

East Sussex Environment Strategy 2020 Technical Appendix

‘At pace & at scale’



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Introduction

This is the Technical Appendix to the East Sussex Environment Strategy 2020. This Appendix should be read in conjunction with the Environment Strategy, which can be found here: www.eastsussex.gov.uk/environment/priorities/environmentstrategy

The Environment Strategy sets out the compelling case for action to improve the environment at pace and at scale and commits to deliver a set of new priority actions. The delivery of some of these actions will be impacted by the Covid-19 crisis.

This Technical Appendix provides the evidence base to support the Strategy by:

- providing an analysis of the challenges and opportunities under the five key environmental themes identified in the Environment Strategy, namely climate change, natural capital, air quality, water and resource efficiency.
- setting out the legislative and policy context for each theme.
- highlighting some examples of the extensive work that is already in progress nationally and locally to address the environmental priorities.
- explaining the reasons why the short-term actions set out in the Strategy have been chosen.

No single organisation, acting alone, can secure the changes that we need. Therefore, a partnership of private, public and educational sector organisations has come together to form the Environment Board for East Sussex and has developed the Environment Strategy.

The organisations represented on the Environment Board are:

- The Country Land and Business Association
- East Sussex County Council
- National Farmers Union
- Plumpton College
- South East Water

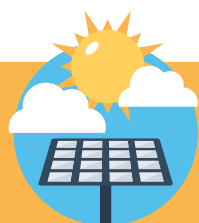
- University of Brighton
- Wealden District Council
- Eastbourne and Lewes Councils
- Environment Agency
- Natural England
- Southern Water
- Sussex Chamber of Commerce
- University of Sussex

The main aim of the Board is to drive measurable improvements in our environment, to ensure East Sussex continues to be a place where people want to live, work, study, visit and do business. The Board will do this by leading the delivery of the actions set out in the Environment Strategy.

Progress in delivering the actions in the Strategy will be reviewed and reported on every year and, subject to progress, additional actions will be agreed every year. The effect of the actions will be tracked through a small number of targeted performance indicators, to provide reliable and objective information about whether the environment is improving over time or not and where more action may be needed to achieve the long term goals set out in the Strategy. The link between actions taken and environmental change is often not direct or immediate, and data may show year-to-year fluctuations that are difficult to assess. These factors will be addressed in the annual progress report and the indicator framework will be kept under review so that it continues to be relevant and provide a useful, transparent and cost-effective way of assessing progress.

There are a number of social, cultural, economic, demographic and political factors that impact on our environment, but an analysis of these are beyond the scope of this Appendix. For example, the long term aims set out in the Environment Strategy will only be achieved if people change their behaviour.

The following sections of the Technical Appendix provide the evidence base for the Environment Strategy, looking at each environmental theme in turn, starting with climate change.



Climate change

The challenge

The 2018 UN Paris Agreement on climate change commits the global community to take action to limit the increase in global average temperature to 1.5°C above pre-industrial levels to avoid catastrophic and irreversible climate change. The UN's Intergovernmental Panel on Climate Change concluded that to achieve this requires "rapid, far-reaching, and unprecedented changes in all aspects of society".

Human activity has already led to an average of 1°C of global warming from pre-industrial levels, which is resulting in damaging impacts on lives, infrastructure and ecosystems that are apparent

today. For instance, global sea-level has risen by about 20cm since the start of the 20th century and global average crop yields have decreased by about 5% since the 1960s. Business-as-usual would lead to global average temperatures about 4-5°C above pre-industrial levels by 2100, with more warming expected beyond that (figure 1). Even the best-case scenario of 1.5°C of warming will see extreme temperatures in many regions and leave disadvantaged populations with food insecurity, lost incomes, and worse health. The most severe impact is predicted to occur in poor countries, which are responsible for a small fraction of total historic global emissions and have the least capacity to protect themselves.

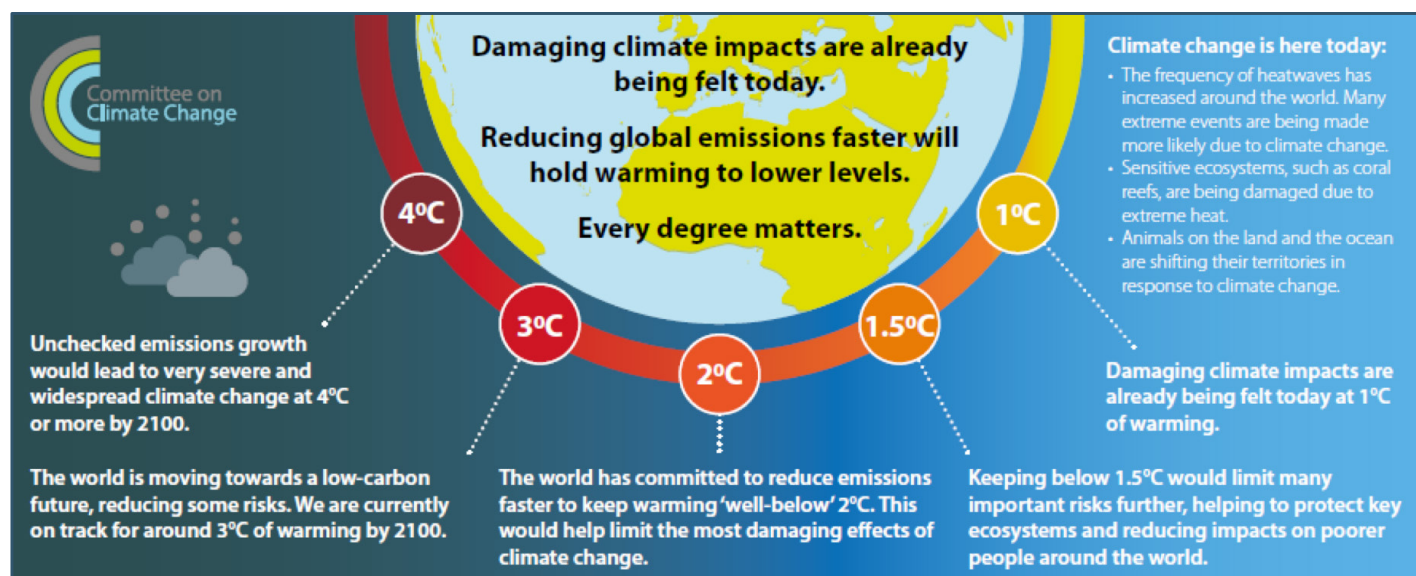


Figure 1. The climate change impact of different increases in average global temperatures (Committee on Climate Change, 2019)

The predicted impacts of climate change in East Sussex include more frequent and intense flooding, drought and episodes of extreme heat, as well as impacts from the effects of climate change overseas, such as on food supply. This will lead to an increase in heat-related deaths, particularly amongst the elderly, damage to

essential infrastructure, increased cost of food, disruption to supply chains and service provision, greater coastal erosion and impact on coastal habitats.

The UK, which is the 5th largest cumulative emitter of greenhouse gases since the industrial

revolution, has set a legally-binding target under the Climate Change Act to reach net zero emissions by 2050. The Committee on Climate Change, which acts as an independent advisor to government, has estimated that the cost of meeting this target will be about 1-2% of GDP, which would be partially offset by the

benefits of avoiding the worst impacts of climate change, for example by having to build more flood defences. The cost of having to adapt to the effects of unabated climate change was estimated in the Stern Report to be about 5% of GDP (2006)'.

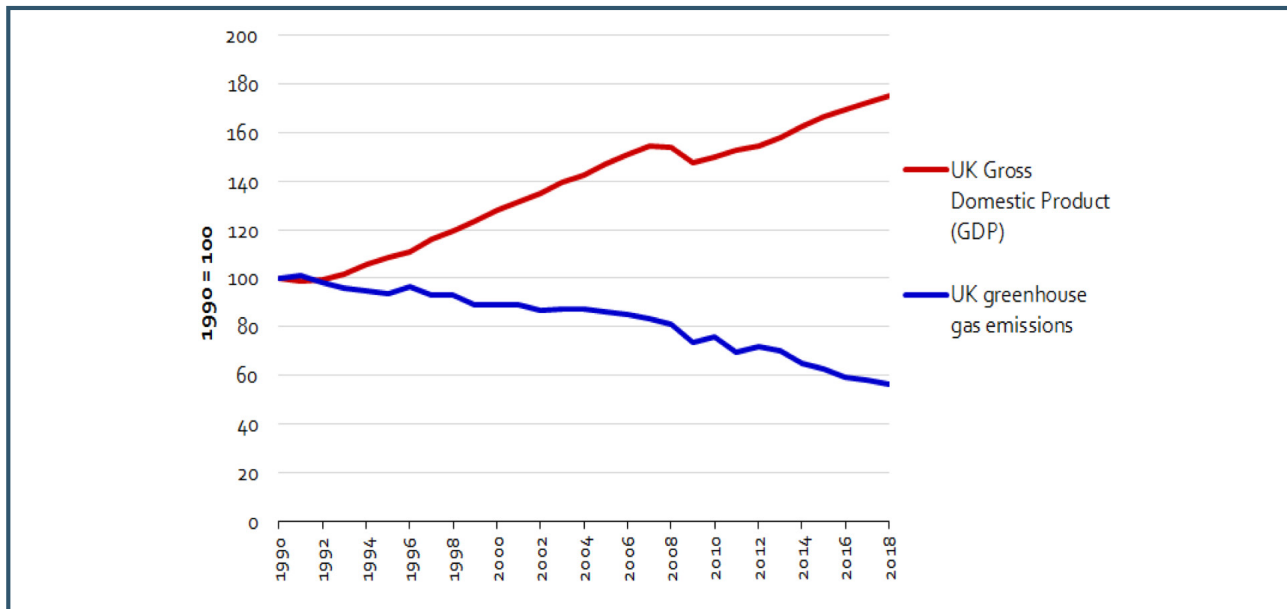


Figure 2. Change in UK GDP and greenhouse gas emissions between 1990-2018 (BEIS, 2019)

Reducing greenhouse gas emissions (GHGs) and increasing economic prosperity are not mutually exclusive. This is clear from the 40% reduction in UK carbon emissions since 1990, during which time the economy has grown by 2/3rds (figure 2). This has meant that UK per capita emissions are now close to the global average of 7-8 tonnes of CO₂e per person. This significant reduction in emissions has largely been achieved by replacing most coal-fired power stations with natural gas and renewables, by the reduction in biodegradable waste going to landfill and by the off-shoring of some emissions to other countries.

CO₂ emissions in East Sussex fell by 27% between 2005 and 2016, during which time the population grew by about 8%. This excludes emissions that occur outside the boundary of East Sussex as a result of the demand for goods and services that are consumed in East Sussex. This reduction is similar to the national rate of

reduction, as it has been driven by the same changes, for instance the switch from coal to gas and renewables to generate electricity. Emissions in East Sussex from all sectors have decreased, but the reduction from local transport is significantly less (at -6%) than the domestic sector (-33%) and commercial and industrial sector (-40%). Consequently, transport now accounts for the largest share (44%) of total carbon emissions in East Sussex (figure 3, page 6). This is similar to the national picture.

The Covid-19 crisis has led to the largest reduction in GHGs on record, as society has demonstrated profound resilience and adaptability in making radical changes to behaviour. The key challenge is whether recovery plans can both lock in the environmental improvements that have occurred because of the Covid-19 crisis and deliver economic prosperity.

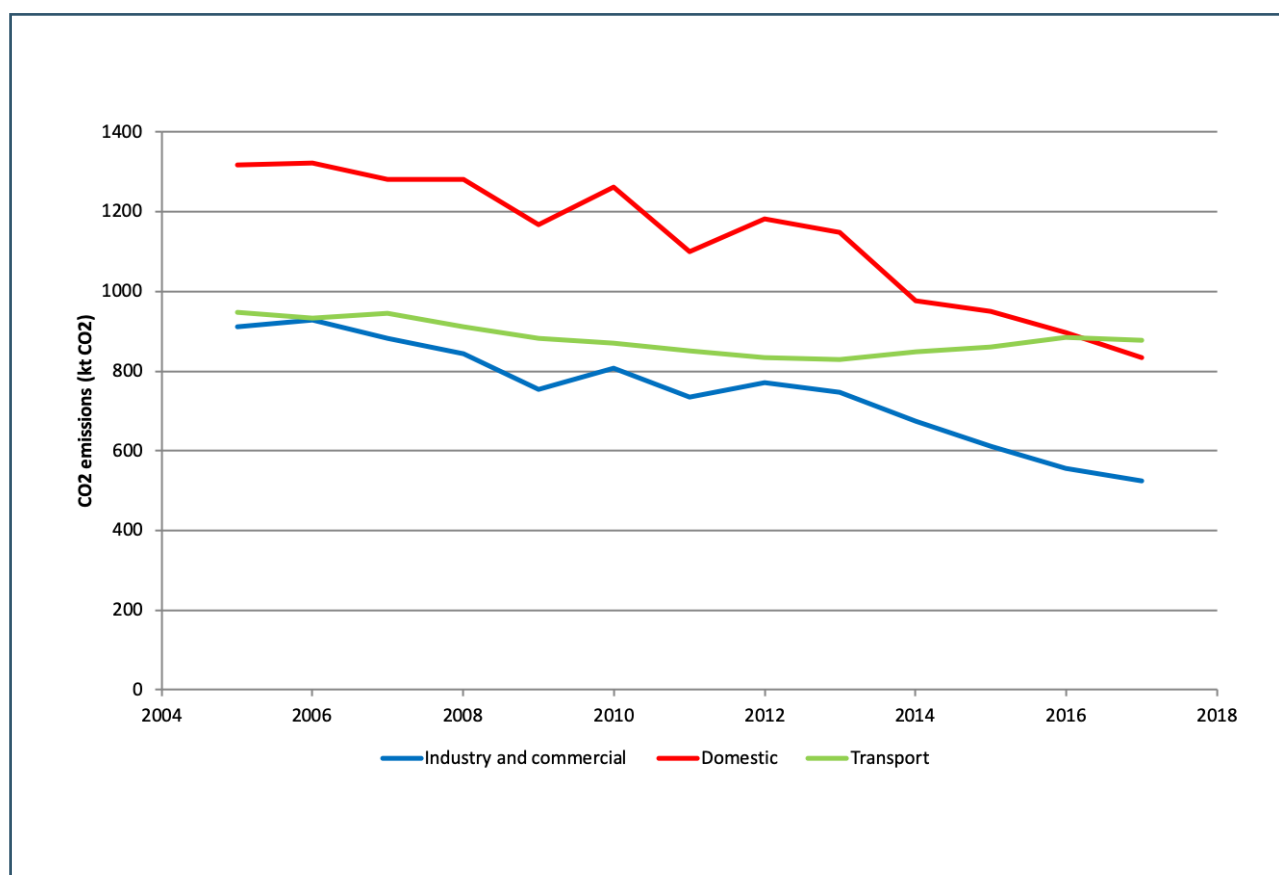


Figure 3. CO₂e emissions by sector between 2005-17 in East Sussex (Source: BEIS, 2019)

The volume of GHGs in the atmosphere determines global average temperatures. Therefore, to stay below a global average temperature increase of 1.5°C above pre-industrial levels means that there is only a fixed amount of additional GHGs that can be released to the atmosphere, and that all emissions above this budget will contribute to exceeding the 1.5°C threshold. This remaining global ‘budget’ of greenhouse gases can be divided into national and sub-national budgets in different ways, each of which has their strengths and weaknesses.

The UK’s Tyndall Centre for Climate Change Research has developed a recognised methodology for calculating the remaining budget by local authority area. This provides a useful starting point to specify by how much and how quickly an area needs to reduce CO₂

emissions to keep within its carbon budget. The Tyndall Centre estimates that the total emissions of GHGs from East Sussex in 2017 were about 2.295 million tonnes and that the remaining GHG budget for the county is about 14 million tonnes. This means that, if we continue with business-as-usual, the county’s budget will be used up in less than 7 years, beyond which all local emissions will contribute to pushing global average temperatures above 1.5°C. To stay within budget requires cutting emissions by an average of about 13% per year, which roughly equates to cutting total emissions in half every 5 years (figure 4). This rate of change has not been achieved in the past. However, this science-based approach to setting a GHG reduction target is increasingly being adopted. For instance, companies with a collective market valuation of over \$13 trillion have signed up to the international Science Based Target Initiative.

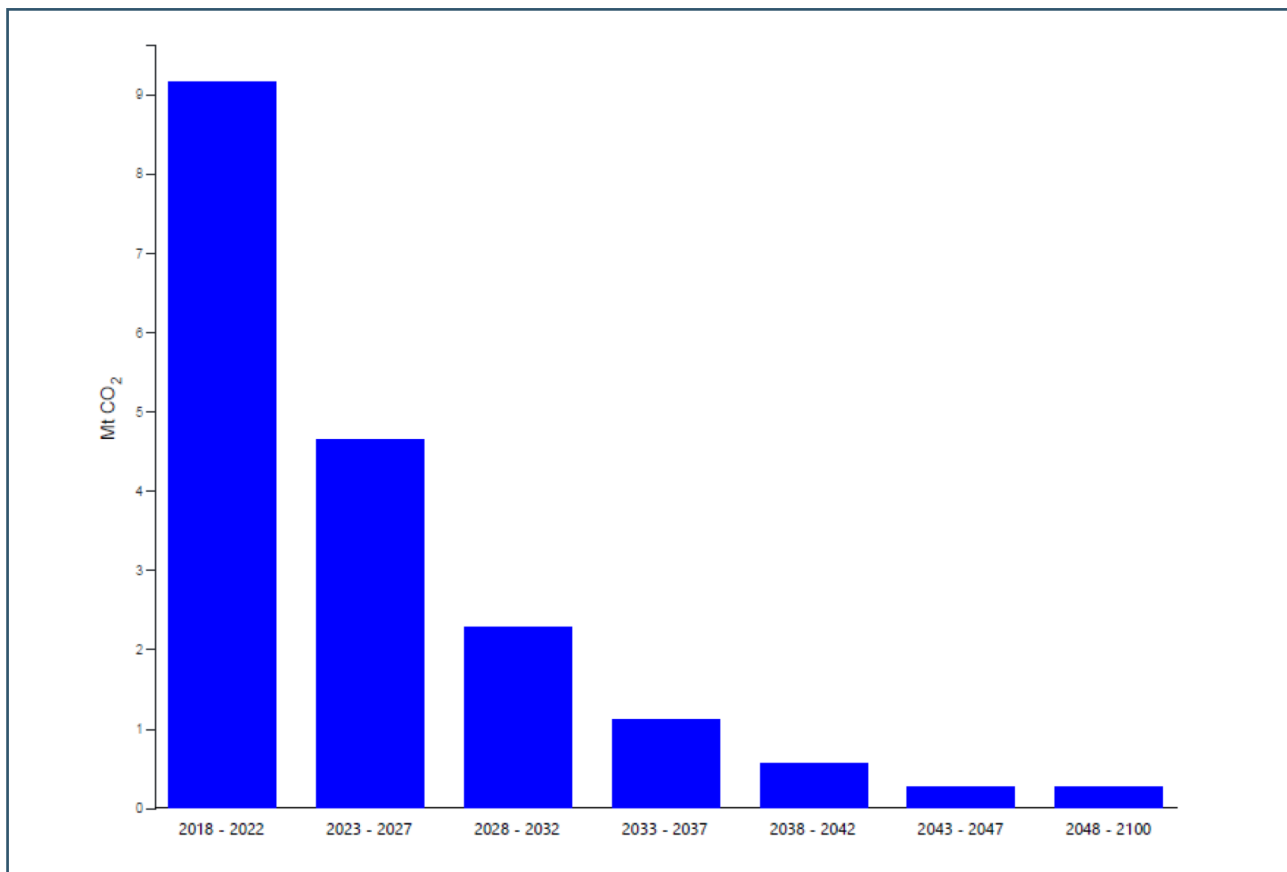


Figure 4. Cumulative CO₂ emissions budget for East Sussex from 2018 to 2100
(Source: Tyndall Centre for Climate Change, 2020)

Reaching net-zero emissions requires far reaching changes across all levels of society within a relatively short timeframe, set against a predicted increase in the demand for energy due to a growing population and economic growth. The key challenges to achieving net zero include:

- 1. Current performance:** to keep average global warming to no more than 1.5°C above pre-industrial levels requires a global reduction in greenhouse gases of 45% by 2030 against a 2010 baseline. However, since the first IPCC report was published in 1990 global emissions have increased by 60% rather than decreased. There are many UK and local examples of slow progress to date. For instance, less than 5% of UK industrial energy demand is currently met by low carbon sources, whilst walking rates in East Sussex have decreased in recent years and the current stock of housing and business workspace – most of which will still be in use in 2050 – is not energy efficient.
- 2. Timescale:** the speed of decarbonisation is constrained by the time required for the development of markets, supply chains and infrastructure, as well as innovation and turnover of the capital stock (e.g. a decarbonised electricity grid, vehicles, heating systems and industrial plant). However, major decisions about low carbon infrastructure that will be in place for a long time need to be made soon and implemented quickly to enable the net carbon zero target to be met.
- 3. Finance:** there needs to be a significant focus of public and private investment into low carbon capital stock and technologies. For instance, it's estimated that about £8 billion would be required to retrofit existing domestic properties in East Sussex to achieve their maximum energy efficiency. The Committee on Climate Change concluded that this kind of investment will largely be off-set in the long term by reduced energy

costs and the delivery of co-benefits. For example, improving the energy efficiency of domestic properties reduces fuel poverty and associated health impacts from living in cold homes. The Committee noted that much of this investment could be a re-directing of existing rather than additional investment, and that public funds might need to contribute about 10% of the total required.

4. Policy: the frequent changes to policy, such as the changes to the funding and subsidy arrangements for renewable energy systems and ultra-low emission vehicles, lead to significant fluctuations in delivery and uncertainty for investors. For instance, the number of insulation measures delivered in 2018 was the lowest since 2008, largely due to changes in how fuel poverty measures were funded, and there was an 18% reduction in the number of solar schemes installed in the first 3 months after the feed in tariff ended (Department for Business, Energy and Industrial Strategy, 2019).

5. Skills: there's a widely-recognised shortage of people with the required skills in building design, construction and in the installation of energy efficiency and renewable energy systems to meet the scale of change required over the next decade (The Economist, 2019). For example, it's estimated that an additional 2,200 tradespeople such as electricians and gas engineers are needed in East Sussex alone just to deliver an energy efficiency retrofit programme at scale for existing domestic properties (Retrofit Works, 2020).

6. Public acceptability: many people state that they support the need to mitigate and adapt to climate change, but the evidence of actual change in personal investment and behaviours is limited, for instance with low uptake of domestic low carbon heating options such as heat pumps, despite the generous subsidy. To date, much of the success in reducing UK emissions has been invisible to the public, and there are not yet compelling narratives to inspire and mobilise mainstream participation in solutions, or the adoption of technologies and change

in behaviours. In addition, most voters tend not to like to have to make hard choices or engage with complex issues.

7. Uncertainty: there are a number of key unknowns, including in key parts of the science of climate change, the rate at which technologies might become available and how effective they might be. For example, it's unclear what role hydrogen might play in both transport and heating compared with, or alongside, a decarbonised electricity grid, with the risk of investing today in what could become stranded assets in future.

8. Collective action: tackling climate change requires action by every part of society. However, harm from climate change is driven much more by what others do than what individual countries, organisations or individuals do. Consequently, everyone has an incentive to free-ride on the sacrifices and costs incurred by others to cut their emissions, which undermines the case for collective action. This is further complicated by the need to ensure that those on low incomes are assisted with the financial cost of transition, for instance to low carbon heating at home or transport.

Even if global warming can be limited to 1.5°C, significant additional investment will still need to be made in measures to adapt to the effects of climate change that are already locked in due to past emissions of greenhouse gases. The main effects include increased flooding as a result of sea level rise and the possible increase in the severity of storm events, droughts and heat waves. The UN Environment Programme estimates that by 2030, assuming global average temperatures do not exceed 2°C, poor countries will need to spend somewhere between \$140 billion to \$300 billion each year on adaptation measures, such as coastal defences. An increase above 2°C will require more spending on adaptation, and unmitigated global warming could result in catastrophic scenarios that outstrip the capacity to adapt (The Economist, 2019).

In the UK, mean sea level around the UK has risen by about 17 cm since the start of the 20th century, when corrected for land movement (Met Office, 2018). Continued rise in sea level is predicted to have an impact on property, infrastructure, supply chains and service delivery. For instance, in England around one in six properties and over half of water and sewage treatment works are already in areas at risk of flooding from rivers, the sea or surface water.

The greater the increase in climate change the greater will be the need – and the higher the cost – of adaptation. There will also be limits to the ability to adapt, for instance in being able to protect coastal infrastructure and communities. The responsibility for adapting to climate change is divided between a range of organisations and there is an extensive network of assets and systems in place to manage these risks. For example, the Sussex Resilience Forum prepares for the effects of extreme weather, including storms, flooding, heatwaves and droughts. But currently there is no strategic and integrated

assessment of the likely impacts of climate change in East Sussex, supported by a single adaptation plan to ensure future resilience.

The opportunity

Any action to reduce emissions helps to limit the risk of triggering large-scale, irreversible and damaging shifts in the climate. This can deliver multiple benefits, including:

1. Greater prosperity

The low carbon and environmental goods and services sector contributed over £30 billion to the UK economy in 2015, employing more than 430,000 people in largely high value jobs, and grew by 23% between 2010-15. In East Sussex the sector includes over 500 businesses, employing over 9,300 and generated £1.2 billion of sales in 2017. The scale of the challenge to get to net zero represents a very significant growth opportunity for this sector, whilst also delivering climate mitigation and cleaner air (figure 5).

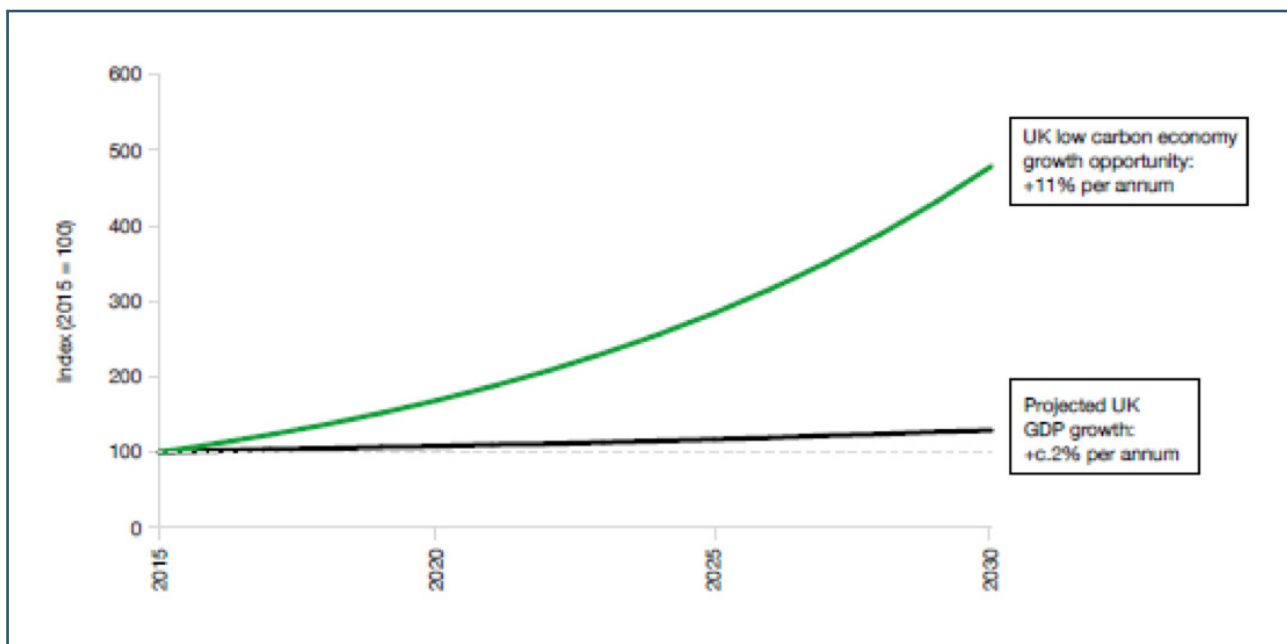


Figure 5. Potential growth in the UK low carbon economy
(Source: BEIS, 2019)

- The UK's Clean Growth Strategy of 2017 estimated that businesses could improve their energy efficiency, on average, by at least 20% by 2030, which could deliver up to £6bn in cost savings for businesses, as well as cut up to 22MtCO₂e (BEIS, 2017).
- The need to decarbonise is driving considerable innovation, for instance in smart technology to help manage demand on the electricity grid and drive consumer behaviour, the benefits of which then spreads across the wider economy.

2. Improved health

- Air quality: most measures that reduce greenhouse gases also reduce air pollution, for instance when replacing diesel or petrol vehicles with electric vehicles. These measures deliver immediate and long-term benefits to health.
- Winter deaths: about a third of the estimated 34,300 national excess winter deaths are attributable to living in a cold home, which would be reduced with more energy efficient homes.
- Diet: meeting the average dietary intake recommended by the World Health Organisation, for instance by reducing the consumption of intensively-reared red meat, would reduce greenhouse gas emissions by up to 17% and reduce the incidence of type-2 diabetes, stroke and certain types of cancer.
- Exercise: investing in walking and cycling delivers a cost-benefit ratio of between 2:1 to 10:1 because the health benefits enable people to be more productive and reduce the cost burden on the health system.

3. Reduced poverty

- Over 320,000 fuel-poor households in England live in properties with an F or G energy performance rating and, currently, about 10% of households in East Sussex are fuel poor. F and G rated properties cost an average of £1,000 more per year to heat compared with a typical home, and fuel poverty contributes to mental and physical ill-health. Consequently, increasing the

energy efficiency of properties can help those living in fuel poverty to save money, lift more people out of poverty, and reduce carbon emissions.

4. Greater security

- Energy: reducing energy demand and increasing the amount of renewable energy generated in the UK improves the UK's energy security by reducing our reliance on imported oil and gas, much of which comes from politically volatile regions.
- Migration: the UN predicts that climate change and the associated rise in sea level will make a number of areas uninhabitable and force some populations to migrate. The Committee on Climate Change concluded that, as a consequence, it stands to reason that higher levels of climate change are likely to be associated with greater numbers of people forced to seek refuge in countries such as the UK.

Current action

There's a complex mix of international and national regulation, policy, fiscal measures, voluntary agreements and market pressure that is driving investment in measures to mitigate and adapt to climate change. These include:

- 1. Reporting on carbon emissions:** there are various mandatory reporting schemes in place for larger companies. These include Climate Change Agreements with specific industries, and the new Streamlined Energy and Carbon Reporting scheme, which requires about 12,000 large or listed businesses to report annually on their energy use and carbon emissions, and to explain the measures they are taking to reduce their energy consumption.
- 2. Legislative and policy targets:** some of the main requirements are summarised in table 1 (on page 12).
- 3. Fiscal measures to reduce emissions:** a mix of taxes on carbon emissions (eg. the EU Emissions Trading Scheme and the UK Climate Change Levy) and subsidies for investment in renewables and low carbon

vehicles (eg. the Renewables Heat Incentive) are driving investment in climate mitigation measures.

- 4. Voluntary sector-based schemes to reduce emissions:** these include agreements between the government and different economic sectors to help deliver net zero emissions. For example, the UK Offshore Wind Sector Deal has been established to support the sector to aim to produce one third of the UK's electricity from offshore wind by 2030.
- 5. Regional energy hubs:** the South East Energy Strategy, which was partly developed by the South East Local Enterprise Partnership, sets out some ambitious targets (see table 1). Delivery is supported by government-funded regional energy hubs, which provide technical support to develop energy projects across the South East.
- 6. Community sector activity:** Community Energy South, based in Lewes, brings together a number of local community organisations across the south to develop community-owned energy schemes, notably solar PV schemes.

New actions on climate change

The actions set out in the Environment Strategy on climate change are to develop:

- 1.** A science-based road map for cutting carbon emissions from East Sussex.
- 2.** A pipeline of projects that deliver a significant reduction in carbon emissions.
- 3.** An electric vehicle charging strategy for East Sussex.

The reasons for the actions:

- 1. A science-based road map:** the purpose of the road map is to begin to set out how a 13% per year reduction might be achieved.

2. A pipeline of projects: there is an urgent need to increase the pace and scale of mitigation measures, in order to contribute to the delivery of secure, affordable and sustainable energy. Therefore, based on the priority measures identified in the road map, a process will be established with a range of partners to identify and bring forward more and larger projects that can reduce carbon emissions.

3. An electric vehicle charging strategy: There's no plausible path to net zero without major reductions in transport emissions. Currently, there is no strategic co-ordination of what types of charge points are points should be installed where and when in the country or in the county. The indications so far are that the market is only looking to provide charge points where there is a financial return, which is likely to leave some areas of the county, particularly in rural and deprived communities, with less access to charge points. This will limit future mobility, as the sale of petrol and diesel vehicles is gradually phased out by 2040, including for local businesses and for visitors. An electric vehicle charging strategy will be developed to identify how best to address this market failure and ensure a network is developed which is socially and economically just.

The indicator: The effect of the above actions in reducing CO₂ emissions from East Sussex will be measured by using the government's annual report on 'The local and regional carbon dioxide emissions estimates' since 2005, as it provides an independent, recognised and publicly-accessible dataset.

The lead organisations: all the local authorities in East Sussex have declared a climate emergency, either covering their corporate emissions or their area emissions or both. Therefore, they will collectively lead on the actions above and will work with a range of partners, recognising that everyone has a part to play in addressing climate change.

Level	What	By
UN	Sustainable Development Goals (2015)	
	• Target 7.2 Increase the share of renewable energy.	2030
	• Target 7.3 Double the global rate of energy efficiency.	2030
	• Target 13.1 Strengthen resilience and adaptation to climate change.	2030
EU	• Target 13.3 Improve education on climate change.	2030
	EU 2030 Climate & Energy Framework (2014)	
	• Increase renewable energy use to at least 32% of total energy.	2030
	• Increase energy efficiency by at least 32.5% from 1990 levels.	2030
UK	• Reduce greenhouse gas emissions by 80-95% from 1990 levels.	2050
	• EU F-Gas Regulations: reduce F-gas emissions by two-thirds compared to 2014 levels.	2030
	The Energy Efficiency Regulations (2015)	
	• All new rented properties must have EPC rating of E or above.	2023
	• All existing properties must have EPC rating of E or above.	
	Fuel Poverty Strategy (2015)	
	• As many fuel poor homes as possible to reach an EPC band of E by 2020, band D by 2025 and band C by 2030.	2025
	Clean Growth Strategy (2018)	
	• Phase out the use of unabated coal to produce electricity.	2040
	Road to Zero (2018)	
South East	• All new cars and vans to be effectively zero emission.	2040
	Clean Maritime Plan (2019)	
	• All vessels operating in UK waters to be zero emission.	2050
	Climate Change Act (2008, revised 2019)	
South East	• Net zero emissions of GHGs.	2050
	Tri-LEP energy strategy (2019)	
	• Decarbonize in line with the national trajectory.	2050
	• Reduce CO ₂ emissions by 13,615 kilo-tonnes.	2050
South East	Transport for the South East Transport Strategy (2020)	
	• Cut the South East's carbon emissions to net-zero.	2050

Table 1. Key climate change legislative and policy targets.



Natural capital

The challenge

Natural capital refers to the stock of natural assets such as soils, water, forests and the natural processes and cycles that underpin them, as well as the flows of benefits they provide to people including food, fuel, clean water, pollination of crops and climate regulation (figure 6). This multitude of services and benefits all have a value, some of which can be quantified, such as the value of timber or food produced from farmland, and others are either under-valued or unvalued and, therefore tend not to be taken into account in decision-

making. Consequently, natural capital is often degraded or lost because it's perceived to be free, as well as because there are often multiple beneficiaries, some of whom will behave as free riders. Yet natural capital regulates numerous life-supporting processes and provides the raw materials on which our economic prosperity is built. Therefore, it's increasingly understood that protecting and enhancing natural capital is not an economic cost but is necessary to maintain the foundations of a productive and resilient economy and society.

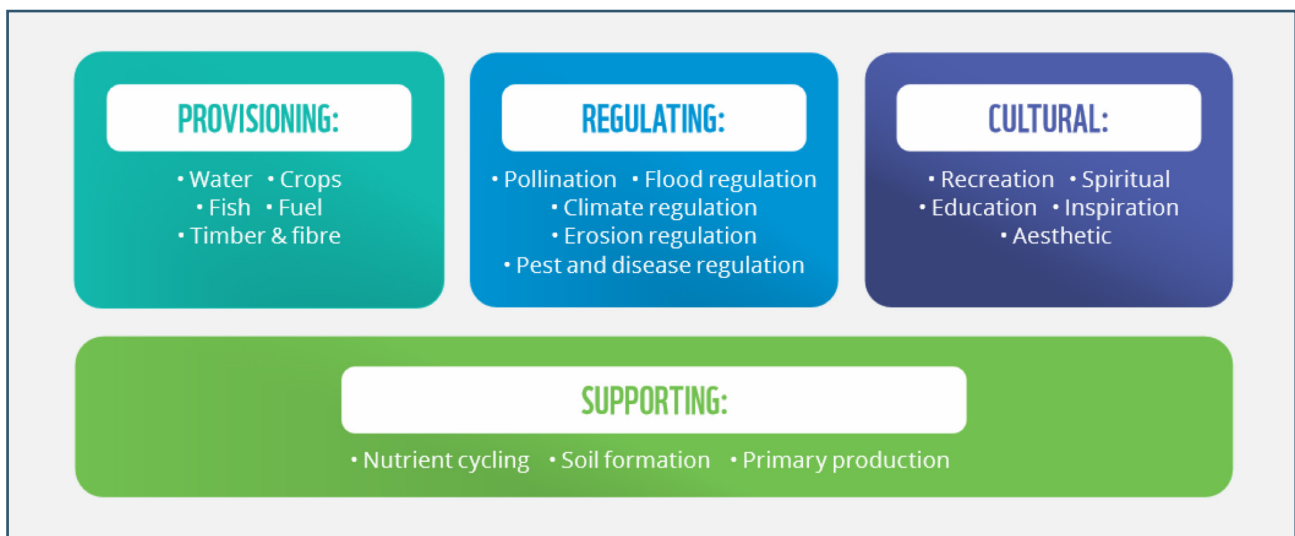


Figure 6. Ecosystem services and benefits (World Wide Fund for Nature, 2020)

No model is ever likely to capture all the value of natural capital, for instance where intangible or non-market benefits are provided, such as cultural services. In addition, 'nature' has an intrinsic value irrespective of human measures of utility. Yet there is also a clear market failure to protect and develop public 'goods' that are provided through natural capital. For example, more than 2 billion people rely on wood fuel to meet their primary energy needs and about

4 billion people rely mainly on natural medicines for their health care.

In 2019 the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), which is an independent intergovernmental body, evaluated changes in global natural capital over the last 50 years and the implications for our economies, livelihoods, food security and quality of life. The key challenges were identified as follows:

- the diversity within species, between species and of ecosystems is declining faster than at any time in human history. Loss of diversity, including genetic diversity, poses a serious risk to global food security by undermining the resilience of many agricultural systems to threats such as pests, pathogens and climate change.
- around 1 million species already face extinction, many within decades, unless action is taken to reduce the intensity of drivers of biodiversity loss. Extinction rates increased sharply in the past century, with the global rate of extinction being at least tens to hundreds of times higher than it has averaged over the past 10 million years.
- the value of agricultural crop production has increased approximately threefold since 1970, but soil organic carbon and pollinator diversity have declined, which indicates that gains in production are unlikely to be sustainable in the long term. In the UK, soil degradation was

calculated in 2010 to cost £1.2 billion every year (Environment Agency, 2019).

- land degradation has reduced productivity in 23% of global terrestrial areas, whilst over 85% of wetlands area, which provide coastal protection and are important fisheries, has been lost. In the UK, 90% of our wetland habitats have been lost.

The rate of global change in nature during the past 50 years is unprecedented in human history. The main causes are the intensification in the use of land and sea resources, pollution, non-native invasive species and climate change (figure 7). Underlying drivers include production and consumption patterns, population growth and technological changes. As these causes and drivers are largely projected to continue for the foreseeable future so the negative trends outlined above are predicted to worsen in most future scenarios. These are not only damaging to nature but also have a direct impact on our prosperity and wellbeing.

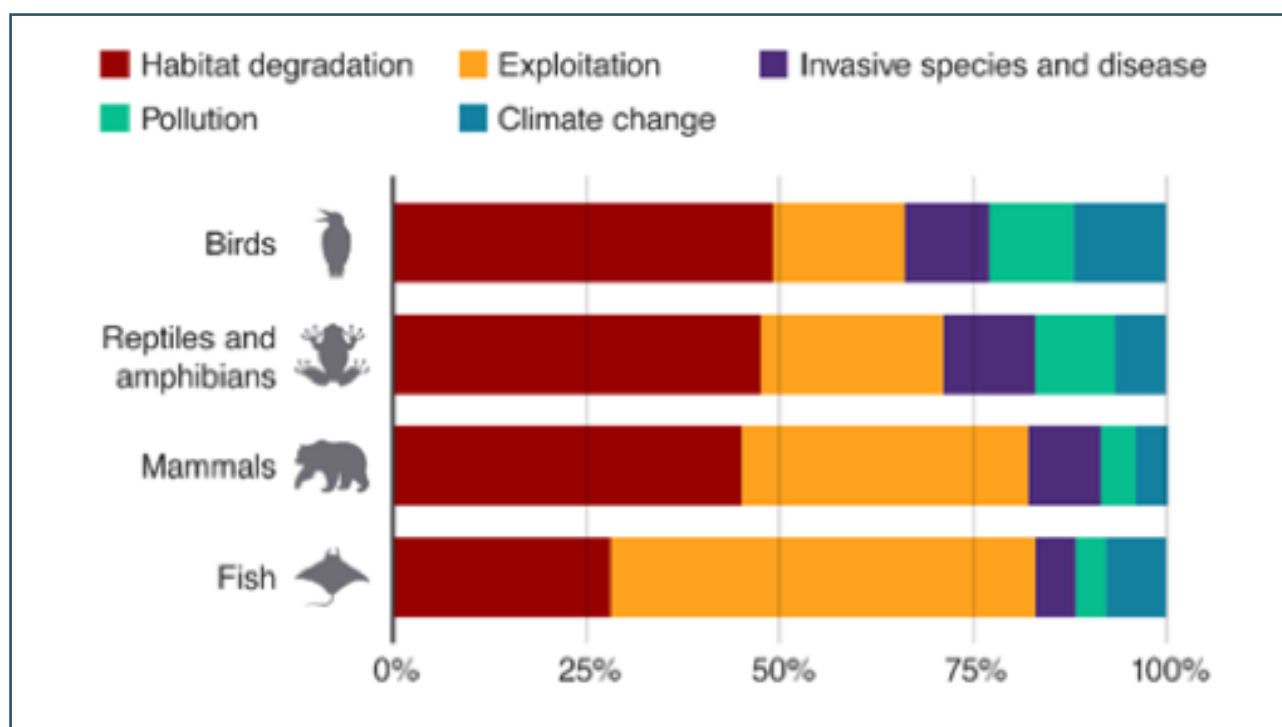


Figure 7. Key drivers of species decline (World Wide Fund for Nature, 2018)

In the UK, the Natural Capital Committee, which is an independent advisory body to government, concluded in 2019 that natural capital in the UK

is delivering flows of benefits well below what is possible or desirable. This is largely because data on species and habitats show significant

losses over the last 50 years (figure 8). For example:

- about a third of UK soils are thought to be degraded and about a third of fish stocks are at unsustainable levels.
- 71% of European-designated sites in the UK are in unfavourable condition, compared with an EU average of 30%.
- More species have shown strong or moderate decreases in abundance (41%) than increases (26%) since 1970, and likewise more species have decreased in distribution (27%) than increased (21%) since 1970.

(Defra, 2018; State of Nature Partnership, 2019).

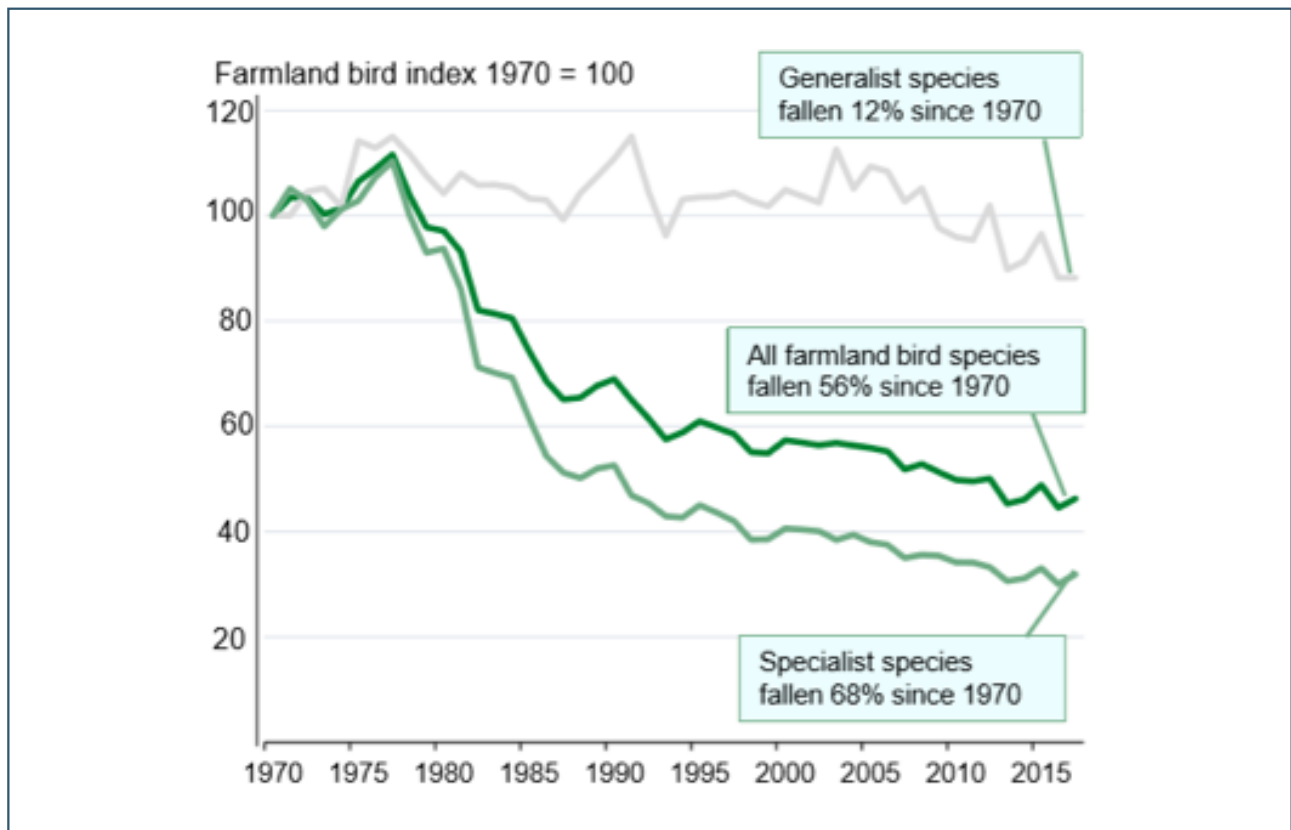


Figure 8. Farmland bird index (DEFRA, 2019)

The trends in East Sussex are broadly similar to those seen nationally, with over 400 species found in the county which are either globally threatened or in rapid decline (Sussex Biodiversity Records Centre, 2019).

A key barrier to addressing these challenges is being able to monetise and measure a return from investing in natural capital to ensure a reliable income stream. For instance, a 2016 survey by the Country Land and Business Association found that only 6% of its members felt that investing in the environment as part of their farming practices provided an attractive rate of return.

The opportunities

Continuing with business as usual will continue to reduce the goods and services provided through natural capital. In contrast, investing in improvements to natural capital can deliver significant economic, social and environmental benefits, including:

1. **Higher productivity:** the Office for National Statistics (ONS) estimated that the UK's natural capital contributed about £760 billion to the economy in 2015. If properly measured and managed, natural capital could continue to provide this scale of benefits indefinitely.

2. Contribution to growth: East Sussex has significant natural capital, with environmental designations covering over 2/3rds of the county compared with an average of 25% across England (DEFRA, 2018). This unique natural environment underpins part of the visitor economy, which makes up nearly 1 in 5 businesses and a quarter of all jobs, and is largely managed by land-based industries, which make up over 7% of all businesses in East Sussex. And these jobs can't be shipped abroad. (Skills East Sussex, 2017). Development that damages natural capital undermines sustainable prosperity, and may increasingly fail to gain community support, whereas development that includes good quality natural capital, such as green spaces, tend to increase the value of commercial and private property (Natural England, 2017).

3. Improved health outcomes: a number of studies have shown that spending time in nature can deliver measurable improvements in mental and physical health which, in turn, deliver lower health care costs and increased productivity. For example, regular exercise can reduce the risk of hip fractures by 68%, type 2 diabetes by 40%, heart disease by 35%, and depression by 30% (Department of Health, 2019). But there's a local deficit in access to green spaces in the coastal area of the county and the value of existing natural assets is not being realised, with surveys indicating that less than 20% of those aged 16 or above living in East Sussex use outdoor space for health or exercise at least once a week.

4. Ecological resilience: increasing the quantity and quality of habitats, and ensuring they are well-connected, enables habitats and species to cope better with changes such as climate change, whilst remaining healthy and productive.

5. Climate change mitigation: significant amounts of greenhouse gases are locked up in ecosystems such as peatlands, soils and forests. Where these are poorly managed they become net contributors to global warming, but where they are well managed

they become part of the solution to climate change by actively remove greenhouse gases from the atmosphere. The ONS estimated that in 2017 vegetation in the UK removed an estimated 28 million tonnes (CO₂ equivalent) of carbon gases and the Committee on Climate Change has made it clear that the UK's net zero target will not be met without changes to how we use land. The developing carbon off-setting market provides a financial diversification opportunity for farmers and land managers.

6. Climate change adaptation: a number of habitats, such as saltmarsh, provide coastal protection by anchoring sediments and absorbing wave energy. These, in turn, can deliver lower costs by reducing the need for hard engineering solutions in some locations.

Current action

There is extensive legislation and a large number of programmes and projects in place to protect and enhance natural capital in the UK. Examples include:

1. Legislative and policy targets: some of the main targets are summarised in table 2 (page 18).

2. Measuring natural capital: nationally, the ONS is implementing a programme to record the size and condition of our natural assets and the physical and monetary values of the benefits and services they provide, to create a natural capital account (ONS, 2018). This will help to make the case for increasing investment in natural capital.

3. Sussex Natural Capital Investment Strategy: the Sussex Local Nature Partnership was set up in 2014 to conserve existing natural capital and develop new natural capital in Sussex. It includes conservation organisations, environmental regulators, local authorities and businesses, and has produced a Natural Capital Investment Strategy for Sussex in 2020. The purpose of the Strategy is to help decision makers become aware of the value of investing in natural capital. It includes a strategic assessment of the quality, quantity

and location of key natural capital assets and whether they are successfully providing the services and benefits expected or whether they are assets at risk. This has identified a strategic priority list of what natural capital to invest in and where, both to protect what is at risk and to develop new assets.

4. Land management programmes: over 70% of land in England is farmed, so agriculture clearly has a major influence on natural capital. There are a number of agri-environment schemes, such as the Environmental Stewardship programme, which aim to improve natural capital, for instance by encouraging land management practices that reduce soil erosion and

water pollution. At its peak, the Countryside Stewardship scheme covered over 70% of agricultural land, and for every £1 of support put in there has been an estimated £3.60 benefit to natural capital (DEFRA, 2019). These publicly funded schemes are complemented by commercial land management schemes, such as between water companies and farmers. For example, Wessex Water uses reverse auctions to pay farmers for land management practices that reduce nitrate run-off, which brings lower fertiliser costs to farmers and lower water treatment costs to Wessex Water (Green Alliance, 2017).

Level	What	By
UN	Sustainable Development Goals	
	<ul style="list-style-type: none"> • Target 15.1 Ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems. • Target 15.5 Take urgent and significant action to reduce the degradation of natural habitats and halt the loss of biodiversity. 	2030 2030
EU	EU Biodiversity Strategy (2011)	
	1. Achieve a significant and measurable improvement in the status of all species and habitats covered by EU nature legislation.	2020
	2. Restore at least 15 % of degraded ecosystems.	2020
	3. Achieve Good Environmental Status for fisheries.	2020
	4. Control or eradicate priority invasive alien species.	2020
UK	25 Year Environment Plan	
	• Plant 1 million trees in England's towns and cities.	2022
	• Sustainable management of soil.	2030
	• Restore 75% of terrestrial and freshwater protected sites to favourable condition.	2043
	• Create/restore 500,000 hectares wildlife-rich habitat outside protected sites.	2043
	• Increase woodland to 12% in England.	2060

Table 2. Key natural capital legislative and policy targets.

5. Partnerships that deliver natural capital benefits:

the Local Wildlife Sites partnership in Sussex is providing advice to landowners on how to manage their sites to deliver greater natural capital, and river catchment partnerships across the UK deliver a number of practical projects to improve the water environment, which have wider natural capital benefits. For example, the Sussex Flow Initiative in the River Ouse catchment aims to reduce the flood risk for residents in Uckfield and Lewes by creating and restoring natural river features, and in the process has restored areas of priority habitat.

6. Social prescribing:

this involves helping patients to improve their physical and mental health by connecting them to non-clinical community services. Examples include green gyms, health walks and taking part in conservation activities. The East Sussex Social Prescribing Pathway Project is currently developing a partnership of voluntary and community sector providers, to build on existing projects such as the free 'rural rambles' that take place in the South Downs National Park.

7. Climate change mitigation:

the government has set up the £50m Woodland Carbon Guarantee scheme to help accelerate woodland planting rates to sequester CO₂. It provides landowners with a guaranteed price for the carbon credits, to help provide an additional long-term income from planting and maintaining woodland which is verified independently under the Woodland Carbon Code.

New action on Natural Capital

The action on natural capital in the Environment Strategy is to develop a Natural Capital Implementation Plan. The purpose of the Plan is to:

- embed natural capital in land-use planning.
- prepare a natural capital investment plan for Sussex.

- develop a pipeline of projects that can be matched to potential funders and investors. These include infrastructure providers and insurance companies looking to reduce their costs and risks, bonds from the financial markets, land management schemes and net gain funds, corporate sustainability funds, local community funding, private endowments, as well as more traditional public funding routes such as grants and developer contributions.

The reasons for the action:

- To address the urgent need to reverse the decline in natural capital in East Sussex by ensuring existing habitat is in better condition and is better connected, and developing new high quality habitat.
- To develop a strategic and co-ordinated implementation plan so that additional resources are targeted where they will deliver the most effective outcomes.
- To develop verifiable metrics, including ways of monetising and measuring a reliable return on investment, to attract more investment.

The indicator: the effect of the action will be determined by measuring the total area of restored or new habitat delivered by the Natural Capital Implementation Plan. This indicator supports the 25 Year Environment Plan ambition to create or restore 500,000 hectares of wildlife-rich habitat outside protected sites and will complement a number of existing indicators that are already reported on separately by a range of organisations, for instance on the condition of designated sites.

The lead organisation: the Sussex Local Nature Partnership, which is currently hosted by East Sussex County Council and chaired by Southern Water, will lead the development of the Implementation Plan as this will build on the LNP's Natural Capital Investment Strategy (see: <http://sussexlnp.org.uk>).



Air quality

The challenge

Up to 36,000 deaths per year in the UK are attributable to exposure to outdoor air pollution (Public Health England, 2017). This makes air pollution the top environmental risk to human health in the UK, and the fourth greatest threat to public health after cancer, heart disease and obesity (Clean Air Strategy, 2019). The economic cost of air pollution on health is estimated at

up to £20 billion per year due to the healthcare costs, premature illness and days lost from work (Royal College of Physicians, 2017). In addition, air pollution damages economic assets and the natural environment, by contributing to acidification and eutrophication of soil and water courses, and by damaging crops, forests and buildings.

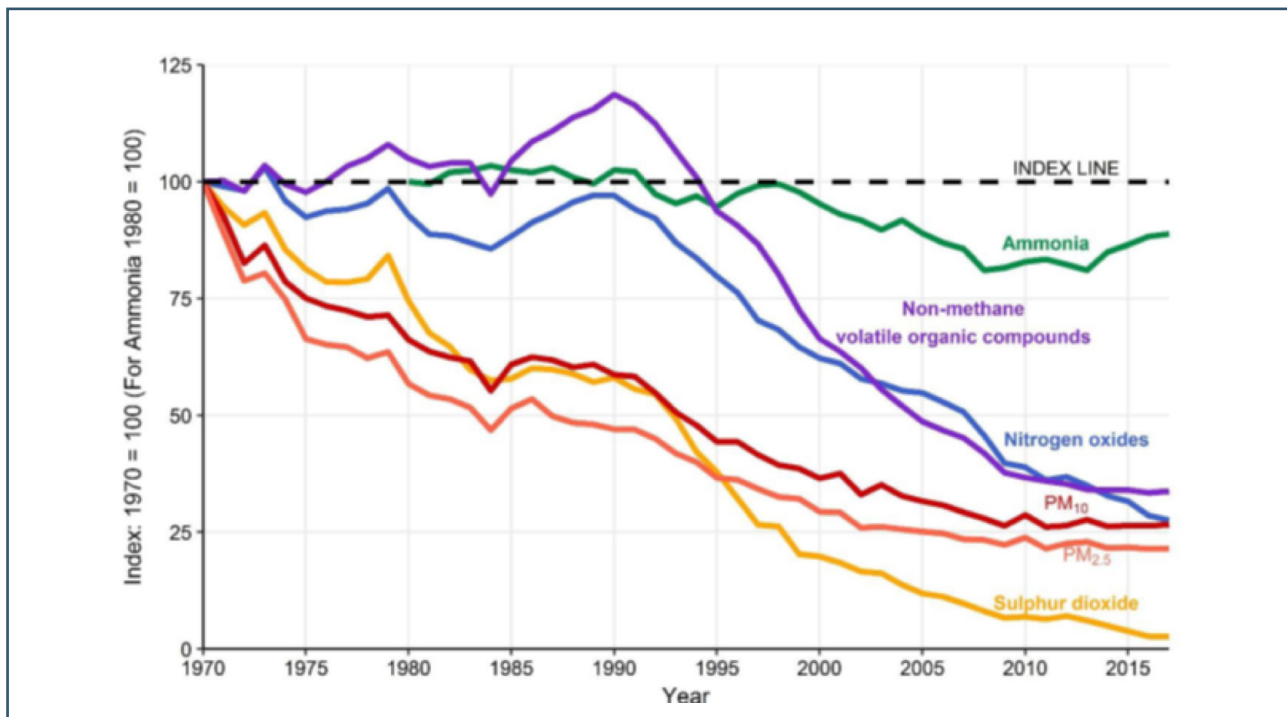


Figure 9. Trend of main air pollutants measured in the UK from 1970 – 2017 (Ricardo, 2017).

Being exposed to poor outdoor air quality is not a lifestyle choice, as is smoking or drinking. Those most affected are children, pregnant women, those with existing cardiovascular and/or respiratory disease, the elderly and those who spend more time in polluted locations, for instance people who live and work near busy roads. Consequently, there's a correlation between areas of poor air quality and regions

of deprivation, as high density and cheaper housing is often located closest to busy road networks, which compounds existing health inequalities (Public Health England, 2015).

Different pollutants have different impacts on health and the environment. The three main pollutants of concern to health in East Sussex are particulate matter (PM), nitrogen dioxide (NO₂), and ozone (O₃). These are linked to lung

diseases (asthma, bronchitis and emphysema), heart conditions, cancer and potentially neurological conditions such as reduced IQ in children and the onset of dementia. The main man-made sources are the combustion of fuels by vehicles, industry and, increasingly, from domestic wood burners. The largest local contribution is from vehicles. Some air

pollutants have no safe levels of exposure, for instance particulate matter, which contributes to an estimated 290 deaths per year in East Sussex. Consequently, any improvement in air quality generally brings public health benefits to everyone and in all locations where there is exposure, not just identified hotspots of poor air quality.

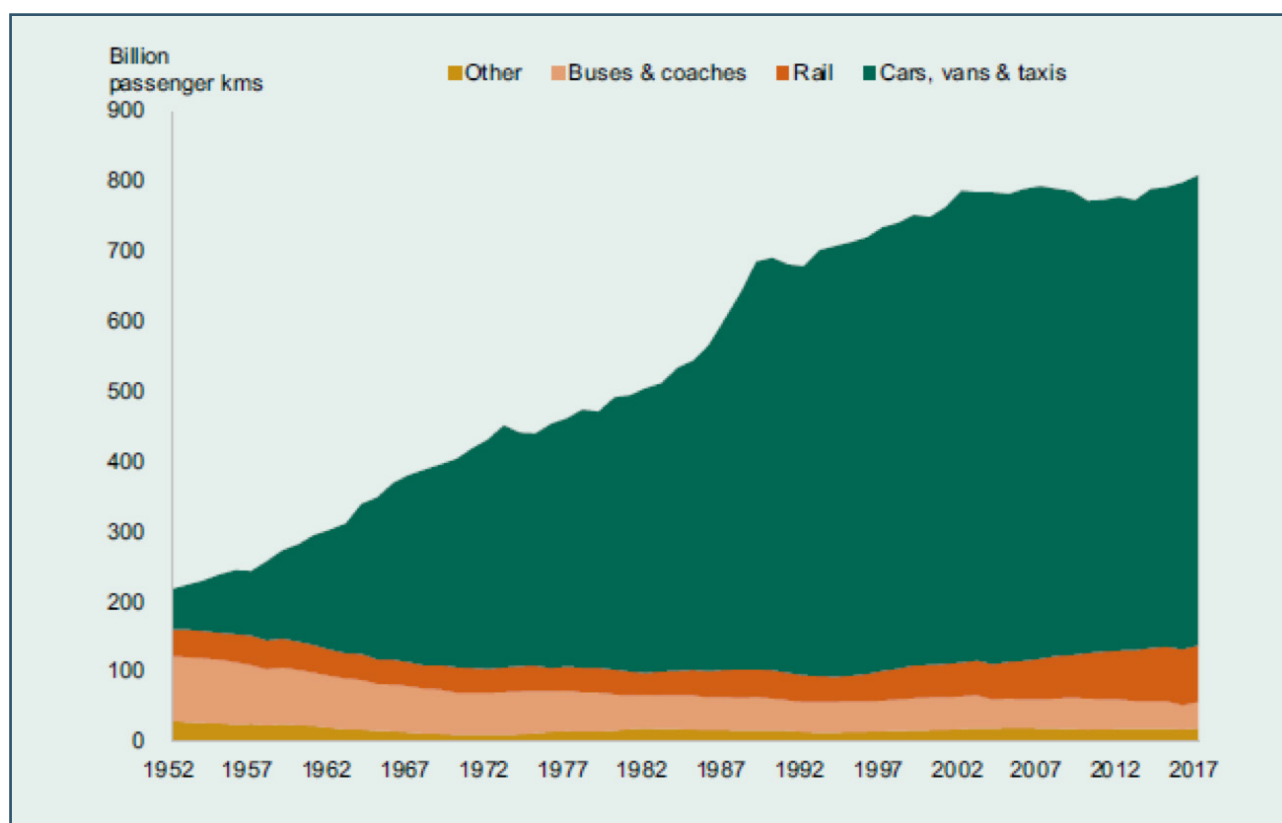


Figure 10. Passenger kms by transport mode in Great Britain between 1952-2017 (Department for Transport, 2018).

Air quality in the UK has improved significantly since the first Clean Air Act of 1956, mainly due to the reduction in coal-fired power stations and an increase in cleaner transport (figure 9, opposite). The main sources of air pollution in the UK are now:

- road transport, which is the biggest source of NO₂, due to the consistent increase in vehicles numbers and distance travelled (figure 10).
- domestic solid fuel, such as wood and coal burnt in stoves and open fires, which is the largest source of PM2.5.
- agriculture, which accounts for 88% of UK

emissions of ammonia, from the storage and spreading of manures, slurries and fertilisers.

The Department for Transport forecasts that, with no change in government policy beyond what has already been announced, road traffic in England is forecast to grow by between 17% and 51% by 2050, mostly due to population growth and lower vehicle running costs (DfT, 2018). There will be considerable variability in traffic growth, for instance with traffic in Eastbourne forecast to increase by between 36-60% by 2027 as a result of new housing. This forecast growth in housing and traffic is likely to increase air pollution, even with the transition to electric heating and transport.

The Environment Act 1995 requires District and Borough Councils to review and assess outdoor air quality in their areas, where members of the public are regularly exposed to pollution. If the UK health-based air quality objectives are not being met then a local authority is required to declare an Air Quality Management Area and to develop a plan to show how it intends to improve air quality.

In East Sussex there are two areas currently in breach of the statutory health-based thresholds – which were meant to have been achieved a decade ago – namely central Lewes and the Newhaven ring road, both due to local emissions from traffic. In addition, Lullington Heath in Wealden has frequently seen some of the highest levels of ozone recorded in the UK.

The opportunities

Delivering further improvements in local air quality will deliver significant economic, social and environmental benefits, including:

Improved health outcomes: the rate of premature death will decrease, which will also lower healthcare costs. For instance, reducing PM exposure by 10ug/m³ would potentially extend lifespan in the UK by five times more than eliminating casualties on the roads (Public Health England, 2017).

Better quality of life: actions that increase active travel (walking and cycling) deliver multiple benefits, including a range of physical and mental health benefits such as measurable reductions in heart disease, diabetes, dementia and depression.

Higher productivity: cleaner air will reduce the number of working days lost due to illness, whilst measures to move people from private vehicles to active travel and public transport will reduce congestion, which was estimated to have cost the economy about £8 billion in 2018 (Inrix, 2019).

Enhanced natural capital: reducing pollution contributes to a reduction in acidification and eutrophication, which can impact on habitats and species.

Lower carbon emissions: most measures that reduce air pollution, such as walking and cycling, also reduce emissions of greenhouse gases.

Current action

International and national regulatory and economic instruments, supported by a range of policies and programmes, are seeking to prevent air pollution from occurring in the first place rather than tackling air pollution after health-based limits are exceeded. Measures include:

- **Legislative and policy targets:** some of the main targets are summarised in table 3.
- **The power sector:** unabated coal is being phased out completely by 2040, whilst heat and transport is increasingly electric, with investment in clean hydrogen and energy storage.
- **Transport investment:** there is significant investment in public transport, electric vehicles, and cycling and walking. For example, investment in walking and cycling in East Sussex between 2014-20 was over £22m.
- **The agriculture sector:** changes to farming techniques are being implemented to reduce ammonia emissions.
- **Technology:** this ranges from investment in broadband, which enables more flexible and remote working, and therefore less travel, to setting increasingly stringent emissions standards for new vehicles. For example, the 'eSussex' project is investing £28.5m in broadband infrastructure in the county.
- **Road pricing:** road user charging schemes are being implemented in cities with particularly poor air quality, notably the various schemes that cover parts of London.
- **Behaviour change programmes:** to encourage more walking and cycling and use of public transport. For example, work with 27 schools across Sussex in 2019 led to an average increase of 7% of pupils choosing to cycle to and from school.
- **Consumer preferences:** an emerging trend prior to Covid-19, was a growing demand for buying or leasing mobility services, such as ride sharing and car sharing, rather than buying an expensive asset such as a vehicle that remains unused most of the time.

Level	What	By
UN	Sustainable Development Goals <ul style="list-style-type: none"> • Target 11.2 Provide access to safe, affordable, accessible and sustainable transport systems for all. 	2030
EU	The Ambient Air Quality Directive (2008) <ul style="list-style-type: none"> • National exposure reduction targets depending of initial concentration. 	2030
	Clean Air Programme for Europe (2013) <ul style="list-style-type: none"> • Reduce health impacts due to particulate matter and ozone by 52%, relative to 2005 levels. 	2030
	National Emission Ceilings Directive (2016) <ul style="list-style-type: none"> • ‘% reduction in SOx, NOx, NMVOCs, PM2.5 and NH3’. 	2030
	Euro Standards <ul style="list-style-type: none"> • Reduction in carbon emissions from cars by 37.5% and vans by 31%. • Increase low emission vehicles registered cars to 35% and vans to 30%. 	2030
UK	Clean Air Strategy (2019) <ul style="list-style-type: none"> • Reduce the number of people exposed to levels of PM2.5 above 10 µg/m3 by 50% 	2030
	<ul style="list-style-type: none"> • Reduce particulate matter emissions against 2005 baseline by 46%. 	2030
	<ul style="list-style-type: none"> • Reduce emissions of ammonia against 2005 baseline by 16%. 	2030
	<ul style="list-style-type: none"> • Reduce emissions of nitrogen oxides against 2005 baseline by 73%. 	2030
	<ul style="list-style-type: none"> • Phase out diesel-only trains. 	2040
	National Cycling and Walking Investment Strategy (2017) <ul style="list-style-type: none"> • Double cycling levels • Increase walking activity to 300 stages per person per year 	2025 2025

Table 3. Key air quality legislative and policy targets

New action on air quality

The action: to develop a local cycling and walking infrastructure plan for East Sussex for 2020-30. The plan will outline a programme of infrastructure improvements, supported by behaviour change programmes, which the County Council, as the Highway Authority, will work with other key local partners to seek investment for.

The reasons:

1. transport is the largest local contributor to poor air quality. Therefore, encouraging more people to switch from using vehicles to walking and cycling by providing the right infrastructure is the intervention that has the greatest direct impact on local air quality.
2. Walking and cycling are forms of 'active travel' that deliver a number of co-benefits including improved health and wellbeing, reduced congestion, lower carbon emissions, and they do so in a way that is economically just, in that walking is free and cycling is very low cost.
3. The current rates of walking and cycling in East Sussex are relatively low, with walking rates showing a slight decrease over time and cycling rates showing a slight increase over time (figures 11 and 12). It's been estimated that for every £1 spent on cycling and walking provision the NHS would save £4 in health-related costs because there would be a reduced risk of coronary heart disease, stroke, cancer, obesity and type 2 diabetes (The Kings Fund, 2013).

4. Most local journeys to and from work are below 5km. This enables cycling and walking for many of these journeys to be an achievable option.
5. To support the growth of sustainable communities by seeking to ensure that the approximately 2,000 new homes and additional employment space that is proposed to be built every year in East Sussex are well provided for walking and cycling, particularly following the lessons learned from Covid-19.

The indicators: The effect of the action will be measured by monitoring local air quality. District and Borough Councils have a statutory duty to report every year on how the air quality in their area compares with UK air quality standards. The main pollutants of concern in East Sussex are nitrogen dioxide (NO₂) and particulate matter (PM). We will produce an annual report which compares the level of these pollutants across East Sussex with the health-based thresholds recommended by the World Health Organisation. The data set that this will be taken from is publicly available at:

www.sussex-air.net

The lead organisation: East Sussex County Council, as the Highway Authority, will lead on developing the Local Cycling and Walking Infrastructure Plan.

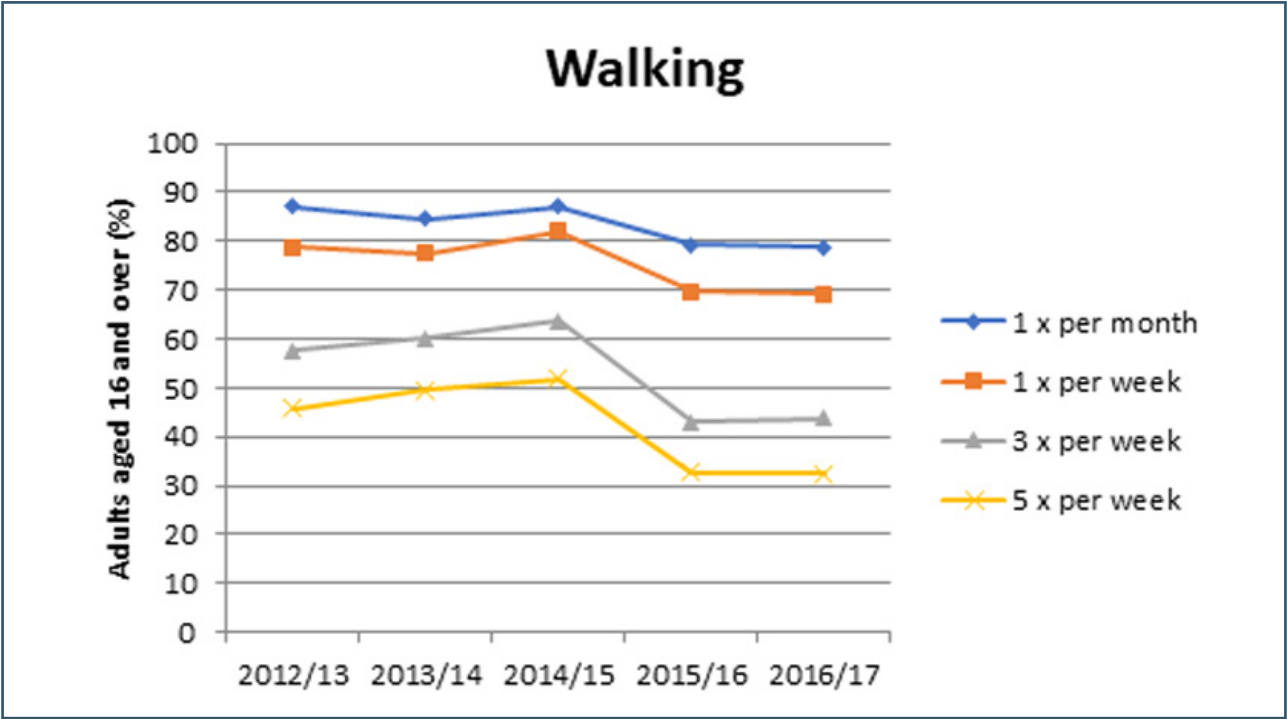


Figure 11. Walking rates in East Sussex (East Sussex in Figures, 2020).

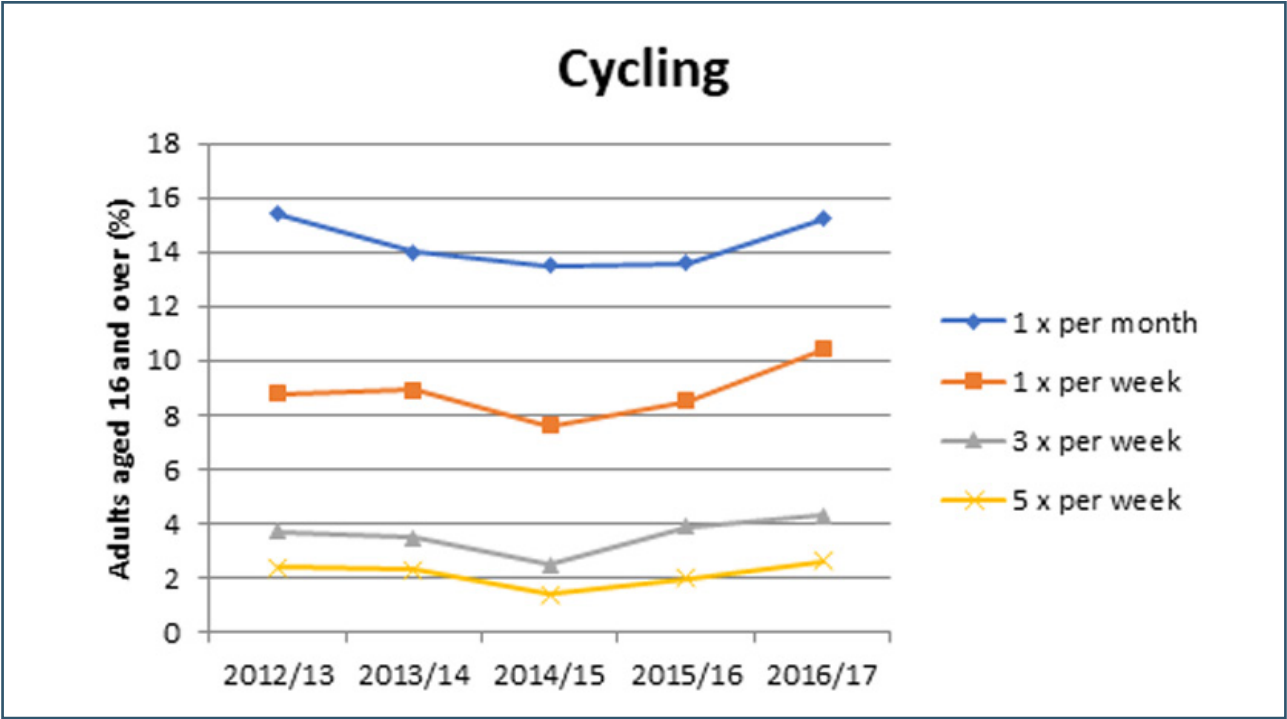


Figure 12. Cycling rates in East Sussex (East Sussex in Figures, 2020).



Water

The challenge

Water is essential to life: for drinking, sanitation, economic prosperity, the natural environment and recreation. We assume that it's an infinitely

renewable resource, yet freshwater makes up only 2.5% of all Earth's water and much of this is either polluted or abstracted more quickly than it is being replenished (figure 13).

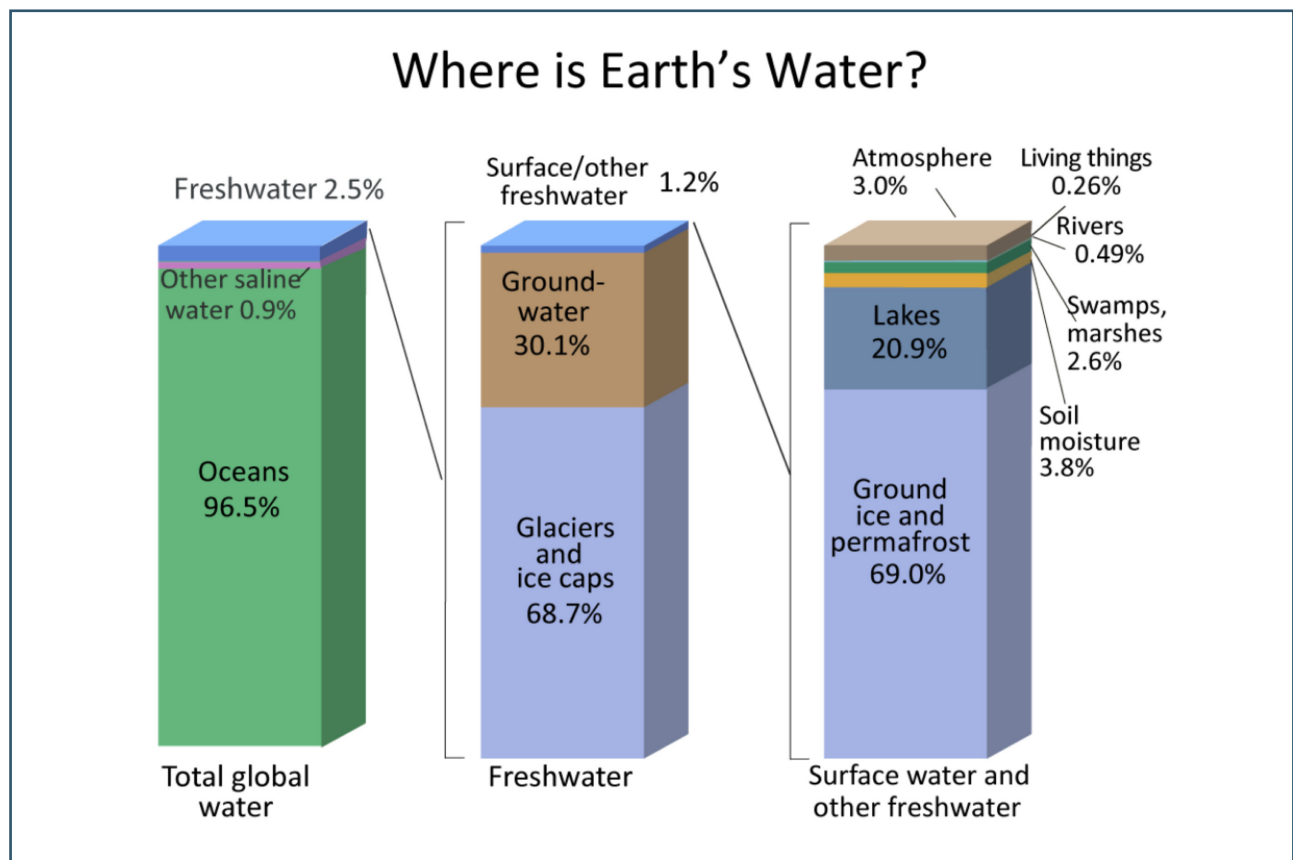


Figure 13. Global water (US Geological Society, 2017)

The UN's latest report on global water resources (2019) highlights that:

- a quarter of humanity already lives where water is severely scarce.
- nearly 2 billion people drink water that's not protected against contamination from faeces, with 340,000 children under five dying every year from preventable diarrhoeal diseases.
- 90% of all natural disasters are water-related.

- water is a growing cause of conflict within and between states.

The pressure on water quality and availability will increase due to population growth, higher standards of living and climate change, whilst the COVID-19 pandemic highlights that a lack of access to clean water for significant numbers of people for regular handwashing presents a public health risk to everyone.

In the UK, regulation has helped to drive a significant improvement in water quality over 30 years. For example, the latest figures from Ofwat and the Environment Agency showing over 99% compliance with the UK and European standards for drinking water quality in England and 98% compliance with bathing water standards.

There has also been a significant reduction in serious water pollution incidents, from over 500 per year from the water industry in the early 1990s to 57 in 2016. However, key challenges remain:

- **Water availability:** demand for water in the UK is mainly from households, the power sector and agriculture (figure 16). East Sussex is considered already by government as an area of serious water stress, as demand

sometimes exceeds supply. Population & housing growth is forecast to drive greater demand for water, whilst climate change is likely to lead to an increase in the frequency and duration of droughts, due to an increase in summer temperatures and a decrease in rainfall. Therefore, the times of greatest demand from households and agriculture, during the summer, will coincide with the main periods of drought. The National Infrastructure Commission concluded that without further action to reduce demand, there is a 1 in 4 chance over the next 30 years that large numbers of households in England will have their water supply cut off for an extended period because of severe drought.

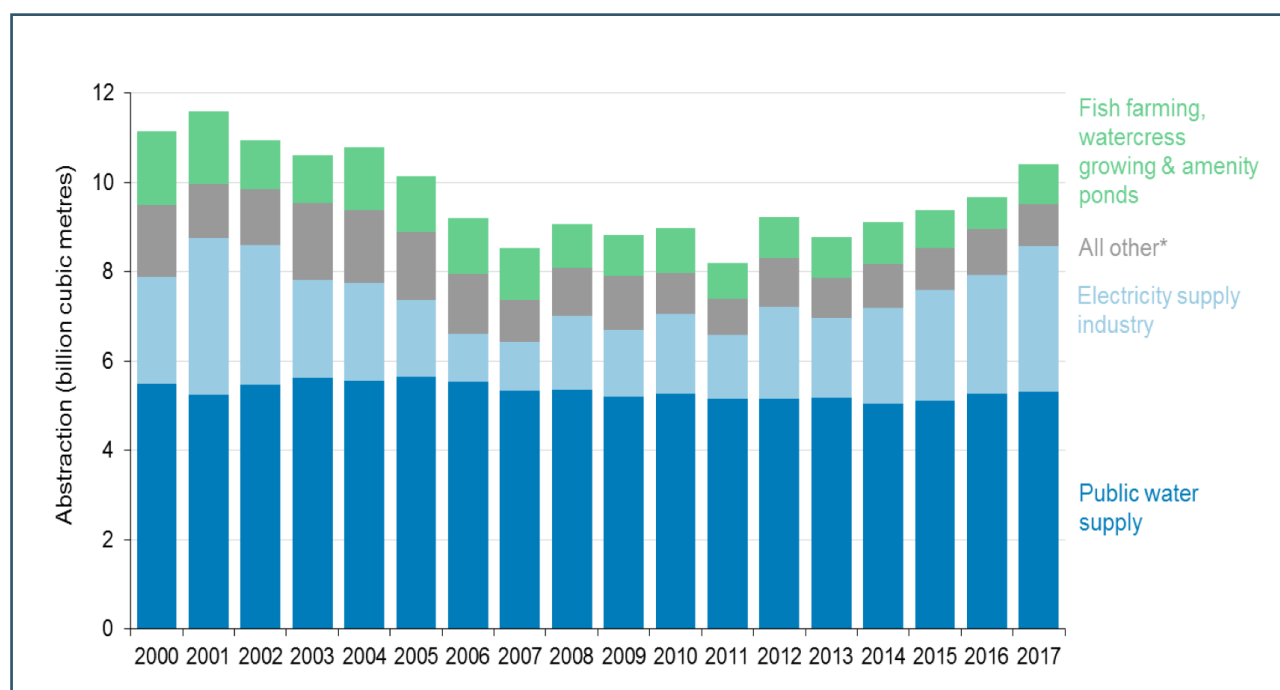


Figure 14. Water demand from different sectors

- **Over-abstraction:** the Environment Agency considers that abstraction in about a third of groundwater bodies and about one in ten surface waters in England is already unsustainable. Low water levels have a number of impacts on freshwater ecosystems: sediment builds up, pollutants become more concentrated, water temperature increases, and reduced water volume increases

competition between species. An estimated 80% of Sussex wetland and river ecosystems, some of which are rare, have been damaged or destroyed from over-abstraction and pollution. As a result, many wetland species have declined significantly. For example, Sussex water voles have declined by over 98% in 30 years.

- **Leakage:** about a third of water taken from the natural environment for distribution is wasted, through a combination of pipe leaks, losses during the treatment process and losses in the home (Environment Agency, 2018).
- **Water quality:** water pollution is mostly caused by land management practices (eg. agricultural run-off), wastewater treatment plants, and urban and highway run-off. In East Sussex, the quality of waterbodies has deteriorated in recent years (figures 14 and 15). For instance, the quality of some ground waters, which provide about 70% of drinking water, have deteriorated due to rising nitrate levels, mostly due to historic farming practices.
- **Climate change:** water is probably the primary medium through which the effects of climate change can be felt most, due to sea level rise, the effect on water availability and flooding.

The opportunity

The objectives are to ensure that drinking water quality is maintained, water is distributed and used efficiently, that it's available to all at a reasonable cost, and that there's sufficient water of good quality to sustain the wider environment. The benefits of doing so include:

1. **Lower costs to consumers:** if more water is available to reach consumers because of a lower leakage rate, and if consumers use water more efficiently, there's less need to have to invest in building new water supply and wastewater infrastructure. In addition, if the quality of the water in the wider environment remains good then water companies need to spend less on water treatment.
2. **More resilient and productive natural capital:** safeguarding the quality and quantity of water in the wider environment will ensure that the natural environment has greater resilience to adapt to pressures such as climate change, and continue to support productive fisheries, natural water purification processes and recreational opportunities.

3. **Climate change mitigation:** the water industry contributes about 1% of total UK greenhouse gas emissions, due to the power required to treat and distribute drinking water and treat wastewater. In addition, about 5% of total greenhouse gas emissions are due to the domestic use of hot water for cooking and cleaning (Waterwise, 2017). Lower water usage will reduce these emissions.

Current action

There's a detailed regulatory regime covering water, with a number of key targets which are summarised in table 4 overleaf. The main organisations responsible for managing water are:

1. the Environment Agency, whose responsibilities include regulating water pollution, some aspects of flood risk and compliance with the EU Water Framework Directive, which requires that all water bodies are restored as close to their natural state as possible by 2027, where practicable.
2. The water companies, which are required to:
 - produce long term water resource management plans to show how they will balance supply and demand;
 - meet drinking water standards overseen by the Drinking Water Inspectorate;
 - deliver a number of environmental objectives set out in the Water Industry National Environment Programme, covering water quality, biodiversity and resilience.
3. Farmers and land managers, for instance through investment in Catchment Sensitive Farming.
4. Water companies and regulators such as the Environment Agency work together on water resource management on a regional scale. For example, 'Water Resources South East' is an alliance of the 6 water companies that cover the South East, which seeks to develop a regional resilience plan for all water users.

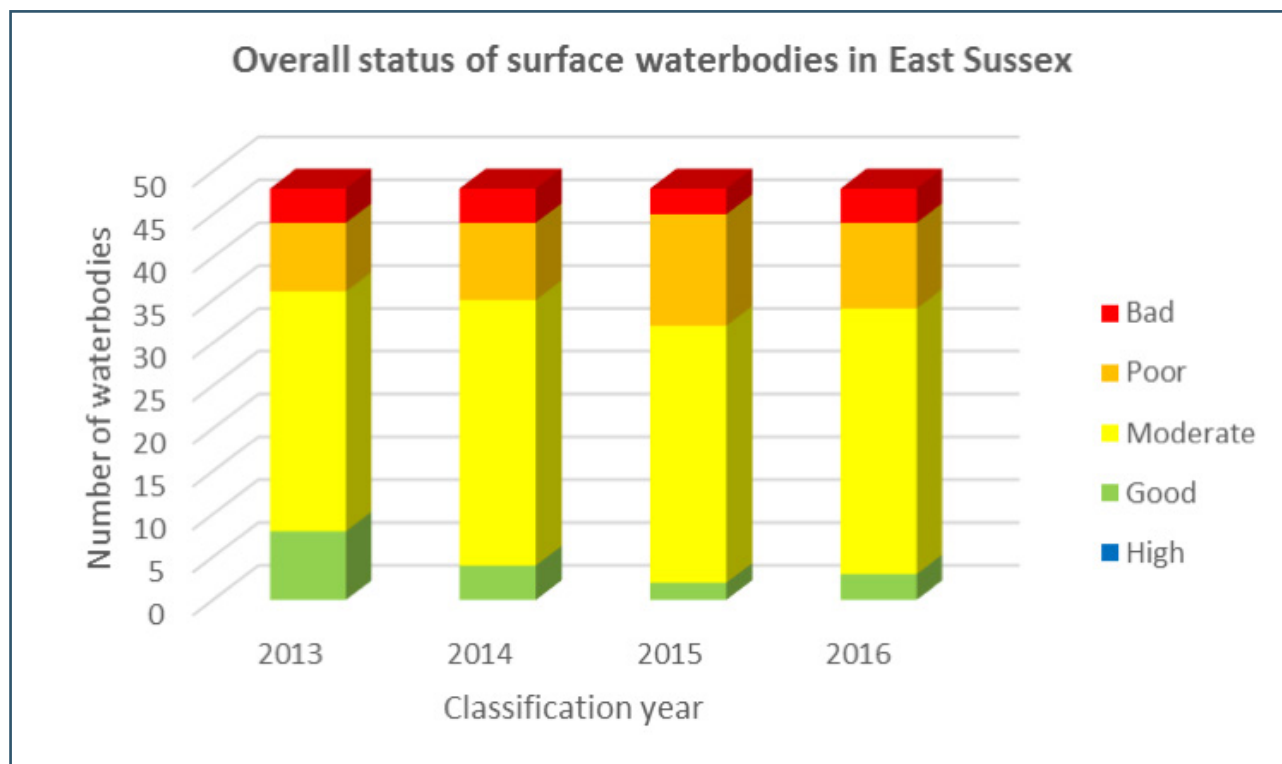


Figure 15. the overall status of surface waterbodies in East Sussex (source: EA, 2019)

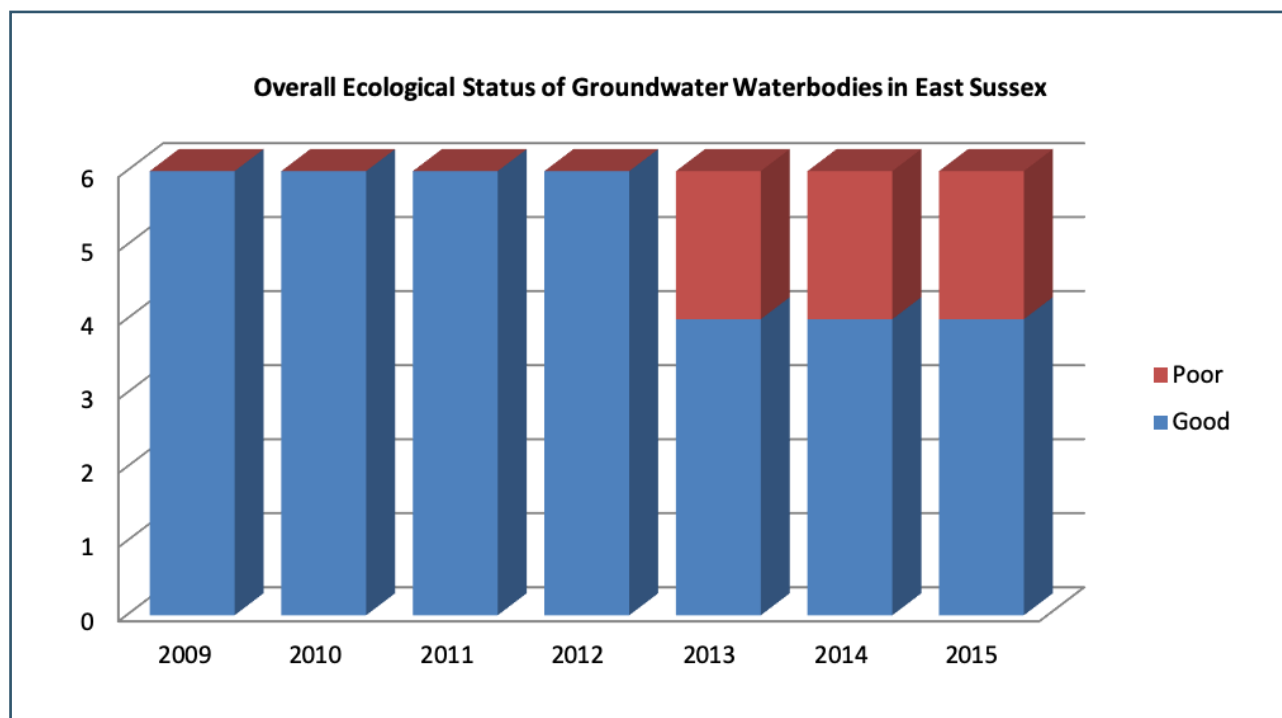


Figure 16. (Source: Environment Agency, need an updated version)

Level	What	By
UN	Sustainable Development Goals <ul style="list-style-type: none"> • Target 6.3 Improve water quality by reducing pollution and halving the proportion of untreated wastewater. • Target 6.4 Substantially increase water-use efficiency. 	2030
EU	Water Framework Directive <ul style="list-style-type: none"> • All inland and coastal waters to reach at least 'good' status. 	2027
UK	25 Year Environment Plan <ul style="list-style-type: none"> • Increase the proportion of water bodies with enough water to support environmental standards from 82% to 90% for surface water bodies and from 72% to 77% for groundwater bodies. 	2021
	OFWAT <ul style="list-style-type: none"> • Water companies to reduce leakage by an average of 15% from 2017-18. 	2025
	Water Industry National Environment Programme <ul style="list-style-type: none"> • Protect and improve at least 6,000km of our waters. • Protect and improve 24 Bathing Waters and 10 Shellfish sites. • Protect and improve 1,800 hectares of protected nature conservation sites. • Enhance 900 km of river. 	2025
	PR19 targets <ul style="list-style-type: none"> • Zero serious pollution incidents. • Two-thirds more catchment management schemes. • 8,000km river improved. • 98% of bathing waters meeting European standards by 2025. 	2025
	National Framework for Water Resources (2020): <ul style="list-style-type: none"> • Reduce water demand to an average of 110 litres per person per day. • Halve leakage rates. 	2025

Table 4. Key water legislation and policy targets.

Current programmes and actions include:

- 1. Measuring water quality:** the Water Framework Directive has required a much better understanding of the current condition of water bodies and the potential measures to improve their status. This has helped to ensure evidence-based decisions about where to target cost-effective interventions.
- 2. Sustainable abstraction:** the Environment Agency has revoked or amended a number of abstraction licences, and applied licences to previously exempt abstractions, to retain water in the environment. This has meant that the volume of water currently abstracted for public supply is about the same level as during the 1970s, despite an increase in population of about 4 million people and the UK having the highest per capita level of water consumption in Europe.
- 3. Leakage reduction:** water companies have reduced rates by around a third since the mid-1990s. Ofwat's challenge to water companies is to reduce leakage by a further 15% by 2025 and the water industry has committed to halving leakage by 2050.
- 4. Demand reduction:** the land use planning system is gradually driving greater water efficiency in new developments, and the water companies are delivering initiatives to reduce demand, such as metering, awareness programmes, and the distribution of water-saving devices.
- 5. Catchment management:** in East Sussex, the Adur and Ouse Catchment Partnership (www.adurandousecatchment.org.uk) and the Cuckmere and Pevensey Levels Catchment Partnership (www.cplcp.org.uk) deliver a number of practical projects to improve the water environment. For example, agri-environment schemes with land managers aim to reduce soil and pesticide run-off, which reduces costs for both farmers and water companies by retaining soil quality and reducing water treatment costs.
- 6. Measurable improvements in water quality:** the Water Industry National Environment Programme includes schemes

such as the Hastings Bathing Water project, which tackled urban diffuse pollution by addressing misconnections and enabled Hastings bathing water quality to reach and remain at 'good' since 2015.

New action on water

The action: to deliver advice and home visits business audits to assist households and businesses to reduce water usage.

The reasons for the action:

- East Sussex is already recognised by government as being a water-stressed area.
- The resilience of the water supply system can be increased by a combination of building new water infrastructure, reducing leakage and managing demand (figure 17). Water companies have comprehensive plans for new infrastructure and leakage, but would benefit from support to scale up programmes to manage demand, as this is a responsibility of all water users.
- Water scarcity could impact on a number of important local economic sectors, including tourism and land management, as well as reduce the amount of water available in the natural environment, which would impact on a number of habitats and species.
- Improved domestic water efficiency will reduce the pressure to increase water bills by reducing water consumption and reduce the need for additional investment in high cost water infrastructure such as reservoirs.

The indicator: the effect of the action will be measured by a reduction in water demand (per capita consumption). The two water companies that supply water in East Sussex, Southern Water and South East Water, have monitoring plans in place and regular reporting requirements on per capita consumption.

The lead organisations: Southern Water and South East Water, as they have the main statutory responsibility for ensuring the efficient use of water in East Sussex.

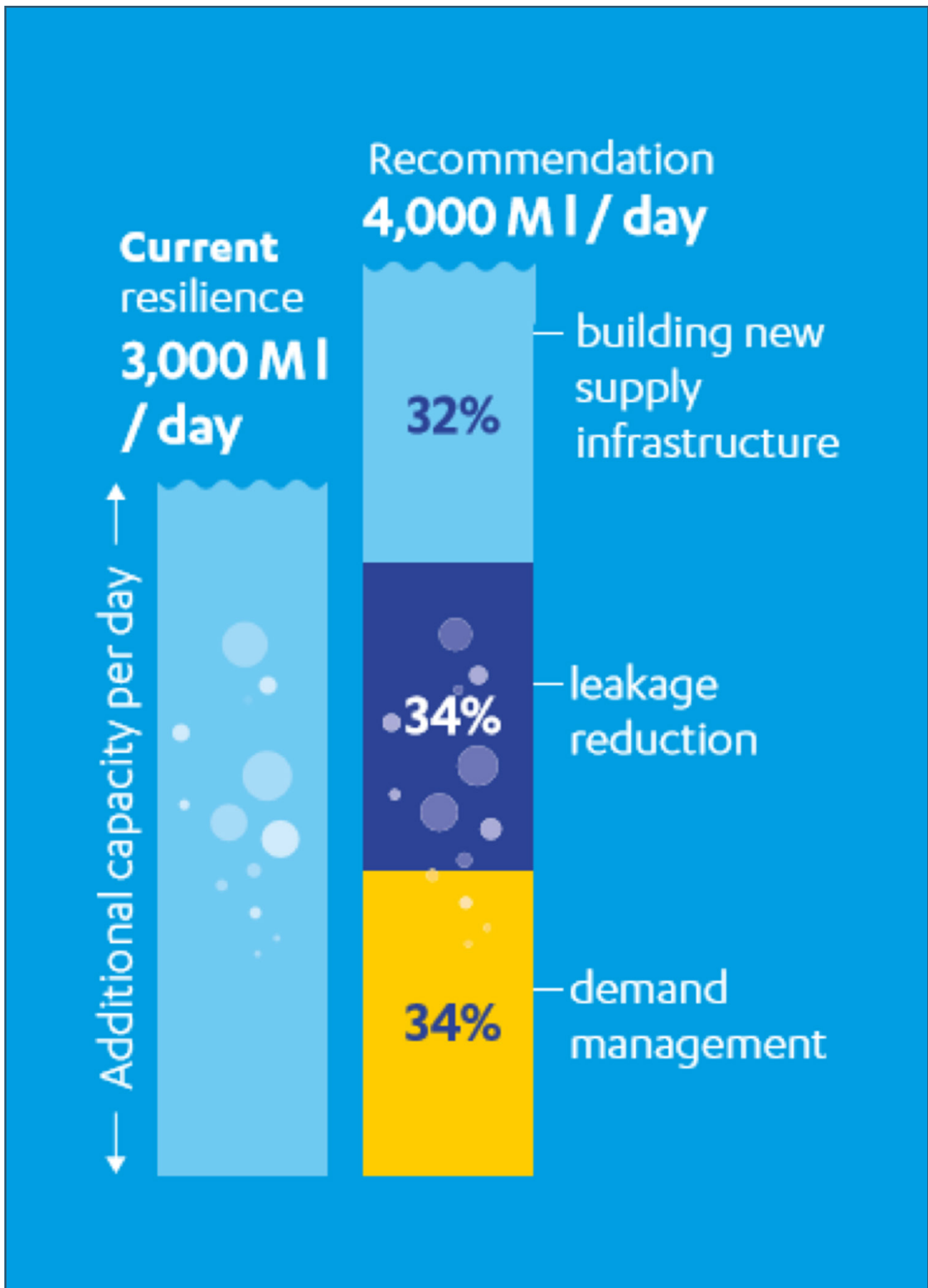


Figure 17. Actions required to assure long-term water supply (National Infrastructure Commission, 2018)



Resource efficiency

The challenge

Global use of material resources has increased ten-fold since 1900 and is set to double again by 2030 (figure 18). In contrast, the UK's raw material footprint fell by about 27% between 2000 and 2013 while over the same period GDP rose by 18% and the population increased by about 6%. This de-coupling of GDP growth from resource use is likely to have been the

result of a range of factors, including an increase in the service sector compared with manufacturing, changes in consumer patterns and improvements in resource efficiency. However, this de-coupling trend has stalled in the last few years, whilst the average life span of many products we buy and use in daily life is now lower than it was 20 years ago (Resources and Waste Strategy, 2018).

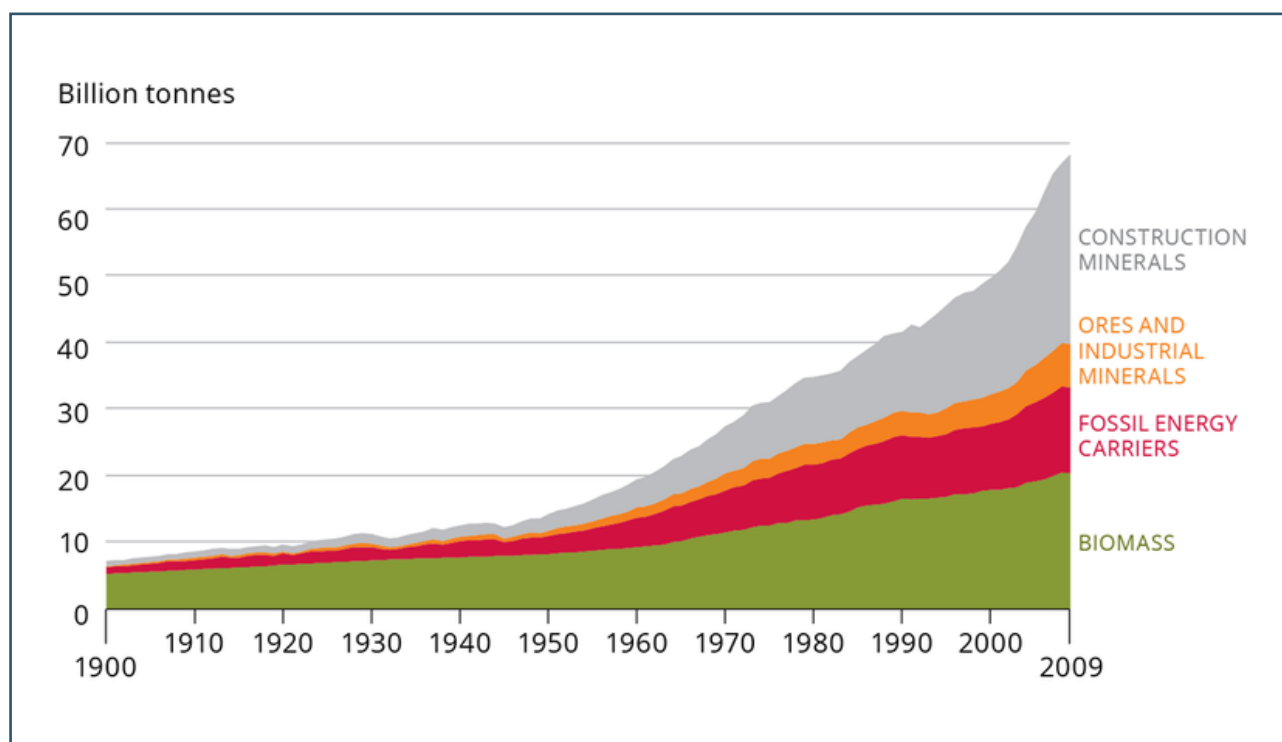


Figure 18. Global use of construction materials, ores & industrial minerals, fossil fuel energy and biomass (European Environment Agency, 2019)

The key challenges with our use of resources include:

- **An inefficient model:** our mainly linear 'take-make-dispose' economic model and culture fails to maximise the value of all materials, which reduces productivity (figure 19). For example, in the UK an estimated 10

million tonnes of food and drink are wasted post-farm gate annually, worth around £20 billion and equating to over 1 billion meals, most of which could be used.

- **The scale of resource use:** the consumption of natural resources, such as sand and gravel, by developed countries is in the

range of 54-85 tonnes per person per year (World Resources Institute, 2018). If the total global population consumed resources at this same rate then, on the basis of known

global reserves of materials, we would need 1.7 Earths to provide the resources we use and absorb the waste we generate (Global Footprinting Network, 2019).

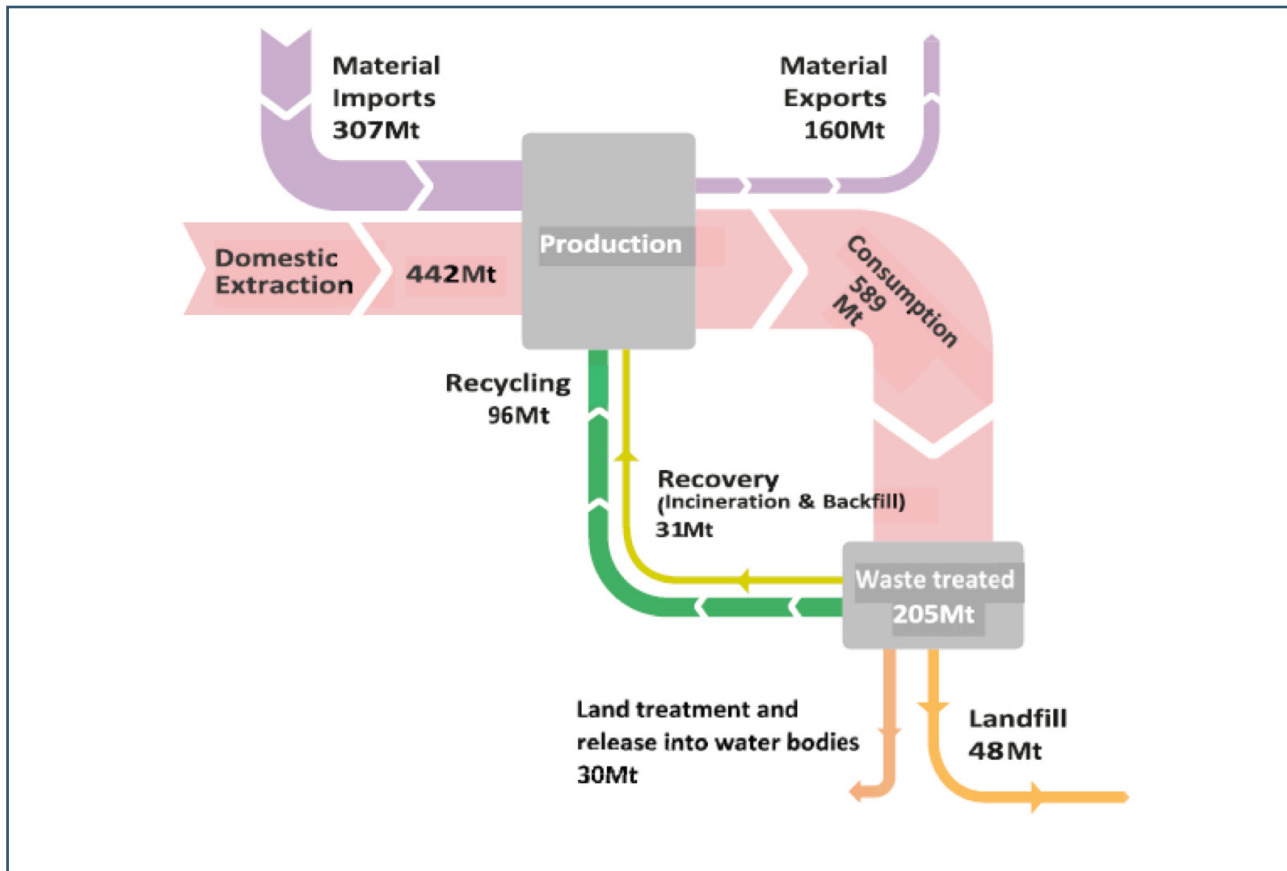


Figure 19. The flow of material resources around the UK economy in 2014 (Resources and Waste Strategy, 2018)

- Unsustainable levels of resource use:** some renewable resources are already harvested beyond the planet's reproductive capacity, whilst non-renewable resources are, by definition, finite. For example, over a third of global fish stocks are being fished at a biologically unsustainable rate, which impacts on food security and the long-term prosperity of some coastal communities.
- Increasing and volatile costs:** there's a clear long-term pattern of rising real commodity prices as demand has continued to grow but supply has been constrained. Higher and volatile prices have a negative impact on productivity (The Economist, 2018).

- Pollution:** the rate at which resources are used and the inefficient way in which many are developed, used and managed drives significant levels of pollution, such as mine tailings and some plastic packaging.

There are no data on the flow of materials through the East Sussex economy. What we do know is that approximately 1.75 million tonnes of solid waste is generated each year in East Sussex and Brighton and Hove (figure 20), most of which is recycled, composted or incinerated with energy recovery. For households, this equates to an average of about 1 tonne per year. Over the last few years re-use and recycling rates have remained fairly static, in line with national rates, which means that we are still some way off reaching statutory recycling targets.

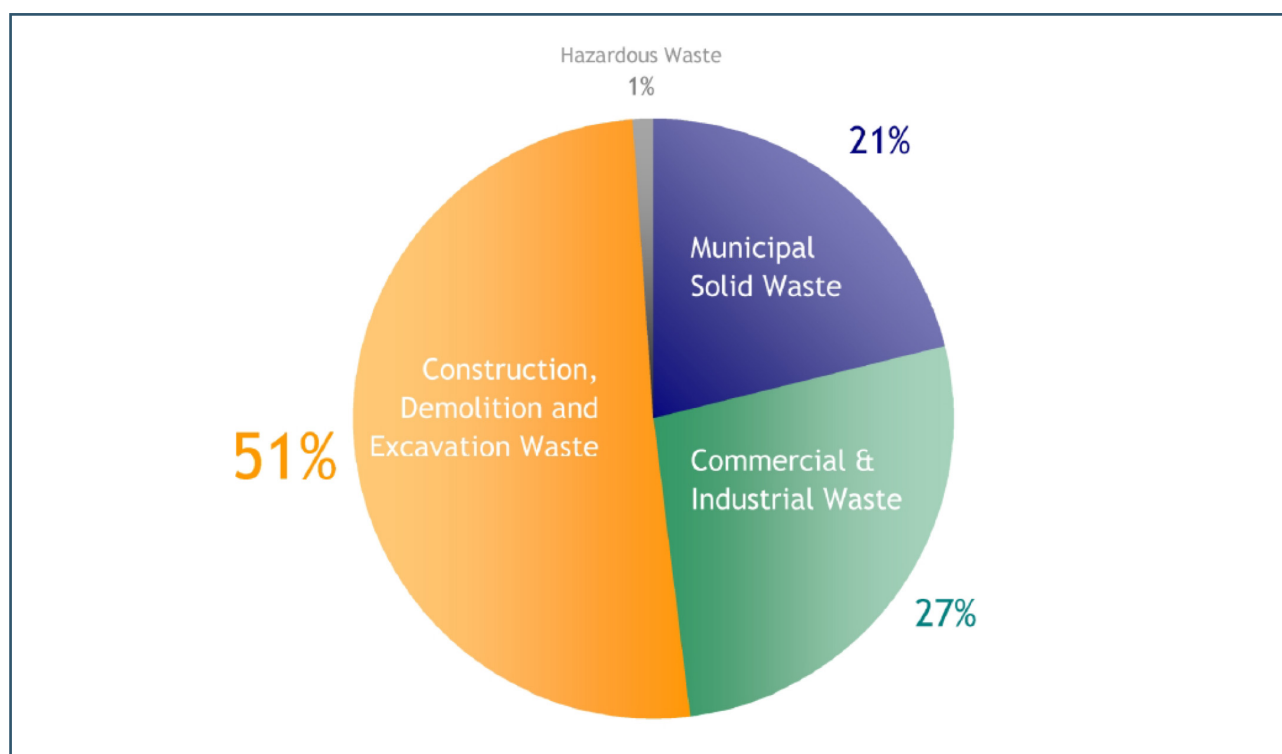


Figure 20. Where solid waste in East Sussex comes from (ESCC, 2018)

The opportunities

A key means to address the challenges above is to develop a more circular economy model. This involves capitalizing on the full value of resources by keeping them in use for as long as possible, extracting the maximum value from them whilst in use, then recycling or disposing of them in a useful way (WRAP, 2019). The opportunities from doing so include:

- **Greater productivity:** because suppliers of goods and materials have an incentive to maintain the quality and value of their stock for as long as possible, and the model drives innovation by viewing waste as a design flaw.
- **Job creation:** these are generated, for instance, in the reuse and repair sector, which tends to create jobs and work experience opportunities for those who find it difficult to access employment.
- **Lower costs to consumers:** by providing more durable or re-usable products, which tend to be less expensive to manufacture than products that are manufactured from virgin materials.

- **Less pollution:** a circular economy model requires less input of energy and virgin materials, which means that products have a smaller carbon footprint and generate less waste.

Current action

Existing regulatory and economic instruments that incentivise a circular economy, including:

1. **Legislative and policy targets:** some of the main targets are summarised in table 5.
2. **Extended Producer Responsibility schemes:** these require a producer to take responsibility for a product once a consumer has finished using it. These schemes cover a range of materials including packaging waste, vehicles, batteries and electronic and electrical equipment, with additional materials likely to be added. This incentivises producers to design their products to make it easier for them to be reused, dismantled and/or recycled at the end of their useful life and has stimulated the development of secondary markets.
3. **Economic instruments:** this includes the 5p plastic bag charge at main retailers, which

Level	What	By
UN	Sustainable Development Goals <ul style="list-style-type: none"> • Target 12.3 Halve per capita global food waste. 	2030
EU	Water Framework Directive (2008) <ul style="list-style-type: none"> • Increase re-use and recycling of municipal waste to 55%. • Increase re-use and recycling of municipal waste to 60%. • Increase re-use and recycling of municipal waste to 65%. 	2025 2030 2035
UK	25 Year Environment Plan (2018) & Resource & Waste Strategy (2018) <ul style="list-style-type: none"> • Cut the greenhouse gas intensity of food and drink by a fifth. • No food waste entering landfill. • Eliminate avoidable plastic waste • Double resource productivity. • Zero avoidable waste 	2025 2030 2042 2050 2050
East Sussex	East Sussex Joint Waste Management Strategy (2014) <ul style="list-style-type: none"> • Limit household waste produced to 995 kg per household per year. • Recycle and compost 50% of household waste. • Reuse 15% of household waste. • Divert at least 95% of household waste from landfill. • Recycle and compost 60% of the household waste produced. 	2020 2020 2020 2020 2025

Table 5. Key resource efficiency legislation and policy targets.

has led to approximately 15 billion fewer bags being handed out to shoppers in the UK between 2014 and 2018.

4. Voluntary schemes: between government and those business sectors with a high material use and environmental impact. For instance, the Construction Sector Deal provides huge potential for increasing resource efficiency, through off-site manufacturing and innovative construction materials and techniques. The outcome from existing schemes is that between 2000 and 2010 about 70 million tonnes of materials were put back into the economy.

5. Successful circular economy business models:

these include buying mobility services such as car sharing clubs, leasing white goods, and on-line re-use platforms such as Gumtree and Freecycle.

It's estimated that the economy-wide adoption of resource efficient business models in the UK, such as remanufacturing, repair, leasing and recycling, could benefit UK businesses by up to £23 billion per year (WRAP, 2019). The no- and low-cost interventions alone, with a payback of less than one year, are estimated to be worth about £3 billion per year.

Action on resource efficiency

The action: to develop a food re-use network in East Sussex, to collect surplus food for redistribution.

The reasons for the action:

Food waste in the UK warrants special attention because:

- More than 10 million tonnes of food, worth over £20 billion, is wasted every year in the UK, 70% of which is edible and, therefore, could have been avoided (figure 21).
- consumers are spending £12 billion on food that goes in the bin, which equates to about £680 for the average family per year, at a time when Oxfam estimates that approximately two million people in the UK are malnourished.
- An estimated additional 4 million tonnes of food will be required by 2025 to meet projected increases in the UK population.

- Food waste generated over 25 million tonnes of greenhouse gas emissions, which is equivalent to one in four cars on UK roads, and has a water footprint that is nearly twice the average domestic use of water.
- There's an estimated benefit to cost ratio of 14:1 for businesses to reduce commercial food waste.
- There is currently no county-wide programme to divert surplus commercial food from businesses to more productive use, including to those in need.

(WRAP, 2018).

The indicator: the effect of the action will be measured by the amount of waste that is collected and re-distributed by a food re-use network.

The lead organisation: the East Sussex Environment Board will lead the delivery of this action.



Figure 21. Food waste in England (Defra, 2019).



Glossary

BEIS Department for Business, Energy & Industrial Strategy

CO₂ Carbon dioxide

DfT Department for transport

EU European Union

GDP Gross domestic product

GHG Greenhouse gases

IPBES Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

LNP Local nature partnership

mtCO₂ Million tonnes of carbon dioxide equivalent

NMVOCs Non-methane volatile organic compounds

NO₂ Nitrogen dioxide

NO_x Nitrogen oxides

O₃ Ozone

ONS Office for National Statistics

PM Particulate Matter

PM_{2.5} Particulate Matter (PM) that has a diameter of less than 2.5 micrometers

PV Photovoltaic solar electricity

SO_x Sulphur oxides

UN United Nations

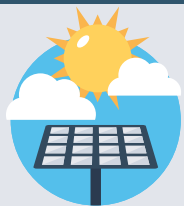
WRAP The Waste and Resources Action Programme

"The future of life on earth depends on our ability to take action."

Sir David Attenborough
Broadcaster and Natural Historian



What can you do?



Climate change

Join or support your local community energy group.
Go to www.communityenergysouth.org/engage



Natural Capital

Volunteer for an organisation such as the Sussex Wildlife Trust.
Go to: sussexwildlifetrust.org.uk/get-involved/volunteer



Air quality

Get support with journey planning for walking, cycling or using public transport.
Go to: www.eastsussex.gov.uk/roadsandtransport/localtransportplan/funding/active-access-for-growth/active-access-for-growth



Water

Get free advice and water-saving visits from your water company.
Go to: www.southernwater.co.uk/help-advice/how-to-save-water or
www.southeastwater.co.uk/my-water-supply/save-water-save-money



Resource efficiency

Buy a garden compost bin or wormery for your food waste.
Go to: www.getcomposting.com/profile/login

What can your organisation do?



Energy: contact LoCASE for free audits and grants at locase.co.uk/register-here

Air quality: contact the Energy Savings Trust for free advice and support at:
energysavingtrust.org.uk/transport

Water: contact your water supplier for advice and support on water efficiency.

Resource efficiency: contact WRAP for sector-specific support at:
www.wrap.org.uk/category/what-we-offer/business-support



Feedback on the Environment Strategy

If you have any questions or comments on the Environment Strategy please email: eastsussexenvironmentstrategy@eastsussex.gov.uk