

East Sussex Climate Emergency

Road Map for 2022-25

DRAFT

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Foreword

The recent United Nations Climate Change Conference in Glasgow (COP 26) highlighted that climate change is one of the defining issues of our time: the UN's Intergovernmental Panel on Climate Change concluded recently that if we fail to achieve rapid, far-reaching, and unprecedented changes in all aspects of society then we will face catastrophic and irreversible climate change.

More than half of the emissions cuts required in the UK rely on decisions that are made at a local level – by individuals, businesses and organisations changing what we buy, how we travel and what we eat.

This roadmap sets out the size of our carbon footprint in the county, describes the science-based carbon budget that we need to keep within to play our part in keeping global average temperatures below a 1.5°C increase above pre-industrial levels, and illustrates the options available to decarbonise our homes, transport, businesses and way of life. But, whilst we know the scale of the challenge, we don't yet know the optimal path to get to net zero. This road map sets out the no-regret actions that will be delivered over the next couple of years by a range of partnerships in the public, private and community sectors. These will be reviewed after the first year and updated in light of changing legislation, technology, levels of resources available and our rate of progress.

The aim is simple: to make progress in achieving the vision of being a net zero and climate resilient county. The road to get there is anything but simple: modelling of the actions that can be taken at a local level to reduce emissions highlights that all possible measures need to be implemented, rapidly and at scale. The challenges include finding the money to pay for the scale of change required, building a mandate for rapid change, developing supply chains with the skills and capacity to deliver, and making sure that change is carried out in a way that is fair and equitable.

The many benefits of addressing climate change provide a compelling narrative to help build consensus for change and legitimacy for difficult decisions. This includes the opportunity for growth in good quality jobs through the investment required to get to net zero, improvements in health and well-being through more walking and cycling and low carbon diets, better local air quality and more profitable businesses through lower energy costs. In addition, and as the Treasury concluded in advance of COP26, the costs of inaction significantly outweigh the costs of action. We want to ensure that these many benefits and avoided costs are also shared and experienced equally and fairly across the county, supporting our efforts to reduce inequality.

2020 to 2030 is the decisive decade of change. No single organisation, acting alone, has the powers or resources to secure the scale of change we need at a local level. It requires shared responsibility for making change, strong leadership and collective effort across the county from multiple stakeholders, to pool resources in order to maximise the opportunities and benefits - and we know that the longer we delay in making significant change the greater will be the cost.

We look forward to working with you to ensure East Sussex continues to be a place where people want and are able to live, work, study, visit and do business.

Graham Peters
Chair, Team East Sussex

Michael Turner
Chair, Environment East Sussex Board

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1. Introduction

The latest report from the United Nations Intergovernmental Panel on Climate Change (IPCC) stated that we are already seeing the consequences of an average of 1.1°C of global warming, through more extreme weather, rising sea levels and diminishing Arctic sea ice, among other changes. If we carry on with business-as-usual then the global average temperature is expected to be 4 - 5°C above pre-industrial levels by 2100, with more warming expected beyond that. The IPCC concluded that without substantial efforts to curb greenhouse gas emissions over the next decade we are likely to face severe, widespread, and irreversible impacts. 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.

We are already seeing the effects of climate change: for example, record temperatures in Russia in 2010 contributed to a reduction in wheat yields of about one-third, leading Russia to ban exports in order to maintain its own supply, which led to price spikes on global food markets and which, in turn, were linked to civil unrest in a number of low-income countries (The Economist, 2021).

Every extra bit of warming matters: the damage caused by an increase between 1.5°C to 2°C above pre-industrial levels is much greater than the damage likely to be caused by an increase between 1°C and 1.5°C. For instance, the difference between a 1.5°C and a 2°C increase is the difference between 1 in 10 people globally who will experience severe heat at least once every 5 years to 1 in 3 and the difference between losing about 70% of all coral reefs and losing 99%.

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 older and disabled people, greater coastal erosion, damage to essential infrastructure, increased cost of food, and disruption to supply chains and service provision.

The science tells us that we need to implement rapid and deep carbon reduction by about 2030 and cannot continue with the same incremental change that we've seen to date. It requires an unprecedented rate and scale of change, applying technologies and establishing and maintaining levels of public and business engagement over decades in a way that has never previously been achieved. As this rate of change is unprecedented, so there's little evidence to draw on to help understand the conditions required for success. However, it's clear that we need to build public support for transformative action.

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. This has meant that UK per capita emissions are now close to the global average of 7-8 tonnes of CO₂ 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.

The UK government has set a legally binding target under the Climate Change Act to reach net zero emissions by 2050. The Committee on Climate Change, which is the independent advisory body to government on getting to net zero, estimates that the cost of getting to net zero in the UK is less than 1% of GDP and that this will mostly pay for itself over time because the investment in measures to improve

energy efficiency will bring major financial savings through lower operating costs. However, a key challenge is that the costs are incurred up-front but the benefits will take time to be delivered.

2. The benefits of addressing climate change

Investing up-front to address climate change can deliver a number of very important benefits, including:

- 1) Greater prosperity:
 - In East Sussex in 2020 there were approximately 1,500 low carbon sector businesses employing about 8,735 people and contributing £575m to gross value added (GVA), which is about 6% of businesses and GVA in the county. This sector is recognized as having the potential for maintaining strong growth over a long period of time, if nurtured in the right way.
 - The Office for Budget Responsibility and the Treasury concluded in 2021 that the net economic benefits of a successful response to climate change would be huge.
 - Failure to address climate change will lead to much higher costs and impacts from having to adapt to climate change, such as having to build more flood defences. The greater the increase in climate change the greater will be the need - and the higher the cost - of adaptation.
- 2) Improved health outcomes through:
 - a reduction in illness and excess winter deaths as a result of living in more energy efficient and warmer homes. Currently, about 10% of households in East Sussex are fuel poor.
 - Higher levels of exercise as a result of more walking and cycling, which deliver 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 NHS.
 - Cleaner local air quality due to a reduction in diesel and petrol vehicles. These measures deliver both immediate and long-term benefits to health.
 - Meeting the average dietary intake recommended by the World Health Organisation, for instance by reducing the consumption of intensively-reared red meat, which would reduce greenhouse gas emissions by up to 17% and reduce the incidence of type-2 diabetes, stroke and certain types of cancer.
- 3) Greater energy security, by reducing our reliance on the import of oil and gas from other countries, many of which are in politically volatile regions.
- 4) Improved quality of life, for instance through development which enables people to live close to where they work and spend their leisure time.
- 5) An improved natural environment, by making changes to how land is used in order to reduce GHG emissions from agriculture and to off-set residual emissions. For example, planting the right kind of trees in the right place can deliver a range of co-benefits, such as improved biodiversity, reduced flood risk, improved air quality, and an increase in green infrastructure.
- 6) Reducing the risks of conflict and need for migration: the UN predicts that climate change will increase conflicts over resources and make a number of areas uninhabitable that will force some populations to migrate. The Committee on Climate Change and the Office of Budget Responsibility both concluded that small open economies like the UK cannot be insulated from the resulting mass migration to more temperate countries and impacts on global supply chains.

3. The challenges of addressing climate change

Reaching net-zero GHG emissions requires extensive 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 reaching net zero include:

- 1) **Current performance:** globally, carbon emissions continue to rise steadily with no sign of peaking, whilst the current national pledges to cut emissions continue to fall well short of what is needed to keep below the 1.5°C increase above pre-industrial levels, even after the many commitments made at COP26 in Glasgow in November 2021. Nationally, many of the indicators of change are also not going in the right direction, for instance with the Department for Transport forecasting that the UK car fleet will increase from 27 million in 2018 up to 40.5 million by 2050 (DfT, 2018).
- 2) **Timescale:** it takes time for markets, supply chains and infrastructure to lead to the significant turnover of capital stock (e.g. vehicles, heating systems and industrial plant). This means that major investment decisions need to be made now for them to begin to show results in reducing carbon over the next decade.
- 3) **Finance:** there needs to be a significant increase in public and private investment into low carbon capital stock and innovative technologies, from about £10 billion per year now to about £50 billion per year in the very near future. It's unclear where that scale of finance will come from.
- 4) **Policy:** the current gaps in some areas of policy, together with frequent changes to policy such as subsidy arrangements for renewable energy systems, lead to significant fluctuations in delivery and uncertainty for investors. For instance, there was an 18% reduction in the number of solar schemes installed in the first 3 months after the feed in tariff ended (BEIS, 2019). What is required are clear, stable and well-designed policies and interventions at a national and local scale. In addition, the time that it can take to formulate policy means that it is often not responding to the latest scientific evidence.
- 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.
- 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 and low levels of walking and cycling. 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, the adoption of technologies and change in behaviours.
- 7) **Uncertainty:** there are a number of key unknowns, including the rates at which technologies might become available, their cost, and their effectiveness, such as carbon capture and storage technologies to off-set residual carbon emissions. In addition, the national Net Zero Strategy that was published in October 2021, which set out the action that the government plans to take to achieve the carbon emission reduction target set out in the national Sixth Carbon Budget that runs up to 2037, did not clarify the roles and responsibilities that the private, public and community sectors will be expected to have in getting to net zero, including who will be expected to pay for what.

- 8) Complexity: as with most environmental issues, climate change is an example of a complex system problem, which is not caused by one party in isolation and can only be solved by extensive collaboration and by addressing a number of issues simultaneously.

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, droughts and heat waves. For instance, in England around one in six properties and over half of water and sewage treatment works are 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 are also limits to the ability to adapt, for instance in being able to protect coastal infrastructure and communities and in the ability of plants and animals, including our main food crops, being able to adapt as fast as the climate changes.

4. Co-operation and partnership

International and national government action and co-operation are essential to achieve the pace and scale of change required, Covid-19 has shown us what a global emergency looks like and what co-operation is required to address it. There are some important similarities between the Covid-19 pandemic and the climate emergency: both require international cooperation, have complex science, disproportionately impact on poorer people, have seen remarkable community resilience and require unprecedented peacetime intervention by governments and massive change in public behaviour. There are also some important differences: there's no vaccine for climate change, the price of lockdowns on the economy, liberty and happiness are unsustainable for very long, and the types of interventions made by government to address Covid-19 are entirely unsuited to a campaign to address the climate emergency that has to last decades. The pandemic does not alter the climate emergency and clearly illustrates that, as with climate change, prevention is hugely preferable to the cure. A key challenge now is how to turn the tragedy of Covid-19 into a low carbon recovery.

The Committee on Climate Change has concluded that more than half of the cuts required in carbon emissions rely on individuals and organisations deciding to take up low carbon solutions. Many of these decisions depend on having the right supporting infrastructure and systems in place, both nationally and locally, and require local partnership working to achieve the most effective outcome through pooling resources and sovereignty.

5. The Purpose of This Roadmap

In 2020 Team East Sussex, which is the federated board for the Local Enterprise Partnership, adopted the East Sussex Environment Strategy (see: <https://www.essp.org.uk/what-we-do/pride-of-place/environment-and-climate-change/>). The Strategy sets out the rationale for urgent action on climate change and commits to the aim of ensuring that East Sussex remains within its science-based carbon budget, which requires halving emissions approximately every 5 years. To help achieve this aim, the Strategy set out the following three actions:

1. develop a road map for cutting carbon emissions in East Sussex by an average of 13% per year.
2. develop a pipeline of projects that delivers a reduction in carbon emissions.
3. develop an electric vehicle strategy for East Sussex.

This road map seeks to address these actions, by setting out the current level of carbon emissions (the carbon baseline) and the carbon budget for the county (appendices 2 and 3), painting a picture of what it would take to get East Sussex to net zero (appendix 3), setting out an electric vehicle strategy for East Sussex (appendix 6) and developing a 2-3 year plan of priority partnership actions (pages 10-11).

There is already a great deal of activity taking place throughout East Sussex to address climate change. This includes strategies, plans and projects from a large number of organisations, partnerships and individuals across the private, community and public sectors, as well as a significant amount of partnership working, notably by the partnerships listed in appendix 7. This road map highlights areas of existing partnership work on climate change and provides an evidence-based and practical framework to enable additional work to be developed in priority areas that can build on what's already being done.

This road map has been put together by the organisations represented on the East Sussex Environment Board, which is accountable to Team East Sussex. These are:

- The Country Land & Business Association and the National Farmers Union.
- South East Water and Southern Water.
- Sussex Chamber of Commerce and the Federation of Small Businesses.
- The University of Brighton, the University of Sussex and Plumpton College.
- Eastbourne and Lewes Councils, Rother District Council, East Sussex County Council and the South Downs National Park Authority.
- The Environment Agency and Natural England.

The road map complements the plans already produced to cover each district and borough area, which can be found here:

- Eastbourne: Climate Change - [The Eastbourne Climate Emergency - Lewes and Eastbourne Councils \(lewes-eastbourne.gov.uk\)](https://www.lewes-eastbourne.gov.uk)
- Hastings: <https://www.hastings.gov.uk/my-council/policies-strategies/climate/>
- Lewes: <https://www.lewes-eastbourne.gov.uk/community/climate-change/>
- Rother: Environment Strategy – [Environment Strategy – Rother District Council](https://www.rother.gov.uk/environment-strategy/)
- Wealden: <https://www.wealden.gov.uk/environment-and-pollution/climate-emergency/>

6. East Sussex Action Plan on Climate Change

The national Net Zero Strategy of 2021 set out the actions that the government plans to take to achieve the carbon emission reduction target contained in the national Sixth Carbon Budget that runs up to 2037. The Strategy brings together a range of existing sector-specific government climate change strategies which have been published over the last couple of years, such as on transport and heating, and sets out indicative delivery pathways and funding allocations for each sector. However, the Net Zero Strategy does not provide a national road map as to how the UK will reach net-zero, with clear roles and responsibilities as to who will cut which emissions and who will pay for what. This uncertainty is reflected in the different pathways to net zero that were described in the 6th carbon budget report by the Committee on Climate Change in 2020 and in the Future Energy Scenarios set out by National Grid in 2021. The Office for Budget Responsibility concluded in 2021 that there are many possible paths ahead, each with different implications. Consequently, it's not yet possible to set out a complete road map to net zero for East Sussex.

As a result, the action plan set out on pages 10 & 11 covers the period 2022-25, as this is as far into the future as we can reliably predict our actions and the finances that support them. Focussing on the near-term, and accepting that uncertainty will require a substantial degree of flexibility regarding later years, will ensure practical progress is prioritised above trying to define a set path to net zero now. Appendix 3 outlines what needs to be achieved in the long term and this outline will be shaped into a more comprehensive action plan as uncertainty reduces over time and in response to changes in legislation, policy, resources and technology.

The action plan provides a summary of a number of actions that are either being, or will be, delivered by partnerships in East Sussex to mitigate or adapt to climate change over the next few years. It's not intended to be exhaustive but to illustrate the breadth and depth of partnership activity that already exists and to act as a catalyst for future work. The actions cover a mix of activity that either deliver measurable carbon reduction or help to build longer-term capacity to deliver measurable carbon reduction, alongside measures to adapt to the effects of unavoidable climate change.

According to the carbon budget for the county (appendix 2), to make our fair contribution to keeping the average global temperature increase to no more than 1.5°C above pre-industrial levels requires reducing the county's carbon footprint by about 200,000 tonnes of CO₂e per year over the next couple of years. The action plan does not attempt to show how this reduction might be achieved because it's not possible to estimate the carbon reduction that many of the actions might deliver and because the action plan cannot capture all the measures that are and will be taken across the county, for instance the effects of national policy or actions by individuals. However, as the data that's gathered and our understanding as to the effect of different interventions improves, so future iterations of the action plan will look to include carbon reduction figures from actions, where possible, and gauge the scale and pace of actual progress compared with the need to reduce emissions by an average of 13% per year.

7. Terminology

There are six main greenhouse gases (GHGs) that contribute to global warming. Most of these gases arise from combustion of fossil fuels, and some originate from refrigeration, agriculture, chemical production and electrical applications. Each gas has its own global warming potential over a 100 year period (GWP). Carbon dioxide (CO₂) has the lowest GWP of all the gases but is by far the most abundant GHG gas, hence the focus on CO₂ when discussing climate change. By comparing the GWP of each gas to that of CO₂ we are able to derive a CO₂ equivalent value (expressed as 'CO₂e'). For example, CO₂ has a GWP of 1, methane has a GWP of 24, therefore we can say that 1 tonne of methane emissions is equal to 24 tonnes of CO₂ (expressed as '24 tCO₂e'). This enables the total global warming potential of a range of greenhouse gases to be presented as a single figure, which simplifies analysis and reporting. In this report 'carbon' is used interchangeably with 'CO₂e'. Different sources quoted in this report use just CO₂ and not all GHGs, whereas other sources include all GHGs. This is highlighted in the report, where relevant.

A tonne of CO₂e is calculated by multiplying the amount of energy used, for instance in units of kWhs for gas or electricity or litres of fuel used in a vehicle, by the amount of carbon produced per unit, which is a standardised unit set by government to ensure consistency in reporting over time.

The terms 'carbon neutral' and 'net zero carbon' are sometimes used inter-changeably and sometimes defined in different ways. For the purposes of this report they are considered to be inter-changeable.

No.	Theme	Action	Outputs and Outcomes	Lead
1	Transport	Produce and consult on Local Transport Plan 4	Updated local transport strategy in place aligned to net zero	East Sussex County Council
2		Develop a pipeline of cycling and walking projects	Active Access programme to continue to increase walking & cycling to school, employment and education	East Sussex County Council
3		Develop and implement a Bus Service Improvement Plan	1) More comprehensive bus networks with better coverage. 2) Increase in use of public transport.	East Sussex County Council & bus companies
4		Develop a co-ordinated approach to electric vehicle (EV) chargepoints	Lay the groundwork to accelerate EV uptake	SPACES (Strategic Property Asset Collaboration in East Sussex)
5		Develop a hydrogen storage and re-fuelling depot in Newhaven	Hydrogen storage and re-fuelling capacity developed for buses and HGVs	Lewes District Council & Brighton & Hove Buses
6	Domestic properties	Retrofit fuel poor properties	Deliver the additional £4.2m of funding to 2023 to assist hundreds of fuel poor households	East Sussex Energy Partnership
7		Retrofit social housing by stock-owning local authorities	Co-ordination of social housing retrofit amongst Sussex stock owning local authorities (9,500 properties, 4% of East Sussex total)	Lewes and Eastbourne Councils
8		Develop Barcombe CommuniHeat net zero village	Develop a model solution for able-to-pay rural communities to get to net zero, working with the local supply chain and harnessing community finance	OVESCo, Community Energy South, UK Power Networks and Buro Happold
9		Develop Crowhurst village net zero energy plans, and Firle and Forest Row renewable heat plans	Develop whole community low carbon solutions	Community Energy South partners
10	Non-domestic properties	Deliver free energy audits and grants to businesses through the Low Carbon in the South East programme (LoCASE)	150 businesses awarded grants of up to £10,000 each by June 2023 to cut 450 tonnes of CO ₂ e	East Sussex County Council & Green Growth Platform
11		Secure funding from Innovate UK to map non-domestic buildings	Understanding of commercial building stock in East Sussex to enable targeted interventions	South East Local Enterprise Partnership Clean Growth group
12	Waste	Develop a Waste Carbon Reduction Plan	Detailed understanding of the carbon emissions from the current waste collection contract & the opportunities for improvement	Joint Waste Partnership (Wealden District Council)
13		Develop a stronger policy framework to increase the sustainable use of materials in the construction industry.	Revised Waste & Minerals Plan, which will introduce policy on the sustainable use of aggregates.	South Downs National Park Authority and East Sussex County Council
14	Renewables	Develop a solar farm via Cuckmere Community group	4MW solar farm installed with 10 acres of rewilding	Cuckmere Community Solar
15		Connect Cuckmere Community solar farm to Network Rail via Riding Sunbeams project	Use locally produced and financed solar farm to power part of the rail network in East Sussex through a ground-breaking project	Riding Sunbeams & Cuckmere Community Solar

No.	Theme	Action	Outputs and Outcomes	Lead
16		Develop community-owned Ouse Valley Solar Farm	Possible 16MW solar farm installed	OVESCo & Lewes District Council
17		Assist homeowners to purchase solar PV through Sussex Solar Together	200 households adopting solar PV per year	Local authorities
18	Agriculture and land use	Deliver the SELEP-funded 'Accelerating nature-based climate solutions' project	Understand the scale of regional supply and demand for natural capital carbon sequestration and key barriers to market development	Sussex Nature Partnership
19		Develop a Local Nature Recovery Strategy for East Sussex	Bring forward proposals for creating and improving habitat for nature, including to address climate change	Sussex Nature Partnership
20	Adaptation & resilience	Improve flood defences in Eastbourne, Pevensey, Telscombe cliffs and Seaford	10,000 homes, 1,000s of commercial properties and major infrastructure such as the A27 and A259 to be better protected.	Environment Agency
21		Deliver the Eastbourne and South Wealden Flood Innovation Project	Better understanding of the different aspects of flood risk in this catchment, which will lead to improved management of flood risk and better flood warning systems in place.	East Sussex County Council
22	Behaviour change	Deliver community engagement via the 5 year Ouse Valley CARES project	Enable the Ouse Valley community to become a national pioneer in tackling climate change	South Downs National Park & OVESCo
23		Develop and deliver carbon literacy training for 16-18 year olds	Every 16-18 year old to receive carbon literacy training from autumn 2022	Sussex Colleges
24	Skills training &	Develop a plan that supports a strong net zero skills base	Identify and develop new training provision required and promote careers in low carbon sectors	Skills East Sussex
25		Set up a centre of excellence in retrofitting and green energy installation in Ore Valley	£3m Town Deal bid to create a Green Technology Training Centre	East Sussex College & Hastings Borough Council
26		Set up new land management training programmes	Land management training to maximise benefits of schemes such as the national Environmental Land Management Scheme	Plumpton College
27	Finance	Explore options for low carbon funding, in preparation for the Shared Prosperity Fund	Increase investment in climate change mitigation and adaptation measures in East Sussex	Team East Sussex
28	Lobby government	Present collective messages from East Sussex	Influence policy and investment in East Sussex	Dependent on each lobbying theme
29	Comms	Develop a co-ordinated climate change communications plan	Clear and consistent communication with residents & businesses	East Sussex Local authorities

Note: There are a number of partners involved in the development and delivery of many of the above actions. For the sake of simplicity only the lead organisation(s) or partnership has been named.

Appendix 1 - East Sussex Baseline Emissions and Trends

A climate change road map requires a detailed understanding of an area's greenhouse gas (GHG) emissions, as it provides both the evidence to develop targeted interventions and the evidence of progress towards becoming carbon neutral.

Greenhouse gas emissions are commonly grouped into 3 categories, based on where they occur:

Scope 1: GHG emissions from sources located within an area.

Scope 2: GHG emissions from using grid-supplied electricity within an area.

Scope 3: GHG emissions that occur outside an area as a result of activities taking place within an area (eg. products that are manufactured outside of East Sussex but that are used in East Sussex).

This roadmap is focused on the key carbon emissions that are generated in East Sussex. It does not cover aviation, shipping or emissions generated from products that are manufactured elsewhere but consumed or used in East Sussex, as there is currently no means to show this at a county level. It also does not cover power generation, beyond looking at local renewables, as these are outside the scope of what local organisations and individuals can control or influence, and it does not consider factors that determine energy demand, such as population growth or economic activity.

At present there is no published information on total GHG emissions by county area. Instead, the Department for Business, Energy and Industrial Strategy (BEIS) publishes data each year by local authority area to monitor CO₂ emissions from domestic housing, businesses, transport and changes in land use (see: <https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018>). The data provide a continuous record of emissions from 2005 to 2019. It's published about 18 months in arrears due to the complexity of collating and verifying the data, and so the data shown here do not take into account any changes that have occurred as a result of Covid-19. This national dataset excludes emissions from some key sectors, including air travel, shipping and goods manufactured abroad.

Using the most recent BEIS data, figure 1 illustrates the change in emissions, split between the main sectors of commercial, industrial, transport, domestic and public sector emissions, between 2005 and 2019. The key points are:

- Total emissions of CO₂ from East Sussex in 2018 were about 0.5% of total UK emissions.
- emissions have reduced by about 35% between 2005 and 2018, despite an increase in population. This is an average reduction of 3% per year, which is similar to the national trend because it's due to the same changes, notably the gradual decarbonisation of the electricity grid.

Emissions 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 of total carbon emissions in East Sussex.

East Sussex currently has the lowest per capita CO₂ emissions of English counties, which is mainly due to the lack of heavy industry and motorways. However, the forecast increase in population of 3% by 2025 and annual house building targets of 3,870 will put significant upward pressure on these figures.

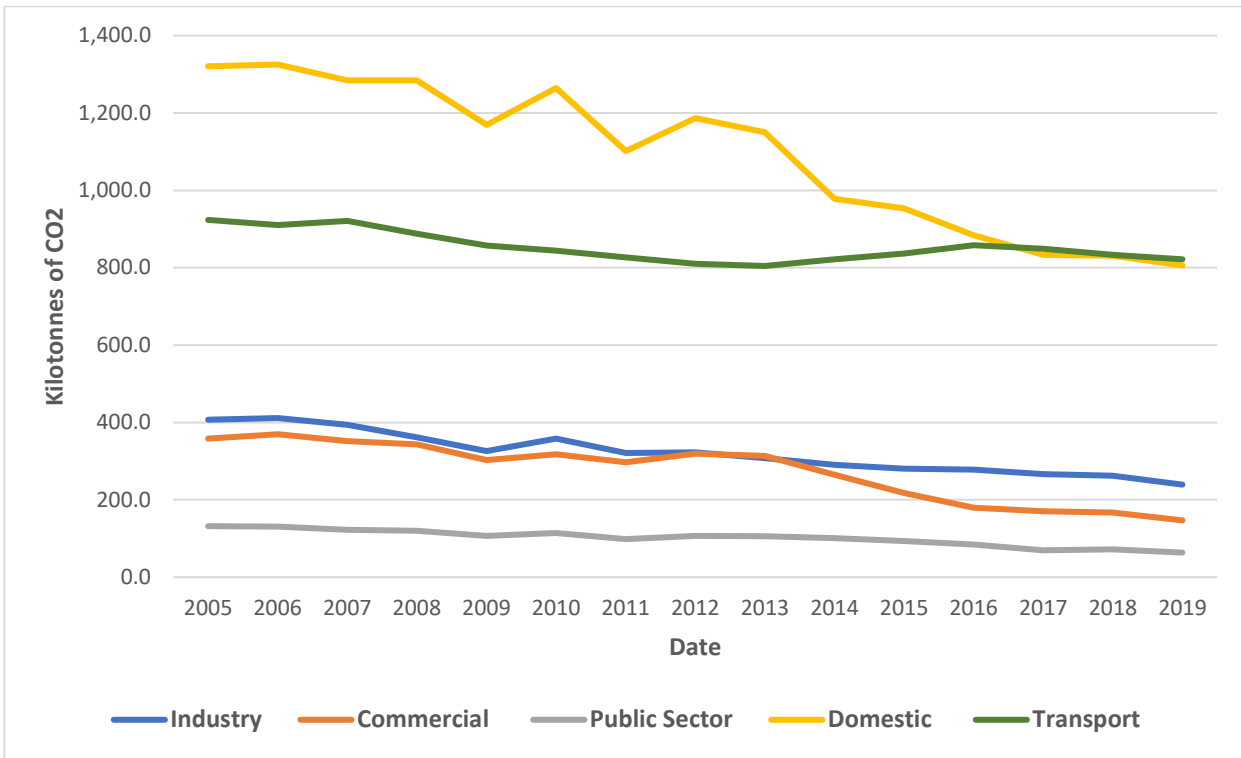


Figure 1. CO₂ emissions in East Sussex by sector between 2005 and 2019 (BEIS, 2021).

Figure 2 indicates how emissions break down across the main sectors in England, the South East, East Sussex and the 5 district and borough areas. The 2 urban areas, Eastbourne and Hastings, have a higher percentage of domestic sector emissions and lower transport sector emissions than the 3 more rural areas (Lewes, Rother and Wealden), as they have a higher population density and lower levels of car ownership. This is also reflected in higher emissions per capita in the rural areas, because there are fewer transport options and therefore higher private car ownership, as well as many properties that are not on the gas grid.

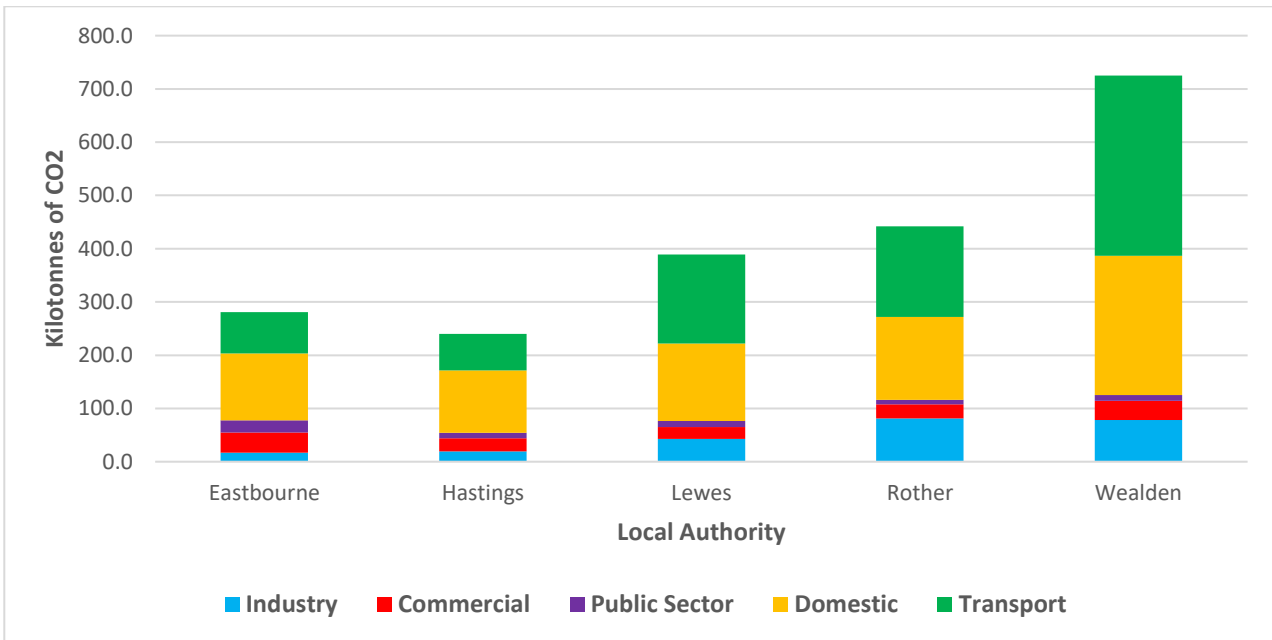


Figure 2. Percentage CO₂ emissions by sector in 2019 in England, the South East, East Sussex and by district and borough (BEIS, 2021).

There are a number of other tools and data sources available for communities and organisations to better understand their carbon footprint and identify what changes can make the biggest difference, including:

- 1) For communities:
 - a. the 'impact' tool: [Impact | Community carbon calculator \(impact-tool.org.uk\)](https://www.impact-tool.org.uk).
 - b. the 'place-based carbon calculator': [Place-based carbon calculator](#).
 - c. the Net Zero Navigator tool: [NetZero Navigator by Catapult \(oneplanet.com\)](https://www.oneplanet.com).
- 2) For businesses: [Welcome to the Net Zero Hub \(britishchambers.org.uk\)](https://www.britishchambers.org.uk).
- 3) For individuals: [WWF Footprint Calculator](#).

These have been developed by a range of organisations and each has different strengths and weaknesses.

Appendix 2 - Climate Emergency Targets

The government's target is to get to net zero by 2050 and figure 2a sets out how the Committee on Climate Change has modelled how this might be achieved. A large number of organisations in the public, private and third sector have also committed to climate emergency targets, usually setting a date by which they will aim to achieve net zero carbon emissions. Whilst target dates vary, they are all extremely ambitious and reflect a broad consensus on the need to get to net zero as quickly as possible.

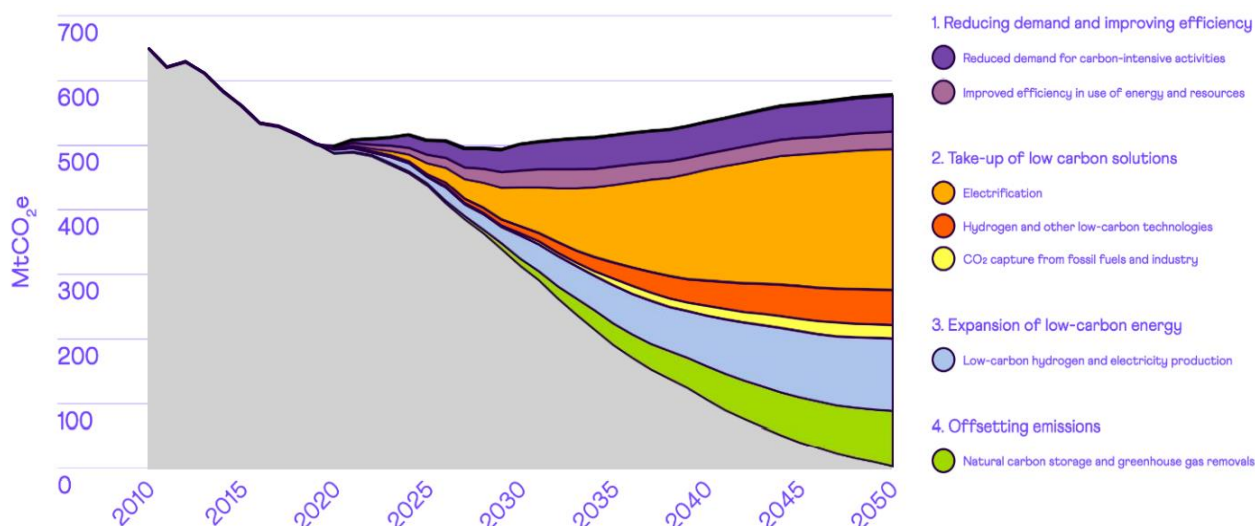


Figure 2a. How England might get to net zero by 2050 (Committee on Climate Change, 2020).

A simple approach to determine the potential direction of travel of carbon emissions in East Sussex and to help set a target is to extrapolate the recent trend in emissions to see when they would be reduced to zero. This is illustrated in figure 3, which shows emissions reaching net zero by about 2045. However, this needs to be treated with caution, as it assumes uniform reductions across all sectors and over time and that past performance is a good indication of future performance. In practice, it's likely that emission reductions will become harder and more costly over time, whilst some sectors, notably transport, have seen little to no reduction in emissions in the recent past. More importantly, this rate of reduction will not enable East Sussex to keep within its science-based carbon budget.

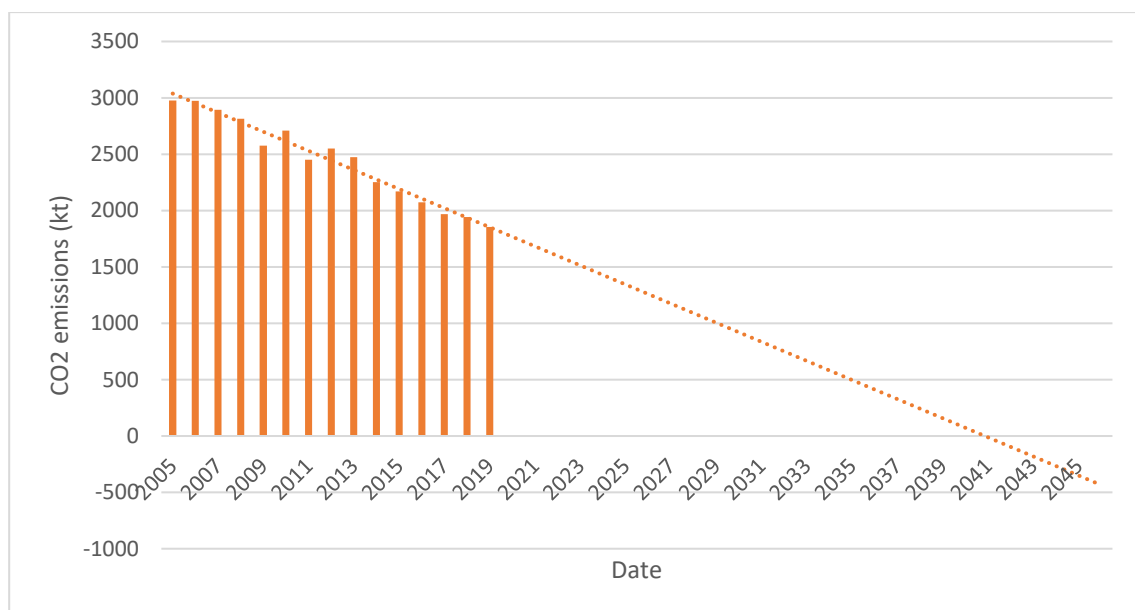


Figure 3. The actual and potential trend in East Sussex carbon emissions from 2005 – 45.

This report takes its target from the one set out in the East Sussex Environment Strategy, namely an average reduction in carbon emissions of 13% per year, as it is a science-based target and is in keeping with the international Paris Climate Agreement to try to limit maximum average global warming to 1.5°C above pre-industrial levels.

To keep below the 1.5°C increase requires a limit to the total quantity of greenhouse gases released to the atmosphere. This is the global carbon budget, which can be divided down into national and local carbon budgets. All emissions above this budget will contribute to exceeding the 1.5°C threshold. The UK’s Tyndall Centre for Climate Change Research has developed a recognised methodology for calculating the CO₂ budget for the UK that is aligned with the Paris Agreement, and has divided this down to different administrative levels (eg. district/borough and county), to ensure that carbon budgets are comparable and that all areas are contributing to a common UK carbon budget and in an equal and fair manner.

The Tyndall methodology makes a number of simplifying assumptions and only covers CO₂ rather than all GHGs. Nevertheless, it’s a useful model which indicates that:

- The total remaining CO₂ budget for East Sussex is about 14 million tonnes up to 2100.
- At current emission levels in East Sussex of about 2 million tonnes of CO₂ per year this budget will be exceeded in 7 years.
- the annual average reduction in CO₂ required to keep within the remaining budget is about 13% (see figure 4).

One approach to determine the scale and pace of carbon reduction that might be possible, and how this compares with the carbon budget for East Sussex indicated by the Tyndall Centre, is through the government-funded SCATTER model (<https://scattercities.com/>). The model shows what emissions reductions could be achieved based on the current local baseline and by estimating the effect of a combination of 30 different types of interventions, using current evidence as to the maximum that might be technically and socially feasible. The interventions either reduce the demand for energy (for example through improved insulation) or increase the supply of ‘green’ energy (for example the deployment of renewables). Both types of measures contribute to cutting CO₂ emissions. These interventions are based on national data scaled to a county level. Figure 4 provides a visual summary of the Tyndall carbon budget and how far the interventions set out in the SCATTER model would get the county towards its carbon budget.

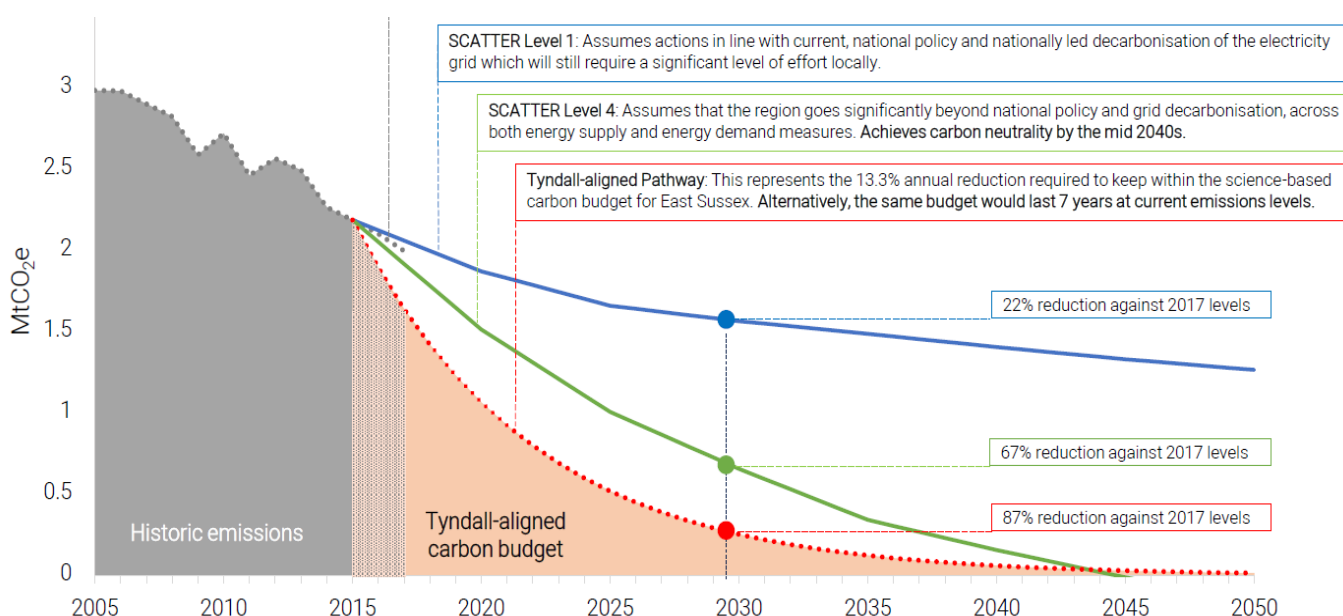


Figure 4. East Sussex carbon reduction pathways (SCATTER, 2020).

- 1) The blue line illustrates the business-as-usual pathway, as it tracks the predicted effects of national policies and decarbonisation of the electricity grid. Emission reductions are expected to slow down over time.
- 2) The Green line represents the highest level of ambition, which depends on the successful implementation of an extensive programme of emission reduction measures across East Sussex.
- 3) The red line represents the annual emissions reduction recommended by the Tyndall centre of about 13% per year to keep within the carbon budget. The total area underneath the red line represents the total remaining carbon budget for East Sussex.

What's clear is that the earlier and greater the reduction in emissions the more likely we are to contribute to remaining within the global carbon budget and, conversely, the later and slower the reduction in emissions the more likely we are to contribute to exceeding the global carbon budget.

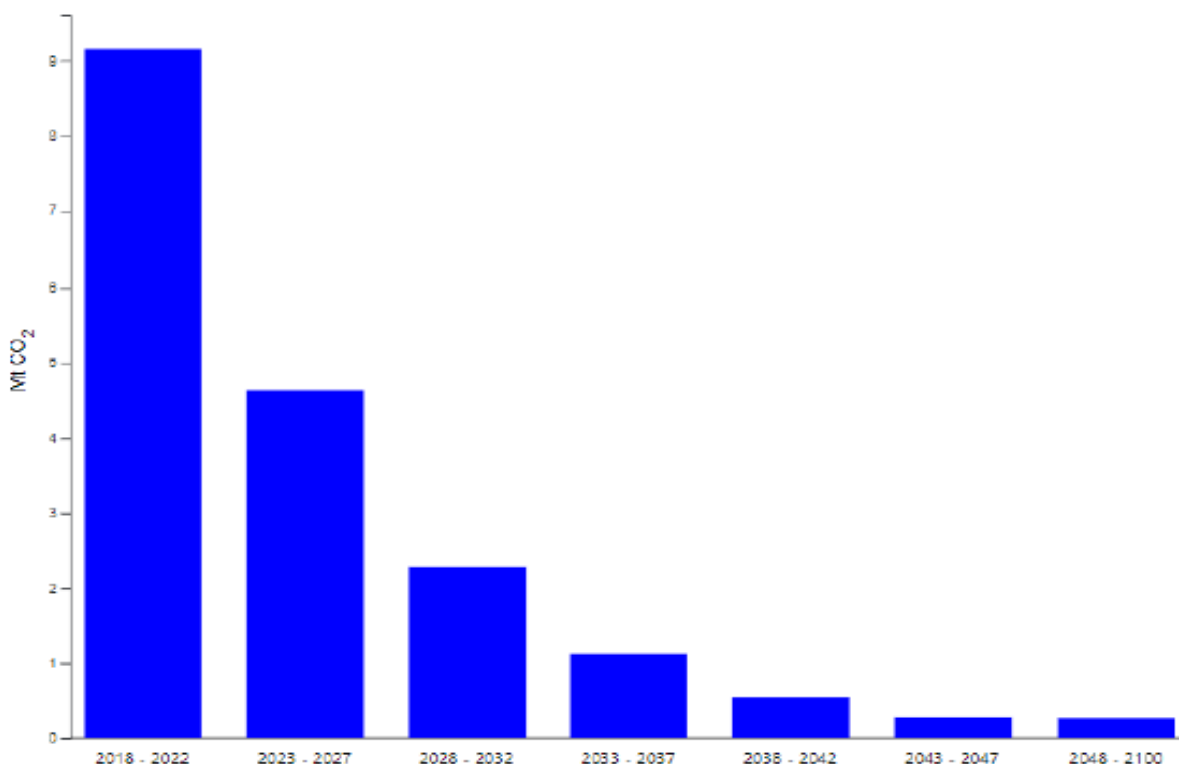


Figure 5. East Sussex carbon budget, split into 5 year milestones (Anthesis, 2020).

Using the Tyndall Centre approach and the SCATTER model enables an annual emissions reduction pathway to be set for East Sussex, against which future progress can be tracked. However, it's not possible to set out the annual reduction in tonnes of CO₂e for the period covered by this road map, namely 2022-25, because the carbon data produced by government at a county level is about 18 months behind, due to the complexity of collating and analysing the data. For example, the latest data, up to 2019, were published in June 2021. This means that reporting on progress each year against the 13% annual average reduction target will be about 18 months behind.

Appendix 3 - Decarbonisation Road Map

In 2020 the Committee on Climate Change set out how England could get to net zero by 2050 (<https://www.theccc.org.uk/publicationtype/0-report/01-net-zero-reports/>). It concluded that it's:

- technically feasible.
- highly challenging, because it requires extensive 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.
- entirely contingent on the introduction of clear, stable and well-designed policies and interventions at a national and local level, the appropriate resourcing, a supply chain able to deliver the required scale and pace of change, and an unprecedented level of public involvement and consent for change.

The Committee has produced an extensive set of reports on how we can get to net zero nationally, which are summarised in figure 6. The government published the national Net Zero Strategy in October 2021 and has published a number of related strategies over the last couple of years. Collectively, these set out some of the government's proposals as to how the UK can transition to net zero. However, they do not set out a complete road map and it's unclear what role local areas need to play in the transition.

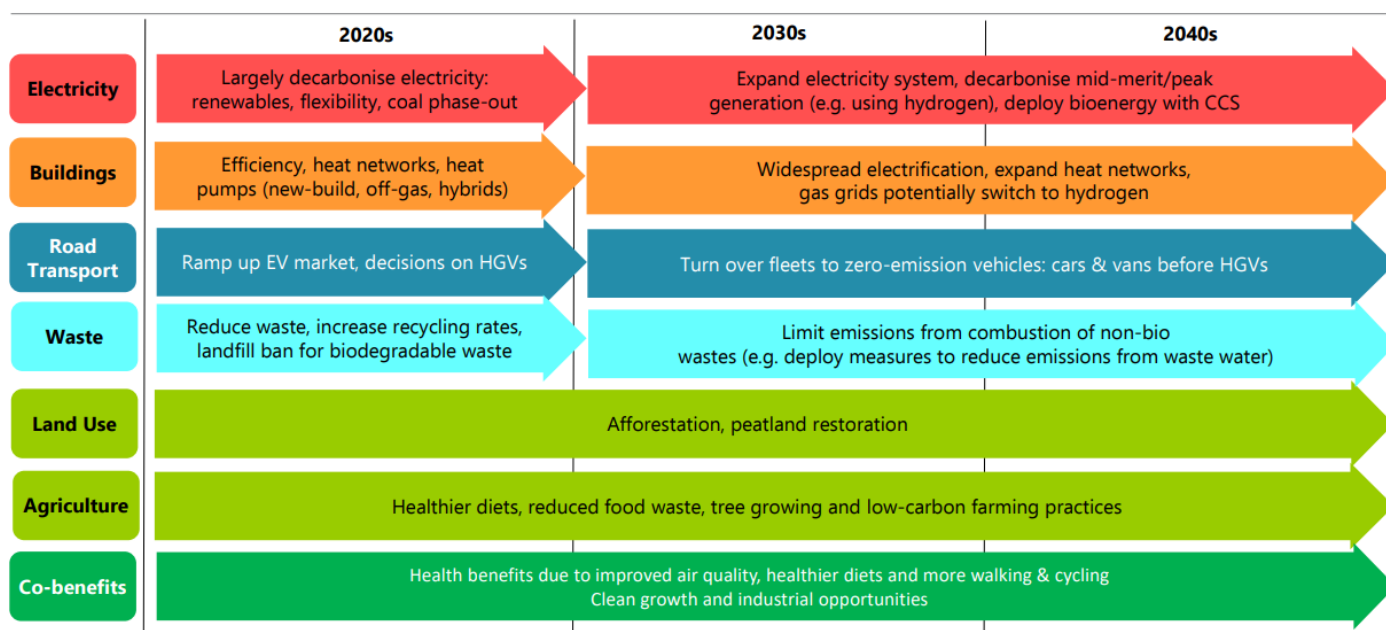


Figure 6. Committee on Climate Change roadmap to net zero for the UK (source: CCC, 2020).

In the absence of a clear national road map, the SCATTER model provides a means to help prioritise actions at a local level, to compare actual progress against the required scale and pace of progress to get to net zero, and to set milestones. Figure 7 provides a summary of the relative contribution of the different measures included in SCATTER, up to 2030. This highlights that action is required in all areas, as well as the relative importance of focussing on reducing emissions through domestic retrofit programmes and transport measures.

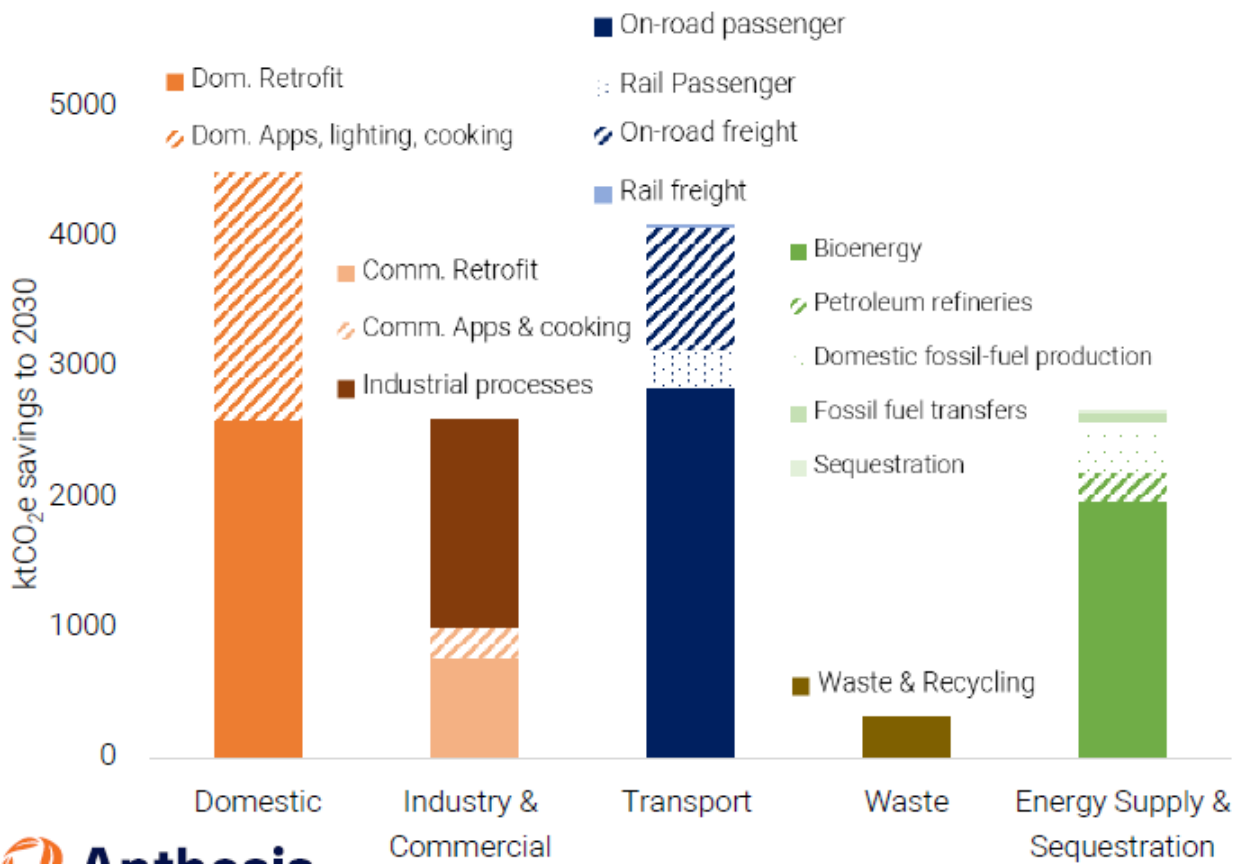


Figure 7. The relative contributions of carbon reductions in East Sussex up to 2030 (SCATTER, 2020).

A further tool to help decide which measures to prioritise is the energy hierarchy (figure 8). This sets out that the most effective option to cut carbon is usually to use less energy in the first place, whilst the last option to consider is off-setting emission that cannot be cut.

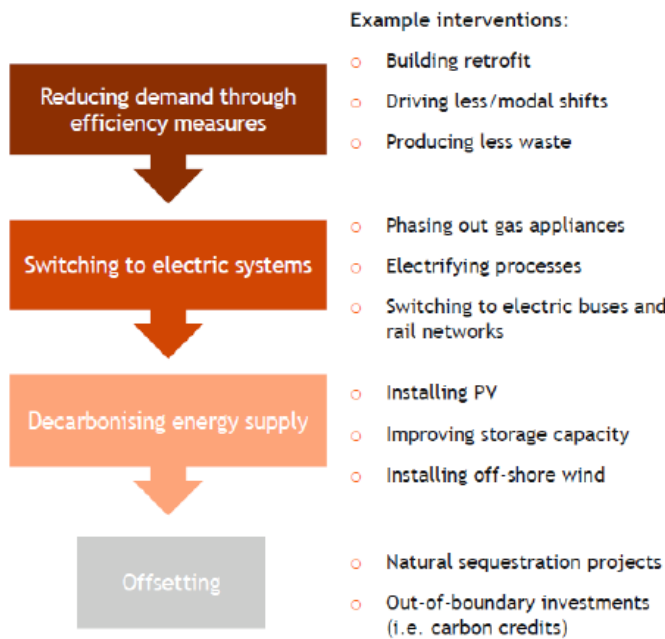


Figure 8. Energy hierarchy of actions and example interventions (Image: Anthesis)

The hierarchy does not always hold true, as illustrated in figure 9, which illustrates the relative effectiveness of different measures that individuals can take to reduce carbon, as calculated by Hampshire County Council. The assumptions that underpin figure 9 will change over time, in light of changes in technology and our understanding of their relative effectiveness, but it provides a useful indication of measures to prioritise.

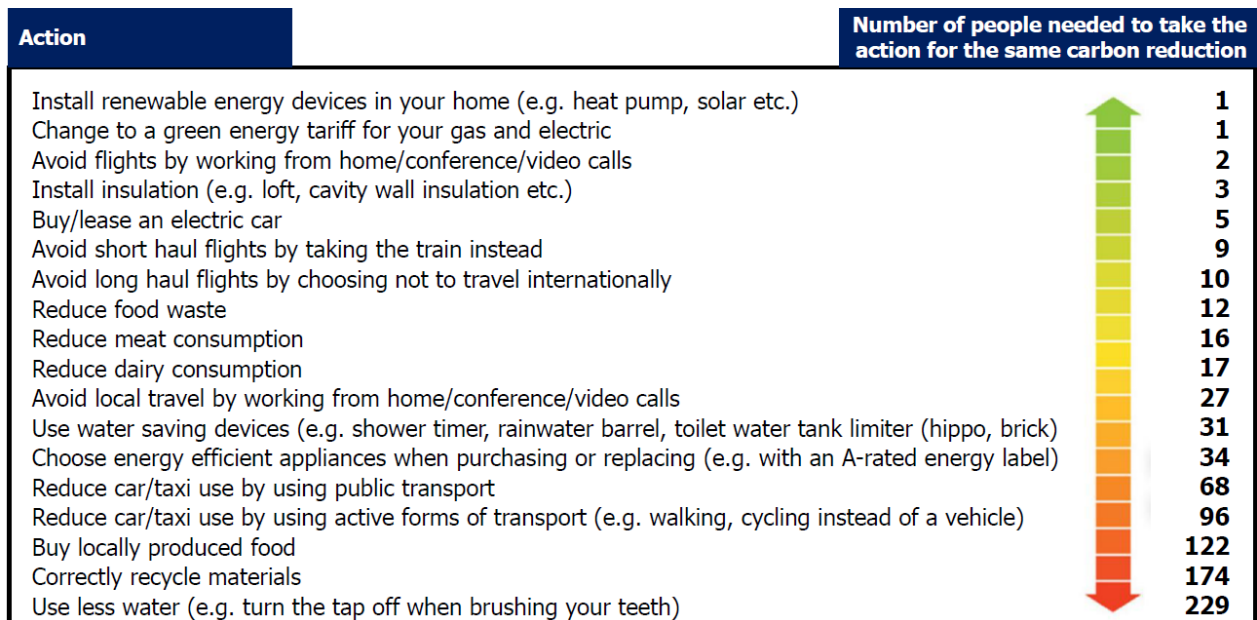


Figure 9. The relative effectiveness of different measures in reducing carbon (HCC, 2020).

The following sections look at each sector in turn, setting out the national context, the current position in East Sussex and some of the key local partnership actions planned or being taken forward in the short term.

3.1 Transport

Ways to decarbonise transport

There are three main ways to decarbonise transport, which are illustrated in figure 10 and which represent a hierarchy from the most effective to the least effective ways to do so. These are to:

- 1) avoid the need to travel by:
 - Planning and designing well-connected communities to reduce the number and length of vehicle journeys required to access work, education and services. If the distance that people need to travel is less than 1 mile then they are much more likely to walk or cycle.
 - enabling home working through greater digitisation and broadband.
- 2) Shift journeys to those that generate no or low carbon, including:
 - active travel, namely walking and cycling.
 - public transport that is convenient, cost effective, reliable, accessible, flexible and integrated.
- 3) Improve the carbon efficiency of transport networks and vehicles where journeys are necessary, by:
 - Using electric or hydrogen-powered vehicles, including e-bikes and e-scooters.
 - driver training to improve fuel efficiency.

- increase car occupancy through ride sharing, car clubs and mobility as a service.
- establishing consolidation centres in towns to enable last mile local deliveries to be by means of low carbon vehicles such as e-cargo bikes.

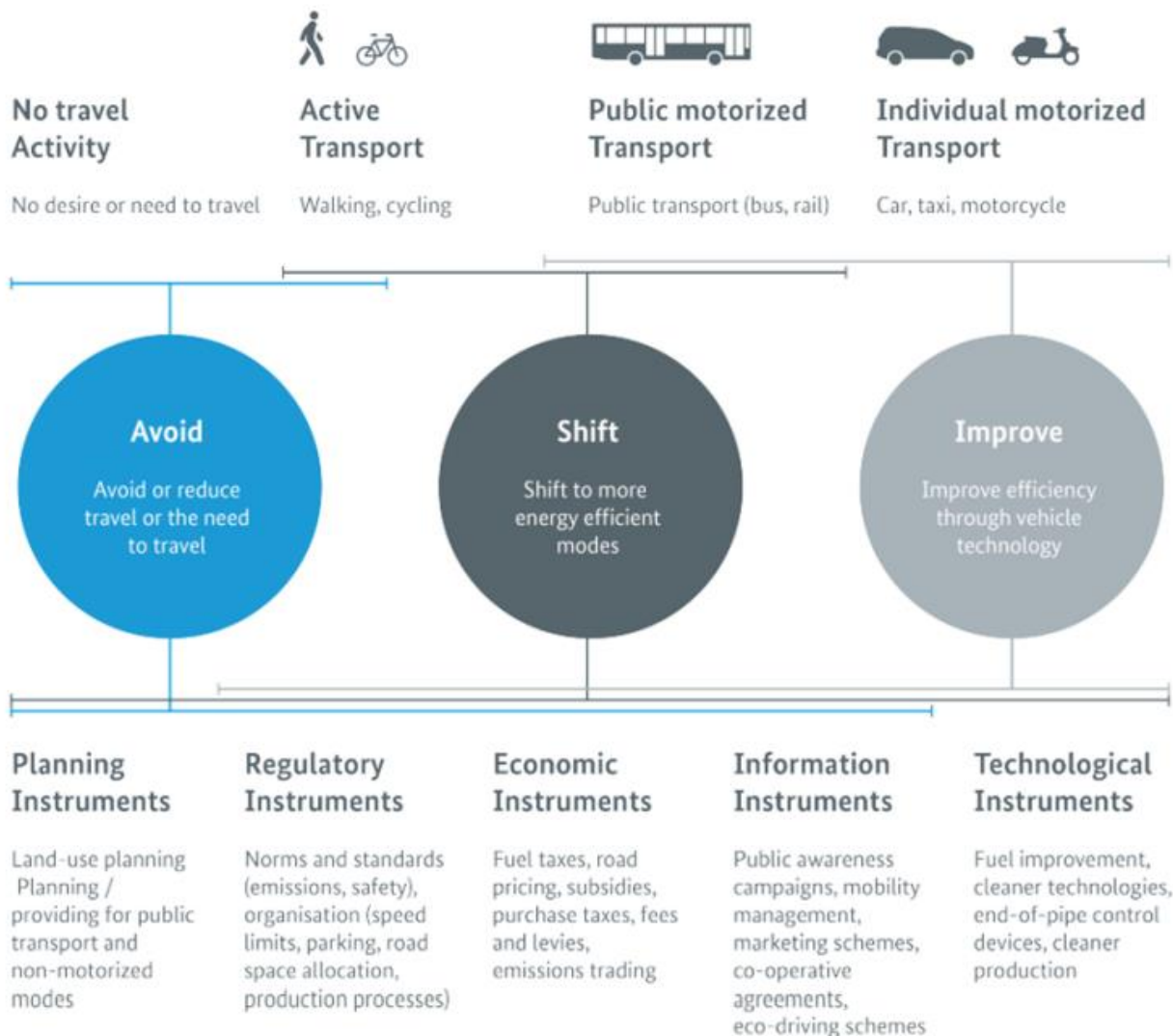


Figure 10. Avoid, shift, improve measures (source: Ricardo, 2020).

The measures listed above require a combination of appropriate incentives and disincentives, with the aim of encouraging the take up of the lowest carbon options first. These include incentives such as integrated public transport networks and ticketing and disincentives such as fuel duty and road user charging. A key challenge is the political will to implement measures that are unpopular. Consequently, how communities are engaged with is critical to the success of new measures, to ensure early and widespread buy-in.

There are a number of significant co-benefits from implementing the travel hierarchy. These include improved physical and mental health from better local air quality and more physical activity - which also brings cost savings to the NHS - safer roads and improved public realm from lower traffic volumes, and economic benefits from reduced congestion. However, it's important not to underestimate how the take up of low carbon transport, and therefore the achievement of these co-benefits, is largely influenced by individual needs and choices about when, where and how we each travel. Therefore, it's likely that significant change in transport emissions is only likely to come about with major interventions by government, through regulation and fiscal measures such as road user charging.

The national picture

The UK is in the top ten most congested countries in the world, which brings an economic cost of about £37 billion per year due to lost productivity and fuel costs. In addition, Poor air quality, which is mostly from traffic, accounts for about 36,000 premature deaths per year, which is estimated to cost up to a further £20 billion per year due to premature illness and days lost from work (Royal College of Physicians, 2017). There has been no net reduction in carbon or energy from UK transport since 1990 (figure 11). This is mostly due to the improvements in vehicle fuel efficiency being balanced out by an increase in the distance travelled and a marked increase in the market share of SUVs, from 6% in 2006 to about 25% in 2019, which will lock in high fossil fuel use from transport for at least the next decade. Consequently, as emissions from other sectors have decreased, so the relative emissions from transport have increased, from 21% of all UK emissions in 1990 to 33% of all emissions in 2018.

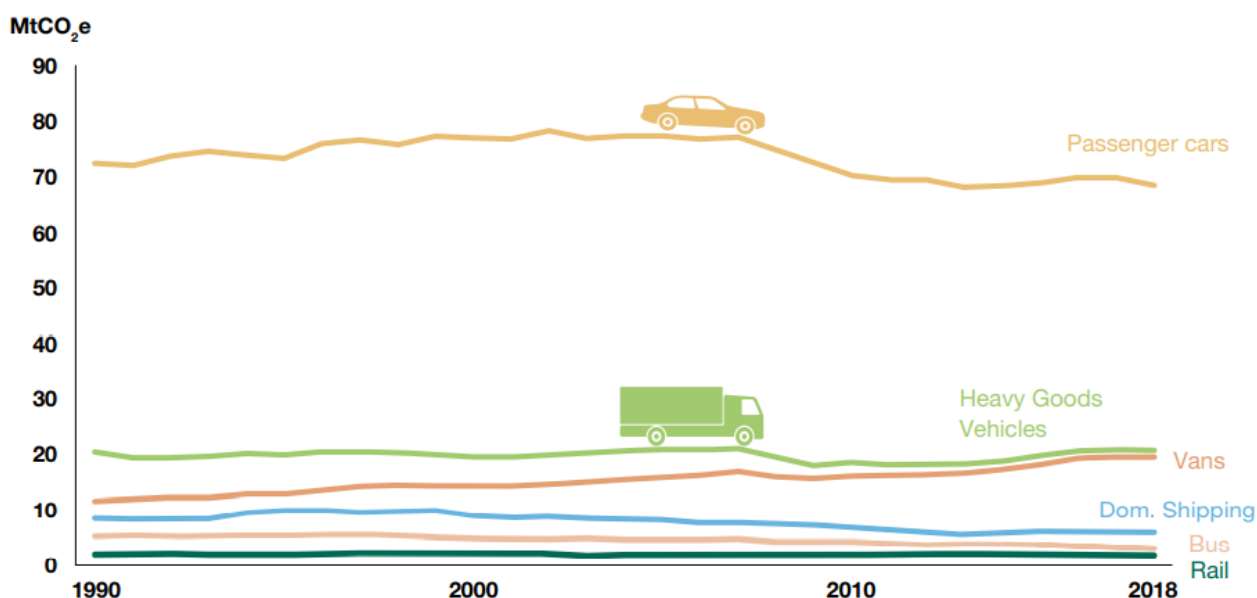


Figure 11. UK Transport GHG emissions by mode, 1990 and 2018 (Source; DfT, 2020).

The Committee on Climate Change has mapped out how it thinks transport will get to net zero, following the avoid, shift and improve model (figure 12). What this highlights is that improving the fleet, for instance through electrification and 'green' hydrogen, is considered to be by far the most important measure, representing about 80% of emissions abatement from transport. This is reflected in the DfT's recent Transport Decarbonisation Plan and the UK Hydrogen Strategy, both published in 2021, and the commitment of £1.3 billion to installing EV charge points over the next 4 years. The Plan also announced the development of a transport decarbonisation toolkit, to assist organisations to develop plans in line with the 'avoid, shift and improve' model, and set out a requirement that Local Transport Plans, which are produced by Local Transport Authorities such as East Sussex County Council, will need to deliver measurable carbon reduction from transport in line with national carbon budgets. However, the Decarbonisation Plan, along with the DfT's recent accompanying Cycling and Walking Strategy and Bus Back Better Strategy, is lacking in detail as to how the headline targets will be delivered.

There remain significant policy and resource gaps, as well as policy contradictions, that mean that there is not yet a robust mix of incentives and disincentives in place to persuade many people to change their travel choices. This includes, for example, no clear policy on how to avoid travel, even though a marked reduction in vehicle kilometres is required to meet decarbonisation targets and would significantly reduce the scale and cost of having to invest in the 'shift' and 'improve' measures. And there are not yet clear policies on road user charging to radically change price signals and no clear plans for freight decarbonisation.

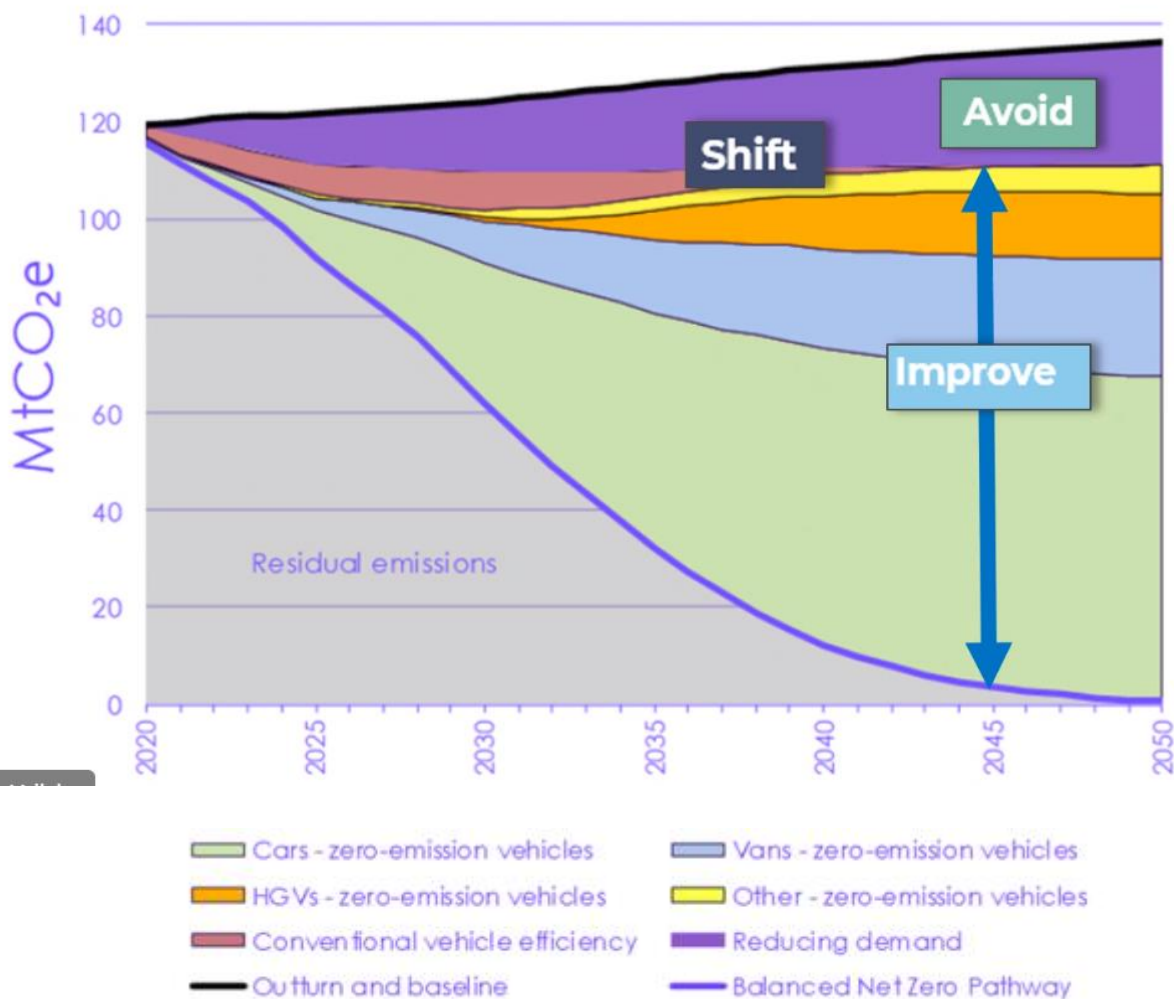


Figure 12. The CCC’s road map to decarbonising transport (2021).

These challenges highlight that transport is probably the most complex sector to decarbonise, for a number of reasons, in particular widespread public objection to restrictions being placed on the ability to travel by private car.

The East Sussex picture

Transport services in East Sussex, as in other counties, are guided by a mix of national legislation and national and local policy. Train services are delivered by private train operating companies, bus services are mostly run by private sector providers and supplemented by non-profit community bus services. The County Council is responsible for some bus infrastructure, such as bus stops, it subsidises some unprofitable bus services to help maintain social mobility and access to essential services and it is responsible for administering the concessionary travel scheme in the county. The majority of the road network, including cycle and footpaths, is planned for, owned and maintained by the county council.

Pre-covid-19 carbon emissions from transport in East Sussex were higher than emissions from any other sector and traffic levels were growing at about 1-2% per year. In addition, there were very low levels of commuting by bicycle, at less than 2%, and low levels of commuting by public transport, at about 11%, with bus patronage on a downward trend. The pandemic broadly increased walking and cycling but has had a severe negative impact on public transport, particularly train travel, though it’s unclear to what extent these changes will remain longer term.

The SCATTER model indicates that a combination of the following changes will be required by 2050 or earlier for emissions from transport to reduce in line with a science-based carbon reduction target:

- A reduction in the total number of miles travelled by cars, vans and motorcycles of about 20%, through fewer and shorter journeys.
- An increase in the percentage of distance travelled by bicycle from 1% to 5%.
- An increase in the percentage of distance travelled by bus from 5% to about 19%.
- All passenger vehicles and on-road freight to be electric or hydrogen-fuelled.

The SCATTER model assumes that the percentage of distance travelled on foot or by train will remain relatively static, at about 4% and 10% respectively. Figure 13 provides a visual summary of these changes. The update to the Local Transport Plan, which will be developed in 2022 by the County Council as the Local Transport Authority, will include a more detailed assessment of the transport changes required and how they could be delivered. However, one of the key challenges is that the funding currently available from government is not enough to begin to decarbonise transport on the scale and pace required.

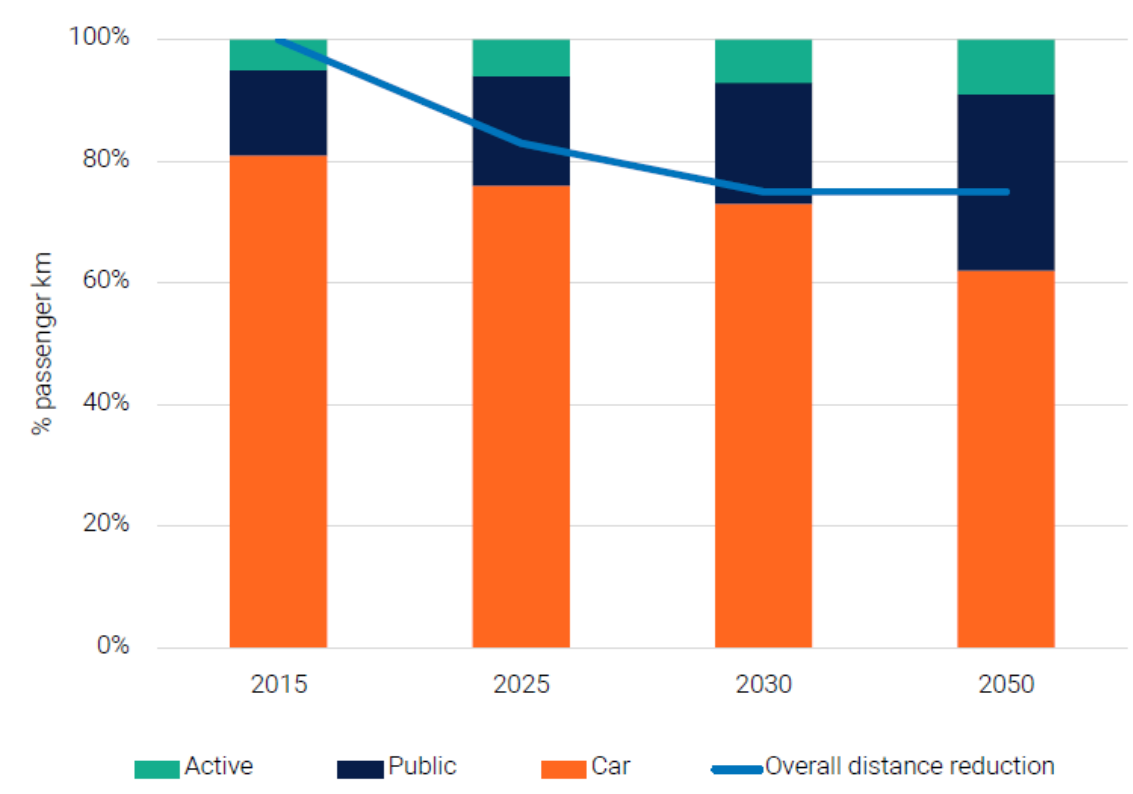


Figure 13. Modal share (by mileage) of different forms of transport (the bars), as well as overall mileage reduction in distance travelled (the blue line). (SCATTER, 2020).

There are a number of programmes and projects being delivered in East Sussex in line with the transport hierarchy, including:

- Well-connected communities: the local authorities are working in partnership to assess the impact of additional traffic from future housing and commercial development on existing roads as well as the opportunities for increasing walking, cycling and public transport. This includes developing a county-wide 'Shared Transport Evidence Base', which will set out the transport mitigation plans and opportunities to enable housing and employment growth to come forward through Local Plans.

- Digitisation and broadband: since 2013 over £32m has been spent through the 'eSussex' programme to deliver superfast broadband to homes and businesses that are not considered commercially viable by private providers. Superfast coverage is now over 97% of the county (see: Home - SPS e-Sussex (esussex.org)).
- Active travel: improvements to walking and cycling infrastructure are mostly developed and delivered by the County Council, following public consultation. Since 2014 over £20m has been secured via the South East Local Enterprise Partnership to deliver sustainable transport improvements. The current programme of infrastructure is focussed in the main areas of housing and employment growth, namely in Eastbourne and South Wealden, Hastings and Bexhill. Physical infrastructure has been supported by a programme of active travel initiatives and training led by Sustrans and delivered by a range of organisations, to encourage people to walk and cycle to get to work, education and training. A Local Cycling and Walking Investment Plan (LCWIP) was adopted by the County Council in 2021 and will be used to develop a prioritised programme of works over the next ten years and to support organisations to be able to bid for national and local funding. Other organisations that support more active lifestyles in East Sussex include 'Active Sussex' and 'One You East Sussex'.
- Public transport: the County Council is subsidising bus services which are not viable on a commercial basis with £1.75m in 2021-22 to assist with access to education, employment, health, and shopping, and it is continuing to introduce bus priority measures. A new Bus Service Improvement Plan has been developed and an Enhanced Bus Partnership will be established by April 2022, as required by the government's Bus Strategy, with the aim of increasing bus usage in the county. Longer term, opportunities to bring high speed rail services into East Sussex from Ashford and improve connectivity, as well as to electrify the Uckfield train line which would remove a fleet of diesel trains, are being investigated. The rural nature of much of East Sussex presents probably the largest challenge to public transport provision.
- Electric vehicles (EVs): chargepoints for EVs are being installed in East Sussex by a mix of private, public and community organisations. However, charge point provision is currently relatively low for the number of EVs that have been purchased in the county and there is no co-ordination as to where charge points are being installed and the costs and access requirements that users face. To help to address these challenges an EV strategy for East Sussex is set out in appendix 6, the main aim of which is to ensure the timely and cost-effective development of an integrated, high quality and affordable network that contributes to meeting current and future mobility needs within a wider local transport plan.
- Hydrogen vehicles: currently, there is no production, storage or use of green hydrogen in East Sussex. The recently-formed Hydrogen Sussex partnership is investigating opportunities to develop the local hydrogen economy, notably for buses and HGVs, and the successful Newhaven Towns Fund bid includes the development of hydrogen vehicle refuelling infrastructure, to cater for Brighton & Hove buses and Eastbourne-Lewes Councils' refuse vehicles.

Actions

Based on the evidence above, the short-term priorities to decarbonise transport are to:

- Update the local transport strategy, so that it's aligned to net zero.
- Develop a pipeline of cycling and walking projects.
- Develop and implement a Bus Service Improvement Plan, subject to government funding.

- Develop a co-ordinated approach across the county to electric vehicle chargepoints.
- Trial hydrogen fuelling for buses and HGVs.

3.2 Domestic buildings

Ways to decarbonise domestic property

There are two needs:

- to decarbonise existing homes through retrofit measures.
- to build new homes that are carbon neutral or carbon negative (ie. they generate more energy than they consume).

The larger challenge is to retrofit existing homes because the vast majority of buildings that are currently in place will still be here in 2050 and nearly all of them will require some form of carbon reduction (Committee on Climate Change, 2020).

The three main ways to reduce emissions from buildings follow the energy hierarchy illustrated in figure 8, namely: first, reduce demand, then improve energy efficiency, then reduce emissions through generating renewable energy.

Retrofit

There are three main steps to reducing emissions from buildings, namely: switching from fossil fuels to low carbon alternatives, improving energy efficiency, and behaviour change. Figure 14 illustrates how energy is used in the average UK home. This highlights the need to focus on reducing the amount of energy required for space heating. To do so, the first step is usually to improve thermal efficiency through better insulation (i.e. roofs, walls, floors, windows), then install a low carbon heating system such as a heat pump, which converts electricity into heat and which only works effectively in a thermally efficient building. Heat pumps operate like a refrigerator in reverse, with air source heat pumps (ASHP) extracting heat from the ambient air and ground source heat pumps (GSHP) from the ground. ASHPs are more widely applicable to UK housing because they are easier to install and cheaper than GSHPs. The carbon reduction benefit of heat pumps will increase over time as the electricity grid continues to decarbonise. They are widespread in other countries but not yet in the UK.

Other heating options include heat networks and hybrid heat pumps. Heat networks, such as district heating systems, function at a large scale and are only feasible for areas of high heat density, so are typically located in urban areas due to the cost of installation. Hybrid heat pumps, which are heat pumps with a hydrogen-ready gas boiler, are a transitional technology that enable a reduction in carbon emissions now whilst being compatible with the future supply of green hydrogen through modifications to the existing gas delivery infrastructure. Hybrid heat pumps are considered best suited to existing buildings that are connected to the gas grid that have not had extensive thermal energy efficiency measures carried out. Full hydrogen boilers are not yet available on the market.

A range of other measures can also be installed to reduce carbon emissions, such as energy efficient lighting and appliances and the installation of solar thermal and solar PV renewables. There is a complex interaction between all these measures and so they usually need to be considered together. For instance, the more thermally-efficient a building the less space heating is required. According to the Committee on Climate Change, buildings which are easier and less costly to decarbonise are those which are new or are off the

gas grid, whereas other buildings may be harder or more costly to treat because of their age, condition or heritage constraints.

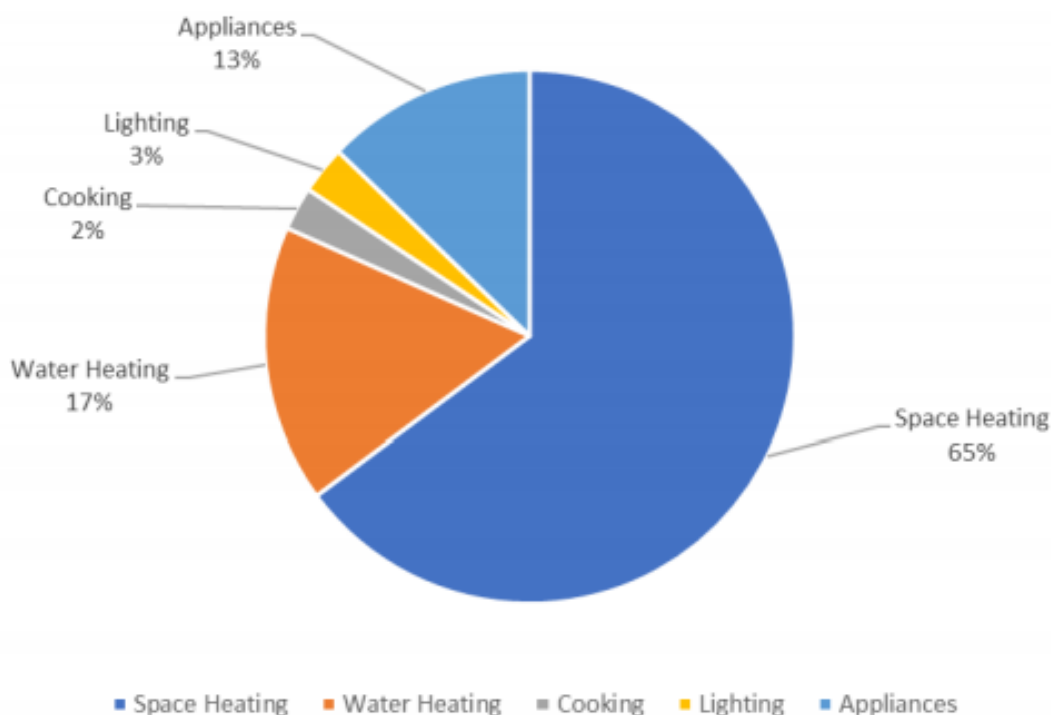


Figure 14. Energy use breakdown for average UK household (2018)

New build

New build needs to be zero carbon in order to avoid increasing carbon emissions from the domestic sector and to avoid future retrofit costs. Approaches to new build include adopting modern methods of construction, such as modular homes, and building to recognised no and low carbon standards such as Passivhaus. For example, wood can be used instead of steel and concrete and locks some carbon emissions into the structure of the building. It is no more technically complex to build houses and low-rise structures with timber, and the standards exist in the UK to do so.

There are a number of significant benefits to improving the energy efficiency of domestic properties, beyond cutting carbon. These include:

- Reducing the estimated 34,300 national excess winter deaths that are attributable to living in a cold home.
- Reducing fuel poverty, which helps to lift people out of poverty and improve wellbeing and productivity by reducing the rate of illness that can come from living in a cold home.
- Supporting an estimated 50,000 jobs in the low carbon sector by 2030.
- Improving local air quality through fewer emissions from gas and wood fired boilers.
- supporting more resilient communities.

The National Picture

Retrofit

National emissions of carbon from the domestic sector have decreased between 2005-18 across the UK, despite an increase in population and housing numbers. This decrease is mainly due to the rapid

decarbonisation of the electricity grid, as coal has been replaced by renewables and gas, and by the improvements in the energy efficiency requirements of the Building Regulations. However, the existing UK housing stock remains one of the most energy inefficient in Europe and the levels of energy retro-fitting are generally low, due to a lack of demand, lack of financial incentives and business models, and a lack of capacity and skills within the supply chain.

National schemes have been in place since 1994 to try to improve the energy efficiency of existing properties for those in fuel poverty, which covers households that need to spend a high proportion of their income to keep their home at a reasonable temperature. These schemes have recently been supplemented by additional, short-term funding programmes, which are being rolled out as part of a post covid-19 recovery programme. These include the Social Housing Decarbonisation Fund and the Green Homes Grant Funds.

There have also been various attempts by government over the last few years to stimulate investment by able-to-pay households in improving the energy efficiency of their homes. The 2012 Green Deal was scrapped in 2015 with just 15,000 loans having been taken out, and in 2020 the Green Homes Grant was scrapped with less than 2% of the £1.5 billion earmarked for the scheme having been allocated. These schemes have largely failed because of their complexity, the lack of financial or regulatory incentive and constraints in the supply chain. Without a comprehensive national programme to help develop the supply chain and subsidise low carbon measures it will not be possible to reach the targets recommended by the Committee on Climate Change for decarbonising the housing sector. The covid-19 Recovery Commission has recommended a 15-year pathway to the decarbonisation of the housing stock, both to support the long term recovery from Covid-19 and contribute to reaching net zero.

New build

In response to the shortage of housing the government has given many local planning authorities high house building targets. The pressure to meet the five year housing land supply means that new residential locations are often chosen based on how quickly they can be delivered rather than whether they will lead to a coherent community where jobs, retail, leisure, education and other functions are integrated locally and are well connected with active and public transport links. This often leads to bubbles of isolated development that only meet minimum energy standards and generate additional traffic due to their car-dependency. In addition, there is clear evidence that many new homes do not meet even the current minimum energy efficiency requirements, whilst the increasing range of permitted development rights limits the legal ability of local planning authorities to steer the carbon outcome of development.

The current Building Regulations covering the energy efficiency standards for new homes are well below net zero, which means that all properties being built now will have to be retrofitted at some later date. The government's Future Homes Standard, which is due to come into effect in 2025, only envisages carbon reductions of 75-80% against the current Building Regulations. In addition, the Building Regulations only account for a building's operational carbon emissions. In contrast, the Committee on Climate Change recommends that all new homes need to be net zero from 2025.

Local planning authorities are permitted to set energy performance standards for new homes, regardless of local context, that are higher than the standards set out in the current Building Regulations, up to the equivalent of Code for Sustainable Homes Level 4. However, even though this is well below net zero some developers claim that even this standard stops some sites from being economically viable, which means that local policies that seek to set higher energy performance standards are often watered down, or deleted, when they get to the Examination stage. But the Green Building Council estimates that Level 4 can

be achieved entirely through energy efficiency measures, adding up to £3,000 to the build cost for a terraced house and £6,000 for a detached house. In addition, local planning authorities are not restricted as to what energy performance standards they stipulate for commercial and industrial development and can also impose reasonable requirements for a proportion of energy used in a development to be from renewable sources. Such requirements are technically possible, immediately deployable, economically viable and legally sound (Green Building Council, 2020).

Probably the greatest current challenges for local planning authorities is the lack of strong national direction on climate change through the government's National Planning Policy Framework (NPPF), which sets out the government's planning policies for England and how these are expected to be applied, and the focus on house building numbers to the detriment of wider planning policy objectives such as climate change.

The government's Heat and Buildings Strategy, produced in November 2021, sets out a number of commitments to reduce carbon emissions from existing and new domestic and commercial properties, including:

- a decision will be made in 2022 on whether to shift some environmental levies from the cost of electricity to gas, to make electric heating more cost effective.
- Large-scale trials of hydrogen for heating will be carried out, with a decision by 2026 on the role of hydrogen in decarbonising heating.
- 600,000 heat pumps to be installed by 2028 to replace gas boilers.
- The sale of gas boilers to be banned from 2035.

However, there is a lack of detail about how some commitments will be delivered and there's a consensus that the government funding for decarbonising buildings is currently too little for the scale of the challenge.

The East Sussex Picture

In 2020 there were 246,700 properties in East Sussex, which is expected to increase by about 5% by 2024. The majority are owner-occupied, though there is significant variability across the county, with a much higher proportion of private rented housing in Eastbourne and Hastings. About 10% of households in East Sussex are in fuel poverty, meaning that they would fall below the poverty line if residents heated their homes sufficiently throughout the year.

According to the government's combined heat and power (CHP) development map there are no heat networks in East Sussex, and there is low potential for heat network due to the low heat demand density in the county and the building stock profile.

Retrofit

The energy efficiency of the existing housing stock in East Sussex has largely been assessed, which helps understand the need and potential for improvements and where to target energy efficiency solutions, both in location (ie. those properties with poor energy efficiency) and types of measures (ie. the most effective measures to improve energy efficiency). The energy efficiency of buildings is shown in Energy Performance Certificates (EPCs), which rate the energy efficiency of buildings on a scale of A (most efficient) to G (least efficient). An EPC is a legal requirement when a property is bought, sold or rented and provides an indication of energy performance improvements. Figure 15 illustrates that most properties in East Sussex are currently in band D or below.

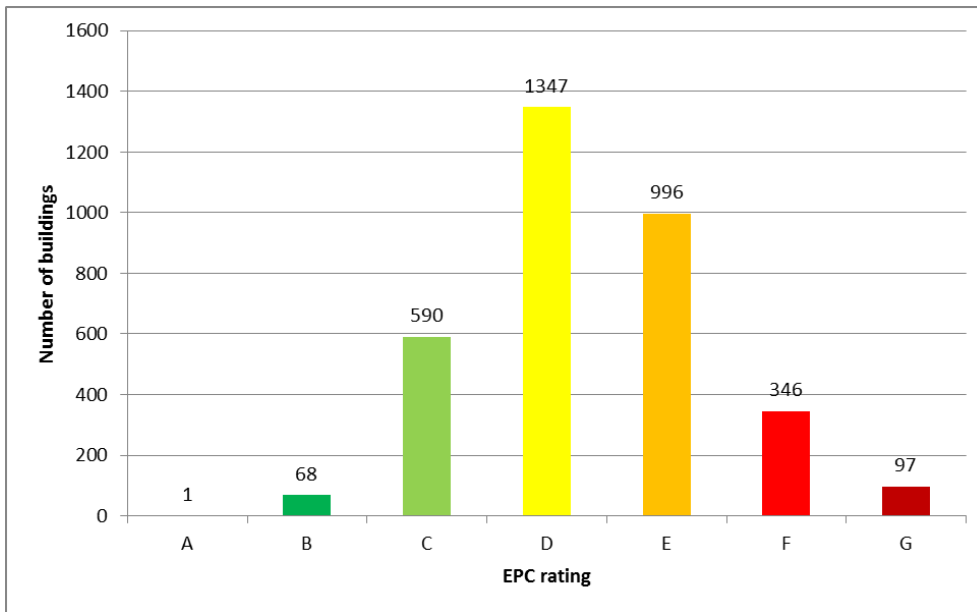


Figure 15. Distribution of Energy Performance Certificate ratings of domestic properties in East Sussex (Source: MHCLG, 2019).

Retrofit Works, a not-for-profit organisation which currently manages the fuel poverty programme in East Sussex, has estimated that, based on the current EPC ratings of existing properties, it would cost approximately £8 billion to carry out a deep retrofit of all domestic properties in East Sussex, based on an average cost of about £27,000 per property. This would require 2,170 new tradespeople locally and would still leave about a quarter of household emissions to be offset, which would amount to about 230,000 tonnes of CO₂.

The SCATTER model helps to illustrate the pace and scale of change required for domestic retrofit in order to keep within the carbon budget for East Sussex. For example, figure 16 shows the rate of up-take required in retrofitting insulation and heat pumps.

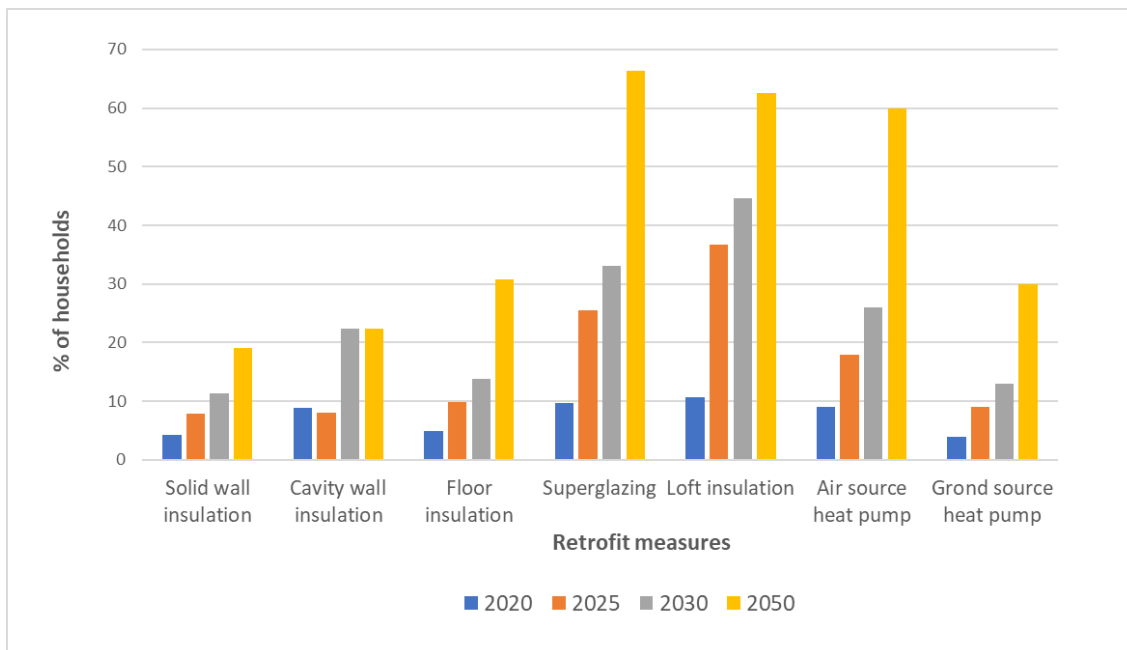


Figure 16. The pace and scale of retrofit measures required in the domestic sector (SCATTER, 2020).

UK Power Networks have modelled the estimated take-up of heat pumps in East Sussex up to 2027-28, which indicates a possible installation rate of about 3,000 per year, with the rate possibly increasing once the Future Homes standard begins to take effect from 2025 (table 1).

Local Authority	Decarbonised heat units – 2020/21	Decarbonised heat units – 2027/28	% of properties using decarbonised heat (2027/28)	% Growth
Lewes	200	3,000	7%	1,832%
Eastbourne	300	6,000	11%	1,788%
Wealden	200	6,000	7%	2,314%
Hastings	200	5,000	11%	2,245%
Rother	200	3,000	7%	1,843%
Total	1,100	23,000	8%	2,007%

Table 1. Uptake of low carbon heating in properties in East Sussex between 2020-21 and 2027-28 (UKPN, 2021).

New build

Average annual housing completions in East Sussex are at about 1,570. However, the indicative annual local housing need targets are significantly higher, at 3,869 per year (table 2).

LPA	New Annual Indicative Local Housing Need
Eastbourne	675
Hastings	451
Lewes	782
Rother	736
Wealden	1,225
Total	3,869

Table 2. Indicative annual Local Housing Need targets (source: ESCC, 2021)

The 5 local planning authorities are currently updating their Local Plans, which include a mix of low carbon policies, for example covering energy efficiency requirements for domestic and commercial refurbishment and new build. Some plans are also accompanied by supplementary planning guidance and Technical Advice Notes, for instance on sustainable construction.

There are a large number of programmes and projects across East Sussex to decarbonise the domestic sector, including by housing associations and stock-owning local authorities. Examples of partnership programmes include:

- 1) The East Sussex Energy Partnership: it has coordinated a programme worth £3.6m over the last few years to reduce fuel poverty (see: [About us – Warm East Sussex](#)). This has included hundreds of targeted interventions to improve heating and insulation measures and connecting fuel poor households to the gas network. Successful bids, notably to the national Green Homes Grant fund, have secured an additional £4.2m in 2020-23, which will enable the scaling up of low carbon retrofit to those in fuel poverty.
- 2) Local community energy groups: a number of groups are working with a range of partners to investigate how to transform whole areas, for example the village of Barcombe in Lewes, to net zero. It’s a rural and off-gas grid community that’s investigating the costs, efficiency, and electricity network impact of

different approaches, including heat pumps, heat networks and electric vehicles, which could be a replicable model for affordable and community-led ways to decarbonise other rural villages. The Barcombe CommuniHeat project has the potential to be the UK's first electric low carbon village. The current feasibility study work could enable funding to be secured from the government's proposed Green Heat Network Fund, which is due to be available from 2022 to help fund the capital cost of low and zero carbon heat technologies.

Actions

Based on the evidence above, the local short-term priorities for the domestic sector are to:

- support those in fuel poverty.
- reduce carbon emissions from social housing, led by stock-owning local authorities and Housing Associations.
- develop approaches to getting whole communities decarbonised, notably in the private able-to-pay market, led by community energy organisations in East Sussex.
- support the private able-to-pay market to take up renewable energy.

3.3 Non-domestic Buildings

Ways to Decarbonise Non-domestic Buildings

The challenge for decarbonising non-domestic buildings are broadly similar to those for the domestic sector, in that there is a need to decarbonise both existing and new buildings and the ways to do so follow the energy hierarchy, namely reducing demand, improving energy efficiency and reducing emissions through renewable energy. However, the retrofit need and opportunity in this sector, which includes manufacturing, retail, offices, hospitals, schools and so on, is more difficult to assess because of the much greater variability in building types, different patterns of usage and the range of process activities that take place within them compared with domestic properties.

The national Picture

Non-domestic buildings currently account for about 9% of UK greenhouse gas emissions. Emissions have decreased between 2005-18, mainly for the same reasons as with the domestic sector, namely due to the rapid decarbonisation of the electricity grid.

There's a complex mix of regulation, policy, fiscal measures, voluntary agreements and market pressure that is driving investment by different non-domestic sectors in measures to reduce carbon. These include:

1. Reporting on carbon emissions: there are various mandatory and voluntary carbon disclosure schemes in place, which are mostly 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, with the aim of encouraging the implementation of energy efficiency measures.
2. Legislative and policy targets: some of the main requirements are summarised in the Environment Strategy ([Environment Strategy 2020 – East Sussex County Council](#)).

3. Fiscal measures to reduce emissions: a mix of taxes on carbon emissions (eg. the UK Emissions Trading Scheme), subsidies for investment in renewables and low carbon vehicles (eg. grants to purchase electric vehicles), and tax incentives are driving investment in carbon reduction.

However, the majority of small and medium-sized businesses are only marginally affected by the above and there is currently no government policy or national incentive and disincentive programmes in place to require or assist most of them. As a result, recent research by the British Chamber of Commerce found that only one in ten businesses have measured their carbon footprint and almost two thirds of businesses say they don't see net zero as a high priority (BCC, 2021). This is despite the Clean Growth Strategy of 2017 highlighting that becoming more energy efficient and generating renewable energy improves profitability, as well as drives significant business to the low carbon supply sector.

The East Sussex Picture

In 2020 there were 23,135 businesses in East Sussex, covering the sectors shown in figure 17. There are very few large businesses and there is a lack of heavy industry. Gross Value Added (GVA), which is a measure of goods and services produced in the economy, is just 68% of the national average, which gives an indication of the relative size of the local economy. East Sussex also has fewer businesses than average for the region and growth is slowing. Consequently, carbon emissions from this sector are low compared with most of the rest of the country, although there is a relatively large public sector in East Sussex.

Most commercial and industrial property stock is pre-1940, so is likely to have significant potential for carbon reduction. However, low demand for commercial space in much of the county and the low rental rates that occupiers are prepared to pay means that there is limited incentive to invest in upgrading much of the existing building stock. In addition, most of the commercial property market is still feeling the impacts of Covid-19 and the various lockdowns.

Whilst EPCs are also produced for non-domestic properties, the varied nature of non-domestic buildings based on use, purpose and occupancy mean that the retrofit need and opportunity in this sector is more difficult to measure and model. This requires more work, in order to be able to design a pipeline of targeted and prioritised interventions.

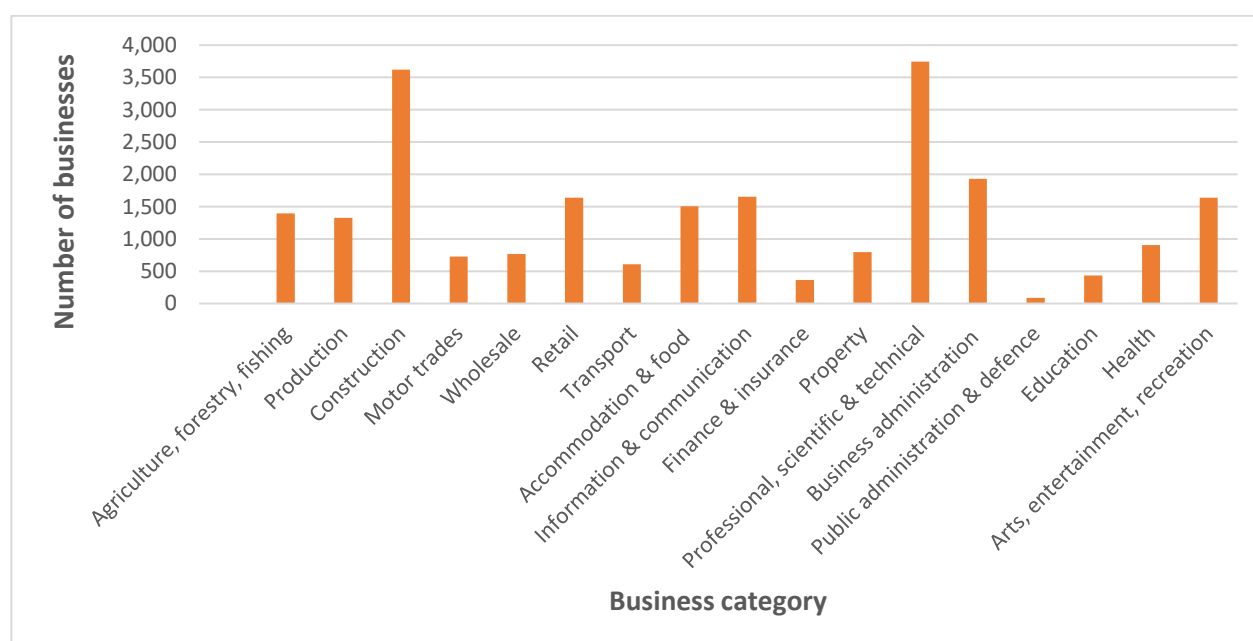


Figure 17. Businesses in East Sussex by UK Standard Industrial Classification (ESiF, 2021).

There are a number of schemes and organisations operating across the SELEP area to support business, but very few have a primary objective to decarbonise the economy. This applies equally in East Sussex. Examples of the few partnership programmes and projects in East Sussex to decarbonise this sector include:

- The Low Carbon Across the South East programme (LoCASE), which is a £14.7m EU-funded programme across the South East LEP area that runs until June 2023 and which provides free energy audits and grants of up to £10,000 to local businesses to cut their carbon and costs.
- Clean Growth UK, which provides support from the University of Brighton and partner universities to help businesses in the environmental goods and services sector to develop and commercialise ideas. This supports the ‘supply’ side of the market and is delivered with support from a range of other organisations, such as the Sussex Chamber of Commerce.
- the Strategic Property Asset Collaboration in East Sussex (SPACES), which is a partnership that looks to make better use of public sector assets, to create cost and carbon savings. The partnership includes all local authorities, emergency services, NHS Trusts, Clinical Commissioning Groups, education, the VCSE sector and government bodies represented within the county.

The scale of change from these programmes currently remains low. For example, between 2016-20 the LoCASE programme assisted 140 businesses to cut about 1,250 tonnes of CO₂e, which is about 0.2% of total commercial and industrial emissions in East Sussex.

Actions

The priorities, based on the evidence above, are to:

- Gain a better understanding of which non-domestic sectors and building types to target.
- Increase the scale of the current intervention programmes, to drive larger carbon reductions from the sector.

3.4 Waste

Options to Decarbonise Waste

The waste hierarchy (figure 18) is similar in principle to the energy hierarchy and provides a useful way to decide which measures to prioritise to reduce waste which, in turn, reduces the greenhouse gases that are required to make new materials and that are generated when waste is sent for disposal to landfill or energy recovery facilities (ERFs).

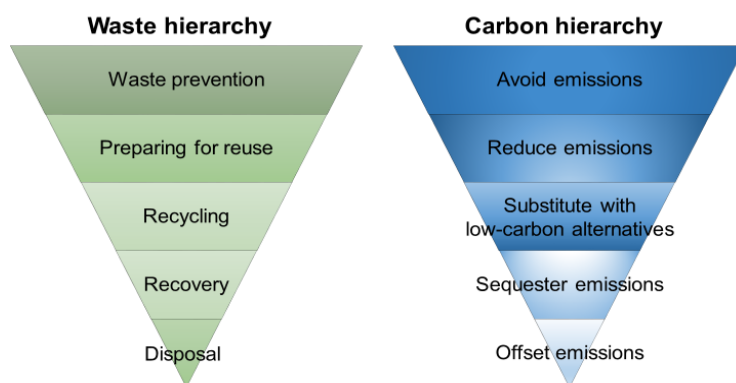


Figure 18. The waste and carbon hierarchies.

Options for reducing emissions from waste and minerals include:

- 1) Adopting a circular economy model to reduce the volume of waste generated. This involves capitalising 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. This encompasses the entire lifecycle from product design to end of life treatment.
- 2) Making improvements to recycling infrastructure to expand the range of materials recycled, and to ensure that there is sufficient local capacity for recycling produced by residents and local businesses.
- 3) Reducing the amount of carbon rich material in residual waste that is sent to energy recovery facilities, such as plastic, food waste and garden waste.
- 4) Minimising the transport of waste materials and transition to low carbon forms of transport.
- 5) Reducing the amount of landfill gas flared from former landfill sites by capturing as much as possible for use as heat or power.
- 6) Improving processes at wastewater treatment plants, for instance by installing anaerobic digestion systems, and at composting facilities, for instance forced aeration to avoid anaerobic conditions.

The National Picture

Carbon emissions from waste are primarily driven by the types and volumes of waste that end up in landfill or ERF facilities, which are, in turn, driven by UK consumption of products and food, and the programmes and facilities in place to reduce, reuse and recycle waste. Wastewater emissions are more driven by water quality requirements, population numbers and the value of biomethane.

Until recently, waste sector emissions had fallen significantly over the last 2 decades due to reductions in waste being landfilled. These now account for about 6% of UK greenhouse gas emissions, most of which is methane from the decomposition of biodegradable waste in landfill sites.

Most waste is from construction, demolition, commercial and industrial activities, although these waste streams are difficult to quantify because they are largely left to the market to address and there is no centralised and robust data management process. Household waste is collected and disposed of by local authorities. Recycling rates of household waste have remained relatively static over the last few years and an increasing percentage of local authority waste is being sent for incineration.

The East Sussex Environment Strategy sets out the current EU and UK waste targets and describes some of the many schemes and programmes in place to shift the current linear 'take-make-dispose' economic model to a more circular economy model ([Environment Strategy 2020 – East Sussex County Council](#)). The Environment Act of 2021 adds to the legal drivers, for instance by requiring government to set legally binding targets on resource efficiency and waste reduction by 2022, eliminating food waste from landfill by 2030, reforming the packaging producer responsibility system and introducing consistent household recycling collections.

Improving recycling rates is key to reducing carbon emissions, since recycling diverts plastics, paper, cardboard, metals, glass and other materials away from energy recovery and landfill. This avoids the need to extract and refine raw materials when these materials can be sourced from waste management.

The Environmental Services Association, which represents the waste industry, has committed the sector to achieving net zero by 2040. Its priorities are to invest about £10 billion into recycling infrastructure over the next 10 years, to remove biodegradable waste from landfill by 2030 and to transition waste vehicles to being zero emission.

The national and sector commitments made to date fall short of the recommendations made by the Committee on Climate Change, for instance to achieve a 70% recycling rate by 2030. Consequently, the waste and minerals sectors are likely to continue to make a small contribution to national carbon emissions that remains difficult to reduce.

The East Sussex Picture

The best estimate for the total amount of solid waste generated in East Sussex is 1.75 million tonnes of waste each year, most of which is either recovered, recycled or incinerated (figure 19). Construction, demolition and excavation waste, together with commercial and industrial waste, make up about 78% of total waste generated in the county. Some of it is processed, treated and disposed of within the county and some is taken outside of the county. Equally, some waste is brought into the county from elsewhere for processing, treatment and disposal.

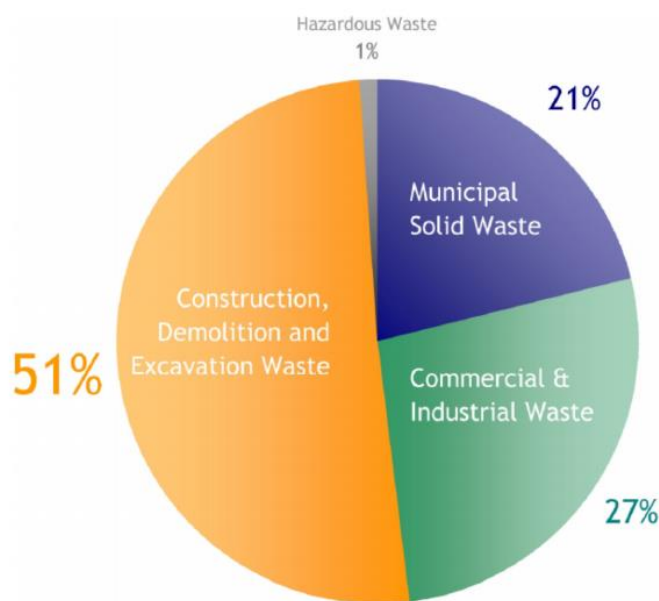


Figure 19. Solid waste generated in East Sussex (ESCC, 2018).

Local authorities in East Sussex are responsible for the collection and disposal of almost 250,000 tonnes of waste each year. This is mainly waste from households, but this also includes street litter and a small amount of commercial waste collected from local businesses. Waste is collected by the five District and Borough Councils, who also provide neighbourhood recycling points. The County Council provides waste transfer stations, sorting facilities, treatment facilities and household waste recycling sites. Local authority services are delivered through a combination of in-house services and external private-sector contractors such as Veolia, Viridor and Biffa, who also provide waste services to the private and community sector.

Recycling rates for household waste have remained relatively static over the last five years both in East Sussex and nationally, at about 43%. However, enormous strides have been made to divert waste from landfill to energy recovery plants. In East Sussex about 3% of household waste is landfilled, compared with over 50% a decade ago (figure 20).

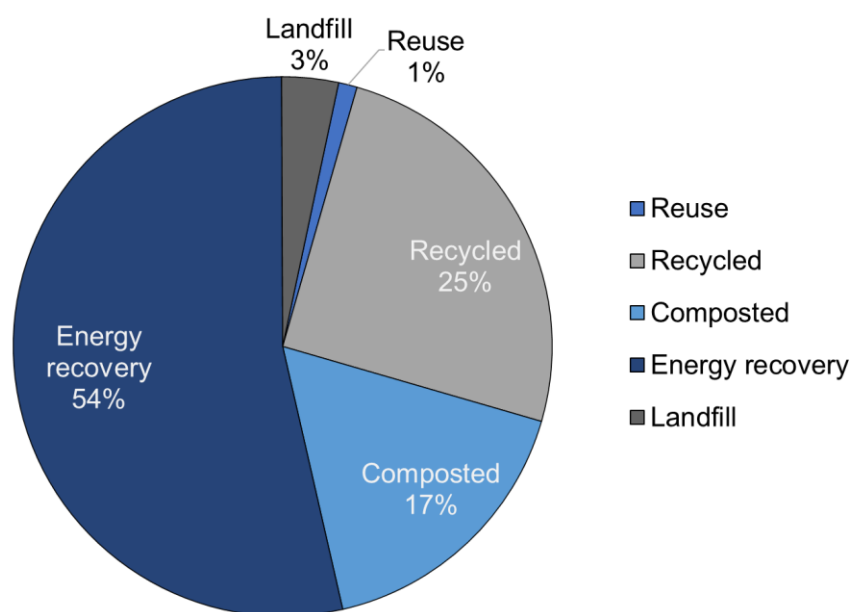


Figure 20. Local authority collected waste by disposal method (2019/20)

Estimates of the recycling rates for commercial and industrial waste vary but is believed to be around 67% for commercial and industrial waste, and around 45% for construction, demolition and excavation waste.

Most residual household waste is sent to Newhaven Energy Recovery Facility where it is used to generate 19 MWs of electricity per year and exported to the National Grid. Metals are extracted from the residue and incinerator bottom ash is recycled, removed by rail and used in the construction industry.

Within the county, there are over 300 closed landfill sites and no operational landfill sites. Those landfills that accepted biodegradable waste will be producing varying quantities of greenhouse gas emissions and will probably continue to do so for a number of years, though this will gradually decrease over time. The County Council is responsible for managing some of the more recent former landfill sites and at four sites there are still significant gas emissions. The largest of these sites is located at Pebsham near Hastings, where methane captured from the landfill site generates electricity. At the other three sites an estimated 630,000m³ of landfill gas is flared annually, as the sites and their remote location make it uneconomic to generate electricity.

The main partnerships in the county that address household waste are the Waste Resource Strategy Group, which includes all East Sussex local authorities and aims to encourage and develop partnership working across the county, and the East Sussex Joint Waste Partnership, which is a partnership of Wealden, Rother and Hastings local authorities and oversees the waste collection contract for these authorities.

The priorities, based on the evidence above, are to:

- Identify carbon reduction opportunities from municipal waste collections.
- Develop a stronger policy framework to increase the sustainable use of materials in the construction industry.

3.5 Renewables

Reducing Carbon Through Renewables

One of the main ways to achieve a zero carbon power supply is to significantly increase the amount of power generated from renewable energy sources to replace fossil-fuelled power plants. This decarbonisation of the electricity grid needs to be accompanied by a means of creating a more resilient and flexible network so that the grid can cope with the intermittent nature of wind and solar power, match supply and demand and minimise the need for costly network reinforcement. This can be achieved by energy storage, notably through batteries, by managing demand, from interconnection, and from use of dispatchable low carbon generation.

Installing renewable energy supports the decarbonisation of the grid which, in turn, supports the switch in buildings and vehicles away from fossil fuels (e.g. heat pumps and electric vehicles). It also contributes to ensuring security of supply, protects consumers from rising electricity prices, provides an opportunity for individual and community ownership of local renewable generation, and helps farmers and land owners to diversify their income.

The National Picture

Figure 21 illustrates the change in the fuel type used to power the electricity network between 1990 – 2019. Currently, electricity use accounts for about 20% of the UK’s greenhouse gas emissions (BEIS, 2020). Electricity consumption is expected to double between 2020 and 2050, mostly due to the increased electrification of heating and transport through the uptake of EVs, heat pumps and digital technology. Over that time the carbon intensity of the grid is expected to decline from over 200 gCO₂/kWh today to around 1-2 gCO₂/kWh by 2050, through the increase in renewables and nuclear.

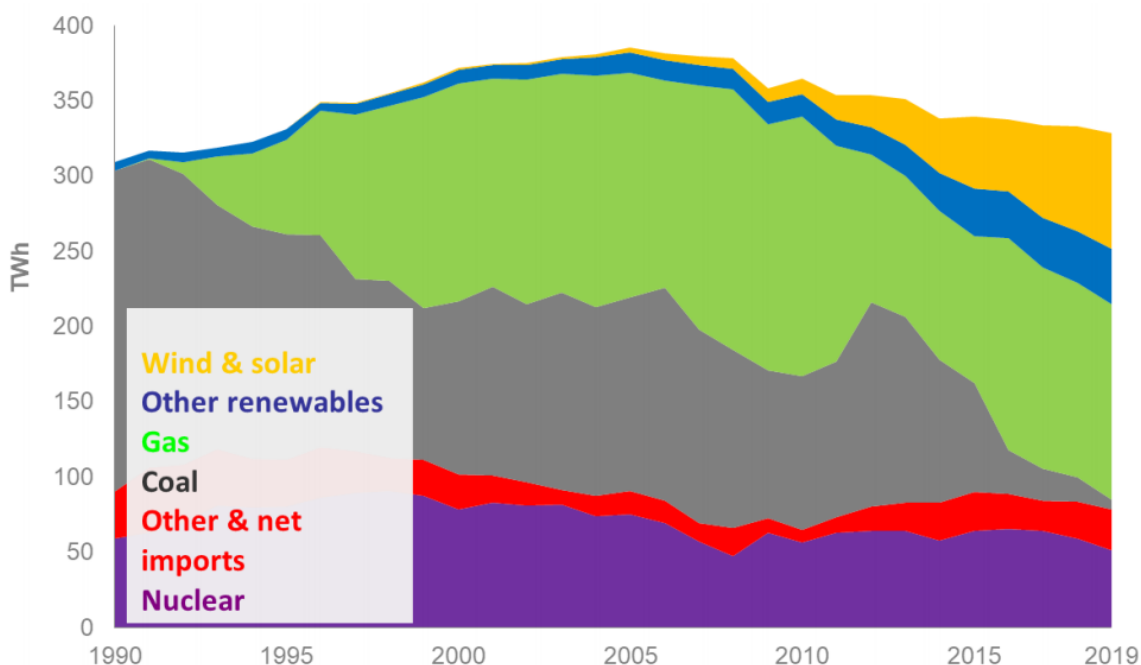


Figure 21. Electricity supplied in the UK by fuel type between 1990 - 2019 (source: BEIS, 2020).

The main government policy currently in place to drive up renewable energy generation is the Contracts for Difference auction scheme. This seeks to incentivise investment in renewable energy by providing project developers with a flat rate for the electricity they produce over the first 15 years of a scheme, to

help reduce the high upfront costs of schemes and provide some protection from volatile wholesale prices. Alongside this scheme is a diminishing set of subsidies, including the smart export guarantee, which is a payment from electricity suppliers to small-scale low-carbon generators for electricity exported to the National Grid, as well as the domestic Renewable Heat Incentive, which is paid by government to incentivise homeowners and landlords to switch from conventional fossil fuel heating to renewable heating.

A key challenge is for the government and the distribution network operators, such as UK Power Networks in East Sussex, to deliver a smart grid that has greater flexibility to cope with the additional supply (renewables) and demand (heat pumps and EVs). Balancing these, for instance with smart technology and using batteries, will help to minimise the need for costly reinforcement of the electricity grid.

The community energy sector has developed into an important driver of renewable energy schemes in the UK. There are currently 300 community energy groups, who have developed and own 194 MW of energy, of which about 80% is solar. Community skills and finance provide an important resource to help scale up the delivery of more renewables in East Sussex.

The East Sussex Picture

The government’s Renewable Energy Planning Database indicates that approximately 103 MW of renewable energy generation has been installed in East Sussex where planning permission has been required (figure 22) and, as at the end of 2019, over 9,000 solar PV installations and 6 on-shore wind turbines have been installed.

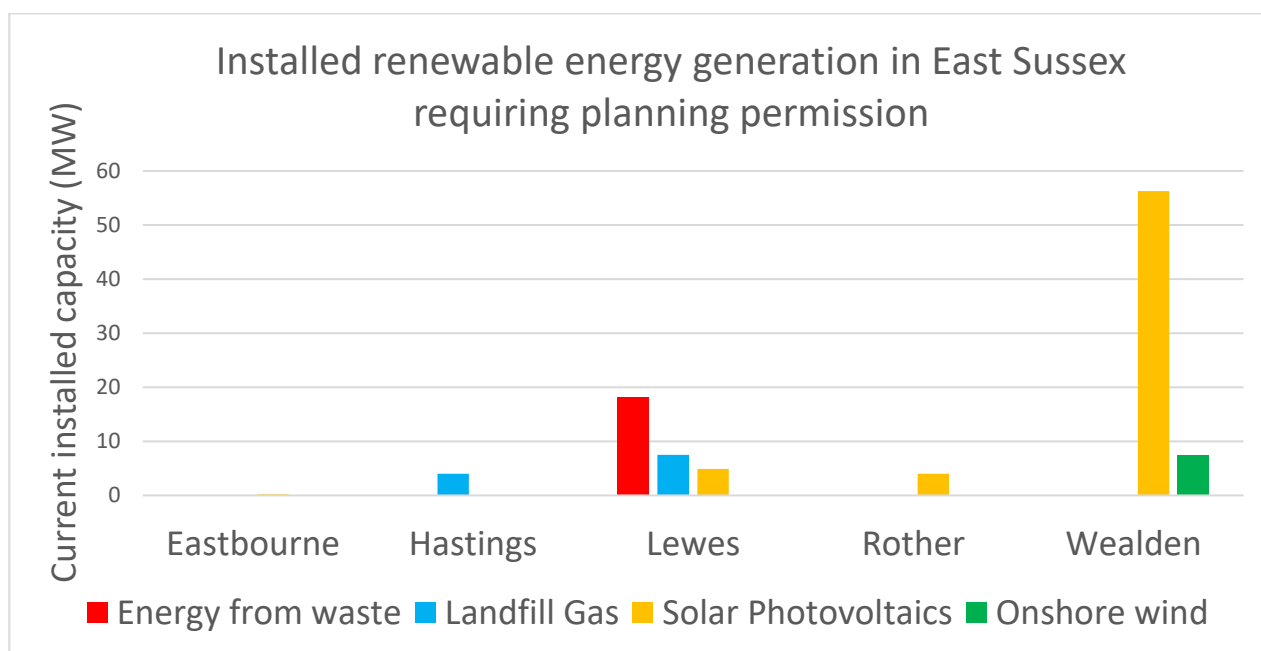


Figure 22. Installed renewable energy generation in East Sussex requiring planning permission (BEIS, 2021).

The community energy sector is well established in East Sussex. Community Energy South (CES) is a not-for-profit company set up in 2013 to support the network of community energy groups in the South East and is based in East Sussex. CES acts as a voice for the community energy sector and supports the development of a number of projects.

The SCATTER model has been used to estimate the total amount of renewable energy that would need to be generated in East Sussex to make its relative contribution to the National Grid’s forecast of need (figure

23). This is based on the county’s population, number of households and land area, and does not take into account local constraints.

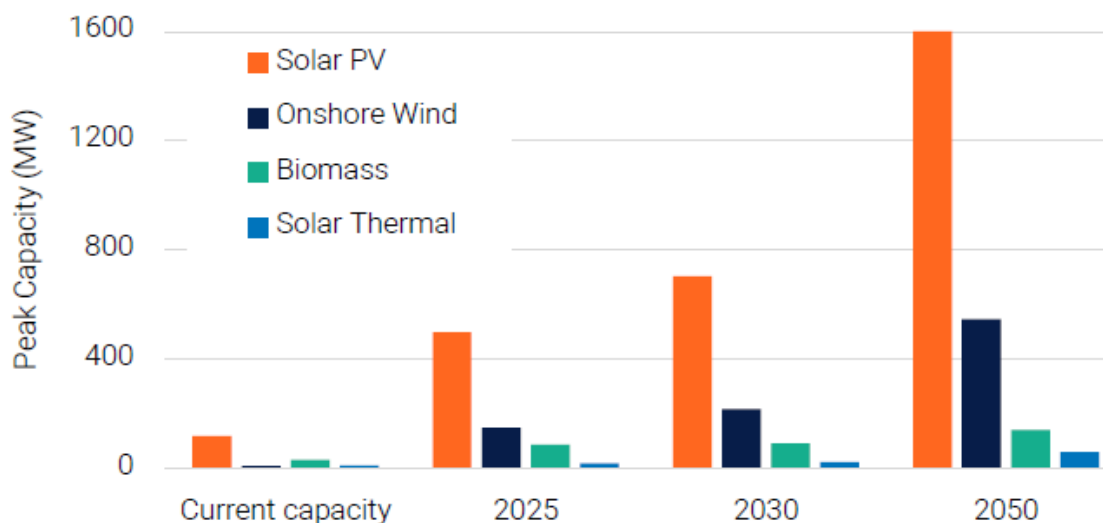


Figure 23. The forecast increased need for solar PV, onshore wind, biomass and solar thermal increases up to 2050 (SCATTER, 2020).

Examples of partnership schemes that are being delivered in East Sussex that have increased the scale of renewables include:

- Community energy schemes: Cuckmere Community Solar is developing a 4MW solar farm in Berwick, which is working with Riding Sunbeams and Network Rail to supply power to the Eastbourne – London mainline railway, with shares in the venture to be offered to local communities to purchase. Riding Sunbeams has received a grant of £2.5m million from the national Getting Building Fund via Team East Sussex.
- Sussex Solar Together: this annual scheme provides a means for residents to join a Sussex-wide bulk buying scheme to purchase discounted solar PV for their home.

The short term priorities for renewables, based on the evidence above, are to:

- Install additional community-owned and led solar PV farms.
- Support the take up of solar PV by households in the able-to-pay market.

3.6 Agriculture and land use

Options to reduce greenhouse gases from agriculture and land use

There are two main options with agriculture and land use:

- Reducing greenhouse gas emissions from farming and land use.
- Using land to off-set carbon emissions from other activities that are either unavoidable or too costly to mitigate, including through renewables and bioenergy.

Agriculture

Based on current understanding and knowledge, it is not possible to reduce agricultural greenhouse gas emissions to zero, due to the natural biological and chemical processes inherent in crop and livestock

production. Nevertheless, emissions can be reduced through a wide range of site-specific farm practices, for instance through maintenance of existing carbon stores in soils, increasing carbon storage and sequestration through woodland creation, adopting low carbon farming practices and providing land for renewable energy such as solar and wind. However, the measures needed to reduce greenhouse gas emissions must not impact on the ability to continue to produce food, fuel and fibre, otherwise the emissions for these activities may simply be exported elsewhere.

Offsetting

Off-setting refers to when an organisation or individual compensates for the emissions they cannot avoid by supporting schemes that reduce emissions. There are three types of off-setting schemes:

1. Emissions avoidance – these projects avoid greenhouse gas emissions that would otherwise be released into the atmosphere, for example investment in renewable energy or the distribution of efficient cooking stoves in developing countries.
2. Emissions removal – these projects actively remove or sequester carbon, for example through the planting of trees or changes to land management to absorb and store more carbon from the atmosphere.
3. Emissions capture – Similar to emissions removal, although not nature-based, for example carbon removal technologies. These technologies have only been deployed as pilot projects in the UK and there is currently insufficient evidence as to their potential contribution, therefore they are not considered further in this road map.

The energy hierarchy recommends that carbon emissions should be reduced as much as possible before any residual emissions are compensated for by off-setting. However, schemes that are based on using natural habitats to off-set carbon, such as tree planting, often have long lead-in times before they deliver a net carbon reduction. Therefore, there is a need early on to plan for, and invest in, off-setting alongside implementing measures that are higher up the energy hierarchy.

The evidence base as to which natural habitats, both terrestrial and aquatic, are able to store carbon, under what conditions and for how long is still developing. For example, the rates of carbon sequestration achieved through woodland planting vary significantly depending on climate, tree species, soil type and the ongoing management of the wooded areas and may not begin to deliver net removals of carbon for around 10 years or longer after planting. This determines when a scheme needs to start before it can be considered to be effective. There are also a number of complex questions that need to be addressed to ensure that investing in natural capital carbon off-setting delivers what is intended, including how to price the off-setting activity and how carbon reductions will be verified. Without greater clarity and certainty on the science there are strong concerns about the financial and reputational risk for investors and landowners. What is increasingly clear is that many types of natural capital carbon off-setting will need to begin very soon and at scale if they are to produce large-scale removals of carbon within the next 10 years or so.

There are a number of potential co-benefits that can come from both reducing carbon emissions from farming and land use and from well-designed and delivered natural capital carbon off-setting schemes. This includes flood alleviation, improvements to water quality and biodiversity, enhanced recreational value, and jobs in land management sectors. This also provides the potential, subject to government policy, to combine income from off-setting carbon with income for other natural capital services, for instance payments from water companies for flood alleviation and reduced run-off, which increases the financial viability of such investments.

The National Picture

GHG emissions from agriculture in England and Wales have remained largely static since 2000 and are currently about 10% of total UK emissions. These emissions are a more complex mix than from other sectors, with around 40% being nitrous oxide (N₂O), 50% being methane (CH₄) and 10% being carbon dioxide (CO₂). The agriculture and land use sector is also a carbon sink, with about 10 MtCO₂e being sequestered in 2018, which is equivalent to abating around 2% of total UK carbon emissions. In other words, the sector is both a source and a sink of greenhouse gases, but emissions are greater than the amount of carbon being sequestered.

The Committee on Climate Change concluded in 2020 that deep emissions reductions in the agriculture and land sectors cannot be achieved without changes in how land is used. The contribution to emissions reduction from these sectors requires actions to change farming practices and consumer behaviour to release about a fifth of agricultural land by 2050 so that it can be used to sequester carbon, assuming that the need for land for food production, housing and other activities is met first. The Committee also concluded that government must increase net tree planting from the current rate of about 9,000 hectares per year to an average of about 30,000 per year, with the aim of increasing woodland cover in the UK from today's 13% to 19% by 2050.

Over 70% of UK land is managed for agriculture. The National Farmers Union (NFU), whose members cover two-thirds of the agricultural land in England and Wales, has committed to deliver net zero in agriculture by 2040. The Country Land & Business Association (CLA), whose members own and manage around half the rural land of England and Wales, is committed to helping the government achieve net-zero by 2050, through improving the efficiency of farming, improving land management, changing land use to capture more carbon, and boosting renewable energy and the wider bioeconomy.

There are a variety of mechanisms and government funding streams in place to support investment in natural capital carbon offsets. For example, the Woodland Carbon Code provides a recognised way to measure the amount of carbon sequestered in new woodland and the government's Woodland Carbon Guarantee provides a minimum price for carbon for those planting new woodland. There are also a range of national grant schemes available for developing and managing woodland. More recently, the 2020 Agriculture Act sets out how the new Environmental Land Management scheme (ELMs) will gradually replace the EU's "Basic Payments" subsidy system as the main source of public funding in agriculture and land management over the next 7 years. This will alter payments allocated according to the amount of land being farmed to the way it's farmed, with payments to deliver "public goods" such as better air and water quality, including carbon sequestration. However, it is not yet clear exactly how the money will be distributed, which makes it hard for farmers to plan ahead, and the total budget is only guaranteed up to the end of this Parliament, in 2024. At present, 40% of all farmers depend on "Basic Payments" to remain solvent, so the transition to ELMs must be managed carefully if the economy and culture of the countryside is to survive and thrive. The Government must ensure that ELMs payments are sufficiently generous to make it worthwhile for farmers to switch from conventional farming to more sustainable practises.

Carbon off-setting offers the opportunity for new revenue streams for landowners and farmers. The challenge is to address some key questions in this new market, notably on the science of carbon sequestration, the financial and contractual practicalities of risk and reward, as well as balancing the needs of food production with carbon off-setting. In addition, it's currently unclear whether carbon sequestration can be enhanced to a point that enough carbon is being removed from the atmosphere to offset not only all emissions from the agricultural sector itself but also cater for the offsetting of residual emissions from other sectors.

The East Sussex Picture

The agricultural, land use and forestry sectors are, collectively, a net emissions sink in East Sussex of about 120 kt CO₂ per year (figure 24). Most of the carbon sequestration is from woodland in Wealden and Rother.

East Sussex may have a natural advantage with farming and land management, given the high level of environmental designations, the relatively large land management workforce and the fact that it's the 4th most wooded county in England (Forest Research, 2016). The sector is supported by the training and education provided by specialist colleges, notably Plumpton College, which is putting together training courses to maximise the opportunities from the new Environmental Land Management scheme.

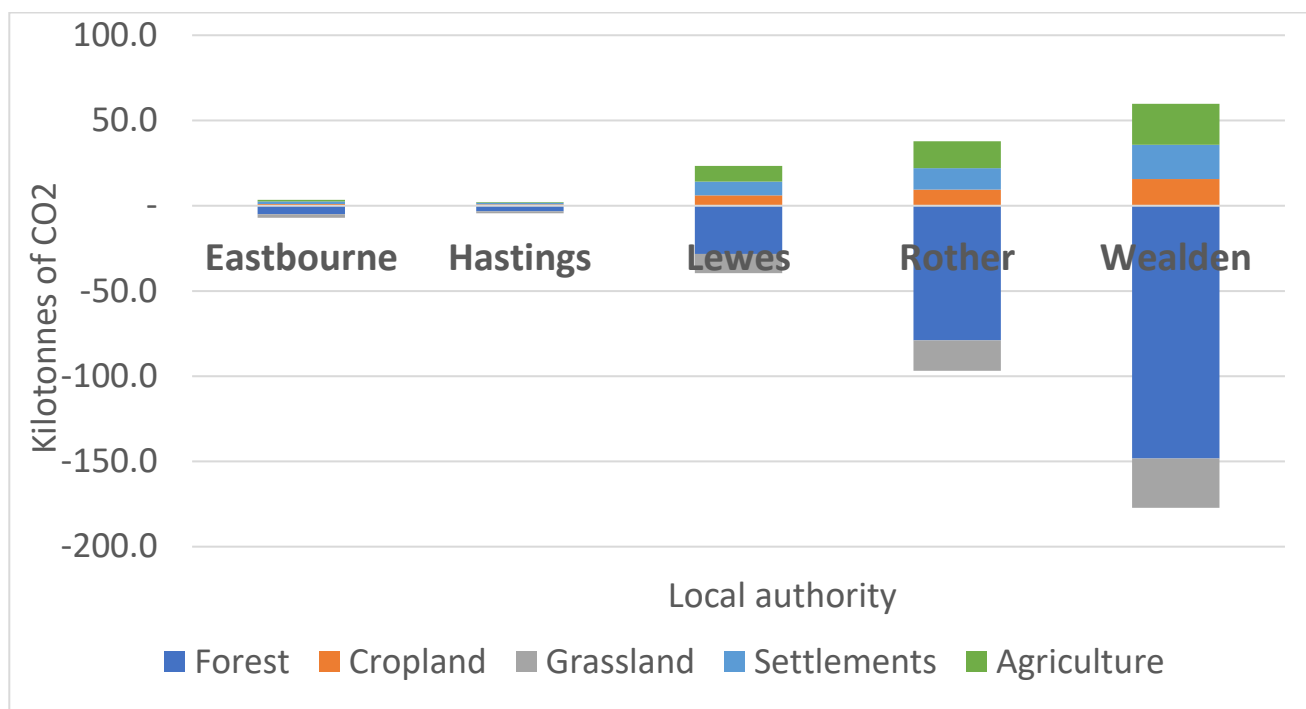


Figure 24. Carbon emissions and sequestration from agriculture, land use and forestry by district and borough in 2018 (BEIS, 2020).

Action

Local priorities for agriculture and land use include:

- Supporting the development of a market for natural capital carbon sequestration.
- Identifying a pipeline of local schemes to create and improve habitat for nature and climate change.

Appendix 4 - Adaptation & Resilience

The majority of this road map covers measures to mitigate climate change, namely measures that reduce the magnitude of climate change by reducing carbon emissions. Climate change adaptation refers to the adjustments that we need to make in response to actual and expected climate change, to reduce the impact and increase the potential opportunities from climate change. These include engineered solutions such as flood defences, nature-based solutions such as green sustainable urban drainage, changing standards such as Building Regulations to avoid over-heating, behavioural changes such as agricultural practices and financial changes such as with the insurance industry. Adaptation opportunities are often time-limited, in that measures such as flood defences need to be completed before the areas that they are intended to protect become overwhelmed by flooding.

Even if all carbon emissions ended today our climate would continue to change as a result of historic emissions, which will require spending on adaptation, such as flood defences. The greater the change in climate the more investment will be needed, whilst unmitigated global warming could result in catastrophic scenarios that outstrip our capacity to adapt. Figure 25 summarises the effects of different levels of climate change, globally and in the UK.

Whilst it's difficult to attribute individual extreme weather events to climate change the UN's IPCC has stated that impacts are already being felt and that further change is inevitable, with the communities most at risk tending to be those that are least able to adapt, due to poverty. As a result, we need to both reduce carbon emissions and make changes, for instance to our infrastructure to enable us to adapt to climate change.

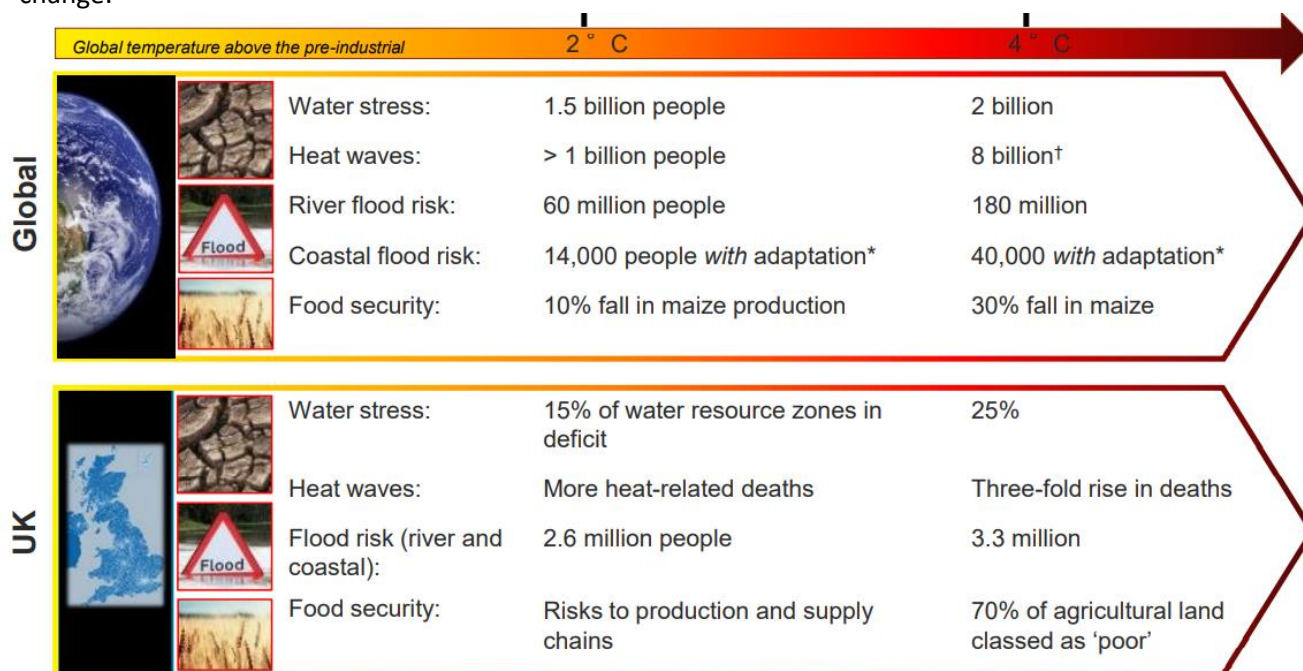


Figure 25. Global and national risks from different levels of climate change (source: Met Office, 2020)

The national Picture

In the UK, mean sea level around the UK has risen by about 20 cm since the start of the 20th century. In 2018 the UK Met Office published its climate projections for the next century based on different rates of greenhouse gas emissions. Each scenario showed hotter and drier summers, milder and wetter winters, more droughts, more flooding and more intense and frequent storms. Continued rise in sea level is predicted to have an impact on property, infrastructure, supply chains and service delivery. The

Environment Agency estimated in 2021 that four million people and £200 billion of assets are at risk of flooding from rivers or the sea. The greater the increase in climate change the greater will be the need – and the higher the cost – of adaptation. The Met Office has developed tools to help people begin to visualise what climate change might mean to where they live ([Climate change in your area - Met Office](#)). Whilst there will be some benefits of climate change, for example a reduction in excess winter deaths and improved productivity for some agricultural sectors, the majority of effects are likely to be negative and significant, as highlighted in figure 25.

The Environment Agency estimates that the UK already experiences an average of £1.4 billion in damages from flooding per year, even with the current level of investment in flood and coastal defences. As climate impacts change in type and severity over time so the scale of adaptation is likely to need to increase. The Climate Change Act of 2008 requires the government to commission an independent climate change risk assessment and to produce a National Adaptation Programme in response to the risk assessment. The cycle of five year plans is intended to drive a dynamic and flexible approach to building resilience. The second Adaptation Programme covers 2018-23. The Committee on Climate Change reports to Parliament every two years on the Government's progress in preparing the UK for the impacts of climate change. The Committee's latest report, in June 2021, highlighted that:

- the gap between the level of risk we face and the level of adaptation underway has widened, as adaptation has failed to keep pace with worsening risks.
- The UK has the capacity and the resources to respond effectively to these risks, but it has not yet done so.
- Acting now will be cheaper than waiting to deal with the consequences and cost of climate change.

A key challenge with adaptation is that the long timescales and the level of uncertainty involved tend to make it difficult to plan and to justify the required up-front costs.

The East Sussex Picture

The impacts of climate change will vary from location to location. In East Sussex many of our communities are coastal, or near tidal rivers. Current government guidance indicates that the south east of England may experience a sea level rise of between 1.2m and 1.6m between 2000 to 2125. In addition, increased storminess means our coastline is subject to greater wave energy and higher storm surges which have to be accommodated by existing and planned defences. Figure 26 shows the predicted impact from sea level rise on our communities as a result of just a 1.5°C warming by 2100. There are particularly significant impacts for the Ouse valley and Pevensey Levels.

East Sussex is an area of significant water stress, as demand sometimes exceeds supply. This will be exacerbated by population and housing growth, which will drive greater demand for water, and by climate change, which will increase the frequency and intensity of droughts. In addition, the county has one of the highest proportion of people aged over 65 in the UK, which is the group that is most vulnerable to the effects of increasing summer temperatures.



Figure 26. The effect of a 1.5°C warming on flood risk in East Sussex.

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 recently-completed £18m flood defences at Newhaven. Coastal flood risk is the responsibility of the District and Borough Councils and the Environment Agency, who currently take the position in East Sussex to hold the line and continue to protect coastal towns, with a small number of exceptions. In addition, the Sussex Resilience Forum is required to plan for the effects of extreme weather, including storms, flooding, heatwaves and droughts, and a number of other organisations are responsible for developing long-term plans to address specific climate change risks, for example water company drought plans and river catchment partnership plans. However, currently there is no integrated approach to climate change adaptation in East Sussex.

Action

The priorities for adaptation in East Sussex are to invest nearly £200m over the next ten years to reduce the risk of flooding and coastal erosion to over 10,000 homes, 1,000s of commercial properties, major infrastructure such as the A27 and A259, and helping to preserve and make ready for climate change protected areas in East Sussex such as the 5,000 hectare SSSI at Pevensey Levels.

Appendix 5 – Cross Cutting Themes

There are a number of themes that cut across the sectors covered above in appendices 3 and 4. These themes include behaviour change, skills, land use planning, finance and lobbying.

5.1 Behaviour Change

Tackling climate change requires action by every part of society because the way we live our lives, from what we buy to how we travel and what we eat, will all have a critical influence on whether we reach net zero. 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. There are a number of reasons for this, including:

- For most people climate change seems remote, in that greenhouse gases are invisible, tasteless, and odourless, and so are out of sight, and few people in the UK are yet to experience any negative effects from climate change.
- For those who are already engaged, the case for action on the climate emergency can seem overwhelmingly complex and it can be hard to answer ‘what can I do?’ in ways that seem significant and immediate.
- People have an incentive to free-ride on the sacrifices and costs incurred by others to cut their emissions, which undermines the case for collective action.
- Most of us are typically poor at weighing cost now against benefits later.
- The climate change benefits and costs associated with behaviour change tend to be much more difficult to quantify than technical improvements such as installing solar PV.
- There are not yet compelling narratives, taken up and promoted by the media, to inspire and mobilise mainstream participation in solutions, the adoption of technologies and change in behaviours. This requires articulating a positive vision of the net zero future based around jobs, growth, technology, health, community and quality of life, and a transition that is seen to be just and fair.
- Most of us will only bear the inconvenience and / or cost of making low carbon choices, for instance taking public transport or buying a heat pump, if there’s a compelling rationale.

There is evidence of growing pressure from the public for the scale of change required, but it is still limited. This makes the politics of change complicated, as the radical scale and pace of change that is required first needs social permission, as it will impact people’s lives and lifestyles. Failure to secure this consensus runs the risk of social backlash, as witnessed, for example, with the ‘gilets jaunes’ in France, which began as a reaction to carbon taxes.

The Committee on Climate Change estimates that about 2/5^{ths} of the change required to get to net zero in the UK requires individuals and organisations to make changes to what they buy, for example electric vehicles and heat pumps, and about 1/5th needs to come directly from behavioural change, such as changes to how we travel and what we choose to eat. In other words, it’s only possible to get to net zero with a radical transition in people’s homes and daily lives, to match the scale of the climate challenge, rather than the small and easy changes that have been talked about in the past.

A significant amount of research has gone into how best to secure a mandate for change. Ultimately, it requires individuals, communities and organisations to have the information, incentives and conditions to make change possible so that it’s simple, attractive, socially normalised and timely. In addition, there is likely to be a need to edit some choices, for example by ending the sale of inefficient light bulbs and internal

combustion engines, and some changes will require coercion, for example road pricing. The national Climate Change Assembly ([Climate Assembly UK](#)), which took place in 2020, has helped to provide a national mandate for action, with this being replicated in some areas with local climate assemblies.

As all emissions are attributable to organisations and individuals so it's clear that communities need to be engaged in shaping and delivering local action. This starts with willing residents, community groups and businesses developing their carbon literacy and becoming champions of change. This uses the skills, ideas and perspectives of local people, which is more likely to lead to initiatives being widely accepted and effective. This may require, longer term, the evolution of a new social contract with government.

It's important to note that some people's behaviours are much more polluting than others and that some people are much more able to pay for the cost of changes than others, mostly due to differences in income (figure 27). This means that people have a different ability to reduce their carbon footprint, with those people who have a larger carbon footprint usually having more private resources to be able to cut their footprint, for instance by investing in an electric vehicle or a heat pump. This has implications for who to engage with and how, as well as policy implications to ensure that the cost of addressing climate change is fair and equitable and seen to be so.

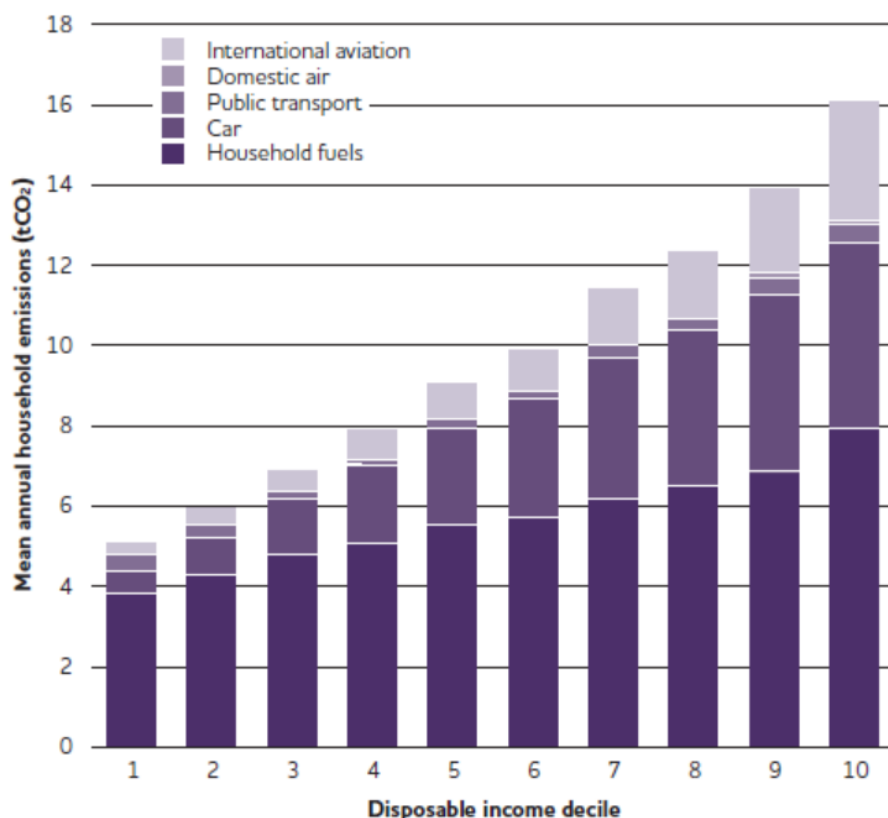


Figure 27. Mean annual household CO₂ emissions by disposable household income decile (source: Joseph Rowntree Foundation).

Following research by the government's Behavioural Insights Team, government has committed, through the Net Zero Strategy and the draft Sustainability and Climate Change Strategy for education, both published in November 2021, to:

- embed climate change into the curriculum and school activities from 2023.
- Explore how to consolidate and simplify advice and other support on net zero to householders and businesses.

- enable behaviour change through targeted personal incentives, such as GPs prescribing active travel, as well as existing tax reliefs and rewards programmes.

Priorities to increase behavioural change in East Sussex include:

- expanding the delivery of carbon literacy, including through the East Sussex College Group.
- Delivering the Ouse Valle CASES project, as a national pioneer project.

5.2 Skills and the Supply Chain

Across the UK there are already over 410,000 jobs in low carbon businesses and their supply chains, with turnover estimated at £42.6 billion in 2019 (Green Jobs Taskforce, 2020). Recent reports have concluded that a Covid-19 recovery stimulus package could create and sustain a further 700,000 direct jobs could be created in England’s low carbon and renewable energy economy by 2030, rising to more than 1.18 million by 2050 (LGA, 2020; Energy Efficiency Infrastructure Group, 2020).

Research by the Place Based Climate Action Network suggests that around 3 million workers in the UK will require upskilling and around 3 million more jobs will be in high demand. Figure 27a indicates how this might be spread across different sectors. Work by National Grid indicates that these roles will be spread across every region in the UK (2021).

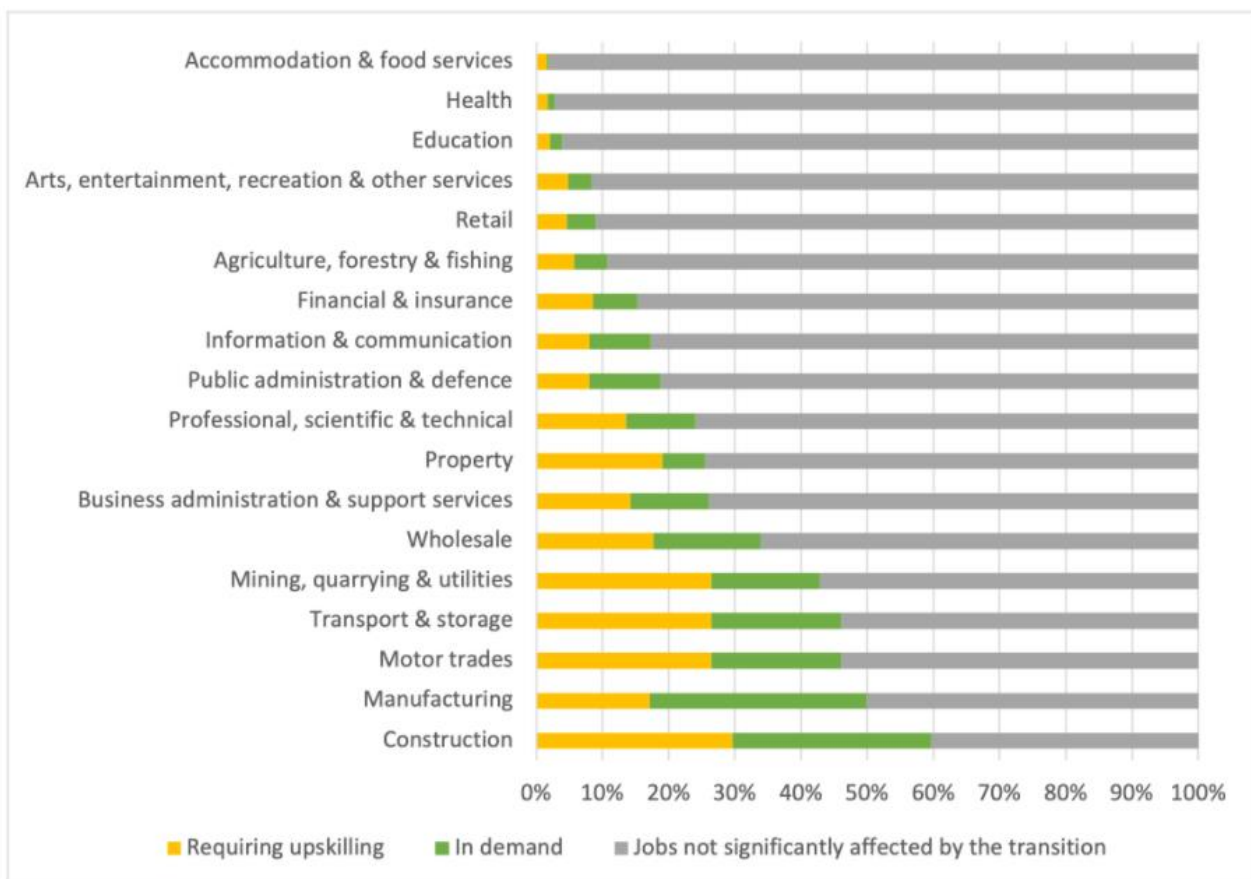


Figure 27a. (Place Based Climate Action Network, 2020).

The government set up a Green Jobs Taskforce in 2020 to provide an independent assessment of the evidence of the skills needed for the UK to transition to net zero and how government, industry and the education sector should respond to this need. The government’s Net Zero Strategy in 2021 set out how it’s

taking up the Taskforce’s recommendations in order to increase the capacity and capability of the UK supply chain. This includes setting up a Green Apprenticeship Advisory Panel to identify existing apprenticeships that best support green career pathways, adding green jobs in its ‘Free Courses for Jobs’ offer, such as in construction and forestry, and expanding the Skills Bootcamp training programmes to offer fully funded places for adults to upskill or retrain, including a set of ‘green skills’.

In East Sussex, there were approximately 1,500 businesses in the low carbon sector in 2020, employing about 8,735 people and contributing about £575m to GVA, which is about 6% of businesses and GVA in the county. The largest subsectors are low carbon and energy efficiency equipment, water and waste management, forestry and woodland management, and low carbon financial and advisory services.

An assessment of capital investment forecasts in clean growth in the south east suggests that about £122 billion of investment is being considered between now and 2050, which will drive an increase in the number of businesses and jobs in the sector (figure 28). The Place Based Climate Action Network estimates that the transition to net zero will require about 10% of current jobs in East Sussex to be upskilled.

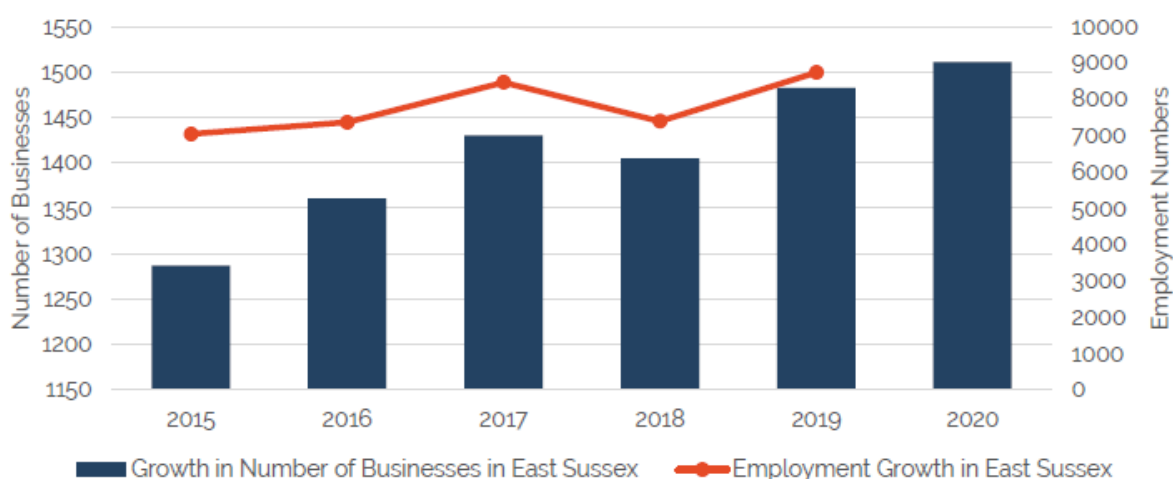


Figure 28. The clean growth sector in East Sussex (source: Opergy, 2021).

The key challenges, nationally and locally, are to:

- Set a long-term “push” of a national skills strategy, from schools upwards, alongside the “pull” of stable and long-term policy and strategy on net zero to help drive the creation of, and demand for, green jobs.
- meet the existing shortfall of people with the right training and skills to support current low carbon delivery programmes, notably in construction, engineering and land management, recognising the long lead-in times to develop suitably trained staff.
- target support for workers and business sectors that need to adapt to the zero carbon economy, to ensure a fair transition for those whose jobs and businesses will be lost.
- develop clearer pathways through further and higher education, and through apprenticeships, for people to gain the right skills.
- Provide a roadmap for how to become a green business, for instance to obtain the required accreditations (E.g. Trustmark and the Microgeneration Certification Scheme).
- Ensure that contract opportunities are visible and accessible to local businesses, as well as ensure that low carbon methods and materials are specified in contracts in order to drive demand.
- End the stop-start of government competitive funding with short delivery times that prevents the development of a sustainable and skilled local supply chain.

Activity in East Sussex to address some of these challenges includes:

- the Sussex College Group securing £7m of Strategic Development Funding to establish a range of low carbon programmes across Sussex designed to accelerate the development of green tech skills. This includes establishing an electric vehicle technology training centre of excellence in Hastings and Eastbourne, a centre on transitioning land management towards the zero carbon agenda at Plumpton College and support for retrofitting and green energy installation skills across the East Sussex College Group.
- The Sussex Chamber of Commerce is leading the Local Skills Improvement Plan to help match training with local skills gaps.
- The Skills East Sussex Board established a Net Zero skills working group in April 2021, which will identify and develop new training provision required and promote careers in low carbon sectors.
- The University of Brighton's Green Growth Platform, which has helped create over 300 green economy jobs since it launched in 2014, including through the delivery of staff training and student placements and support for innovation and commercialisation of new products and services.

The immediate priorities to address the supply chain challenges are to:

- In partnership with employers, identify and develop new training provision and promote careers in low carbon sectors.
- Deliver the £7m of Strategic Development Funding secured by the Sussex College Group to establish a range of low carbon programmes across Sussex designed to accelerate the development of green tech skills.

5.3 Local Development Policy

The purpose of the UK planning system is to help achieve sustainable development, which means ensuring that the right kind of development happens in the right place and at the right time. The government's National Planning Policy Framework (NPPF) sets the broad objectives for the planning system and requires that it supports climate change mitigation and adaptation. Local planning authorities set out local development policy for land, buildings, water, waste and transport through a series of strategic plans. These plans provide a degree of certainty for communities, businesses and investors, and provide a framework for guiding decisions on individual planning applications. Local Plans are restricted in what they can do by national policy and building regulations.

All planning decisions can contribute to getting to net zero. For a development to be low carbon its location, design, construction, use, transport provision and demolition need to be right. If not, it will embed further carbon emissions that may last for decades. Planning policies that can support getting to net zero include:

- Setting low carbon design standards for retrofitting existing buildings and for new development, for example minimum energy performance standards.
- Requiring the provision of infrastructure and investment that supports a reduction in travel needs, and an increase in walking, cycling, public transport and electric vehicles.
- Supporting renewable energy development.
- Increasing carbon sequestration through land use requirements.

The government recently published a White Paper with proposals to overhaul the planning system, largely to support the construction of more housing, with the most notable proposals being the possible introduction of zonal planning and the introduction of a new infrastructure levy. These proposals were due to be taken forward in a new Planning Bill, however these are now being re-considered by government.

All Local Plans in East Sussex are either being prepared or being reviewed. This provides an opportunity for Local Planning Authorities to set a policy framework that compels the development industry to set much higher energy performance standards in new developments. This may not be a universal approach across the county, but where such developments are taking place, lessons on how they have been achieved, including how concerns around site viability have been overcome, need to be gathered and shared amongst those involved in the planning and development industry in East Sussex in order to drive greater and faster change. For example, several Local Planning Authorities in East Sussex are preparing circular economy and design policies for their Local Plans, which are aimed at delivering low carbon buildings and efficient resource use.

The key action is for Local Planning Authorities to drive greater decarbonisation, by setting more stringent requirements from development in their forthcoming Local Plans.

5.4 Financing

The Committee on Climate Change estimates that the cost of getting to net zero in the UK is less than 1% of GDP and that this will mostly pay for itself over time because the investment in measures to improve energy efficiency will bring major financial savings in operating costs (figure 29). In addition, net-zero will yield significant co-benefits, such as health improvements from fewer households in fuel poverty, improved diets, better air quality and active travel, which will also bring financial benefits, such as improved productivity as a result of less ill health.

The Committee estimates that getting to net zero will require investment to increase from about £10bn/year in 2020 to around £50bn/year in 2030. The net cost to the state is estimated to be £344 billion in real terms which, spread over the next 30 years, would represent an average of 0.4% of GDP in additional public spending each year, which is significant but not exceptional. The Office for Budget Responsibility reviewed the fiscal risks of climate change in 2021 and noted that:

- Net costs might be expected to peak in about 2027, when investment in power generation is highest and investment in buildings is ramping up.
- Net costs could then fall steadily as savings from improved energy efficiency grow and running costs fall.
- From 2040 onwards net savings are projected to outweigh investment costs.
- By 2050 there may be an estimated £19 billion annual saving relative to the baseline emissions scenario.

The UK Treasury published its own review in November 2021 of the costs and benefits of the transition. This indicated that the Treasury intends to use a mix of policy instruments to support getting to net zero, including carbon prices to incentivise the market, targeted regulation where demand is not responsive to price changes, and government subsidy to address specific market failures (e.g. on heat pumps). The Treasury also concluded that it will be much cheaper to make this up-front investment than trying to cope with the costs caused by unabated climate change. However, there are very significant barriers to reaching the scale of investment recommended by the Committee on Climate Change, including the lack of a financial return on many types of carbon investments, the lack of a government view to date on the extent to which public spending should bear the cost of the transition to net zero, and the uncertainty as to what to invest in and when in order to achieve the optimum route to net zero.

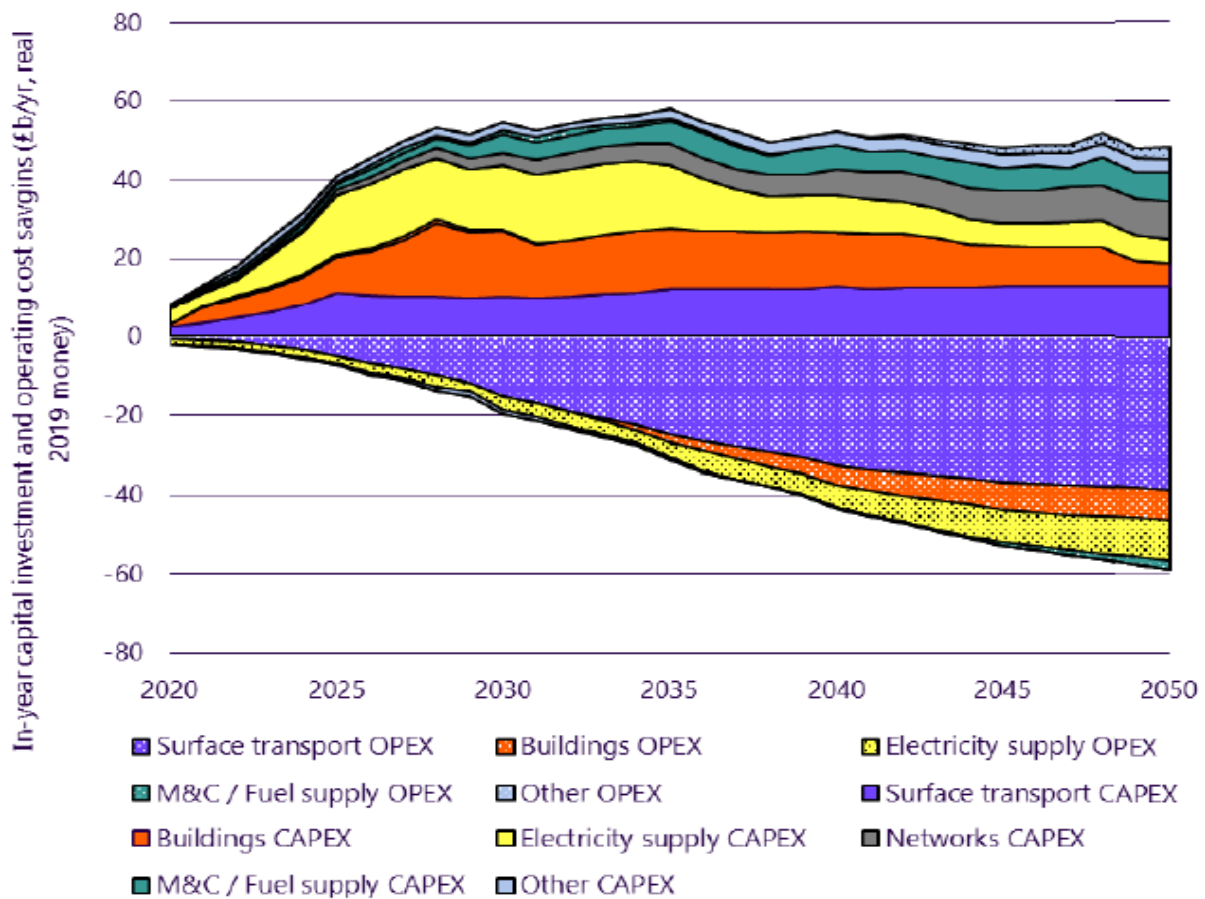


Figure 29. Estimated costs and savings to reach net zero in the UK (CCC, 2020).

What is clear is that neither public finance nor the markets alone will deliver the scale and pace of capital mobilisation required. A blend of finance, ranging from government funding, institutional investors, insurers, through to community organisations and individuals, is needed. For example, government uses the levers at its disposal, such as taxation, regulation, borrowing, and support for research and development, to provide the right signals and leverage for private capital which, in turn, can drive down cost, as seen with the significant reduction in the unit cost of solar PV and wind over the last decade. It's likely that this kind of public finance will need to be the main source of funding over the next few years, with significant, non-competitive and long-term investment and loans into retrofit, heat decarbonization infrastructure and modal shift, alongside measures to ensure that those on low incomes are assisted with the financial cost of transition. In the medium to longer term the balance of investment will increasingly need to transfer to the private sector, to communities and to individuals as the cost of heat pumps, EVs and so on decrease. However, the Treasury has noted that, as with all economic transitions, ultimately the costs and benefits of the transition to a net zero economy will pass through to households through the labour market, prices and asset values (2021).

There are a growing number of ways to drive private and community investment into low carbon measures, some of which were explored by the government's independent Green Finance Taskforce in 2018 and set out in the Green Finance Strategy of 2019. These alternative financing mechanisms, some of which are over-lapping, include municipal bonds, social impact bonds, green mortgages, pay-as-you-save schemes, linking stamp duty or council tax to domestic energy efficiency, developer contributions and local philanthropy. Each has different levels of financial risk and return.

An essential requirement of financing the shift to net zero is to ensure that it is a financially just transition. In the UK the cost of low carbon policies, such as renewable energy subsidies, household retrofit and installation of smart meters, currently adds an additional 13% to household energy bills. Low-income households pay disproportionately more towards these low carbon policy costs because they spend on average 10% of their income on heating and powering their homes, whereas the highest income households spend about 1.5%. Consequently, low-income households that do not receive any support through fuel poverty programmes are paying disproportionately for low carbon policy measures.

The current financing of carbon reduction and adaptation measures in East Sussex is coming from a very wide range of public and private sources, for instance through the regulated business plans of the electricity and gas suppliers, to one-off government funding opportunities through to individual businesses and householders making private investments. However, more innovative financing options are growing, for instance with share offers from community energy groups in local renewable energy schemes and the consideration of green bonds, or community municipal investments, by some local authorities. A key challenge is how best to take a holistic view of financing options and funding opportunities to help drive a step change in the scale of investment in low carbon infrastructure and activity. Locally, a key priority is to take a co-ordinated view and approach to investment in mitigation and adaptation, in order to help drive scale and a consistent approach. For example, this could include Team East Sussex developing a co-ordinated approach to how best to lever funding from the UK Shared Prosperity Fund for climate change work in East Sussex.

5.5 Lobbying

Covid-19 has clearly demonstrated the importance of the role of government in driving profound change quickly. This also applies to climate change, where current government policy is insufficient to get to net zero.

The need from government is to set clear, long-term, ambitious and consistent policy, backed by appropriate legislation, standards, funding and incentives. Examples where this hasn't been the case highlight the importance of getting this right, for instance the Green Deal and the changes to subsidy regimes for renewable energy have been scaled back or withdrawn at short notice. This undermines the confidence that investors, the supply chain and individuals need in order to make important decisions about how and when to spend money that supports net zero.

Many partnerships, organisations and individuals already lobby their elected representatives or government on climate change, for example through Team East Sussex, the Sussex Nature Partnership and others. The priority is to make this lobbying activity on net zero more co-ordinated and consistent in order to provide a stronger message to government and help to drive the allocation of more resources to East Sussex. Additional lobbying activity will need to build on existing activity by setting out a list of agreed 'asks', supported by the appropriate evidence, and the development and delivery of a clear advocacy strategy.

Appendix 6 – Electric Vehicle Strategy

Introduction

The East Sussex Environment Strategy of 2020 committed the local authorities in East Sussex to develop an electric vehicle (EV) strategy (see: [East Sussex Strategic Partnership - Environment and Climate Change \(essp.org.uk\)](http://essp.org.uk)). The EV Strategy is set out in this appendix.

This strategy sets out:

- The aim and objectives of a partnership approach to developing and delivering an EV charge point strategy in the county.
- The reasons for having an EV strategy.
- the current and forecast provision of EV charge points in East Sussex.
- the role that the local authorities will take in developing the local network of charge points to drive take up of EVs.
- The priority actions that will be taken to implement this approach.

The strategy focusses on cars and vans used by private individuals, businesses and taxis. It does not consider public transport or freight, which may be better served by complementary fuels that are not yet available at scale, such as green hydrogen.

Aim

The main aim of the Strategy is to: ‘Ensure the timely and cost-effective development of an integrated, high quality and affordable network that contributes to meeting current and future mobility needs within a wider local transport plan’.

Objectives

The objectives of the EV strategy are to:

- 1) Contribute to delivering the infrastructure that drives local sustainable economic growth.
- 2) Enable people to help themselves and play their part in addressing climate change.
- 3) Support the take up of EVs as part of a coherent wider transport plan for East Sussex.
- 4) Address a recognised market failure in the provision of EV charge points in certain locations.
- 5) make best use of the highway and public car park network.
- 6) Achieve measurable reductions in carbon emissions from transport.
- 7) Achieve measurable improvements in local air quality.

The reasons for implementing an EV strategy

The take up of EVs depends on five main factors, namely: the timely supply of affordable EVs, the provision of a reliable EV charging network, capacity within the electricity grid to cope with the additional demand on the network, the availability of a suitably trained workforce to install and maintain charge points, and a supportive legal and financial framework. Bottlenecks at any of these points will impact on the transition

from petrol and diesel vehicles to EVs. This strategy only deals with the provision of EV charge point infrastructure, as the other factors are beyond the control of local authorities.

There is currently no statutory requirement for any organisation to buy or promote EVs or install EV chargepoints. However, there are a number of reasons for the local authorities to take an active role in the development of the local EV charge point network, including:

- 1) Market failure: private sector providers are installing chargepoints only where there's a financial return. This is leaving parts of East Sussex, notably more rural and deprived communities, with poor provision and will lead to charging blackspots. The extent of the market failure is highlighted by the scale of government intervention, which has invested £1.5 billion since April 2015, and has committed to a further £2.8 billion, to make electric vehicle ownership more affordable and to offset the costs of installing chargepoints in the home, workplace and on-street.
- 2) Highway authority role: about 78% of households in East Sussex own at least 1 car and about 38% of households don't have enough space to park a car off-street. A number of those people who own a car in these areas will have no choice where to charge an EV except at on-street charge points, which can only be installed with the approval of, or by, the County Council.
- 3) Owners of public car parks: local authorities, notably the District and Borough Councils, own a large number of public car parks in a wide range of locations, which provide key destination points for cars and vans and are ideal locations for charging EVs.
- 4) Economic growth: the government has committed to ban the sale of new petrol and diesel vehicles from 2030 and hybrid vehicles from 2035. Charging infrastructure needs to be in place to enable consumers and businesses to make the transition to EVs. Poor provision of chargepoints in East Sussex will act as a constraint on future growth by impacting on mobility options for businesses and residents and may discourage visitors to East Sussex. The current poor provision of local EV charging infrastructure has been identified through resident surveys and business feedback as one of the most significant barriers to the uptake of EVs.
- 5) Consumer experience: there's currently no co-ordinated approach to determining where EV chargepoints should be provided, how consumers access chargepoints and how much it costs them to charge their vehicles. This fragmentation in the market creates a further barrier to the take up of EVs.
- 6) Climate change: there's no plausible path to net zero carbon without a major reduction from transport emissions. Transport emissions account for the largest share of carbon emissions in East Sussex and have shown the smallest reduction in emissions of any sector over the last decade. Subject to the de-carbonisation of the national grid, or the procurement of 100% renewable electricity to supply a local network, the lifetime carbon benefit of switching to EVs could reduce this carbon footprint by at least 2/3rds (BEIS, 2019). The Committee on Climate Change has identified that moving to EV cars and vans is by far the largest change that needs to take place to de-carbonise surface transport and that this is one of the simpler changes required to get to net zero.
- 7) Air quality: up to 36,000 deaths per year in the UK are attributable to exposure to outdoor air pollution (with about 920 deaths in East Sussex) and poor air quality has been linked to increased deaths from Covid-19. This makes air pollution the fourth greatest threat to public health after cancer, heart disease and obesity (PHE, 2019). The economic cost is estimated at £20 billion per year, due to the healthcare costs, premature illness and lost productivity from illness. Local

transport is the largest contributor to local air pollution in East Sussex, which EVs would help to reduce by avoiding tailpipe emissions.

- 8) Local policy commitments: In June 2020 Team East Sussex adopted a county-wide Environment Strategy, which included an action for the local authorities in East Sussex to develop an EV strategy, and the East Sussex Economic Recovery Plan of 2020 included an action to prepare a plan for the delivery of EV charging infrastructure in East Sussex.

The current and forecast provision of EV charge points in East Sussex.

In 2020 about 10% of new vehicles registered in the UK had a plug, compared with about 1% in 2015. This increase reflects both the increase in demand for electric vehicles and the decline in demand for traditional, particularly diesel, vehicles. There are about 30,000 public EV chargepoint connectors available in the UK, shared between around 230,000 plug-in vehicles.

In East Sussex there were a total of 1,213 battery electric vehicles registered as at the end of December 2020, which is approximately 217 per 100,000 of population, compared with the average in England of 196 per 100,000. There are currently 21 publicly accessible EV charge points identified on ZapMap (see: [Charging points and electric vehicles UK 2020 - Zap Map \(zap-map.com\)](https://zap-map.com)). This is approximately 4 charge points per 100,000, compared with an average of 27 per 100,000 in England. In other words, East Sussex currently has a higher than average level of EV car ownership but a lower than average provision of EV charge points. Most public charge points in East Sussex are in petrol stations, supermarkets, car parks or car dealerships. There are a number of private or restricted-access chargepoints, for instance at destination points such as hotels. The majority of charge points are along the coastal strip, with less provision in rural areas where car dependency is greatest.

The UK has a large number of EV charge point networks and operators. They include energy companies (eg. BP and Shell), vehicle manufacturers (eg. Tesla), utilities (eg. Engie), charge point manufacturers (eg. Podpoint) and national or local government (eg. Chargeplace Scotland). They have varying methods for users to access charge points (eg. by membership card or app) and there are a variety of charging tariffs, usually based on the amount of energy used and sometimes with a flat connection fee added. Legislation now requires all publicly available charge points to be available for use by all EV drivers without the need to join a membership network.

The industry is reporting that most charge points are currently under-utilised. This reflects the inevitable lag between the provision of charging infrastructure and the up take of EVs, as well as the fact that most current EV owners have off-street parking and so charge at home.

It's estimated that over 4 million chargepoints would be required to support the wholesale transition to EVs for all 32 million cars currently registered in the UK. Whilst improvements in battery technology could mean the actual number of EV chargepoints required may be less than this, considerable growth in the scale of UK EV charging infrastructure will inevitably be required.

UK Power Networks have modelled the estimated forecast uptake of EVs in East Sussex, based on low / medium / high levels of uptake that are similar to the national assumptions in the government's Road to Zero plan about vehicle costs, range, supply of vehicles and charging infrastructure (table 3). The forecasts included in their latest business plan indicate an uptake of approximately 12,000 EVs per year. This would

allow for a gradual roll-out of charging infrastructure, responding to clear indicators of growing demand for charge points in different parts of the county as it arises. This approach would reduce the risk of stranded assets and would enable the adoption of the latest EV technologies as they emerge, which would help to future-proof the charging infrastructure. Further work is required to understand how the forecast growth in EVs in East Sussex translates into the number, type and location of EV chargepoints.

Local Authority	EVs – 2020/21	EVs – 2027/28	% of total vehicle stock	% Growth
Lewes	700	16,000	25%	2,316%
Eastbourne	300	13,000	23%	3,755%
Wealden	1,200	30,000	25%	2,328%
Hastings	300	13,000	23%	3,734%
Rother	600	17,000	25%	2,526%
Total	3,200	89,000	24%	2,667%

Table 3. UKPN estimate of EV take up in East Sussex districts and boroughs between 2020-21 and 2027-28 (2021).

The role of Local Authorities

A key need is to try to co-ordinate which type of public EV chargepoints are installed and where, in order to reduce both the risk of charge point providers ending up with stranded assets or the under-provision of charge points to meet demand, and to provide EV users with a consistent service. The local authorities recognise that they are only some of the many organisations that have an interest in establishing a coherent EV charge point network in East Sussex, and that many other organisations in the public, private and third sectors will install EV charge points in East Sussex, sometimes with no regard to existing or planned charging infrastructure. Engaging with key stakeholders will help to understand their plans for their own fleets and for installing charge points. This will initially be done through the SPACES partnership (‘Strategic Property Asset Collaboration in East Sussex’), which brings together all local authorities, emergency services, NHS Trusts, Clinical Commissioning Groups, education, the VCSE sector and government bodies represented within the county. Collectively, they own a large number of public car parks and sites such as health, leisure and office sites. In addition, co-ordination will take place with Transport for the South East and neighbouring highway authorities.

The local authorities will seek to:

- 1) Ensure that EV charge points are part of an integrated approach to transport, articulated through the update of the Local Transport Plan that will be carried out during 2022.
- 2) Work with relevant partners to develop an effective spatial distribution of appropriate charge points across East Sussex, to ensure the delivery of a co-ordinated approach which makes best use of resources and shares risks, costs and benefits.
- 3) Only provide charge points on owned assets and on-street.
- 4) Only provide charge points where there is a demonstrable need, there is a market failure to meet this need and the public sector is best placed to meet this need.

- 5) Only provide charge points where they do not encourage additional car usage and where they are complementary to transport measures that are preferable, notably walking, cycling and public transport.
- 6) Support equitable access to charge points, including providing equal access for disabled drivers and recognising that over 20% of households in East Sussex don't own a car and that EVs are currently more expensive than equivalent petrol or diesel vehicles.
- 7) Encourage the market (employers, retailers, developers and residents with off-street parking) to meet as much of the demand for EV charge points as possible, in order to minimise the need for public sector intervention in EV infrastructure provision.
- 8) Meet forecast needs for EV charging as it develops, without leading to any significant periods of under or over-supply of charge points, though recognising that over-provision may be required at the outset to provide confidence to users as to the availability of charge points.
- 9) Ensure EV user needs are central to the development of EV charging infrastructure.
- 10) Ensure that all electricity used to supply EVs is from 100% renewable energy sources.

Actions

The actions that will be taken to implement this approach are summarised in table 4.

LA role	Action
Policy	Develop consistent and robust policies on EV charge points in Local Plans
Communications	Develop an EV communications plan for residents & businesses to highlight the benefits of EV vehicles, explain the choice of technologies and the national grant schemes, and publicise the location of EV charge points.
EV charge points	Demand profiling: identify projected future growth of EVs and charge points in East Sussex.
	Stakeholder engagement: co-ordinate the development of plans for EV charge points amongst the partners in SPACES and ensure integration with the plans of adjacent Highway Authorities.
	Site selection: develop an agreed prioritised list of sites in the short term.
	Procurement: share information on the market and procurement options and seek to develop a consistent offer to EV drivers.

Table 4. EV Strategy Action Plan

Governance

A sub-group of the SPACES partnership, supported by consultancy that will be commissioned by the County Council, will lead on the above action plan and will report to the SPACES board. Progress will also be reported to the East Sussex Environment Board and to Team East Sussex.

Monitoring and reporting

The SPACES sub-group will agree the approach to monitoring and reporting, including appropriate performance indicators, and updates to the action plan.

Appendix 7 – Key Partnerships and Organisations

There are a number of regional organisations and partnerships that play an important role in setting and / or delivering a pathway to net zero in East Sussex. These include:

- the South East Local Enterprise Partnership (SELEP): together with other LEPs it developed a regional energy strategy in 2019 which identified a number of types of projects that are rapidly scalable, such as domestic energy retrofit (see: [Energy South2East - The South East Local Enterprise Partnership \(southeastlep.com\)](https://southeastlep.com)). It estimated both the total investment required to meet the required emission reduction targets over the next decade and the numbers of jobs that this investment could secure and create.
- The Greater South East Energy Hub: government is supporting the delivery of regional energy strategies by funding 5 energy hubs across England. These were set up in 2019, with the role of identifying and helping to scale up the delivery of projects that cut carbon. The Greater South East Local Energy Hub, which covers East Sussex and comprises ten LEPs and the Greater London Authority, includes technical specialists whose purpose is to develop and prioritise a pipeline of local energy projects through feasibility and business cases to the point where investment can be secured.
- Transport for the South East: this is the sub-national transport body for the south east, whose purpose is to determine what investment is needed to transform the region's transport system, including to get to net zero by 2050. The seven sub national transport bodies in England are working together to develop scenarios on how to decarbonise the transport sector and TfSE is developing a range of support for local transport authorities in the south east.
- UK Power Networks and Southern Gas Networks: they own and maintain the electricity and gas networks in East Sussex. They are looking to take a more integrated approach to power, heat and transport needs on an area basis, to help identify the most efficient means of addressing future demand, notably from the predicted growth in housing, commercial space, heat pumps and electric vehicles. UKPN is set to invest about £300m in electricity infrastructure improvements in East Sussex over their next business plan cycle to support this transition.
- Public transport operators: including the train operating companies and bus operators. The national direction is set by government policy but the provision of services, in particular bus services, is largely determined by commercial operators.
- Community Energy South: this regional umbrella organisation, based in East Sussex, supports local community energy groups to generate local energy supplies, for instance community-owned solar PV schemes, to reduce fuel poverty and to build community resilience.

There are also a number of local partnerships that have a role in addressing climate change in East Sussex, including:

- The Sussex Nature Partnership includes public, private and environmental organisations that works to protect and enhance the natural environment (Sussex Local Nature Partnership (sussexlnp.org.uk)).

- Hydrogen Sussex is a partnership of the private and public sectors that aims to develop local green hydrogen production, storage and use, notably in transport (Hydrogen Sussex).
- Sussex Air is a partnership of all the local authorities in Sussex that aims to improve local air quality (Sussex-air :: Promoting better Air Quality in Sussex :: sussex-air.net :: Home).
- The East Sussex Joint Waste Partnership, which is administered by Wealden District Council, is a partnership of Wealden and Rother District Councils and Hastings Borough Council and oversees the waste collection contract for these authorities.
- The East Sussex Energy Partnership is the lead partnership for tackling fuel poverty in the residential sector. It is chaired by ESCC Public Health and has representatives of the district and borough councils, voluntary and charity sector organisations and community energy groups.
- the Strategic Property Asset Collaboration in East Sussex (SPACES) partnership works to assist in the better utilisation of public sector assets, including looking at asset decarbonisation, to create cost and carbon savings. The partnership includes all local authorities, emergency services, NHS Trusts, Clinical Commissioning Groups, education, the VCSE sector and government bodies represented within the county.

Appendix 8 - Governance, Monitoring and Reporting

Governance

The development of the road map has been led by the East Sussex Environment Board, which is accountable to Team East Sussex.

Monitoring and reporting

Progress in delivering the actions in this road map will be reported on at least once a year to Team East Sussex. The effect of the actions will be tracked through a small number of targeted performance indicators, which are listed below, to provide reliable and objective information about whether East Sussex is meeting the science-based target of 13% reduction in CO₂e per year. The link between actions taken and carbon reduction is not always direct or immediate, and data may show year-to-year fluctuations that are difficult to assess., where possible. These factors will be identified and addressed in the annual progress report and the indicator framework will be kept under review so that it continues to provide a useful, transparent and cost-effective way of assessing progress.

Performance indicators:

- CO₂: by area, sector, per capita (source: BEIS. Frequency: annual).
- Transport:
 - Distance travelled by mode (source: ESCC. Frequency: annual).
 - EV share of the fleet (source: DfT. Frequency: annual).
- Domestic buildings: EPC ratings (source: C-Path. Frequency: annual).
- Non-domestic buildings: EPC ratings (source & frequency: tbc, subject to funding from Innovate UK).
- Waste: kgs of household waste per year and the split across reuse, recycling, composting, and disposal to ERF or landfill (source: ESCC. Frequency: annual).
- Renewables: generation capacity (source: BEIS. Frequency: annual).

Review of the Road Map

This road map will be reviewed and updated by the East Sussex Environment Board in 2025, in light of progress and changes to legislation, policy, technology and resources. The scope is likely to increase to cover the full range of climate change challenges, such as changes to diets and embodied carbon. Assessment of equality impacts will also be reviewed, so that specific barriers and opportunities can be factored into plans. In the meantime, it's likely that more detailed sector-specific strategies and plans will be developed for East Sussex, such as the update to the Local Transport Plan due in 2022, which will supersede parts of this road map.

Glossary

Acronym	
ASHP	Air source heat pump
BAU	Business-as-usual
BEIS	Dept of business, energy and industrial strategy
CCC	Committee on Climate Change
CLA	Countryside Land and Business Association
CO2	Carbon dioxide
CO2e	Carbon dioxide equivalent
DfT	Department for transport
EfW	Energy from waste
EV	Electric vehicles
GHG	Greenhouse gas
GSHP	Ground source heat pump
GWP	Greenhouse warming potential
GVA	Gross value added
HGV	Heavy goods vehicle
LCWIP	Local cycling and walking investment plan
LPA	Local planning authority
NFU	National Farmers Union
NPPF	National Planning Policy Framework
SCATTER	Setting city area targets and trajectories for emissions-reduction
SELEP	South East Local enterprise partnership
UKPN	UK Power Networks