FINAL REPORT

Planning and Climate Change in Crawley

A report for Crawley Borough Council by the Energy Centre for Sustainable Communities

Report written by:

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Report

1 Introduction

Climate Change is widely recognised as one of the most fundamental challenges affecting our future, the effects of which are being seen in changes to weather patterns, rising sea levels and an increased frequency and intensity of extreme weather events. The main human influence on global climate is main

emissions, 81%, are from the built environment (combining domestic, industrial and commercial emissions) and hence this forms the scope of the study. It should be noted that the data below does not include emissions from aviation.

Figure 1 Tonnes of CO_2 by Sector. (Defra, November 2006. End user summary 2004).

The impacts of Climate Change in Crawley are likely to be felt through an increase in extreme weather events such as flooding, droughts, heat waves, severe storms and winds. There is already some evidence of such events with severe flooding in 2000: over 600 homes were flooded in Maidenbower and Pound Hill when the Gatwick Stream overflowed due to increased flows and surface run off. Conversely, in 2003 and again in 2006, the town suffered severe droughts with record low levels being experienced at supply reservoirs. Crawley normally receives its water from Weirwood Reservoir, but in 2006, water had to be pumped from Portsmouth to prevent standpipes from being used. The 2003 heat wave that affected northern Europe affected Crawley's infrastructure with local train lines beginning to buckle and the melting of local road surfaces.

1.3 Where Crawley is now

1.3.1 Key initiatives

The Council responded initia1Tf00

- One of the Council's sites, the K2 leisure centre, has a CHP unit installed to provide heat and power and a rain water harvesting system is

2 The policy context for Climate Change and Planning

The government has recognised the important role that spatial planning has to play in effective action to tackle climate change. Spatial planners can use their role of facilitating the provision of new houses, jobs and infrastructure to shape places that have lower carbon emissions and are resilient to changes in climate.

Although building regulations will inevitably play a large part in reducing the emissions from individual dwellings, the Department for Communities and Local Government is increasingly looking to local planning authorities to provide the framework to integrate new development within other programmes that can influence the nature of places and how they function.

Below is a review of current policy that will need to be considered by Crawley in preparation of its SPD on Planning and Climate Change.

2.1 National Policy

2.1.1 PPS 1: Delivering Sustainable Development (2005)

PPS 1 sets out the overarching planning policies on the delivery of sustainable development through the planning system. It emphasises that Sustainable Development - ensuring a better quality of life for everyone, now and for future generations - should be the core principle underpinning planning.

It states that "Development plan policies should take account of environmental issues such as: mitigation of the effects of, and adaptation to, climate change through the reduction of greenhouse gas emissions and the use of renewable energy…"

2.1.2 Draft supplement to PPS 1: Planning and Climate Change (2006) *(N.B. This PPS is currently only available in draft form and therefore the details below relate to the draft PPS)*

In December 2006 the Government published a draft PPS on Planning and Climate Change, that, when adopted in late 2007, will become a supplement to PPS 1: Delivering Sustainable Development.

The draft PPS on Planning and Climate Change sets out Key Planning Objectives that planning authorities should deliver through their spatial strategies, including making "…a full contribution to delivering the Government's Climate Change Programme and energy policies, and in doing so contribute to global sustainability".

The draft PPS states that when identifying i d 9 8 5 . 3

development and promoting sustainable transport choices, including reducing the need to travel and providing alternatives to car use.

2.1.5 PPS 7: Sustainable Development in Rural Areas (2004)

PPS 7 sets out the Government's planning policies for rural areas. A Government objective for rural areas is to promote more sustainable patterns of development by:

- focusing most development in, or next to, existing towns and villages
- preventing urban sprawl
- discouraging the development of 'greenfield' land, and, where such land must be used, ensuring it is not used wastefully
- promoting a range of uses to maximise the potential benefits of the countryside fringing urban areas
- providing appropriate leisure opportunities to enable urban and rural dwellers to enjoy the wider countryside.

2.1.6 PPS 9: Biodiversity and Geological Conservation (2005)

PPS 9 sets out planning policies on protection of biodiversity and geological conservation through the planning system. A government objective is to promote sustainable development by ensuring that it is promoted through the conservation and enhancement of biological and geological diversity.

It recognises that over time the distribution of habitats and species, and geomorphological processes and features, will be affected by climate change and such change will be need to be taken into account in the development of planning policy.

2.1.7 PPS 10: Planning for Sustainable Waste Management (2005)

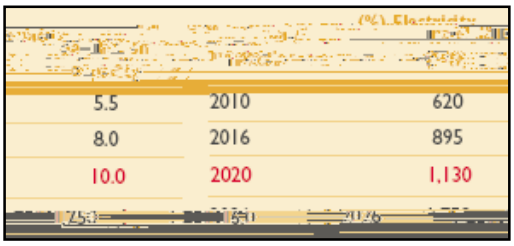
III. the likely increase in pressure on resources with climate change;
IV. the way that the distribution of nationally or regionally significant species and habitats may alter with climate change, and the effects of biodiversity and nationally or internationally designated areas;
V. the need to consider possible adaptation options for vulnerable areas, while understanding the uncertainties inherent in projections of the impacts of climate change. In the longer t h e

The following principles should be adhered to by Local Planning Authorities when preparing their local development framework:

- LPAs should prepare Local Development Documents (LDDs) that set out policies for the allocation of sites and the control of development which avoid flood risk to people and property where possible and manage it elsewhere, reflecting the approach to managing flood risk in this PPS and in the RSS for their region
- Where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, LPAs should consider whether there are opportunities in the preparation of LDDs to facilitate the relocation of development, including housing to

- Through the spatial planning system supporting low carbon living
- Establishment of a Climate Change Commission to consider how local leadership can drive change

Table 1 South East Regional Renewable Energy Targets (The South East Plan)

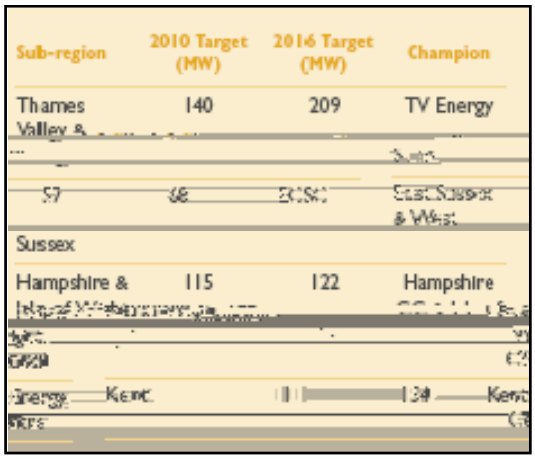


5.5	2010	620
8.0	2016	895
10.0	2020	1,130

Policy EN4 Sub-regional targets

The sub regional target for electricity generation from renewable sources is in table 2.

Table 2 South East Sub Regional Targets (The South East Plan)



Sub-region	2010 Target (MW)	2016 Target (MW)	Champion
Thames Valley &	140	209	TV Energy
Sussex			
Hampshire &	115	122	Hampshire
Kent			Kent

Local Development Documents should seek to contribute to the achievement of these targets. This should include:

1. Undertaking more detailed assessments of local potential
2. Encouraging small scale community-based schemes
3. Encouraging development of local supply chains, especially for biomass
4. Raising awareness, ownership and understanding of renewable energy

Policy EN5 Location of Renewable Energy Development

This policy states that renewable energy, particularly wind and biomass, should be located and designed to minimise adverse impacts on landscape, wildlife and amenity.

Policy EN6 Development Criteria

LDFs should support in principle the development of renewable energy. Local Development Documents should therefore include criteria-based policies that, in addition to general criteria applicable to all development, should consider the following issues:

1. The contribution the development will make towards achieving national, regional and sub-regional renewable energy targets and carbon dioxide savings
2. The potential to integrate the proposal with existing or new development
3. The potential benefits to host communities and opportunities for environmental enhancement

- Energy/CO_2
- Water
- Materials
- Surface water run-off
- Waste
- Pollution
- Health and well-being
- Management
- Ecology

The Code uses a sustainability rating system from level 1 to level 6. Level 1 (or one star) is the entry level (set above building regulations) and level 6 (or six stars) is the highest level reflecting exemplar development in sustainability terms.

The code offers a degree of flexibility in how developers can meet each level. However, minimum standards exist for a number of the categories as shown in table 3.

2.4.2 Building a Greener Future: Towards Zero Carbon Development

The government held a consultation from December 2006 until March 2007 entitled 'Building a Greener Future: Towards Zero Carbon Development'.

The consultation document proposed that zero carbon housing should be possible within ten years.)

To achieve these ambitious targets the government acknowledges that there are three main policy levers that can be used:

1. The planning system
2. The Code for Sustainable Homes
3. Building Regulations

It acknowledges that the planning system sets out the overall framework for development and building regulations can determine the environmental performance of individual buildings.

The proposals in table 4 were confirmed in a Policy Statement called Building a Greener Future[4] released in July 2007.

It is worth noting that the zero carbon targets apply to housing only. The Government has yet to describe how it intends to reduce carbon emissions from the non-residential sector.

2.5 Conclusion

The forthcoming PPS on Planning and Climate Change, expected in late 2007, will help to clarify the position of government expectations of LPAs with regards to Climate Change. At present there is no clear guidance as to what LPAs can demand in terms of maximum and minimum energy efficiency and renewable energy standards in new development. The draft PPS states that "planning authorities should…expect substantial new development to gain a significant proportion of its energy supply on-site and renewably and/or connect to a decentralised, renewable

energy "planning

achieved through a combination of both building regulations and the planning system and LPAs should prepare policy accordingly. At present, there is no guidance relating to the non-domestic sector but the government has aspirations to publish such guidance.

Finally, it is also evident that planning is encouraged to give greater consideration to the inclusion of measures in the design of new development that provide resilience to predicted changes in our climate.

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4 Sustainabl

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The review of techn
energy technologies

Table 6 Overview of tecl

Energy Efficiency
Renewable Ener Technologies
Sustainable Ener Technologies
Climate Change Adaptation Opti

4.2 Renewable Energy Technologies

Using renewable energy sources ensures that no net carbon dioxide is released when energy is produced and helps to mitigate the effects of climate change. Renewable energy sources can be available on-site (such as wind and solar energy) or produced locally (such as biomass). Where renewable energy is produced locally, its use ensures increased security of supply and can result in greater energy price stability, making it easier to predict future energy costs.

The presence of renewable energy generating equipment such as solar panels or wind turbines also

4.2.3 Solar Thermal

Solar thermal panels use the heat of the sun to generate hot water. There are two main types of solar thermal panels: flat plate collectors and evacuated tube collectors.

Evacuated tube collectors tend to be more efficient, but they also tend to be more expensive. A solar thermal system usually includes a collector/panel, a pump to circulate the heat and a large cylinder/tank, where the heated water is stored.

4.2.3.1 Benefits

On average the annual output of an evacuated tube collector is approximately 550kWh/m^2, saving approximately 105 kg/m^2 of CO_2 per year. CO_2 savings are based on the solar thermal panels displacing gas-heated hot water. If displacing hot water heated using electricity then the CO_2 savings will be higher.

4.2.3.2 Potential Problems

As with solar PV panels, the visual impact of solar thermal panels, especially on pitched roofs need to be considered. Planning permission is not normally required if the solar collectors do not project significantly beyond the roof slope. However, exceptions may apply for systems on listed buildings or in Areas of Outstanding Natural Beauty.

It must be ensured that shade from surrounding obstructions such as trees or nearby buildings does not become a problem and that the roof is strong enough to withstand the weight of the solar thermal panels.

4.2.3.3 Economic Impacts

A solar thermal evacuated tube size of 3m^2 (suitable for a typical domestic installation) costs approximately £3,000, which includes the capital cost and installation cost. The lifespan of an evacuated tube is approximately 20 to 25 years. The maintenance costs associated with solar thermal panels are log2n5.3274972n.9802790D09D0.0014Tc(25)Tj/TT11Tf1.01640TDhy

4.2.3.4 Opportunities

Solar thermal collectors need to be installed on an unshaded South East to South West facing roof for optimal performance. Collectors can be installed on pitched roofs, vertically or mounted at an angle onto flat roofs. It is recommended that the cylinder be located as close to the collectors as possible to reduce heat loss. As solar thermal collectors provide hot water they are more suitable for buildings with a significant hot water demand e.g. residential buildings and catering and leisure facilities

4.2.4 Ground Source Heat Pumps

A ground source heat pump (GSHP) extracts low grade heat from the ground (via coils buried in the ground) and the heat is pumped around a building to provide space heating. A heat pump raises the temperature to the point where it can provide space heating or hot water. GSHPs require an input of electrical energy to drive the pumps. The difference between the energy input and heat output is expressed at the heat pump's coefficient of performance (COP).

There are three types of closed loop system:

- Horizontal
- Vertical
- Lake/Pond

These are illustrated in Figure 7.

Figure 7: Ground Source Heat Pumps (www.eere.energy.gov)

power the pump, three to four kW of heat is produced.

4.2.5.2 Potential Problems

An ASHP has a maximum noise level of 63.8 decibels (slightly louder than normal conversation) therefore it is preferable that they are located in an area that is not frequently occupied, such as outside. In housing developments, care must be taken in positioning ASHP to avoid noise disturbance to neighbouring properties.

Although this technology has the advantage of being easier and cheaper to install when compared to GSHPs as they require no excavation, the efficiency of air source heat pumps varies with external air temperature which fluctuates more widely than ground temperature.

4.2.5.3 Economic Impacts

An 8kW ASHP has a capital cost of approximately £13,000 fully installed, and would be suitable for a large house. There are minimal maintenance costs associated with it.

4.2.5.4 Opportunities

As with GSHPs, ASHPs are primarily suited to:

- Off gas network properties
- Properties with underfloor heating

4.2.6 Biomass

Biomass refers to the use of a wide variety of organic material such as wood, straw, dedicated energy crops, sewage

It is necessary to comply with the Clean Air Act (1993), which states that wood can only be burnt on exempted appliances. There are also some other regulations that relate to the installation of solid fuel heating systems that would require compliance including BS EN 303 Part 5 (1999).

Ash disposal and de coking arrangements need to be considered and there needs to be a reliable supply of wood fuel in the area. If an automatic wood fuel feeding system is not being used, it is necessary to consider how the wood fuel will be fed into the boiler.

4.2.6.3 Economic Impacts

The cost of biomass boilers varies depending upon the type of fuel used in the boiler i.e. wood chip, pellet or logs but would be in the region of £6,500. The cost includes the installation, flue and commissioning and is in

Further detailed information on CHP is shown below. Please note, as Micro CHP units are not yet currently available in the UK the details below relate to commercial sized CHP units.

4.3.1.1 Benefits

The higher efficiency of a CHP unit means that there are lower carbon dioxide emissions from a CHP unit than the alternative of supplying heat from a gas-fired boiler and electricity from the national grid. Generating electricity near its use also reduces the loss of power which can occur from transmitting electricity over the national grid from a power station located a long way from the point of electricity use. If biomass is used as a fuel source, it is classified as carbon neutral.

4.3.1.2 Potential Problems

A flue will be required when installing a CHP unit and planning permission is often required and it is necessary to comply with the Clean Air Act (1993). For larger units, there may also be noise and vibration issues that will

4.3.1.4 Opportunities

CHP systems are most feasible where there is a significant and constant demand for heat. If used in combination with district heating networks, compact

4.4 Climate Change Adaptation Options

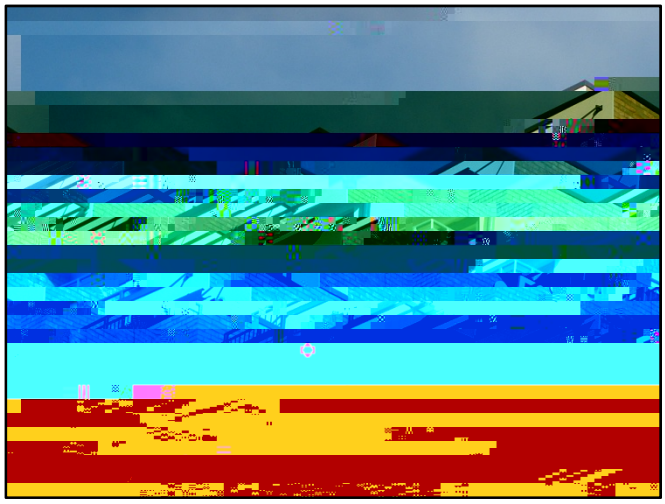
A major consequence of Climate Change will be more extreme weather events; this study identifies three likely key scenarios which will require adaptive design in new developments in Crawley:

1. Elevated summer temperatures and an increased likelihood and severity of heatwaves;
2. Increased levels of winter rainfall and year round increased rainfall intensity leading to increased risk of localised flooding;
3. Reduced summer rainfall and risk of increased severity and duration of drought.

It is imperative that the planning system recognises these likely impacts and creates a built environment that is resilient to both our present and future climate. A review of adaptation methods is below.

4.4.1 Natural Ventilation and Cooling

With expected higher summer temperatures, buildings should be designed to reduce the need for active cooling (air conditioning) by reducing internal heat loads and utilising passive cooling measures such as solar shading, thermal mass and effective natural ventilation systems.



Measures include:

- Shading devices such as blinds and external shading (often referred to as brise soleil), as shown in figure 12
- Surface treatments that reflect heat in

Energy

Green roofs are roofs that comprise of vegetated material, or roofs that have vegetated spaces. The most commonly used vegetation is sedum.

There are two types of green roof:

1. Extensive – these have fewer drainage layers and a simpler construction, meaning they are cheaper and more suitable for larger roofs where weight is a greater consideration
2. Intensive – these are more traditionally regarded as roof gardens and are primarily designed for aesthetic rather than economical value. It has a more complex drainage system than an extensive green roof.

4.4.3.1 Planning Considerations

There are some maintenance issues associated with green roofs, especially in the early stages of establishment. For new developments, it should be clear who the maintenance responsibility lies with and where possible this should not be passed on to the homeowner (in the case of residential). Unless a manicured appearance is required, there will be very little maintenance after years one and two[15].

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4.4.4 Flood Resilient Construction

Where development is required on floodplains it is important that construction is as resilient as possible to the flooding that may occur.

energy savings. Ideally all water fittings should be grouped around the hot water source, with the most frequently used fittings being the nearest. This minimises the 'dead-leg' i.e. the amount of cold water that has to be drawn off each time a tap or shower is used. When designing pipe layout, hot water pipes should be placed above cold water pipes to reduce heat transfer.

4.4.6.1 Planning Considerations

There are few planning considerations associated with water conservation measures.

4.4.6.2 Economic Impacts

The cost of water conservation measures varies depending upon the measure being installed. Some of the measures described above are no-cost for example, plumbing and heating design and management. Others, such as water efficient toilets, have a very low marginal cost.

Cost savings will be made through water savings in buildings that have water meters installed.

4.4.6.3 Environmental Impacts

For minimal investment the associated savings are high. Fitting spray taps for example can save up to 80% of the water and energy used in filling hand basins and installing dual-flush and low-flush toilets can save more than half of the water used for flushing toilets.

4.4.6.4 Technological Considerations

The technological considerations depend upon the measure being installed. It should be ensured that all measures are suitable for the use of the appliance e.g. spray taps will be less effective if they are than e.g. ò ɢ سه œf ضŸ ò ʰ2ط M

4.4.7.3 Environmental Impacts

Rainwater harvesting systems reduce

4.4.8.3 *Environmental Impacts*

The use of a greywater system reduces the use of potable water and the energy and environmental costs associated with its

- Energy efficiency measures to reduce the electricity demand should be considered such as energy efficient lighting and appliances
- Solar Thermal is likely to be appropriate to meet a proportion of the hot water demand
- Biomass boilers or ground source heat pumps to meet heating demand are likely to be feasible
- As the daytime electricity demand is low, solar photovoltaics are likely to be less feasible
- Where sufficient wind resource exists, wind turbines can generate useful amounts of electricity during times of peak electricity demand
- Water conservation measures such as water efficient toilets and spray taps should be considered

- Monitoring and Emissions Reporting
- Customer Services and Billing

The setting up of an ESCO specifically for the delivery of an individual project can allow investment from interested parties (e.g. the developers or Council) and provide an associated return on investment for these parties. Alternatively the ESCO provider can have full ownership of the project and thus take on all of the financial risks.

An ESCO will typically consider a community energy scheme over the course of 20-30 years to allow capital costs of setting up the community energy scheme to be recouped and profit accrued. The ESCO can do this by running the community energy scheme, providing operation and maintenance to the project and selling energy to customers. The ESCO will purchase the fuel required to run any CHP or boilers servicing the project and will sell heat and electricity to the customers of the scheme. The prices of heat and electricity to consumers are usually guaranteed to be below the comparative prices charged by the leading energy suppliers in the area.

Where CHP is incorporated into the community energy scheme it will typically be used to provide the base energy demand of the scheme, with boilers and electricity from the national grid being used to provide top up and back up when required. At times when the electricity produced by the CHP engine is not required by the customers, it will be exported back to the national grid and will generate an additional income for the ESCO.

The benefits to customers of buying heat and electricity from a community energy scheme supplied by an ESCO are:

- No maintenance costs associated with individual boilers
- Dwellings do not have discrete boilers
- Prices of heat and power are guaranteed to be lower than the cost of supply from other local uboilers Not

5.1.3 Opportunities

When considering the opportunities for setting up an ESCO the Council will need to consider the following issues:

- The overall purpose and objectives of the ESCO
- Type(s) of technology to invest in i.e. renewable energy, energy efficiency, sustainable energy or a combination of technologies
- Preferred Company form e.g. Limited Company, Limited Liability Partnership, Community Interest Company etc.
- Investment size dependant on the budget that the Council otc.

5.3 Heads of Terms in Land and Asset disposal agreements

Where the Council is selling land for development it is reasonable to use this as an opportunity to negotiate with the prospective developer with a view to obligating them to implement sustainable energy or climate change adaptation measures as part of the land sales agreement.

An

With both models upfront cash (or equity) is required. The source of this equity can be either from the Council's own capital, prudential borrowing, grants or a combination of all three sources. In invest-to-save models the capital funding is generally put into energy efficiency measures to *save* cash. In invest-to-generate models the capital investment is put into renewable energy and/or CHP projects to *generate* cash. Both types of model can be combined to maximise the return on the investment.

The Council needs to consider the circumstances under which it may invest in sustainable energy measures either on its own estate or on developments within the Borough. By taking this approach the Council can establish financial criteria (such as payback times or rates of return) to appraise opportunities and the risks involved.

5.6 Conclusion

Local authorities have a wide remit to deliver action on Climate Change mitigation and adaptation, and there are a number of mechanisms that can be used to assist. It is important that the Council decides which delivery mechanisms are appropriate to its own objectives and capabilities. For example, with ESCO development, some local authorities may have the expertise and resource available to establish and run an ESCO. In other cases, the local authority may partner the private sector in a joint venture ESCO.

In the case of Crawley, the Council has an opportunity to consider contributing towards the capital costs of the energy solutions on new developments and is likely to be able to justify a lower return on this investment than a purely commercial private sector investor. The Council is recommended to carry out further work to determine an optimal solution based on the current policy agenda of the council and

6 Opportunities for Crawley

Crawley Borough covers 4,497 hectares and is situated in the north eastern part of the County of West Sussex. Horsham District abuts the town on the western side, Mid Sussex District is to the south and east whilst the County of Surrey abuts the town to the north.

Mainly urban in character, Crawley is surrounded by countryside and a small part of the southern area is within the High Weald Area of Outstanding Natural Beauty. It lies adjacent to the M23 and close to the M25 and is on the main railway line linking London to the coast. Gatwick Airport, one of the world's major international airports, is located within the Borough.

Crawley has its origins in the Middle Ages or even earlier. However, the majority of its growth and its character is derived from its designation as a New Town in 1947. Crawley was one of eight new towns established by the Government after the war to stem the increasing congestion and outward sprawl of London and to provide a better quality of life for Londoners living in the inner, overcrowded areas of the city. The New Town was to provide employment and good quality housing in a green

6.1.2 Options for securing a more sustainable energy supply

The Council has a strong policy basis to demand strict environmental measures from BAA on the Gatwick Airport site. The current Sustainable Development Strategy includes an objective for reduction in energy use on site[32] and in new development[33].

With the airport being a twenty-four hour operation with a constant heat

Figure 18: Image showing areas where a wind turbine of 20m

6.2.2 Options for securing a more sustainable energy supply

With redevelopment and intensification within Manor Royal and County Oak, the opportunity for CHP should be investigated. It is unlikely that there will be a significant all year round heat and hot water demand for office space but some of the industry in the area may have a heat or hot water demand, meaning CHP becomes more feasible. With much of the industry being airport related, there is likely to be a twenty four hour, seven day demand, which is optimal for CHP. If the airport is extended into the safeguarded land at a later date it may be possible to have CHP on a community network incorporating both the airport and Manor Royal and County Oak.

Rather than large scale redevelopment at one time, Manor Royal and County Oak are undergoing incremental change as plots come forward. As there is no one developer that is likely to take the lead on the development of an ESCO, this would provide an opportunity for the involvement of the Council to promote CHP and assess the viability of setting up an ESCO.

Manor Royal and County Oak should become subject to an SPD that details the required levels of sustainable energy. The Council should consider using the Building Research Establishment's Environmental Assessment Method (BREAAM) that assesses the environmental performance of any building, giving a rating of either Pass, Good, Very Good or Excellent. BREAAM considers environmental impacts in eight broad areas, one of which is energy. Ideally all new development in the area should be rated as BREAAM Excellent for energy.

Renewable energy should be incorporated into new development; the amount will be dependent upon the policies adopted by the Council through its SPDs. As with all of Crawley, large scale wind turbines are likely to affect the radar signals at Gatwick Airport, and therefore it is likely that any wind power would need to be building integrated and on a small scale. Office space has a high daytime electricity demand and therefore solar photovoltaic panels are likely to be feasible depending on the orientation of the building. With new development, solar PV can be designed in at an early stage and can be With

Paragraph 6.10 and 6.11 of the Issues and Options for the Joint Area Action Plan are concerned with Sustainable Housing. This includes “implementing environmental measures, including employing sustainable construction methods, providing 10% on site renewables and securing efficient use of water resources”.

The Submission Core Strategy has an objective for the area that “development should be based on maximising the opportunities for the use of sustainable construction methods”. The area will include a high quality mixed use neighbourhood that will comprise of up to 2,500 dwellings, a new neighbourhood centre (potentially including shops, employment floorspace, a community hall, a primary school, a doctor’s surgery, a library, a public house, public open space) andc8003Tj/TT21Tf0.2240TD0.006Tc[

7 Opportunities and the way forward

Chapter 5 considers the roles that a local authority has in delivery on Climate Change, namely as:

- An Estate Manager
- A Service Provider
- A Community leader

It is imperative that the Council considers its responsibilities under all of these roles and makes a choice on appropriate delivery mechanisms. Delivery will involve having a strong foundation of both Corporate and Planning policy. Recommendations in these areas are shown below.

7.1 Corporate Policy

A workshop was held with officers in July 2007 to consider actions that the Council could take corporately to impact on Climate Change. Following the workshop, some suggestions for action are outlined below that will allow Climate Change to be incorporated into corporate policies and initiatives.

7.1.1 A clear strategic framework is required

For effective delivery on Climate Change programmes in Crawley, the Council must ensure that it has a clear strategic framework in place. Any Change policies has

The Council has an environmental management system in place and was only the twelfth local authority in the UK to receive the prestigious EMAS accreditation. The environmental management system evaluates, manages and monitors the Council's environmental performance and should therefore be integral to any action on Climate Change.

7.1.2 Partnership working

Where appropriate, partnerships should be formed with relevant organisations such as the Local Strategic Partnership, Local Agenda 21 group, other local authorities, Chamber of Trade and Commerce and the private sector. Suitable partnerships have the potential to bring in additional funding for projects and allow the effective sharing of knowledge and expertise. There is already good practice in this area:

The planning department has a good working relationship with Horsham District Council, as demonstrated by the Joint Area Action Plan currently being developed for the West and North West of Crawley. Crawley's Building Control functions are operated by Horsham District Council through the partnership of 'Sussex Building Control'.

The Environment Unit has been working with the community and local businesses through the Defra funded Climate Challenge programme[37].

The Council should form close working relationships with the other West Sussex District and Borough Councils and the County Council to identify areas for partnership working on Climate Change. This may be in the form of a joint Climate Change Strategy or action plan.

There are a number of energy related businesses in Crawley, such as Utilicom and Ceres Power; the Council should capitalise on this opportunity to learn from leading companies within the energy sector.

Local Area Agreements are a key driver in action at a local level and Crawley should work with West Sussex County Council to use the Local Area Agreement to deliver on Climate Change initiatives, working in partnership with neighbouring local authorities. The West Sussex Local Area Agreement includes a target to reduce total CO_2 emissions from energy use (excluding energy from transport) and the lead partners to deliver on this indicator are the District and Borough Councils in West Sussex.

7.1.3 Financial Structures

The use of innovative financial structures and take-up of available funding streams would ensure that Crawley can deliver g4044TD0.0004Tc92/TT11Tf2.78690TD0Tc8003Tj/TT21TfTf3proj06s.0.0001Tc(can)Tj

carbon technology. CHP systems can actually increase overall delivered energy use while still reducing carbon emissions.

- Energy targets might encourage the use of electric rather than gas fired plant which would increase carbon dioxide emissions.
- An energy target may encourage ground and air source heat pumps over electricity generating technologies such as PV. Heat pumps are most appropriate in buildings with high levels of energy efficiency and low temperature distribution systems located off the gas network (often in rural settings). Compared with a conventional building with an efficient gas boiler, heat pumps can sometimes increase emissions.
- The national calculation methodologies for assessing building performance are based on

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cooling and used for pre-heating and cooling were more cost effective in non-domestic buildings.

- There may sometimes be conflicts between the domestic and non-domestic sectors.

8 Appendix 1: Learning from

8.1.1.4 Expertise required

Internal expertise in the form of the Environment and Sustainability Manager has been required to implement the policy

8.1.4.1 Current Policy

The Council adopted an SPD on Sustainable Design and Construction[40] in March 07. This has a number of policies related to climate change including:

- Energy Efficiency - All housing should meet ecohomes 'very good' (or Code for Sustainable Homes level 3) and commercial properties should meet BREAAM 'very good'. For major developments 50% of properties should meet excellent standards in ecohomes or BREAAM. Passive solar energy ظ Efficiency

During the consultation stage for the SPD the issue was raised about negotiating the polices in the SPD with other deliverables such as affordable housing, however this has not been raised since the SPD was adopted.

The adaptation policies in the report e.g. water resources and flooding are generally accepted by the developers as they feel more confident with these technologies.

8.1.4.6 Outcomes of policy

At the time of the interview (four months after adoption) there has not yet been a development that has met the

8.1.6.3 Resource implications

As the policy is a County policy there was no resource implication in policy development. However, the planning policy officer has spent approximately 5 days to put together briefing notes and introduce the policy. All DC officers have attended a day training session and have a small time implication with each planning application.

8.1.6.4 Expertise required

In the early days of implementation an officer at the County Council would be used for verification of compliance and technical advice. However, as the DC officers

A full list of planning authorities that are implementing renewable energy polices can be found on the Merton Rule Website[46]

8.2.1 Surrey Local Planning Authorities

Crawley borders the Surrey Local Authorities of Mole Valley, Reigate and Banstead and Tandridge to the North. All Surrey Local Authorities are subject to the Surrey Structure Plan policy SE2 that states that development should be designed such that "a minimum of 10% of the energy requirement is provided by renewable resources. The use of combined heat and power or similar technology will be encouraged, and for all developments in excess of 5,000 sq m floorspace should be regarded as the norm. All types of development should incorporate energy efficiency best practice measures in their design, layout and orientation."

8.2.2 Mid Sussex

Mid Sussex's current Local Plan has a number of policies relating to Climate Change such as encouraging renewable energy, energy efficiency and water conservation. These are complemented by an SPD on Sustainable Construction. Although a small number of developers have proactively taken sustainable construction on board the majority still do not implement measures as the policies are lacking 'teeth' (being 'encourage' rather than 'require').

The Council is due to submit its Preferred Options for its Core Strategy towards the end of 2007. This is likely to include prescriptive policies relating to climate change. Mitigation polices include a ramping renewable energy requirement for new development as shown in table 10.

Planning and Climat

Energy Centre for Su

9 Appendix 2: Policy implementation

9.1 Policy implementation methodology

Once a sustainable energy policy and targets for new developments have been put in place, a mechanism for ensuring successful implementation needs to be established. This requires a methodology defined by the Council for developers to measure the performance of proposed developments and demonstrat

Figure 20: Compliance Process for Carbon Emissions Assessment

9.1.2.1 Post Construction Proof of Compliance

The compliance assessment process needs to incorporate mechanisms for ensuring that the constructed building actually delivers the agreed carbon reductions over baseline. This could take the form of requiring proof of purchase such as invoices for renewable energy equipment. Section 106 agreements could be used to ensure on-going energy monitoring.

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Figure 21: A demonstration of an output screen from CPlan (ecsc)

9.1.5 Training

Development control officers will need training to help them successfully implement policy. Officers need to

9.1.6 List of approved consultants

As noted in chapter 3, in many cases developers were lacking the necessary knowledge and required assistance to develop an energy statement. The Council should therefore compile a list of approved consultants who can assist developers.

9.2 Summary of recommendations for implementation of a policy

Table 11 Summary of of ٦

10 Glossary

Air Source Heat Pump (ASHP)	A pump system that transfers heat from outdoor air to indoor air during the winter, and can work in reverse during the summer.
Array	Collection of panels (either solar thermal or PV)
Biomass boiler	A boiler that burns fuels such as wood chips, straw and agricultural

11 List of abbreviations

ASHP	Air Source Heat Pump
CHP	Combined Heat and Power
CLG	Communities and Local Government
CO_2	Carbon Dioxide
CSH	The Code for Sustainable Homes
DC	Development Control
DPD	Development Plan Document
EE	Energy Efficiency
EEBPH	Energy Efficiency Best Practice in Housing (an EST Programme)
ESCO	Energy Services Company
EST	Energy Saving Trust
GCC	Ground Coupled Cooling
GIFA	Gross Internal Floor Area
GSHP	Ground Source Heat Pump
GWh	Gigawatt hours
HVAC	Heating, Ventilation and Air Conditioning
kWh	Kilowatt hour

SHW	Solar Hot Water (aka Solar Thermal)
SPD	Supplementary Planning Document
SPG	Supplementary Planning Guidance
SUDS	Sustainable Drainage Systems
TER	Target Emission Rate
UDP	Unitary Development Plan