



Project

Promotion of efficient heat pumps for heating
(ProHeatPump)

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Report on existing policy on heat pumps



Work Package 4
Policy context and measures

Intelligent Energy  **Europe**

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This deliverable has been accomplished in October 2007 and should be updated according to new knowledge on marketing instruments for ground source heat pumps.

With agreement from the Intelligent Energy for Europe Agency the project partners decided to merge this deliverable with the deliverables 9 “Report on the analysis of marketing instruments” and 10 “Report on analysis of governmental campaigns”.

Since the new combined document is now available on the project WEB site this document will not be updated anymore. Only the new combined document will subject of regularly updates according to hew developments in the markets and their policy environment.

1 Introduction

- 1.1 This report contains a preliminary examination of documents that set out policies or support mechanisms that cover heat pumps at the European level, for the member states represented in the *ProHeatPump* consortium – namely Germany, France, Sweden, the UK and Bulgaria – and where appropriate for regions within them.
- 1.2 This examination is the first step towards the major goal of WP4 of understanding and evaluating existing policies and support mechanisms, and proposing new interventions at regional, national and European levels to increase the uptake of heat pumps. The findings will be combined with insights from interviews and other investigations in WP4, particularly to examine how effective the explicit measures on heat pumps are in promoting their uptake, how they are implemented in practice, and how they interact with policies and interventions in other energy and related areas. This report deals largely with documents that explicitly address heat pumps or include heat pumps among desirable renewable energy or energy efficiency measures. It does not attempt to cover the full range of policies and interventions in other areas that may have indirect effects on the adoption of the technology.
- 1.3 The emphasis as in the rest of the project is on ground source heat pumps wherever the distinction between modes of operation is made.

2 Europe

- 2.1 European Union policy acts by creating frameworks and targets for action that national and regional governments are obliged to meet through their own legislation. The success of this approach depends on obligations that can be enforced and actually produce change; voluntary agreements and targets may fail to deliver the policy goals.
- 2.2 European level policies are having a considerable effect on driving national policies that shape the GSHP market. The *EU Energy Efficiency Action Plan (EEAP)*, adopted in October 2006, outlines targets of 20% cost-effective energy savings potential by 2020, and outlines 10 priority actions. It aims to lead the restructuring of the internal energy market, by encouraging energy efficiency through both legislation and consumer choice. This attempts to strengthen some of the existing legal frameworks. The core directives that are relevant are the *Energy Performance of Buildings Directive (EPBD)*ⁱ and the *EC Directive on Energy End Use Efficiency and Energy Services (Energy Services Directive)*,ⁱⁱ although the Eco-Design Directive, the Energy Star Regulation, the Combined Heat and Power Directive and the Labelling Directive may have some impact on equipment design and market position for GSHP systems. The 2008 Energy Tax Directive will integrate energy efficiency more coherently into energy taxation.
- 2.3 The *EEAP* indicates that the largest cost-effective savings potential in residential and commercial building sector lies 'where the full potential is now estimated to be around 27% and 30% of energy use' (p.5). Key elements of the Plan include improving building performance, financing efficiency investments, using taxation, and raising energy efficiency awareness.
- 2.4 The *EPDB* aims to make the energy efficiency of buildings a factor in the market for buildings as they are constructed, sold or leased, by providing information about energy efficiency. The instrument for this is an *Energy Performance Certificate (EPC)*, to be introduced by January 2009 (Article 7). This will rate a building and provide advice on how to improve building energy efficiency. This is seen as a key step in enabling business and government to meet obligations for energy efficiency and carbon emissions, and is intended to provide incentives for private building owners to improve energy efficiency. This rating system is decentralised, and states are able to develop their own rating methods and their own systems of training and accrediting inspectors. This directive also obliges states to provide advice and information services on the energy performance of boilers, heating systems and air-conditioning systems, which include GSHP systems. Article 12 obliges states to produce studies and advice on the effects of alternative energy systems on local climate.
- 2.5 The Energy Services Directive came into force on 17 May 2006 and member states have until 17 May 2008 to implement it. It aims to increase energy end-use efficiency by cost-effective means. It requires member states to create national Energy Efficiency Action Plans, and establishes indicative (i.e. non-mandatory) energy saving targets of 9% by the end of 2016. It puts obligations on all providers of energy efficiency measures, distribution system operators and all users, except those in the European Union Emissions Trading Scheme (which are larger users of energy). This is the first directive that requires members states to place energy

efficiency obligations on distributors and retailers, although allowing them a choice of measures. This clearly may be an incentive to invest in GSHPs. The public sector is required to play an 'exemplary role', again providing opportunities in the GSHP market.

- 2.6 The obligations on energy distributors and suppliers are linked to the desire to develop markets in energy services, in which suppliers take responsibility for the energy use and efficiency of their customers, instead of simply providing energy and leaving efficiency actions to be shaped purely by the cost of delivered energy. This may have long term impacts on the way energy is supplied, and encourage investments by energy services companies in GSHPs.

3 Sweden

- 3.1 The aim of current Swedish energy is to produce a sustainable energy system, involving a change to renewable and environmental friendly energy sources and maximum efficiency in the use of all energy resources. The policy entails strict rules for the protection of health and the environment in the development and use of all energy techniques.ⁱⁱⁱ
- 3.2 The overall goal of Swedish environmental policy is that 'within one generation, the major environmental problems currently facing [Sweden] will have been solved.'^{iv} Among sixteen national environmental objectives, objective 15 *A Good Built Environment* includes targets for energy use in buildings:
- Total energy consumption per unit area heated in residential and commercial buildings will decrease, with target reductions of 20% by 2020 and 50% by 2050, compared with consumption in 1995. By 2020 dependence on fossil fuels for the energy used in the built environment sector will be broken, at the same time as there will be a continuous increase in the share of renewable energy.^v
- 3.3 *Energimyndigheten* (the Swedish Energy Agency), in relation to its key role in guiding and supporting energy research, indicates a goal of boosting 'the efficiency of energy consumption for heating, hot water and operational electricity by 50 per cent over 40–50 years'.^{vi}
- 3.4 A key instrument for the objectives both of reducing energy consumption in the built environment and reduced climate^{vii} is a system of energy taxes – part of the country's exemplary 'green tax shift'. The tax on electricity was raised from 0,261 SEK/kWh to 0,265 SEK/kWh on 1 January 2007. In areas with lower energy tax it was raised from 0,201 SEK/kWh to 0,204 SEK/kWh.^{viii} The tax on oil is also likely to influence heat pump uptake: it has increased from 1801 SEK/m³ in year 2000 till the level of 3362 SEK/m³ in 2007.^{ix}
- 3.5 An electricity certificate trading scheme was introduced in Sweden in 2003 to favour production from renewable sources.^x For consumers this increases electricity prices by about 0,03 SEK/kWh.
- 3.6 House owners in Sweden pay tax on real estate – for small house owners it corresponds to about 1% of the rateable value, set by the standard and location of the house.^{xi} Installation of a heat pump increases the standard of the property and hence the rateable value and the real estate tax. This tax will however be replaced in January 2008 by a municipal fee of up to 4500 SEK a year which will favour investments in energy efficient technology.
- 3.7 *Boverket* (the Swedish National Board of Housing, Building and Planning) regulates building energy standards. In July 2006 it introduced new requirements for specific use of energy (per unit area) in new houses, in place of the previous requirements in terms of an overall maximum U-value.^{xii} The new regulation favours heat pumps in that the measure of specific energy use is in terms of purchased energy and a heat pump allows the standard to be met easily. The government is however formulating a regulation to limit the use of electricity, which will decrease the benefit for heat pumps.

- 3.8 In 2006 the Swedish Parliament decided to give a subsidy to owners of small houses, multi-family houses and premises connected to houses in order to stimulate a change from both direct electrical heating and oil-fired heating to district heating or individual heating from biomass, ground source heat pumps or solar heat.^{xiii}
- 3.9 Municipalities are responsible for approving GSHP installations, though the procedure varies. *Svenska Värmepumpföreningen* (SVEP), the Swedish Heat Pump Association, runs a certification scheme for installers. All consumer complaints concerning heat pumps – no matter what brand, producer or installer – are handled by VPN.^{xiv}

4 France

- 4.1 The *Climat* program was passed by the French government in 2004 with the objective of reducing greenhouse gas emissions by a factor 4 by 2050. The program is the general framework within which tax concessions and energy certificate procedures have been launched.^{xv}
- 4.2 France has two specific regulations on thermal energy in buildings: RT2000 and RT2005. These regulations cover energy consumption of new buildings, including space heating and cooling and hot water production. RT2005 provides minimum requirements for space heating and cooling and hot water production for all new buildings with the aim of reducing primary energy consumption by 40% by 2040. Specific targets have been fixed for three regions in France from 80 to 130 kWh/m² for fossil fuel heating and from 130 to 250 kWh/m² for electric heating (these higher values take into account losses in the production and distribution of electricity: the primary to final energy ratio for electricity is taken as 2.58). Thus RT2005 can indirectly affect the uptake of heat pumps as a system having a higher efficiency than a fossil fuel boiler.^{xvi}
- 4.3 In 2006 France launched the *Certificats d'Economie d'Energie* (Energy Efficiency Certificates) mechanism.^{xvii} The basic aim is to obtain a general reduction in the primary energy use of 54 TWh in the period July 2006 to June 2007. Each of the energy suppliers (electricity, gas, domestic fuel and district heating and cooling) has a mandatory target. If a target is not reached a penalty of 2 €cents/kWh will be applied. The energy suppliers are therefore required to implement actions to promote energy conservation measures or energy efficient technologies. The Certificate describes, for individual technologies, the potential savings over its lifetime. Heat pumps are specifically addressed for individual houses or buildings. A figure for primary energy savings is determined according to the COP.
- 4.4 Tax credits are available on the purchase of certain equipment for heating using renewable sources – particularly heat pumps, solar thermal collectors and wood boilers. The terms of the credits were set out in national financial legislation passed in 2005, and the credits were raised in 2006 from 40% to 50% of costs.^{xviii} The provision covers all types of heat pump. It sets minimum performance requirements for eligibility and requires professional installation.^{xix} The credit is on the purchase costs of the pump only – not the distribution system nor labour costs. It applies to new and existing dwellings but only to a main residence, not holiday homes. The credit is additional to the lower rate of VAT (5.5% instead of 17.5%) that applies renovation work carried out by professionals on houses more than two years old.
- 4.5 The national electricity utility EDF currently makes available low-interest loans for heat pump installations^{xx} in new houses: between €2000 and €15000 at 2.85%. For buildings over 15 years old, the ANAH (*Agence Nationale pour l'Amélioration de l'Habitat* – National Agency for the Improvement of Buildings) provides grants of €900 for air to water heat pumps and €1800 for GSHP installation.
- 4.6 ADEME (*Agence de l'Environnement et de la Maîtrise de l'Energie* – Environment and Energy Management Agency) and some regions provide special financial support for exemplary heat pump installations which go well beyond current practice.^{xxi}

- 4.7 The PREBAT research programme (*Programme de Recherche et d'Expérimentation sur l'Energie dans le Bâtiment*), operated by a consortium of ministries, agencies and other organisations including ADEME and ANR (*Agence Nationale de la Recherche*), is dedicated to improving the energy efficiency of buildings in France. It provides funding for projects on new materials and components, integrating new systems into buildings and sociological studies. Projects dealing with heat pumps were specifically addressed in 2006.^{xxii}
- 4.8 The Building Energy Foundation (*Fondation Bâtiment Energie*) was established in 2005 by Arcelor, EDF, Gaz de France and Lafarge, on the initiative of ADEME and the *Centre Scientifique et Technique du Bâtiment* (CSTB), with the aim of supporting demonstration operation of buildings with low energy consumption and low CO₂ emissions.^{xxiii}

5 Germany

- 5.1 In Germany the federal government and legislature is primarily responsible for legislation and the *Bundesländer* are responsible for implementation of national law. Responsibility for energy policy at the Federal level lies with the Federal Ministry of Economics and Technology (*Bundesministerium für Wirtschaft und Technologie, BMWi*). The *BMWi* however is not the only ministry dealing with energy related issues. Market adoption of renewable energy sources, issues related to nuclear safety, and research on renewable energy sources, are overseen by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (*Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, BMU*). The *BMU* administers the Renewable Energy Sources Act (*Erneuerbare-Energien-Gesetz, EEG^{xxiv}*) and is responsible for environmental regulation affecting the energy sector.^{xxv} The Ministry for Transport, Buildings and Urban Affairs (*Bundesministerium für Verkehr, Bau und Stadtentwicklung, BMVBS*) and the *BMWi* deal with issues concerning energy savings in buildings. Biomass issues are overseen by the Federal Ministry for Food, Agriculture and Consumer Protection (*Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz*). Finally energy taxation issues are handled by the Federal Ministry of Finance (*Bundesministerium für Finanzen*) and its subordinate agencies.
- 5.2 German energy policy aims to combine security of supply and affordable energy prices with effective environment protection and climate change mitigation in an efficient manner. Despite the central principle of individual responsibility of market participants, the government believes that it remains one of its duties to create conditions in which market forces can produce economically desirable outcomes. These conditions include the provision of subsidies or grants for certain technologies that are not yet ready for the market. German energy policy is highly influenced by two general decisions: the phase-out of nuclear energy and the formulation of challenging goals for the reduction of carbon dioxide emissions.^{xxvi} These objectives have provided the primary incentives for its programme promoting renewable energy and have led, particularly through differentiated tariffs for renewables-based electricity fed into the grid,^{xxvii} to significant increases in renewable energy capacity and production.^{xxviii}
- 5.3 The German government regards effective climate protection as one of the greatest challenges in the world, and Germany's environmental goals are very ambitious. Accordingly the German government has started a wide variety of initiatives aimed at more economical and rational energy use. Its target for domestic energy use, for example, is to double efficiency between 1990 and 2020. To meet this target the annual rate of improvement must nearly double from that seen between 1990 and 2005. The CO₂ emissions cap for the energy sector and energy-intensive industries set under the EU-ETS, and the National Climate Protection Programme for all other greenhouse gas emitting sectors, are designed to ensure that Germany reaches its obligations under the Kyoto and EU burden-sharing agreements. In order to reach its environmental targets, political interest, previously focussed on power production, has now been extended to domestic heating. Measures to reduce energy use in households are widely discussed and a federal renewable energy heating law – comparable to the one for electricity – is one of the

cornerstones of the new energy and climate protection programme (*Energie- und Klimaschutzprogramm*) [5.11].

- 5.4 The first German heat insulation ordinance (*Wärmeschutzverordnung*) was introduced in 1977. The *Wärmeschutzverordnung* was intended to raise the required standards of housing insulation and thus to reduce primary energy use for heating in new-build houses. In 1994 a heating systems ordinance (*Heizungsanlagen-Verordnung*) was adopted. This focused on improving the energy efficiency of heating systems in the German housing stock. Both ordinances were replaced by the Energy Savings Ordinance (*Energieeinsparverordnung, EnEV*)^{xxxix} in February 2002, based on the German energy savings law *EnEG*^{xxx} – *Gesetz zur Einsparung von Energie in Gebäuden (Energieeinsparungsgesetz)*. *EnEV* focuses on the reduction of primary energy use in the German housing stock by combining regulations for the insulation of houses with those focussing on efficient systems engineering. This combination makes it possible for house owners to rely on a combination of existing house insulation with efficient heating systems to reach the required standards set by the *EnEV*. This will become more important in that from July 2008 house owners must offer buyers or tenants an energy card (*Energieausweis*) with information on the energy balance and energy efficiency of the building. Buyers and tenants will therefore be able to consider energy costs when choosing a flat or house. These measures have had a great impact on the energy needed for heating in the German housing stock. Houses built up to 1977 typically need around 290 kWh/m²/year. The maximum allowance for primary energy use in new-build houses has been reduced in several steps by successive ordinances from 1977 to 70 kWh/m²/year in 2002.^{xxxi} These figures indicate that to significantly reduce the energy needed for heating, cooling and hot water production in German houses, the focus must now be placed on retrofitting the older housing stock.
- 5.5 Another federal law affecting the German heating market and hence also the installation of GSHPs is the law on combined heat and power from 2002 (*Gesetz für die Erhaltung, die Modernisierung und den Ausbau der Kraft-Wärme-Kopplung*).^{xxxii} This law aims to reduce CO₂ emissions by enabling the use of CHP plants in Germany. The German government recently decided further to promote CHP with €750m per year to increase the percentage of electricity produced with this technique; the new target is 25% by 2020.^{xxxiii} The combination of CHP and district heating is encouraged by communal obligations to use DH where available. About 12% of German households are heated from DH.
- 5.6 In the past people wishing to install ground-source heat pumps often had problems obtaining approval for drilling from local authorities. There are still areas where the installation of GSHPs is prevented by authorities arguably without adequate reason – for example in Berlin.^{xxxiv} Furthermore people installing GSHPs have to deal with different local authority departments depending on the length of the drilling hole.^{xxxv}
- 5.7 The federal bank *Kreditanstalt für Wiederaufbau KfW* offers private households in Germany loans with special low interest rates (2,5-4,6%). The aim of the *CO₂-Gebäudesanierungsprogramm* (CO₂-building refurbishment programme) is to promote renovations such as the insulation of buildings, refurbishment of heating systems and renewable energy installations. The interest rate varies according to

the efficiency of the renovation in terms of the reduction in CO₂ emissions – the higher the reduction the lower the interest rate. If the renovation leads to a reduction of CO₂ emissions comparable to the level set by the *EnEV* for new build houses, the amount to be repaid may be reduced by up to 12,5%. The maximum loan is €50,000. House builders who do not wish to take up a loan may be granted a subsidy – depending on the energy performance level reached – of up to €8750. The success of the programme has prompted the government to raise the total value of the programme to €5,6b for the period 2007-2009. The CO₂-*Gebäudesanierungsprogramm* was not specifically introduced to promote ground-source heat pumps.^{xxxvi}

- 5.8 While there is no Federal programme specifically to support heat pumps, some of the Bundesländer have had such schemes. In Baden-Württemberg, for example, installers of GSHPs were granted subsidies dependent on the installed heating capacity up to 2005. Around 60% of heat pumps in Germany have been installed in Bavaria, Baden-Württemberg and Nordrhein-Westfalen: all have had or still have special heat pump programmes providing subsidies for installation, and support from the ministers in charge has been important for the penetration of heat pumps.
- 5.9 More common in Germany are subsidies from energy suppliers. Currently over 100 energy suppliers offer subsidies and grants when a heat pump is installed. Subsidies for ground source heat pumps are on average between €500 and €1000 – and sometimes up to €2000 – depending on the heat output.
- 5.10 Energy taxation in Germany differs according to the primary energy used. Today about 40% of the electricity price in Germany is made up of taxes and levies: electricity tax, value added tax, EEG and KWK levies and concession levies. A *Mineralölsteuer* and VAT apply to heating oil, while gas is taxed with the *Erdgassteuer* and VAT. Wood pellets however are just taxed with VAT at a reduced rate of 7%, while electricity, gas and oil are taxed with the standard rate of 19%. There is no tax reduction for renewable-source electricity when used to run heat pumps.
- 5.11 On 24 August 2007 the German government passed a new energy and climate protection programme (*Energie- und Klimaschutzprogramm*). The objective of this programme is to reduce CO₂ emissions by 36% by 2020. The renewable energy heating law (*Erneuerbare-Energien Wärmegesetz, EEWärmeG*) included in this programme makes it mandatory that 15% of the energy used for heating in newly built houses comes from renewable energy sources by 2020. The use of heat pumps is explicitly mentioned as a contribution to reaching that goal. The programme also requires the heating of newly built houses to be independent of fossil fuels by 2020 through further improvements in energy efficiency and use of renewable energy. The government has also decided to continue with its building refurbishment programme (*CO₂ Gebäudesanierungsprogramm*) which provides state aid to reduce CO₂ emissions from existing buildings. There are plans to reduce operating costs in apartment buildings, government-owned buildings, schools, etc. by promoting energy-saving measures.

- 5.12 In the new programme the German government has also amended the *EEG*. The objective of this amendment is to increase the percentage of electricity produced with renewable energies from now 13% to 25-30% by 2020.^{xxxvii}
- 5.13 Among the *Länder*, the government of Baden-Württemberg recently (July 2007) presented a draft of a Renewable Heating Law.^{xxxviii} The law aims at a reduction of primary energy use for heating purposes and to enforce the sustainability of energy supply. From 1 April 2008 house constructors will be obliged to obtain at least 20% of the energy needed for heating from renewable energy sources. Furthermore it is planned that existing houses must obtain at least 10% of heating energy from renewable energy sources when the heating system or boiler is replaced after 1 January 2010. These initiatives by the government in Baden-Württemberg demonstrate that heating and cooling from renewable energy sources have increasingly come into public focus. This provides a promising context for a growing penetration of ground-source heat pumps in Germany.

6 Bulgaria

- 6.1 Bulgarian government policy on the introduction of heat pumps is reflected in its the National Energy Strategy – the third version is currently being prepared; in the relevant key legislation on energy – the *Energy Act 2003* and the *Energy Efficiency Act 2004*; in the subdelegated legislation adopted with respect to them; and in acts and subdelegated legislation on the protection of the environment.
- 6.2 Energy policy in Bulgaria is the responsibility of the Ministry of the Economy and Energy, which includes an Agency for Energy Efficiency.^{xxxix} In all 28 of the country's districts, Energy Efficiency Councils have been formed as part of each district governor's administration. There are also Energy Efficiency Units in the bigger municipalities. District and regional programmes – short-term (up to 2007) and long-term (up to 2014) – for Energy Efficiency and Mastering of Renewable Energy Sources have been drawn up on the initiative of the municipal governments. Among non-government organisations the Municipal Network for Energy Efficiency *Ecoenergy*, the Union of Bulgarian Black Sea Local Authorities and other energy agencies work actively in this sphere.
- 6.3 A variety of provisions for heat pumps are contained in the key laws and associated documents. In the *Energy Act*, geothermal energy is listed as a renewable energy source, and ground- and water-source heat pumps are treated as facilities for highly efficient heating because they save well over 10% of the conventional fuel necessary to provide the same amount of heat.^{xl} In the *Energy Efficiency Act*, ground- and water-source heat pumps are treated as a measure increasing energy efficiency because they lead to a reduction in the cost of a first energy carrier or energy while preserving a degree of comfort in households.^{xli}
- 6.4 A draft *Act for Encouraging the Use of Renewable Energy Sources, Alternative Energy Sources and Biofuels* contains further provisions for encouraging the use of renewable sources. It stipulates responsibilities for the Council of Ministers, the Minister of the Economy and Energy, District Governors and local authorities – particularly responding to national indicative objectives and developing short-term and long-term programmes for stimulating the use of renewables.
- 6.5 The Bulgarian government supports the reduction of energy consumption in households and the adoption of renewable energy technologies. There are schemes for the mandatory inspection, certification and documentation of building energy performance – of existing and new buildings.
- 6.6 Under the Residential Energy Efficiency Credit Line (REECL) facility operated in cooperation with Bulgarian banks, grants are available to householders in conjunction with loans from the banks, for small renewable and energy-saving projects. The scheme explicitly includes heat pumps.^{xlii} It is unlikely that more than 10% of the population would be in a financial position to make use of these grants.
- 6.7 For municipalities, small and medium size enterprises and private individuals, financial support is available through the Bulgarian Energy Efficiency Fund (BgEEF) established under the *Energy Efficiency Act 2004*,^{xliii} and again heat pumps are explicitly included in the list of measures. The support takes several forms: loans from BgEEF or in co-financing arrangements with a bank, dependent on a minimum investment by the developer; partial credit guarantees; and portfolio

guarantees – for energy services companies for a suite of projects; and for householders in a multiple-occupancy building or site, in conjunction with a bank.^{xliv}

7 United Kingdom

- 7.1 The UK has a wide variety of policies with influence on the GSHP market, working through a range of mechanisms, and with mixed aims. These policies are being continuously reviewed. Much of policy is supposedly 'technology-neutral', intended to allow the market to promote the most cost-effective means of saving energy or reducing carbon emissions. In effect, technologies such as CHP, biomass, photovoltaics and wind power have received most attention and investment.
- 7.2 The principal policies relevant to GSHPs are energy, environment, house/building and social policies, and to a lesser extent industry policies. The UK has a largely centralised government covering England, Wales, Scotland and Northern Ireland, but each nation now has a devolved administration with responsibility for many areas of policy, particularly related to environment and housing.^{xlv} Energy policy however is handled by the Department for Business, Enterprise and Regulatory Reform (BERR) (previously the Department of Trade and Industry) at a UK level.^{xlvi} Central UK government thus retains responsibility for energy regulation, energy services, appliance labelling, mandatory obligations and energy services. The liberalised energy markets are regulated by an independent body, Ofgem. Devolved policies such as those related to environment are the responsibility of the Department for Environment, Food and Rural Affairs (defra) in England, and the Scottish Executive in Scotland.^{xlvii} Matters relating to housing and building are overseen by the Department for Communities and Local Government (DCLG)^{xlviii} in England, and the Scottish Executive in Scotland. For some policies, such as the Enhanced Capital Allowance (ECA), the tax department, HM Revenue & Customs is responsible. Much planning control is administered by local authorities. They are also obliged to make energy conservation strategies, and often have policies on renewable energy.
- 7.3 Two independent companies, the Energy Savings Trust (EST) and the Carbon Trust, are responsible for administering many of the policies directly related to investment in carbon emissions reduction. They are funded in England by defra and BERR, and by the regional administrations - the Scottish Executive, the Welsh Assembly Government and Invest Northern Ireland. They also receive private funding. The Carbon Trust is principally focused on innovation in low/lower carbon technologies and on promoting the commercialisation of these technologies through grants, business incubator schemes, and providing information and infrastructures for business. Although building heating technologies are a key focus of the Carbon Trust,^{xlix} we are not aware if it has yet directly supported innovation in the GSHP market. The Energy Saving Trust is more focused on the demand side, attempting to cut carbon dioxide emissions via the promotion of sustainable and efficient use of energy. It administers one of the grant schemes that covers GSHPs, runs networks of Energy Efficiency Advice Centres (EEACs), provides online information to consumers on GSHPs, other policy advice, and acts as the UK representative on the European Energy Network (EnR). Its principal focus for the next five years is building

insulation, as the most cost-effective way of reducing carbon emissions. In the longer term it will also be concerned to develop the market infrastructure for large scale installation of microgeneration, including GSHPs.

- 7.4 There are a range of private and charitable organisations that also develop regional and local policy advice and operate schemes and projects.¹
- 7.5 Energy policies in the UK are principally concerned with energy security, access to energy, and energy supply regulation. More recently policies have been developed in relation to renewable energy, particularly latterly with the explicit goal of reducing carbon emissions. The 2007 White Paper thus poses two long term challenges: ‘tackling climate change by reducing carbon dioxide emissions both within the UK and abroad; and ensuring secure, clean and affordable energy as we become increasingly dependent imported fuel.’ It suggests the following policy goals:
- to put ourselves on a path to cutting CO₂ emissions by some 60% by about 2050, with real progress by 2020; to maintain the reliability of energy supplies; to promote competitive markets in the UK and beyond; to ensure that every home is adequately and affordably heated.^{li}
- 7.6 Energy poverty is a powerful concept in the UK energy policy domain, and successive governments have favoured cheap delivered energy over any attempt to shape demand by increasing prices. This stems from a number of factors: poor housing stock, with low insulation and expensive heating systems; low social security payments, particularly state pensions, leaving many older people unable to pay for energy; and an *ad hoc* process of winter fuel payments for older people. These have created a politically sensitive issue that shapes much policy on energy supply and on investment in new domestic energy technologies, including GSHPs. For example, energy supply firms are obliged to invest in demand-side reduction via the Energy Efficiency Commitment, but 50% must be spent on the poorest households, rather than those that will save the greatest amount of energy or carbon emissions.
- 7.7 The UK Energy Efficiency Action Plan sets out policies and measures for promoting energy efficiency,^{lii} to meet its commitment of a 9% reduction in energy use by 2016 under the EU Energy Services Directive. These focus primarily on changing demand in all sectors. Households are targeted though building regulations and the Code for Sustainable Homes, fuel poverty programmes, Energy Performance Certificates, and smart metering. In other sectors, the EU Emissions Trading Scheme, the Climate Change Levy and Climate Change Agreements are the main instruments, along with enhanced capital allowances on investment and Energy Performance Certificates. The public sector is also an important market for GSHPs, and policies to increase energy efficiency in hospitals, local government and in particular of schools^{liii} are likely to be important stimuli for the GSHP market in the next few years.

- 7.8 The Energy Efficiency Commitment and Carbon Emissions Reduction Target could form one of the most important initiatives for the development of GSHP market in the longer term. The EEC is a demand management scheme administered by Ofgem, aimed at gas and electricity suppliers, obliging them to promote improvements in domestic energy efficiency, as part of the Climate Change Programme. However at least 50% of energy savings must be focused on low-income consumers. Suppliers are allowed to choose from a range of eligible measures, such as insulation, that have been allocated pre-established values for carbon saving. Almost all investment has been in insulation, which still remains the most cost-effective way to reduce carbon emissions. The government claims 10 million households have benefited from the EEC. The next round of EEC, called the Carbon Emissions Reduction Target (CERT) or EEC3, aims to stimulate microgeneration, energy efficiency and consumer behaviour change. In the subsequent round of EEC, from 2011, this is expected to be extended to oblige suppliers to invest in more expensive measures such as zero-carbon technologies.^{liv} This means that the experimental and tentative work by some energy providers on GSHPs and other microrenewables is likely to increase slowly over the next 5 years.
- 7.9 The UK currently has four main policies related to renewable energy:^{lv} a Renewables Obligation on suppliers to supply from eligible sources; a Climate Change Levy (CCL) introduced in April 2004 aimed at encouraging non-domestic users to reduce electricity consumption, by taxing non-renewable sources; finance for capital grant programme and R&D in new and renewable energy; and a regional energy policy. Key aspects of these policies are the definition of 'eligible' renewable sources or of low carbon technologies, whether GSHPs are included, and thus whether GSHPs can be included in grant schemes, tax rebates, and other accounting methods. At present there is no clear national standard that rates carbon emissions of GSHP installations based on recent empirical evidence, but research towards its development is being undertaken by BRE.
- 7.10 As the EEC experience shows, micro-generation has not been an important part of UK policy in recent years. However a UK micro-generation strategy published in March 2006 speculates that 30-40% of UK electricity demand could be met by microgeneration, with emphasis on CHP. The other technologies most heavily promoted are wind and solar.^{lvi} However arrangements for exporting electricity to the grid have been a problem for several decades. Under the Climate Change and Sustainable Energy Act of August 2007 suppliers can now be obliged to offer tariffs for exported electricity. This measure may have a detrimental impact on heat technologies such as GSHPs by making alternatives more attractive, and highlights the policy commitment to electricity generating technologies above heat-only. However, Scotland, with large state investments in biomass, is also developing a Renewable Heat Strategy, which should favour heat pump installations too.

- 7.11 One of the most important UK policies on the environment is set out in the UK Climate Change Programme. This sets targets of a 20% reduction in carbon dioxide emissions by 2010, and 60% by 2050. There are a range of sub-policies and initiatives, some on the production of energy as explained, and some around consumption, particular related to buildings. A major part of the policy is directed to building standards for both domestic and commercial buildings, and to the technologies used to generate heat in buildings. For example, the most recent target is a commitment for all new building in England to be 'zero-carbon' by 2016.^{lvii}
- 7.12 One of the key areas of government intervention that will affect the GSHP market is developments in the building standards regulations, aimed at improving the energy efficiency of buildings and reducing carbon emissions.^{lviii} The recently increased energy performance standards in Part L of the Building Regulations^{lix} are expected to be one of the most significant contributors to UK energy savings and carbon emissions reductions. The recently announced target of zero-carbon homes may provide significant impetus for builders to install GSHPs, as an established and stable technology to meet these regulatory obligations, as long as there is an infrastructure to service the demand.^{lx}
- 7.13 Since many homes are still built by local authorities, an important piece of legislation is the *Home Energy Conservation Act 1995* (HECA) which requires all UK Energy Conservation Authorities (that is, local authorities with housing responsibilities) to prepare an energy conservation report. This type of policy stimulates knowledge transfer between local authorities.
- 7.14 Some cities and regions in the UK have also developed their own energy and carbon strategies, and one that may be influential is that developed by the Greater London Authority to provide zero-carbon low-cost housing.^{lxi}
- 7.15 The Energy Performance Certificates are driven by the EU EPBD. Regional administrations have set up schemes that require buildings to have energy and carbon dioxide impact ratings conducted and to be certified. For example, from 1 August 2007, English homes over 3 bedrooms need an Energy Performance Certificate when offered for sale. In Scotland all buildings subject to the building warrant application process must submit an Energy Performance Certificate (EPC) as part of the completion certificate. This is an attempt to simulate owner investment in improving energy efficiency and carbon emission reduction. One major issue is the need to train a large number of accredited Energy Assessors to carry out the inspections.^{lxii}
- 7.16 One major problem in the GSHP market, and indeed with all policy on energy efficiency and renewable energy technology, is the lack of trained and experienced installers, and of professionals in construction and architecture with knowledge of the issues and technologies. There appears to be almost no policy in the UK related to the training of installers and the education of 'front-line' heating technicians in the UK responsible for installing and indeed selling GSHP systems. There are now programmes aimed at

- architects, such as the SUST initiative in Scotland,^{lxiii} that have started to accredit architects with knowledge of sustainable building techniques.
- 7.17 There is a range of policies and programmes aimed at fuel poverty – where a household has to spend more than 10% of its income on energy. These include the *Warm Front and Decent Homes* programmes in England and Scotland’s *Warm Deal and Central Heating* programme. These generally focus on insulation. EEC / CERT also contributes to fuel poverty reduction, and there are many programmes by local authorities and housing associations related to heating in their own public housing stock. These corporate programmes are likely to be important for increasing the installation of GSHPs in smaller developments, and for stimulating the supply capability of the market.
- 7.18 Certain policies need to be adapted to accommodate or encourage GSHPs. One important area is planning control, where local authorities have to give permission for installation, with regard to issues such as heritage protection. GSHPs may present issues in relation to contamination and boreholes may thus need authorisation from the Environmental Protection Agency^{lxiv}; planning permission may be required for exploratory drilling; and archaeological issues may arise. At present planning regulators (under devolved powers) have to decide what size and types of installation can be installed without the need for planning permission. This can have an impact on the size of system installed.^{lxv}
- 7.19 The principal source of grants for GSHPs in England in the last four years has been the DTI *Clear Skies* programme, which applies to the whole of the United Kingdom. This ran in parallel with a major investment in solar photovoltaics. This scheme was replaced in 2006 by the £80m *Low Carbon Building Programme*, part of BERR’s Microgeneration Strategy, covering the whole of the UK.^{lxvi} This offers grants towards the costs of low or zero carbon technologies (LCZ), and is run by the Energy Saving Trust and a private firm, BRE. Phase 1 of the programme runs from 2006-2008, and supports householders in Stream 1 and SMEs in Stream 2. Householders can get different levels of grant depending on the technology, with GSHPs attracting £1200 or contributing to the costs of low or zero carbon technologies (LCZ). Stream 2A offers grants to SMEs of £100k or 40-50% of total costs; Stream 2B offers £1m or 40-50% of total costs. Phase 2, run by BRE only, with £80m up to 2009, will support public sector buildings, including schools, hospitals, housing associations and local authorities, and charitable bodies. . This programme does not cover Air Source Heat Pump systems.
- 7.20 Scotland and Northern Ireland also run independent programmes. In Scotland the Scottish Executive has invested £18m up to March 2008 in the *Scottish Communities and Householder Renewables Initiative* (SCHRI), which offers grants to householders and communities for small scale renewable technologies. This includes grants up to about £2500, and so far over 600 have been granted for GSHP installations.

- 7.21 Products that attract grants must be approved by the programmes, under agreement with ‘framework suppliers’. Installers must be certified for the customers to receive these grants. The certification system is intended to maintain consumer standards and give consumer confidence in the industry and technology.^{lxvii}
- 7.22 There are two main tax initiatives relevant to the installation of GSHPs. First, a reduced level 5% VAT on grant-funded heating appliances is now applied to ground-source heat pumps, air-source heat pumps and micro-CHP. Second, from 1 October 2007, homes meeting the zero-carbon standard and costing up to £500,000 will pay no stamp duty, and zero-carbon homes costing over £500,000 will have stamp duty reduced by £15,000.
- 7.23 Under the Enhanced Capital Allowance (ECA) scheme, the UK government offers one year 100% tax relief on energy-saving equipment for businesses (compared with a 30% standard allowance). A list of eligible products is continuously updated; it currently includes 58 GSHP products from a small number of suppliers.
- 7.24 The Scottish Executive has recently issued the draft report of an Independent Review of Energy Efficiency and Microgeneration Advice and Support in Scotland, assessing the impact and effectiveness of the policies in the domestic, business and public sectors.^{lxviii}

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- i Directive 2002/91/EC, 16 Dec 2002.
<http://www.ofgem.gov.uk/Europe/Backgrd/Legal/Documents1/Energy%20Efficiency%20Directive.pdf>
- ii Directive 2006/32/EC, 5 Apr 2006.
http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_114/l_11420060427en00640085.pdf
- iii *Samverkan för en trygg, effektiv och miljövänlig energiförsörjning* (Joint action for a secure, effective and environmentally-friendly energy supply), prop. 2001/02:143, bet. 2001/02:NU17, rskr. 2001/02:137.
- iv Sveriges miljömål, *Environmental Objectives Portal: Why Environmental Objectives?*
<http://www.miljomal.nu/english/background.php>
- v Sveriges miljömål, *Environmental Objectives Portal: a Good Built Environment, 2007.*
<http://www.miljomal.nu/english/obj15.php>
- vi Swedish Energy Agency, <http://www.energimyndigheten.se/english>
- vii Sveriges miljömål, *Environmental Objectives Portal: Reduced Climate Impact, 2007.*
<http://www.miljomal.nu/english/obj1.php>
- viii The lower energy tax is for municipalities in the counties of Norrbotten, Jämtland and Västerbotten and also the municipalities Sollefteå, Ånge, Örnsköldsvik, Ljusdahl Torsby, Malung, Mora, Orsa and Älvdalen. VAT is added on the energy tax.
- ix Equivalent to 0,337 SEK/kWh.
- x Operated by the Swedish Energy Agency and Svenska Kraftnät. Proposition 2005/06:154 *Förnybar el med gröna certifikat* (Renewable electricity with green certificates).
- xi *Fastighetsskatt* (Real estate tax), SKV 296 edition 16.
- xii Boverket, *The National Board of Housing, Building and Planning.* <http://www.boverket.se>.

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- houses shall be constructed in a way so that the specific use of energy at a maximum is 110 kWh per m² floor area and year in the southern climate zone and 130 kWh per m² floor area and year in the northern climate zone.
 - in single and two family houses with electricity as primary heating source the specific use of energy shall not exceed 75 kWh per m² floor area and year in the southern climate zone and 95 kWh per m² floor area and year in the northern climate zone.
 - premises shall be constructed in a way so that the specific use of energy at a maximum is 100 kWh per m² floor area and year in the southern climate zone and 120 kWh per m² floor area and year in the northern climate zone.
- xiii Regulation 2005:1255: *Konverteringsstöd från direktverkande elvärme i bostadshus* (Conversion from direct electrical heating in dwelling houses); Regulation 2005:1256: *Konverteringsstöd från oljeuppvärmningssystem i småhus* (Conversion from oil-based heating in dwelling houses). To qualify conversion must have started and be finished in the period 1 January 2006 to 31 December 2010. The maximum subsidy for conversion is 30%, but not more than 30 000 SEK per dwelling for electrical heating or 14 000 SEK for oil-based heating. If solar heat is installed at the same time another subsidy of up to 7500 SEK can be obtained. 450 million SEK is allocated to the subsidy scheme for the five-year period. *Miljöpartiet de Gröna* (the Green Party) and *Moderata samlingspartiet* (the Moderate Party) want to remove these two conversion subsidies, but for different reasons. The Moderate Party believes that subsidies make the market unstable. The Green Party thinks that the pressures to decrease oil consumption are strong enough anyway and that heat pumps contribute to load peaks on cold days during winter.
- xiv SVEP provides the secretariat for VPN but has no voting rights. It currently costs 1500 SEK to have a case examined by VPN. VPN handled about 50 cases during 2006 and about two thirds were resolved in favour of the consumer.
- xv Ministère de l'Economie, des Finances et de l'Industrie: Direction Générale de l'Energie et des Matières Premières, *Principaux Textes Législatifs et Réglementaires sur l'Energie Depuis le 1er Janvier 1990*. http://www.industrie.gouv.fr/energie/reglement/f1e_regl.htm
- xvi Agence de l'Environnement et de la Maîtrise de l'Energie / Ministère de l'Ecologie, du Développement et de l'Aménagement Durables, *Réglementation Thermiques 2000*. <http://www.rt2000.net/>
- xvii Ministère de l'Economie, des Finances et de l'Industrie: Direction Générale de l'Energie et des Matières Premières, *La Mise en Oeuvre des Certificats d'Économies d'Énergie: un Nouvel Outil pour Inciter les Français à Economiser l'Énergie*, Jun 2007. http://www.industrie.gouv.fr/cgi-bin/industrie/frame23e.pl?bandeau=/energie/developp/econo/be_eco.htm&gauche=/energie/developp/econo/me_eco.htm&droite=/energie/developp/econo/cee-sommaire.htm
- xviii Ministère de l'Economie, des Finances et de l'Industrie: Direction Générale de l'Energie et des Matières Premières, *Le Crédit d'Impôt Dédié au Développement Durable (Economies d'Énergie, Énergies Renouvelables)*, May 2006. http://www.industrie.gouv.fr/cgi-bin/industrie/frame23e.pl?bandeau=/energie/developp/econo/be_eco.htm&gauche=/energie/developp/econo/me_eco.htm&droite=/energie/developp/econo/textes/credit-impot-2005.htm
- xix The credits are on equipment costs of up to €8000 for a single person and €16000 for a married couple. The performance requirements are set out in 14511-2. In summary:
- geothermal or water to water heat pumps with a COP greater than 3 for an evaporation temperature of -5°C under specified operating conditions;
 - air to water heat pumps with a COP over 3 for an evaporation temperature of 7°C under specified operating conditions;
 - air to air heat pumps with a COP over 3 with an air temperature of 7°C and with the main following conditions:
 - centralised systems

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- certified performances at -15°C
 - minimum heat capacity of 5kW at 7°C
- xx With the Vivrelec label. EDF, *Le Prêt Vivrelec Habitat Neuf*, 2006.
<http://particuliers.edf.fr/141396i/EDF-Particuliers/je-fais-construire/je-realise-mon-projet/le-Pret-Vivrelec-Habitat-Neuf.html>
- xxi ADEME is a state industrial and commercial body, acting under the joint responsibility of the French Ministries of the Environment, Industry and Research.
- xxii PREBAT: *Programme de Recherche et d'Expérimentation sur l'Energie dans le Bâtiment*.
<http://www.prebat.net/>
- xxiii *Fondation Bâtiment Energie*, 2006. <http://www.batiment-energie.org>
- xxiv *Gesetz für den Vorrang Erneuerbarer Energien (Erneuerbare-Energien-Gesetz)*, 21 Jul 2004 (BGBl IS 1918), last amended 7 Nov 2006 (BGBl IS 2550).
- xxv The current ministers in the *BMWi* and the *BMU*, Glos (CSU) and Gabriel (SPD), often have different views on how to reach given targets. This raises the risk of compromises in energy policy producing less than optimal outcomes.
- xxvi The decision to phase out nuclear energy was made in 1999. By 2022 all nuclear power stations should have been taken out of service. Nuclear power currently provides 26% of net production of electricity in Germany.
- xxvii Under provisions in the *Erneuerbare-Energien-Gesetz (EEG)*. See note xxiv.
- xxviii Estimates at Aug 2007 show that Germany has already reached 14% electricity generated from renewable energy sources, exceeding its goal of producing 12,5% by 2010. *BMU*, Aug 2007.
- xxix *Verordnung über energiesparenden Wärmeschutz und energiesparende Anlagentechnik bei Gebäuden (Energieeinsparverordnung, EnEV)*, 16 Nov 2001, last amended 2 Dec 2004 (BGBl IS 3146). The latest amendment of the *EnEV* in July 2007 was necessary to meet the requirements of the EU Directive on the energy performance of buildings.
- xxx *Gesetz zur Einsparung von Energie in Gebäuden (Energieeinsparungsgesetz)*, 22 Jul 1976, last amended 1 Sep 2005 (BGBl IS 2684).
- xxxi In comparison, passive solar houses in Germany now need 15 kWh/m²/year or less – but this is not the general standard for new-build houses.
- xxxii *Gesetz für die Erhaltung, die Modernisierung und den Ausbau der Kraft-Wärme-Kopplung*, 19 Mar 2002, last amended 31 Oct 2006.
- xxxiii *BMU, Eckpunkte für ein integriertes Energie- und Klimaprogramm*, 24 Aug 2007.
- xxxiv Drilling is prohibited in certain areas for environmental reasons (possible interaction with ground water, nature reserves, etc.) and in others where there has been intensive mining activity.
- xxxv For holes up to 100m depth the *Untere Wasserbehörde* (lower water department) is responsible for approval, and for holes deeper than 100m the *Bergamt* (mountain department).
- xxxvi Within the Federal *Marktanzreizprogramm* to increase the penetration of renewable heating systems, solar panels, wood pellets and automatically and semi-automatically filled wood heating systems are offered subsidies. The amount offered depends on the installed capacity but is at least €1500 per unit for wood pellets and other wood-using systems. Heat pumps are not included in the programme.
- xxxvii *BMU, Eckpunkte für ein integriertes Energie- und Klimaprogramm*, 24 Aug 2007.
- xxxviii *Gesetz zur Nutzung Erneuerbarer Wärmeenergie in Baden-Württemberg (Erneuerbare-Wärme Gesetz – EwärmeG)*, draft, 29 Jul 2007.

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- xxxix Republic of Bulgaria, Ministry of Economy and Energy. <http://www.mee.government.bg/eng/index.html>; Energy Efficiency Agency, http://www.seea.government.bg/index_en.php; Energy Efficiency Agency, *National Energy Efficiency Program*, July 1998; Ministry of Energy and Energy Resources, *Energy Strategy of Bulgaria*, 2002.
- xl Additional Provisions, §.1, p.6.
- xli Additional Provisions, §.1, p.3.
- xlII Residential Energy Efficiency Credit Line, 2005. <http://www.reecl.org/indexen.php>. The maximum total grant for all measures is €850, of which up to €400 is available for a heat pump. Equipment is subject to eligibility criteria, and eligible suppliers and installers are listed.
- xlIII Bulgarian Energy Efficiency Fund, 2006. <http://www.bgeef.com/display.aspx>
- xlIV For project costs of between ~€15,000 and 150,000. A range of other eligibility criteria are specified, concerning technologies, projected energy savings, payback time and equity contributions. <http://www.bgeef.com/display.aspx?page=procedure>
- xlV This section draws on policy at both levels but offers more examples from the Scottish context.
- xlVI Department for Business, Enterprise and Regulatory Reform. <http://www.berr.gov.uk/>
- xlVII Department for Environment, Food and Rural Affairs. <http://www.defra.gov.uk/>; Scottish Executive, *Environment*. <http://www.scotland.gov.uk/Topics/Environment>
- xlVIII Communities and Local Government. <http://www.communities.gov.uk/>
- xlIX Carbon Trust, *Low Carbon Technology Assessment (LCTA)*, 2005. <http://www.carbontrust.co.uk/technology/technicalolutions/lcta.htm>
- 1 These include National Energy Action <http://www.nea.org.uk> which promotes energy efficiency services to tackle the heating and insulation problems of low-income households; and the Centre for Sustainable Energy <http://www.cse.org.uk> which develops policy on environmentally sound and affordable energy services for various levels of government, business and NGOs.
- II DTI, *Meeting the Energy Challenge: a White Paper on Energy*, May 2007. <http://www.dti.gov.uk/energy/whitepaper/page39534.html>
- III defra, *UK Energy Efficiency Action Plan*, Jun 2007. <http://www.defra.gov.uk/environment/climatechange/uk/energy/pdf/action-plan-2007.pdf>
- IIII *Building Schools for the Future* programme. <http://www.bsf.gov.uk>
- IIIV The EU Energy Services Directive also requires these measures to be extended to other fuels besides gas and electricity.
- IV The EU Renewables Directive set a target for the UK from eligible renewables equivalent to 10% of all electricity consumption.
- IVI These technologies currently attract only 5% VAT.
- IVII *Code for Sustainable Homes*, Apr 2007. <http://www.communities.gov.uk/planningandbuilding/buildingregulations/legislation/englandandwales/codesustainable/>
- IVIII Much of the older (pre-1971) housing stock in the UK has poor insulation. Building standards have improved slowly since this time, but it is recognised that many buildings do not reach even existing standards, and that there are problems in enforcement.
- lix England, 2005/6; Scotland 2007.

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- ix However GSHP continues to be controversial among the supporters of zero-carbon, often being classed as ‘electric heating’. GSHPs in combined technology systems, and using ‘green’ electricity supplies, may provide a resolution to such objections.
- lxi London Energy Partnership, *Recent, Current and Future Work*, undated.
<http://www.london.gov.uk/mayor/environment/energy/partnership-steering-group/action.jsp>
This initiative is related to the Covenant of Mayors of major European cities to improve energy efficiency, under the EU Energy Action Plan 2006.
- lxii Training, and the development of standards, are undertaken by a small number of private companies, such as NHER (National Home Energy Rating Scheme. <http://www.nher.co.uk>), under the guidance of Asset Skills, a public body responsible for the National Occupational Standards.
- lxiii *SUST: the Lighthouse on Sustainability*. <http://www.sust.org/>
- lxiv Scottish Environmental Protection Agency in Scotland.
- lxv See e.g. Scottish Executive Development Department 2007, PAN 45 Annex: Planning for Micro-Renewables.
- lxvi Department for Business, Enterprise and Regulatory Reform, *Microgeneration*.
<http://www.dti.gov.uk/energy/sources/sustainable/microgeneration/index.html>; *Low Carbon Buildings Programme*. <http://www.lowcarbonbuildings.org.uk/home/>
- lxvii BRE Certification was awarded the contract for the UK Microgeneration Certification Scheme in Sep 2006.
- lxviii Scottish Executive, *Energy Efficiency and Microgeneration: Achieving a Low Carbon Future: a Strategy for Scotland*, draft for consultation, Mar 2007.
<http://www.scotland.gov.uk/Publications/2007/03/09144516/0>