# Derbyshire and Derby Minerals Local Plan 2022 – 2038

# Background Paper: Climate Change

January 2023

Derby City Council

DERBYSHIRE County Council

## Contents

# 1. Introduction and Background

1.1 Climate change refers to long lasting changes in global climate and particularly those that we have seen in the last few decades, attributed to the rapid increase in global temperatures, caused largely by increased levels of atmospheric carbon dioxide ($CO^2$) produced by the use of fossil fuels. The climate has never been static, with natural fluctuations taking place constantly. Natural events include volcanic eruptions, changes to the ocean currents, the orbit of the earth and solar variations. However, although the world's climate has always varied, it was not until the second half of the 20th century that the scale of human influences on $CO^2$ levels was recognised and the term 'Greenhouse' applied to the effect on climate, and to the gases responsible, principally carbon dioxide, methane, nitrous oxide and fluorinated gases. As concentrations of these gases increase, the world warms, the sea level rises, and the atmosphere becomes more turbulent and able to hold more moisture. These changes are increasing the risk of extreme weather in the form of heatwaves, floods, droughts and wildfires. In the UK this will mean warmer, wetter winters with less snowfall and fewer frosts. Summers will be hotter and generally dryer but the potential for extreme, intense rainfall, droughts, heatwaves, flooding and storms will all increase.

A recent Intergovernmental Panel on Climate Change report[1] noted,

*"Human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones, and, in particular, their attribution to human influence, has strengthened since AR5 (5th Assessment Report)."*

1.2 The World Metrological Organisation published its state of the Climate Report in 2021, with the following key findings. The atmospheric concentration of carbon dioxide ($CO^2$) has risen from a pre-industrial 280 parts per million (ppm) in the 1750s, to 300ppm in the 1950s, and over 400 ppm in 2018. A new high was reached in May 2021 with 419.13 parts per million recorded at Mauna Loa in Hawaii.[2] Without action, at the current rate of change this could reach 900 ppm by the end of the

[1] United Nations Intergovernmental Panel on Climate Change (IPPC) Sixth Assessment Report August 2021

[2] State of the Climate Report 2021, World Meteorological Organisation

century.[3] The global annual mean temperature in 2021 was around 1.11 ±0.13 °C above the 1850-1900 pre-industrial average, less warm than some recent years owing to cooling La Niña conditions at the start and end of the year. The most recent seven years, 2015 to 2021, are the seven warmest years on record.[4] The IPPC estimate that global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate.[5]

1.3 Ocean heat was record high. The upper 2000m depth of the ocean continued to warm in 2021 and it is expected that it will continue to warm in the future – a change which is irreversible on centennial to millennial time scales. All data sets agree that ocean warming rates show a particularly strong increase in the past two decades. The warmth is penetrating to ever deeper levels.

1.4 The ocean absorbs around 23% of the annual emissions of anthropogenic $CO_2$ to the atmosphere. This reacts with seawater and leads to ocean acidification, which threatens organisms and ecosystem services, and hence food security, tourism and coastal protection. As the pH of the ocean decreases, its capacity to absorb $CO_2$ from the atmosphere also declines. The IPCC concluded that "there is very high confidence that open ocean surface pH is now the lowest it has been for at least 26,000 years and current rates of pH change are unprecedented since at least that time."

1.5 Global mean sea level reached a new record high in 2021 and increased at an average 4.5 mm per year over the period 2013 -2021. This is more than double the rate of between 1993 and 2002 and the change in rate is mainly due to the accelerated loss of ice mass from the ice sheets. This has major implications for hundreds of millions of coastal dwellers and increases vulnerability to tropical cyclones.

1.6 The Intergovernmental Panel on Climate Change (IPPC) Sixth Assessment Report on Climate Change[6] stated,' It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. Many changes due to past and future

[3] United States National Oceanographic and Atmospheric Administration, Climate Change: Atmospheric Carbon Dioxide. 2020
[4] State of the Climate Report 2021, World Meteorological Organisation
[5] IPPC Special Report on the impacts of global warming of 1.5 $^0$C, October 2018
[6] IPPC Sixth Assessment Report August 2021

greenhouse gas emissions are irreversible for centuries to millennia, especially changes in the ocean, ice sheets and global sea level.'

1.7 In the UK, the average temperature over the most recent decade (2012-2021) has been on average 0.2 °C warmer than the 1991-2020 average and 1.0 °C warmer than the 1961-1990 average. All the top ten warmest years for the UK, in the series from 1884, have occurred since 2002. The most recent decade (2012–2021) has had for the UK on average 2% more hours of bright sunshine than the 1991–2020 average and 8% more than the 1961–1990 average. The most recent decade (2012–2021) has been on average 2% wetter than 1991–2020 and 10% wetter than 1961–1990 for the UK overall.[7]

1.8 Recent statistics issued by the Department for Business, Energy and Industrial Strategy (DBEIS)[8] suggest that carbon dioxide accounted for 79% of greenhouse gas emissions in the UK in 2020 with the remainder made up of methane 13%, nitrous oxide 5% and fluorinated gases 3%.The coronavirus (COVID-19) pandemic and the resulting restrictions introduced in 2020 across the UK had major impacts on various aspects of society and the economy, which led to a significant impact on greenhouse gas emissions in the UK. In 2020, net territorial greenhouse gas emissions in the UK were estimated to be 405.5 million tonnes carbon dioxide equivalent (MtCO2e), a decrease of 9.5% compared to the 2019 figure of 447.9 million tonnes and 49.7% lower than they were in 1990. Transport remains the largest emitting sector at 24%, Energy Supply 21%, Business 18%, Residential 16%, and Agriculture 11% with the remainder 10% allocated to the waste management, industrial processes, public sector and the land use, land use change and forestry (LULUCF) sectors. Of the emissions allocated to industrial processes (2%) the largest source was cement production, with other processes such as sinter, lime and iron and steel production also contributing significantly.

1.9 BEIS also publish figures based on the end user where the activity occurred rather than the source of emissions so, for example, emissions relating to electricity generation are attributed to homes and businesses where the electricity is used rather than to power stations as shown in Figure 5.1.

[7] The State of the UK Climate 2021, Royal Meteorological Society July 2022
[8] DBEIS 2020 UK Greenhouse gas emissions, February 2022


**Figure 5.1: Proportion of net greenhouse gas emissions in each end user sector, UK 2020[9]**

It has been estimated that Individuals are responsible for about 40% of greenhouse gas emissions in the UK, the biggest domestic sources being energy use in the home, road transport and air travel. Businesses and associated traffic and agriculture are other large end user emitters. Reducing emissions in the UK will require a collective effort and support from every citizen in the UK alongside businesses, industry and Government.

1.10 Minerals are essential in maintaining our economy and lifestyle, but their extraction, processing and transport comes at a cost to the environment. Mining is responsible for 4 to 7% of global greenhouse gas emissions. Scope 1 and Scope 2 $CO^2$ emissions from the sector (those incurred through mining operations and power consumption, respectively) amount to 1%, and fugitive-methane emissions from coal mining are estimated at 3 to 6%.A significant share of global emissions—28%—would be considered Scope 3 (indirect) emissions, including the combustion of coal.[10] It has been estimated that the UK Mining and Quarrying industry accounted for just over 4% of UK greenhouse gas emissions in 2021.[11]

1.11 Scopes are the basis for taking account of emission sources. The term first appeared in the Greenhouse Gas (GHG) Protocol 2021. Figure 5.2

[9] DBEIS Annex 1 2020 UK greenhouse gas emissions, final figures by end user and uncertainty estimates. Source: Table 5.1, Final UK greenhouse gas emissions national statistics 1990-2020 Excel data tables Note: Other includes Public, Industrial Processes and the Land Use, Land Use Change and Forestry (LULUCF) sectors. The percentages may not sum to 100% due to rounding

[10] Emissions based on research by Mckinsey's Basic Materials Institute

[11] DBEIS UK Environmental Accounts, 2022

shows a visualisation of emission sources as they are accounted for in the GHG emissions protocol.

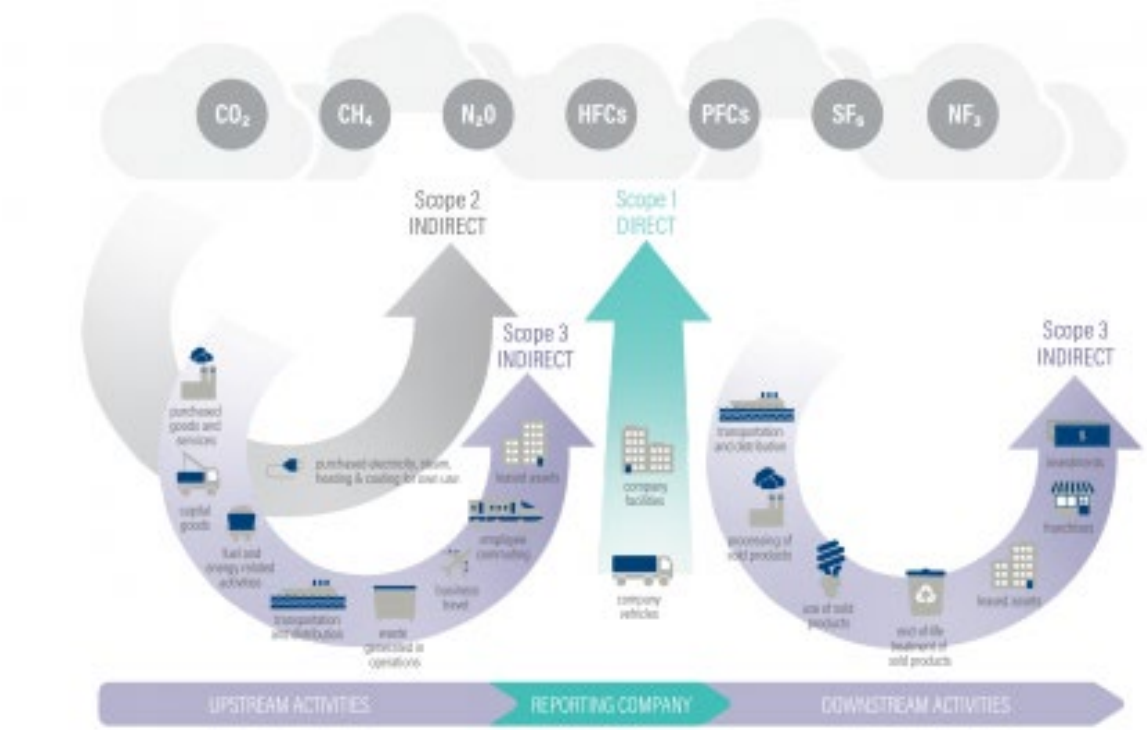



**Figure 5.2: Emission Sources by Scope**

*Source World Resources Institute, WBSCD, GHG Protocol 2021*

- Scope 1 emissions— These are the emissions that a company makes directly — for example while running its boilers and vehicles.
- Scope 2 emissions — These are the emissions it makes indirectly – like when the electricity or energy it buys for heating and cooling buildings, is being produced on its behalf.
- Scope 3 emissions — These are the emissions associated, not with the company itself, but that the organisation is indirectly responsible for, up and down its value chain. For example, from buying products from its suppliers, and from its products when customers use them.

1.12 Climate change but particularly global warming is the biggest threat to human society and therefore in 2015, the Paris Agreement was signed by 195 Governments making a commitment to keeping a global temperature rise this century well below 2°C above pre-industrial levels and pursuing efforts to limit the increase even further to 1.5°C, a limit that is now close to being breached. In order to limit global warming to 2°C it has been calculated the world can only emit a certain quantity of carbon

dioxide to the atmosphere. This is the global carbon budget which is then divided amongst individual countries according to the Paris Agreement. The UK is committed to achieving its carbon budget. In 2019 the UK Parliament declared a Climate Change Emergency and has committed in law[12] to achieve net-zero carbon emissions by 2050[13] with an interim target of 78% reduction by 2035[14].

1.13 Because greenhouse gases stay in the atmosphere for such a long time, ($CO_2$ persists for up to 200 years), whatever we do we cannot escape some climate change, but the worst effects can be avoided if the levels of greenhouse gases in the atmosphere are stabilised and reduced instead of being allowed to increase. The challenge is now to reduce the rate of increase of these gases and ultimately, to achieve net zero greenhouse gas emissions by 2050 so that the rate of warming and the climate change they cause is within our ability to cope.

1.15 While it is clear that the legally binding targets of the Climate Change Act will contribute to the mitigation of the causes of climate change, the need for significant adaptation measures cannot be avoided. The planning system, and the development plans and national polices which drive planning, can and must play a part in ensuring that the development necessary in the coming decades will contribute to both the mitigation of climate change and adaptation to the risks which it will bring.

1.15 This paper will explore how the Derbyshire and Derby Minerals Local Plan can, where appropriate, contribute to the mitigation of and adaptation to climate change and contribute to the UK target of achieving net zero carbon emissions by 2050.

[12] The Climate Change Act 2008
[13] The Climate Change Act 2008 (2050 Target Amendment) Order 2019
[14] The Carbon Budget Order SI 2021 No.750

# 2. Policy Context

## International Legislation and Policy

2.1 The United Nations Framework Convention on Climate Change (UNFCCC) or Rio Summit adopted in June 1992 established the objective to stabilise Greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The convention set non-binding limits of GHG emissions for individual countries and established a framework for the introduction of legally binding 'protocols' to set out how the UNFCCC objectives could be achieved.

2.2 The UNFCCC Kyoto Protocol was adopted by 192 parties, including all but 4 United Nations member states, in December 1997. The protocol introduced a commitment to reducing the atmospheric concentration of 6 GHGs, Carbon dioxide, Methane, Nitrous oxide, Hydrofluorocarbons, Perfluorocarbons and Sulphur hexafluoride. The protocol sets binding targets for the reduction of GHGs over a number of commitment periods.

2.3 The United Nations Framework Convention on Climate Change (UNFCC COP21) took place in Paris in 2015. UNFCC is an international environmental agreement on climate change, of which there are 195 States Parties, including the UK. The following matters were agreed:

- A long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels;
- To aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impacts of climate change;
- On the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries;
- To undertake rapid reductions thereafter in accordance with the best available science.

2.4 The meeting in Paris was hailed as a make-or-break opportunity to secure an international agreement on approaches to tacking climate change, a commitment to a longer-term goal of near zero net emissions in the second half of the century and supporting a transition to a clean economy and low carbon society. The Paris Agreement requires individual counties to submit Nationally Determined Contributions (every 5 years) to the UNFCCC committing to reducing greenhouse gas

emissions and Adaptation Communication setting out actions on adaptation and resilience. It should be noted that although the Paris agreement recognised the need for emissions to peak as soon as possible, emissions are expected to rebound by about 4.8% in 2021 following a 5.8% drop due to the Covid 19 pandemic in 2020.

2.5 COP26 held in November 2021 aimed to ensure that countries near term commitments for GHG emissions reductions were ambitious enough to achieve the Paris Agreement targets.153 Countries have agreed new 2030 emission targets, to meet next year to strengthen commitments, including a move away from the unabated use of coal, halting and reversing deforestation, reducing methane emissions and speeding the switch to electric vehicles. 45 countries submitted adaption plans with a record amount of adaption finance being agreed globally.

2.6 The Intergovernmental Panel on Climate Change (IPCC) published its 6th Assessment Report on 9 August 2021[15] and an Impacts, Adaptation and Vulnerability Report in February 2022[16]. It notes that human-induced climate change is causing dangerous and widespread disruption in nature and affecting the lives of billions of people around the world, despite efforts to reduce the risks. People and ecosystems least able to cope are being hardest hit. It contains a damning assessment of the current state of action on climate change and states that strong, rapid and sustained reductions in greenhouse gas emissions along with limiting cumulative carbon dioxide ($CO_2$) emissions, reaching at least net zero by 2050, are required to keep climate change to between 1.5°C and 2.0°C this century. The report concludes that there is now a small window of opportunity when significant action by society and governments can reduce the worst effects of climate change to within our ability to adapt. More recently in October 2022, a United Nations Environment Programme Report 'Closing the Window' has identified that current pledged emissions reductions will only reduce temperature rises to between 2.4 – 2.6°C by the end of the century.[17]

2.7 The UN Climate Change Conference (COP)27 held in Autumn 2022 established a fund to compensate vulnerable nations for loss and damage from climate change disasters. The UN Secretary General

[15] IPPC Sixth Assessment Report Working Group 1:The Physical Science Base, August 2021
[16] IPPC Climate Change 2022: Impacts, Adaptation and Vulnerability
[17] United Nations Environment Programme Emissions Gap Report – Closing the Window, October 2022.

welcomed the decision, calling it “an important step towards justice.” He at the same time called for “a giant leap on climate ambition” stressing the need to “drastically reduce emissions now.”

## National Legislation and Policy

### Climate Change Act 2008 and Amendment

2.8 The Climate Change Act 2008 sets a framework for the UK to reduce GHG emissions and build capacity to adapt and strengthen resilience to climate change. It established the Climate Change and Adaptation Committee an independent statutory body whose role it is to advise the UK governments on emissions targets and to report to Parliament on progress made in reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change.

2.9 The Act originally committed the UK to cut its emissions by at least 80% below the 1990 baseline level by 2050. Following the declaration of a climate change emergency, this target was amended, on 27 June 2019[18], committing the UK to a legally binding target of net zero emissions by 2050, set on a whole-economy basis with an interim target of a 57% reduction by 2030. (For carbon dioxide, methane and nitrous oxide the baseline is 1990. For hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride the base year is 1995.) This interim target has been amended further to require a 78% reduction by 2035.

2.10 The Climate Change Act 2008 also introduced legally binding ‘carbon budgets’ which cap emissions over successive 5-year periods which must be set 12 years in advance to allow, policy makers, businesses and individuals enough time to prepare. The first five carbon budgets cover the period 2008-2032. The UK has currently just ended the third carbon budget period with the sixth carbon budget (2033-2037) legislated in June 2021. This budget includes international aviation and shipping for the first time. These budgets are in addition to our Nationally Determined Contribution under the Paris Agreement, which is a commitment of a 68% reduction in emissions by 2030, relative to 1990 levels, a more stringent target than the fifth Carbon Budget (2028 - 2032). The table below shows the progress made to date:

[18] The Climate Change Act 2008 (2050 Target Amendment) order 2019

| Budget | Carbon Budget Level MtCO2e | Reduction below 1990 levels | Met? |
|---|---|---|---|
| 1st budget (2008-2012) | 3,018 | 25% | Yes |
| 2nd budget (2013-2017) | 2,782 | 31% | Yes |
| 3rd budget (2018-2022) | 2,544 | 37% by 2020 | On track |
| 4th budget (2023-2027) | 1,950 | 51% by 2025 | Off track |
| 5th budget (2028-2032) | 1,725 | 57% by 2030 | Off track |
| 6th budget (2033-2037) | 965 | 78% by 2035 | Off track |
| Net Zero Target | | At least 100% by 2050 | |

2.11 The Climate Change Act 2008 also requires the government:

- to assess regularly, on a five-yearly cycle, the risks to the UK of the current and predicted impact of climate change;
- to set out its climate change adaptation objectives; and
- to set out its proposals and policies for meeting these objectives.

2.12 These requirements are fulfilled by the UK climate change risk assessment and the national adaptation programme report respectively. The most recent UK Climate Change Risk Assessment Report, January 2022 sets out eight priority areas needing urgent further action over the next five years. They are risks to:

- the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards;
- soil health from increased flooding and drought;
- natural carbon stores and sequestration from multiple hazards, leading to increased emissions;
- crops, livestock and commercial trees from multiple climate hazards;
- supply of food, goods and vital services due to climate related collapse of supply chains and distribution networks;
- people and the economy from climate-related failure of the power system;

- human health, wellbeing and productivity from increased exposure to heat in homes and other buildings; and
- Multiple risks to the UK from climate change impacts overseas.

2.13 The National Adaptation Programme sets out the actions that the Government will take to adapt and build resilience to the challenges of climate change based on the Climate Change Risk Assessment Report. The most recent Report in 2018 sets out the Government's response to the risks identified in the Climate Change Risk Assessment Report 2017 based on six themes below. The third Adaptation Report is due to be published in 2023.

- Flooding and coastal change risks to communities, businesses and infrastructure;
- Risks to health, well-being and productivity from high temperatures;
- Risk of shortages in the public water supply and for agriculture, energy generation and industry;
- Risks to natural capital, including terrestrial, coastal, marine and freshwater ecosystems, soils and biodiversity;
- Risks to domestic and international food production and trade;
- New and emerging pests and diseases, and invasive non-native species, affecting people, plants and animals.

2.14 The Climate Change and Adaption Committee's Progress Report to Parliament in reducing emissions and biennial assessment of progress in adapting to climate change was published in June 2022. It stressed that whilst the Government has a solid Net Zero strategy in place the climate challenge must be reflected more robustly throughout Government policy and planning. 'Climate risks affect all aspects of society, while any new source of emissions could put the Net Zero path at risk. Climate change must therefore be integrated throughout policy and planning decisions and must be a key consideration in the Government's proposed planning reforms.'

**The Planning and Compulsory Purchase Act 2004**

2.15 The Planning and Compulsory Purchase Act 2004 Section 19(1A) (as amended by section 182 of the Planning Act 2008) requires that local plans include policies designed to secure that, the development and use of land in a local planning authority's area, contribute to the mitigation of,

and adaptation to, climate change. Clearly this legal duty requires that local development plans take account of the need for climate change mitigation and adaptation in development proposals and the policies that direct them. It is important to note that here mitigation and adaptation are given the same weight and should therefore be equally considered in the drafting of policy and its implementation.

**Town and Country Planning: General Permitted Development Order 2015**

2.16 In most cases the installation of small-scale renewable energy equipment, including heat pumps, solar thermal and solar PV is permitted development subject to certain limits including not extending beyond 0.2m from the roof face or being higher than the roof line. In relation to listed buildings, scheduled monuments, conservation areas and world heritage sites, the installation of such equipment is not permitted development, however, the benefits of the installation of small-scale renewables should be weighed carefully against the harm to a conservation area or the setting of a listed building.

**Planning and Energy Act 2008**

2.17 The Act allows MPAs to include local plan policies which impose reasonable requirements for:

- A proportion of energy used in development in their area to be energy from renewable sources in the locality of the development.
- A proportion of energy used in development in their area to be low carbon energy from sources in the locality of the development.
- Development in their area to comply with energy efficiency standards that exceed the energy requirements of building regulations.

**National Planning Policy Framework (NPPF)**

2.18 The NPPF[19] states that 'The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.'

[19] NPPF July 2021, Paragraph 152

2.19 Local Plans are required to adopt a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.

2.20 It[20] also sets out that Local Plans should take account of climate change over the longer term, including factors such as flood risk, coastal change, water supply and changes to biodiversity and landscape. It states that new development should be planned to avoid increased vulnerability to the range of impacts from climate change. It also sets out that where new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure.

**Planning Practice Guidance**

2.21 Planning Practice Guidance[21] provides examples of how local plans can mitigate and facilitate adaptation to climate change through:

- Reducing the need to travel and providing for sustainable transport.
- Providing opportunities for renewable and low carbon energy technologies.
- Promoting low carbon design approaches to reduce energy consumption.
- Considering climate risks when allocating development sites.
- Considering the impact of and promoting design response to flood risk for the lifetime of development.

2.22 Addressing climate change is one of the core land use planning principles which the NPPF expects to underpin both plan-making and decision-making. To be found sound, local plans will need to reflect this principle and enable the delivery of sustainable development in accordance with the policies in the NPPF. There is a requirement to

[20] NPPF July 2021, Paragraph 153
[21] PPG Climate Change 2019 Paragraph: 003 Reference ID: 6-003-20140612 Revision date: 06 03 2014

adopt pro-active strategies to mitigate and adapt to climate change in line with the provisions of the Climate Change Act 2008 and co-operate to deliver strategic priorities which include climate change.

2.23 There is therefore a clear requirement for the plan-making and decision-making processes to adopt the measures needed to meet the UK Government and legal targets of achieving net zero emissions by 2050 to mitigate the effects of climate change and keep global temperature increases to as near to, or below 1.5$^{o}$C. Similarly, development plan policies and the decision-making process should also take into account the need for climate change adaptation.

**Other Government reports and strategies**

2.24 The UK Government has published a number of other reports and strategies aimed at addressing climate change issues; these include:

- **UK Clean Growth Strategy 2017** – planning for the UK's economy to grow whist still reducing greenhouse gas emissions;
- **UK 25 Year Environment Plan (YEP) 2018** – improving our environment over a generation, leading to Environment Act 2021 with commitment to bring forward legally binding targets on air quality, biodiversity, water and resource efficiency and waste reduction to support achievement of the net zero emissions target of 2050;
- **The Companies (Director's Report) and Limited Liability Partnerships (Energy and Carbon Report) Regulations 2018** implement the Government's policy on Streamlined Energy and Carbon Reporting requiring businesses (an estimated 12,000 companies) to produce an annual report on energy use and carbon emissions, intensity ratios and energy efficiency;
- **UK The Road to Zero**: Next steps towards cleaner road transport and delivering our industrial strategy 2018 – sets out UK's approach to tackling greenhouse gas emissions;
- **UK Clean Air Strategy 2019** - sets out plans for dealing with all sources of air pollution making our air healthier to breathe, protecting nature and boosting the economy;
- **UK Ten Point Plan for a green industrial revolution 2020** - Spanning clean energy, buildings, transport, nature and innovative technologies, the plan will mobilise £12 billion of government investment to create and support up to 250,000 highly-skilled green

jobs in the UK, and unlock three times as much private sector investment by 2030;

- **UK Energy White Paper Powering our Net Zero Future December 2020** - establishes the goal of a decisive shift from fossil fuels to clean energy in power, buildings and industry consistent with net zero emissions by 2050;
- **UK Industrial Decarbonisation Strategy March 2021** - shows how the UK can have a thriving industrial sector aligned with the net zero target, without pushing emissions and business abroad, and how government will act to support this;
- **Draft National Policy Statements for Energy September 2021** - The policy documents set out the case for an urgent need for offshore wind, solar PV, wave, tidal range, tidal stream, energy from waste, natural gas, low carbon hydrogen, small modular, advanced modular and large scale nuclear reactors as well as fusion power plants. Natural gas and other combustion plants, including energy from waste and biomass will still be required to meet peak demand periods, but will operate with carbon capture, utilisation and storage to reduce their GHG emissions.
- **Hydrogen Strategy 2021** - Hydrogen is one of a handful of new, low carbon solutions that will be critical for the UK's transition to net zero. As part of a deeply decarbonised, renewable energy system, low carbon hydrogen could be a versatile replacement for high-carbon fuels used today – helping to bring down emissions in UK industrial sectors and providing flexible energy for power, heat and transport. The UK Hydrogen Strategy sets out how the country will drive progress in the 2020s, to deliver a 5GW production ambition by 2030 and position hydrogen to help meet the Sixth Carbon Budget and net zero commitments.

  The UK Hydrogen Strategy includes the promotion of both Blue and Green hydrogen. Blue H2, produced from natural gas, is seen as a bridge to a truly low carbon source of energy although it has the disadvantage of having the potential to create greater CO2 emissions per KWh of energy than simply burning the natural gas unless it is linked to an effective carbon capture and storage system. Future green H2, from the electrolysis of water using wind or solar power, will replace blue H2 as the grid further decarbonises.

- **Future Buildings Standard 2021** - The aim of the Future Buildings Standard is to improve energy efficiency in new and renovated buildings while ensuring that the design and construction is sustainable. It applies to all types of non-domestic buildings including residential uses such as care homes and halls of residence. The standard intends to deliver highly efficient non-domestic buildings using low carbon heat and future proofed against potential over heating without the need for energy intensive air conditioning systems.

  Like the Future Homes Standard, the Future Buildings Standard will come into force from 2025 but includes an interim uplift in buildings regulations applicable from 2021, increasing energy efficiency standards and introducing a 'fabric first' approach to energy efficiency. This is intended to encourage the phase out of fossil fuelled heating systems.

  Rather than banning specified technologies, the Future Buildings Standard will set performance-based standards. It is however unlikely that the new standards will be met without the introduction of low carbon technologies.

- **Net Zero Strategy: Build Back Better - October 2021 -** The strategy identifies a series of policies and proposals to deliver a pathway to emissions reductions meeting the targets of the 6th carbon budget (to 2037) and ultimately toward the net zero target of 2050. The key policies for power generation are for the decarbonisation of electricity supply by 2035, to increase the supply of renewable energy and by 2030 to secure 40GW of additional offshore wind capacity, to secure an investment decision on a large-scale nuclear power plant by the end of the current parliament, launch a new Future Nuclear Enabling Fund to further the development of small modular nuclear reactors, and the deployment of flexibility measures to assist in smoothing of energy price spikes. In relation to fuel supply the main themes are industrial decarbonisation through the Industrial Decarbonisation and Hydrogen Revenue Support scheme (IDHRS) to fund new hydrogen generation and carbon capture business models.

- **The Environment Act 2021 -** seeks to improve the protection of the natural environment including emissions to air, land and water, the protection and recovery of biodiversity and the regulation of waste and resource efficiency. These aims have considerable overlap with climate change adaptation and mitigation in areas such as flood prevention and carbon sequestration or offsetting.

- **Decarbonising transport: a better, greener Britain 2021 - c**ommits to a net zero rail network by 2050, the inclusion of a rail freight growth target and the phasing out of new non-zero emission HGVs. Encourages the shift of freight from road to more sustainable alternatives such as rail and waterways.
- **The North Sea Transition Deal 2021 -** Set targets to reduce offshore emissions from oil and gas production by 10% in 2025, 25% in 2027, and 50% in 2030 against a 2018 baseline with the aim of creating a net zero basin by 2050. Investment of £14-16 billion in new energy technologies to deliver CCUs and hydrogen at scale.
- **UK Energy Security Strategy April 2022**
    - Low carbon power- Target of providing 95% of UK electricity from low carbon sources by 2030 and to fully decarbonise electricity by 2035.
    - Nuclear - increasing capacity from 8 GW today to 24 GW by 2050. This target could see the building of up to eight new reactors.
    - Offshore Wind - increasing capacity from 11 GW today to 50 GW by 2030, including 5 GW of floating offshore wind.
    - Onshore Wind - increasing capacity from 14 GW today in line with local community views. Expansion will be incentivised by offering lower electricity prices to those living near future wind farms
    - Oil and Gas recognised as essential transition fuel and increase in domestic production supported:
    - Offshore Gas - new licensing round launched in autumn (first since 2020) focus on faster development times.
    - Onshore Gas - review of seismic activity on shale gas geological science commissioned from BGS. Report sent to DBEIS awaiting publication.
    - Low Carbon technologies - commitment remains to deliver carbon capture and storage utilisation by 2030.
    - Hydrogen - increasing the previously set target from 5 GW to 10 GW by 2030 with at least 5 GW of green hydrogen.

# 3. Climate Change in Derbyshire and Derby

3.1 The Government has allocated the UK carbon budget amongst local authority areas. In September 2019, local carbon budgets were made available at district, borough and unitary authority level relative to existing practices in their respective areas. Budgets have been aggregated to produce a carbon budget for the County Council administrative area as well.

3.2 The Councils within Derbyshire and Derby recognise their responsibilities to reduce carbon emissions to meet their carbon budgets and play an active part in the global effort to reduce greenhouse gas emissions and avoid and adapt to the most severe consequences of climate change.

## Derbyshire County Council

3.3 Derbyshire County Council agreed a motion to Full Council, in July 2021, to recognise that there is a Climate Crisis. The County Council works with a wide range of organisations across the County and beyond to reduce greenhouse gas emissions from its own estate, and from the county as a whole, to adapt to, and mitigate the impacts of a changing climate. This process was formalised in the Derbyshire Climate and Carbon Reduction Manifesto (May 2019) which consists of a series of carbon reduction pledges. The Derbyshire Environment and Climate Change Framework (Oct 2019) seeks to reduce greenhouse gas emissions to levels which are consistent with the allocated carbon budgets for Derbyshire and to reduce carbon emissions to net zero by 2050. The Derbyshire County Council Carbon Reduction Plan (Oct 2019) requires the County Council to reduce greenhouse gas emissions from its own estate and operations with the aim of having net zero greenhouse gas emissions by 2032. It sets out that the Council will lead the way on tackling greenhouse gas emissions by using its influence and role as a community leader to work with partners, businesses and communities to tackle climate change through a common framework for action across the county and by getting its own house in order by reducing the emissions from its own estate and operations to net zero greenhouse gas emissions. This Plan sets out the actions the Council will undertake to reduce emissions from its own operations to net zero.

3.4 The County Council has published a Climate Change Strategy: Achieving Net Zero 2021-2025. It sets out Derbyshire County Council's ambition to be a net zero organisation by 2032 or sooner and what the County

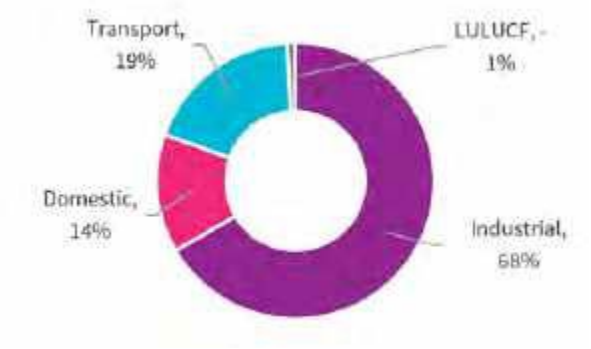
Council will do to help the County to be net zero by 2050. It contains 28 priority targets across five key areas and includes 120 actions that the County Council will lead on or support to address climate change:

Key Areas

- Council estate and operations
- Low carbon economy
- Decarbonising the domestic sector
- Transport, Travel and Infrastructure
- Waste

3.5 The Strategy provides information on wider county-wide emissions (excluding Derby City). It notes that in 2018, Derbyshire's total greenhouse gas emissions across the county were 10.5 MtCO2e. The biggest source of emissions is from the industry and commercial sector, alongside the transport and domestic sectors. Emissions from land use, land use change and forestry (LULUCF) were negative, demonstrating the sequestration of carbon from the atmosphere. Figure 5.3 shows the sectoral emissions:

**Figure 5.3: Sectoral emissions Derbyshire**




Source Derbyshire County Council's Climate Change Strategy: Achieving Net Zero 2021 - 2025 Figure 2 Derbyshire's greenhouse gas emissions breakdown by sector (2018 Contains public sector information licensed under the Open Government Licence v3.0. Source agency: BEIS [2020])

3.6 Derbyshire's county-wide target of net zero by 2050 is aligned with the UK's legal commitment to deliver net zero by 2050. Since 2005, Derbyshire's county-wide emissions have fallen by 21%. Emissions reductions will need to be accelerated in order to achieve the 47% reduction in emissions by 2025 (against the 2005 baseline) which is needed to be on course to deliver net zero by 2050.The Strategy covers

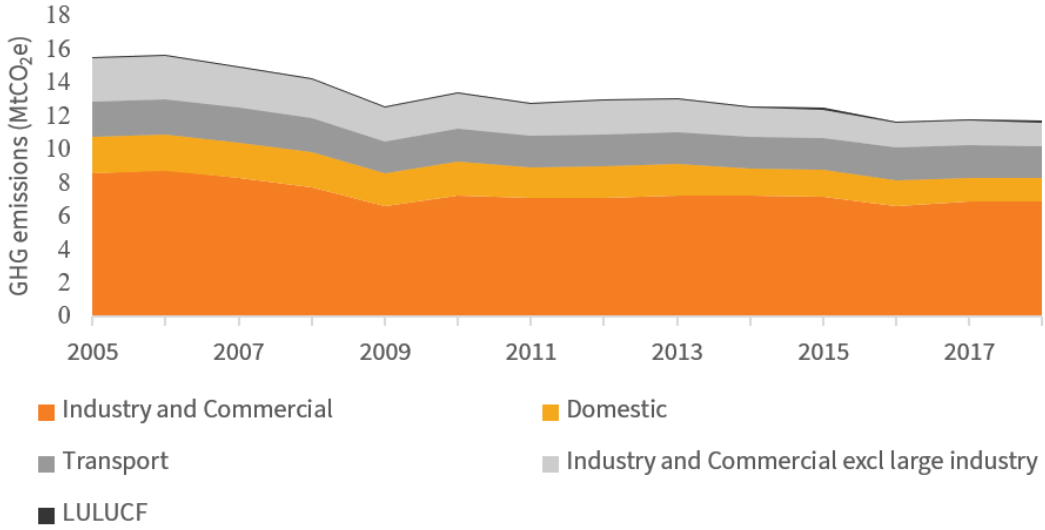
the period 2021 to 2025.It will be complemented by the production of a Natural Capital Strategy and a strategy to build the resilience of Derbyshire to a changing climate.

3.7 The Derbyshire county-wide emission figures are drawn from the BEIS Local Authority Inventory, which is updated annually by the UK government. These figures include all Scope 1 and 2 emissions across transport, industry, and housing but do not include Scope 3 emissions which are indirect up and downstream emissions associated with a company/organisation e.g., from buying products from its suppliers, and from its products when customers use them. The Strategy estimates that total emissions for the county would increase by 58% [22] if Scope 3 emissions were included. Scope 3 emissions are less easy to account for and less easy to directly influence but their reduction is essential in order to meet carbon reduction targets.

3.8 In 2018, Derbyshire's total greenhouse gas emissions were 10.5 MtCO2e, equivalent to 13.2 tCO2e/capita (for Derbyshire's population of 796,142 people), which is much higher than the average for the UK of 6.8 tCO2e/capita.[23] This is predominately due to the higher-than-average industry activity within the county,[24] as well as the spatially disparate nature of communities, which increases the reliance of private vehicles. The commercial and industrial sectors result in 68% of the total emissions, transport makes up 19% of emissions, and domestic buildings contribute 14%. Emissions from land use, land use change and forestry (LULUCF) were -0.1 MtCO2 (equivalent to -1%) demonstrating the sequestration of carbon from the atmosphere. Between 2010 and 2018, domestic emissions fell by 31%, industrial and commercial by 10%,[25] and transport by just 1%. When the contribution of large industry is excluded from the industrial and commercial sector, a much sharper rate of decline of 32% is seen between 2010 and 2018, suggesting the large industry has significantly contributed to emissions over this period. Figure 5.4 shows the county-wide sectoral reduction in emissions.2005 - 2018.

[22] Arup, C40 Cities and Leeds University, 2019. The Future of Urban Consumption in a 1.5 deg World
[23] BEIS, 2020. Emissions of carbon dioxide for Local Authority areas. With scaling factors applied to take account of all GHG emissions and not just CO2.[online] Available at: https://data.gov.uk/dataset/723c243d-2f1a-4d27-8b61-cdb93e5b10ff/emissions-of-carbon-dioxide-for-localauthority-areas. [Accessed 25 March 2021]
[24] During national allocation heavy industries contributing to the national economy are reallocated across counties
[25] Derbyshire County Council, 2020. Organisation Emissions

**Figure 5.4 Derbyshire Sectoral reductions in emissions**




Source: Derbyshire County Council's Climate Change Strategy: Achieving Net Zero 2021 - 2025Figure 9 Derbyshire County's sectoral GHG emissions (2005-2018). Produced by Arup © Contains public sector information licensed under the Open Government Licence v3.0. Source agency: BEIS [2020]

3.9 The county-wide target of net zero by 2050 is aligned with the UK's carbon budgets and it is assumed that a 68% reduction by 2030 is inferred within this commitment, to demonstrate progress towards the 2050 target.[26] The pathway, aligned to the national emissions reductions required to meet net zero, would require Derbyshire to adopt the emissions reductions, as outlined below, against the 2005 baseline.[27] Figure 5.5 sets out Derbyshire's pathway to net zero, as well as a previously developed, more aggressive decarbonisation pathway as determined by analysis through the Tyndall Carbon Budget Tool to demonstrate an extended ambitious pathway[28] .The Strategy states, 'We will be reducing our emissions as a minimum to our net zero pathway, and where possible accelerate to the Tyndall Centre ambition.' Both of these pathways highlight the need for the county to take ambitious, deep and widespread action to achieve its target of net zero by 2050.

[26] BEIS, 2020. Press release: UK sets ambitious new climate target ahead of UN Summit. Available at: https://www.gov.uk/government/news/uk-sets-ambitious-new-climate-target-ahead-of-unsummit

[27] The 2005 baseline has been used as it's the earliest emissions data the UK government provides for local authorities

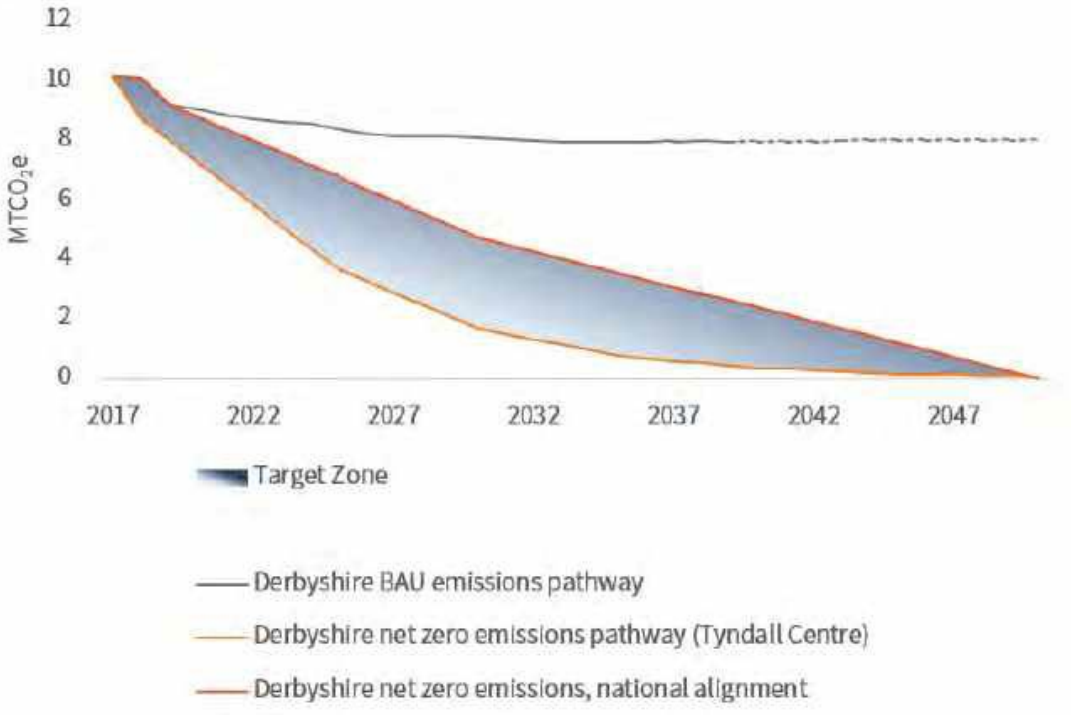
[28] These reductions are largely as a result of higher proportions of renewable energy in the UK's energy mix, which results in a lower carbon intensity of national grid electricity used by these sector (The Tyndall Carbon Budget Tool presents climate change targets for UK local authority areas that are based on the commitments in the United Nations Paris Agreement, informed by the latest science on climate change and defined by science-based carbon budget setting. More information: https://carbonbudget.manchester.ac.uk/reports/ ).

**Derbyshire's emission reduction targets**

| | |
|---|---|
| 2025 | 47% |
| 2030 | 63% |
| 2035 | 72% |
| 2040 | 81% |
| 2045 | 91% |
| 2050 | 100% |

3.10 The Strategy seeks to achieve net zero across the county through reducing emissions directly, however, it is anticipated based on current technological developments there will be a small percentage of residual emissions remaining in 2050. The Strategy seeks to balance these residual emissions through nature based or other forms of GHG removals such as Carbon Capture and Underground Storage.

**Figure 5.5 Net Zero Emission Pathways**




Source :Derbyshire County Council's Climate Change Strategy: Achieving Net Zero 2021 - 2025 Figure 12 Derbyshire County target net zero emissions pathways against business as usual. Note the Business As Usual (BAU) pathway has been estimated from 2040 - 2050 using average emissions changes in the preceding five years as national data has not yet been published by BEIS for this period © Arup

3.11 The Strategy seeks to deliver a low carbon economy in Derbyshire. The emissions from the commercial and industrial sector (including the minerals industry) contribute to 7,279 ktCO2e, equivalent to 68% of Derbyshire's Scope 1 and 2 emissions. Fossil fuel combustion, e.g. natural gas, coal, LPG, fuel oil etc. currently accounts for 93% of the total emissions in the commercial and industrial sector. Over two-thirds of these emissions are from heavy industrial activity/processes. In the Clean Growth Strategy, the Government set out an initial goal for businesses and industry to improve energy efficiency by at least 20% by 2030.[29] However, the UK Committee on Climate Change's (UKCCC) Sixth Budget has identified that manufacturing will need to reduce its emissions by 70% by 2035 and 90% by 2040, through fuel switching, resource efficiencies and Carbon Capture & Storage. The Strategy includes the county wide target to reduce manufacturing and construction emissions by 70% by 2035 (against 1990 levels) through energy efficiency improvements and expansion of CCUS technologies, and promotion of fuel switching.

3.12 The Strategy seeks to deliver county wide zero carbon integrated transport. In 2018, Derbyshire's transport emissions were 1,922 ktCO2e, representing 19% of the county's total emissions.[30] The International Transport Forum estimates that 17% of all transport emissions come from freight-related transport.[31] Reducing emissions from freight and goods transport is potentially more challenging than passenger transport due to freight vehicles typically being heavy goods vehicles (HGVs), for which there are currently limited low or zero emissions alternatives. Solutions for HGVs are likely to utilise hydrogen technology to support decarbonisation. There is currently only one hydrogen refuelling station at in the County at Staveley. The Strategy includes targets to deliver 2 hydrogen refuelling stations in Derbyshire and to reduce HGV emissions in the county by 2035 against baseline.

## Derby City Council

3.13 In May 2019 the City Council declared a Climate Emergency. The Council is to establish a Climate Change working group to recommend

[29] BEIS, 2017. Clean Growth Strategy

[30] BEIS, 2020. Emissions of carbon dioxide for local authority areas. [Adapted], includes road transport (A roads, motorways and minor roads), diesel railways and other transport.

[31] Department for Transport, 2017. Freight Carbon Review: Moving Britain ahead. [Online] Available at: https://assets.publishing.service.gov.uk/

actions for Derby to become carbon neutral. The Council's Climate Change Strategy was published in 2014 and is currently being updated. It includes the following aims:

- To raise the profile and understanding of how Derby can respond proactively to climate change;
- To develop a shared vision for Derby about this critically important issue;
- To recognise and build on the strengths of the city while identifying the gaps that exist in tackling this complex and challenging issue;
- To promote long term, integrated planning across different disciplines and organisations to help manage the city's response to climate change.

The Derby City Local Plan Part One Core Strategy, adopted January 2017, has two objectives which relate to climate change - the first is to reduce Derby's impact on climate change through promoting more sustainable forms of development, low carbon technologies, renewable forms of energy, recycling, careful use of resources and minimising waste. The second is to enhance the role of Derby's green wedges in recognition of, amongst other things, their contribution to adapting to climate change.

## Derbyshire Local Authorities

3.14 The County, City and Local Planning Authorities, including the PDNPA, in Derbyshire have worked together to prepare Planning Guidance on Climate Change to assist authorities in tackling climate change issues in their local plans. They have also published the Derbyshire Spatial Energy Study to provide an evidence base for local plan preparation enabling better integration of planning for future energy needs and addressing climate change.

3.15 Many of the eight Borough/District Councils/PDNPA within Derbyshire have declared Climate Change Emergencies and published their own Climate Change Strategies as well as including Climate Change polices in their Local Plans. The Spatial Energy Study provides an overview of local plan preparation and climate change in Table 3.2.

Further information on this can be found at Planning policy - Derbyshire County Council

3.16 The Planning Guidance is accompanied by a metric, a climate change assessment tool designed to give an indication of the degree to which planning proposals have included climate change mitigation and adaptation measures in their conception and implementation. The tool does not attempt to identify the climate impact, reduction of climate impact or degree to which the proposal is adapted to possible climate change scenarios in terms of tonnes of GHG or degrees of temperature rise. The tool will suggest whether or not the issues have been considered and included, it will also give an indication of which issues have been omitted or superficially included and therefore where further discussion and revision may be required to achieve adequate climate change mitigation or adaptation.

3.17 The issues or measures for consideration have been grouped by topic and are discussed below. Each issue is accompanied by a short description and rationale, explaining what the relevance is and how this can contribute to mitigation or adaptation. The issues are reflected in the assessment tool, but where there has been some contraction of the list, grouping similar issues and outcomes to ensure that the system is informative while remaining useable in the development management and policy fields, and potentially by developers bringing forward proposals. The issues list is not exhaustive, and as technologies develop there may be scope for further additions to the assessment tool.

3.18 Details of how to use the assessment tool are included in the tool itself. However, in summary, the tool presents 8 sets of measures which may contribute to mitigation or adaptation. These are categorised as:

- Built Environment, Design and Layout
- Commercial, Design and Layout
- Securing Enhanced Green Infrastructure
- Renewable Energy Generation
- Reducing the Need to Travel, Encouraging Active Travel
- Managing the Water Environment
- Sustainable Approach to Minerals
- Sustainable Approach to Waste Development.

3.19 Each section lists a number of measures or design features the inclusion of which may contribute to tackling climate change. These can be identified as:

- Not considered
- Considered and rejected
- Partially implemented
- Fully implemented
- Not relevant

3.20 The selection of 'Not considered' will score 0, while 'Fully implemented' will give a higher score as each measure is weighted depending on its potential to contribute to greenhouse gas reductions. The selection on 'Not relevant' will remove that option from the calculation so that the final score for that category will be a % of only the relevant measures.

3.21 The scoring summary view displays the total score of relevant measures categories as a 'Red, Amber Green' (RAG) graph for each category and as a % of the total score available for that form of development. There is no 'pass/fail' score, the RAG rating only directs the user to measures that may be considered if climate change performance is to be improved. The system does not attempt to quantify emissions reductions or savings as this is considered to require too much data to be manageable. The aim of the tool is therefore to direct the decision maker to those areas where there may be greater potential for improvement. The tool may be used in Development Management to assess proposals, it's use by developers may be encourage to provide an assessment as part of a submission or it could be considered to assist in the assessment of the potential for policy outcomes to mitigate climate change.

# 4. Addressing the Impacts of Climate Change through Minerals Planning

4.1 The production and use of minerals contributes to emissions and subsequently to climate change however minerals are essential to the economy and our way of life. It is important therefore that they are extracted, processed and transported sustainably and that, wherever possible, within the scope of minerals planning, measures are taken to mitigate and adapt to climate change. This can be achieved through:

a) Mitigating its effects through avoiding or reducing greenhouse gas emissions associated with mineral development (mitigation). Where this is not possible by including off setting or capturing and storing emissions (sequestration), and

b) Ensuring that minerals development contributes to the adaptation and resilience of the built and natural environment to the effects of climate change (adaptation).

## Secondary and Recycled Aggregates

4.2 The increased use of secondary and re-cycled aggregates helps to reduce emissions. If minerals are not re-used or recycled, then more primary mineral resources have to be extracted and new products manufactured, resulting in the use of additional resources and energy. Also, the recycling and re-use of construction and demolition material on site reduces the need for transporting aggregates which is a major source of carbon emissions.

## Greenhouse Gas Emissions

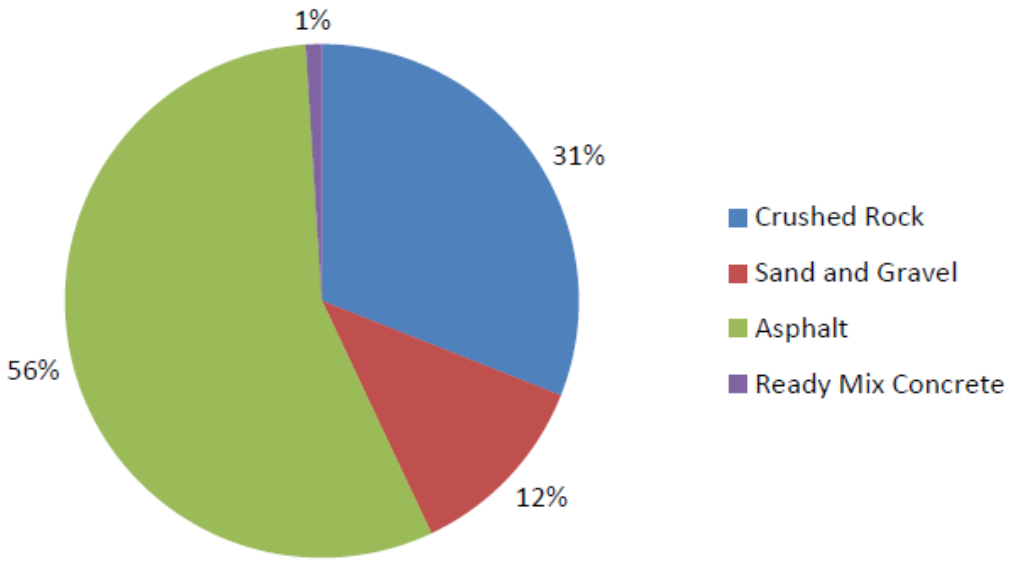
4.3 The extraction of minerals, processing and transport to market all generate emissions although the level of emissions will depend on the method of extraction, the way in which they are processed and transport requirements. For example, the processing of industrial minerals is particularly energy intensive with fuel and electricity required to heat kilns and operate plant.

## Energy Efficiency

4.4 The extraction and processing of minerals involves extraction machinery and processing plant and can be energy intensive. In 2020 the mining and quarrying sector (not including transport) in the UK consumed energy from fossil fuels equivalent to 5.5 million tonnes of oil

equivalent[32], and emitted 18.6 million tonnes of $CO_2$. equivalent[33] Figure 5.6[34] depicts industrial consumption of energy by sub sector from 1990 to 2020 which shows that, behind 'iron and steel', the UK's industrial sub-sector with the largest year-on-year decrease in energy consumption was the 'mineral products' sector (including mining and quarrying). Nevertheless, the scale of energy use means that it is important for the minerals industry to increase energy efficiency. Energy demands vary considerably depending on the mineral in question. Figure 5.6 illustrates the proportion of energy consumed during the extraction and processing of different types of aggregates.

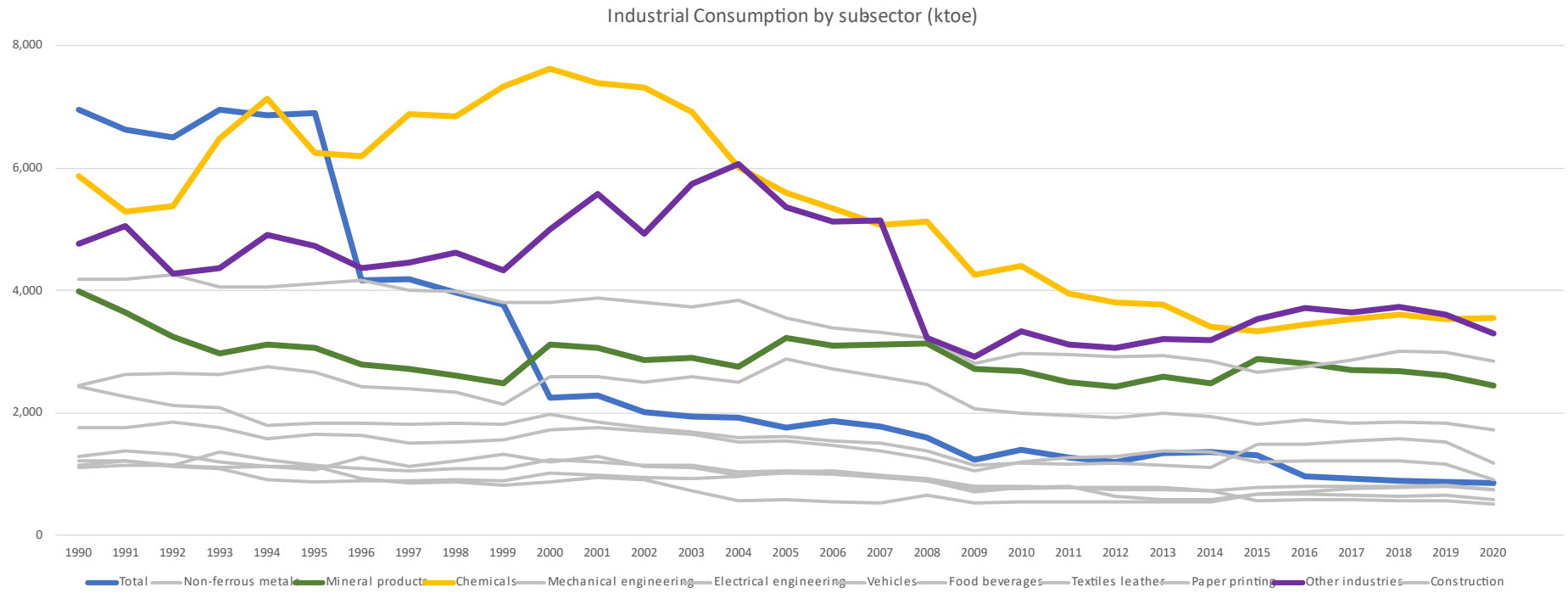
**Figure 5.6 Energy Consumption by product (aggregates)**




Source: Carbon Trust (2011) Aggregate Energy Consumption Guide based on 2009 data

[32] ONS UK Environmental Accounts 2022 Energy consumption in millions tonnes of oil equivalent (Mtoe) by industry
[33] ONS UK Environmental Accounts 2022 Total greenhouse gas emissions by industry.
[34] DBEIS Energy Consumption in the UK (ECUK) 1970 -2020

**Figure 5.7 Energy consumption by sub sector 1990 – 2020**



4.5 Research undertaken by the Carbon Trust[35] looks at energy consumption across a variety of quarries and mineral workings at different scales. This research indicated that economies of scale can have benefits for energy performance; however it also found that some small sites had achieved energy performance levels which matched the larger ones confirming there is also potential for small sites to become very efficient. The research considered the energy consumption and therefore $CO^2$ saving that could be made across the sector if all sites operated at a good practice benchmark[36] as shown in Figure 5.8.

**Figure 5.8 Average and good practice, $CO^2$ emissions and energy consumption by sector: potential savings**

| Sector | Production (million tonnes) | Average $CO_2$ emissions per tonne ($kgCO_2/t$) | Average Energy consumption per tonne (kWh/t) | Good practice benchmark consumption per tonne (kWh/t) | Potential energy saving across sector | Carbon saving across sector if achieved (t $CO_2$) |
|---|---|---|---|---|---|---|
| Crushed rock | 105.5 | 4.6 | 14.2 | 10.6 | 17% | 27,000 |
| Sand and Gravel | 46 | 4.0 | 11.7 | 8.4 | 27% | 24,000 |
| Asphalt | 20.5 | 34.9 | 117.6 | 102.6 | 10% | 40,500 |
| Ready-mix Concrete | 34.2 | 0.95 | 1.9 | 1.1 | 46% | 8,800 |

Source: Collated from information in Carbon Trust Report (2011) Aggregate Energy Consumption Guide Summary Report

4.6 The findings suggest that energy efficiency improvements to meet good practice levels could deliver an 8.4% reduction in energy consumption across the sector, with potential for greater savings if all sites had energy performance levels which were equivalent to the sector leaders. Since these studies were undertaken energy efficiency has become an integral part of the minerals industry. Across the industry there are examples of efficiency improvements being achieved, for example, Tarmac has achieved a 23.5% reduction in $CO_2$ per tonne of product since 1990 and has set a milestone to achieve a 45% reduction in $CO_2$ per tonne of product compared to 1990 levels (Scope 1 and 2 emissions) by 2030.[37]

4.7 The extraction and processing of minerals can be both energy and water intensive which means that it is important for the minerals industry to

[35] Carbon Trust (2011) Aggregate Energy Consumption Guide: Summary Report
[36] The good practice benchmark is set as the upper quartile of performance.
[37] Tarmac Website Climate Change 2022

reduce the consumption of energy and water and increase efficiency. From the outset proposals should take account of landform, layout, building orientation, massing and landscaping to minimise energy and water consumption.

4.8 Other measures to improve energy efficiency include:

- adapting processes and procedures;
- updating/refurbishing/retrofitting plant and buildings;
- using sustainable design and construction techniques in plant and buildings, including the re-use of buildings, use of recycled or recyclable materials and locally sourced or on-site building materials;
- Increasing water efficiency by re-using wastewater, harvesting rainwater and using winter storage reservoirs to supplement supply throughout the summer months;
- Installing SMART meters and energy monitoring tools;
- Improving service and maintenance procedures to ensure plant, machinery, vehicles operate more efficiently;
- Investment in improved efficiency, including upgraded insulation, more efficient LED lighting, low energy heating, and natural ventilation to reduce the reliance on air conditioning;
- Behavioural change programmes. It has been estimated that maintaining equipment well or turning it off when it is not in use, can reduce energy demand by up to 10%[38].

## Use of renewable and low carbon energy

4.8 The use of renewable and low carbon energy can help reduce carbon emissions. Renewables account for around 40%[39] of UK electricity generation in 2021, de-carbonising the grid will therefore require more than a doubling of our renewables supply. This bought its share below fossil fuels which accounted for 43%. However, this accounts only for electricity supply. If, transport, gas and oil for domestic, commercial and industrial purposes are included, renewable account for only 17% of the UK energy consumption.

[38] MPrA Website Resources Carbon Trust A Well Oiled Machine and Switch It Off

[39] Department for Business, Energy and Industrial Strategy's (BEIS) Digest of UK Energy Statistics (DUKES)

4.10 In 2020 the mineral products industry (including mining and quarrying), excluding transport, accounted for 12% of industrial fuel consumption in the UK, of this 46% was from Natural Gas, 19% electricity, 14% coal, 12% bioenergy and waste and 7%petroleum products. Since the turn of the century fuel consumption by the minerals product sector has decreased by some 16%; in 2001 coal accounted for 26% of consumption, fuel from bioenergy and waste has only been consumed since 2015 [40].

4.11 Key factors in the potential for using renewable and low carbon energy at mineral operations are the scale, location and anticipated life of workings. Many of the limestone quarries within the plan area are large scale and long term and a number of them are involved in processing industrial minerals which can be particularly energy intensive. In these cases the potential for renewable energy generation would be similar to that of any other industrial development. However, many of the limestone quarries are located in rural areas close to the PDNP and therefore the environmental and visual impacts of significant renewable energy generation would need to be taken into account. For shorter term operations that involve temporary buildings the potential for energy generation may be more limited to roof-mounted photovoltaic panels or similar.

4.12 The NPPF makes it clear that small-scale renewable or low carbon energy projects can provide a valuable contribution to cutting greenhouse gas emissions and that applicants for energy development should not be required to demonstrate the overall need for renewable or low carbon energy. Some small-scale schemes may be considered an ancillary part of a minerals working or restoration scheme, but in some cases separate planning permission might be required from the relevant district, city or borough planning authority.

4.13 Within the Plan area an example of the use of renewable energy is by Longcliffe Quarries at their Brassington Moor and Ryder Point quarries which consume over 1 million pounds worth of electricity a year. The majority of this power is consumed in processing limestone to produce industrial powders. The Company has invested in the construction of two 2.3MW wind turbines at Ryder point which now generate power

[40] DBEIS Digest of UK Energy Statistics (DUKES) 2021 ECUK Consumption Data Tables

equivalent to 85% of that consumed by all the company's electrical operations.

## Industrial Process Emissions

4.14 The processing of 'industrial' minerals can generate significant emissions. In the Plan area the calcination (heating) of limestone to produce cement and lime requires significant amounts of energy. Not all aspects of carbon emissions are from energy consumption some are from 'chemical reactions' or those which cannot be engineered out of the process. For example, the production of cement clinker produces significant carbon dioxide emissions, and in 2018, it was estimated that the concrete and cement production accounted for 1.5% of UK $CO_2$ emissions. Of the 7.3 million tonnes of carbon dioxide produced in 2018; around 4.4 million tonnes were 'process emissions' from clinker production, 2.2 million tonnes from fuel combustion and the remainder from electricity use and transport. Significant progress has been made in reducing emissions which have decreased by 53% since 1990.This has been achieved through a move toward using alternative waste-derived fuels and increasing the use of by-products and waste from other industries to substitute for clinker. Clinker is the principal ingredient in cement and clinker production the main source of carbon dioxide emissions. In 2018, the sector took 43% of its kiln fuel thermal input from waste derived sources, avoiding the use of just under 500,000 tonnes of coal. In addition, cement manufacturers replaced 7% of their raw materials with waste derived alternatives. Further reductions may be achieved if product and design standards allow for lower carbon cement formulations and these are adopted by the market. However, to realistically meet 'net zero' emissions from cement production by 2050 carbon capture, transport and storage will need to be technologically and economically feasible. Research is ongoing into the feasibility of this as part of the DBEIS Decarbonising Industry Strategy. A cluster (the Peak District Inland Cluster) of high emitting sites which includes two cement sites and three lime sites with total emissions of 2.2 $MtCO^2$ in 2016 has been identified for investigation into options for carbon capture, transport and storage.

## Reducing Transport Emissions

4.15 Another major contribution to emissions from the minerals industry is transport, from vehicles used on site in the extraction process and off site, for transporting the mineral to the market. Despite comprising only

5% of UK road vehicles, heavy goods vehicles (HGVs) produce 17% of greenhouse gas emissions from the surface transport sector[41]. The use of more sustainable modes of transport such as pipeline, conveyor, rail and water along with low carbon emission vehicles and fuels, such as hydrogen, would assist in reducing carbon emissions together with more efficient transport planning and logistics. Whilst indications are that over the 5-year period (2013-2018) nationally mineral products rail freight has increased by 21%[42], within the Plan area it is currently only the limestone quarries that are long-life (2042) and have large scale production (between 3 to 6 mtpa) which transport mineral by rail. Three limestone quarries are currently rail linked and a further two quarries that are resuming production intend to transport mineral by rail. In 2019, approximately 50% of aggregate limestone was transported by rail.

## Preparing for and Adapting to the Effects of Climate Change

4.16 The effects of climate change are experienced through more extreme and unpredictable weather conditions, which may include more intense rainfall events, hotter summers and warmer but wetter winters. The impacts of these changes on the Plan area include an increased risk of flooding, increase risk of fire and heatwaves, droughts and damage to infrastructure from an increase in storm events. A changing climate also harms wildlife and precious ecosystems. It is recognised that a certain degree of impacts from climate change are inevitable due to past emissions and even if emissions are reduced dramatically, it is important that new developments are planned to take into account adaptive measures including those to protect the natural environment and increase its resilience to change.

4.17 The inclusion of adaptive measures at mineral sites is important to ensure on site resilience from extreme climatic events such as heat and drought, storm events and high winds. Climate change may particularly lead to increased and new risks of flooding within the lifetime of planned mineral developments. In principle mineral development should located to avoid areas of vulnerability to climate change and flood risk; where this is not possible, it will need to be planned, designed and operated to avoid, reduce and manage potential flood risk from all sources over its lifetime including the risk of increasing flooding elsewhere. Mineral working can impact on water supply and groundwater and it is important

[41] Carbon Brief - Clear on Climate, 9 December 2020
[42] Sustainable Development Report 2020/2021 Minerals Products Association

that any impacts affecting the availability of water resources are appropriately assessed and mitigated. The use of sustainable drainage systems and water efficiency should be encouraged at mineral sites.

4.18 Mineral development does, however, provide opportunities to increase resilience to climate change through the restoration of mineral sites. Restoration schemes for sand and gravel quarries (which because of where the mineral is found often have to operate in the flood plains of the river valleys) can contribute towards reducing the risk and scale of flooding. Such schemes are most effective where they are part of an integrated approach to flood risk management and where they include natural flood management techniques such as using the extraction area next to the river for river braiding or widening or to provide increased capacity for winter flood water storage.

4.19 Restoration schemes can also provide opportunities for the creation of habitats for species affected by climate change. This includes the provision of wildlife corridors and making links to the wider green infrastructure network to improve the resistance of the natural environment to climate change. From a wildlife perspective, ensuring that water is managed so that water bodies, water courses and wetlands are receiving and storing water will be essential. Creating space for flood waters can also provide new habitats for wildlife, whilst the management of habitats should try to maintain a variety of micro-habitats to include shady, cooler areas as well as more open, hotter habitats.

4.20 More generally restoration schemes can also increase and enhance green infrastructure providing a network of multi-functional green and blue spaces and other natural features including newly planted trees; all of which provide local and wider benefits for the climate including carbon reduction. For example, increased vegetation will absorb greater quantities of carbon and will also help to reduce soil erosion during heavy rain and flooding by the roots binding the soil. Vegetation also reduces water run off by holding and absorbing water, helping to reduce the severity of flooding. Measures to support mitigation and adaptation to climate change should be provided for on-site and included as part of the restoration scheme rather than offset elsewhere.

## Mineral Companies - Climate Change and Sustainability Commitments

4.21 The majority of mineral companies in Derbyshire have developed sustainability strategies and identified pathways associated with carbon reduction targets towards achieving net zero by 2050. Annex A provides examples of the climate change and sustainability commitments of mineral companies operating within the Plan area.

# Annex A: Examples of Climate Change and Sustainability Commitments by Mineral Companies operating in Derbyshire

A1 This Annex provides examples of what mineral companies in Derbyshire have already done to tackle climate change and what they expect in the form of future commitments. This information is grouped under the following subheadings:

- Energy efficiency
- Emission reduction
- Fuel switching for energy and vehicles
- Carbon offsetting through restoration

The information is taken from sustainability reports published on mineral company websites operating in Derbyshire. These companies range from multi-nationals to those operating solely within Derbyshire.

## Review

A2 Tarmac have produced a Sustainability Strategy[43] which sets out their sustainability commitments for the next 10-years which is monitored and reported through publication of annual Sustainability Reports[44]. They have developed an encompassing People, Planet and Solutions approach and aim to continuously enhance the sustainable performance of their business, creating a "whole life approach when sourcing, manufacturing and delivering innovative, sustainable solutions that create value and contribute to the circular economy". Whilst Tarmac refer to the whole carbon costs, the majority of their information relates to the credentials of their products (which is perhaps of most interest to their customer), rather than specifically to practices associated with obtaining minerals as the raw product i.e. extraction, transport, and restoration.

A3 Longclifffe - an established limestone and dolomite quarry for over 90 years recognise their responsibility to ensure their quarrying operations are sustainable and kind to the environment and have a number of

[43] https://tarmac.com/sustainability/sustainability-strategy/
[44] https://sustainability-report.tarmac.com/

policies in place to ensure they have as little an impact on the natural world as possible. They uphold a number of accreditations[45] and are dedicated to ensuring their management systems and manufacturing operations are accredited using internationally-recognised industry standards. Their processes are externally audited on a regular basis using the regulations set out under ISO 9001, ISO 14001, ISO 45001, ISO 50001, BES 6001 and ISO 14021, focusing on quality management, environmental management, health & safety management, energy management, the responsible sourcing of construction products and environmental labels and declaration verification, respectively. This gives their customers the confidence that they can deliver on their promises and are committed to a programme of continual improvement in all aspects of the business to maintain and improve its position in the marketplace, to provide a safe working environment and to minimise its effect on the environment, including the prevention of pollution. They are committed to developing new, sustainable ways to manage their sites. Longcliffe's environmental policy is the driver for their environmental management system. The current policy, which forms part of their Integrated Management System (IMS), sets objectives with respect to minimising the impact of their operations on the environment. Longcliffe's environmental management system meets the requirements of ISO 14001:2015. This international standard sets out requirements for organisations looking to operate an effective environmental management system to document and improve their environmental impact.

A4 Breedon recognise their social responsibility obligations and are committed to ensuring that their business is conducted in all respects according to rigorous ethical, professional and legal standards. In 2018 Breedon became an active member of the Global Cement & Concrete Association (GCCA), which aims to drive industry leadership in the manufacture and use of cement and concrete, improve the social and environmental impact of the sector's activities and products and foster innovation and collaboration with industry associations and innovators along the length of the built-environment value chain[46]. In 2019 a strong commitment was made to the five pillars of sustainability contained in the GCCA's Sustainability Charter and its associated guidelines: Health and Safety; Climate Change and Energy; Social Responsibility; Environment and Nature; and the Circular Economy. Breedon has until 2023 to ensure

[45] https://www.longcliffe.co.uk/who-we-are/our-company/accreditations
[46] https://www.breedongroup.com/sustainability

that these are fully embedded across all their business lines, that KPI reporting is harmonised with others in the sector and that they report all relevant performance data. In many cases Breedon have committed to comply with other statutory reporting requirements, some of which are more onerous than those of the GCCA but will always comply with the GCCA's guidelines as a minimum and in general will seek to go well beyond them.

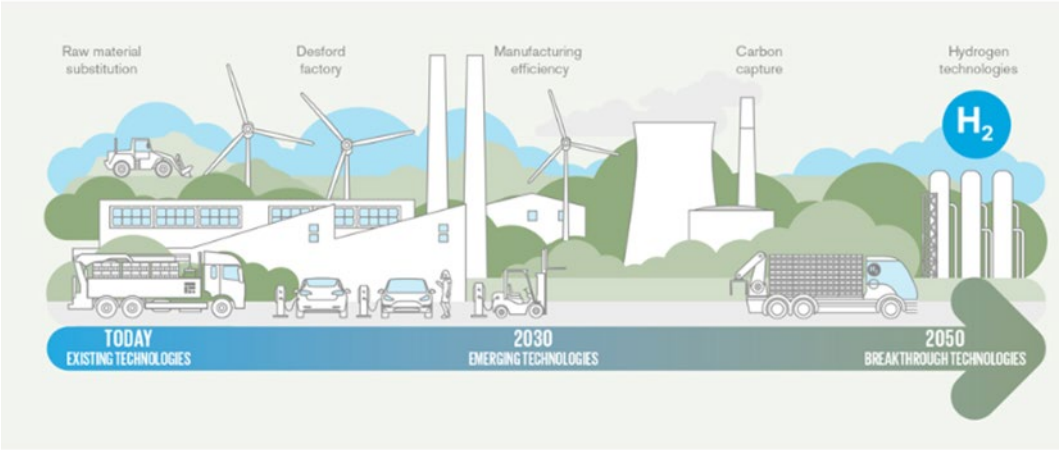
A5 Cemex recognize their responsibility in the development of sustainable cities and resilient communities and have defined priorities, aligned with their commitment to achieve the Sustainable Development Goals (SDGs) set by the United Nations (UN), that represent their best opportunities to create shared value and concentrate their greatest potential in the construction of a better future. Cemex believe global industry collaboration is key to accelerating the development of strategic climate action enablers at a global scale and are active members and hold leadership positions in national, regional and global industry associations in the countries where they operate.

A6 Wienerberger recognise the huge challenge presented by the drive to achieving sustainable operations, providing products and services that respond to the global challenges of climate change, biodiversity loss and resource scarcity in the built environment. They also recognise the need to become a net-zero emission, nature-positive business and have set out the pathways in their Sustainability Strategy[47]. To minimise the impact on the environment and reach net-zero emissions, Wienerberger recognise the need for systemic change within the construction sector. Wienerberger have committed to "play an important role, as the design of our products, and the services we provide, can impact the whole lifecycle impact of a building".Wienerberger proclaim to design products and systems with durability in mind by creating long-lasting products that require minimal maintenance during their lifespan and 'design out' waste and carbon emissions. By 2023, 100% of their new products will be designed in a way that they are reusable or recyclable.

A7 Forterra recognise the ever-increasing expectations of their stakeholders, and their primary future challenge is the decarbonisation of their products to support the wider built environment aspirations of

[47] Sustainability | Wienerberger

delivering zero carbon buildings[48]. They have set themselves carbon reduction targets for 2030 which contribute directly to achieving the UK's 2050 Net Zero Carbon ambition by taking advantage of emerging and breakthrough technologies.




A8 Hanson have a commitment to reaching net zero carbon by 2050. Having already reduced emission by 50% since 1990. They have also committed to invest £55million by 2023 to cut carbon emissions by a further 15%[49].

## Energy efficiency

A9 Use of technologies and materials to create more energy efficient products, such as Tarmac's Warm mix asphalts that are reported to deliver $CO_2$ savings of between 8-12% compared to conventional materials, without compromise to performance.

A10 Longcliffe has set targets for the reduction of energy consumption and carbon emissions and aim to reduce their use of fossil fuels in their operations, primarily production and transport, through energy efficiency and seeking alternative, renewable energy sources. Longcliffe have developed a renewable energy plan[50]. The energy consumed in the processing of limestone and dolomite products is the largest contributor to their overall carbon footprint making it a key priority in their environmental agenda. They are constantly upgrading plant and machinery and energy efficiency is a key consideration in their planning and investment programme. Longcliffe's ISO 50001 certificate for energy management forms part of their Integrated Management System (IMS)

[48] https://www.forterra.co.uk/sustainability/planet/
[49] https://www.hanson.co.uk/sites/default/files/2022-08/hanson-uk-committed-to-reaching-net-zero-carbon.pdf
[50] https://www.longcliffe.co.uk/who-we-are/environment-and-sustainability/renewable-energyv

and recognises that they have a robust system to manage and reduce their energy consumption.

A11 Their quarries are reported to consume one million pounds worth of electricity per annum as part of the crushing, screening, grinding and classifying blasted limestone to powders process. It is therefore essential that energy is used efficiently and sourced from sustainable means as a way of reducing operational costs and impact on the environment. Investment in renewable energy forms an integral part of Longcliffe's responsible energy policy and gives the company more control over its electricity costs as well as helping to secure the future of the business. Specific interventions include the installation of two wind turbines at Ryder Point (see photo inset) completed in January 2016 which generate 85% of energy consumed. A 9kW solar panel array plus a 12kW TESLA storage battery is installed on the roof of the head office. Additionally, the following electricity efficiency methods have been installed.

- Ordering the highest rating of energy efficient motors, (IE3 or IE4) and employing inverters to minimise energy by controlling motor speed.
- Installing power factor correction equipment to bring the power factor as close as practically possible to unity.
- Using sensors to turn of plant when not in use, using LED lighting wherever possible and PIR intelligent lighting controls.
- Employing appropriately sized and variable speed air compressors to avoid wasting power.

In terms of gas energy efficiency the following have been achieved.

- Use of fluid bed rather than rotary dryers, the efficiency is 10 – 20% better.
- All limestone for drying is stored in silos to minimise moisture content.
- Gas usage is minimised by automatically linking gas flow into the temperature of the emission gas. The latter will rise and fall with the moisture content of the limestone being dried.
- PLC controlled burners are regularly maintained.

A12 Longcliffe has been certified to the ISO 14001 environmental standard for a number of years, and last year became the first operation of its kind in the country to be certified to the ISO 50001 energy management standard. This entails constant improvement in the way in which energy

usage is managed as well as doing everything possible to minimise energy consumption and to maximise the efficiency with which energy products are bought.

A13 Additionally, Longcliffe strive to maximise mineral resource efficiency through optimisation of raw material use[51]. This reduces the potential for waste whilst ensuring use of the correct reserve for the most suitable application. This is achieved through drilling to obtain samples to produce a 3D map of reserves. The net effect of this complex analysis is that mineral reserves are worked to the appropriate quality of stone for the appropriate end use. For example, high-quality mineral is never used for lower quality applications, effectively conserving the purest stone for the most demanding applications.

A14 Cemex have a commitment to decarbonise their operations and have developed a pathway to carbon neutrality through evolving production processes to reduce carbon footprint[52]. Their ultimate goal is to deliver only net-zero $CO_2$ concrete by 2050. To ensure they are on the right track, they have set ambitious 2030 targets with a very specific roadmap to achieve them and working with external partners to validate and endorse their commitments[53]. They have identified four levers to reduce their emissions to meet their 2030 goals. These are as follows.

- Increasing the use of alternative fuels e.g. biomass instead of regular fossil fuels.
- Reducing the clinker factor in cement.
- Optimizing thermal efficiency in kilns.
- Using decarbonated raw materials.

In 2021 around 30% of Cemex's operation's power came from clean energy sources. The plan is to increase this to 55% by 2030 and 100% by 2050.

A15 Wienerberger are increasing energy efficiency across their manufacturing sites as one of the tactics to reach their decarbonisation targets. Their partner Powerstar has helped reduce electricity

[51] https://www.longcliffe.co.uk/who-we-are/environment-and-sustainability/current-projects/mineral-resource-efficiency
[52] https://www.cemex.co.uk/decarbonising-our-operations
[53] https://www.cemex.co.uk/future-in-action

consumption and improve reliability at their brick factory in Hartlebury[54] which translates to an 8% annual electricity saving. At the Mouselow Quarry in Derbyshire Wienerberger has partnered with Booth Ventures to ensure that no usable material is wasted, thus ensuring effective resource conservation and reducing the potential for wasted energy and resources.

A16 Hanson are optimising their plant set up, including the introduction of state of the art production assets, increasing digitalisation and sharing best practice to further improve energy management, carbon reduction and reduce wastage. They also purchase electricity rated as a zero carbon product, thereby almost eliminating their Scope 2 $CO_2$ emissions and aim to change the energy source for all their mobile crushing equipment from diesel to electricity over the coming years, reducing their $CO_2$ emissions by 100% once all equipment has been changed over.

## Emission reduction

A17 Tarmac are increasingly delivering low carbon materials, responding to carbon related enquiries and supporting customers to select the lowest carbon option for their projects and achieve their carbon targets.

A18 Tarmac have adopted a collaborative approach to 'sustainable and innovative construction'[55], with major construction and infrastructure clients attending a leading industry event hosted by Tarmac to discuss the technologies and behavioural changes that are needed to unlock the net zero opportunity. This provides a multi-channel opportunity to discuss the state of the UK road network, understand Tarmac's view of the transition to net zero, as well as debate the practical steps Government and industry must take to drive clean construction and deliver net zero by 2050.

## Case Study – Tarmac "Chlorine Bypass for Tunstead cement'[56]

A19 A new chlorine bypass has been approved for Tunstead Cement. The new system will reduce the use of fossil fuels by increasing the consumption of waste derived fuels using equipment. "The installation of the chlorine bypass will enable Tunstead Cement to replace

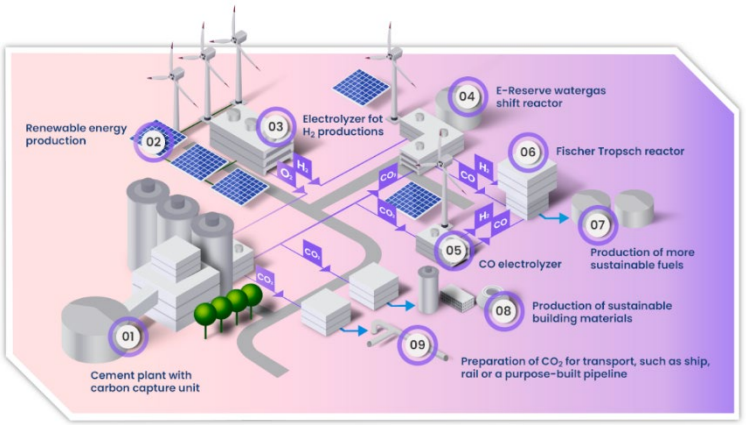
[54] https://www.wienerberger.co.uk/about-us/sustainability/sustainability-case-studies/energy-efficiency-hartlebury.html

[55] https://sustainability-report.tarmac.com/case-studies/a-collaborative-approach-to-sustainable-and-innovative-construction-event/

[56] https://sustainability-report.tarmac.com/case-studies/new-chlorine-bypass-for-tunstead-cement/

approximately 70 percent of fossil fuel with waste derived fuels when it's commissioned in 2022."

A20 Cemex's renewable energy policies enable and promote the energy transition and clean energy generation which is key to achieving their target of 55% clean energy consumption by 2030. They recognise that the key to unlocking true carbon neutrality is discovering and scaling new technologies that can capture, store, or use carbon[57]. Through partnership working they are investing in new technologies that are at the forefront of carbon capture, use, and storage (CCUS), as well as clean energy generation and are working towards the creation of the World's first net-zero $CO_2$ cement plant.




A21 Wienerberger have set a 15% reduction target in $CO_2$ emissions (tonnes $CO_2e$ per $m^2$ of product) from a 2020 baseline and will have set a Science Based Target and established a net-zero (Scope 1 & 2) ceramic production line as a key milestone towards achieving net-zero emissions before 2050[58].

A22 Wienerberger UK have also partnered with British Steel, Heatcatcher Limited and Low Carbon Europe Limited in a knowledge exchange project, co-ordinated by The Materials Processing Institute. This initiative will investigate combustion efficiency and heat flows and identify opportunities to cut carbon emissions produced in the manufacturing process[59].

A23 Forterra have already switched to procuring 100% of their electricity requirement from renewable sources removing all of their Scope 2

[57] https://www.cemex.co.uk/innovation-and-partnerships
[58] Sustainability | Wienerberger
[59] https://www.wienerberger.co.uk/about-us/sustainability/sustainability-case-studies/combustion-efficiency.html

emissions in 2020[60]. In addition to this, they will continue to investigate the possibility of investing in their own renewable electricity generation capacity which whilst not reducing their emissions relative to purchasing green electricity from the grid, would allow them to contribute to increasing the UK's capacity, to generate renewable electricity as well as potentially reducing their cost of electricity

A24 Lhoist takes a 'constructive approach' to the reduction of carbon. Examples of this include the following, however no specific details are provided:

- efforts to improve performance and support long-term responsible development. Investigate and test new ways to minimize energy consumption through the use of alternative fuels and renewable energy.
- increasing usage of biomass fuels, investing in energy-efficient technologies and working with kiln manufacturers to improve installations.
- playing an active role in ongoing global initiatives, Lhoist supports the development of carbon capture and storage methodologies.
- developing products and processes to enable and encourage resource efficiency to do more with less.

A25 Hanson are working on finding alternative fuels for their mobile plant fleet. The use of biofuels such as hydrotreated vegetable oil (HVO) has the potential to reduce $CO_2$ emissions in the short term before hydrogen technology becomes widely available. Hanson in partnership with HyNet Northwest expect to install carbon capture plant technology at their Padeswood cement works near Mold, North Wales to store carbon dioxide generated from hydrogen production. The project is currently at feasibility stage, however, is expected to reduce regional $CO_2$ emissions by up to 10 million tonnes every year by 2030. This figure includes up to 800,000 tonnes from the Padeswood plant and, if successful, could mean net zero carbon cement from the plant as early as 2027[61].

[60] https://www.forterra.co.uk/sustainability/planet/
[61] https://www.hanson.co.uk/en/news-and-events/hanson-joins-hynet-north-west-consortium

**Fuel switching for energy and vehicles**

A26 Tarmac have reported that 90% of their haulage vehicles are now compliant with Euro 6 emissions standard[62]. Alongside the increased fuel efficiency of their vehicles, Tarmac are also utilising telematics data to provide an insight into their carbon footprint and continuing to trial emissions reducing fuel additives and introduce diesel alternatives through 2022, which includes the use of HVO (hydrotreated vegetable oil) on rail and road. Furthermore, they are committed to trialling zero emission vehicles as they become operationally viable, including battery electric and hydrogen fuel cell[63]. A key part of Tarmac's overall logistics vision is a modal shift from road to lower carbon rail utilising extensive national rail network and terminals.

A27 Longcliffe are committed to investing and maintaining a modern, transport fleet that meets, and often exceeds, relevant industry regulations such as TASCC and emissions standards. They also use GPS tracking and management systems to optimise fleet efficiency, safety and fuel consumption demonstrating a commitment to operating the distribution network in the most sustainable way possible. In 2015, Longcliffe's transport fleet won the prestigious Freight Transport Association Small Fleet Operator of the Year award. The prize was given to acknowledge efficient operation of the company's 40- string road tanker fleet, which had seen a 4% saving in fuel efficiency[64].

A28 Breedon operates several railheads around the UK and have extended their commitment to utilising sustainable rail infrastructure to transport material through the reopening of disused infrastructure[65]. This latest investment further improves its distribution network for customers and lower the carbon footprint of its operations. Typical freight trains carry 1,500 tonnes of material, compared to a truck's 28 tonnes, leading to reductions in $CO_2$ emissions, road traffic and operating costs. The case study provided is however outside of Derbyshire.

[62] https://sustainability-report.tarmac.com/case-studies/tarmac-reaches-major-milestone-for-hgv-emissions-standards/
[63] https://sustainability-report.tarmac.com/case-studies/tarmac-commits-to-renewable-fuel-in-rail-freight/
[64] https://www.longcliffe.co.uk/who-we-are/environment-and-sustainability/energy-management
[65] https://www.breedongroup.com/news-media/breedon-extends-commitment-to-sustainable-rail-infrastructure

A29 Wienerberger is moving its company car fleet to electric vehicles, expecting to reduce business travel emissions by 500 tonnes of $CO_2e$ per year when complete in 2025[66]. Additionally, by 2025 they expect a complete transition to electric forklift trucks. Additionally, Wienerberger are also trialling running mobile plant on Hydrogenated Vegetable Oil (HVO), which has resulted in a reduction in $CO_2$ emissions by 90%. At the Sandtoft site, this translates to a carbon saving of 200 tonnes ($CO_2e$) per year[67].

A30 Hanson expect that the majority of mobile plants and delivery trucks will run on biofuels, green electricity or hydrogen by 2040, with all delivery trucks being carbon neutral by 2050.Hanson recognise that decarbonising truck deliveries is challenging, there are no viable hybrid or hydrogen truck options at present although they are investigating the use of biofuels. They are investing heavily in their network of rail connected quarries and depots in order to increase the amount of aggregate moved by rail, reducing vehicle movements and cutting $CO_2$ emissions. They have however committed to 50% of their van and 100% of their car fleets to be fully electric or hybrid by 2025. Their network of rail connected depots save 18.6 million road miles each year, reducing $CO_2$ emissions. In 2021 they opened two new rail depots which have saved 27,000 HGV movements.

**Carbon offsetting through restoration**

A31 Longcliffe has an established programme of former quarry restoration and recognise the opportunity to capture carbon as part of the process. This is demonstrated in their 'quarrying to nature' project at the former Hoe Grange Quarry in Derbyshire which was last mined in the 1970s. This quarry is now managed as a nature reserve, and whilst the majority of benefits are largely attributable to biodiversity in terms of habitat creation, there are some benefits in terms of carbon capture.

A32 Cemex have an established track record of restoration and conservation of their sites across the UK, however, as above these are mainly associated with enhancing biodiversity through habitat creation rather

[66] https://www.wienerberger.co.uk/about-us/sustainability/sustainability-case-studies/reducing-business-travel-emissions.html
[67] https://www.wienerberger.co.uk/about-us/sustainability/sustainability-case-studies/sandtoft-co2-reduction.html

than carbon capture and offsetting[68]. The wetland habitats created will inevitably assist with carbon sequestration.

A33 **Summary**

- The majority of companies have developed sustainability strategies and identified pathways with associated carbon reduction targets towards achieving net carbon zero by 2050. Many are investing heavily in the field of carbon reduction.
- Most companies are investing in energy reduction technologies to reduce overall consumption, costs and $CO_2$ emissions. Some have committed to generating their own energy onsite.
- A range of companies are utilising alternative fuels for plant, these mainly include hydrogenated vegetable oil (HVO). Some are investing in hydrogen technology.
- A number of companies are utilising rail to transport raw material/product as a means of reducing their carbon emissions.
- Most companies are committed to reducing emissions from their light vehicle fleets i.e. investing in electric vehicles and providing EVCPs.
- Decarbonising road HGV deliveries is recognised as challenging as there are currently no viable alternatives to diesel at present. Few companies are investing in cleaner HGVs or conducting trials. Tarmac and Hanson appear to be the leaders in this field, however, have only committed to adopt alternative fuels once they are viable.
- Expectation that hydrogen fuel will provide solutions going forward.
- Some companies are leading in developing new technologies. Others are waiting to adopt new technologies once they are proven viable.
- Hanson appear to be the only company investing in carbon capture (site outside Derbyshire) as part of their restoration proposals. Other companies are mainly focused on biodiversity outcomes, particularly in Derbyshire.

[68] https://www.cemex.co.uk/restoration-and-conservation