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MICROGENERATION STRATEGY AND LOW CARBON BUILDINGS PROGRAMME

Consultation

June 2005

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sepn

Sustainable Energy Policy Network

This consultation is being published as part of the work of the Sustainable Energy Policy Network (SEPN).

SEPN is a network of Government departments, Devolved Administrations, regulators and other key organisations that are jointly responsible for delivering the Energy White Paper, '*Our Energy Future – creating a low carbon economy*' published in February 2003.

http://www.dti.gov.uk/energy/sepn/index.shtml

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- CARBON TRUST
- DEPARTMENT FOR EDUCATION AND SKILLS
- DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS
- DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
- DEPARTMENT OF TRADE AND INDUSTRY
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Microgeneration strategy and low carbon buildings programme: consultation

June 2005

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Foreword

Over the past 50 years, in all walks of life, we have seen technological advancements almost beyond imagining. From personal computers to mobile telephones, innovation has led to the once extraordinary becoming commonplace. A key feature of all this innovation has been technologies decreasing in size whilst increasing in power. Computers used to be huge machines requiring large rooms with dedicated cooling and ventilation systems. Now the ubiquitous mobile phone can act as computer, internet portal, email sender to say nothing of video, camera and music player.

Power generation has been subject to the same innovative influences. In the 1980s power stations were built on a scale to supply entire cities. Then came the introduction of combined-cycle gas turbine plants, which made smaller powerplants more economic. CHP plants were developed to provide heat and electricity to industrial sites, then shrank in size again to supply heat and electricity to single blocks of flats or offices. And still the innovation continues. CHP units are now small enough to be a replacement for a conventional domestic boiler, devices that use renewable energy sources (such as solar power, wind) are now of a size to make them practical for homes and offices.

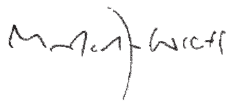
Our vision for 2020, as set out in the Energy White Paper[4], is for much more diverse, local energy generation with fuller connection to the distribution network. We want to see more micro-CHP, micro-wind, micro-hydro, solar thermal and photovoltaics, ground and air source heat pumps, fuel cells (and any other low carbon small-scale generating technology), supplying individual customers and buildings. We need sustainable, secure, affordable heat and electricity to be delivered through competitive markets, and microgeneration has an important contribution to make in achieving this goal.

Many of the technologies and systems required to make this vision a reality already exist, others are in the process of being developed. This strategy looks to create the right competitive environment for these technologies to fulfil their potential.

[4] http://www.dti.gov.uk/energy/whitepaper/index.shtml

There is more work to be done in terms of assessing the real costs and benefits of microgeneration over the long term. We need to ensure that we have a clear picture of the barriers currently preventing widespread take-up and a substantive evidence base that allows us to identify the most cost-effective measures to help microgeneration technologies make their contribution to our energy policy goals.

This consultation is an important step towards the development of an effective strategy and we look forward to a lively debate.



Malcolm Wicks MP
Minister of State for Energy

Context for and aims of the consultation

Microgeneration is the production of heat and/or electricity on a small-scale[1] from a low carbon[2] source. Various technologies can be used for microgeneration - air source heat pumps, ground source heat pumps, fuel cells, micro-CHP, micro-hydro, micro-wind, bio-energy and solar (thermal and PV(photovoltaic)). More details about these technologies can be found at Annex A.

This consultation will inform the development of the Government's strategy for the promotion of microgeneration in Britain, including the development of the Low Carbon Buildings Programme. The strategy will form part of the Government's wider energy policy by helping to ensure that the UK has sustainable, reliable and affordable energy for all, delivered through competitive markets. Publishing the strategy will fulfil a requirement under Section 82 of the Energy Act 2004[3]. It is being developed jointly by Government Departments with responsibility for energy matters, sustainable development, planning, housing, building regulations and finance: DTI, DEFRA, ODPM and HMT.

The document seeks your views on the potential of microgeneration to meet the goals of energy policy and on ways of making the best possible use of existing and new technologies. The proposals relate to measures aimed at stimulating the demand for, and facilitating the supply of, microgeneration technologies in order to help the market become self-sustaining. Specific questions are posed throughout the document and are summarised on pages 10-13. The content of this document is aimed to stimulate discussion rather than restrict respondents views so comments are welcome both in response to the specific questions listed and in relation to any other issue related to the promotion of microgeneration.

Issued: 23rd June 2005
Respond by: 23rd September 2005

Enquiries on the Low Carbon Buildings Programme - Kathryn Newell
micro.generation@dti.gsi.gov.uk

All other enquiries – Rachel Crisp
micro.generation@dti.gsi.gov.uk

[1] Small-scale in this instance refers to homes and small commercial developments/public sector buildings
[2] Low carbon refers to either renewable energy generators or technologies with better fuel efficiency than conventional technologies
[3] http://www.legislation.hmso.gov.uk/acts/acts2004/40020—g.htm#82

1. Introduction

How does microgeneration fit with wider energy policy?

1.1 Microgeneration has the potential to play a significant role in moving towards the Government's objective of sustainable, reliable and affordable energy for all, delivered through competitive markets. The Energy White Paper[5] acknowledges the contribution microgeneration could make towards the UK Government's vision of the energy system in 2020 by suggesting that there will be "much more local generation" and, more specifically, "much more microgeneration, for example from CHP plant, fuel cells in buildings or photovoltaics".

1.2 Increased deployment of microgeneration technologies can have a beneficial impact on all four of the UK Government's energy policy goals -

- Reducing carbon emissions – the Renewables Innovation Review[6] suggests that buildings (domestic, commercial and industrial) contribute around 47% of carbon dioxide emissions in the UK. Microgeneration has the potential to reduce these emissions by providing low carbon sources of electricity and heat to houses and small commercial premises throughout the country.
- Ensuring reliable energy supplies – widespread microgeneration reduces the load on the distribution network, whilst more diverse and local generation also reduces transmission losses and, if deployed on a widespread scale, will help the UK to avoid over-dependence on energy imports.
- Promoting competitive markets – microgeneration introduces an additional aspect to the energy markets giving people a wider choice of products from which to gain their electricity and heat. It also allows suppliers to offer more innovative energy services packages that may include a micro-generation element.
- Affordable heating for all – microgeneration is currently a more costly contributor to reducing fuel poverty than energy efficiency measures. However, if the fairly substantial upfront costs of microgeneration technologies can be defrayed, the lower energy bills associated with such technologies could potentially contribute to reducing fuel poverty.

[5] http://www.dti.gov.uk/energy/whitepaper/index.shtml
[6] http://www.dti.gov.uk/renewables/renew_2.1.4.htm

Barriers facing the microgeneration industry

1.3 The markets for most microgeneration technologies are at an early stage of development with only an estimated 80,900 installations of low or zero carbon technologies generating either heat or electricity completed prior to 2004.

1.4 There are a number of likely barriers to the widespread deployment of microgeneration technologies, including:

- cost constraints — the lack of demand for microgeneration technologies has restricted the extent to which the industry has been able to exploit scale economies and learning effects in their production. Combined with the infancy of the industry and the significant expenditure on R&D associated with product development this means that the costs of these products are currently very high and act as an economic barrier to their uptake;
- information constraints — inadequate promotion and provision of 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 characteristics of these products; and
- technical constraints — the lack of metering arrangements that meet the needs associated with the management of electricity distribution and the needs of the consumer, and the lack of a comprehensive approach to dealing with the issues surrounding the connection of microgenerators to the distribution network, constitute barriers of a technical nature that could be preventing take-up of microgeneration technologies

1.5 These areas are discussed in greater detail in the text of the consultation document with specific questions (which are summarised on page 10-13). This consultation document ***invites views on the extent to which these barriers exist and can be overcome***.

Costs and benefits of microgeneration

1.6 The range of technologies envisaged, the different stages of their development and the fact that the overall industry is in a formative stage makes it difficult to develop reliable trend data to quantify the future benefits each technology will bring and to assess how cost curves will develop.

1.7 To get a true picture of the overall costs of microgeneration technologies (rather than the absolute cost to consumer), the costs that widespread installation will save need to be offset against the product cost. Reduced load on the distribution network could potentially ease the need for long-term investment (although clearly investment would still be required to upgrade and maintain the transmission and distribution networks). This would need to be assessed against the investment required to adapt the network to increased levels of microgeneration. There may be reduced costs associated with lower requirements for centrally connected generation. There may also be reduced costs linked to reduced transmission losses as electricity/heat is generated closer to the point of use.

1.8 To help fill the existing knowledge gap and assist in developing a robust evidence base for the strategy, this consultation ***invites views on how the costs of microgeneration technologies might evolve over the next 5-15 years and how these costs could compare with other low-carbon technologies such as large-scale renewables and energy efficiency measures***.

1.9 More work needs to be done to assess the real costs and benefits of microgeneration over the long term, but the current evidence base suggests that microgeneration can make a positive contribution towards the Government's wider energy policy goals. Future Government support for microgeneration must be based on clear, well defined criteria such as its contribution to reducing carbon emissions, achieving energy savings and alleviating fuel poverty.

Why is there a need for a strategy?

1.10 The Government, through the work of several different Departments, is already supporting microgeneration technologies via a variety of measures such as capital grant schemes, reduced VAT rates and planning policy statements (see Annex B for details). But, as the technologies develop, there is clearly a need for a coherent and joined-up approach to supporting microgeneration in a way that enables the industry to be well placed to make a substantive contribution to energy policy goals as we move towards 2020.

1.11 In terms of wider benefits for the UK as a whole, developing the UK market for microgeneration technologies will help UK industry to grow and become better placed to compete abroad in the rapidly growing market for these technologies. There are already examples of UK companies taking the lead in developing innovative technologies (e.g. micro-wind turbines for household use) and a strong home market could help the companies developing these products to prosper in the UK and abroad.

1.12 The Government agrees with industry and key stakeholders that a strategy will help in providing a framework through which appropriate support can be delivered in a structured way that can help microgeneration technologies make a useful contribution to wider energy policy goals. Section 82 of the Energy Act[7] formalises this agreement by imposing a statutory duty for the Government to publish a strategy for the promotion of microgeneration in Britain. The aim of the strategy is not to promote one specific microgeneration technology above another. The aim is to remove barriers that are preventing the uptake of microgeneration and stimulate demand to create a marketplace where these technologies become everyday, popular commodities rather than expensive and complex niche products.

1.13 The consultation document is divided into 6 main sections –

- ***Product development and deployment*** - issues associated with R&D and the need for a comprehensive skills base.
- ***Communications*** - issues associated with promotion and information provision activities, the need for a widely understood accreditation system for products and installers.

[7] http://www.legislation.hmso.gov.uk/acts/acts2004/40020—g.htm#82

- ***Economics*** - looks at the possibilities of encouraging the installation of microgeneration through the use of economic instruments, access to Renewable Obligation Certificates and a reward for the export of excess electricity.
- ***Installation*** – addresses regulations that could affect the installation of microgeneration technologies such as planning policy and the Building Regulations.
- ***Low Carbon Buildings Programme*** – discusses the development of the successor scheme to the Clear Skies Initiative and Major PV Demonstration Programme (more information on these existing programmes at Annex C).
- ***Physical infrastructure*** - addresses the technical issues such as identifying the most effective metering arrangements that meet the need for management of electricity distribution and the needs of the consumer, and addressing issues surrounding the connection of microgenerators to the distribution network.

Who is involved in the strategy?

1.14 The development and implementation of the strategy will be led by DTI in partnership with other Government Departments with a direct interest and with the Devolved Administrations. The Sustainable Energy Policy Network[8], set up to deliver Energy White Paper commitments, provides the ideal cross-Government forum to ensure that work on the strategy is fully co-ordinated. Government will also work closely with OFGEM (as the regulator of the gas and electricity industries), the industry (manufacturers, installers, operators) and their assorted representative bodies, other key stakeholders (such as the Energy Saving Trust, the Carbon Trust, local and regional bodies) and consumers.

Full list of consultation questions

General

Q1. What are the main obstacles to the development of a long-term self-sustaining market in microgeneration technologies? How can these obstacles be overcome?

Q2. What are the most important policy/regulatory/other issues that we should address to facilitate successful implementation of microgeneration technologies?

Q3. What are the key supply chain issues affecting the industry? What should be done to address these issues?

Q4. How will the costs of microgeneration technologies develop over the next 5 -15 years? How will these costs compare with other low-carbon technologies such as large-scale renewables and energy efficiency measures?

Q5. What are the criteria by which the strategy should measure success?

[8] http://www.dti.gov.uk/energy/sepn/

Product development and deployment

Q6. Is Government funding for research and development being effectively targeted?

Q7. Is there sufficient co-ordination of research efforts?

Q8. What actions could the Government take to develop the skills base in relation to the development of microgeneration technologies and their integration into communities and buildings by good practice in design, installation, operation and maintenance?

Communications

Q9. Where are the most significant communications gaps and what should the Government be doing to help to fill them?

Q10. How important are the existing advice/information services to successful development of microgeneration technologies? Is further activity required and if so at whom should it be targeted and who should be leading?

Q11. Is there a need for more general communication/education activity and if so how should this be tackled?

Q12. Are the existing support and advice networks sufficiently coordinated? What more could be done?

Q13. What would be the most effective way of setting up and running a reputable accreditation scheme?

Q14. What would be the most effective way that Government could support the development of robust product standards for all microgeneration technologies (including installation and maintenance)?

Economics

Q15. How can the Government best encourage householders and all businesses to consider microgeneration as part of a package of measures to make their energy consumption more sustainable?

Q16. How can competition for the excess electricity generated by microgenerators be encouraged?

Installation

Q17. How could Building Regulations (taking account of the availability of the new powers to make regulations about the way energy is used in the Secure and Sustainable Buildings Act) be used to encourage cost-effective microgeneration technologies?

Q18. How could Government help the construction industry and the building control bodies to be become better informed about the applications of microgeneration systems, satisfactory design, installation operation and maintenance practice, and the benefits to be obtained?

Q19. Are there any barriers in the planning system that are hindering the development of micro-generation?

Q20. If the Code for Sustainable Buildings is to be helpful in terms of promoting microgeneration, what sort of issues might it address?

Q21. What more should the Government be doing through the management of its own wider estates to promote microgeneration?

Low Carbon Buildings Programme

Q22. Will a 6 year programme provide the confidence that industry requires for future investment decisions?

Q23. Are the objectives on page 33 an appropriate focus for the new programme and will they contribute to developing and moving the micro-renewable sector forward?

Q24. Views are invited on the impact of a "technology blind" approach on the selection of the renewable technologies

Q25. Are there any other micro-renewable energy technologies for generating either heat or electricity that should be considered in addition to those mentioned on page 34?

Q26. Would the same fixed level of grant for all technologies have an impact on selection of renewable technologies or should there be a variable rate for different technologies?

Q27. If there should be a variable rate, what should this rate be based on – potential electricity or heat generation over the lifetime of the product, potential to reduce carbon emissions, nearness to market?

Q28. Views are invited on alternative support mechanisms to capital grants for supporting the uptake of renewable technologies and the advantages that these alternatives would have over a capital grant scheme.

Q29. How should Stream 1 (individual and community projects) be designed to ensure energy efficiency is addressed effectively?

Q30. What other measures should be included under Stream 2 (larger scale developments) to ensure that energy efficiency is addressed effectively?

Q31. Views are invited on whether the Code for Sustainable Buildings is the most appropriate standard for buildings supported by this programme.

Q32. Would earmarking funding for individual and community projects under Stream 1 in the way proposed enable a smooth transition between the existing schemes and the new programme?

Q33. What restrictions or criteria should be used for selecting individual and community projects (e.g. size of installation, type of building)?

Q34. Is the focus on larger scale projects likely to contribute towards a change in the market?

Q35. Further suggestions of the kind of larger scale developments that might be suitable for support are invited.

Q36. Views are invited on other factors affecting the development of low carbon buildings and specifically the uptake of renewable energy technologies, particularly factors that are not already highlighted elsewhere in this consultation document.

Physical Infrastructure

Q37. What set of metering arrangements would allow consumers to exploit the full range of the potential benefits of microgeneration?

Q38. What steps can be taken to reduce the costs of metering and encourage new meter operators to enter the market with more sophisticated products?

Q39. Are there any public safety implications that may arise in relation to large-scale uptake of microgeneration? If so, how can these be managed?

Local authorities and regional bodies

Q40. What specific roles should Devolved Administrations, Local Authorities, Regional Development Agencies, Regional Housing Boards and Housing Associations play in promoting microgeneration?

Q41. What steps should Government take to assist these bodies in taking this role?

Responding to this consultation

How to respond

1.15 When responding to this consultation please state whether you are responding as an individual or representing the views of an organisation. If responding on behalf of an organisation, please make it clear who the organisation represents and, where applicable, how the views of the members were assembled.

1.16 If any of your responses relate to government policy and actions, please indicate whether responsibility should lie with the UK Central Government, Devolved Administrations or Local Authorities.

Responses can be submitted by letter, fax or email to:

Rachel Crisp
Energy Strategy Unit
Department of Trade and Industry
1 Victoria Street
London
SW1H OET

Telephone: 0207 215 0303
Fax: 0207 215 0300
Email: micro.generation@dti.gsi.gov.uk

Additional copies

1.17 You may make copies of this document without seeking permission. Further printed copies of the consultation document can be obtained from –

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An electronic version of this document can be found at
www.dti.gov.uk/energy/consultation/microgen.pdf

Confidentiality

1.18 Your response may be made public by the DTI. If you do not want all or part of your response or name made public, please state this clearly in the response. Any confidentiality disclaimer that may be generated by your organisation's IT system or included as a general statement in your fax cover sheet will be taken to apply only to information in your response for which confidentiality has been requested.

1.19 Access to information held by or on behalf of DTI is governed by the Freedom of Information Act 2000. Any requests for information received by DTI will be administered accordingly.

1.20 We will handle any personal data you provide appropriately in accordance with the Data Protection Act 1998.

Help with queries

1.21 Questions about the policy issues raised in the document can be addressed to –

Rachel Crisp
Energy Strategy Unit
Department of Trade and Industry
1 Victoria Street
London
SW1H OET

Telephone: 0207 215 0303
Fax: 0207 215 0300
Email: micro.generation@dti.gsi.gov.uk

1.22 Questions on the Low Carbon Buildings Programme should be directed to –

Kathryn Newell
Energy Industries and Technologies Unit
Department of Trade and Industry
1 Victoria Street
London
SW1H OET

Telephone: 0207 215 2652
Fax: 0207 215 6528
Email: micro.generation@dti.gsi.gov.uk

1.23 If you have comments or complaints about the way this consultation has been conducted, these should be sent to –

Nick van Benschoten
Consultation Co-ordinator
Department of Trade and Industry
Room 723
1 Victoria Street
London
SW1H OET

Telephone: 0207 215 6206
Email: Nick.VanBenschoten@dti.gsi.gov.uk

A copy of the Code of Practice on Consultation is at Annex E

Next Steps

1.24 A partial regulatory impact assessment will be published alongside this document.

1.25 At this stage we are looking for input to help us shape our thinking as we develop the final strategy.

2. Product Development and Deployment

Research and Development

2.1 Sufficient investment that is targeted effectively is critical to the success of new products.

2.2 The Government's ten-year Science and Innovation Investment Framework, published in July 2004[9], reaffirmed the commitment to support businesses investing in new and emerging technologies. Over the period 2005-2008, £320 million is available to businesses in the form of grants to support research and development in the new and emerging technologies critical to the growth of the UK economy. Under the April 2004 call for projects approximately £9 million worth of funds supported 17 different projects across a broad spectrum of energy issues including polymer photovoltaics, advanced metering technology for embedded generation, stealth technology for wind turbines and biomass micro-turbines. The most recent call[10], which closed on 25 April 2005, sought applications for collaborative research & development projects in the following emerging energy technologies: intelligent grid management; hydrogen; fuel cells; and wave and tidal stream technologies.

2.3 There are also substantial funds available from the European Union's Framework Programme 6 (which provides support for R&D projects across a range of science and technologies) CONCERTO initiative. This particular initiative aims to demonstrate the integration of renewable and energy efficient technologies in local communities. Nearly £11 million of funds have been committed that will contribute to the funding of 3 major projects to take place in London, Bracknell and Milton Keynes. These projects will demonstrate a variety of different microgeneration technologies in residential settings, schools and commercial undertakings. In each case the project combines the involvement of local authorities with universities and other interested stakeholders.

[9] http://www.hm-treasury.gov.uk./spending_review/spend_sr04/associated_documents/spending_sr04_science.cfm
[10] http://www.dti.gov.uk/technologyprogramme/apr05_comp.html

2.4 The Carbon Trust and the Engineering and Physical Sciences Research Council (EPSRC) launched Carbon Vision[11] in November 2002. It is a jointly funded £14 million initiative over 4 years to promote innovation in low carbon technologies by supporting fundamental research into ways of achieving step change reductions in the lifecycle carbon footprint of carbon intensive materials, products, process and buildings. Under the scheme demands from business for low carbon technologies and solutions will be matched against university departments best able to research ways to address these demands and overcome existing barriers in the innovation chain.

2.5 A number of Regional Development Agencies are funding energy research, development and demonstration activities that cover microgeneration: For example, the New and Renewable Energy Centre (NaREC) in the North East and the developing 'Joule Centre' in the North West.

2.6 As the previous paragraphs give a flavour of, significant efforts are being made to ensure there is adequate investment in technologies relevant to microgeneration. But with several different sources of funding and the involvement of different organisations it is important to ensure that research is covering all the critical areas.

Question 6 – is Government funding for research and development being effectively targeted?

Question 7 - is there sufficient co-ordination of research efforts?

Skills

2.7 The Energy White Paper acknowledged that there was a shortage of the appropriate skills required to fully implement the best available resource efficient technologies. It is vital to ensure that an adequate skills base is developed to be able to design micro-generation systems for communities and for individual buildings and to be capable of installing and maintaining the various microgeneration technologies.

2.8 The renewable energy industry in a general sense is still very much an emerging industry with little occupational research existing to determine the structure, size and skills of this relatively new area. Recognising this, the Energy and Utility Skills Council[12] (one of the Sector Skills Councils) is proposing to undertake a functional and occupational mapping exercise of the renewable energy sector. This should provide a clear picture of the areas in which provisions need to be made to ensure that we have the right level of skills to support growth across the renewables industry as a whole, including at the microgeneration end of the scale.

2.9 Under the DTI's Clear Skies programme, some support for installer training has been provided, specifically in the context of how to work within the programme, and some support has also been provided for the development of installer training courses. The requirement for installers to be accredited to the Clear Skies scheme has also contributed to improving skills, practices and standards.

[11] http://www.thecarbontrust.co.uk/carbontrust/low_carbon_tech/dlct2_1_8.html
[12] http://www.euskills.co.uk/opencms/export/www/home.asp

2.10 In Scotland, Inverness college will shortly offer a course for heating engineers and plumbers to achieve the necessary standards and skills required to apply for the accreditation. This will enable them to install renewables technologies under the Scottish Community and Householder Renewables Initiative (SCHRI). Academic institutes across Wales are promoting study courses and research into sustainable development and renewable energy applications.

2.11 Of course there is other work being undertaken to help boost the skills base at national, regional and local level. For example, the Academy for Sustainable Communities in Leeds seeks to influence the provision of skills training for regeneration professionals, officials in local government and those working in consultancies and agencies.

2.12 It is not just the traditional energy, manufacturing or construction sectors that require growing levels of new skills to adapt to the move towards more sustainable methods for energy generation. The financial services sector can also play a key role in ensuring social, environmental and ethical decisions are incorporated across lending, investment and insurance decisions. DEFRA is working with Forum for the Future to explore the process for integrating an understanding of sustainable development issues into the decision processes of service sector professions such as financial analysis, accountancy and marketing.

Question 8 – what actions could the Government take to develop the skills base in relation to the development of microgeneration technologies and their integration into communities and buildings by good practice in design, installation, operation and maintenance?

3. Communications

Communications

3.1 Effective communication is a prerequisite for the successful promotion of any product and microgeneration is no different. In many respects it is a matter for the industry itself to stimulate public interest and promote their products, but there is still a role for Government to play.

3.2 There are many different target audiences for Government communications in this field. It is not just the end users of the products that we should be looking to influence. Without the support of the construction industry (from architects to housing developers) it will be very difficult for the microgeneration industry to achieve its full potential. The energy supply companies and distributed network operators are also key audiences both as guardians of the infrastructure into which microgeneration must fit and as the main interlocutors between the consumer and the energy markets. To engage these diverse sectors in issues relating to microgeneration will require a comprehensive communications strategy. This strategy would also need to look at creating demand-pull via consumers.

3.3 DEFRA have provided a £12 million package of funding, over a period of 3 years, as the first part of a climate change communications initiative[13] to change public attitudes towards climate change. Raising the level of awareness about climate change and convincing the general public that their actions can and do matter will provide a more receptive environment in which the microgeneration industry can promote its products. Government can build on this environment by improving the information available to the public, building awareness of the types of products available and helping people to make an informed choice.

3.4 It is necessary to consider at what level communication is carried out most effectively. All levels of government from central through regional to local have important roles to play. In particular local and regional bodies are better placed than central government to understand local drivers and tailor communications towards the

[13] http://www.defra.gov.uk/environment/climatechange/02.htm#ccc

individual characteristics of their area. The key is to ensure that communications at each level reinforce rather than contradict or confuse.

Question 9 – where could the Government best target its communications efforts and what should that communications effort consist of?

3.5 Advice and information for consumers and other groups on renewable energy is available from a range of sources e.g. Trade Associations, Carbon Trust, Community Renewables Initiative, Energy Saving Trust (including EST's Renewable Energy Advice Centres), Energy Agencies, and local regional renewable advice agencies.

Question 10 - how important are these advice/information services to successful development of microgeneration technologies? Is further activity required and if so at whom should it be targeted and who should be leading?

Question 11 - is there a need for more general communication/education activity and if so how should this be tackled?

Question 12 - are these existing networks sufficiently coordinated? What more could be done?

Accreditation and Product standards

3.6 For all new products it is important to have a high level of quality in order to gain the trust of the market. This is particularly important when the product in question will be performing such a fundamental function as generating electricity and/or heat. Consumers will want to trust the product and the installer before making a purchase.

3.7 Product standards have a key role to play in providing a clear indication to consumers (and installers) that a particular product has met acceptable levels in terms of performance and safety. These product standards should also incorporate standards for installation and maintenance that (if followed) ensure the product continues to meet those levels of performance and safety throughout it's life.

3.8 The Clear Skies programme and the Major PV demonstration programme currently keep a list of accredited companies and products. Although both programmes are coming to an end it is important to ensure that there continues to be a trusted form of accreditation for companies working in the microgeneration industry. This does not necessarily have to be run by the Government: similar schemes in other industries (e.g. CORGI) are supervised by industry representatives or associations. Ideally any scheme would become self-sustaining in the long run and would be linked to a robust system of product standards.

Question 13 – what would be the most effective way of setting up and running a reputable accreditation scheme?

Question 14 – what would be the most effective way that Government could support the development of robust product standards for all microgeneration technologies (including installation and maintenance)?

4. Economics

Economic Instruments

4.1 A range of economic instruments already exists to support microgeneration technologies. These include a 5% VAT rate for most microgeneration technologies (micro-wind, solar thermal, solar PV, ground source heat pumps, micro-hydro). In the 2005 Budget, the Chancellor extended this reduced rate to cover air source heat pumps and microCHP.

4.2 MicroCHP also benefits under the Energy Efficiency Commitment (EEC). Under the EEC, electricity and gas suppliers are required to achieve targets for improving household energy efficiency. In the second phase of EEC (running between 2005-08) there is an incentive for innovative action - where a supplier carries out an innovative action, OFGEM is required to attribute an improvement 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. Micro-CHP is one of the technologies that suppliers may use in order to claim this incentive. Installing micro-CHP thus becomes more attractive to the energy suppliers as it facilitates meeting their EEC targets.

4.3 Incentives to encourage investment in microgeneration in the rental market need to be structured differently to those that apply to homeowners or small businesses. The Government announced the creation of a Green Landlord scheme in Budget 2004 and as part of its consideration of the workings of this scheme, the Government will explore how tax deductions and reliefs might be developed to encourage and reward landlords who improve the energy efficiency of their building. Informal discussions on this issue will be taking place with key stakeholders over the summer.

Question 15 – how can the Government best encourage householders and all businesses to consider microgeneration as part of a package of measures to make their energy consumption more sustainable?

Access to ROCs

4.4 Making it easier for microgenerators to acquire Renewable Obligation Certificates (ROCs) will help to shorten the payback period and help to make microgeneration a more attractive option. Some steps have already been taken to make it easier for microgenerators to access ROCs – the Renewables Obligation (RO) was amended last year so that generating stations with a declared net capacity of 50kW or less could claim ROCs on an annual or monthly basis. But there remain some areas in the administration of the RO in which improvement may facilitate access to ROCs for microgenerators.

4.5 The DTI's preliminary consultation document on the Review of the Renewables Obligation[14] provides an initial opportunity to comment on proposals to streamline the administrative arrangements for microgenerators. That consultation suggests possible amendments that could be beneficial to microgenerators and could help a market to emerge for agents to provide a service to microgenerators who do not wish to handle the administrative burden of the RO –

- Allowing agents to act on behalf of microgenerators through the process of accreditation and claiming of ROCs
- Allowing ROCs to be issued to agents
- Allowing agents to amalgamate the output of microgenerators

4.6 One further amendment suggested by the RO Review consultation is the removal of the requirement for a microgenerator to have a sale and buy back agreement with a supplier.

Payment for export

4.7 The variable nature of most microgeneration technologies makes it unlikely that all the electricity produced will be used at the time of generation. Until storage technologies improve, in the vast majority of cases, the excess electricity will be fed back into the distribution network. Payment for this electricity would obviously make microgeneration a more attractive proposition as it can help shorten the overall payback period. Some energy companies already pay customers for excess electricity and the Government would like to see this aspect of the energy markets develop to become more competitive. Yet it would not be appropriate for the Government to set a price for exported electricity. To do so would risk distorting the electricity supply market and would be incompatible with the liberalised arrangements of the British electricity market. The framework underpinning our competitive energy markets was established to provide market based solutions to our energy needs, governed by an independent regulator. Intervention by the Government to the extent of setting a price for exported electricity would be an unwarranted intervention that could have adverse effects on the confidence and certainty our liberal framework provides for investors.

Question 16 – how can competition for the excess electricity generated by microgenerators be encouraged?

[14] http://www.dti.gov.uk/consultations/consultation-1475.html

5. Installation

Building Regulations

5.1 Building Regulations are framed in terms of reasonable, adequate and appropriate functional requirements for buildings. The Approved Documents that accompany the Regulations suggest how the regulations can be met by demonstrating some ways of compliance. The Government has signalled in the Energy White Paper its intention of raising performance standards in the decade to 2013. It is also implementing the Energy Performance of Buildings Directive. The Regulations and accompanying Approved Documents can therefore have a significant role to play in showing how products with low or zero carbon emissions are attractive in terms of helping the construction industry to comply with the regulations. In furtherance of this the ODPM has uploaded "Low or Zero Carbon Energy Sources - Strategic Guide (Interim Publication)"[15] onto its web site and this will shortly be published as an ODPM priced publication.

5.2 Proposals to amend Approved Document L (conservation of fuel and power) of the Building Regulations were the subject of a consultation exercise in July 2004[16]. The suggested amendments would substantially raise performance standards but because of the functional nature of the regulations, would not require microgeneration to be incorporated in the design of new buildings.

5.3 The installation of such technologies will, however, help builders to achieve the levels of carbon emissions necessary to comply with the regulations particularly with the inclusion, as guidance, of a notional contribution from micro-renewable systems.

[15] http://www.odpm.gov.uk/stellent/groups/odpm_buildreg/documents/page/odpm_breg_034291.pdf
[16] http://www.odpm.gov.uk/stellent/groups/odpm_buildreg/documents/divisionhomepage/br0032.hcsp

5.4 The Government intends to review Approved Document L roughly every 5 years. Each update will clearly signal what the requirements of the next stage are likely to be which will lead to incremental increases in the energy standards of new and altered buildings. As standards rise it is likely that buildings will need to incorporate increasing levels of microgeneration technology as the opportunities for conventional energy efficiency measures are exhausted. The forward look section of last year's consultation document draws attention to the role that microgeneration could play in the future – "… it may well be argued that it should be impossible to achieve the overall target without some renewables provision. Such an approach would perhaps be appropriate if the supply capacity had grown to support such a market size by 2010".

5.5 The Government fully recognises that issues of compliance with, and enforcement of, the Building Regulations are an important concern. Work is taking place with key Local Authority and Approved Inspector Building Control bodies and with industry umbrella organisations to develop cost effective guidance, dissemination of information and training with the aim of improving compliance.

5.6 The passage of the Sustainable and Secure Buildings Act 2004[17] amends the Building Act 1984, paving the way for further expansion of the actions caught under the regulations. Amongst other things, the Act allows for the addition of new purposes for which Building regulations can be made, including environmental protection and sustainable development. It will also allow building regulations to apply to existing buildings in certain circumstances. The Sustainable Development Commission is working with the ODPM on how best to use these new powers.

Question 17 - how could Building Regulations (taking account of the new powers in the Secure and Sustainable Buildings Act to make regulations about energy use) be used to encourage cost-effective microgeneration technologies?

Question 18 - how could Government help the construction industry and the building control bodies to be become better informed about the applications of microgeneration systems, satisfactory design, installation operation and maintenance practice, and the benefits to be obtained?

[17] http://www.legislation.hmso.gov.uk/acts/acts2004/20040022.htm

Planning Policy

5.7 The planning system is important for the development of microgeneration in a number of ways.

5.8 It determines which schemes require planning permission. The Town and Country Planning (General Permitted Development) Act 1985 establishes categories of developments that do not require a planning application because planning consent is deemed to have been granted. As a general rule, solar panels and photovoltaic cells can already be installed on the roofs of individual houses as developments permitted under these categories, providing the panels don't project significantly above the roof. The ODPM is currently reviewing the regulatory regimes that relate to householder consents[18] and will be assessing possible changes that could make it easier for householders to install other technologies.

5.9 Where planning permission is required, planning policy is potentially an important tool for setting requirements for microgeneration in both new and existing developments. It is a tool that could be applied to considerable effect in planning to meet England's need for new homes and associated developments. The Government has already taken steps to facilitate microgeneration through national planning policy. Planning Policy Statement 22 *Renewable Energy* (PPS 22)[19], published last August, established that local authorities 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".

5.10 Some planning authorities had adopted such policies before the revision of PPS22. The London Borough of Merton introduced a policy that requires all new non-residential developments to reduce predicted carbon emissions by 10% through the use of onsite renewable energy sources. The GLA has recently adopted a similar policy outlined in the Mayor's Energy Strategy[20] – "To contribute to meeting London's targets for the generation of renewable energy, the Mayor will expect applications referable to him to generate a least 10% of the site's energy needs (power and heat) from renewable energy on the site where feasible. Boroughs should develop appropriate planning polices to reflect this strategic policy".

[18] http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/divisionhomepage/033875.hcsp
[19] http://www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=5681&l=3
[20] http://www.london.gov.uk/mayor/strategies/energy/download.jsp

5.11 Existing buildings may also have the potential to make use of microgeneration technologies. Whilst planning authorities may develop policies to consider such proposals favourably, that potential may be less in sensitive locations such as conservation areas. This is because some microgeneration technologies could have impacts upon their surroundings that would conflict with authorities' broader duty to protect the environment. Planning Policy Statement 1 *Delivering Sustainable Development*[21] requires that, to help deliver sustainable development, planning should ensure that development is of a high quality and that it helps to protect and enhance the natural and historic environment, the quality and character of the countryside and existing communities. To meet this objective local authorities must ensure that design, conservation and other amenity considerations are accorded their due weight in decision-making on proposals connected with microgeneration.

Question 19 – are there any barriers in the planning system that are hindering the development of micro-generation?

Sustainable Communities Plan and the Code for Sustainable Buildings

5.12 The Sustainable Communities Plan "Sustainable Communities: Building for the Future"[22] outlines the Government's approach to meeting the increasing demands for houses in a way that provides decent homes and a good quality local environment in all regions. The intention is that new and existing communities see development of the highest quality. 4 growth areas have been identified within the Plan – the Thames Gateway, Milton Keynes/South Midlands, London-Stanstead-Cambridge-Peterborough and Ashford. Total housing built in these growth areas to 2016 will be 476,355.

5.13 Intelligent use of microgeneration technologies is obviously compatible with the sustainable community philosophy and the specified growth areas could provide an opportunity for interested developers to show case microgeneration technologies.

5.14 Government will be working with local authorities and developers to ensure that a full-scale demonstration of how the Code for Sustainable Buildings[23] will be applied is available across the Thames Gateway and in other areas.

5.15 The Code for Sustainable Buildings has its origins in a recommendation made by the Sustainable Building Task Group report, "Better buildings, Better lives"[24], published last year. It will incorporate minimum standards in key resource efficiency criteria, including energy, which will go beyond the minimum requirements set out in the Building Regulations. Work (led by ODPM) has already started on the Code and the Government is looking to complete it by the end of 2005 in order that it can be rolled out nationally by April 2006. An informal consultation exercise on the draft Code is due later this year.

Question 20 – if the Code is to be helpful in terms of promoting microgeneration, what sort of requirements might it include?

[21] http://www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=5845&l=3
[22] http://www.odpm.gov.uk/stellent/groups/odpm_communities/documents/page/odpm_comm_022184.hcsp
[23] http://www.dti.gov.uk/construction/sustain/presrel.doc
[24] http://www.dti.gov.uk/construction/sustain/EA_Sustainable_Report_41564_2.pdf

Government Estate

5.16 The public sector has an important role to play in providing leadership to and driving change in other sectors. It can do this by setting an example through its own procurement policies. The Sustainable Development Framework for the Government Estate (Part E – the Energy Framework)[25] already requires Government departments to develop delivery plans to meet a range of environmental targets on their central London estates. These targets include reducing overall carbon emissions, increasing energy efficiency and sourcing electricity from renewable sources. The Government has committed to a wide-ranging review on the framework looking at issues such as resources, wider participation and data collection. The review will also include consideration of the reasons for variations in Departmental performance against Framework targets and commitments. The aim of the review is to enable a 'step change' in operational performance in the management of the Governments land and buildings.

Question 21 – what more should the Government be doing through the management of its own estates to promote microgeneration?

[25] http://www.sustainable-development.gov.uk/delivery/integrating/estate/estate.htm

6. Low Carbon Buildings Programme

6.1 Since the publication of the Energy White Paper in 2003 the potential for renewable technologies and barriers to uptake have been assessed in the Renewables Innovation Review (RIR). The review identified the potential for microgeneration technologies and suggested that the environmental benefits in buildings could be maximised by developing an appropriate mix of building integrated renewables and energy efficiency. See Annex D for further details on the recommendations for action that relate to buildings.

6.2 In response to these recommendations, the Low Carbon Buildings Programme will supersede the current DTI grant schemes for small-scale renewable energy technologies (which are due to end in March 2006). It will provide a more holistic approach to reducing carbon emissions from buildings through a combination of practical advice on energy efficiency measures and practical advice and capital grants for the installation of micro-renewables. The programme will continue support for the microgeneration industry by providing a confirmed opportunity to deploy significant volumes of small-scale renewable technologies.

6.3 The current relevant DTI capital grant schemes (Clear Skies and Major PV Demonstration programmes – details at Annex B) have gone some way towards developing a market for microgeneration technologies, but have not delivered the scale of projects that require the level of mass production that, in turn, leads to cost reductions. For example, under the major PV Demonstration Programme, there has been an annual price reduction of around 7-8% since 2002 – whilst prices are undoubtedly moving in the right direction, this reduction is only 2-3 % more than would normally be expected through efficiency savings. These figures suggest that a refocusing of support is needed to stimulate the market more effectively. The focus of the Low Carbon Buildings Programme on a more limited number of large scale projects (alongside some individual and community programmes) should provide the large scale demand that can help to reduce manufacturing costs. These larger projects will also aim to engage the construction sector in developing projects that utilise micro-renewable technologies and demonstrate their merits. Greater engagement by the construction sector is critical to achieving a sustainable market for microgeneration technologies.

6.4 Both the current capital grant schemes address the issue of energy efficiency by offering advice on simple energy saving measures such as adequate insulation, the use of energy efficient light bulbs and appliances. But more emphasis could have been placed on the opportunities for energy efficient measures and their interaction with the renewable energy technologies that are the focus of the support. Energy efficiency technologies are supported through other Government schemes such as Warm Front, Home Energy Efficiency Scheme, Energy Efficiency Commitment etc[26]. DEFRA and the Devolved Administrations also support programmes on energy efficiency through the Carbon Trust and the Energy Saving Trust.

6.5 In terms of achieving the maximum contribution to reducing carbon emissions, it is clear that more efforts need to be made in terms of ensuring that microgeneration and energy efficiency technologies are seen as complementary and mutually reinforcing.

6.6 It is proposed that the Low Carbon Building Programme will operate for a 6-year period from April 1st 2006 (subject to securing State Aids approval[27]). Projects will be submitted in response to calls for proposals and will be assessed against a set of published criteria by a panel of experts and selected on a competitive basis. The criteria will be developed in conjunction with the Renewables Advisory Board[28]. The process for project selection will also give consideration to ensuring that the full range of technologies is represented within the programme. There will be two streams of funding – one (stream 1) for individual and community projects, the other (stream 2) for larger scale developments.

Question 22 – will a 6 year programme provide the confidence that industry requires for future investment decisions?

6.7 The programme will be "technology blind", in other words no single technology will be favoured over another. This will allow architects, developers and the construction industry the flexibility to use the most appropriate technology or combination of technologies to deliver the energy requirements of the building with reduced carbon emissions. Priority will be given to projects (under both streams of funding) that demonstrate an integrated design approach to carbon savings through energy efficiency measures as well as the installation of heat and/or electricity generation technologies. Capital grants will not be available from the DTI for the energy efficiency measures, but applicants will be encouraged to access other sources of funds such as the Carbon Trust's Energy Efficiency Loans[29] or grants provided by local authorities and energy service providers. Successful applications under the larger scale stream 2 will be given the support of a carbon manager/technical adviser to advise the project applicants on appropriate energy efficiency measures as well as the generation technologies. The carbon manager/technical adviser will be appointed for the duration of the project to work with the project developers to ensure that the proposed carbon reductions are delivered. This advisory role is being pioneered by the Carbon Trust through their existing refurbishment programme and the Low Carbon Buildings Programme will complement this programme.

[26] further details on Government support for energy efficiency can be found at - http://www.defra.gov.uk/environment/energy/index.htm
[27] European Union State Aids clearance is required for publicly supported programmes which provide financial support to industry.
[28] http://www.dti.gov.uk/renewables/renew_2.8.htm
[29] http://www.thecarbontrust.org.uk/energy/pages/page_72.asp

Objectives

Objectives for the whole programme –

- To support a more holistic approach to reducing carbon emissions from buildings, by demonstrating innovative combinations of both energy efficiency measures and micro-renewable technologies in a single development
- To demonstrate on a wider scale emerging micro-renewable technologies (with a focus on building integrated technologies)
- To see micro-renewable technology costs reduce over the lifetime of the programme against a 2005 baseline (the baseline and percentage reduction to be agreed with industry)
- To raise awareness by linking demonstration projects to a wider programme of activities including developing skills and project replication.

6.8 The programme will be evaluated after 5 years to assess the contribution the support has made to reducing carbon emissions and whether the expected cost reductions have been made. The evaluation will also identify which combinations of integrated packages of renewable energy technologies and energy efficiency measures are most relevant to building owners and tenants.

6.9 Specific objectives for Stream 1 (individual and community projects) –

- To fund on a tapering basis innovative individual and community based projects which meet the agreed standards for the programme (such as the Code for Sustainable Buildings)

6.10 Stream 1 will help to ensure a smooth transition between the existing programmes and the new programme.

6.11 Specific objectives for Stream 2 (larger scale developments) –

- To support a number of high profile, large scale, low carbon building developments – including both new build and refurbishment – in the areas of household, commercial and public sector buildings.
- To expand the expertise of the construction sector in developing, constructing and operating large scale developments of low carbon buildings by demonstrating innovative combinations of micro-renewable and energy efficiency measures

Question 23 – are these objectives an appropriate focus for the new programme and will they contribute to developing and moving the micro-renewable sector forward?

Operation

Stream 1 –
- Administered by a management contractor appointed by DTI
- The funding will be tapered over the 6 years of the programme
- Projects will be selected on a competitive basis in response to call for proposals.
- Successful applicants will receive capital grants, at a fixed % of the eligible costs, for the installation of micro-renewable technologies

Stream 2 –
- Administered by a management contractor appointed by DTI
- Successful applicants will receive the following support –
  - The appointment of a carbon manager/technical adviser to advise on micro-renewable technologies and energy efficiency measures throughout the lifetime of the project
  - Capital grants of up to a set % of the eligible costs for the micro-renewable installations
- Projects will be selected on a competitive basis in response to call for proposals.
- Complement Carbon Trust activities in innovation and energy efficiency

6.12 Further details on the operation of the programme including criteria for selection of projects will be developed following the consultation.

Key Features

Eligible Technologies

6.13 The programme will be technology blind, allowing architects, developers and the construction industry the flexibility to use the most appropriate technology or combination of technologies to deliver the lowest carbon savings for the building. The programme will be designed to ensure good representation across the range of eligible technologies.

Question 24 – views are invited on the impact of a "technology blind" approach on the selection of the micro-renewable technologies

6.14 The programme will support technologies already identified under the existing DTI capital grant programmes as well as other emerging technologies. This will include solar (thermal and photovoltaic), ground source and air source heat pumps, bio-energy, micro-wind, micro-hydro, renewable micro-CHP and fuel cells.

Question 25 – are there any other micro-renewable energy technologies for generating either heat or electricity that should be considered in addition to those mentioned?

6.15 The capital grants will be available for up to a defined % of eligible costs for all micro-renewable technologies. The maximum amount of grant available to a single project will be limited. However these emerging technologies are at different stages of economic viability and the absolute cost of the technologies may affect their selection by the project developers. The level of grant may therefore be assessed during the selection process and may take account of the impact of the technologies on carbon reduction and heat or electricity generation potential, as well as economic viability.

Question 26 – would the same fixed level of grant for all technologies have an impact on selection of micro-renewable technologies or should there be a variable rate for different technologies?

Question 27 – if so, what should this rate be based on – potential electricity or heat generation over the lifetime of the product, potential to reduce carbon emissions, nearness to market?

6.16 The DTI considers properly designed capital grant schemes can provide an important incentive for encouraging and incorporating micro-renewable technologies into buildings.

Question 28 – views are invited on alternative support mechanisms to capital grants for supporting the uptake of micro-renewable technologies and the advantages that these alternatives would have over a capital grant scheme

Energy Efficiency Measures

6.17 Projects under Stream 1 are expected to address energy efficiency measures as well as the installation of micro-renewables.

Question 29 – how should Stream 1 be designed to ensure energy efficiency is addressed effectively?

6.18 Projects under Stream 2 are also expected to address energy efficiency measures. Successful applicants will have the support of a carbon manager/technical adviser to advise on appropriate energy efficiency measures as well as the installation of micro-renewable technologies. The manager/adviser will be appointed for the duration of the project to work with the project developers to ensure that the proposed carbon reductions are delivered. The Carbon Trust is pioneering this approach through their existing low carbon building refurbishment project and the DTI programme will complement the Carbon Trust's initiative.

6.19 Capital grants will not be available from DTI for the installation of energy efficiency measures, but applicants will be able to access alternative resources to fund these activities, such as Carbon Trust Energy Efficiency Loans or grants provided by local authorities and the energy service providers.

Question 30 – what other measures should be included under Stream 2 to ensure that energy efficiency is addressed effectively?

Building Standards

6.20 Successful projects in the programme must attain a high standard of sustainability as a result of Government support and exceed mandatory building regulation requirements. On completion of the project, the building must meet the standards defined in the Code for Sustainable Buildings.

Question 31 – views are invited on whether the Code for Sustainable Buildings is the most appropriate standard for buildings supported by this programme.

Eligible Buildings/Projects

6.21 Under Stream 1, a proportion of the total programme funds will be available for capital grants for individual and community projects.

Question 32 – would earmarking funding for individual and community projects in the way proposed enable a smooth transition between the existing schemes and the new programme?

Question 33 – what restrictions or criteria should be used for selecting individual and community projects (e.g. size of installation, type of building)?

6.22 The overall focus of the programme is on larger scale projects to generate economies of scale and projects that can be replicated across the UK. Therefore the programme will look to support the following developments –

- Larger scale developments including residential, commercial and public sector developments
- Developments that have wide applicability to other similar projects
- New build and refurbishment projects

Question 34 – is this focus on larger scale projects likely to contribute towards a change in the market?

6.23 Examples of the kinds of developments that might be considered for support include –

- A new housing development (social or private), built to the standard of the Code for Sustainable Buildings and with a % of power generation provided by a combination of renewable technologies such as solar photovoltaic roof tiles (for electricity generation in the summer) and ground source heat/cooling pumps (for heat generation and cooling throughout the year).
- Regeneration of an industrial site, including a range of commercial buildings, new build and refurbishments (refurbished to the standard of the Code for Sustainable Buildings) and with a local energy generation system including renewable CHP, solar photovoltaics and small-scale wind turbines.

Question 35 – further suggestions of the kind of developments that might be suitable for support are invited

Other Issues

6.24 It is recognised that a number of parallel activities may be required to complement any low carbon-building programme to develop a more sustainable market for renewable energy technologies in the long term. Some of these have already been raised in the more general context of the microgeneration strategy, but views are particularly sought with respect to the development of low carbon buildings.

Question 36 – views are invited on other factors affecting the development of low carbon buildings and specifically the uptake of renewable energy technologies, particularly factors that are not already highlighted elsewhere in this consultation document.

7. Physical Infrastructure

Metering

7.1 At the very basic level new metering technology is not necessarily a pre-requisite for the installation and operation of microgeneration technologies. It would be possible to install all forms of microgeneration with the existing system of one-way import meters. Benefits in terms of reduced bills for electricity and heat would be achieved, but the full range of potential benefits would be foregone. In order to take advantage of the full range of potential rewards available, data on the import of electricity, the export of electricity and the generation of electricity by the microgeneration technology will be required. A recent ILEX study[30] explores the various metering arrangements that might be applicable to microgeneration. It suggests that the most beneficial solution is a system incorporating an import meter, an export meter and a gross generation meter.

7.2 There is also the question of whether data needs to be collected on a half-hourly basis. Work is underway to collect the data required to build the more sophisticated profiles that will be required if data are not collected on a half hourly basis. Currently half hourly metering is required to measure exported electricity for systems larger than 30kW. The threshold has already been raised once to 30kW from 16A/ph (or approximately 4kW), with the profiling data provided by DTI's advanced metering project playing a significant role in achieving this rise. At the moment the penetration of microgeneration is low enough that the amount of electricity exported back into the distribution network has an absolutely minimal impact on the overall balancing and settlement arrangements of the wholesale electricity market. But as the number of microgeneration installations increases it will become more important to have an accurate assessment of the amount of electricity being imported from and exported to the distribution network.

7.3 Of course this issue is of less immediate relevance to heat producing microgeneration technologies, although improved metering and billing technologies would be of benefit to all consumers.

[30] Metering, Settlement and Export Reward Options for Microgeneration – ILEX Energy Consulting, December 2004. Full report can be found at – (http://www.distributed-generation.gov.uk/documents/18_02_2005_masm_final_formated.pdf)

Question 37 - what set of metering arrangements would allow consumers to exploit the full range of the potential benefits of microgeneration?

Question 38 - what steps can be taken to reduce the costs of metering and encourage new meter operators to enter the market with more sophisticated products?

Connection to the distribution network

7.4 Current regulations require installations with an output of more than 16A/ph (around 4 kW) to comply with technical standards designed for generators up to 5MW in size when connecting to the distribution network. Compliance with these standards is costly, likely to require feasibility studies, and consequently could well be a significant hindrance to would-be microgeneration installers. DTI has launched a project to look at how connection standards could be simplified and is also undertaking a study to review the actual experience of people trying to connect to the system that should identify the real barriers in this area. Both of these studies should be completed over the summer and the results will be fed into the final strategy.

Public safety implications

7.5 It is important to identify whether there are any public safety implications that may arise in relation to specific products or that may arise as a result of changes in the way the distribution and transmission systems operate with greater levels of microgeneration. Any safety issues must then be addressed to ensure that widespread uptake of microgeneration will not have any adverse health and safety impacts.

Question 39 - are there any public safety implications that may arise in relation to large-scale uptake of microgeneration, if so, how can these be managed?

8. Local Authorities and Regional Bodies

8.1 The Energy White Paper outlines several means through which local and regional authorities can support the development of low carbon technologies. These include business and innovation support activities, new development and regeneration projects, and their own procurement strategies. The Government remains committed to strengthening its partnership with local and regional bodies on sustainable energy issues. This includes working to promote microgeneration technologies.

8.2 The important role of local planning in the deployment of microgeneration has already been covered. In relation to the Low Carbon Buildings Programme, the Regional Development Agencies, Regional Housing Boards, Housing Associations and others are funders of large-scale housing and regeneration projects, putting them in an ideal position to identify potential projects for future support.

8.3 RDAs will also be important in wider efforts to promote low carbon buildings and issues affecting the broader uptake of these technologies – in particular the development of skills, supply chains and awareness in the construction industry.

Question 39 – what specific roles should Local Authorities, Regional Development Agencies, Regional Housing Boards and Housing Associations play in promoting microgeneration?

Question 40 – what steps should Government take to assist these bodies in taking this role?

9. Devolved Administrations

Scotland

9.1 In Scotland, responsibility for the promotion of renewable energy rests with the Scottish Executive. *A Partnership for a better Scotland: Partnership Agreement*, published in 2003, includes a commitment to encourage participation in renewable energy projects by communities and local authorities. The Executive launched the Scottish Community and Householder Renewables Initiative (SCHRI) at the end of 2002, backed by £2.2million per annum. This scheme is helping deliver that commitment, and was recently extended to 2007/08.

9.2 The SCHRI offers an advisory service and grant support scheme to non-profit community organisations and individual householders for installing a range of small-scale renewables technologies. Solar PV installation is not supported under SCHRI because the DTI Major PV Demonstration programme provides financial grant assistance. SCHRI grants for community projects can cover 100% of capital costs up to a maximum of £100,000. Household grants are available for 30% of capital costs up to £4,000.

9.3 The Low Carbon Building Programme, like the current DTI programmes, will be open to applicants in England, Wales and Northern Ireland. In Scotland, the new programme will apply to the installation of PV only for stream 1 projects and for stream 2. As mentioned above, the Scottish Executive funds its own programme for the installation on non-PV renewable energy technologies for non-profit community organisations and individual householders. This scheme will continue to provide support for these technologies after the DTI Clear Skies Initiative ends. In the new programme projects for stream 1 which include PV and other small scale renewables will be reviewed jointly by the DTI and the Scottish Executive.

9.4 Some aspects of energy efficiency policy are also a devolved matter and the Scottish Executive is currently developing an energy efficiency strategy for Scotland that is expected to be published in Autumn 2005. Measures to promote micro-generation (where the relevant powers are devolved) may feature as a part of this strategy.

Wales

9.5. As part of its sustainable development duty, the Welsh Assembly Government is committed to encouraging the development of an indigenous microgeneration 'renewables' industry in Wales, with a particular focus on opportunities for Small and Medium Enterprises. This will be done through partnership between the Welsh Development Agency, Carbon Trust and Energy Saving Trust and other renewables focused organisations. The response to this consultation document will inform the development of this commitment in Wales so that it can be taken forward in the context of the proposed UK strategy.

9.6 The Welsh Assembly Government has launched a document "Energy Saving Wales" which aims to increase the level of interest in energy efficiency and highlights the need to promote microgeneration. The Assembly Government is also developing an Energy Savings Wales Portal containing a directory of publicly funded organisations that provide a range of services on energy efficiency and small-scale renewable energy.

9.7 Under the Sustainable Development Action Plan the Welsh Assembly Government is also committed to establishing pilot projects that explore the potential of using renewable energy solutions in policies and programmes aimed at tackling fuel poverty amongst low income vulnerable households, particularly those unable to benefit from traditional improvement solutions.

9.8 The Welsh Assembly Government has also published an Energy Route Map which outlines plans for the adoption of renewable energy and improvement of energy efficiency. Planning Policy Wales (2002) (PPW) sets the framework for sustainable energy development in Wales stating that local planning authorities "should make positive provision" for renewable energy/energy efficiency in their development plans and seek opportunities to integrate energy efficiency and conservation objectives into the design of new development. *Technical Advice Note 12* - Design was issued in 2002 and contains additional policy on resource efficient planning. Draft revisions to PPW and a draft *Technical Advice Note 8* - Renewable Energy (TAN 8) were issued last year to enable the Assembly to reach its renewable energy targets by 2010. The final versions are due to be published in the summer of 2005.

9.9 The Welsh Development Agency has published a document "Creating Sustainable Places" which set out sustainability and design quality expectations for all regeneration projects in Wales.

Annex A: Eligible Micro-Generation Technologies

This annex brings together information on the micro-generation technologies which the strategy aims to promote and which the Low Carbon Buildings Programme may support. It includes information on the potential market for some of these technologies as well as providing some current information on the financial costs and benefits of these technologies. As mentioned in the introduction, it is very difficult to predict the potential market trends and costs for many of these emerging technologies. This annex is therefore a simple analysis based on existing information and for specific worked examples, it does not attempt to assess the wider and more subjective benefits of these technologies.

As highlighted in the strategy, further work is required to develop a more robust basis for calculating the long-term contribution that these technologies could make to reducing carbon emissions in the future.

Electricity Generation Technologies

Solar photovoltaics

There is a small but growing market for photovoltaics (PV) in the UK. It is estimated that by the end of 2004 around 8,164 kWp[31] of PV was installed in total in the UK.

The cumulative installation of PV has grown substantially over the last years:

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total kWp installed	173	266	338	368	423	589	690	1131	1929	2746	4136	5903	8164

[31] Based on IEA PVPS data for up to 2003, and estimate of PV in 2004

In addition the Renewables Innovation Review estimated that PV could contribute 6-8% of overall electricity supply by 2050 and lead to a 3MtC reduction in carbon emissions.

PV systems consist of semi-conductor cells that are linked and encapsulated into modular panels - often a rectangular shape about a metre long. These are then interconnected to provide electrical power, which can be harmonised with grid electricity and fed back into the network. For grid-connected installations an inverter is required to turn the electricity generated from direct current (DC) to alternating current (AC) and for off-grid installations, a storage mechanism and control system are generally needed. A typical household system of 2kWp could provide an average of between 40-50% of total annual electricity needs. The cost of installing a PV system varies depending on whether it is a standard bolt on system or a more integrated system, but the average cost is around £6,300 per kWp[32].

A 2 kWp system would generate around 1500kWh/yr[33]. This might amount to financial saving (in the form of reduced electricity costs) of around £100[34] per year and would equate to a carbon saving of about 0.65 tCO2/ year[35]. The pay back time on an average 2kWp household system would therefore be around 120 years (based on current electricity prices).

Wind Turbines

There are a number of established wind developers and installers both at the small (household) level and at the larger more commercial scale. It is estimated that there are around 650 – 700[36] small scale installations in the UK. Current small scale installations are not generally mounted directly onto buildings, but small building mounted machines are under development and becoming more widely available.

A wind turbine converts wind to electricity. The most common design is for three blades mounted on a horizontal axis, which is free to rotate into the wind on a tall tower. The blades drive a generator either directly or via gearbox (generally for larger machines) to produce electricity. The electricity can either link to the grid or charge batteries. Small wind turbines (less than 20kW) produce "wild" AC (variable voltage and frequency) current which is converted to DC via a system controller. This DC is then converted to normal AC (240V 50Hz) current by inverters as with PV. Modern designs tend to be very near silent in operation.

A typical small scale system costs between £2,500 - £5,000 per kWe installed[37]. A small wind turbine of 6kW capacity (sufficient for all of the electricity requirements of two or three typical UK households), costing about £20,000 to install, will generate about 10,000 kWh per year[38]. This might amount to financial savings of around £700 per year[39] and would equate to carbon saving of 4.3 tCO2/year[40]. The pay back time on an average 6kWp system would therefore be around 29 years (based on current electricity prices).

[32] Cost is based on data from the Major PV Demonstration Programme Stream 1
[33] Energy generation is based on following assumption (derived from experiences of the Major PV Demonstration Programme) an average of 750kWh/kWp per year
[34] The price assumes a net metering arrangement where household receive similar rate for export as for import of electricity of around 6 – 7p/kWh
[35] Carbon saving calculated using the DEFRA electricity displacement coefficient of 0.43kg CO2./kWh used since 2000.
[36] BRE
[37] Summary of renewable energy technologies characteristics, from the London Renewable: Toolkit for planners, developers and consultants', section 3; www.london.gov.uk/mayor/environment/energy/london_renew.jsp
[38] BRE. Based on case study from Clear Skies programme.
[38] The price assumes a net metering arrangement where the community receives similar rate for export as for import of electricity of around 6 – 7p/kWh
[40] Carbon saving calculated using the DEFRA electricity displacement coefficient of 0.43kg CO2./kWh used since 2000.

Small Hydro

There is a small, limited market for small and micro-hydro in the UK. A total installed capacity of around 100 MW is currently operating at about 120 small hydro sites, each with installed capacity of <5MW. In addition there are an unknown number of operational micro-hydro sites, with installed capacities <20MW. Growth is estimated to at about 10MW per year. There are a number of small but established companies currently operating in the UK that specialise in micro-hydro installations.[41]

Water is used by "hydro turbines" to generate electricity. Water flowing down rivers, for example, turns the turbine round; this movement is used to produce power. Most hydro power is produced in hilly or mountainous areas, or in river valleys. The amount of electricity that can be produced is determined by how much water is available and how fast it flows. Additionally of all renewable energy technologies, it is the most consistent at providing electricity.

Costs for hydro projects depend greatly on the site and vary considerably, but can cost anything between £1,000 and £3,000 per installed kW.

Heat Generation Technologies

Solar Thermal Hot Water

There is a small but established market in the UK for solar water heating systems. Estimates put the total number of existing installed domestic systems in the UK at over 70,000[42], with about 5,000[43] new domestic systems installed each year. The main potential for this technology is in the domestic market. It is estimated that there is the potential for the number of retrofit installations to increase from this relatively low base (under favourable market conditions) to 50,000 new units installed per year by 2010, 300,000 by 2015 and 800,000 by 2020[44].

Systems comprise of solar collectors (evacuated tubes or flat plates), a heat transfer system (a fluid in pipes) and a hot water store (e.g. domestic hot water cylinder). A 4m^2 collection area will provide between 50 – 70% of a typical home's annual hot water requirement[45]. The cost of a professionally installed solar system for heating hot water can vary significantly, but a household system (4m^2) could cost between £2,500 - £4,000[46].

[41] Definition Study of the Community and Household Renewable Energy Grants Scheme, ESD Ltd and EST, September 2002
[42] BRE
[43] BRE
[44] Draft Renewable Heat and Heat from Combined Heat and Power Plants – Study and Analysis – AEAT April 2005
[45] Summary of renewable energy technologies characteristics, from the London Renewable: Toolkit for planners, developers and consultants', section 3; www.london.gov.uk/mayor/environment/energy/london_renew.jsp
[46] As for footnote 44.

System savings range from around 454 kWh/ year/m^2 of flat plate collector – 582 kWh/year/m^2 for an evacuated tube system[47]. This might amount to a saving of around £120 - £150 per year[48] for electrically heated property or be as low as £36 - £46 [49] for a gas-heated property, and would equate to a carbon saving of about 0.79 - 1 tCO2/ year[50] for electrically heated property and about 0.35 – 0.44 tCO2/year for gas-heated property[51]. The pay back time on an average 4 m^2 household system would therefore be around 24 years for an electrically heated property and 80 years for a gas-heated property (based on current energy prices).

Ground Source Heat Pumps

The market for ground source heat pumps is currently small but growing. The total number of existing installation in the UK is estimated at 5MWth made up of around 600 - 700 units[50]. The principal market for GSHP are domestic housing, commercial properties not connected to the natural gas network and commercial industrial properties with stable heat demand. It is estimated that there is the potential for the number of installations to increase from this low base to 10,000 new units installed per year by 2010, 35,000 by 2015 and 55,000 by 2020[53].

Systems operate by circulating water (or another fluid) through pipes buried in the ground in trenches or in vertical boreholes. The pipes extract heat from the ground and a heat exchanger within the heat pump extracts the heat from this fluid. The compression cycle is employed (also used in refrigerators) to then raise the temperature to supply hot water to the building. They require electricity to work, although this can be provided by complimentary renewable energy sources. The cost of a typical household system is £4 - 6,000[54]. A typical system will provide 95 - 100% of a households heating requirements.

For a domestic system with a total annual heat load of 30,000 kWh heated by natural gas[55] the annual carbon emissions would be in the region of 6.3tCO_2/ year[56]. Employing a 9kW (peak heat output) ground source heat pump with a coefficient of performance (CoP) of 3.5 and costing around £9,000 would require 8,570 kWh of electricity to operate the pump. Assuming a normal electricity tariff, the carbon dioxide emissions would equate to 3.7tCO_2/ year equivalent to a net saving of 2.6tCO_2/ year[57]. If a 'Green' electricity tariff supplied the electricity for the pump, the carbon dioxide emissions could be reduced to zero.

Ground Source Heat pumps are most likely to be an option where there is no access to natural gas and so the alternative may be oil or direct electric heating (storage heaters). In the case of the latter, financial savings could amount to around £640[58] per annum (assuming off-peak electricity). In the case of oil fired heating, the likely running and installation costs would be comparable.

[47] As for footnote 44.
[48] The price assumes the import cost of electricity of around 6 – 7p/kWh
[49] The price assumes the cost of natural gas around 2 p/kWh
[50] Carbon saving calculated using the DEFRA electricity displacement coefficient of 0.43kg CO2./kWh used since 2000.
[51] Carbon savings calculated using gas displacement coefficient of 0.19 kgCO2/kWh and assumes boiler efficiency of 70%
[50] Draft Renewable Heat and Heat from Combined Heat and Power Plants – Study and Analysis – AEAT April 2005
[53] See footnote 50.
[54] Clear Skies website. www.clear-skies.org/households/GrantsAndTechnologies.aspx?intTechnologyID=4
[55] This assumes with a new gas condensing boiler with SEDBUK efficiency of around 90%
[56] Calculated on basis of 30,000 kWh/ 0.9(boiler efficiency) x 0.19 kgCO2/kWh.
[57] Calculated on basis of total gas equivalent CO2 emissions (6.3tCO2/ year) – electricity equivalent CO2 emissions to operate pump (8,570 kWh x 0.43 kg CO2/kWh
[58] Calculated on basis that direct electric heating would cost (assuming 3p/kWh might-time rate) 30,000kWh x 3p = £900 per annum and GSHP would cost 8,570kWh x 3p - £257 per annum

Air Source Heat Pumps

These systems have yet to become widely available for the domestic market and continue to undergo minor development work. However they are likely to become commercially viable in the very near future.

They work in the same way as ground source heat pumps except that the source of the heat is the external ambient air. As external temperature is more variable than in the ground, coefficients of performance are likely to be lower, but so too are installation costs as no trenching or ground drilling is required.

Systems are often installed on an external wall, and may give rise to noise issues in high-density housing developments.

Bio-energy

There are a range of small-scale biomass heating systems commercially available in the UK across a wide range of sizes, combustion technologies and fuel sources. These range from single room heaters hand fed with logs, through to large scale industrial units with fully automated fuel handling systems using wood chips for large scale steam or CHP operation. It is estimated that the current existing number of domestic wood burning installations produce around 2.38 TWhours/year.[59] The principal market for domestic scale biomass heating will be in more rural locations where there is the space to accommodate the boilers and access to fuel is easier. The potential market size is 1.1M houses with an energy potential of 19.6TWh/year.[60]

Biomass systems do emit carbon dioxide. However, as the biomass fuel is cultivated, it absorbs the exact same amount of carbon dioxide as is released when burnt. There will however be carbon emissions associated with, for example, any fertiliser used in production of the biomass fuels. As such, bioenergy systems are considered to be broadly carbon neutral and will almost always save more than 95% of the carbon from fossil fuels displaced[61].

The cost of a typical household system is between £2,400 - £2,600 for a single room heater or £200 - £600 per k Wth installed for a boiler system[62], with fuel costs of around £15 – 30/MWh for wood pellets[63].

For a typical domestic system with a total annual heat load of 30,000 kWh, a 9kW biomass system could deliver the heat required. In addition to the initial capital outlay, there would be an annual cost for fuel and maintenance[64]. Overall the running costs would be comparable to gas or oil heated properties. But there would be net carbon savings of around 1.74tCO_2/ year[65] for a gas heated property and 2.16tCO_2/year for an oil heated property.

[59] Draft Renewable Heat and Heat from Combined Heat and Power Plants – Study and Analysis – AEAT April 2005
[60] See footnote 57.
[61] See footnote 57. Carbon savings are 0.058 kgC/MWh where gas derived heat is substituted.
[62] Clear Skies website: www.clear-skies.org/households/GrantsAndTechnologies.aspx?intTechnologyID=5
[63] See footnote 57.
[64] Assumes a fuel cost of £15 - 30 per MWh
[65] Carbon saving calculated on basis that 95% of the carbon from fossil fuels will be displaced. This means a C saving of 0.058kgC/MWh where gas derived heat is substituted and 0.071kgC/MWh where oil is replaced.

Cogeneration technologies

CHP

Combined Heat and Power (CHP) is a highly fuel-efficient energy technology, which puts to use waste heat produced as a by-product of the electricity generation process. CHP can increase the overall efficiency of fuel utilisation to more than 75% Gross Calorific Value - compared with around 40% achieved by fossil fuel electricity generation plants in operation today, and up to 50% from modern Combined Cycle Gas Turbines - and has the potential to save substantially on energy bills.
Most new CHP schemes use natural gas, but a significant proportion burn alternative, including renewable, fuels.

The UK has a target to install 10GW CHP by 2010. Current installed capacity is estimated at around 5GW.

Hydrogen Energy and Fuel Cells

Hydrogen and fuel cells are intermediate technologies, not renewable sources, they cannot contribute to renewable energy targets. However, the production of hydrogen from renewable energy sources offers the potential to create an almost zero emission energy chain, with hydrogen and fuel cells used to power everything from domestic households (providing both heat and power) to mobile phones and cars.

Fuel-cell technology is an emerging global industry, with North America, Japan and the UK playing leading roles. Areas such as Teesside, with its long history of petrochemical innovation, are pioneering the initial development of the necessary technology and infrastructure to produce larger-scale hydrogen fuel cells and help speed the creation of a hydrogen economy.

Fuel cells have been designed to combine hydrogen and oxygen to form electricity, heat and water. These can be used for providing heat and power to individual or multiple homes and for powering cars. They operate best on pure hydrogen, but other natural gases can be converted into hydrogen too.

Fuel-cell technology is still at the pre-commercial stage; so existing installations are demonstration projects. These include stationary power generation or CHP (for example at Woking) and transport (for example London buses).

Annex B: Existing Government 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. In Scotland, the Scottish Executive has provided £5.9 million support to the Scottish Community and Householder Renewables Initiative (SCHRI). A further £6.6 million has been committed up to 2007/08.
- Amendments to the Renewables Obligation Order to make it easier for small generators to claim Renewable Obligation Certificates (ROCs) by allowing them to claim for the ROCs on an annual, or monthly, basis. The current review of the Renewables Obligation is looking at possible further measures in this area.
- Funding specific research into issues facing the microgeneration industry under Workstream 4 of the Distributed Generation Co-Ordination Group (DGCG)[66]. Further research will be undertaken by the Electricity Networks Steering Group that succeeds the DGCG.
- Enabling microCHP to be used by suppliers as an 'innovative technology' to claim a 50% uplift in the second phase of EEC (more details on page 23).
- 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.

[66] Details of work carried out by this group can be found at –
http://www.distributed-generation.gov.uk/wstreams.php?action=projects&f_ws_id=4&f_ws_no=4

Annex C: Existing DTI Capital Grant Programmes for Microgeneration

Major PV Demonstration Programme

Objectives include –
- Raising awareness of PV in the UK
- Generating investment in the PV industry
- Assuring quality installations of PV
- Generating growth and competition in the industry
- Reducing product and installation costs over time
- Establishing a sustainable PV market in the UK

This scheme has been in operation since 2002 and, by the time it ends in March 2006, will have allocated £31million. Revised targets for the programme are 1150 small scale and individual installations and 210 medium and large-scale installations. As of May 2005 we have committed funds to approximately 1000 small-scale/individual projects and 165 larger scale projects.

Clear Skies

Objectives include –
- Raising public awareness and support for renewable energy through the installation of household and community scale schemes
- Demonstrating the contribution renewable energy can make to the household
- Increasing the degree of community involvement with renewable energy schemes
- Increasing the number of people who are active supporters of renewable energy
- Stimulating the development of a robust renewable energy installation industry throughout the UK, sustainable beyond the lifetime of the programme

This scheme has been operating since 2003 and, by the end date of March 2006, will have committed funds for installations to a total value of £12.5 million. The programme targets are to achieve 3900 individual installations and 335 community installations. As of May 2005, 6000 individual installations have been funded, along with 304 community projects.

Other support activities for small/building scale renewables

Other activities which have provided support for the small scale renewable energy generation include –

- Activities led by local and regional government, including schemes such as Solar for London, (which provides grants for the installation of solar thermal hot water systems) and support for exemplar developments such as BEDZED and Sherwood Energy Village.
- Central government schemes e.g. Scolar, which provides support for the installation of solar PV in schools and also educational information
- Non-government schemes e.g. RSPB's Going Solar programme which provides loans for the purchase of solar PV and solar thermal hot water systems and EDF's Green Energy Fund which provides grants towards community installations of renewable energy technologies
- European Union programmes e.g. the CONCERTO initiative (comes under the Framework Research and Demonstration Programme) which has supported research projects in relation to the installation of renewable energy technologies
- Advice services e.g. the Energy Saving Trust's Renewable Energy Advice Centres, the Countryside Agencies Community Renewables Initiative, Scottish Community and Householder Renewables Initiative, Action Renewables and other local support networks.

Annex D: Renewables Innovation Review February 2004: Summary of the recommended actions relating to buildings

Develop a wider buildings approach including solar

- Buildings contribute a significant amount to UK carbon emissions. In 2000, buildings (domestic, commercial and industrial) account for 47% of UK carbon emissions

- Building integrated renewables (BIR) and energy efficiency (EE) technologies have an important part to play in low carbon buildings and refurbishment of existing stock
  - Best case scenario: EE technologies and use of renewable energy through the grid could achieve almost 60% reduction in carbon emissions
  - Low side scenario: EE technologies and use of renewable energy through the grid could achieve a 20% carbon reduction
  - In both scenarios, BIR can contribute to further carbon savings from buildings
  - In addressing carbon emissions from buildings, it makes sense to offer BIR/EE grants to new build and refurb. of existing stock as by 2050, 20 m dwellings (about 65% of total) will date from pre-2000

- PV support should be integrated as part of a building integrated approach under a technology blind programme
  - PV is very expensive; building integrated PV (BIPV) could become economic in UK in mid 2030s, and bolt-on in 2040s
  - PV may be chosen from a range of building integrated renewables due to non-cost values and attributes specific to PV, e.g. visible green and high-tech identity, brand/image enhancement, replaces building materials

- Start now due to long lead in time of new technologies in UK building stock
  - EE and new technologies will have a minimum lead in time of 30 years based on historical market penetration S-curves

UK needs to focus now on appropriate use of renewables and energy efficiency in buildings

Current UK Situation:

- Low penetration of building integrated renewables (BIR) technology (e.g. installed PV base in UK is low at 4.2 MWe)
- Considerable number of market failures in BIR exist:
  - Landlord/tenant dilemma
  - Insurance risk
  - Information gap on grid connection
  - Public acceptance

Desirable UK Situation:

- Appropriate uptake of a mix of renewables and energy efficiency measures installed in new build and refurbished buildings according to the market and local resource conditions
- Established and qualified supply chain to install BIR and energy efficiency technologies
- Market pull created by public demand for, and acceptance of, low energy buildings
- To be effective, this must operate within a relevant BIR policy and market framework (with long-term time frame)

Annex E: DTI Consultation Criteria

1. Consult widely throughout the process, allowing a minimum of 12 weeks for written consultation at least once during the development of the policy.
2. Be clear about what your proposals are, who may be affected, what questions are being asked and the timescale for responses.
3. Ensure that your consultation is clear concise and widely accessible.
4. Give feedback regarding the responses received and how the consultation process influenced the policy.
5. Monitor your department's effectiveness at consultation, including through the use of a designated consultation co-ordinator.
6. Ensure your consultation follows better regulation best practice, including carrying out a Regulatory Impact Assessment if appropriate.

The complete code is available on the Cabinet Office's web site, address http://www.cabinet-office.gov.uk/servicefirst/index/consultation

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^2) – 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^2 fixed by plants millions of years ago and thus increases its concentration in the atmosphere.

Carbon Trust – an independent, not-for-profit company set up by government with support from business to encourage and promote the development of low carbon technologies. Key to this aim is its support for UK businesses in reducing carbon emissions though funding, supporting technological innovation and by encouraging more efficient working practices.

Combined cycle gas turbines – combined cycle gas turbines use both gas and steam turbine cycles in a single plant to produce electricity with high conversion efficiencies and relatively low emissions.

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.

Engineering and Physical Sciences Research Council (EPSRC) – the UK Government's leading funding agency for research and training in engineering and the physical sciences.

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^{0}C in the living room 18^{0}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.

Micro-CHP – 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.

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.

Sustainable Development Commission – The Commission's main role is to advocate sustainable development across all sectors in the UK, review progress towards it and build consensus on the actions needed if further progress is to be achieved.

Units of Energy

Energy is the ability to do work. 1Watt hour (Wh) is the amount of energy used by a 1W device operating for an hour.

KWh (kilowatt-hour) 1kWh = 1,000Wh.

MWh (megawatt-hour) 1MWh = 1,000 kWh = 1,000,000 Wh.

Printed in the UK on recycled paper with a minimum HMSO score of 75.
First published June 2005. Department of Trade and Industry.

DTI/Pub 7880/1k/06/05/NP.
URN 05/1292