Topic Paper 3 - Climate Change and Energy

Climate Change and Energy

Baseline

1 Climate change refers to the long-term change in average weather patterns affecting any region or the Earth as a whole. There is strong evidence that most of the warming that has occurred over the last fifty years is attributable to human activities, and that human-induced climate change, additional to that caused by natural variability, is now taking place. Prior to 1750, the background level of the three principal greenhouse gases – carbon dioxide, methane and nitrous oxide – had remained constant for a millennium or more. Since then, concentrations have increased directly or indirectly as a result of human activities.

2 The Government believes that climate change is the greatest long-term challenge facing the world today. Tackling climate change is a principal concern for sustainable development and a key Government priority for the planning system.

3 The Climate Change Act (2008) places a legally binding target on the UK for greenhouse gas emission reductions through action in the UK and abroad of at least 80% by 2050, and reductions in carbon dioxide emissions of at least 34% by 2020, against a 1990 baseline.

4 Two key strategies have been developed within Dorset aimed at mitigating climate change. The complementary Dorset, Bournemouth & Poole Renewable Energy Strategy 'Unpacking the Technologies' and Energy Efficiency Strategy set targets to ensure that 7.5% of Dorset's energy needs are met by local renewable energy installations by 2020 and that energy consumption is reduced by 30% in Dorset by 2020.

5 The emissions of carbon dioxide by each district and borough in Dorset is shown in Table 1.

Table 1 Carbon Dioxide Emissions

	Industry and commercial	Domestic	Road Transport	Total
Christchurch	80.7	94.8	96.0	271.3
East Dorset	114.8	199.6	178.2	483.9
North Dorset	125.5	157.6	126.7	413.7
Purbeck	151.6	99.8	118.4	384.9
West Dorset	212.6	239.1	258.0	738.7
Weymouth & Portland	73.9	116.3	77.3	268.8
Poole	312.5	285.9	183.5	782.2
Bournemouth	261.2	335.4	172.8	769.1

Source *: National Indicators 185 and 186 - DECC (Local and Regional CO2 Estimates for 2005-20011* https://www.gov.uk/government/publications/local-authority-emissions-estimates

Global Climate Change

6 The Inter-Government Panel on Climate Change (IPCC) [1] conclude that there is a 95% probability that human action is the dominant cause of climate change and that the 30 year period between, 1983-2012 is likely to have been the warmest in the past 1,400 years. Overall they observe that global combined land and ocean surface temperatures have increased by 0.85% from 1850 – 2012.

7 If current trends continue, warming is likely to exceed two degrees and could possibly exceed 4°C by 2100. This is likely to result in large changes to most natural cycles increasing the likelihood and severity of extremes such as floods, heatwaves and droughts as well as increasing sea level rise.

Future Climate in the UK

8 The UK Climate Projections (UKCP09) suggest a broad trend of hotter, drier summers and warmer, wetter winters across the whole of the UK by the end of the century with significant regional variations that will see average summer temperatures rise between 2.5°C in those areas least affected and 4.5°C in those areas most affected. Winter temperatures are estimated to increase between 2°C and 3°C. This does not mean that cold winters and snow and ice, such as the 2009/10 winter, will become consigned to the past, there will still be the natural variability within our climate, they will just become less frequent.

9 Total annual precipitation rates will remain about the same however, there is likely to be an increase of between 10 - 40% in winter rainfall and conversely a similar expected decrease in summer rainfall. Alongside this warming trend, we are expected to experience more extreme weather events with an increase in the frequency and intensity of heavy rainfall, leading to flash flooding in summer and saturated soils leading to flooding in winter, more frequent heatwaves and continuing sea level rise round the South West coast.

Future Climate Change in Dorset

10 According to the UKCP09 projections, by 2050 Dorset will experience hotter summers with an increase in average summer temperature of between 1.3 - 4.6 °C on the current average summer temperature. The hottest summer days could rise by as much as 7°C although it is more likely to be around 4°C. Average winter temperatures are also set to rise with an expected increase of between 1.1 - 3.6 °C on that which is currently experienced today.

11 In terms of precipitation, the total annual rainfall is unlikely to change, however, the patterns of rainfall could shift with total summer rainfall likely to decrease by around 20% and winter rainfall predicted to rise by a similar amount.

Sea level rise & Flooding

12 The IPCC have observed that, since the mid 19th century, sea level rise has been larger than the mean rate during the previous two millennia. They have recorded that global sea level has already risen by 20cm in the last century and scientists are now 90% certain that the rate of rise will increase. Predictions for sea level rise in the period 2080-2100 range between 26-82cm, depending on what action is taken to reduce the increase in and reduce the total amount of carbon emissions in the atmosphere.

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1 inter-governmental Panel on Climate Change - 5th Assessment Report "Climate Change 2013: The Physical Science Basis", Sept 2013

13 Whilst data on sea level change is not available for Dorset, coastal district councils (particularly Christchurch and Weymouth) have highlighted the impact of coastal flooding over the last ten years [(2)].

14 The relative sea level rise in England also depends on the local vertical movement of the land, which is generally falling in the south-east and rising in the north and west. Allowances for the regional rates of relative sea level rise, shown in Figure 1, should be used as a starting point for considering flooding from the sea in preparing flood risk assessments.

Figure 1 Contingency Allowances for Net Sea Level Rise

Administrative Region	Net Sea Level Rise (mm/yr) Relative to 1990			
	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
East of England, East Midlands, London, SE England (south of Flamborough Head)	4.0	8.5	12.0	15.0
South West	3.5	8.0	11.5	14.5
NW England, NE England (north of Flamborough Head)	2.5	7.0	10.0	13.0

Source: *PPS25 (December 2006) - p.15*

15 The rise in sea level will change the frequency of occurrence of high water levels relative to today's sea levels, assuming no change in storminess. There may also be secondary impacts such as changes in wave heights due to increased water depths, as well as possible changes in the frequency, duration and severity of storm events. A 10% sensitivity allowance should be added to offshore wind speeds and wave heights by the 2080s.

16 The effects of climate change on landscape, nature conservation areas, surface and underground water resources and land are commonly acknowledged. However these effects have not been researched and documented in Dorset. It is important to take into account these potential impacts while developing the minerals and waste plans in order to mitigate them and contribute towards adaptation. This includes consideration of the potential for flood alleviation, the provision of green space and the incorporation of water efficiency measures into schemes to reduce demand on water resources and reduce the amount of energy required to treat and supply water

Summary of relevant policy documents - Climate Change

N.B. More detail on these and other policy documents is included at the end of this topic paper.

Table 2 Key messages from relevant policy

Policy Documents	Relevance to Minerals and Waste Plans
Key International Policy • Kyoto protocol	

2 Local Climate Impacts Profile, Dorset County Council and district/borough councils

Key National/ILocal policy • Climate Change Act 2008 • National Planning Framework & technical guidance • Climate Change Risk assessment and National Adaptation plan – July 2012 • Bournemouth, Dorset & Poole renewable energy strategy to 2020 – March 2012 • Bournemouth, Dorset & Poole energy efficiency strategy & action plan – Nov 2009	The minerals & waste plans will have a role, albeit limited in securing sustainable development. In relation to climate change minerals activities should aim to minimise green house gas emissions from there operations, minimise and impacts which could increase vulnerability to climate change (particularly flooding & water resources) and adapt to the impacts of climate change on the abstraction and waste industries. Minerals and waste policy will have a role in guiding development into areas that will have a lesser effect on, or where there is a minimal likelihood of being affected by, climate change (particularly flooding).

Implications of climate change relevant to mineral extraction & waste

17 The minerals and waste activities in Dorset will need to adapt to the predicted changes in climate and also take action to mitigate climate change. The mitigation of and adaptation to climate change impacts should be taken into account while developing the minerals and waste plans. Some issues are identified below but this should not be taken as an exhaustive list, further work is required with the minerals and waste industry to explore the implications of climate change

Adaptation

18 The national Comprehensive Risk Assessment for the UK outlines a number of risks posed by climate change for the business and industrial sectors. However, specific implications for the minerals and waste operations in Dorset have not been assessed to date and would need a specific risk assessment to be undertaken for these activities. This would need to consider the vulnerability of minerals and waste activities to a range of climate variables expected for Dorset such as hotter summers, warmer winters, sea level rise, intensity of rain fall etc.

Issues

- Hotter drier summers and drought, increasing demand for water potentially effecting availability for minerals operations. Also affecting building temperatures and demand for cooling.
- Effects to ground and surface water levels and quality affecting vulnerability of these resources as well as abstraction
- Increased risk of flooding, creating a greater need for flood and surface water management and higher risk of surface and ground water pollution, as well as disruption to operations.
- Increased windiness, potential affecting waste management on exposed landfill sites or changes to dust and pollution control within some minerals operations.
- Increasing risk of coastal flooding sea level rise a consideration for the location, longevity and viability of minerals operations near the coast. Requiring further vulnerability assessments.
- Extreme events increasing disruption to supply chains, infrastructure and transport

Mitigation

- Minerals and waste operations can contribute to climate change through the emission of Greenhouse gases principally Carbon Dioxide (CO2) from the use of fossil fuels, and Methane (CH4) from the decomposition of waste within landfill sites.
- Emissions of green house gasses from operations should be minimised as much as possible by reducing energy consumption within operational buildings and of equipment used as well as increasing the efficient use of fuels within vehicles and the use of alternative fuels.
- In addition minerals and waste operations provide an opportunity for the use of renewable energy on site and these opportunities should be fully explored and encouraged.
- Greenhouse gas mitigation often provides long term financial savings in utility and fuel costs.

Further opportunities/issues

- Other opportunities and issues can also be considered to help address other implications of climate change and ensure its potential impacts are not exacerbated. These may include:-
- The restoration of minerals and waste sites offers opportunities for improvements to green infrastructure, opportunities to reduce the vulnerability of biodiversity to climate change, and opportunities for renewable energy installations and for growing bio fuels.
- Minerals or waste operations could likewise affect flood storage capacity, e.g. through tipping of mineral waste, workings may cause changes in ground water level or land instability, affect local hydrology and affect flood defences of extraction on open coast increasing vulnerability to climate change.

Suggested Sustainability Objectives

To adapt to the impacts of and mitigate climate change.

...and Broad Indicators

"To what extent does the strategic option, objective, strategy or policy..."

- Ensure new development minimises vulnerability and provides resilience to climate change?
- Minimise emissions of greenhouse gases from operations, ensuring the efficient use of energy, and maximising opportunities for the generation of renewable energy?

Relevant Policy Documents: Climate change and energy

Table 3

Kyoto Protocol to the UN Framework Convention on Climate Change (UN: 1997)

The convention's objectives are to achieve stabilisation of atmospheric concentrations of greenhouse gas concentrations in the atmosphere at safe levels that would prevent dangerous anthropogenic (human-included) interference with the climate change; ecosystems should be allowed to adopt naturally; food supply should not be threatened and economic development should be able to proceed in a sustainable manner.

Further COP meetings (Conference of the parties), 2009-2012 have set out UN targets to limit global warming to 2oC rise in temperature and agreed a time line to review and update the Kyoto Protocol. With the aim of seeking full international agreement by 2015.

In 2012 the UK signed a second period of the current Kyoto Protocol committing to reducing carbon emissions by 2020, in line with its domestic strategies and the UK Climate Change Act.

Implications:

Climate Change Act 2008 (UK Government 2008)

The Act aims to improve carbon management and help the transition towards a low carbon economy in the UK; and to demonstrate strong UK leadership internationally, signalling that we are committed to taking our share of responsibility for reducing global emissions in the context of developing international negotiations on Climate Change.

Key Provisions include:

- **2050 Target.** The act commits the UK to reducing emissions by at least 80% in 2050 from 1990 levels.
- **Carbon Budgets.** The Act requires the Government to set legally binding 'carbon budgets'. A carbon budget is a cap on the amount of greenhouse gases emitted in the UK over a five-year period.
- **The Committee on Climate Change .** Set up to advise the Government on emissions targets, and report to Parliament on progress made in reducing greenhouse gas emissions.
- **A National Adaptation Plan. T**he Government to assess the UK's risks from climate change, prepare a strategy to address them, and encourage critical organisations to do the same.

Implications:

The policies and strategy within the minerals and waste plans should seek to assist the reduction of carbon dioxide emissions and support the National Adaptation Plan.

National Adaptation Programme (NAP) & UK Climate Change Risk Assessment (CCRA)

The **National Adaptation Programme (NAP)** sets out what government, businesses, and society are doing to become more climate ready. It contains a register of actions and aligned to risks identified in the UK Climate Change Risk Assessment. Action in the NAP is divided into the following broad categories:

- raising awareness of the need for climate change adaptation
- increasing resilience to current climate extremes
- taking timely action for long-lead time measures
- addressing major evidence gaps.

The UK Climate Change Risk Assessment (CCRA) provides an analysis of key risks and opportunities of climate change across all sectors of our economy at the national level. Evidence for the assessment has been gathered in eleven sector and are presented in the UK Climate Change Risk Assessment Evidence Report under five themes: • Agriculture & Forestry; • Business; • Health & Wellbeing; • Buildings & Infrastructure; and • Natural Environment.

The Evidence Report brings together an overview of climate change risks and opportunities based on the analyses described in the Sector Reports and other sources of information. It is intended to provide information to policy makers on the vulnerability of the UK and future risks and opportunities due to climate change.

Implications:

The preparation of the minerals and waste plans should take these documents into account and identify adaptation and mitigation to climate change

Securing the Future - Delivering UK Sustainable Development Strategy

(DEFRA: 2005)

Establishes key principles for sustainable development and shared priorities agreed across the UK. The strategy contains

- an integrated vision building on the previous 1999 strategy with stronger international and societal dimensions.
- five principles – with a more explicit focus on environmental limits
- four agreed priorities – sustainable consumption and production, climate change, natural resource protection and sustainable communities.
- a new indicator set, which is more outcome focused.

Implications:

The preparation of the minerals and waste plans should take the requirements of this Strategy into consideration.

National Planning Policy Framework

March 2012, Department for Communities and Local Government

The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied. It notes the purpose of the planning system is to contribute to the achievement of sustainable development and sets out within the NPPF policies , which taken as a whole, constitute the Government's view of what sustainable development in England means in practice for the planning system.

Meeting the challenges of climate change, **flooding and coastal change** is identified as a key policy area and policies are set out within the NPPF. Planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure.

Implications:

The preparation of the minerals and waste plans should take the requirements of this Framework into consideration.

Renewable Energy Roadmap for the UK

Department of Energy and Climate Change (DECC) - July 2011

The fist UK's Renewable Energy Roadmap sets out our shared approach to unlocking the UK's renewable energy potential. The Roadmap builds on the actions already underway to support and encourage renewable energy in the UK.

The strategy makes a clear government commitment to increase the amount of renewable energy deployed in the UK. This will make the UK more energy secure, will help protect consumers from fossil fuel price fluctuations, will help drive investment in new jobs and businesses in the renewable energy sector, as well as keep us on track to meet our carbon reduction objectives for the coming decades.

It sets out a goal is to ensure that 15% of our energy demand is met from renewable sources by 2020 in the most cost effective way

Implication:

The preparation of the minerals and waste plans should take the requirements of this into consideration

Bournemouth , Dorset & Poole Renewable Energy Strategy to 2020 –

Final Version (Jan 2013)

Vision - "For the community of Dorset to play our part in mitigating climate change by using energy more efficiently and harnessing our viable renewable energy resources. We wish to maximise the local

economic, environmental and community benefits that doing this can bring."

The strategy aims tomaximise the potential for local economic benefit and diversification; To facilitate renewable energy development that is appropriate to Dorset's environment and communities; To encourage a high degree of community involvement, understanding and benefit from using energy more efficiently and developing Dorset's renewable energy resources; To enable Dorset to play its part in reducing greenhouse gas emissions in line with local, regional, national and international targets; To provide local, affordable and secure renewable energy supplies.

It sets an aspirational target of at least 15% of Dorset, Bournemouth and Poole's energy needs to be met from renewable sources by 2020[3]

Implications:

While preparing the minerals and waste plans, this strategy should be taken into account.

Bournemouth Dorset & Poole Energy Efficiency Strategy and Action Plan

Final version, November 2009

The strategy sets out five aims and a course of action to improve energy efficiency and curb energy demand across Dorset, in order to realise the potential within the county to reduce carbon emissions, eliminate fuel poverty, and save energy costs.

The strategy has a target to achieve a 30% reduction in CO2 emissions by 2020, relative to 2005, in line with national targets, together with a target to eliminate fuel poverty in Bournemouth, Dorset & Poole by 2016.

Implications:

While preparing the minerals and waste plans, this strategy should be taken into account.

3 This target assumes that approximately 7.5% of this will be delivered via renewable energy resources considered by Government as 'national' resources, regardless of local action, this Strategy will focus on delivering a secondary target of a minimum of 7.5% of Dorset's energy needs to be met from local renewable energy resources.