



State of Medway Report

Climate Change, Renewables and Flooding

Updated January 2012

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State of Medway Reports

This is one of a series of factual reports that were first produced in 2008 to inform the preparation of Medway's Local Development Framework or LDF. Each deals with a specific topic and draws together available information from a variety of sources.

The reports were intended to establish the current position and a baseline for further work. They also helped in highlighting gaps in the information base.

Each was updated in January 2012 to provide an updated baseline and inform the independent examination of the Medway Core Strategy.

To monitor progress being made on the LDF please regularly check our website at www.medway.gov.uk/ldf.

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1. Introduction

- 1.1 This paper covers the possible impacts of climate change, which will affect both the whole country and the Medway area. It also considers the ecological footprint of Medway in comparison to other areas. It then goes on to discuss the policy context relating to climate change and renewable energy and finally discusses the characteristics of different renewable resources that the Medway area may be able to exploit.

2. Impacts of climate change

- 2.1 As noted within the Stern Review, it has been accepted that the current pattern of (natural) resource use cannot continue because if ignored there will be detrimental impacts on economic growth, human health and the natural environment. Faster development has also hastened

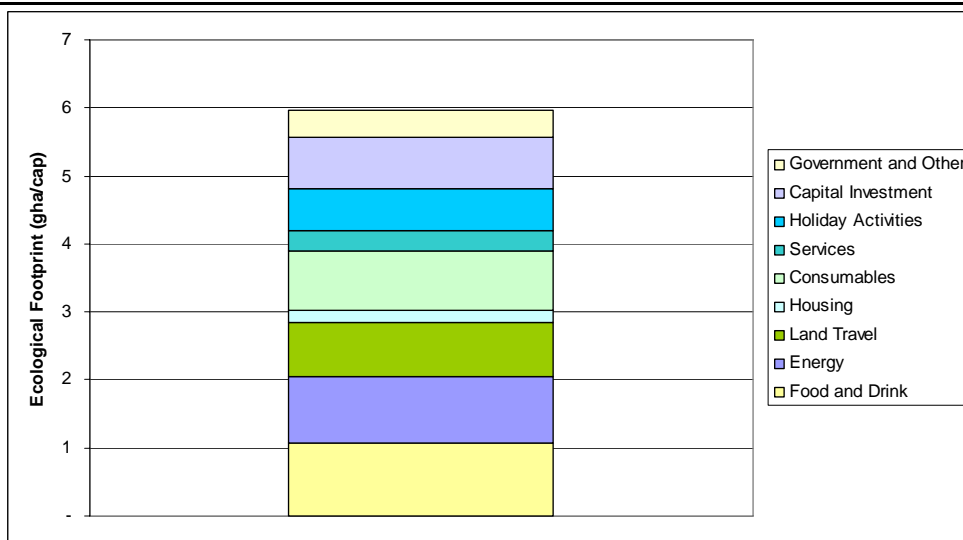
impacts that appear to be occurring at a faster rate and at a greater intensity than any models had previously predicted.

- 2.2 The main impacts predicted across the country of climate change, will be hotter, drier summers and milder, wetter winters with an intensification of urban island effects (general temperature warming). There is also the possibility that there will be higher winds and more severe storms, as well as climate events being of a more extreme nature with hot days having higher temperatures and downpours being more intense, as well as greater levels of coastal erosion and greater frequency and height of tidal surges.
- 2.3 These can have significant affects on the human population, the natural environment and the interaction between the two. The natural environment can be affected in a number of different ways, from a change in the quality and characteristics of different habitats, to different migration patterns and movement of wildlife as climates change to be more or less accommodating. The human environment is affected through where to site services and changing land uses to help mitigate against the direct and indirect impacts.
- 2.4 The former regional development agency SEEDA forecast that the average global temperature has risen by 0.6°C over the past 100 years and that it is expected by 2080 the average annual temperature in the South East could be up 4.5°C over the 1990 average and this would be expected to be higher during the summer.
- 2.5 DEFRA has also published estimates and the best available figures for the South East consider there will be a warming of 1.5-2.5°C by 2050. It also states there will be a change in the distribution of precipitation throughout the year, expecting a decrease in summer by 30-40% and an increase of 15-20% in winter. Models show a predicted rise in sea level of up to 36cm over the same period.
- 2.6 It is predicted that due to isostatic rebound (land tilting) sea levels will rise by at least 6mm a year. Some models have predicted that sea levels around Kent could rise 16cm by 2020 and 74cm by 2080. This along with the increased number of and intensity of heavier rainfall incidents, as well as expected stormy weather mean that it is likely the greatest impact on the Medway area resulting from climate change is likely to be a greater risk of flooding from higher water levels in rivers and surges of sea water being pushed into the estuaries, as well as the possibility of increased coastal erosion around the Peninsula.
- 2.7 There is a simulation model at www.flood.firetree.net that shows the extent different increases in water levels would have across the area. In general, the first areas affected using this would be areas on the peninsula, some of Rochester Riverside and some of St Mary's Island. However the simulation does not take account of new flood defences.

3. Ecological footprint of Medway

- 3.1 Ecological Footprinting is a method that has evolved to give a quantitative figure to the amount of land and water needed to produce all the resources consumed and absorb all the waste generated. This is measured in global acres (hectares) and can be applied at varying scales from an individual through to humanity.
- 3.2 The UK's ecological footprint was 5.4 global hectares per person (gha/person) in 2006. Back in 2001 the footprint per person for the South East was calculated to be 17% higher than the UK average. In 2003 the per capita level for the South East was 6.3 gha and rising at 1.1% per annum.
- 3.3 The ecological footprint for Medway was calculated in 2006 by the Stockholm Environment Institute as being 5.97 gha/person. This is higher than the UK average of 5.4gha/person. As can be seen in the figure below, the largest areas within this are food and drink at 18%, household energy consumption at 16%, consumables at 15% and transport/travel 13% of the ecological footprint.

Figure 1: Breakdown of ecological footprint of Medway



- 3.4 From these results it can be concluded that one of the fastest ways to reduce Medway's ecological footprint would be through more localised sourcing of food supplies, less intensive processing and a reduction in meat content. This could be linked to other strategy aims.
- 3.5 A further way to reduce the impact would be through the introduction and use of more energy efficient appliances. This has become simpler with a coding system now being applied, particularly to electrical

goods. However, this may be hampered by the fact that responsibilities are often split between landlords and utility providers.

- 3.6 Carbon Dioxide emissions for the Medway area have decreased slightly, falling from 1,231kt CO₂ in 2005 to 1,223kt CO₂ in 2006. However, due to rounding of the figures involved and a minimal increase in population, the per capita emissions have stayed the same at 4.9tCO₂. Interestingly, Medway's highest sector for emissions is from the domestic market, with the Industrial and Commercial sector contributing a large amount and the lowest emissions coming from the road transport sector. This reinforces the findings from the ecological footprinting of Medway.
- 3.7 Both the South East region and the Medway area's consumption needs to be stabilised in the short term and reduced in the future. This will need rigorous standards to be applied to new built development, with more sustainable construction methods, greater use of recycled materials and a reduction in consumption and the production of waste.
- 3.8 It is often patterns of consumption and wastage that can have the greatest impact rather than construction. On this basis, it is vitally important that the existing housing stock is well maintained and that patterns of efficiency are increased, particularly in relation to heat insulation and loss; energy usage and water demand.

4. Policy Context

- 4.1 The policy direction in respect of climate change and renewable energy has been developing rapidly. It began with the Rio de Janeiro Conference of 1992 but it has only been in more recent years when the impacts of climate change have become more obvious that policy development has been prioritised.
- 4.2 This is discussed in the following sections.

National legislation

- 4.3 Many of the targets set within government legislation have come from commitments agreed within the European Union.
- 4.4 There is a binding UK target for 10% of total electricity generation to come from renewable sources by 2010 through the EU Renewables Directive. This will be doubled to 20% by 2020. It has also been agreed that only 500mg per kilowatt hour will be allowed in emissions from large scale power plants from 2015, which effectively means all will need to have some form of carbon capture and storage (CCS) technology. In addition €10bn has been committed to fund 12 CCS demonstration plants across Europe.

- 4.5 The Climate Change Act has put into British law targets relating to different areas that will affect the ways in which we mitigate and adapt to climate change, as well as reductions in CO₂ to be achieved by set dates.
- 4.6 The main one within this is a binding target for CO₂ emissions to be reduced to 80% of the 1990 levels. This also includes an interim target of 50% by 2035, agreed by the EU Environment Committee in October 2008. The Climate Change Programme also accompanies this Bill, to give a framework for monitoring and assessing progress towards these targets.
- 4.7 The UK Renewable Energy Strategy is currently going through the process of consultation. Within this the government have laid out how they consider future energy should be provided through a mix of traditional energy sources, with an expanded emphasis on how to provide and increase our level of energy coming from renewable sources, following on from The Energy White Paper published in 2007.
- 4.8 This sets a target of 15% of total energy demand to come from renewable sources by 2020. Currently it is being proposed that energy and heat would need to be provided from renewable sources for 10% of the transport sector, 14% of the heat sector and 32% in terms of electricity generation.
- 4.9 To help encourage the take up of renewable energy schemes the government introduced a system of Feed in Tariffs (FITs). These are particularly intended to encourage the uptake of smaller schemes at a community level, with a limit set at 5MW. Though the number of applications since its implementation last April has significantly increased, it has still not been as expected. It is thought that this is because the cost for householders still tends to be too great.
- 4.10 Although the scheme has been relatively successful, the government have said that it considers the scheme to be unsustainable in its current form. This mainly resulted from the fact that the scheme did not anticipate non-domestic installations until 2013 and resultantly it has been seen that proportionately a large number of applications were coming from larger organisations. As a result a fast track review of FITs was started in March specifically in relation to changing the bandings related to larger developments, such as photovoltaic installations greater than 50kW and farm scale anaerobic digesters up to 500kW.
- 4.11 In addition, the Flood & Water Management Act was brought into law in April 2010, although a number of elements will be enacted through subsequent legislation. Overall the Act will aim to ensure greater security for people and homes from flooding and coastal erosion; better service and greater sustainability. This would be expected to mean security of water supplies and protection of essential supplies through

- droughts, better delivery of major infrastructure projects and improving communities ability to adapt to increasingly severe weather events.
- 4.12 There will be a set of National Standards in respect to SUDs, which are being still worked up by the Environment Agency. These will be in relation to standards that will need to be met for multiple buildings to meet before being allowed to connect to the foul water (sewerage) network.
- 4.13 As well as the above, the policy direction in relation to renewable energy in terms of planning guidance is laid out in PPS22: Renewable Energy and reinforced by the supplement that accompanies PPS1.
- 4.14 PPS1 and the accompanying supplement directs that development should be away from areas that will, or are likely, to be affected by climate change in the future. It should be noted however that the emphasis of these documents are on reducing carbon production and mitigating the impact we have through an increased focus on renewable energy. These documents also consider the possibility of other ways in which to cope with climate change adaptations, such as carbon sinks and Sustainable Urban Drainage Systems (SUDs).
- 4.15 PPS22 relates to planning for renewable energy developments. Within this, it states that LDDs and any necessary SPDs should include policies that are designed to promote and encourage renewable energy resources. However it also constrains this slightly by stating that *“local planning authorities should not make assumptions about the technical and commercial feasibility of renewable energy projects (e.g. identifying generalised locations for development based on mean wind speeds).”*
- 4.16 It considers that development in sensitive areas should not be ruled out and lays out general rules that should be applied to assess whether it may be considered to be appropriate or not. This would be in addition to joining forces with local stakeholders to establish possible assessments of likely and future potential growth at area level. If specific sites are allocated then these should be where developers have already expressed an interest and confirmed the site is viable and will be brought forward during the plan period.
- 4.17 It goes on to discuss the fact that there may be other issues that could be considered or included, such as the proximity of a combined heat and power plant to its fuel source, when drawing up policies. It also states that it may be appropriate for policies to be included that require a percentage of energy in various developments to come from on-site renewables. However these should not place an undue burden on developers.

- 4.18 In addition to the above, the government has stated that all new houses should be 'zero carbon' by 2016 and all new build non-domestic buildings by 2019.
- 4.19 PPS25: Planning and Flood Risk sets out the basis for development to be sited away from flood risk areas. If it is necessary for development to be sited within these areas, categorised as 2, 3a and 3b, potential developments are grouped in terms of their acceptability. They should have a sequential approach applied in the first instance to establish whether a strategic flood risk assessment (SFRA) is required.
- 4.20 In addition, within E5 of the Annexes to PPS25 it is stated that "*LPAs and other decision-makers should prepare SFRA's in consultation with the Environment Agency... to refine information on areas that may flood... The SFRA should be used to inform the Sustainability Appraisal (incorporating the SEA Directive) of the Local Development Documents.*"
- 4.21 PPG20 – Planning Policy Guidance: Coastal Planning sets out guidance specifically in relation to development along the coast. The management of the shoreline in terms of the siting of development, in reference to the North Kent coast is laid out within the Isle of Grain to South Foreland and Medway Estuary and Swale Shoreline Management Plans.

Regional policy

- 4.22 The South East Plan contains a number of policies that cover climate change and renewable energy issues. The first policy is CC2: Climate Change, where a targets of CO₂ emission reductions are set to at least 20% below 1990 levels by 2010 and 25% by 2015. Another target for 2026 was to be developed and incorporated into the first review of the Plan. This also gives suggested ways to adapt for climate change, including "*Guiding strategic development to locations offering greater protection from impacts such as flooding, erosion, storms, water shortages and subsidence*", that buildings should be resilient to impacts, increasing flood storage capacity and ensure that options for flood management and migrating habitats and species are not affected.
- 4.23 Policy CC3: Resource Use relates to the South East's ecological footprint and states that "*A sustained programme of action to help stabilise the South East's ecological footprint by 2016 and reduce it by 2026 should be incorporated into plans and programmes*". It also states within the supporting text that where an impact of the Plan would contribute to increasing the ecological footprint, measures should be put in place to offset and ideally reduce its impact.
- 4.24 Policy CC4: Sustainable Design and Construction discusses a number of ways in which developments can be designed and constructed so

that they are more sustainable, contributing to a reduction in ecological footprint.

4.25 Chapter 9 of the South East Plan contains a number of policies in relation to natural resources, which include some that result from trying to adapt to climate change issues and also relating to issues in relation to renewable energy.

4.26 The beginning of the chapter relates to water issues, with policy NRM2 relating to water quality and policy NRM4 relating to flood management issues. Policy NRM1 and NRM3 are discussed in more detail in the Water Supply State of Medway Report. Policy NRM2 states that

“ensure that the rate and location of development does not lead to an unacceptable deterioration of water quality, and

iii. not permit development that presents a risk of pollution or where satisfactory pollution prevention measures are not provided in areas of high groundwater vulnerability (in consultation with the Environment Agency and Natural England)”.

4.27 Policy NRM4 relating to sustainable flood management states that inappropriate development should not be allocated in flood zones 2&3, areas at risk of surface water flooding or areas with a history of groundwater flooding. It also states that Local Authorities, with advice from the Environment Agency, should produce Strategic Flood Risk Assessments (SFRAs) to provide a comprehensive understanding of flood risk.

4.28 Within policy NRM5: Conservation and Improvement of Biodiversity it states Local Authorities should *“avoid a net loss of biodiversity, and actively pursue opportunities to achieve a net gain across the region by:*

iv. ensuring appropriate access to areas of wildlife importance, identifying areas of opportunity for biodiversity improvement and setting targets reflecting those in Box NRM3. Opportunities for biodiversity improvement, including connection of sites, large-scale habitat restoration, enhancement and re-creation in the areas of strategic opportunity for biodiversity improvement (Diagram NRM3) should be pursued”.

4.29 The North Kent Marshes have been identified as an area of strategic opportunity for wetlands. Also within the accompanying wording it states that many species and their habitats will need to be able to move if they are to survive and therefore need robust and well-connected wildlife habitats. Further fragmentation of habitats will limit even more the ability of species to move and respond to the impacts of climate change.

- 4.30 The Natural Assets and Open Space State of Medway Report 2009 details the state of these existing areas. However, since then recognition of the importance of the North Kent SPAs has increased and it has been reported that there has been a decline in bird numbers across the Medway estuary. As a result a study looking into recreational disturbance on these has been commissioned and a first phase report is available. This details the impact of recreational disturbance but is not conclusive as to whether this is the cause of bird population declines. Phase 2 of the work is assessing prey abundance and it is also intended that a predictive model is created.
- 4.31 Policies NRM11-16 cover different aspects relating to renewable energy. Policy NRM11 covers the design of development for energy efficiency and renewable energy. The main point from this policy is that Local Authorities should promote and secure a greater use of decentralised and renewable or low-carbon energy in new developments, including through setting ambitious but viable proportions of the energy supply for new developments to be required to come from such sources. In advance of local targets being set, those of 10 dwellings or 1000m² of non-residential floorspace should secure at least 10% of their energy from renewable or low-carbon sources.
- 4.32 Policy NRM12 relates to Combined Heat and Power (CHP) and states the following:
- “Local Development Documents and other policies should encourage the integration of combined heat and power (CHP), including mini and micro-CHP, in all developments and district heating infrastructure in large scale developments in mixed use. The use of biomass fuel should be investigated and promoted where possible.”*
- In the accompanying wording it also states that *“For the purposes of this guidance district heating should be interpreted as including cooling, and that the term ‘cooling’ includes absorption cooling.”* Also within this wording it mentions the government target for the installation of 10,000MW of CHP generation by 2010, as well as the deployment possibilities of CHP.
- 4.33 In the text at the beginning of the renewable energy section it states that Local Development Documents (LDDs) should provide a framework for renewable energy deployment, anticipating the likely range and scale of development which may come forward over the short, medium and longer term and encouraging appropriate development.
- 4.34 Policy NRM13 then lays down the regional energy targets for electricity generation from renewable sources achieved through development and use of all appropriate resources and technologies. These are laid out below:

Year/ timescale	Installed Capacity (MW)	% Electricity Generation Capacity
2010	620	5.5
2016	895	8.0
2020	1,130	10.0
2026	1,750	16.0

- 4.35 Within this policy it discusses illustrative ideas of what may be possible and identifies the potential mix and relative scale of the different resources that have best prospects of both coming forward and providing synergies with other policy areas.
- 4.36 The figures quoted above however are based on there being no increase in conventional generation capacity of the region. They do though, include energy derived from biomass waste, thermal treatment and anaerobic digestion.
- 4.37 In the medium term, it is expected that both on and offshore wind, as well as biomass, will provide the greatest contribution towards electricity generation and heat. Over the longer term (2016-26) solar, wave and tidal are expected to have increasing potential. It is also expected that although landfill gas can be included as a contributor its contribution will lessen over time due to waste policy.
- 4.38 Policy NRM14 outlines the sub-regional targets for land based renewables. These commit Kent to achieving 111MW by 2010, 154MW by 2016 and identifies the Kent Energy Centre as being the champion in terms of helping to assess capacity and potential, as well as promoting the use of renewable resources. The assessment should allow a more detailed geographical breakdown of targets and potential of resources.
- 4.39 In addition, Local Authorities along with local communities, industry and other stakeholders should encourage the development of local supply chains, especially for biomass and raise awareness, ownership and understanding.
- 4.40 The message that comes through in this policy is that there is a relatively even spread across the region in terms of the different technologies, with potentially significant deployment of all major resources.
- 4.41 Policy NRM15: Location of Renewable Development states that wind and biomass developments should be located and designed so that they minimise adverse impacts on landscape, wildlife and amenity. It also states that *“outside urban areas, priority should be given to development in less sensitive parts of the countryside and coast, including on previously developed land and in major transport areas”*.

- 4.42 This is most likely to be met through a mixture of developments of different types and scale. These may translate to 140 individual schemes with photovoltaics by 2010, increasing to 250 (with PV) by 2016-26. It implies that there will need to be 3 wind clusters and four single turbines per county over 20 years plus one large scale wind farm or one large biomass plant in each county and a larger number of small scale developments over the same period.
- 4.43 It indicates that this should not preclude wind and other renewable technologies from AONBs and National Parks, as there will be locations where small scale installations may be possible.
- 4.44 Policy NRM16: Development Criteria reinforces the message in other policies that renewable technologies should be supported and sets out some additional criteria that should be considered.

Local policy

- 4.45 There is now a requirement for local authorities to show within their LDFs how they are addressing risks from climate change, which will be monitored through the Annual Monitoring Report associated with the LDF and the sustainability framework.
- 4.46 There are two policies within the Medway Local Plan 2003 specifically relevant to tackling climate change and renewable energy sources, with an additional policy that covers flooding related issues. The first of these is policy BNE4: Energy Efficiency, which encourages a number of design principles to increase the energy efficiency of developments and use of renewable technologies where applicable, by stating the following:

Energy efficiency measures will be sought within development proposals, providing there is no detrimental impact on amenity. In particular, proposals should have regard to:

(i) appropriate siting, form, orientation and layout of the buildings and the appropriate size and location of windows to maximise passive solar heating, natural lighting and natural ventilation; and

(ii) the appropriate use and siting of soft landscaping to act as shading or shelterbelts; and

(iii) energy efficient technology including solar panels, combined heat and power/district heating schemes and district wind power schemes; and

(iv) high standards of insulation and other heat retaining features; and

(v) the use of building materials of the lowest possible embodied energy,

except where there is an overriding need to avoid damage to the architectural or historic interest of Listed Buildings and buildings in Conservation Areas.

4.47 The second is policy CF11: Renewable Energy which relates directly to electricity generation from renewable sources, stating that “schemes for the generation and consumption of electricity will be permitted when the location, scale and design of the apparatus and associated infrastructure are not detrimental to nature conservation or landscape concerns and present no significant loss of residential or countryside amenity.”

4.48 Policy CF13 relates specifically to when development will be permissible in tidal areas. This is laid out below.

“Development will not be permitted within a tidal flood risk area if:-

(i) it harms the integrity of the flood defences; or

(ii) it fails to provide for a means of escape for people in the event of a flood; or

(iii) it introduces residential living and sleeping accommodation below the estimated flood level; or

(iv) it introduces mobile homes or caravans; or

(v) it introduces new holiday accommodation between October and May.”

4.49 In addition, to the policy stated above Mott MacDonald produced a SFRA for the Council in 2006. The findings and recommendations within this document are covered in the flooding section below. This has been updated following the publication of the new models and findings of the UK Climate Impacts Programme (UKCIP) that are expected during 2009.

4.50 The overall policy direction around the coast in relation to flooding comes from the Shoreline Management Plans that have recently been completed. Account also needs to be taken of the options that are being put forward for the management of flood risk along the Thames Estuary.

5. Renewable Energy sources

- 5.1 As stated above, there is an overall binding target for 15% of total energy demand to be sourced from renewable resources. This is in comparison to the current situation of less than 1% within the transport and heat markets and less than 5% in terms of electricity generation.
- 5.2 In 2002 current installed capacity was reported as being around 73MW across the South East, representing just under 10% of the proposed regional target for 2010 of 750MW.
- 5.3 Renewable Obligations Certificates increased the supply of electricity generation from renewable sources up to approximately 4.4% in 2006 from less than 2% in 2002.
- 5.4 The EU have agreed that emissions from large power plants should be no higher than 500mg per kilowatt hour from 2015 onwards. As such Carbon Capture and Storage (CCS) capacity will be essential in all new plants.
- 5.5 It was previously considered that the existing Kingsnorth power station would be replaced with a coal fired plant with CCS. However, E.ON in October 2010 announced that it did not consider market conditions to be right for a commercial scale plant with CCS. In combination with the fact that its timescales for the Kingsnorth project had also been put back, this resulted in them pulling out of the government's CCS demonstration scheme.
- 5.6 In addition, no objection was raised in July 2006 to a combined cycle gas turbine (CCGT) power station, to be sited at Grain as a replacement for the existing oil powered plant.
- 5.7 Onshore and offshore wind technologies are the most mature and proven within the renewable industry. It is anticipated that development in this area will mean that this will result in better blade technology and may also allow both the viable size of a farm to be reduced and greater exploitation of lower wind speeds to be achieved. This could mean that this option may become more viable on brownfield or town centre sites.
- 5.8 Currently there are permissions for six wind developments of varying sizes in Medway.
- 5.9 In addition, offshore wind farms would create a need for greater levels of demand and distribution management to be able to control and optimise the output from large quantities of intermittent generation capacity.

- 5.10 After wind technology, it is believed that biomass has the greatest potential to contribute significantly to renewable resources both across the country and within the region.
- 5.11 The largest issue associated with this sector is fuel sourcing, ensuring that it is sustainable with a minimal number of indirect impacts. There are 3 methods that can be used:
- *Gasification* – this is the treatment of material with oxygen present. This can use coal, gas or selective waste materials (waste wood and biodegradable waste)
 - *Pyrolysis* – this is the treatment of material in a closed system without the presence of oxygen. More commonly associated with energy from waste developments. These are often larger scale and more industrial in nature, such as recovering energy from tyres or plastics.
 - *Anaerobic Digestion* – this is treatment with various microorganisms being introduced to achieve a reduction of organic wastes and effluents.
- 5.12 These can be applied at varying size scales, although they all face the same main issue in that they need to be sited within relative proximity to the end user. This is particularly pertinent for biomass heat technologies, due to the high level of loss in transportation.
- 5.13 Biomass can often be combined together with other technologies such as combined heat and power or district heating though these are generally associated with commercial boilers fuelled by solid recovered fuel (SRF). Biomass also gets associated with waste treatment when solely using biodegradable materials. Energy from waste itself can contribute a small amount, but the specific amount is linked to and will be determined by the success of the national waste strategy.
- 5.14 Combined heat and power and district heating are often categorised together. Combined heat and power is literally the term used to describe the joint production of heat and power, where district heating is the use of a large boiler or plant to heat a district and/or supply steam to small industries.
- 5.15 At present these are not covered by the renewables obligation legislation, although this is likely to be, and therefore help to encourage the conversion of boilers that may be suitable.
- 5.16 Similarly to biomass, CHP needs to be sited near to its end users and also to have a sustainable fuel source. This sector is still maturing but has been gaining wider application over recent years.
- 5.17 Combined heat and power is often associated with larger scale power plants at the end of the energy generation process. However, on a more localised level this can come from sources such as ground

source heat pumps. There are a number of examples across the country where these have been deployed at the district or neighbourhood scale. In 2006 one scheme was approved at Motney Hill Treatment Works and another scheme in 2007 in Gillingham.

- 5.18 In addition to these larger more commercial sized and mature or maturing technologies, there has been some investigation into biogas and anaerobic digestion, although there is limited experience of this in the UK. If biogas were upgraded into biomethane by removing the carbon dioxide, then this could potentially be injected into the gas grid and be used to produce heat or electricity. This is however still an emerging technology.
- 5.19 More investigations have been done into the infrastructure that would be needed to create an Anaerobic Digestion network that could be implemented across the country. Consultation on this began recently. At present this seems to be an area which government are looking likely to consider placing more investment into.
- 5.20 Wave and tidal schemes are emerging but need greater levels of development before being considered mature. Though a tidal barrage is being considered for siting in the Severn Estuary there are no schemes within the South East at present.
- 5.21 The UK has been leading research and development within the wave and tidal technologies sector for some time but there has been limited deployment to date.
- 5.22 Small scale hydro projects use proven technology but it is unlikely that these schemes will make a significant contribution due to the geography of the South East.
- 5.23 Photovoltaics and solar water heating systems have developed at a fast pace within the last few years. This technology can be reasonably easily applied in the design of new buildings and also fitted into existing buildings but uptake is still limited. In addition, these are good at being incorporated with other technologies.
- 5.24 Another advantage of these technologies is that they are generally less locationally specific and can be deployed at varying scales, including in areas like the side of roads. There is emerging practice of them being used for driving machines and streetlights. Overall there have been four smaller scale schemes approved between 2006 and 2007.
- 5.25 However small-scale technologies (e.g. photovoltaic cells, small wind turbines and solar water heating systems) are still developing and this sector is considered to contribute only a small amount to the overall demand and output satisfied through renewable sources.

- 5.26 In October 2007 amendments were made to the Town and Country Planning (General Permitted Development) Order 1995 to relax the need for planning permission for some micro renewable technologies. Micro renewables is the name given to small-scale renewable technologies that could be placed on housing or small buildings, such as photovoltaics and wind turbines. However this does not appear to have increased the number of installations to any significant extent.

6. Flooding and natural environment issues

- 6.1 The impacts of flooding can be both direct and indirect. Often the worst effects of flooding come from surface water flowing into inland streams from higher up the catchment and by flowing into sewers, so that they become overwhelmed. This was evidenced in the floods across the country in 2007.
- 6.2 Medway is located at the end of the Thames Estuary, with the main towns of Chatham, Rochester and some of Strood directly situated along the banks of the River Medway. The authority area also covers large sections of the North Kent coast, including many streams that run across Cliffe, Cooling & Halstow and Stoke Marshes. This means there are a large number of water bodies and streams that could potentially contribute to an overloading of both the natural and man-made water systems.
- 6.3 There have been a number of flooding incidents within the last century where water levels rose to a maximum of 4.6m AoD (above ordnance datum). The most recent event was in December 2005 when a tidal surge caused low level flooding of Strood affecting Cuxton Marina, Janes Creek and Canal Road. The recorded level at Strood pier some 200m downstream of the A2 bridge was 4.22m AoD.
- 6.4 The Draft South East Plan identified 208,000 properties as being in areas of high probability of flooding and this will be used as a starting point for developing SFRA's and to inform local development decisions. Within the Medway area there are 1551 properties at risk from the likelihood of fluvial flooding at some point during a 1 in 1000 years return period. 1,363 properties have also been identified as being within the likelihood of flooding in a timescale of 1 in 100 years. Maps within the Appendix show the areas that are currently defined as being within Flood Zones 1-3. These are in the main town centres and on the Peninsula.
- 6.5 The Medway Estuary and Swale Shoreline Management Plan lays out the constraints to development that need to be accounted for in terms of flooding and coastal erosion. The plan considers the situation over the next 100 years. The policy is to 'hold the line' along most of the coastline on both sides of the Medway. This applies to all areas where there are either residential properties or industrial or infrastructure

installations.

- 6.6 In addition, there are limited lengths of coast where a policy of 'managed realignment' is to be applied. In these areas local strategies will be developed to set back the existing defences to allow more space for flood storage and inter-tidal habitats. However these may not be implemented for 50 years or more. Areas affected include the edge of Allhallows, some of Allhallows Marshes and some of the northern area of Grain Marsh.
- 6.7 There are also very limited sections where it is proposed there should be 'no active intervention', meaning that there will be no investment in coastal defences and natural processes will be allowed to take over.
- 6.8 The combination of the Strategic Flood Risk Assessment (SFRA) from 2006 and the update of it by Scott Wilson in 2010, identify the areas most at risk from flooding. These show that flood risk tends to be greatest within the urban area.
- 6.9 It can be seen from the SFRA that few of the larger regeneration sites are defended to an appropriate standard and so there will be a need for new or improved defences. This message is also reinforced through the Medway Flood Defence Strategy.
- 6.10 The Medway Flood Defence Strategy is a high level appraisal of the potential solutions for managing flood risk within the urban Medway. As can be seen from this there are wide variations in the standards of existing flood defences. However, it also highlights why a comprehensive approach is needed. Furthermore it shows the fact that the cost benefit of the right level of defence in the right areas can be significant.

Drainage and adaptation measures

- 6.11 Catchment Flood Area Management Plans (CAMS) are the main strategies that help in terms of being able to predict and help to mitigate the effects of flooding incidents. These look at the whole of the river catchment and consider the possible routes by which water may enter the watercourses and where they may drain. These are, in general, restricted to the geographical area of the river and are carried out by the Environment Agency as part of its strategic role in respect to flooding.
- 6.12 These may help to predict and come up with actions to help prevent and cope with flooding. They can consider a wider variety of methods and techniques covering the whole of the catchment area. These may involve both natural and human interventions, including strategies to direct and control water through to the allocation of land for water storage.

- 6.13 There have been increasing ways that buildings and developments can be built to help as well, through the deployment of Sustainable Drainage Systems (SUDs). SUDs are systems that are designed to reduce the potential impact of new and existing developments in respect to surface water drainage discharges, from the selection of materials to incorporating natural features.

Natural environment

- 6.14 In addition to these direct impacts on water levels and resultant water quality, there can also be more indirect impacts over the longer term. Water quality may change if saline water was to encroach further inland or if aquifer levels of groundwater supplies were to rise. In these cases diffuse pollution could occur more easily and possibly with greater frequency. As well as possibly affecting potable supplies, this could affect the ecology of surface water bodies, contrary to the Water Framework Directive.