use its regular contacts with the construction industry to work with them to understand where the real gaps in information are and assess what more can be done to encourage regular

incorporation of microgeneration on a voluntary basis (rather than as a result of regulation).

**Action:** If there is a clear need, DTI will develop a specific communications package, including information packs, to help develop a knowledge base within the construction industry.

#### *Tackling technical constraints*

Whilst the penetration level of microgeneration technologies are at their current low point there is little impact on the overall energy system. But if the levels of penetration of electricity generating technologies were to increase, there are likely to be knock-on effects in terms of management of the distribution network, and also on the balancing and settlement arrangements. Moreover, clusters of installations involving high concentrations of microgeneration may mean that distribution networks require some reinforcement or operational adjustments to be made for the network to continue to operate within statutory limits. The current energy system tends to be centralised, with one-way distribution of electricity from big power stations. As we move towards a system where increasing numbers of households are exporting as well as importing electricity we need to ascertain whether the underlying framework can support this change or whether some adjustment is required. The operation of the balancing and settlement arrangements are also relevant to developing a system for the reward of exported

electricity without imposing costly metering requirements on households. Some work on the impact of microgeneration on the network, profiling and metering arrangements has already been carried out under the auspices of the Distributed Generation Co-ordinating Group<sup>28</sup> (now the Electricity Networks Strategy Group).

**Action:** DTI will work in partnership with the energy supply companies, distribution network operators and Ofgem to ensure that network and market systems are able to cope with growing numbers of microgenerators exporting electricity.

Changes to the Electricity Safety, Quality and Continuity Regulations 2003<sup>29</sup> have allowed a more straightforward process for network connection for electricity producing microgeneration technologies below a certain size (16A per phase). This legislation was followed by the publication, and subsequent citation in the Distribution Code, of Engineering Recommendation G83/1, which sets out the technical performance parameters that microgeneration below 16A/phase needs to meet. Both of these requirements remove the need for a customer to obtain permission from the distribution network operator prior to connecting

<sup>28</sup> [www.distributed-generation.gov.uk](http://www.distributed-generation.gov.uk)

<sup>29</sup> [www.energynetworks.org/dg01.asp](http://www.energynetworks.org/dg01.asp)



microgeneration. However, in a significant number of contracts in existence between domestic customers and their electricity supplier, there remains a requirement to obtain this permission from the Distribution Network Operator. This is inconsistent with the intent of the relevant legislation.

**Action:** DTI will continue to work with Ofgem, the distribution network operators, energy suppliers and the microgeneration industry to resolve this issue through the Electricity Networks Strategy Group.

Some microgeneration developers would like to see changes made to the regulations (BS7671: Requirements for Electrical Installations)<sup>30</sup> to make it easier for customers to connect microgeneration without having to undertake disruptive and expensive wiring works. DTI is monitoring progress, through the relevant project set up under the Electricity Networks Strategy Group, of discussions between the microgeneration industry, distribution network operators, and the JPEL/64 Panel (the National Wiring Regulations Committee) with responsibility for overseeing changes to those regulations. Whilst we wish to ensure that no unnecessary barriers exist through technical regulations, the safety of the public is the number one priority for all electrical installations, and we must be satisfied that any changes made to provide better access for microgeneration is done in a manner which does not reduce safety levels.

**Action:** DTI will continue to work with Ofgem, the Distribution Network Operators, energy suppliers and the microgeneration industry to resolve this issue through the Electricity Networks Strategy Group.



Energy consumption feedback to consumers is another key measure to encourage energy efficiency at home. The recently agreed Energy End-Use Efficiency and Energy Services Directive will require installation of 'actual time of use' metering for all new connections and for replacement meters where "technically possible, financially reasonable and proportionate to the potential savings". The Government is committed to introducing smart metering in the UK as feedback on energy use can have substantial benefits. We estimate that about 0.2 MtC per year could be saved by 2010 with better billing and metering if from 2008 all new and replacement meters are 'smart' meters, also providing consumption feedback. The savings would increase over time as more meters were installed. However, the uncertainty about the scale and duration of these carbon savings is large.

Despite their potential benefits very few smart meters have been installed in the UK. Ofgem's current review of metering is looking at international experience of smart metering and, in the light of this evidence, is examining the potential costs and benefits of innovative metering in the UK context. Ofgem has recently conducted a public consultation<sup>31</sup>. The results of the review are expected in Summer 2006.

<sup>30</sup> [www.iee.org/Publish/WireRegs/BS7671.cfm](http://www.iee.org/Publish/WireRegs/BS7671.cfm)

<sup>31</sup> [www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/13745\\_2006.pdf?wtfrom=/ofgem/work/index.jsp&section=/areasofwork/metering](http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/13745_2006.pdf?wtfrom=/ofgem/work/index.jsp&section=/areasofwork/metering)



It is important that as work continues to develop on the costs and benefits of smart meters the assessment includes the interaction of smart meters with microgeneration technologies. If smart meters are to become the new standard we must be clear on how they relate to electricity generating technologies and whether there are further benefits to systems incorporating both.

**Action: DTI will be investigating the possibility of a field trial that brings together smart meters and microgeneration to the effectiveness of smart meters combined with microgeneration technologies.**

A report recently carried out for the DTI into the difficulties being faced by small generators when connecting to the distribution network suggests that there are barriers still to be overcome.

**Action: DTI will examine the recommendations made in this report and make an assessment regarding the desirability of their implementation.**

### Actions to remove regulatory barriers/take advantage of regulatory opportunities

Stakeholders have expressed several concerns in relation to the regime governing planning permission and its application. These include lack of clarity as to whether specific planning permission is required, different interpretations of the rules by local authorities and the sometimes complex process of seeking planning permission. The Town and Country

Planning (General Permitted Development) Order 1995<sup>32</sup> sets out the criteria under which householders, in certain circumstances, can alter the exterior of their house. The installation of solar panels and photovoltaic cells often fits under these criteria. But in some cases the planning authority may consider that the works would enlarge the roof of a house or alter its shape, and may then require a planning application to be made (including the payment of a fee).

Through its Householder Development Consents Review (HDCR)<sup>33</sup> ODPM has been reviewing the consent regimes that regulate a wide range of developments by householders. ODPM is committed to responding to the Climate Change and Sustainable Energy Bill's requirement for the Secretary of State to form a view as to what provision (or further provision) should be made to facilitate the installation of microgeneration equipment by removing any unnecessary controls. The aim will also be to ensure that planning authorities and householders will have a clearer idea of the situations in which microgeneration can be installed without the need for planning permission. The Secretary of State will report to Parliament on the recommendations of the review and set out any proposals for changes.

<sup>32</sup> Advice can be found on the Planning Portal - [www.planningportal.gov.uk](http://www.planningportal.gov.uk)

<sup>33</sup> [www.odpm.gov.uk/index.asp?id=1143241](http://www.odpm.gov.uk/index.asp?id=1143241)

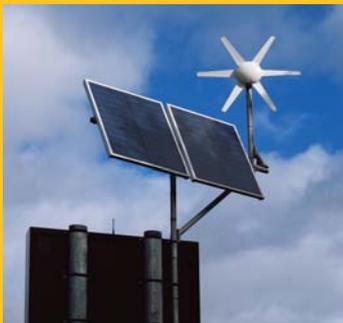


**Action: ODPM work under HDCR will provide the response to the Climate Change and Sustainable Energy Bill's requirement to form a view as to what provision should be made to facilitate the installation of microgeneration.**

There are opportunities to promote microgeneration through use of planning and Building Regulations. Planning Policy Statement 22 Renewable Energy (PPS22), published in August 2004, establishes that local authorities in England may set targets for on-site renewable energy in residential, commercial or industrial projects. It also expressly states that "local authorities and developers should consider the opportunity for incorporating renewable energy projects in all new developments.... Local planning authorities should specifically encourage such schemes through positively expressed policies in local development documents". The success of such policies can be seen in the examples of Croydon and Merton discussed earlier. Whilst acknowledging that local authorities must ensure that design, conservation and other

amenity considerations are accorded their due weight, paragraphs 1(ii), 8 and 188 of PPS22 do require local authorities to plan positively for the use of renewable energy. Nevertheless, concerns have been expressed as to whether all authorities will include policies on on-site renewables in accordance with PPS22.

**Action: ODPM will undertake an urgent review of local plans to determine whether there is a problem with emerging plans that do not fully incorporate PPS22.**



If a problem is then identified, ODPM will take swift and appropriate action. Depending on the severity of the problem, that action could include undertaking further direct engagement with local authorities, issuing a Government statement or consulting on an amendment to PPS22.

To help local authorities implement positive planning policies it is important that they have access to the information allowing them to do this in an appropriate way (see earlier point under 'information constraints').

With approximately 120,000 homes required each year (in order to ensure price trends in line with the EU average of a 1.1% p.a. increase), the construction of these new homes provides a significant opportunity for the use of microgeneration technologies.

Building Regulations are framed in terms of reasonable, adequate and appropriate functional requirements for buildings. The Approved Documents that accompany the England and Wales Regulations suggest how the regulations can be met by demonstrating way of compliance. Approved Document L (conservation of fuel and power) has recently been amended, with those amendments coming into force in April 2006<sup>34</sup>. From April 2006, new buildings will have to meet

<sup>34</sup> [www.odpm.gov.uk/index.asp?id=1164177](http://www.odpm.gov.uk/index.asp?id=1164177)



increased energy standards, which will lead to an average 20% reduction in carbon emissions when compared against homes built under the previous standard. Whilst the regulations do not require the incorporation of microgeneration, it will be easier to meet the higher emissions standards demanded through their use. In fact the guidance accompanying the new Approved Document L highlights the contribution microgeneration technologies can make.



In line with the Energy White Paper commitment to raise standards over the next decade and in accordance with Article 4 of the Energy Performance in Buildings Directive ODPM are required to look at Part L again within 5 years. The level of notional contribution from microgeneration relative to the overall energy performance target would be explored again at that time to reflect technical progress, cost effectiveness and market conditions.

It is also important to ensure that microgeneration technologies are fairly assessed with regards to the contribution they can make to reducing the carbon emissions of buildings.

The Code for Sustainable Homes<sup>35</sup> provides an opportunity to drive forward the use of microgeneration as part of the Government's sustainability agenda. We wish to see all new homes in England built to meet the Code. From April 2006, all new homes built with Housing Corporation funding will comply with Level 3 of the Code, together with homes developed by English Partnerships and homes built with direct funding support from ODPM's housing growth programmes. The consultation on the Code finished on 6th March 2006. The Code is

performance based which means that it does not prescribe how a particular standard should be achieved, and the final details of the Code are still being developed following analysis of the responses to the consultation, but it is extremely likely that compliance with the higher levels of the energy elements of the Code will not be able to be achieved without the incorporation of microgeneration technologies, and that additional Code points will be available where zero emission energy sources are specified and used.

### Summary Box

- Need a clearer idea of the real potential of all microgeneration technologies before setting a target. We will be closely monitoring the development of the market, assessing future trends, before making a further determination regarding the suitability of a target.
- The objective of the microgeneration strategy is to create conditions under which microgeneration becomes a realistic alternative or supplementary energy generation source for the householder, for the community and for small businesses.
- A full list of the actions outlined in this Chapter can be found at page 42.

<sup>35</sup> [www.odpm.gov.uk/index.asp?id=1162094](http://www.odpm.gov.uk/index.asp?id=1162094)





# The status of microgeneration-related industries in the UK

This chapter identifies the UK industries that would need to be involved in the development of a significant market for microgeneration and looks at their capability to contribute and gain benefit from such developments.

## The linkage between microgeneration and UK industries

Many microgeneration projects involve the installation of standard products. This is certainly the case for domestic installations, though larger scale projects may require a separate design phase. The microgeneration industry therefore has three distinct components - product manufacture, design and installation. Since the products generate electricity, heat or hot water and often form part of a building there are also strong links to the plumbing and electrical industries, the construction industry and building design. These are industries that can have a significant impact on the development of a market through the inclusion of microgeneration technologies in their product offerings.

## Presence of microgeneration companies in the UK

There is little large scale manufacturing based in the UK. Most microgeneration technologies are not mass-produced in this country, relying instead on labour intensive processes or assembly in the UK or importing products from abroad (e.g. ground source heat pumps from

Sweden). This situation reflects the fledgling state of the market - it is unrealistic to expect companies to invest significantly in manufacturing facilities if the market is not yet in existence.

The installer market is highly fragmented. There are over 275 installers operating in the microgeneration sector, with an estimated average turnover of £62,000 per company<sup>36</sup>. This does not include companies operating in the microCHP and fuel cell markets - these are very different to other sectors with a just a few active companies employing significant numbers, reflecting the scale of the investment being made into these new technologies. It is estimated that there are between 200-600 jobs in the microgeneration sector (excluding microCHP and fuel cells). The growth in the number of installers has to a large extent been fuelled by the introduction of Government grant programmes in 2002.

The sales and marketing function remains, for the large part, under-developed. There are no nationally established brands such as those seen in other parts of the construction and household product industries

<sup>36</sup> EST Study: Potential for Microgeneration



and little significant marketing activity is undertaken by reliable companies. Again this reflects the early stage of development of the market. To a certain extent this is starting to change as large companies are indicating an interest in microgeneration. Centrica have tied up with Windsave to install 100,000 roof-mounted wind turbines, Scottish and Southern have stakes in Renewable Devices (manufacturer of micro-wind turbines) and Solar Century, Worcester Bosch are entering the solar hot water and ground source heat pump markets. As products that will be installed by domestic consumers as well as larger organisations, consumer confidence supported by product certification and accreditation is crucial.

Success stories in the industry have tended to be linked to the development of innovative products (i.e. the 'Plug n Save' roof mounted wind-turbine from Windsave) or the offering of innovative microgeneration solutions (the business through which Solar Century became 25th fastest growing technology company in the UK).

There is good coverage across all the microgeneration technologies - with all technologies represented to varying degrees. This suggests that the development of a sustainable market in microgeneration technologies will bring direct benefits to UK companies.

Development Agencies. But responses to the consultation indicated that there is a lack of knowledge about available funds, what funding is for and how to apply for it.

**Action: DTI will produce a map of available funding, building on the Research Atlas being developed by the UK Energy Research Centre, together with guidance on how to apply.**

This will then inform further assessment as to whether R&D funding is being appropriately targeted.

## Route map

In order to ensure that the strategy remains relevant and continues to promote microgeneration technologies successfully, a detailed framework to guide the day-to-day implementation of the strategy is required. A route-mapping of all technologies will also give a clear indication of where R&D should be focused to develop next generation technologies and systems in order to develop UK expertise. This will highlight the areas where investment should be encouraged, either by UK companies or through inward investment.

**Action: DTI will work with industry to develop a route map for each microgeneration technology.**



## R&D

Research and Development is an important part of any industry. There are significant funds available for R&D in microgeneration through UK Government programmes (including the DTI Technology Programme), the Research Councils, European Union initiatives and the Regional





## Skills

The UK has most of the technical expertise required for the creation of a sustainable market in microgeneration technologies. But there is little sense in encouraging the development of a market without ensuring that there is an appropriate skills base to support that market. Whilst the growth of a market will, to a

certain extent, drive the development of a skills base as people and firms are attracted by work opportunities, there is still a role for Government in ensuring that there is sufficient support and encouragement to support the skills base.

The Energy and Utility Sector Skills Council<sup>37</sup> recently undertook a functional and occupational mapping exercise of the renewable energy sector. The research concluded that there are no major skills shortages in the renewable energy sectors. But it does find that some traditional occupations (e.g. plumbers and electricians) which are also key to the development of the renewables sector, may come under increasing pressure as demand increases, not just from within the sector but from other developments within the economy such as major construction projects.

**Action: DTI will explore with the Sector Skills Councils what more can be done to ensure that the skills base develops to support the levels of demand that will hopefully be created for microgeneration technologies.**

The other significant issue for industry development is the education of the related industries mentioned above. They need to become comfortable with microgeneration technologies so that ultimately building design routinely incorporates microgeneration and, for example, plumbers are able to offer solar hot

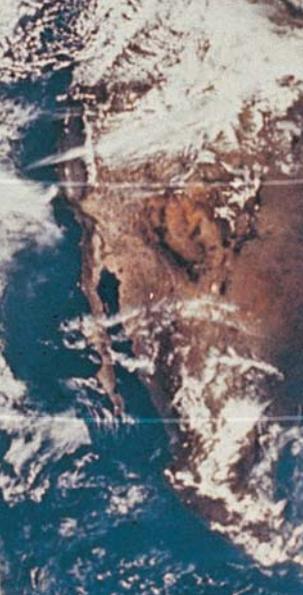
water heating as part of the solution when asked to replace boilers.

## Summary box

- The microgeneration industry has three distinct components - product manufacture, design and installation. There are also strong links to the plumbing and electrical industries, the construction industry and building design.
- There is very little large-scale manufacturing industry in the UK, the installer market is highly fragmented and the sales and marketing function remains largely under developed. Success stories have tended to be linked to the development of innovative products and innovative solutions.
- There are significant funds available for R&D but there appears to be a lack of knowledge about available funds and how to apply for them.
- It is important to ensure that there is an appropriate skills base to support the growing market. The growth of a market will, to a certain extent, drive the development of a skills base but there is still a role for Government in ensuring that there is sufficient support and encouragement to drive the development of a skills base.

<sup>37</sup> [www.euskills.co.uk](http://www.euskills.co.uk)





# Delivering the strategy

The previous chapter looked at actions that Government should be taking in order to achieve the objective of creating conditions under which microgeneration becomes a realistic alternative energy generation source for the householder, for the community and for small businesses. This chapter looks at how this strategy will be delivered covering management, monitoring, organisation and resourcing.

## Organisation and management of the strategy

The Emerging Energy Technologies Unit at the DTI will have specific responsibility for managing the strategy on a day-to-day basis, including the development of the route maps mentioned previously. This unit will also liaise with the Regional Development Agencies and local authorities to help with implementation at a local level. But relevant Government Departments will each have the responsibility for carrying out the actions that fall within their remit. To keep track of the implementation of the strategy, the actions will be allocated to workstreams. Progress on these workstreams will be reported to a Steering Committee comprising representatives of different

Government Departments, regional government, Ofgem and key industry stakeholders.

The Renewables Advisory Board will provide strategic advice and guidance on further development and implementation of the strategy. Members are selected on the basis of their experience and knowledge of the renewable energy sector.

Ofgem has a key role to play in the successful implementation of certain areas of this strategy. They held a consultation in 2005 on some of the regulatory aspects of how microgeneration technologies interact with the existing energy system.

**Action: Ofgem will be issuing a decision document on this consultation and on other matters raised by this strategy in the near future.**

## Reporting on progress

Progress on the strategy will be reported on an annual basis (as required under the Climate Change and Sustainable Energy Bill) as part of the report on progress against Energy White Paper Objectives.



### Summary box

- The Emerging Energy Technologies Unit at the DTI will manage the strategy on a day-to-day basis but relevant Government Departments and Ofgem will have the responsibility for carrying out the actions within their remit.
- A Steering Committee involving Government Departments, Ofgem and key industry stakeholders will be set up to ensure that the actions forming this strategy are carried out. The Renewables Advisory Board will provide strategic advice.
- Progress on the strategy will be reported on an annual basis (as required under the Climate Change and Sustainable Energy Bill) as part of the report on progress against Energy White Paper Objectives.





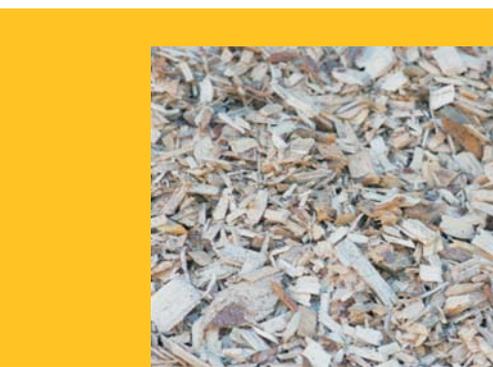
# Devolved administrations

## The Welsh Assembly

Text relating to actions taken by the Welsh Assembly are incorporated throughout the text.

## The Scottish Executive

In addition to the progress being made at a UK level, the Scottish Executive is working in a number of devolved policy areas to support microgeneration. These include energy efficiency, fuel poverty, renewable policy and building regulations. In Scotland there will be more of a holistic approach - linking microgeneration and local/renewable heat with energy efficiency as a range of investment options, to reduce carbon emissions from the heating and lighting of buildings.



The Executive continues to provide support to small-scale renewables through its Scottish Community and Household Renewables Initiative (SCHRI), which provides grants and expert advice on small scale renewable projects such as the installation of solar panels and wind turbines at the likes of community centres, schools and individual households. The Executive is currently reviewing this scheme with a view to re-focusing support more towards community projects obtaining better value for money.

The Executive is currently reviewing planning requirements on small scale and routine developments includes micro-renewables with a view to removing any unnecessary planning controls on this technology. It is also looking at the promotion of this technology in a new Scottish Planning Policy on Renewable Energy Developments and an Annex on Micro-renewables to accompany existing Planning Advice Notes will be issued shortly.

The Executive is currently developing the first Scottish Energy Efficiency Strategy in which it will set out carbon saving targets encompassing all its energy efficiency measures. These will encourage a range of investments in technologies such as microgeneration, local renewable heat and energy efficiency.

In addition, the Executive has committed to developing a renewable heat strategy for Scotland by the end of 2007, and linked to this, producing a Biomass Action Plan by the end of 2006, ensuring that Scotland's biomass resource is properly supported and exploited to deliver additional carbon savings and economic benefits.



### *Northern Ireland*

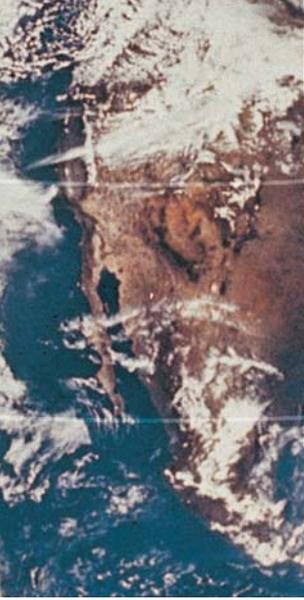
Energy is a transferred matter for Northern Ireland and the Energy Act requirement for the preparation of this strategy extends only to the promotion of micro generation in Great Britain.

Nonetheless Northern Ireland contributes to the overall UK carbon reduction targets and develops initiatives in tandem with the rest of the United Kingdom. For example DTI programmes such as Clear Skies have applied to Northern Ireland and it is intended that similar arrangements will apply to the Low Carbon Building Programme. Additionally, the existing small generator provisions of the Renewable Obligation (RO) apply equally to the Northern Ireland Renewables Obligation (NIRO) and it is intended that the NIRO will mirror the additional arrangements currently being proposed to accommodate micro-generation in the RO.

Furthermore, Northern Ireland amendments to Building Regulations are being considered to mirror those being implemented in GB to facilitate and promote micro-generation. The Planning Service, too, as part of its ongoing review of permitted development rights, is currently considering what permitted development rights might be given for microgeneration with a view to public consultation later in 2006. In addition, work has recently commenced on a new Planning Policy Statement on Renewable Energy which, in addition to containing policy on large scale renewable schemes, will address the issue of microgeneration of heat and/or electricity.

Separately in Northern Ireland the Environment and Renewable Energy Fund launched in February 2006 and involving £59m of additional government support in Northern Ireland over a 2 year period will have a particular focus on promoting micro-generation at community and individual household levels as well as enhancing the development of non-wind sources of energy.





## List of actions

### Cost constraints

DTI will undertake further research into consumer behaviour in relation to microgeneration technologies and, in particular, what drives early-adopter purchase decisions.

DTI to publish details (following consultation with industry) of how the extra £50m will be spent.

DTI and Ofgem will produce a clear guidance document covering ROCs, LECs and REGOS, including the benefits of each and how to claim them.

DTI will investigate all the suggestions outlined in the two reports published by the DGCG on the "Accrual of ROCs, LECs and REGOs" and publish a formal view by end 2006.

Energy suppliers to develop a scheme that will reward those microgenerators exporting excess electricity.

Defra to look carefully at the possibility that electricity generating technologies (other than microCHP) could be included within the framework of the EEC.

### Information constraints

DTI will work with the winner of a tender exercise to develop an accreditation scheme for all microgeneration technologies covering the product, installation and a Code of Conduct with the aim of having it in place by 2006.

DTI will undertake a thorough review of existing activity in this area to assess effectiveness and identify gaps. We will then assess the feasibility of a communications/ information campaign that raises the profile of microgeneration technologies, signposts consumers to reliable sources of information and highlights the accreditation scheme outlined above.

DTI to actively investigate the possibilities for microgeneration on its own estate.

DTI will work with ODPM and planning officers to identify their information needs, assess whether these are being met adequately and, if not, develop a communications pack specifically designed for planners, including information packs and workshops.



DTI to lead work with other Government Departments and local authorities to publish a report on measures that local authorities can take to improve energy efficiency and levels of microgeneration installations, reduce greenhouse gas emissions and alleviate fuel poverty. This report will be published within 12 months after the commencement of the relevant section of the Climate Change and Sustainable Energy Bill.

DTI will develop a specific communications package, including information packs, to help develop a knowledge base within the construction industry.

### Technical constraints

DTI will work in partnership with the energy supply companies, distributed network operators and Ofgem to ensure that network and market systems are able

to cope with growing numbers of microgenerators exporting electricity.

DTI will continue to work with the Ofgem, the distribution network operators, energy suppliers and the microgeneration industry to ensure that existing contracts between domestic customers and their electricity barriers aren't hindering the take-up of microgeneration.

DTI will continue to work with the 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.

DTI will be investigating the possibility of a field trial that brings together smart meters and microgeneration to the effectiveness of smart meters combined with microgeneration technologies

DTI will examine the recommendations made in a recent report on the technical barriers facing microgenerators wishing to connect to the distribution network and assess whether further action is required.

### Regulatory constraints/opportunities

ODPM work under the Housing Development Consents Review will provide the response to the Climate Change and Sustainable Energy Bill's requirement to form a view as to what provision should be made to facilitate the installation of microgeneration.

ODPM will undertake an urgent review of local plans to determine whether there is a problem with emerging plans that do not fully incorporate PPS22.



## Other

DTI and DfES will work with industry and other key stakeholders to develop a scheme for installing microgeneration technologies in schools.

DTI will undertake such further analysis and research as is required, building on the EST study, to enhance understanding of future potential of microgeneration technologies before making a decision on whether a microgeneration target is required.

DTI will produce a map of available funding, building on the Research Atlas being developed by the UK Energy Research Centre, together with guidance on how to apply.

DTI will work with industry to develop a route map for each microgeneration technology.

The DTI will explore with the Sector Skills Councils what more can be done to ensure that the skills base develops to support the levels of demand that will hopefully be created for microgeneration technologies.

Ofgem will be issuing a decision document on this consultation and on other matters raised by this strategy in the near future.





## Annex A: existing support measures for microgeneration

The Government already has several measures in place to support microgeneration technologies, including -

- A 5% VAT level applicable to most microgeneration technologies. The list was lengthened with the addition of ground source heat pumps in Budget 04 and air source heat pumps and microCHP in Budget 05.
- Providing £41 million of support for solar PV projects (through the Major PV Demonstration Programme and field trials) and £12.5 million of support for household and community renewables through the Clear Skies Initiative. These schemes have now ended but have been replaced by the Low Carbon Buildings Programme.
- Amendments to the Renewables Obligation in 2004 made it easier for microgenerators to claim Renewable Obligation Certificates (ROCs) by allowing them to claim for ROCs on an annual or monthly basis.
- Funding specific research into issues facing the microgeneration industry under Workstream 4 of the Distributed Generation Co-Ordination Group (now Work Programme 4 of the Electricity Networks Steering Group)
- Enabling microCHP to be used by suppliers as an 'innovative' technology to claim a 50% uplift in the second phase of the Energy Efficiency Commitment.
- Planning Policy Statement 22, published last year, established that local authorities may set targets for on-site renewable energy in residential, commercial or industrial projects.



## Annex B: low carbon buildings programme

The Low Carbon Buildings Programme was originally a £30 million capital grant programme, which will be administered by a consortium involving EST and BRE. £1.5 million was brought forward to smooth the transition between the previous grant programmes and the LCBP, meaning that between 2006 and 2009 there would have been £28.5 million available. There will also be an additional £5m in support of advice on low carbon design incorporating energy efficiency and microgeneration for the larger scale new build/major refurbishment projects. This tranche of funding comes from the Carbon Trust and can only be used for advice purposes.

Grants will be available for low carbon technologies including solar PV, solar thermal, micro-hydro, micro-wind, biomass, microCHP (including fuel cell powered microCHP) and heat pumps. In keeping with our previous approach to funding installations, grants will only be given to technologies that have been accredited and are installed by accredited installers. Newer technologies, such as microCHP, will have to go through an accreditation process (including a demonstration of their carbon saving potential).

In Budget 06 the Chancellor announced a further £50 million to be allocated through the Low

Carbon Buildings Programme. We are still working on the details as to how this additional funding will be spent. The outline below indicates how the original £28.5 million will be allocated.

This money will be split between two streams.

Stream 1 will fund individual and small-scale community projects. The £10.5 million allocated this stream will be provided on a tapered basis, along the following lines (see table opposite).

Stream 2 will have £18m to allocate and will also be split into two categories - retrofit/minor refurbishment and major refurbishment/new developments (see table opposite).

Retrofit/minor refurbishments will attract a maximum funding of £100k. Applications will be invited for grant support for microgeneration installations and assessed by DTI's independent assessors, in very much the same way as Stream 2 projects are currently handled under Clear Skies and the Major PV Demonstration programmes.



*Stream 1*

<b>£m</b>	<b>2006/07</b>	<b>2007/08</b>	<b>2008/09</b>
Household	3.5	2	1
Community	1.5	1.5	1
<b>Total</b>	<b>5</b>	<b>3.5</b>	<b>2</b>

*Stream 2*

<b>£m</b>	<b>2006/07</b>	<b>2007/08</b>	<b>2008/09</b>
Retrofit/minor refurbishment	3	2	1
New build/major refurbishment	5	5	2
<b>Total</b>	<b>8</b>	<b>7</b>	<b>3</b>

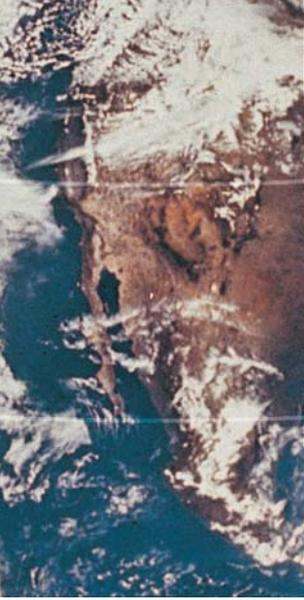
Evidence of energy efficiency will be required with applications but retrofit projects will not involve Carbon Trust advice: we will expect projects to incorporate best practice energy efficiency measures drawing on advice already available in the market.

Refurbishment and New Build will have a funded feasibility study and advice element and technology grant funding up to maximum of £1 million. The initial selection process will focus on choosing suitable buildings in order to engage the building management and construction industries as widely as possible. Calls will be made for suitable building projects, which will be assessed by experts working on behalf of the Carbon Trust and the DTI. The Carbon Trust will then work with successful applicants to develop initial options optimising the low carbon footprint of the building. This study will outline recommendations for low carbon design and recommend a shortlist of technically feasible microgeneration technologies. The building owner/developer will then decide which microgeneration

technologies to seek DTI funding for and will complete the grant funding application. The Carbon Trust will continue to provide light touch advice and support through the design, construction/fit out and commissioning phases of the project.

Further information and details on how to apply for grants can be found from April 3rd on the dedicated website for the programme - [www.lowcarbonbuildings.org](http://www.lowcarbonbuildings.org)





## Annex C: biomass and micro-hydro

Biomass and micro-hydro are two types of microgeneration that have their own unique challenges but offer significant opportunities for expansion.

### Biomass

Biomass can be produced from a number of sources - ranging from virgin material (such as crops and forestry) and recycled wood, to waste from municipal and commercial sources. It has some unique challenges -

- Biomass feedstocks generally have a cost associated with them, unlike other renewable sources such as solar or wind. This has significant impact on project viability, especially for electricity generation
- Biomass has to be stored by the user
- Given its bulky nature, road transportation of biomass is expensive relative to the value of the product

Yet biomass still has the potential to contribute to the reduction of carbon emissions, improved security of energy supply and also rural objectives. Biomass can provide heat, power and transport fuels and has the advantage compared to some other renewables of flexibility of supply - but needs the development of robust fuel supply chains.

There is also strong emerging international support for biomass - with a number of countries already having significant bioenergy

capacity installed e.g. Austria and Finland. The European Commission has published a Biomass Action Plan at the end of 2005 and the G8 (under UK Chairmanship) is developing an International Bioenergy Partnership.

We need to increase the contribution from bioenergy and at the same time ensure that biomass production from energy crops or forestry is sustainable. Appropriate safeguards for biodiversity, the historic environment and other environmental factors need to be in place. Attention also needs to focus on measures to optimise the siting, design and environmental and energy performance of plants.

The complex issues involved in the promotion of biomass is why we gave the Biomass Taskforce (lead by Sir Ben Gill) a remit to assist Government and the biomass industry in optimising the contribution of biomass energy to renewable energy targets and to sustainable farming and forestry and rural economy objectives. The Taskforce published its report on October 25 2005. The Government welcomed the report and is committed to



responding by the end of April (which is why the detail cannot be included in this document). This response will outline areas in which Government will be taking further action in relation to promoting biomass and areas where further analysis is required.

## Micro-hydro

Small-scale hydro-power schemes have good potential to raise public awareness and support for renewables. The impact will be greater with group or community schemes as individual schemes are rarer and tend to be out of public view. Micro-hydro is largely non-controversial, although it can cause problems with fishing and water abstraction in low flow rivers. The largest resource exists in Scotland and Wales.

The unique challenge faced by the micro-hydro industry is that a micro-hydro installation has a measurable impact on its environment. The potential impacts include: impacts on fish migration, fish being damaged in turbines, flood risk, impact on flora and fauna and water quality issues. This does not mean that we should shy away from encouraging micro-hydro schemes, but there is a need to ensure that schemes work with the environment. To support consistency and enable development of practical hydropower sites the DTI is funding a joint project between Environment Agency, industry and the Cabinet Office to develop good practice guidance.

The EST study suggests that the potential for micro-hydro installations in the UK is approximately 100MW, but this is obviously limited by the number practical sites. Most of these sites will require an abstraction licence as well as planning permission.

But there still appears to be issues around the licensing system.





# Glossary

**Bio-energy** - Biomass is derived from plant material and animal residues/wastes. It can be used to generate electricity and or heat and to produce transport fuel. Such energy is known as bio-energy.

A very wide range of biomass can be used for energy purposes. Examples include agricultural wastes, e.g. straw and other crop residues; crops grown specifically for energy production, e.g. willow, miscanthus, oil seed rape and wastes from a range of sources including food production. The nature of the fuel will determine the way that energy can best be recovered from it.

**Carbon dioxide (CO<sub>2</sub>)** - Carbon dioxide contributes approximately 60% of the potential global warming effect of human-made emissions of greenhouse gases world-wide. The burning of fossil fuels releases CO<sub>2</sub> fixed by plants millions of years ago and thus increases its concentration in the atmosphere.

**Combined Heat and Power (CHP)** - CHP is the simultaneous generation of useable heat and power in a single process, thereby discarding less waste than conventional generation.

**Distribution Network Operators** - companies that are responsible for operating the networks that connect electricity consumers to the national transmission system and provide interconnection with embedded generation.

## **Energy Performance of Buildings**

**Directive** - this European Union Directive requires each Member State to: establish a methodology for rating the energy performance of buildings; ensure that energy certificates are issued when a building is built, sold or rented; establish an inspection regime for large energy installations in buildings; ensure that low or zero carbon technologies are considered when a new building is being designed.

**Energy Saving Trust (EST)** - the EST is a not-for-profit organisation set up and largely funded by government to manage a number of programmes to improve energy efficiency, particularly in the domestic sector.

**Fuel Cell** - fuel cells produce electricity from hydrogen and air, with water as the only emission. Potential applications include stationary power generation, transport (replacing the internal combustion engine) and portable power (replacing batteries).

**Fuel Poverty** - the common definition of a fuel poor household is one needing to spend in excess of 10% of household income to achieve a satisfactory heating regime (21°C in the living room 18°C in other occupied rooms).

**Heat pumps** - Heat pumps work like a refrigerator, moving heat from one place to another. Heat pumps can provide space heating, cooling, water heating and sometimes exhaust air heat recovery.

**Levy Exemption Certificates (LECs)** - issued to renewable energy generators for electricity that reaches the utility (i.e. not consumed within the home), they allow the supplier to 'badge' the electricity as being free from the Climate Change Levy.

**MicroCHP** - CHP at the scale of a single dwelling, used in place of a domestic central heating boiler.

**Ofgem** - Ofgem (Office of Gas and Electricity Markets) is the UK energy regulator, charged with: making gas and electricity markets work effectively, regulating monopoly businesses, intelligently securing Britain's gas and electricity supplies, meeting its increased social and environmental responsibilities.

**Photovoltaics (PV)** - the direct conversion of solar radiation into electricity by the interaction of light with the electrons in a semi-conductor device or cell.

**Regional Development Agencies (RDAs)** - the agencies aim to co-ordinate regional economic development and regeneration, enable the English regions to improve their relative competitiveness and reduce the imbalances that exist within and between regions.

**Renewable Energy Guarantee of Origin (REGOs)** - a guarantee of origin issued by Ofgem in respect of electricity produced from a renewable source.

**Renewables Obligation (RO)** - the obligation placed on electricity suppliers to deliver a stated proportion of their electricity from eligible renewable energy sources.

**Renewables Obligation Certificates (ROCs)** - eligible renewable generators receive ROCs for each MWh of electricity generated. These certificates can be sold to suppliers. In order to fulfil their RO suppliers can present enough certificates to cover the required percentage of their output, or pay a 'buyout price' per MWh for any shortfall. All proceeds from buyout payments are recycled to suppliers in proportion to the number of ROCs they present.

**Sector Skills Councils** - independent, UK-wide organisations developed by groups of influential employers in industry or business sectors of economic or strategic significance, to tackle skills and productivity needs of their sector throughout the UK.

**Social enterprise** - a business with primarily social objectives whose surpluses are principally reinvested for that purpose in the business or in the community, rather than being driven by the need to maximise profit for shareholders and owners.

**Sustainable Consumption Roundtable** - a joint project from the National Consumer Council (NCC) and the Sustainable Development Commission (SDC) charged with building wide ownership of sustainable consumption, and producing practical advice for actions to create a shift to more sustainable lifestyles.





