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INTRODUCTION

The government has set a key goal to achieve zero carbon new homes by 2016 (Code for Sustainable Homes). In order to achieve this goal, more and more legislation will be coming into force to ensure that new developments consider sustainable construction principles through the whole life cycle of a development – the planning, construction, maintenance and eventually the demolition process. Developers who take early action and consider sustainable construction principles in new developments will be well prepared for legislation that will soon be coming into force to meet zero carbon targets.

As sustainable construction is such a rapidly growing area of the construction industry, this document focuses specifically on renewable energy solutions that can be adopted in new developments. Practical guidance on other sustainable construction principles for planners and developers can be found at www.sustainable-construction.org.uk. An online sustainable construction checklist has been developed by West Midlands Regional Assembly and Advantage West Midlands to assess to what extent a development site proposal will deliver on the different aspects of sustainability, visit www.checklistwestmidlands.co.uk.

Developers who install renewable energy solutions in a proposed development are more likely to gain a competitive edge in the market, not only in preparing themselves for future legislation but by offering potential customers the benefits of renewable energy. Benefits include cheaper fuel bills, increased security and reliability of energy supply, with the possibility of an income from selling excess energy produced back to the National Grid.

This Practice Note therefore provides guidance to developers on how to incorporate technology relating to renewable energy in the design of new developments.

POLICY CONTEXT

There are now many factors encouraging developers to adopt more sustainable construction practices, and for these to be promoted more effectively through the planning system

- The Code for Sustainable Homes was introduced by the Government in April 2007, its ultimate aim is for all new homes to be zero-carbon by 2016; the generation of renewable energy will play a major role in achieving this target. The Code is currently voluntary, except for Housing Associations; however, it is proposed that a mandatory rating against the Code will be required for all new homes from April 2008.

- *"Sustainable development is the core principle underpinning planning"* (from the opening paragraph of the recently updated Planning Policy Statement 1).

- The landfill tax, aggregates levy, climate change levy, stamp duty exemption for deprived areas, have all been introduced to provide economic incentives.

- Forthcoming legislation including the Energy Performance of Buildings Directive and Updates to Part L of Building Regulations and the Implementation of the Sustainable and Secure Buildings Act will increase minimum standards relating to sustainable construction.
- Planning Policy Statement 22 'Renewable Energy' (PPS22) states that: *Local authorities should consider energy issues before granting planning permission for all new developments. The decisions made in designing and developing the built environment now will have an impact upon the extent to which some of these technologies and design measures can be used in the future.*

- Wyre Forest District Adopted Local Plan states that the design of new development within the District will have significant implications for natural resources and energy conservation. Energy Conservation is one of the Objectives and the District Council promotes energy efficiency in building design and layouts. Policy D.6 states that where practicable, the design of new development should incorporate the utilisation of sustainable energy sources, including solar energy, wind energy and heat recovery.

- The Council's adopted Supplementary Planning Guidance on Design Quality includes a section on sustainable residential requirements and encourages opportunities for sustainable energy sources to meet development requirements.

- The Council's adopted Supplementary Planning Document (SPD) on Planning Obligations states that major planning applications should demonstrate that they have considered the incorporation of renewable energy sources, which would preferably be generated on site. The Council will seek to improve the energy efficiency of new development with the use of Section 106 Planning Obligations in appropriate circumstances.

BENEFITS ASSOCIATED WITH RENEWABLE ENERGY SCHEMES

The environmental benefits of renewable energy are well publicised as media coverage, awareness and government targets related to climate change increases. However, the benefits of renewable energy are much further reaching than reducing carbon dioxide emissions and improving air quality.

The installation of renewable energy is a desirable feature for buyers in a competitive property market. Offering integrated renewable energy in proposed developments will give the future occupant of a development cheaper fuel bills and increased reliability of supply, with a potential income for the land owner as excess electricity can be sold back to the grid.

The application of renewable energy systems boosts the local economy, with job creation both within the manufacture and installation of the systems, with possible indirect marketing of the local area as it is seen as forward looking and 'green', bringing about community pride. There are also longer term health and quality of life benefits associated with improvements in air quality and mitigation against climate change.

TYPES OF RENEWABLE ENERGY

Renewable energy is commonly envisaged as stand-alone schemes such as wind farms, hydroelectric dams or industrial scale biomass plants, however building integrated renewables (integrated within the built environment, both new build and retrofitted to existing buildings) can be used in a proposed development.

The following section sets out the various types of technologies which are currently available. More detailed advice on the range of renewable energy technologies referred to within this Practice Note can be found within the Technical Annex of The Companion Guide to PPS22
(visit www.planningportal.gov.uk/england/professionals/en/1021020428382.html)

Solar Photovoltaics

Solar photovoltaic systems (commonly referred to as solar panels) convert sunlight into electricity; the panels can be mountable to an existing substructure e.g. a broadly south facing roof or can be used in a building material (building-integrated photovoltaics) in their own right e.g. photovoltaic roof tiles.

It is a common misconception that photovoltaic systems will perform poorly in the British climate; research has shown that the lower temperatures and the colour of light received in the UK allow solar photovoltaics to operate more efficiently. Active photovoltaic systems have no moving parts so little maintenance is required and systems are usually guaranteed to last 20-25 years.

In terms of capacity, generally a 1 kWp PV system will produce 750-800 kWh of electricity per year. The average household uses 3300 kWh of electricity in lights and appliances, but energy efficiency measures within a development are capable of reducing this to 1500 kWh per year. A 2kWp system could therefore provide an occupant with all their electricity requirements and is of the right size for a domestic roof. For more information on energy efficient measures visit http://www.energysavingtrust.org.uk

Generally, photovoltaic systems do not require planning permission unless the property is in a conservation area or if the property is a listed building. Planning permission is required if installed on an industrial or commercial building. Although in most cases planning permission is not required, careful consideration is needed when siting the installation - orientation, shading and the temperature of the photovoltaic (PV) elements all impact on the amount of electricity generated from the installation.

Solar Water Heating

Solar water heating systems use the sun's thermal energy to heat water. The technology is well developed with a large choice of equipment to suit many applications.

In domestic developments there are three main components of the solar hot water system; solar panels or collectors, a heat transfer system to collect heat to heat the water and a hot water cylinder to store the hot water that is heated during the day and supplies it for use later. There are two main types of collector: flat plate systems - or evacuated tube systems. Ideally the collectors should be mounted on a south-facing roof, at an elevation of between 10 to 60°. The panels can be bolted onto the roof or integrated into the roof with lead flashings.

Available space is an important factor when deciding upon the viability of a solar hot water system, 3-4 square metres of southeast to southwest facing roof receiving direct sunlight for the main part of the day is needed, with space to locate an additional water cylinder if required. The existing water system needs to be considered as some combi boilers are not suitable. Advice should be sought from a competent accredited installer who will assess the developments needs.

Installing a solar hot water system can provide a domestic development with a third of the development's hot water needs. The average domestic system reduces $C0_2$ by around 350kg per year and will generate about £40 a year reduction in hot water bills, depending on the fuel replaced.

Generally planning permission is not required if installed on a dwelling, unless the property is listed or is within a conservation area. However permission is required if installed on an industrial or commercial building. Where possible, solar water heating systems should be placed on roof areas not visible to the road or sight line of other buildings. Some systems can be integrated flush to the roof.

Biomass

For small scale domestic developments fuel used in biomass applications is usually in the form of wood pellets, wood chips or wood logs. It is a carbon neutral process as the CO_2 released when energy is generated from biomass is balanced by that absorbed during the fuel's production. Biomass also contributes to waste management as less waste is sent to landfill.

There are two main ways of using biomass to heat a property: stand alone stoves to heat a room (fuelled by logs or pellets, generating a 6-12kW output) or boilers connected to a central heating and hot water system (which are generally larger than 15 kW). There are many options available, with automatic pellet and wood chip systems a more expensive selection. A biomass powered boiler could save a domestic development around £200 a year in energy bills and around 8 tonnes of $C0_2$ per year.

It is important to take into account the amount of storage space for fuel and access available to load fuel into the boiler. The flue must also be designed specifically for wood fuel appliances and there must be sufficient air movement for proper operation, an accredited installer will be able to provide more detailed advice. Unlike other forms of renewable energy, biomass systems require you to pay for the fuel. Fuel costs generally depend on the distance from your supplier and whether you can buy in large quantities.

The most common biomass technologies to be found in urban areas are heating schemes for individual properties (generally residential) or Combined Heat and Power schemes serving larger developments. Individual biomass heating schemes may be appropriate in rural villages but are not very well suited to urban areas, due to limited space being available to store the fuel. Domestic biomass boilers also require more room than standard boilers and are unlikely to fit into small properties.

Planning permission is not required for biomass heating stoves/boilers or for combined heat and power systems themselves. However, exhaust gases for both systems require a flue vent that rises above the roofline of the building. Planning permission may be required for the flue vent depending on its height above the roofline. Listed Building Consent is also necessary where installed on a listed building.

Wind Turbines

Wind turbines use the wind to generate mechanical power for electricity generation. Wind turbines are defined by the size (diameter) of the rotor and rated power or capacity in kilowatts (kW) or megawatts (MW).

There are a large number of different wind turbines on the market to suit a development's needs, ranging from small battery charging units with rotor diameters of less than a metre to very large wind turbines with rotor diameters greater than 100 metres with a capacity of several megawatts that can be connected to the national electricity grid. The choice of turbine depends on the site chosen and the scale of development required.

These will require planning permission if mounted on a property and if the pole and turbine exceed 3 metres in height if free-standing.

The issues to be taken into consideration include:

- The average wind speed at the site
- The uneven and turbulent wind patterns that occur near buildings and other obstacles
- The potential visual impact on important public viewpoints and on local ecology
- The potential for noise impact on neighbours
- Any land designations (such as Landscape Protection Area, Green Belt and Conservation Areas)

You are advised to seek advice from a Planning Officer if you are thinking of applying for permission for a wind turbine.

Micro Hydro Power

It is possible to harvest electrical or motive power from a small water course. Liaison between developers, planning authorities and the Environment Agency is needed in the early stages of planning, as there is some potential for environmental improvements through technical measures. Details of its size and position will need to be provided.

Ground Source Heat Pumps

Ground sourced heating uses underground pipes or boreholes to transfer heat from the ground into a building to provide space heating and in some domestic cases hot water.

When considering a ground source heat pump it is important to take into account the amount of space needed for the system. The ground pipe system can be horizontal or vertical. For horizontal systems, a coiled pipe network is buried at around two metres depth below ground level, thus requiring a large area of open space depending on the size of the system. For vertical systems, the pipes are placed in holes bored straight into the ground to a depth of 15 to 150 metres depending on ground conditions and size of system.

The heat pump can replace the boiler in a single house but in larger non-domestic buildings it is likely to be part of the heating solution. The optimal use of the heat pump system is with under-floor heating, as the lower temperatures make the operation of the heat pump more efficient. Payback times for a ground source heat pump will be more favourable in areas where gas is unavailable.

These do not require planning permission provided that the trench/borehole is within your domestic garden if installed on a residential property. If such technology is to be used on commercial or business premises you are advised to check with a Planning Officer before carrying out the works, to establish whether planning permission is required.

FURTHER GUIDANCE

Improving the energy efficiency of your property will maximise the sustainability of your development and should always be considered before investing in renewable energy technologies.

For further detailed advice or information on grants for integrating renewable energy into a development please visit the following websites:

Visit www.est.org.uk or call the Energy Efficiency Advice Centre on 0800 085 0289 to take a Home Energy Check and identify efficiency measures for your home. You may be eligible for a discount or grant on insulation or a heating system.

Visit www.lowcarbonbuildings.org.uk, or call 0800 915 0990 for more information on grants for integrating renewable energy into a development. To be eligible for a grant from the Low Carbon Buildings Programme you must, where possible, install loft and cavity wall insulation, central heating controls, and low energy light bulbs.

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