WINCHESTER CITY COUNCIL

SUSTAINABLE BUILDINGS GUIDANCE for PLANNING APPLICATIONS–

November 2011

CONTENTS

1 Introduction

1.1 The importance of tackling climate change is widely recognised. There are national targets and standards contained within planning guidance and the Code for Sustainable Homes (CSH) and Building Regulations, relating to the need to reduce carbon emissions, promote energy efficiency and renewable energy and reduce water use and flood risk.

1.2 However, the need for specific targets for the Winchester District has been recognised by the City Council. The Winchester District has one of the highest per capita carbon footprints in the South East – 14.10 tonnes CO_2 per year compared to a South East average of 13.17 tonnes and the UK average of 12.10 tonnes (2006 REAP figures). The Winchester area has also been identified by the Environment Agency as an area of water stress. The Council's Climate Change Strategy "Live for the Future: Tackling Climate Change", has set a local target of a 30% CO_2 emissions reduction by 2015.

1.3 Planning policies are an important tool in achieving reductions in carbon emissions and water use. The emerging Core Strategy will outline the Council's strategy in relation to this. Given the extent of the carbon footprint of the District it is considered important that steps are taken to implement measures to reduce carbon emissions in advance of the Core Strategy policies being adopted. Accordingly, the Council adopted an Interim Policy Aspiration on Climate Change in January 2011. A copy of this aspiration is attached at Appendix 1.

1.4 There is a need for this guidance despite the increasing requirements in respect of the Code for Sustainable Homes and the Building Regulations. This is because the timetable and status of the changes are not clear and there is a need for urgent action. Building Regulations cover most aspects of carbon emissions, but only small-scale energy generation. Planning requirements can address wider issues relating to sustainability and also provide the mechanism which allows for offsetting contributions where developments could not otherwise meet the requirements for carbon reduction.

2 Purpose and status of this document

2.1 This guidance is intended to assist in moving development standards towards high levels of energy and water efficiency. The Council will expect applicants to show how they have addressed the aims of the Interim Policy Aspiration in their proposals. Section 8 describes various measures that can be employed to reduce energy and water use and carbon emissions in developments. A checklist has been developed using the main headings of the measures outlined in Section 8 and is attached at Appendix 2. It is suggested that applicants use this to consider the possibilities for utilising measures under these headings.

2.2 Applicants should be prepared to demonstrate why they have not achieved the aims of the Interim Policy Aspiration, if that is the case. If an applicant is proposing an offsetting contribution, this will need to be detailed and secured by means of a planning obligation.

2.3 This document should also be used as a resource containing information regarding national policy aspects relating to carbon reduction and outlines various targets and definitions that may be of assistance when considering carbon reduction measures. When the Core Strategy has been adopted, this guidance may be developed further into a Supplementary Planning Document to the relevant Core Strategy policy (ies). In the meantime, this guidance is intended as a tool to assist applicants in the development of their schemes and to help the Council in assessing the benefits of proposals.

2.4 This guidance and the Interim Policy Aspirations concentrate on measures that reduce the energy and water demand of buildings. It is recognised that there other important elements of sustainability, such as those relating to biodiversity and travel reduction. These elements would still form part of the consideration of a planning application, but are not covered within this document, which is primarily aimed at reducing carbon emissions and water consumption. The Council has also expressed its general support for schemes that develop renewable and decentralised energy but again this is not discussed in depth in this guidance.

2.5 Work is continuing on refining the Core Strategy policies which will be adopted by the Council in due course. Following the adoption of the Core Strategy, it is possible that a Supplementary Planning Document (SPD) will be produced to assist in the implementation of the policy. Details of offsetting requirements will be included. This current guidance is likely to form the basis of a future SPD.

3 Planning Policy

3.1 There is a great deal of planning policy advice at the national and regional level in relation to sustainable buildings and carbon reduction. The main advice is currently contained within PPS1, PPS22, the South East Plan (SEP) and the Planning for Urban South Hampshire (PUSH) Sub-regional supplementary guidance.

3.2 The advice referred to in the paragraph above forms the current guidance which forms the background for the current statutory plan in Winchester (the SEP, and the WDLPR) and relevant local guidance (PUSH guidance) and the Interim Policy. The government is proposing major changes to the planning regime, which will alter this guidance. The government proposes that the NPPF will replace PPS guidance in due course and has put measures in place to abolish the SEP by April 2012.

3.3 In the interests of brevity, the main aspects of the current national, regional and sub-regional planning guidance are summarised in Appendix 3. The Appendix also discusses how they have been taken into account in the development of the Interim Policy Aspiration and the evolving Core Strategy.

3.4 **Winchester Policies**

3.5 In May 2009 the Core Strategy Preferred Options document was published. This included policies CP13 Sustainable Low and Zero Carbon Built Development and CP14 Renewable and Decentralised Energy. Following this, the Council appointed Element Energy consultants to produce a Low Carbon Planning Policy Viability Study to consider the feasibility of achieving the goals of the Preferred Options policies. The study concluded that allowing for 30% of regulated carbon emissions to be mitigated off-site would give reasonable flexibility whilst retaining the viability of most developments at CfH level 5. The Study also concluded that higher levels of code requirements would be likely to generate at least 20% of energy on-site, which would negate the need for a particular target in respect of renewable energy generation. See Sections 5 and 6 of this Guidance for further explanation of regulated/un-regulated emissions and on/off-site mitigation.

3.6 The results of the Low Carbon study fed into the development of the Interim Policy Aspiration on Climate Change. This was agreed by Council in January 2011. A copy of the Interim Policy is attached as Appendix 1.

3.7 Work is continuing on further refining the climate change policies, with revised policies CP13 and CP14 expected to form part of the Core Strategy policies, which should be published in pre-submission form, by the end of 2011. The final version of CP13 will take into account developments since the Interim Policy, such as the discussions of an expert focus group, the findings of the Council's Housing Viability Study and ongoing national developments in low and zero carbon standards.

4 National Standards

4.1 **Carbon Reduction Budget**.

4.2 The Climate Change Act 2008 created a legally binding target to reduce the UK's emissions of greenhouse gases (GHGs) to at least 80% below 1990 levels by 2050. In order to meet the target, carbon budgets have been set that place legally binding ceilings on the level of allowed UK emissions over five year periods. The government has recently agreed the fourth carbon budget which continues this commitment (May 2011). The government's advisory body - the Committee for Climate Change - suggests that in order to achieve this, GHG emissions should be cut by 1.5% per annum up to 2020, and then by 4.3% pa, rising to 4.7% pa by 2050.

4.3 **Code for Sustainable Homes (CSH) and BREEAM**

4.4 The Code for Sustainable Homes (CSH) and Building Research Establishment Environmental Assessment Method (BREEAM) are means of assessing the sustainability of developments. They are both run by the Building Research Establishment (BRE), although the CSH 'brand' is owned by the DCLG.

4.5 The Code for Sustainable Homes is a nationally recognised method of environmental assessment for new residential dwellings. A rating system of 1 to 6 stars is used, 1 star referring to the lowest level, and 6 stars reflecting exemplar development in terms of sustainability. The Code assesses sustainability performance, based on the following categories:

Energy,

Water,

Materials,

Surface Water run-off,

Waste,

Pollution,

Health and Wellbeing,

Management,

Ecology

4.6 Scores are given for various components within the categories, which result in the overall scoring and the award of a level. Some elements are weighted higher than others, and some elements are compulsory to achieve a certain level of code rating. The code sets minimum standards for energy and water use at each level.

4.7 The Code for Sustainable Homes was developed from the earlier BRE EcoHomes scheme, and is a government owned national standard for sustainable buildings referred to in many government publications, including PPS1. It is also linked to Building Regulations as explained below in paragraph 4.8.

4.8 BREEAM is a method of assessing the sustainability of buildings other than individual dwellings. There are different schemes for different categories such as educational buildings, offices, and industrial buildings. BREEAM assessment also gives scores for different elements within categories which are similar to those in the CSH. The combined scores result in a rating ranging from 'unclassified' to 'outstanding'. A comparison of the two systems is shown below:

CSH	Level 1	2	3	4	5	6
% CO_2 DER[1] reduction from 2006 Building Regulations	10	18	25	44	100	Zero Carbon
BREEAM	Pass	Good	Very Good	Excellent	Outstanding	

[1] DER = Dwelling Emission Rate

4.9 Building Regulations have links with the CSH. Since 2010, applications under Part L of the Building Regulations (conservation of fuel and power) must reach the CO_2 emissions requirements set out in Code Level 3 of the CSH. That represents a 25% reduction in the CO_2 Dwelling Emission Rate (DER) requirement of the 2006 Building Regulations. This is proposed to increase to CSH Level 4 (DER -44%) in 2013 and Level 6 (Zero Carbon) by 2016.

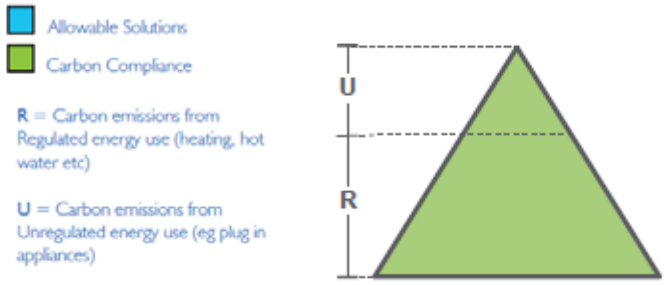
4.10 It is clear from the above that there are strong relationships between the CSH, BREEAM and Building Regulations and planning guidance. It should be noted that the Council's Policy Aspirations are only concerned with the energy and water-related elements of the CSH and BREEAM.

5 Zero Carbon

5.1 Proposed changes to the Building Regulations would require all new buildings to be zero carbon by 2016. However, the definition of zero carbon has evolved from the definition outlined in the CSH. The changing definitions are discussed in further detail below.

5.2 **Level 6 Carbon Compliance.** Level 6 of the CSH required all CO_2 emissions from a building to be eliminated or mitigated in some manner on the site, by means of energy efficiency and low and zero carbon technologies, as illustrated in Diagram 1 below. It is recognised that this is very difficult to achieve and only a very few exemplar buildings have yet been built to this standard.

Diagram 1: CSH Level 6 Carbon Compliance (2006)



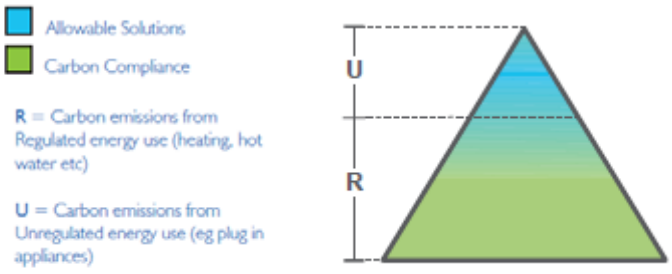
Source: Zero Carbon Hub 'Allowable Solutions for Tomorrow's New Homes' July 2011

5.3 The Zero Carbon Hub (ZCH) was launched in June 2008 and the government has given the Hub a lead responsibility for delivering homes to zero carbon standards by 2016. The Hub has looked into a range of zero carbon delivery options and in mid 2008 concluded that it would be impractical to achieve zero carbon on many sites using the CSH Level 6 definition, which requires elimination of all emissions on the site itself.

5.4 **ZCH Carbon Compliance/Allowable Solutions.** During mid 2008, the ZCH considered that much of a building's carbon emissions could be eliminated by ensuring an energy efficient approach to building design, minimising the need for onsite energy generation. Following these improvements in the fabric efficiency, a proportion of the remaining carbon emissions could be reduced through the use of onsite low and zero carbon technologies and connected heat networks.

5.5 Fabric efficiency improvements and onsite low/zero carbon energy generation are together referred to as Carbon Compliance. Mitigation of any remaining emissions could be facilitated by means of 'Allowable Solutions', which secure carbon savings away from the site. Diagram 2 illustrates this, and Section 6 provides further information on Allowable Solutions.

Diagram 2: ZCH Carbon Compliance/Allowable Solutions 2008

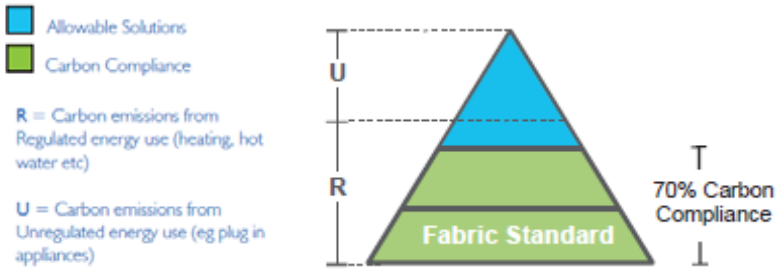


Source: Zero Carbon Hub 'Allowable Solutions for Tomorrow's New Homes' July 2011

5.6 **Carbon Compliance level identified.** Following initial consultation, it was concluded in mid-2009 by the ZCH and government that 70% of regulated emissions could be mitigated on-site as Carbon Compliance

and that the remaining CO_2 emissions (both the remaining regulated and all un-regulated emissions) could be mitigated by means of Allowable Solutions.

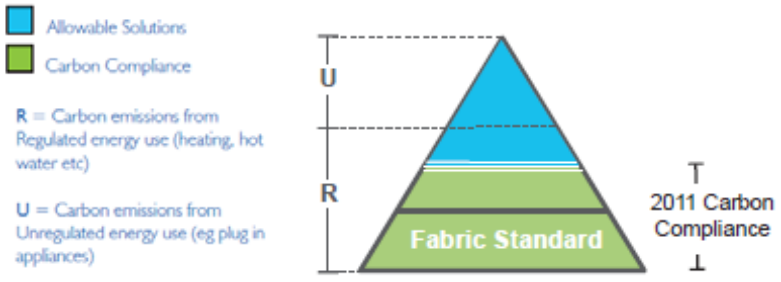
Diagram 3: Carbon Compliance/Allowable Solutions 2009



Source: Zero Carbon Hub 'Allowable Solutions for Tomorrow's New Homes' July 2011

5.7 **ZCH February 2011**. Further studies by the ZCH and stakeholder discussions resulted in another revised recommendation for the required level of Carbon Compliance. The ZCH report 'Carbon Compliance: Setting an Appropriate Limit for Zero Carbon New Homes' concluded that 70% Carbon Compliance threshold would be unviable on many sites and instead proposed a variety of thresholds, depending on the type of dwelling being built. They also recommended changes to using 'as built' performance (currently calculated on designed performance) and that Carbon Compliance limits should be set in terms of amounts of CO_2 emissions permitted per year, rather than % improvements on the 2006 DER. This is illustrated below:

Diagram 4: ZCH 2011 Carbon Compliance/Allowable Solutions



Source: Zero Carbon Hub 'Allowable Solutions for Tomorrow's New Homes' July 2011

5.8 Their recommendations would result in the following limits –

- 10 kg CO_2/m^2/year for detached houses
- 11 kg CO_2/m^2/year for attached houses
- 14 kg CO_2/m^2/year for low rise apartments (up to and including 4 storeys)

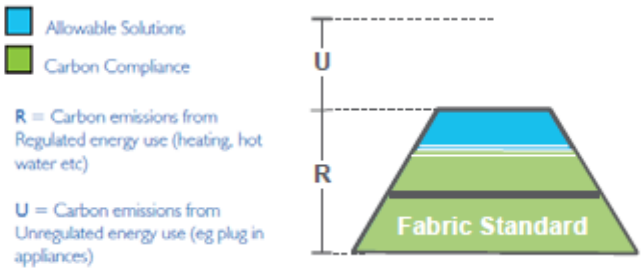
5.9 Although not strictly comparable to the previous method, this would result in the following % improvements on the 2006 standard –

- 60% for detached houses
- 56% for attached houses
- 44% for low rise apartment blocks

See table at 4.6 above for a comparison with the existing requirements.

5.10 **Budget Announcement - March 2011**. The government announced as part of its budget statement that the Zero Carbon Hub's recommendations would form the basis of consultations on changes to the Building Regulations proposed for 2016. It was also confirmed that only regulated emissions would be used when calculating the carbon compliance levels and that unregulated energy use emissions are no longer included at in the definition of zero carbon.

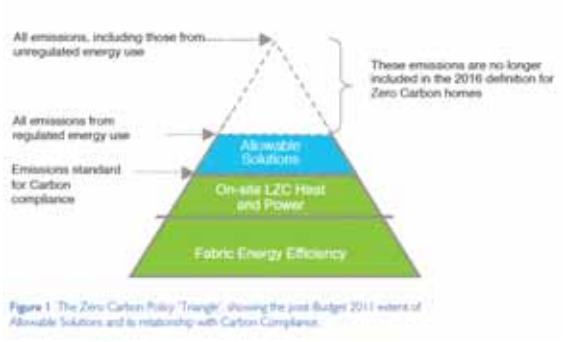
Diagram 5: Carbon Compliance/Allowable Solutions post 2011budget



Source: Zero Carbon Hub 'Allowable Solutions for Tomorrow's New Homes' July 2011

5.11 **Regulated/Unregulated Emissions.** Regulated emissions are CO_2 emissions that result from space heating, hot-water provision, fixed lighting and ventilation and are covered under Building Regulations. Unregulated emissions are those related to cooking and the use of plug-in appliances. The previous definition of zero carbon applicable from 2016, would have considered all sources of CO_2 emissions. The government announced in its 2011 Budget, that only regulated emissions would be used in the zero carbon calculations.

Diagram 6: Current agreed definition of zero carbon post 2011 budget



Source: Zero Carbon Hub 'Allowable Solutions for Tomorrow's New Homes' July 2011

6 Allowable Solutions

6.1 Allowable Solutions refers to the mitigation of any carbon emissions remaining following those reduced on-site, by contributions to approved carbon-saving measures. They are also referred to as off-setting measures. Allowable solutions could comprise a number of elements such as the development of energy-saving measures nearby to the site, the off-site provision of renewable energy generation, or a financial contribution to carbon reduction measures. Examples include physical or financial contribution to the development of CHP or a DHP system in the vicinity, a contribution to a carbon reduction fund for the retrofitting of insulation or other carbon reduction measures to existing buildings, or a contribution to the establishment of a non-profit ESCO, that would carry out carbon-saving initiatives.

6.2 When attempting to satisfy the high levels of energy reduction and water saving measures required by the Interim Policy, if it is not possible to achieve the required standards on-site, offsetting may be proposed by applicants in order to meet the policy aspirations. Off-setting could comprise a number of measures as outlined above.

6.3 The Council does not have a dedicated carbon offsetting fund. In the absence of such a fund, applicants will have to demonstrate how the off-site carbon reductions will be achieved and enter into an agreement to secure the savings. This would currently be secured by means of a planning obligation under S106 of the Planning Act.

7 Future Developments

7.1 The ZCH report 'Allowable Solutions for Tomorrow's New Homes' was published in July 2011. The report has a number of recommendations and possible methods for requiring and achieving allowable solutions. The report makes it clear that further investigation and debate is required on the possible methods, before a preferred approach can be agreed. Options include the local authority setting up a community energy fund, or the possibility of developers making private contracts

with third party providers of Allowable Solutions. The report recommends that the government develops guidelines on the operations of an Allowable Solutions policy to clarify some of these issues.

7.2 In the light of the above, it is likely that further work will be required on the development of an Allowable Solutions policy to be part of carbon reductions policies by 2016. However, it is unclear at this stage what such a policy should contain. The role of local planning authorities regarding the description of approved Allowable Solutions and the collection and payment of any Allowable Solutions finance has not yet been determined.

7.3 The Council is currently considering the future roles of planning obligations, Community Infrastructure Levy (CIL) and possible carbon reduction fund/company, in light of Core Strategy discussions, viability and evolving government incentives and legislation.

8 Carbon Reduction Measures

8.1 The Section below provides example of various measures that can be undertaken to reduce carbon emissions, saving energy and water. The costs referred to are approximate and although they come from reputable sources, they are liable to change with changing economic climate and financial incentives. The information was up-to-date in mid-2011. The government has recently announced changes to the FITs scheme which have not been included in the information.

8.2 The description of measures shows that there are many ways of achieving reductions in the CO_2 emissions of a building. Minimising the energy requirements of a building reduces the need for heating/cooling/lighting in the first place, and is likely to continue to do so over the life of the building. This in itself is therefore likely to lead to a great reduction in the projected CO_2 emission of a development and should be the priority measure. Building terraced developments as opposed to semi-detached or detached dwellings would in itself reduce the energy requirements of buildings by a considerable amount, even to the extent of making CHP more viable. Following the reduction of the energy requirement of buildings, various measures to provide zero and low carbon energy should be considered. Measures that use low carbon or renewable energy should be considered before looking at other methods of producing energy that may involve higher CO_2 emissions.

8.3 This approach should be applied flexibly, as the optimum solutions will tend to vary on a site-by-site basis. For example, maximising the benefits of passive heating, lighting and ventilation by design and layout of buildings may only be possible on certain sites and may conflict with the demands in conservation areas or aspirations for high density development, for example. Certain types of energy generation are much more efficient when blocks of residential are considered

rather than individual units for example. The Low Carbon Viability Study (Element Energy 2010) indicates how different carbon reduction measures provide varying returns (in both monetary and carbon reduction values) in different forms of residential development.

8.4 There is particular concern about the benefits of greywater and blackwater recycling measures. Measures that achieve the highest levels of water savings can also involve intensive mechanical intervention which is not always cost effective and may in itself be carbon intensive. Grey and black water recycling is much more cost effective when units are considered as a group rather than installed on an individual basis.

8.5 It should be noted that although the council's aspirations aim for high levels of carbon reduction, the City Council will consider all aspects of a planning application when assessing proposals including viability, design issues and all elements of planning obligations that may be relevant.

Demand reduction measures

Reducing requirement of artificial heating/cooling for CO_2 and monetary savings

Efficient Building Orientation

- Harnessing passive solar gains for natural heating and lighting.
- Opportunities for solar gain are maximised by ensuring the orientation of the building is within 30° of south, erring towards south-east to make best use of early morning solar gain, and to minimise afternoon overheating.
- Deciduous trees can be strategically planted to provide shading during the summer and allow solar gain during winter.

Benefits:

- Reduced requirement for heating/cooling.

Drawbacks:

- Cannot be retrofitted into an exiting building. Relies upon it being a new build project.
- Sometimes not practical or desirable due to site constraints and/or design considerations, such as on tight urban sites or in design sensitive areas.

Efficient internal layout of the building

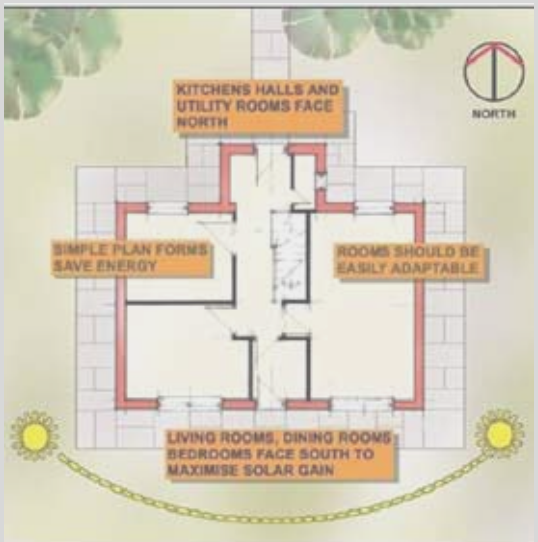
- Ensuring that the most frequently used rooms are located to the south side of the building to enable maximum benefit from passive solar gains.

Benefits:

- Reduced requirement for heating.

Drawbacks:

- Cannot be easily retrofitted into an existing building. Not always possible for historic and listed buildings. In some circumstances, overheating of certain rooms will need to be factored into design.



Source: City of Bradford Metropolitan District Council

Natural ventilation

- Use of design to minimise the need for additional ventilation systems.
- Passive Stack Effect: using pressure differentials to draw cool, fresh air in from the outside.
- Cross ventilation: openings on opposite or adjacent walls to draw air flow through a space, sometimes assisted by roof-mounted turbines.

Benefits:

- Reduced requirement for artificial cooling systems, and reliance on harmful refrigerants.
- HRV systems provide fresh air and improved climate control whilst saving energy and costs of heating or cooling requirements.

Drawbacks:

- Can require additional mechanical ventilation to supplement natural ventilation.

Natural Lighting

- Harnessing of natural light through windows, skylights, sun pipes, atria and other design features in order to diminish the need for electric lighting.
- The amount of glazing must be balanced to avoid overheating through solar gain. More glazing on the northern elevation than the south elevation can help optimise daylight entry without excessive solar gain.

Source: PUSH

Benefits:

- Reduced requirement for artificial lighting.
- Helps provide a pleasant environment to live and work.

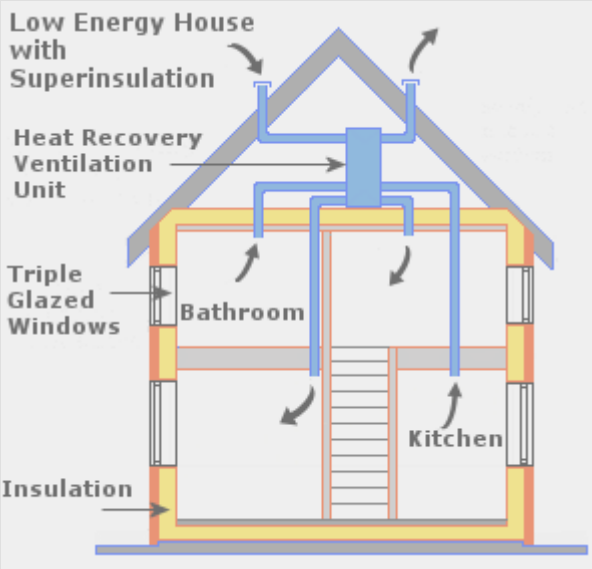
Drawbacks:

- Interior light levels dependant on outside light availability.

Insulation

- Insulation can be integrated in a variety of ways such as cavity wall insulation, solid wall insulation, floor insulation, loft insulation, draught-proofing, tanks and pipes insulation, double or triple glazing.

- Building extensions can form an insulating buffer, retaining warmth or cool in the main building.



Source: www.lowenergyhouse.com

Benefits:

- Reduced heating requirement for building
- Short payback period. Insulation can pay for itself within two years
- Cavity wall insulation can save around 560kg **CO_2** per year. [1]

Drawbacks:

- Older properties which require solid wall insulation tend to have a longer payback period.

Viability in Winchester:

- Identified (along with PV panelling) as the most cost effective energy strategy for meeting CSH Level 3 standards in Winchester. Can work in combination with other technologies to achieve higher levels of the Code.[4]

- Easy to install and can be done retrospectively. Relatively cheap and produces good carbon savings, for not carbon cost (apart from that imbedded in the materials used)

Renewable Energy Technologies

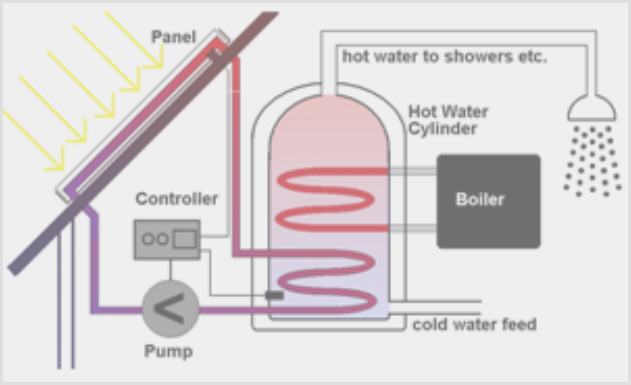
Reducing demand for unsustainable non-renewable energy resources

Solar water heating panels

- Harnessing of energy from the sun for water heating.
- Most commonly installed on south facing roofs to maximise sunlight, with a 30-45° tilt from the horizontal.

Benefits:

- Solar panels are silent, have no moving parts and tend to require low maintenance over long lifetimes.
- Multiple sized systems are available.
- Can reduce household emissions by 260kg CO_2 per year in place of gas heating.[1]
- Meets at least 50% of a home's hot water needs and save about 10% of its carbon emissions.[2]



Solar Water Heating System (source: CAT)

Drawbacks:

- Supply is constrained by the intensity and duration of sunlight
- A boiler will be required to top up hot water requirements during winter months
- Not ideal for education establishments due to this seasonal variation
- Contributes only a modest amount to overall energy requirements.

Costs/Viability:

- Typical costs range from £4,000 to £6,000[1]
- Solar water heating systems typically provide over 1,000 kWh of hot water per year, saving around £50 per year in a home with gas water heating. This does not include RHI payments. [1]
- "There is a technical potential for 30% of all dwellings and 30% of all non-dwellings in the Winchester District to have solar PV / STHW." Based on available south, south-west and south-east facing roofs. [3]
- On-going financial support for small-scale renewable heating installations under The Renewable Heat Incentive (RHI). [6]

Photo Voltaic panels

- Conversion of energy from the sun into electricity.

- PV panels are most commonly installed on south facing roofs in order to maximise exposure to sunlight.

Benefits:

- PV panels are silent, have no moving parts and tend to require low maintenance over long lifetimes.
- One of the few means of generating renewable electricity in dense urban areas. Useful on commercial developments as peak output coincides with daytime usage
- They are modular, so multiple sized systems are available.
- Integrated PVs on new build properties can offset some costs of roof construction
- A 2.2 kWp system will typically save around 1 tonne of CO_2 per year in the UK. [1]
- Greater CO_2 savings and monetary savings than solar water heating, but over a longer pay-back period
- Could meet around 40-60% of a home's electricity needs and save about 25% of its carbon emissions. [2]

Drawbacks:

- Moderately high economic cost is realised over a relatively long period.
- Supply is constrained to the intensity and duration of sunlight. Limited electricity provided in winter. Not ideal for education establishments due to this seasonal variation

Viability in Winchester

- A typical 2.2 kWp domestic system will cost around £12,500, or £5,000 - £7,600 per kWp installed and could generate savings and income of around £920. (Including FITs payments). [1]
- Technical potential for 30% of all buildings in Winchester to have PV/STHW. [3]
- Feed-In Tariffs can make PV instalment a reasonable investment.

Roof mounted PV array

PV roof tile

PV cladding

Examples of PV panelling
Source: PUSH

Wind Power

- Conversion of wind into electricity using rotating blades to drive a generator.
- Two types of wind turbine: Horizontal and vertical axis wind turbines.
- Electricity generated from small turbines can either charge batteries or link to the grid.
- Turbines must be situated with adequate distance from buildings.

Benefits:

- Turbines are available in a range of sizes, down to 1kWh output.
- Now benefit from permitted development rights

Small domestic wind turbine (source: CAT)

Drawbacks:

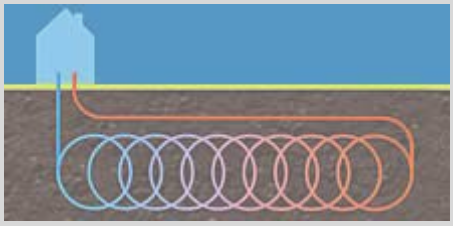
- Wind speed of over 3m per second is required. Intermittent wind strength makes generation capacity fluctuate
- Low wind speeds and fluctuating speeds mitigate against small turbines in urban areas and sheltered locations.
- Turbines create visual impact and noise impact (particularly in the case of large turbines)
- Conventional roofs can often not support the dynamic loads of turbines, which may make retrofitting difficult.

Viability in Winchester:

- ***Large scale*** wind as a renewable resource has high potential in the Winchester District, particularly in the north of the district. [3]
- For large urban extensions/strategic greenfield sites (2000 – 3000 dwellings), the installation of medium to large-scale wind turbines is feasible. The cost of complying with Code Level 5 is estimated at an extra-over cost of £5k per dwelling. [4]
- The technical potential for large scale wind in Winchester could provide 45% of the district's renewable electricity. [3]
- It is suggested that WCC and PUSH stimulate relationships between housing developers in the southern PUSH area and commercial wind companies developing energy production to the north of the district. [3]
- Small scale/micro wind turbines are generally considered unviable given the current poor performance of the technology. [4]
- Eligible for Feed-In Tariffs payments.
- A 6kW turbine could generate income and savings of around £3,200. Includes FITs payment as mid 2011. [1]

Ground Sourced Heat Pumps

- Draws heat from about 2m under the earth's surface where there is a stable temperature of around 11-12°c) and stores it - usually for domestic hot water usage or heating
- Two methods:
  A bore hole and a pipe, driven vertically into the ground.
  A trench system, where a coil of cable is laid out horizontally at shallow depth and water is passed through to capture the heat.
- Can be combined with radiators, but under floor heating is better as it works at a lower temperature.
- Cost of ground source heat pumps range from £9,000 to £17,000. [1]



Ground sourced heat pump source: PUSH

Benefits:

- Little visible impact on the landscape.
- Can save up to 5 tonnes **CO_2** a year depending on what fuel is replaced. [1]
- Covered under permitted development.

Drawbacks:

- Requires a detailed ground survey.
- Multi-storey buildings (those with more than four floors) are considered unsuitable for GSHP, based on the technical potential study, 2008.
- Trench system is simper and cheaper, but requires large amounts of land

Viability in Winchester:

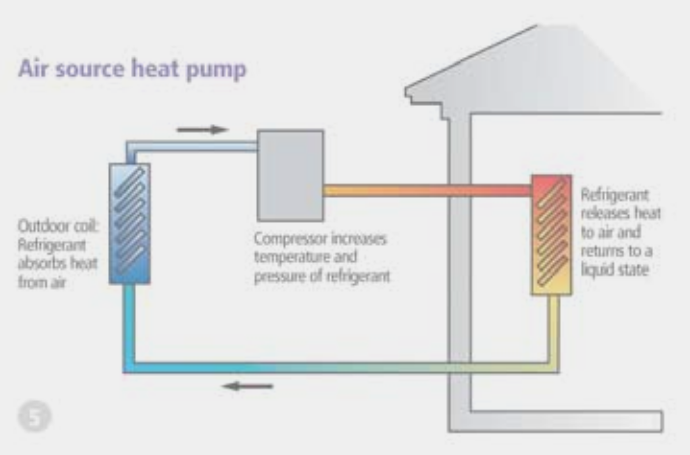
- "There is a technical potential for 50% of all dwellings and 50% of the floor area of all non-dwellings in the Winchester District to have GSHP. This is based on an estimate of buildings without sufficient space for a trench or borehole to accommodate a ground loop and where the ground material is unsuitable for digging." [3]
- On-going financial support for renewable heating installations is available under The Renewable Heat Incentive (RHI). [6]

Air sourced heat pumps

- Conversion of temperature of the outside air into heat, and supply of energy for hot water systems.
- Designed to work in combination with other heating systems.
- Cost of air source heat pumps range from £6,000 to £10,000. [1]

Benefits:

- Only requirement is an external wall, making it a compact option for smaller or flatted dwellings.
- Can save slightly less than 5 tonnes **CO_2** a year depending on what fuel is replaced. [1]
- Now benefits from permitted development rights



Air sourced heat pump
Source: Green Energy Solutions

Drawbacks:

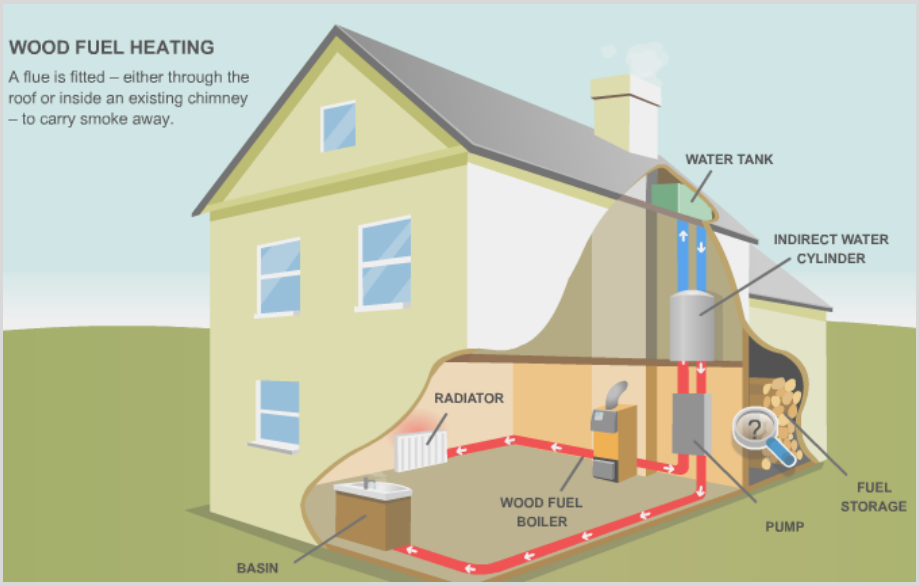
- Can result in visual and noise impacts.
- Not very efficient and requires electricity to run

Viability in Winchester:

- On-going financial support for renewable heating installations is available under The Renewable Heat Incentive (RHI). [6]

Wood fuel and biomass boilers

- Technologies include pellet boilers, pellet stoves, log boilers, log stoves, all of which require frequent refuelling by hand.
- Wood fuel is 'carbon neutral' as the **CO_2** emissions from burning equates to **CO_2** absorption during growth.
- Installation costs can range from around £3,000 for a stove to £11,500 for a complete domestic pellet boiler system. [1]



Wood fuel heating system
Source: Energy Savings Trust)

Benefits:

- Can save up to 9.5 tonnes **CO_2** per year when replacing a coal fired system or electric storage heating
- Usually cheaper than electricity, LPG and sometimes oil
- Renewable replacement of coal, oil or gas for space heating.
- Unlike other renewables, wood can be stored and used when needed.

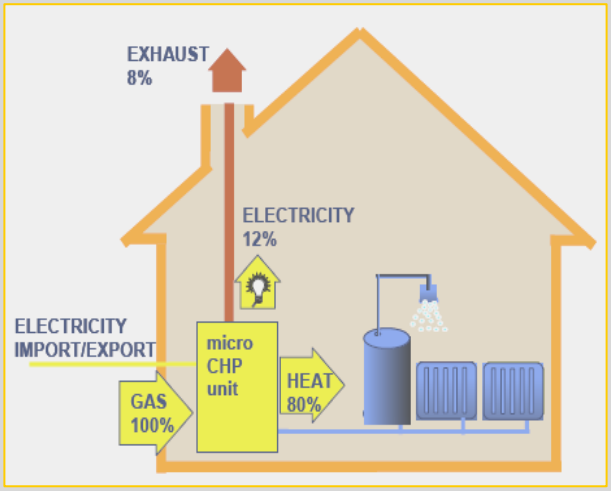
Drawbacks:

- Wood fuelled boilers are larger than conventional alternatives, and there is an additional space requirement for fuel storage.
- Planning permission may be required for flue vents or fuel stoves. In smoke control areas, exempt appliances must be installed. [1]
- Not cheaper than mains gas – though this may change with the introduction of the Renewable Heat Incentive
- More expensive than a conventional boiler to purchase
- Fuel transport emissions are not carbon neutral, but choosing a local supplier can minimise this.
- Requires careful setting up and regular maintenance to act efficiently
- Fuel sources vary greatly in local availability and price

Micro Combined Heat and Power

- Boiler generates heat with electricity at the same time (ratio of approx 6:1 generally) Any space electricity unused can be exported back to the national grid

- Conventional fuel is still 'low carbon' because using this on-site is still more effective than using national grid electricity. CO_2 benefits can be increased by using more sustainable fuels



Micro Combined Heat and Power
Source: PUSH and E.ON

Benefits:

- A typical domestic system has potential to generate up to 1kW of electricity per hour when warmed up, sufficient to power lighting and appliances in an average home. [1]
- Similar in size and appearance to conventional boilers and easy to install
- Reduction in electricity bills for user

Drawbacks

- Initially expensive, most effective in buildings which have a high heat demand (ie in inefficient buildings)
- Fuels and methodology still evolving which may bring costs down.
- Can be a bit more noisy than conventional boiler

Costs/Viability:

- A Micro-CHP typically costs from £5,500 and can be installed instead of a conventional boiler which would cost around £2,500. [1]
- Eligible for Feed-in Tariffs

District Heating Systems

- Centralised boiler to provide heat to a number of buildings.
- Can be heat only or a combined heat and power (CHP).
- With the addition of a chiller unit, the system can be improved into a combined cooling, heat and power (CCHP) system.

Benefits:

- Use of a single boiler to heat a number of buildings has many economies of scale and allows for use of woodchips or other biofuels.

Drawbacks:

- High heat density is required in order to secure CO_2 reductions over conventional heat supply, and the technology is therefore only suited to urban areas.

Viability in Winchester:

- Use of CHP can increase efficiency by up to 3 times (Biomass Energy Centre).
- CHP or CCHP systems are viable when there is a constant demand for energy, and are therefore most suitable for area-wide or mixed use communities.
- The technical potential for macro biomass CHP in Winchester could provide approximately 95% of the district's heat and power needs. [3]

Water Saving Technologies

Reducing demand on water supply

Greywater harvesting and rainwater harvesting

- Grey water harvesting: Disinfection and reuse of water from basins, showers and baths for toilet flushing and watering gardens (non consumable).

- Rainwater harvesting: The capture of rainwater runoff to help meet onsite water requirements. Rainwater is often collected in water butts, but larger systems filter and store water in an underground tank.

Benefits:

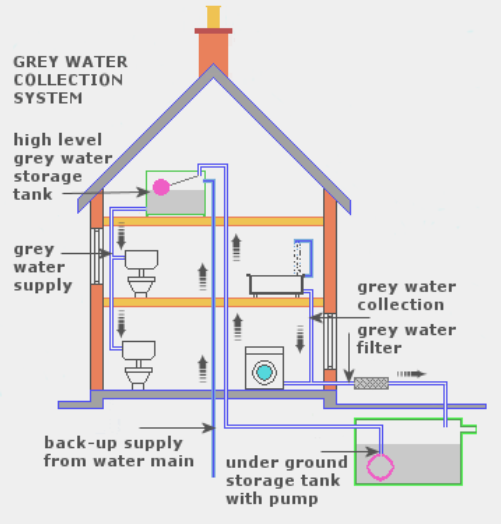
- Savings from occupier's water bill
- Every year roofs collect on average 85,000 litres of water, which is enough to fill 450 water butts and provide free water.

Drawbacks:

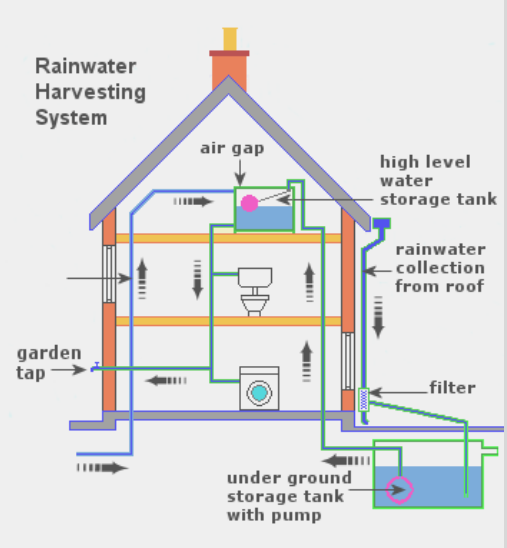
- Not suitable for drinking, washing, cooking or food production.
- Mains system must also be available if rain is scarce.
- Rainwater harvesting is around 40% more carbon intensive than mains water, so should only be used after simpler more cost effective water saving measures have been implemented. [5]

Viability in Winchester:

- The extra-over costs of installation of a rain/grey water recycling scheme and a water efficient washing machine in order to reduce water use to 80 litres/person day:
  - Flat - £1,750
  - Terraced house - £4,200
  - Semi detached house - £4,200
  - Detached house - £4,500 [4]



Grey Water Harvesting
Source: LowEnergyHouse.com



Rain Water Harvesting
Source: LowEnergyHouse.com

Rain Water Harvesting
Source: Thames Water

Black Water Harvesting

- Filtering, treatment and reclamation of water from toilet flushing and washing up. Unlike greywater, may contain human waste

Benefits:

- Savings from occupier's water bill

Drawbacks:

- Not suitable for drinking, washing, cooking or food production.
- Unpopular concept with some domestic users

Viability in Winchester

- High maintenance costs make it only suitable for large developments.

Low – flow fittings: dual/low-flush toilets

- Toilet which reduces water flow to as little at 2 litres per flush.

Benefits:

- Savings from occupier's water bill
- "These systems use up to 6 litres less water per flush than an old fashioned toilet – saving over 16,000 litres of water per year (enough to fill 7 red telephone boxes)."

Drawbacks:

- Can be un-installed by occupiers

Dual Flush Toilet
Source: WaterWise

Low – flow fittings: spray/low-flow/self closing taps

- Taps which restrict level of flow to reduce water wastage.

Benefits:

- Savings from occupier's water bill
- Cost effective and easily retrofitted.

Drawbacks:

- Can be un-installed by occupiers

Aerated Showerhead
Source: WaterWise

Spray tap
Source: WaterWise

References:

1 Energy Savings Trust buyers guide July 2011
2 PUSH Draft Sustainable Development SPD
3 Renewable Energy Study for Winchester District Development Framework 2008
4 Low Carbon Planning Policy Viability Study February 2010
5 Environment Agency 2010
6 RHI for non-domestic schemes applied from 28th November 2011. Domestic schemes should be eligible in autumn 2012, in conjunction with the Green Deal. In the meantime domestic schemes may be eligible for RH Premium Payments. Source: DECC.gov.uk. RHI information pages.

APPENDIX ONE:

WCC INTERIM POLICY ASPIRATIONS ON CLIMATE CHANGE

That new residential developments achieve Code for Sustainable Homes Level 5 for energy and water efficiency, but allowing for up to 30% of regulated emissions to be provided off-site or through a financial contribution;

- ***That new non-residential developments achieve at least the BREEAM 'Very Good' standard, and 'Excellent' from 2012;***
- ***That new developments maximise energy efficiency by ensuring the highest standard of building envelope, to minimise the need for energy use;***
- ***That the Council is supportive of schemes for the generation of renewable and decentralised energy.***

APPENDIX TWO:

CARBON REDUCTION MEASURES CHECKLIST

Carbon Reduction Issues	**Measures employed or explanation of why not applicable for each main heading**
Demand Reduction Measures	
Efficient Building Orientation	
Efficient internal layout of the building	
Natural ventilation	
Natural Lighting	
Insulation	
Renewable Energy Technologies	
Solar water heating panels	
Photo Voltaic panels	
Wind Power	
Ground Sourced Heat Pumps	
Air sourced heat pumps	
Wood fuel and biomass boilers	
Micro Combined Heat and Power	
District Heating Systems	
Water Saving Technologies	
Greywater harvesting and rainwater harvesting	
Black Water Harvesting	
Low – flow fittings: dual/low-flush toilets	
Low – flow fittings: spray/low-flow/self closing taps	

APPENDIX THREE:

NATIONAL, REGIONAL & SUB-REGIONAL PLANNING POLICIES

1 **PPS1** Recent governments have placed sustainability at the heart of planning; 'Sustainable development is the core principle underpinning planning'. (para 3, PPS1, 2005). In recent years, the importance of addressing the components of climate change and reducing carbon use in particular, have become even more important. The 2007 Planning and Climate Change Supplement to PPS1 contains a great deal of guidance on promoting the development of renewable and low-carbon energy generation and states that authorities should 'provide a framework that promotes and encourages renewable and low-carbon energy generation' (para 19).

1.1 The supplement's guidance on sustainable buildings is of particular relevance. It states that planning authorities should help to achieve the national timetable for reducing carbon emissions. It also recognises that 'there will be situations where it could be appropriate for planning authorities to anticipate levels of building sustainability in advance of those set nationally' (para 31). In such cases, planning authorities must be able to clearly demonstrate the local circumstances which warrant any local requirements.

1.2 Local requirements should be specified 'in terms of achievement of nationally described sustainable building standards' (para 32), giving the example of expecting identified housing proposals to 'be delivered at a specific level of the Code for Sustainable Homes'. The guidance further states that where it is not considered appropriate to specify a whole Code level, they can stipulate a requirement solely in relation to the energy standard at a particular level of the Code.

1.3 WCC's Interim Policy Aspiration on Climate Change takes a similar approach, as it is only the requirements in respect of the energy and water efficiency elements of Code Level 5 that are sought. In terms of buildings other than housing, the Interim Policy Aspiration uses the nationally described sustainable building standard of BREEAM, and seeks 'Very good' standard up to 2012 and 'Excellent' from that date on.

1.4 Paragraph 33 of the Supplement to PPS1 states that any policy for local requirements should be set out in a DPD and should be evidence-based and viable. The Policy Aspiration and WCC's emerging Core Strategy policy have been developed following the Low Carbon Planning Policy Viability Study (Element Energy 2010) undertaken into the viability of requiring higher standards of Code. A further study into housing viability also considers the ability of development proposals to contribute to a range of policy aspirations by means of planning

obligations or CIL. Carbon reduction measures are one of the issues considered.

1.5 Paragraph 42 of the PPS1 supplement outlines factors that planning authorities should consider in assessing the environmental performance of a proposed development. These include; landform, layout, building orientation, massing and landscaping to minimise energy consumption and opportunities for decentralised and renewable or low-carbon energy supply. Priority is to be given to the use of sustainable drainage systems (known as SUDS) and the potential for water harvesting and waste water recycling.

2 **PPS 22**: Renewable Energy (2004) promotes the increased development of renewable energy sources. It states that the opportunity for incorporating renewable energy projects should be considered in all new developments" (para. 18). It promotes the use of "solar panels, biomass heating, small scale wind turbines, photovoltaic cells and combined heat and power schemes". It states that local planning authorities may have policies that require a percentage of the energy to be used in new residential, commercial or industrial development to come from on-site renewable developments (para. 8).

3 **Draft National Planning Policy Framework (NPPF).** The draft NPPF published in July 2011 confirms the role of planning in reducing carbon emissions. It states that 'planning should fully support the transition to a low carbon economy in a changing climate' (para 148). Requirements for sustainable buildings should be 'consistent with the Government's zero carbon buildings policy and adopt nationally described standards' (para 150). The NPFF is still in consultation at the moment and the details may be subject to change.

4 **Regional Policy – South East Plan (SEP) July 2009**

4.1 The SEP contains many policies and targets directly and indirectly related to sustainable development including; sustainable building design and construction, resource use, water resources, energy efficiency, renewable energy generation and waste.

4.2 'CC4: Sustainable Design and Construction' states that all new buildings should be designed to secure high standards of sustainable development including energy, water efficiency and biodiversity gain. Buildings should be designed to increase the use of natural lighting, heat and ventilation, and for a proportion of the energy supply to be secured from decentralised and renewable or low-carbon sources. SEP CC4 also states that it may be appropriate for local planning authorities to anticipate levels of building sustainability in advance of those set out nationally, mainly for specific development areas or site-specific opportunities. When proposing any local requirements for sustainable buildings, local planning authorities must be able to demonstrate clearly the local circumstances that warrant and allow this

and set them out in development plan documents, reflecting the advice in PPS1.

4.3 'NRM1: Sustainable Water Resources and Groundwater' outlines measures for conserving water supplies and includes 'identify any circumstances under which new development will need to be supported by water efficiency standards exceeding extant Building Regulations standards'.

4.4 SEP policies NRM11 – NRM16 deal with aspects of energy efficiency and renewable energy and set regional targets. 'NRM11: Development Design for Energy Efficiency and Renewable Energy' requires local planning authorities to set 'ambitious but viable' proportions of energy supply for new development to come from decentralised and renewable or low-carbon energy sources. In advance of these being set in DPDs, the SEP has an interim target of 10%.

4.5 WCC's 'Low Carbon Planning Policy Viability Study' has concluded that developments that would comply with the requirements of the revised Core Strategy policy would likely to incorporate sufficient renewable automatically supply at least 20% of energy on-site, without further investment in generating technologies. As this represents a beneficial option for reducing overall carbon emissions, it is considered that this is preferable to setting specific targets for renewable energy generation, which in any case, is likely to be superfluous.

4.6 The government has announced its intention to abolish Regional Spatial Strategies, including the South East Plan. The government timetable is for the RSS to be revoked by spring 2012 and legislation has been drafted to facilitate this.

5 Sub-Regional Guidance - Planning for Urban South Hampshire (PUSH)

5.1 On 18th March 2008, the PUSH Joint Committee adopted the Push Sustainability Policy Framework and agreed that all LDFs within the PUSH area should include policies to deliver a number of principles in relation to sustainable development

5.2 These included that developments should contribute to the delivery of renewable energy and carbon neutrality in the authority. Where developments are part of a major area of development, they should either link to existing - or produce their own - local renewable energy. They should also maximize resource efficiency opportunities. Districts were to set their own targets for new installations of renewable energy.

5.3 Developments should meet the following CfSH threshold level, and equivalents for non-residential development set out below:

Residential development Code for Sustainable Homes level requirement		Multi and non-residential dev't (>500sqm floorspace) BREEAM standard requirement
Until end 2011	3	BREEAM 'very good'
From 2012	4	BREEAM 'excellent'
From 2016	6	BREEAM 'excellent'

5.4 Although the SEP is likely to be abolished soon, the PUSH guidelines have been agreed by the authorities in the relevant areas and have been subject to the appropriate legislative processes. The guidelines are therefore likely to be given some degree of weight in planning decisions, until superseded by Core Strategy policies.

APPENDIX FOUR:

Glossary of terminology and acronyms

Allowable Solutions	Measures that mitigate carbon emissions, usually away for the site. Also termed 'offsetting'
ASHP	Air Sourced heat Pump
Biomass	A fuel derived from plant material or natural residues. A wide range of biomass can be used to generate electricity and/or heat and to produce transport fuel.
Blackwater	Sewage water. Contains human waste. Eg toilet effluent.
BREEAM	The Building Research Establishment's Environmental Assessment Method, which is used to assess the environmental performance of new and existing non-residential and mixed use buildings. It is regarded by the UK's construction and property sectors as the measure of best practice in environmental design and management.
Carbon neutral	A development that achieves no net carbon emissions from all types (regulated and unregulated) of energy use on an annual basis. It is usual for a development to have emitted some greenhouse gas emissions, so it is necessary to use carbon offsets to achieve neutrality.
Cavity wall insulation	A building with cavity walls can benefit from insulation pumped into the cavity.
CHP/CCHP	Combined Heat and Power or Combined Cooling, Heat and Power. CHP is the simultaneous generation of usable heat and power in a single process, therefore producing less waste.
CIL	Community Infrastructure Levy. A charge that local planning authorities may set on new developments. The levy is used to provide infrastructure in the locality.
Climate change	A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is, in addition to natural climate variability, observed over comparable time periods.
Core Strategy/CS	A Development Plan Document which sets out the long-term spatial vision for the local planning authority, and the spatial objectives and strategic policies to deliver that vision.
CO_2	Carbon Dioxide. A significant contributor to global warming and climate change. A gas resulting from the combustion of fossil fuels including gas, oil and coal.
CSH	The Code for Sustainable Homes. A national environmental standard for sustainable design and construction for certifying and rating new homes, to ensure new homes deliver improvements in key areas such as carbon dioxide and water use reduction.
Decentralised Energy Supply	Energy supply from low carbon sources on a small or community scale and including electricity generation that is connected to a local distribution network rather than directly to the national grid.
DER	Dwelling Emissions Rate. The amount of CO2 emissions per metre of floorspace. It is used in Building Regulation

	calculations.
DHP	District Heating and Power
ESCO	Energy Service Company
Feed-in tariff (FITs)	Feed-In Tariffs are schemes that give financial rewards for the creation of "green electricity". They were introduced to help increase the level of renewable energy in the UK towards our legally binding target of 15% of total energy from renewables by 2020 (up from under 2% in 2009).
Greenhouse Gases	Gases that contribute to global warming. Carbon Dioxide is the principal – but not the only – greenhouse gas.
Greenwater	Between white and blackwater. Leftover water from, baths, showers and basins and washing machines. Does not contain human waste.
GSHP	Ground Sourced Heat Pump. Transfer of heat from the earth to a building by means of a heat exchanger. The heat can then be used for space heating and hot water. They can also be used to remove heat from a building and deposit it into the ground to cool the building in hot weather.
Horizontal axis wind turbine (HAWT)	A type of wind turbine which has the main rotor shaft and electrical generator at the top of a tower, and must be pointed into the wind.
HRV system	An energy recovery ventilation system which employs a counter-flow heat exchanger between the inbound and outbound air flow. HRV provides fresh air and improved climate control, while also saving energy by reducing heating (and cooling) requirements.
LDF	Local Development Framework. A term used to describe a folder of documents, which includes all the local planning authority's Local Development Documents, including the Core Strategy and other Development Plan Documents, Supplementary Planning Documents, and the Statement of Community Involvement (SCI) amongst others.
Low carbon technology	A technology that results in lower net carbon emissions.
NPPF	(Draft) National Planning Policy Framework
Passive solar gain	Refers to the siting, form, fabric and internal layout of buildings so that natural light and solar heat gains are harnessed and controlled reducing the need for artificial lighting, space heating, and mechanical ventilation and cooling.
Permitted development rights	Permission to carry out certain limited forms of development without the need to make an application to a local planning authority, as granted under the terms of the Town and Country Planning (General Permitted Development) Order.
Potable water	Freshwater. Sometimes termed ‘whitewater’.
PPS	Planning Policy Statement. Statement of government planning policy. PPS exist for various topics covered by planning legislation. The government is proposing to replace PPSs with the NPPF.
PUSH	Partnership for Urban South Hampshire
PV	Photo Voltaics. Thin silicone wafers that convert any light, not only sunlight, directly into electricity. They can be fitted to buildings including panels and roof tiles.
Regulated/Unregulated emissions	Regulated emissions are those covered by the Building Regulations – ie space heating, hot water provision, fixed lighting & ventilation. Unregulated emissions are all other

	sources of CO_2 emissions – eg cooking & use of plug-in appliances (eg computers etc)
Renewable energy	Those energy flows that occur naturally and repeatedly in the environment - from the wind, the fall of water, the movement of the oceans, from the sun and also from biomass.
RHI	Renewable Heat Incentive – A scheme comparable to Feed-In Tariffs which give financial rewards for the creation of "green heating".
Solid wall insulation	A building with solid walls can benefit from internal or external insulation. External wall insulation involves adding decorative weather-proof insulating panels or other treatment to the outside of the wall. Alternatively, internal wall insulation can be applied using ready-made insulation/plaster board laminates, or other methods.
SEP	South East Plan. Regional Spatial Strategy for the South East of England. The government intends to abolish Regional Spatial Strategies by April 2012.
SPD	Supplementary Planning Document. Guidance that supplements an adopted planning policy. SPDs need to be formally adopted by the relevant authority, using requirements under the Planning Act.
Sustainable Development/Sustainability	Sustainable development is: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Commission Report, 1987.)
Vertical axis wind turbine (VAWT)	A type of wind turbine where the main rotor shaft is set vertically and the main components are located at the base of the turbine.
WCC	Winchester City Council
WDLPR	Winchester District Local Plan Review 2006. The adopted local plan for the Winchester District until superseded by Local Development Framework policies.
Zero carbon	The proposed amendment to the definition of zero carbon covers carbon dioxide emissions from energy use through heating, fixed lighting, hot water and building services. It does not cover emissions related to energy use from cooking or from plug-in electrical appliances such as computers.
ZCH	Zero Carbon Hub. Body tasked by government with developing a workable definition of zero carbon.