East Sussex Climate Emergency

Road Map for 2022-25

September 2021

Foreword

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, what we eat and by taking up low carbon solutions.

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^{o}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. So this road map proposes a set of no-regret actions to 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 adjusted 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 improved low carbon diets, better local air quality and improved public realm through a reduction in vehicles, especially petrol and diesel vehicles, and more profitable businesses through lower energy costs.

The 2020s is the decisive decade of change. No single organisation, acting alone, has the powers or resources to secure the 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 benefits.

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

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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 Artic 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.

Every extra bit of warming matters. For instance, the difference between a 1.5 and a 2^0C increase is the difference between losing about 70% of all coral reefs and losing 99%, or going from 1 in 10 people globally who will experience severe heat at least once every 5 years to 1 in 3.

The predicted impacts of climate change in East Sussex include more frequent and intense flooding, drought and episodes of extreme heat, as well as impacts from the effects of climate change overseas, such as on food supply. This will lead to an increase in heat-related deaths, particularly amongst the elderly, 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, business and political 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 CO_2 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, estimated in 2020 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.

2. The benefits of addressing climate change

The benefits that this investment can deliver include:

1) Greater prosperity:
   - significant job growth in low carbon sectors which, in East Sussex in 2020, consisted of approximately 1,500 businesses employing about 8,735 people and contributing £575m to gross valued added (GVA), which is the measure of the value of goods and services produced in the county.
   - The Office for Budget Responsibility has identified that establishing an early dominant position in new green technologies could create a source of comparative advantage internationally, benefitting future exports (2021).
   - The Climate Change Committee has estimated that the cost of meeting the 1.5^0C net zero carbon target will be less than 1% of UK GDP, whereas the cost of having to cope with unabated climate change was estimated at about 5% of GDP by the Stern Report. The greater the increase in climate change the greater will be the need - and the higher the likely cost - of adaptation.

2) Improved health outcomes through:
   - a reduction in illness and excess winter deaths as a result of living in a more energy efficient and warmer home. 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 emissions form agriculture and to off-set residual emissions. For example, tree planting of the right kind and 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 and the associated rise in sea level will increase the risk of conflicts over resources and make a number of areas uninhabitable that will force some populations to migrate. The CCC concluded that, as a consequence, it stands to reason that higher levels of climate change are likely to be associated with greater numbers of people forced to seek refuge in countries such as the UK.

3. The challenges of addressing climate change

Reaching net-zero carbon 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 fall well short of what is needed to hit the 2^0C target, let alone 1.5^0C. 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 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 to the funding and subsidy arrangements for renewable energy systems and ultra-low emission vehicles, lead to significant fluctuations in delivery and uncertainty for investors. For instance, 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, respective roles and responsibilities, from national government through to individuals, for addressing different aspects of climate change remain unclear.

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 1.5ºC, 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 will also be limits to the ability to adapt, for instance in being able to protect coastal infrastructure and communities.

4. Co-operation and partnership

International and national government action and co-operation are essential to achieve the pace and scale of change required, whilst COVID-19 means that we now all know what a global emergency looks like and what co-operation is required to address it. There are some important similarities between the Covid pandemic and the climate emergency: both involve the need for 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 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 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 the 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 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 about 13% per year.
2. develop a pipeline of projects that deliver 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 carbon baseline and budget for the county (appendices 1 and 2), identifying an indicative pathway to net zero (appendix 3) and setting out 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 8. The purpose of this road map is to highlight areas of

existing partnership work on climate change and to provide an evidence-based and practical framework to enable and assist 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 - Lewes and Eastbourne Councils (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
- Wealden: https://www.wealden.gov.uk/environment-and-pollution/climate-emergency/

6. Action plan on climate change

Currently, there's not yet a national road map to get to net zero and no recognised optimal path to get to net zero at a local level. it is unclear what the most effective balance of national, regional, local and individual action is likely to be to reduce emissions. Nevertheless, we have a reasonable high-level understanding as to what needs to be achieved overall in East Sussex and by when (see appendix 3). We also have a reasonable understanding of many actions that can be taken in the short term, such as domestic retrofit measures, because they can be justified on economic and environmental grounds irrespective of what emerges in future (see appendix 4).

The action plan in the table below provides a summary of a number of actions that are either being, or will be, delivered in East Sussex to mitigate or adapt to climate change over the next few years. The action plan is not intended to be exhaustive but to illustrate the breadth and depth of partnership activity that already exists. The actions cover a mix of activity that either delivers measurable carbon reduction or helps to build longer-term capacity to deliver measurable carbon reduction or is innovative.

The action plan covers only the next few years as this is as far into the future as we can reliably predict our actions and the finances that support them. The wider road map sets out an outline of what needs to be achieved beyond this period (appendix 4) and this outline will be shaped into a more comprehensive action plan through learning from the next couple of years, from the successes and failures of the actions identified in the action plan and from changes in legislation, policy, resources and technology. Consequently, the table of actions, which is a working document, will be reviewed every year to reflect updated evidence, new activity and changes to resources, and will look to increase in scope to cover the full range of climate change challenges, such as changes to diets.

According to the carbon budget for the county (appendices 2 and 3), to make our fair contribution to keeping the average global temperature increase to no more than 1.5 degrees centigrade above pre-industrial levels requires reducing our county-wide carbon footprint by about 200,000 tonnes of CO_2e 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 does not capture all the measures that 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 and gauge the scale and pace of actual progress compared with the target to reduce emissions by an average of 13% per year.

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		Increase post lockdown usage of public transport	1) enhanced partnerships between bus operators & transport authority to assist funding of improved bus network. 2) Increase in use of public transport.	Train Operating Companies and 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 hydrogen storage and re-fuelling depot in Newhaven	Hydrogen storage and re-fuelling capacity for buses and HGVs	Lewes District Council & Brighton & Hove Buses
6	Domestic properties	Retrofit fuel poor properties	£2m secured in 2020 & 2021 and further bid of £2.2m in 2021 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).	Lewes and Eastbourne Councils
		Barcombe CommuniHeat net zero village	Develop a model solution for able-to-pay rural communities to get to net zero. ntial to scale and create cluster communities with benefits to work with the supply chain and create jobs and harness community finance. (Policy and showcase potentials)	OVESCo, Community Energy South, UK Power Networks and Buro Happold
8		Develop Crowhurst village net zero energy plans, and Firle and Forest Row renewable heat plans	Whole community low carbon solutions	Community Energy South
9	Non-domestic properties	Deliver free energy audits and offer 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	East Sussex County Council & Green Growth Platform
10		Secure funding from Innovate UK to map non-domestic buildings	Detailed understanding of commercial building stock in East Sussex to enable targeted interventions	South East Local Enterprise Partnership Clean Growth group
11	Waste	Develop a Waste Carbon Reduction Plan	Detailed understanding of the carbon emissions from the current waste collection contract and identification of opportunities for improvement	Joint Waste Partnership (Wealden District Council)
		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 Parks Authority and East Sussex County Council
12	Renewables	Develop a solar farm via Cuckmere Community group	4MW solar farm with 10 acres of rewilding	Cuckmere Community Solar

No.	Theme	Action	Outputs and Outcomes	Lead
13		Connect Cuckmere Community solar farm to Network Rail via Riding Sunbeams project	Use locally produced and financed solar power to power part of the rail network in East Sussex through a ground-breaking project	Riding Sunbeams & Cuckmere Community Solar
14		Community-owned Ouse Valley Solar Farm	Possible 16MW solar farm	OVESCo & Lewes District Council
15		Assist homeowners to purchase solar PV through Sussex Solar Together	200 domestic properties adopting solar PV per year	Local authorities
16	Agriculture and land use	SELEP '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 Local Nature Partnership
17	Adaptation & resilience	Improved 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 more protected.	Environment Agency
		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
18	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, Community Energy South & OVESCo
19	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
20		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
21		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
22	Finance	Explore options, in preparation for the Shared Prosperity Fund	Increase investment in climate change mitigation and adaptation measures in East Sussex	Team East Sussex
23	Lobbying government	Present collective messages from East Sussex	Influence the effect of policy and investment in East Sussex	Dependent on each theme

Notes:
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 - 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 (CO_2) has the lowest GWP of all the gases but is by far the most abundant GHG gas, hence the focus on CO_2 when discussing climate change (see figures 1). By comparing the GWP of each gas to that of CO2 we are able to derive a CO_2 equivalent value (expressed as 'CO_2e'). For example, CO_2 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 CO_2 (expressed as '24 tCO_2e'). 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 'CO_2e'. 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 CO_2e 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.

Appendix 2 - East Sussex Baseline Emissions and trends

A climate change road map requires a detailed understanding of an area's greenhouse (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 local authority level. It also does not cover power generation, beyond looking at local renewables, as these are outside the scope of local organisations and individuals to 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 local authority area. Instead, the Department for Business, Energy and Industrial Strategy (BEIS) publishes data each year to monitor CO_2 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 2018. 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. This national dataset excludes emissions from some key sectors, including air travel, shipping and goods manufactured abroad.

There are other tools and data sources available that can be used at different scales. For example, there is a parish level carbon emission estimator, which gives parishes and small communities usable data on their carbon emissions and so assist them to decide where best to focus community-based action to cut emissions (see: Impact | Community carbon calculator (impact-tool.org.uk).

Figure 1 illustrates the change in emissions, split between the 3 main sectors of commercial & industrial, transport and domestic emissions, between 2005 and 2018. The key points from the data are:

- Total emissions of CO_2 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.

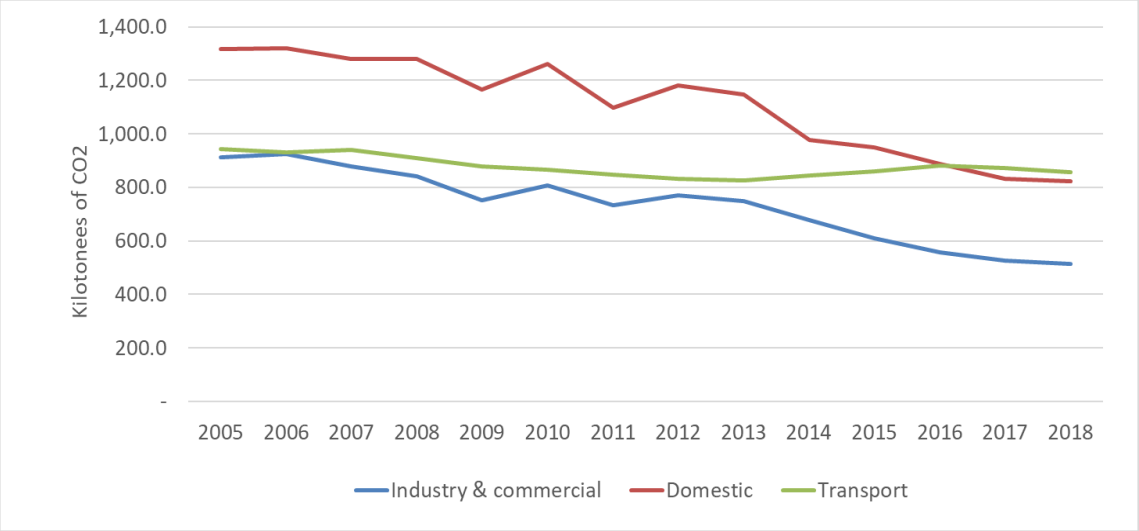

Figure 1. CO_2 emissions in East Sussex by sector between 2005 and 2018 (BEIS, 2020).

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 CO_2 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 2 indicates the variability as to how emissions break down across the 3 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 and many properties are not on the gas grid.

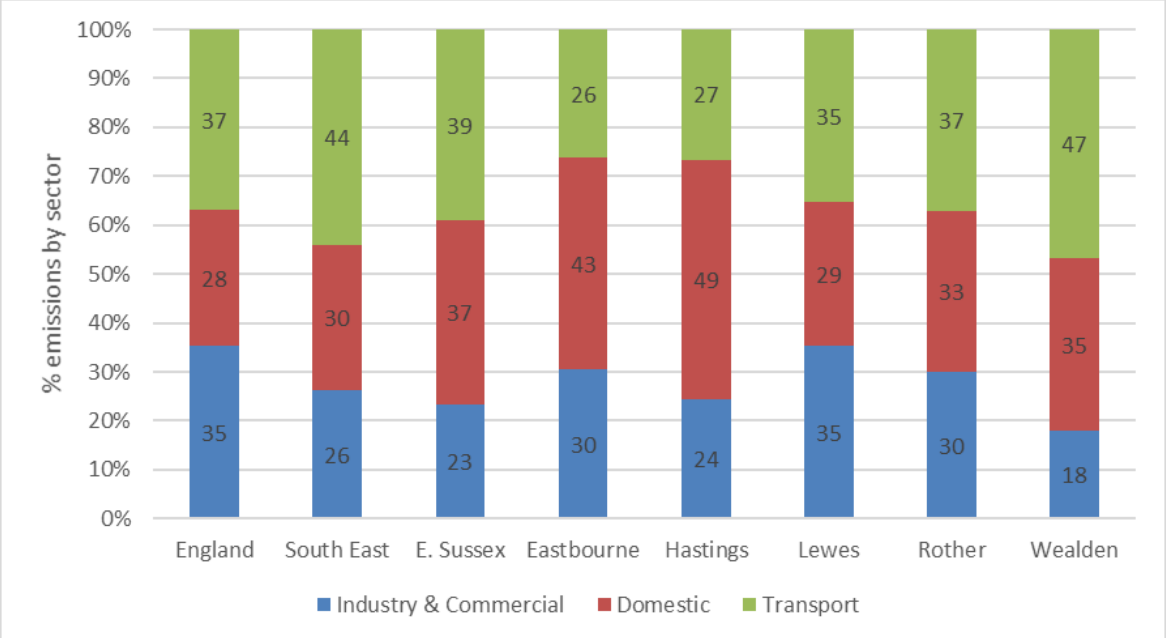

Figure 2. Percentage CO_2 emissions by sector in 2018 in England, the South East, East Sussex and by district and borough.

Appendix 3 - Climate Emergency Targets

The government's target is to get to net zero carbon emissions by 2050. 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 are often not aligned they are, nevertheless, all extremely ambitious and reflect a strong consensus on the need to get to net zero as quicky as possible. This report takes its starting point from the target set out in the East Sussex Environment Strategy, as it is a science-based target and is in keeping with the international Paris Climate Agreement to try to limit maximum warming to 1.5^0C.

To keep below the global average 1.5^oC 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 1.5^0C threshold. The UK's Tyndall Centre for Climate Change Research has developed a recognised methodology for calculating the CO_2 budget for the UK that is aligned with the Paris Agreement, and has divided this by local authority area, to ensure that carbon budgets at different administrative levels (eg. district/borough and county) are comparable and that all areas are contributing to a common UK carbon budget and in an equally fair manner. 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.

The Tyndall methodology makes a number of simplifying assumptions and only covers CO_2 rather than all GHGs. Nevertheless, it's a useful model which indicates that:

- The total remaining CO_2 budget for East Sussex is about 14 million tonnes up to 2100.
- At current emission levels this budget will be exceeded in 7 years.
- the annual average reduction in CO_2 required to keep within the remaining budget is about 13% (see figure 2).

A very simple approach to determine the potential direction of travel of carbon emissions in East Sussex 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 as the easier wins are achieved, whilst some sectors, notably transport, have seen little to no reduction in emissions in the recent past.

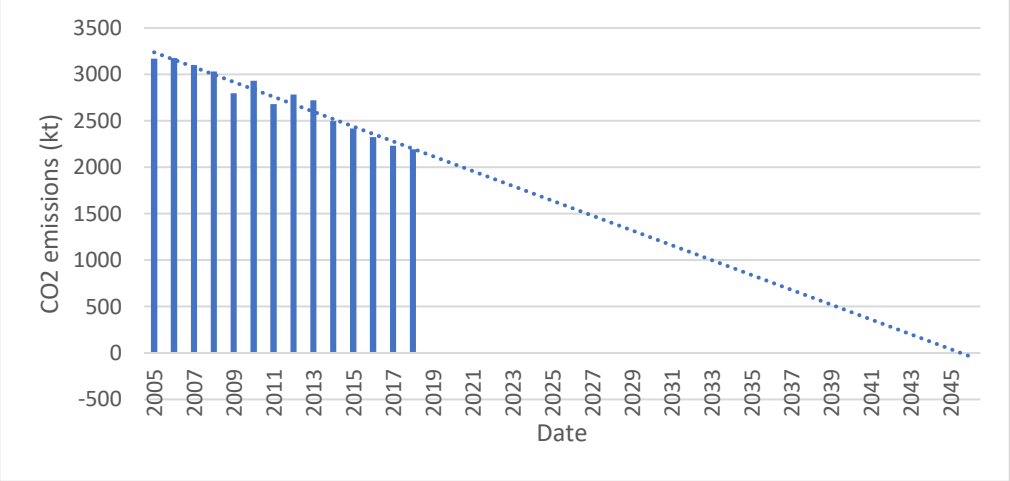

Figure 3. The actual and potential trend in East Sussex carbon emissions from 2005 – 45.

A more scientifically robust 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 estimating the effect of a combination of 30 different types of interventions, based on current evidence as to the maximum that might be technically and socially feasible. The interventions either reduce the demand for energy (for example improved insulation) or increase the supply of 'green' energy (for example the deployment of renewables). Both types of measures contribute to cutting CO_2 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 keeping within the carbon budget.

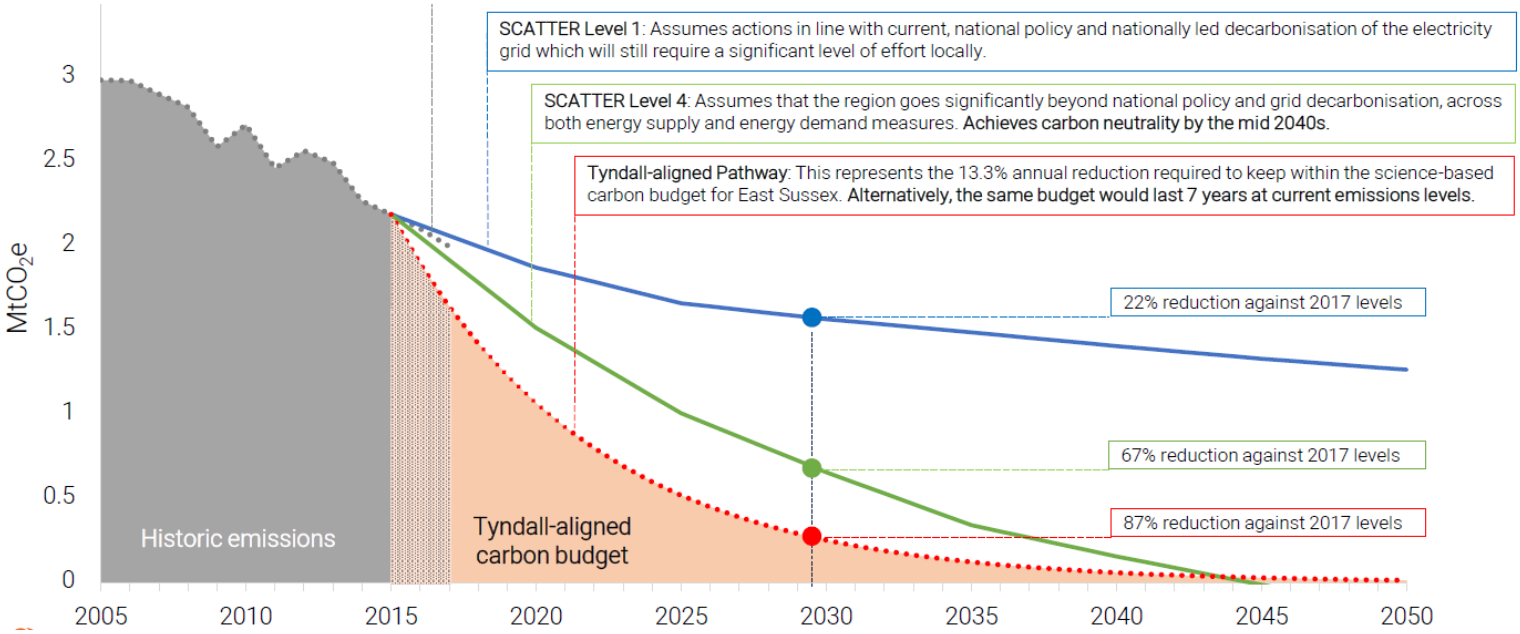

Figure 4. East Sussex carbon reduction pathways (SCATTER, 2020).

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.

The carbon budget will be exceeded by emissions that cannot currently be cut (ie. the area between the green line and red line). These excess emissions would need to be addressed by investing in off-setting emissions, for instance a mix of large-scale off-site renewables, land use sequestration and/or carbon removal technologies.

A 13% per year reduction equates to a halving of CO_2 emissions every 5 years and would lead to East Sussex becoming net zero by about 2043 (see figure 5). To put this into context, between 2005 and 2018 the highest annual reduction rate for any year was 9.5% and the average annual reduction was 3%. This highlights the scale of the challenge to keeping within a carbon budget. It's important to note that the earlier and greater the reduction in emissions the more likely we are to contribute to remaining within the global carbon budget. Conversely, the later and slower the reduction in emissions the more likely we are to contribute to exceeding the global carbon budget. And for every year where progress is slow, the rates for future years will need to be even higher in order to compensate for a slower start.

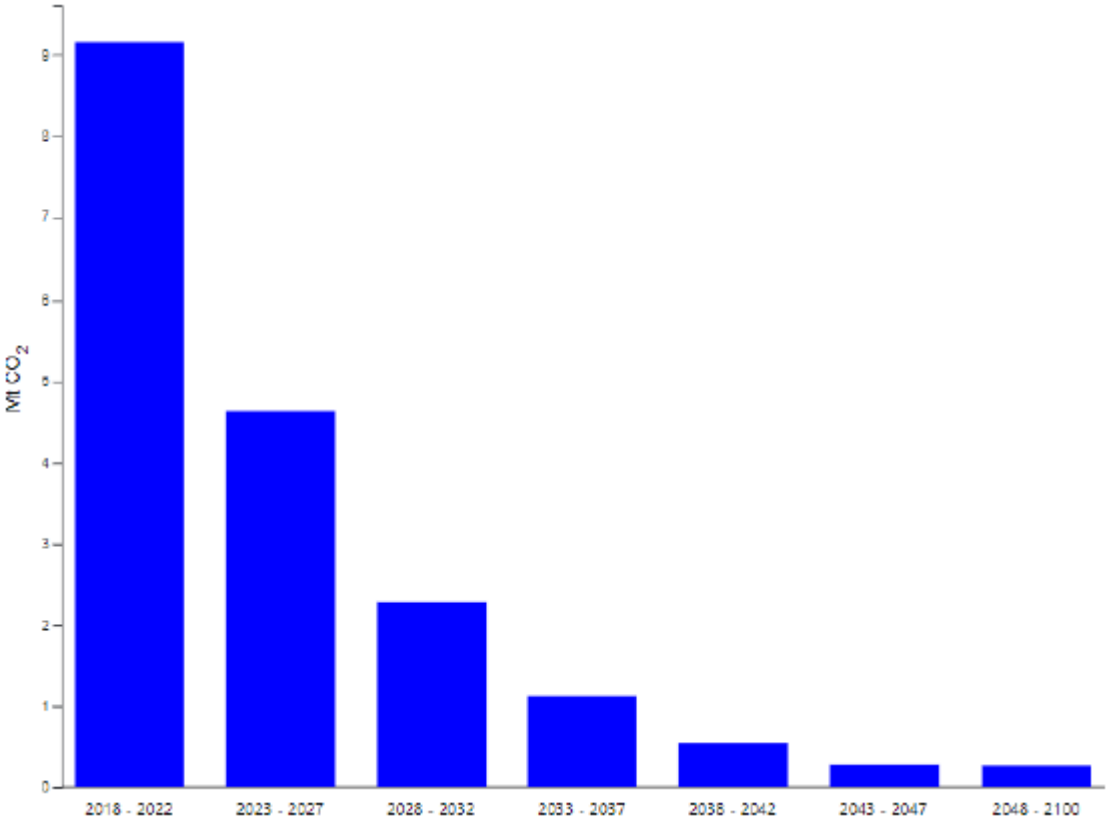

Figure 5. East Sussex carbon budget, split into 5 year milestones (Anthesis, 2020).

Appendix 4 - Decarbonisation Road Map

The Committee on Climate Change has 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 has produced a number of relevant papers, policy announcements and strategies, such as the Energy White Paper in 2021, and the Transport and Hydrogen Strategies in 2021. However, at present the government does not have an agreed national decarbonisation plan, and there is no single pathway to get to net zero. Over the next year or so the government has said that it will produce a net zero strategy, a heat and buildings strategy, an industrial decarbonisation strategy, a nature strategy and the Environment Act, amongst others. Collectively, these are expected to set out in detail how the UK will transition to net zero.

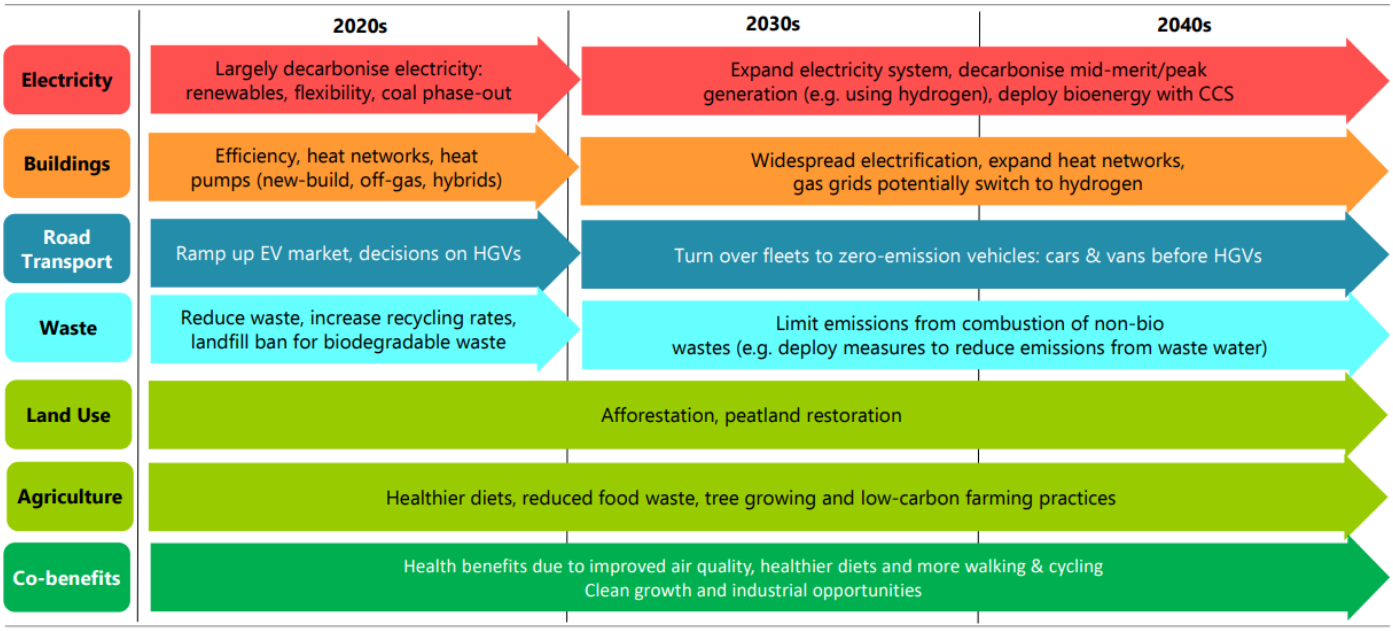

Figure 6. Committee on Climate Change roadmap to net zero for the UK (source: CCC, 2020).

In the meantime, 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 and transport measures.

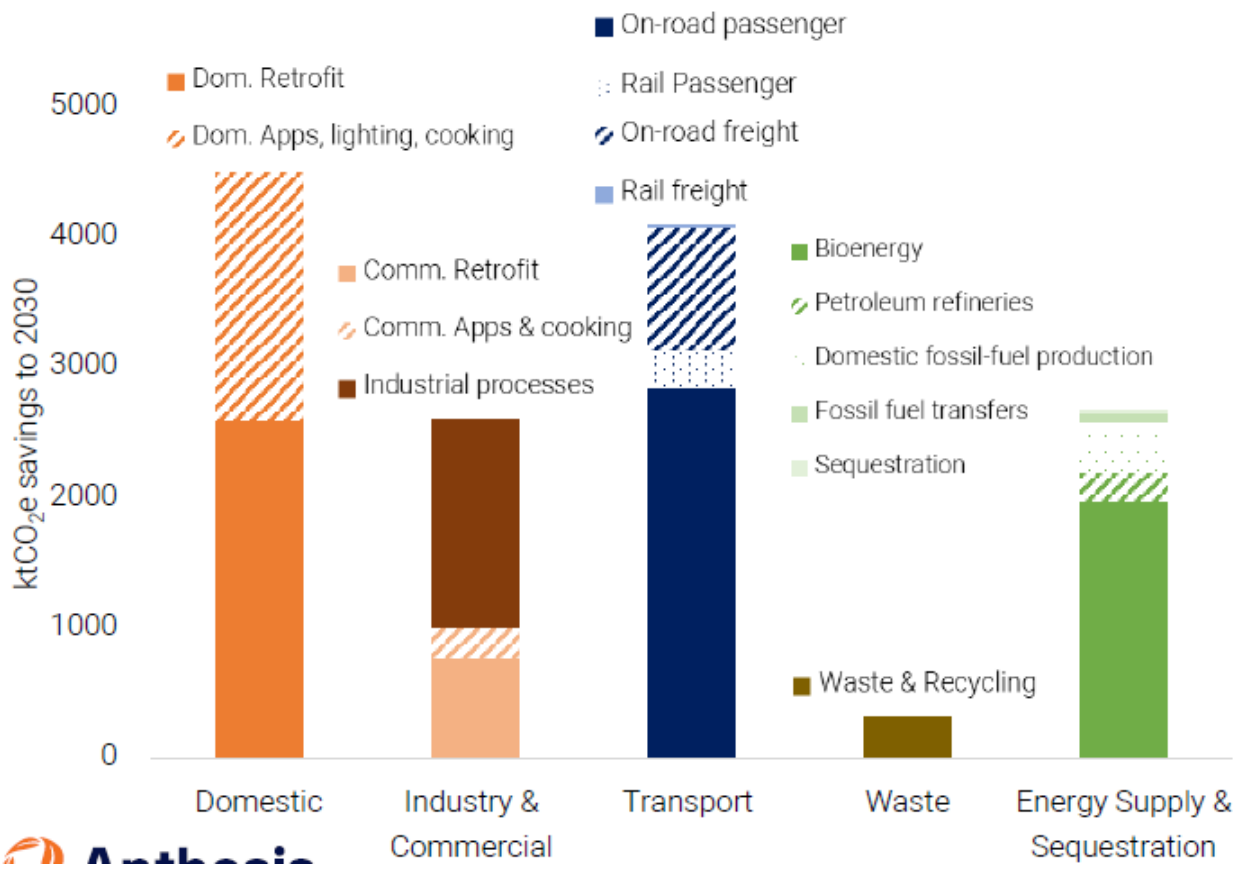

Figure 7. The relative contributions of carbon reductions in East Sussex up to 2030 (SCATTER, 2020).

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.

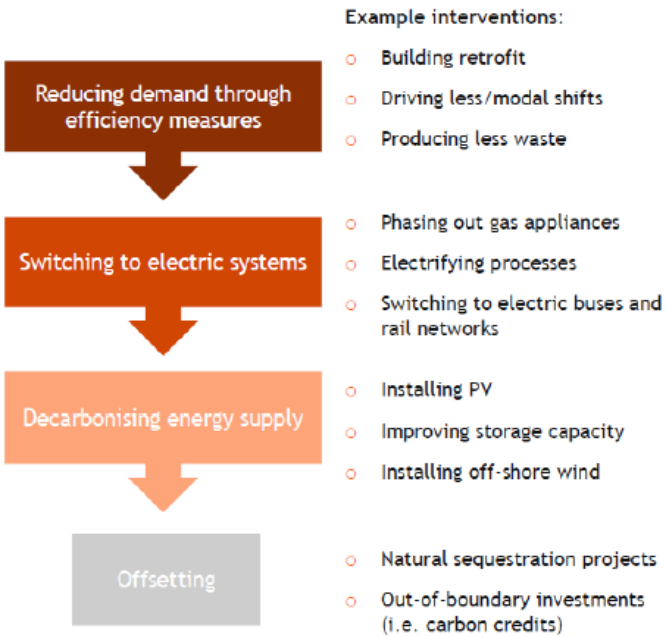

Figure 8. Energy hierarchy of actions and example interventions (Image: Anthesis)

The hierarchy does not always hold true, as illustrated in figure 9, which illustrates the relative effectiveness of different measures in reducing carbon, as calculated by Hampshire County Council. The assumptions that underpin figure 9 will no doubt change over time, in light of changes in technology and our understanding of their relative effectiveness.

Action	Number of people needed to take the action for the same carbon reduction
Install renewable energy devices in your home (e.g. heat pump, solar etc.)	1
Change to a green energy tariff for your gas and electric	1
Avoid flights by working from home/conference/video calls	2
Install insulation (e.g. loft, cavity wall insulation etc.)	3
Buy/lease an electric car	5
Avoid short haul flights by taking the train instead	9
Avoid long haul flights by choosing not to travel internationally	10
Reduce food waste	12
Reduce meat consumption	16
Reduce dairy consumption	17
Avoid local travel by working from home/conference/video calls	27
Use water saving devices (e.g. shower timer, rainwater barrel, toilet water tank limiter (hippo, brick)	31
Choose energy efficient appliances when purchasing or replacing (e.g. with an A-rated energy label)	34
Reduce car/taxi use by using public transport	68
Reduce car/taxi use by using active forms of transport (e.g. walking, cycling instead of a vehicle)	96
Buy locally produced food	122
Correctly recycle materials	174
Use less water (e.g. turn the tap off when brushing your teeth)	229

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, the priority partnership actions to take forward in the short term and the main costs and benefits of the actions.

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 reduce carbon. 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 which is convenient, cost effective, reliable, 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.

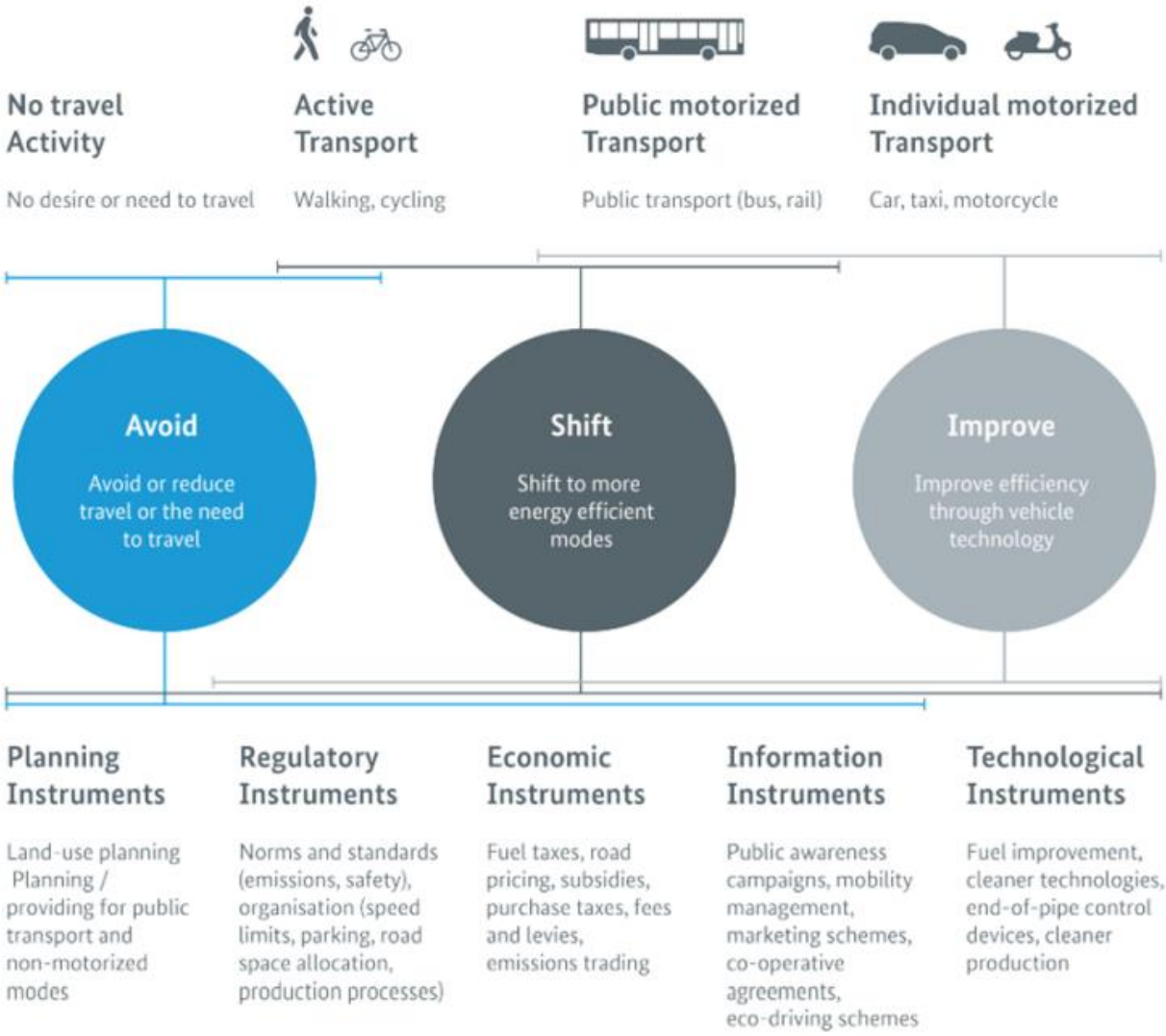

Figure 10. Avoid, shift, improve instruments (source: Ricardo, 2020).

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 may be unpopular. Consequently, how communities are engaged with is critical to the success of new measures to ensure early 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.

The national picture

The UK is in the top ten most congested countries in the world, which costs about £37 billion per year due to the economic impact from 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 £20 billion per year due to the healthcare costs, 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.

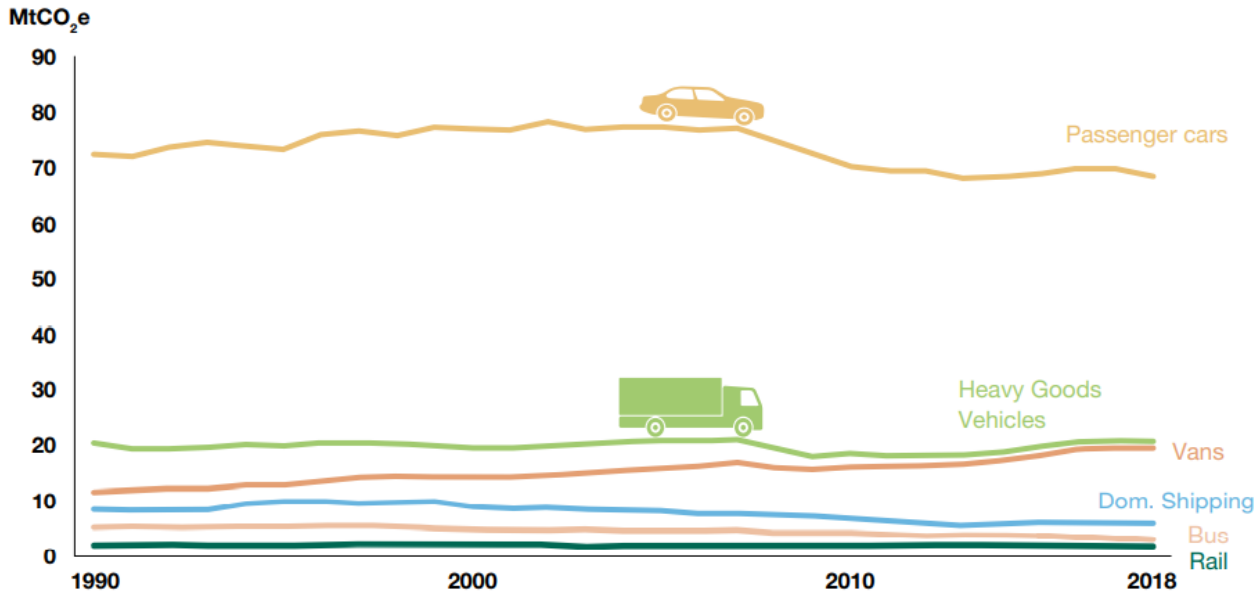

Figure 11. UK Transport GHG emissions by mode, 1990 and 2018 (Source; DfT, 2020).

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. This is echoed in the DfT's recent Transport Decarbonisation Plan and the UK Hydrogen Strategy, both published in summer 2021. 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 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 means that there is not yet a robust mix of incentives and disincentives in place. 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 reducing the scale and cost of having to invest in the 'shift' and 'improve' measures, or clear policies on road user charging, freight decarbonisation, or integrated ticketing on public transport.

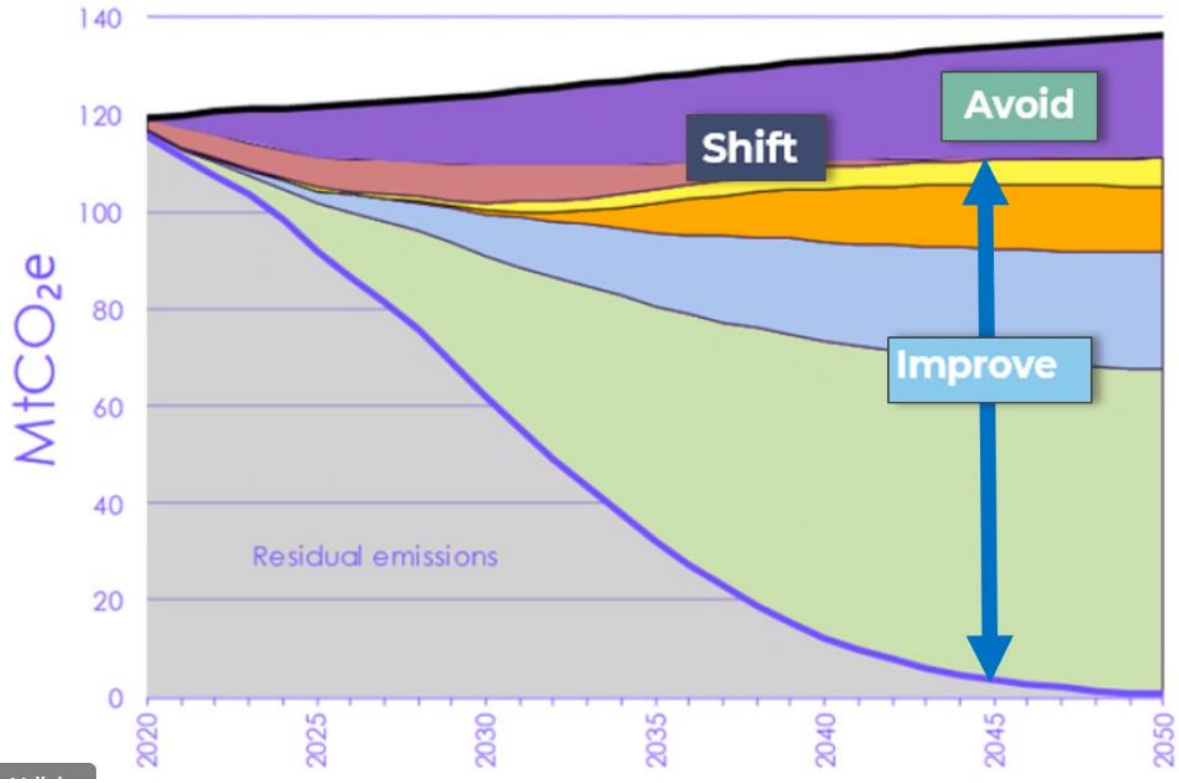

Figure 12. The CCC's road map to decarbonising transport (2021).

This highlights that transport is probably the most complex sector to decarbonise, for a number of reasons, including the complexity of decarbonising freight transport and the 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 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 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. Figure 13 provides a pre-COVID summary of how far people travelled per person per year, for what purpose and by what mode of transport. The pandemic has broadly increased walking and cycling but 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 14 provides a visual summary of the changes required. The update to the Local Transport Plan, which will be developed by the County Council as the Local Transport Authority, will include measures to support achieving the ambition set out above. However, one of the key challenges is that the funding available from government for transport measures is not enough to meet the carbon reduction target, or local expectations.

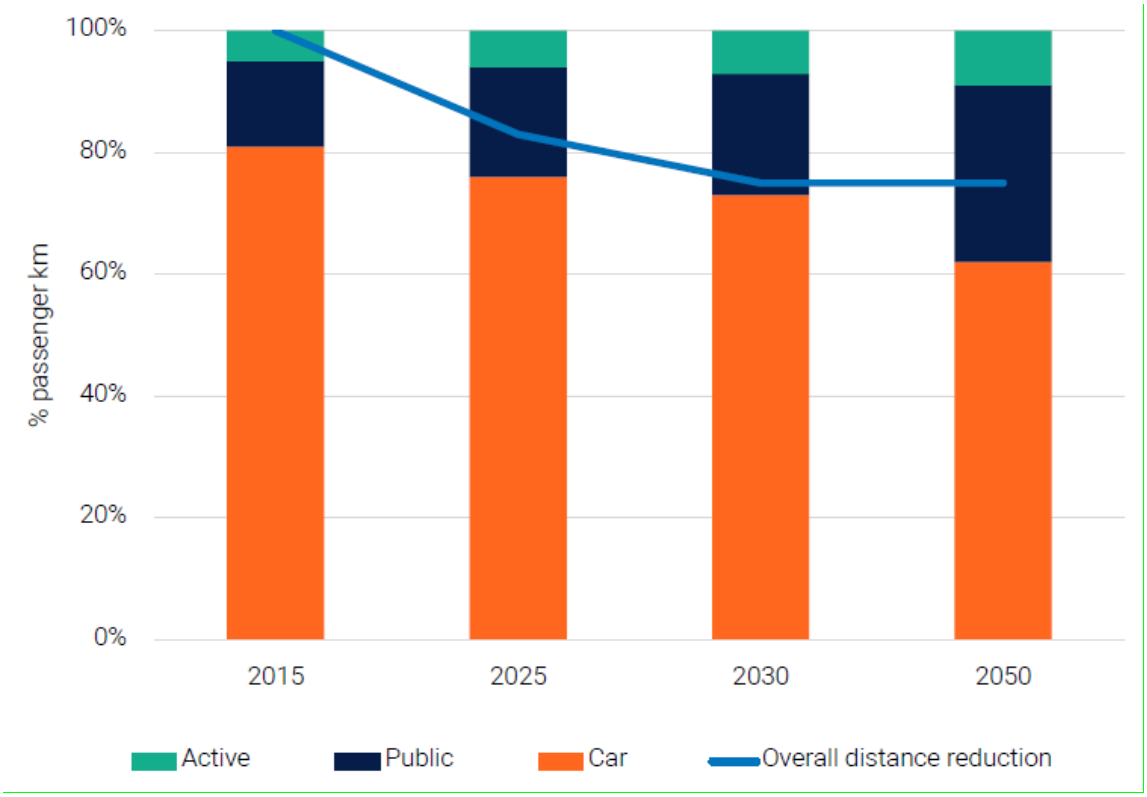

Figure 13. Modal share (by mileage) of different forms of transport (bars), as well as overall mileage reduction in distance travelled (line). (SCATTER, 2020).

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

- Well-connected communities: to support which sites are identified for potential future housing and commercial development the local authorities are working in partnership to assess the impact on existing roads of additional traffic as well as the opportunities for 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.

- 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. Subject to the availability of funding, 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) has been developed and is due to be adopted in 2021. The plan 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.

- Public transport: the County Council is discussing with train and bus operators and user groups about how best to incentivise the use of public transport post lockdown. 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 the fleet of diesel trains, are being investigated. A new Bus Service Improvement Plan will be developed by October 2021 and an Enhanced Bus Partnership established by April 2022, with the aim of increasing bus usage in the county. 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 what type of charge points should be installed where (see appendix 4). The main aim of the EV 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.

- 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 Borough and Lewes District council refuse vehicles. The complementary £12.8m bid to the DfT's Zero Emission Bus Regional Areas Scheme to help purchase 37 hydrogen buses was unsuccessful.

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.

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

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 thermally efficient 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, for instance 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.

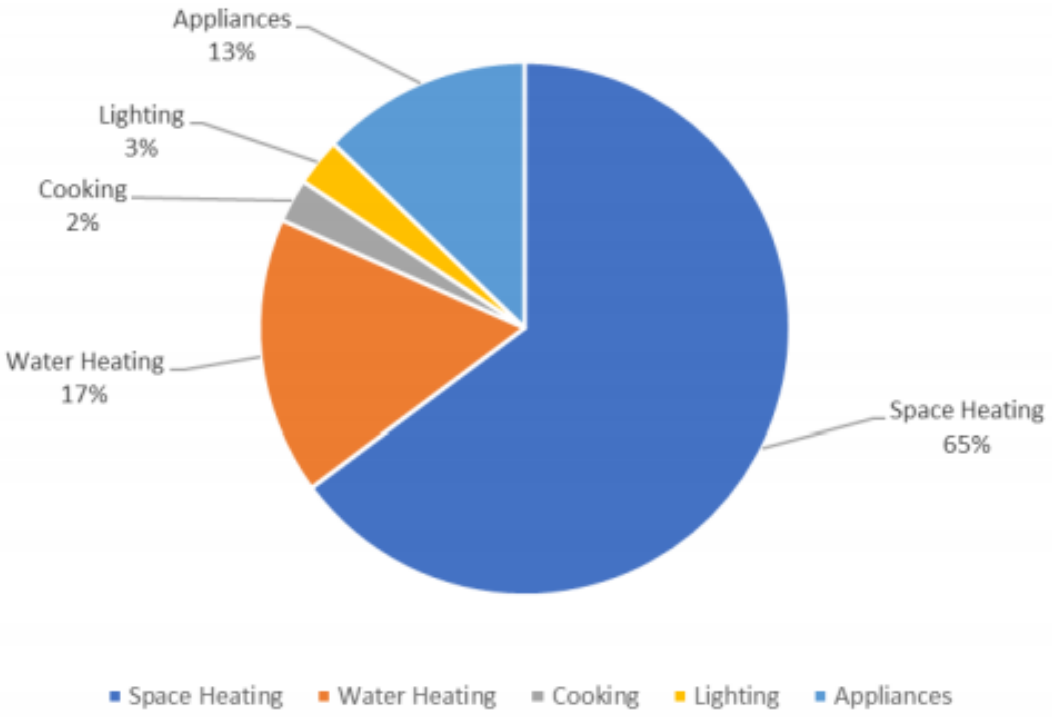

Figure 14. Energy use breakdown for average UK household (2018)

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.

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 this include adopting modern methods of construction, such as modular homes, and building to recognised no and low carbon standards such as Passivhaus. This can include reducing the embedded carbon in the construction of new build, for example by using wood in construction, which displaces 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.

The national picture

There are a number of significant benefits to improving the energy efficiency of domestic properties, beyond cutting carbon, as well as designing and developing new low carbon communities. These include:

- Reducing deaths, where about a third of the estimated 34,300 national excess winter deaths 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.

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 is one of the most energy inefficient in Europe and the levels of low 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 recovery programme. These include the Social Housing Decarbonisation Fund and the Green Homes Grant Fund.

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. So far, these have largely failed to drive significant and sustained investment by households and landlords, due to the complexity of the schemes, 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 Recovery Commission has recommended a 15-year pathway to the decarbonisation of the housing stock, both to support the long term recovery from Covid 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 ability of LPAs 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 a 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 from 2025. 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. The Green Building Council estimates that Level 4 can be achieved entirely through energy efficiency measures, adding up to £3,000 for a terraced house and £6,000 for a detached house to the build cost. 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 te focus on house building numbers to the detriment of wider planning policy objectives such as climate change. Consequently, there is very little development currently taking place that is anywhere near to being net zero.

Both the retrofit and new build domestic sectors require urgent national policy decisions, including how best to decarbonise heat, for instance to decide whether the focus is via a decarbonised electricity grid or decarbonised hydrogen, or a mix, and to drive this across the whole energy system. Each option requires very significant investment in different infrastructure, much of which tends to have a long lead-in time. Without a national consensus it's difficult to make investment decisions on decarbonising heat at a local level due to the risk of ending up with stranded assets.

The East Sussex picture

In 2020 there were 246,700 households 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 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). Energy efficiency is shown in Energy Performance Certificates (EPCs), which rate the energy efficient 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. Figures 15 illustrates that most properties in East Sussex are in band D or below.

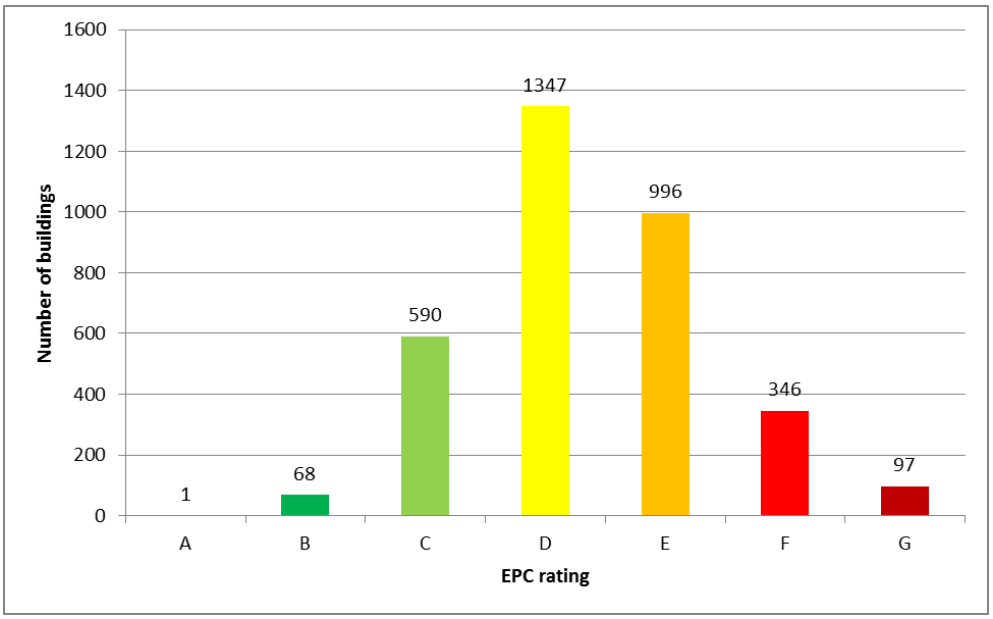

Figure 15. Distribution of Energy Performance Certificate ratings of domestic properties in East Sussex (Source: MHCLG, 2019).

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 amounts to about 230,000 tonnes of CO_2.

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

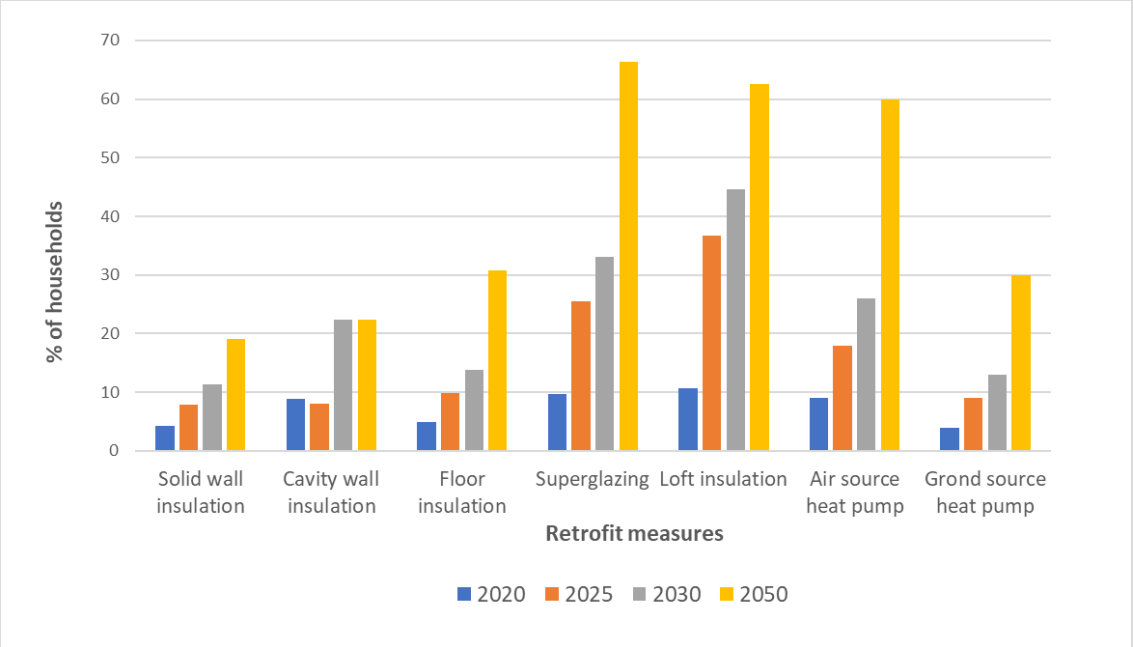

Figure 16. The pace and scale of retrofit measures required in the domestic sector (SCATTER, 2020).

The Barcombe CommuniHeat project has the potential to be the UK's first electric low carbon village and to provide a model as to how rural communities can develop and implement their own Community Area Energy Plans and the relative contribution that rural communities can make to getting to net zero.

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 1).

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

Table 1. 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: has coordinated a programme worth £3.6m over the last few years to reduce fuel poverty (see: About us (warmeastsussex.org.uk)). This has included hundreds of targeted interventions to improve heating and insulation measures and connecting fuel poor households to the gas network. Successful bids to the national Green Homes Grant fund has secured an additional £2m in 2020-21, with a bid for a further £2.2m being made to scale up the delivery of low carbon retrofit to those in fuel poverty up to 2022-23.

2) local community energy groups: are working with a range of partners to investigate how to transform whole areas, notably the villages of Barcombe and Firle Estate in Lewes, to net zero. Both areas are rural and off-gas grid communities that are investigating the costs, efficiency, and electricity network impact of different approaches, including heat pumps, heat networks and electric vehicles, which could be replicable models for affordable and community-owned low carbon energy for other rural villages. 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 short term priorities to decarbonise domestic buildings are focused on:

- improving the energy efficiency of properties, as these are 'no regret' options and will ensure that heat pumps are more effective when they begin to get rolled out at scale in the second half of the 2020s.
- beginning to decarbonise heat, for instance through installing heat pumps.
- supporting those in fuel poverty.
- the public sector (ie. stock-owning local authorities, who own 9,500, or 4%, of domestic properties in East Sussex and Housing Associations).
- community energy organisations leading on enabling whole communities in the private able-to-pay market to decarbonise.
- Encouraging 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 than within 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 EU Emissions Trading Scheme and the UK Climate Change Levy), 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 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 businesses to cut carbon. 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, which is one of the essential steps to driving a post Covid green recovery.

The East Sussex context

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 levels that occupiers are prepared to pay means that there is limited incentive to invest in upgrading much of the existing building stock.

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 targeted and prioritised interventions.

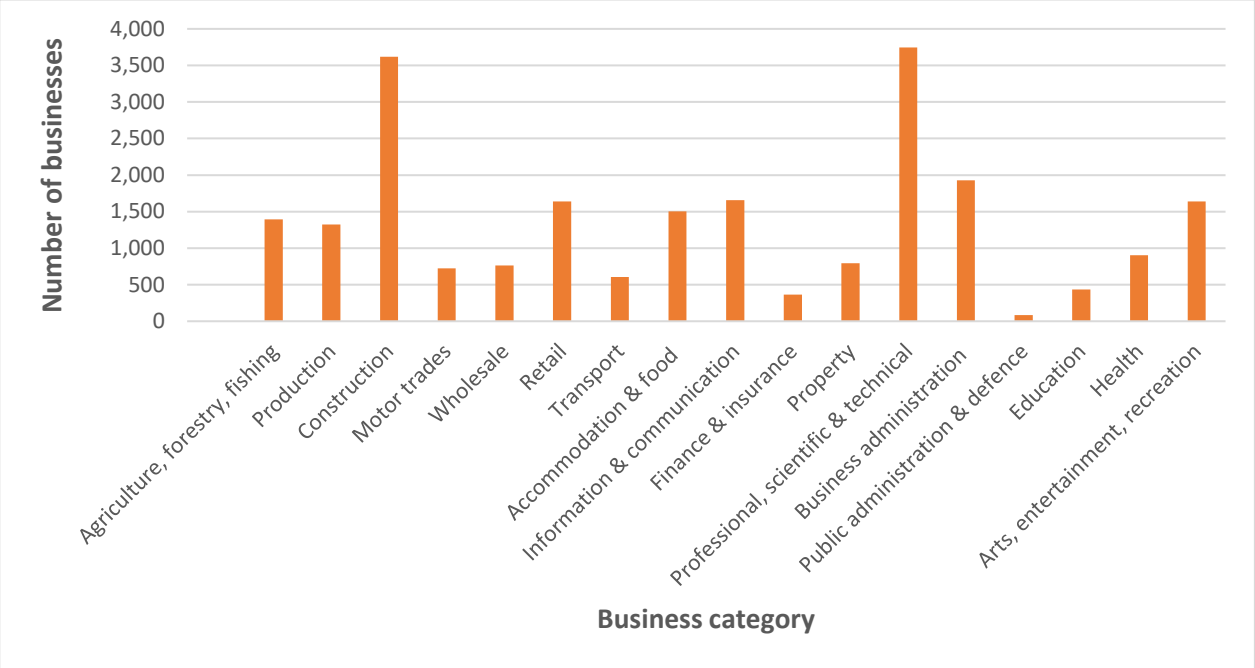

Figure 17. Businesses in East Sussex by UK Standard Industrial Classification (ESiF, 2021).

There are a large 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 the non-domestic sector include:

- Low Carbon Across the South East (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 programme that 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.

The scale of change from these programmes currently remains low. For example, between 2016-20 the LoCASE programme assisted nearly 140 businesses to cut 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 organisations 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 disposed at landfill sites.

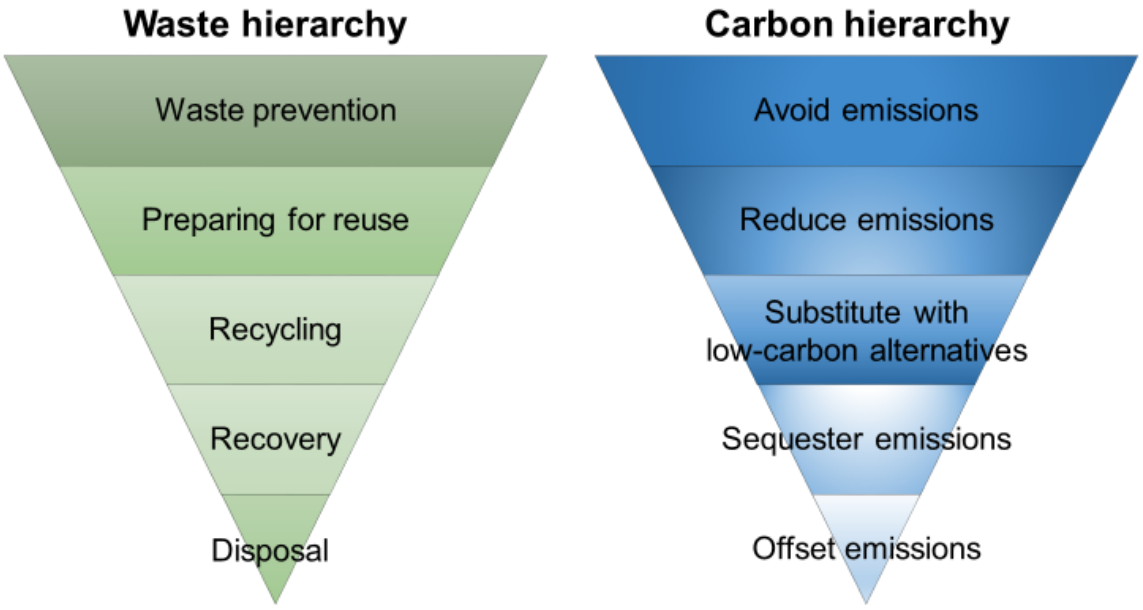

Figure 18. The waste and carbon hierarchies.

Options for reducing emissions from waste and minerals include:

Measures for reducing emissions from waste management include:

1) Adopting a circular economy model to reduce the volume of waste that is 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 our 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. The waste industry can also explore opportunities to implement carbon capture, utilisation and storage (CCUS) technology to capture the remaining emissions from energy recovery facilities.

4) Minimising the transport of waste materials and transition to low-carbon forms of transport as the technology matures.

5) Reduce 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 compositing 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 EfW facilities, which are, in turn, driven by UK consumption of products and food, combined with waste reduction programmes and reuse & recycling infrastructure. 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. They 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 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). A major bearing on the future direction of the waste industry is the government's Resource and Waste Strategy. This contains proposals that will contribute to reducing carbon emissions from waste, including eliminating food waste from landfill by 2030, reforming the packaging producer responsibility system, the launch of a deposit return scheme and measures to make collection of recycling from households and businesses more consistent.

The Resource and Waste Strategy is being incorporated into legislation through the Environment Bill, which contains a number of proposals that would contribute to reducing carbon emissions from waste, including eliminating food waste from landfill by 2030, reforming the packaging producer responsibility system and introducing consistent household recycling collections. However, these measures fall short of the recommendations made by the Committee on Climate Change, for instance to achieve a 70% recycling rate by 2030. The waste and minerals sectors are likely to continue to make a small contribution to national carbon emissions that remains difficult to reduce.

Like most parts of England, local councils and businesses are waiting on clarity from the government as to what will emerge from the Environment Bill, since this may lead to substantial changes to how waste and recycling is collected, and what happens to it. However, what is clear is that 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 Environment Bill may require modifications to be made to waste facilities such as transfer stations and material recovery facilities. District and Borough Councils may need to invest in new fleet and bin infrastructure. Planning is underway to prepare for these changes which are expected to happen from 2023/24 onwards.

The Environmental Services Association, which represents the waste industry, has committed the sector to achieving net zero by 2040. It's 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 East Sussex picture

The best estimate for 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.

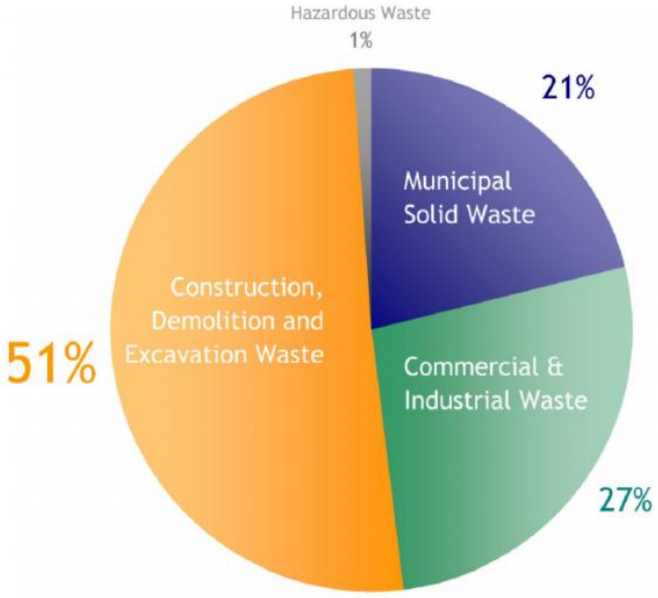

Figure 19. Solid waste generated in East Sussex (ESCC, 2018).

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, less than 3% of household waste is landfilled, compared with over 50% a decade ago (figure 19a).

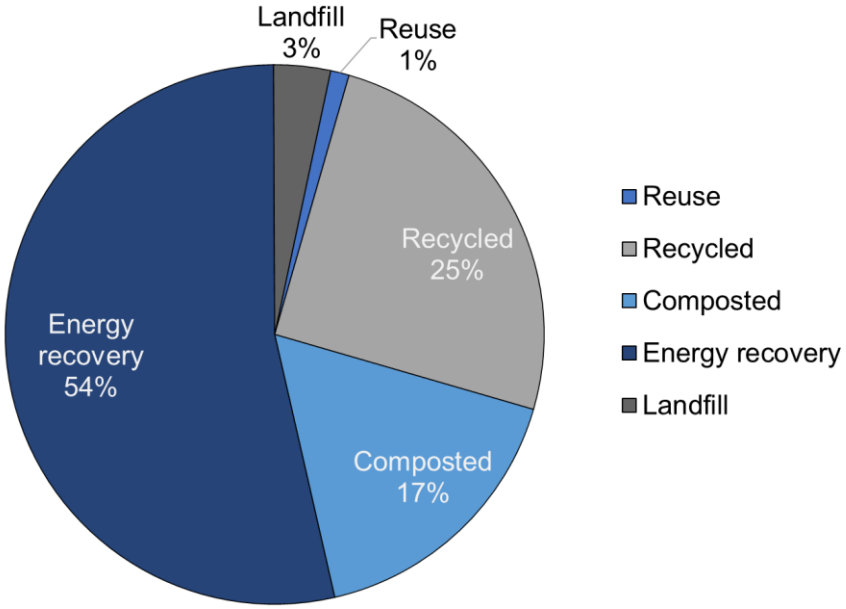

Figure 19a. Local authority collected waste by disposal method (2019/20)

Estimates of the recycling rates for commercial and industrial waste recycled 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 enough electricity to export over 130,000MWh of electricity to the National Grid, which is enough to power 25,000 homes. Metals are extracted from the residue whilst 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 there are still significant gas emissions. The largest of these sites is located at Pebsham near Hastings, where methane captured from the landfill site generated around 9,000MWh of electricity in 2020. At the other three sites an estimated 630,000m^3 of landfill gas is safely 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.

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. It also contributes to ensuring security of supply, protects consumers from rising electricity prices and provides an opportunity for individual and community ownership of local renewable generation and to diversity income. For example, a third of farmers in England have renewable energy projects.

The national picture

Figure 21 illustrates the change in the fuel type used to power the electricity network between 1990 – 2019. 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 gCO_2/kWh today to around 1-2 gCO_2/kWh by 2050, in large part due to the decarbonisation of the electricity grid.

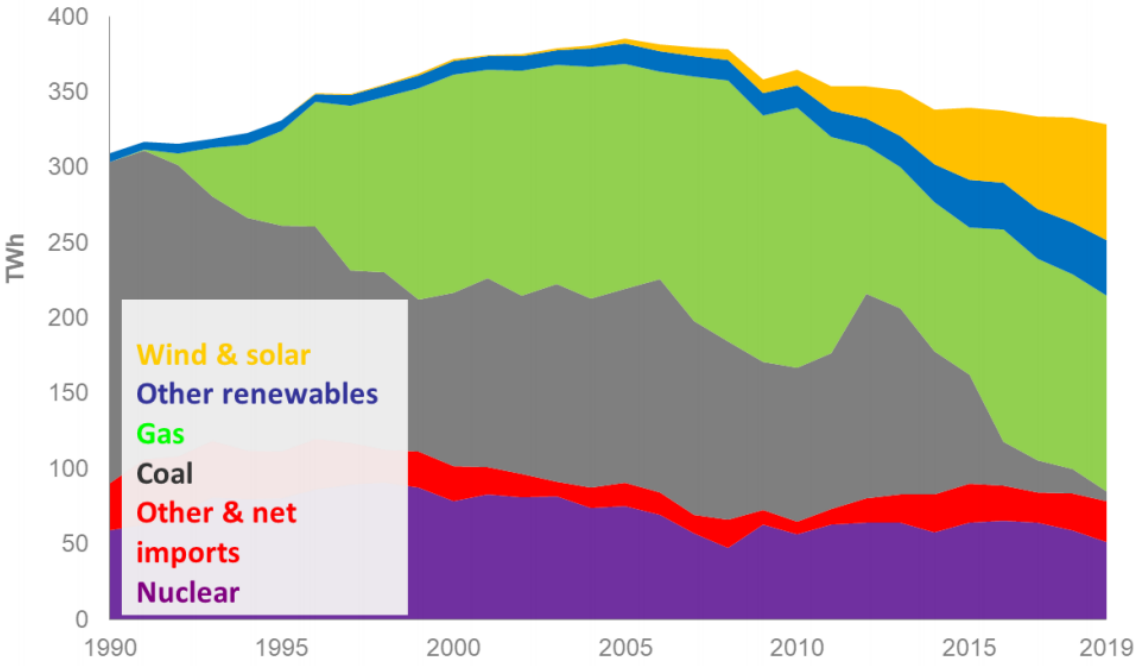

Figure 21. Electricity supplied in the UK by fuel type between 1990 - 2019 (source: BEIS, 2020).

The main government policy currently in place to drive up renewable energy generation capacity 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, and 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 to reinforce the 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.

The East Sussex picture

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

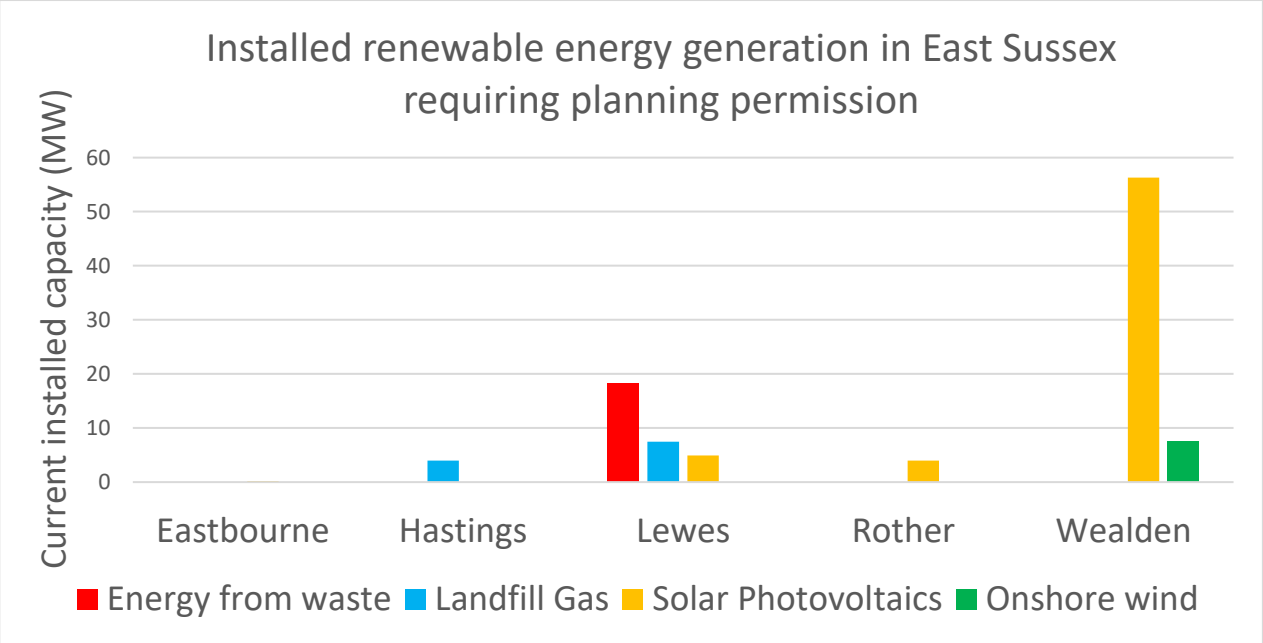

Figure 22. Installed renewable energy generation in East Sussex requiring planning permission (BEIS, 2021).

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.

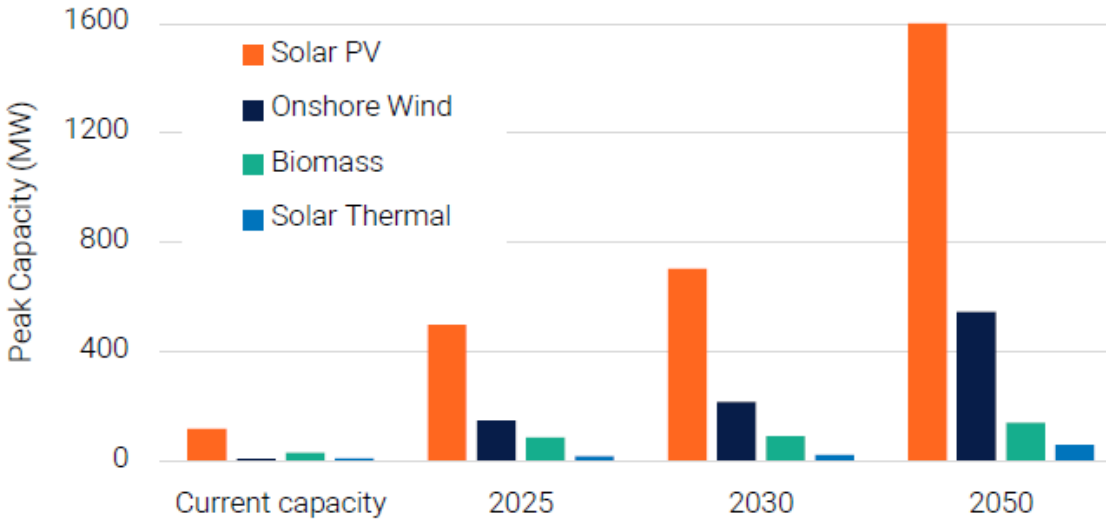

Figure 23. Solar PV, onshore wind, biomass and solar thermal increases in peak capacity (SCATTER, 2020).

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

- 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.
- Sussex Solar Together: this scheme provides a means for residents to join a Sussex-wide bulk buying scheme to purchase discounted solar PV for their home (figures tbc once the scheme completes later this year).

3.6 Agriculture and land use

Options to reduce greenhouse gases from agriculture and land use

There are two aspects to agriculture and land use:

- Reducing greenhouse gas emissions from farming and land use.
- Using land to off-set carbon emissions that are unavoidable from other activities, 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. Emissions can be reduced through a wide range of site-specific farm practices, for instance reduced tillage, innovation such as the adoption of precision farming, changes to the management of wastes and manures, and measures to improve the fuel efficiency of farm machinery. However, not all measures are appropriate for all crops and soil types, and 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 are simply exported elsewhere.

Offsetting

The energy hierarchy recommends that emissions should be reduced as much as possible before any residual emissions are compensated for by using off-setting, which refers to when an organisation or individual removes an amount of carbon from the atmosphere that is equivalent to the amount of carbon that they have emitted. In other words, offsetting enables people to deal with any unavoidable carbon emissions. This could be by investing in renewables, changes in land use to increase carbon sequestration and/or carbon removal technologies. Carbon sequestration through land management is the ability of soils and vegetation to absorb and store carbon. Carbon removal 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 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 the need to be addressed to ensure that investing in natural capital carbon off-setting delivers what is intended, such as the permanence and additionality of the removal of carbon, 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 and managers. However, 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 co-benefits can come from both reducing carbon emissions from farming and land use and from well-designed and delivered natural capital carbon off-setting. 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 are about 55 MtCO2e, which is about 10% of total UK emissions. Emissions from agriculture are a more complex mix than other sectors, with around 40% being nitrous oxide (N_2O), 50% being methane (CH_4) and 10% being carbon dioxide (CO_2). The land use and forestry sector in the UK is a net carbon sink, with about 10 $MtCO_2e$ being sequestered in 2018, which is equivalent to abating around 2% of total UK carbon emissions. In other words, the agriculture and land use sector is both a source and sink of greenhouse gases.

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 they 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 about 9,000 hectares per year currently

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.

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. This would be 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 various 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, which will retain investment in off-setting in the local area, whilst maintaining essential functions such as food production. 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 CO_2 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 its relatively high level of woodland cover compared with most of the rest of the UK, the high level of environmental designations and the relatively large land management workforce. The sector is supported by the training and education provided by Plumpton College amongst others, which is putting together training courses to maximise the opportunities from the new Environmental Land Management scheme.

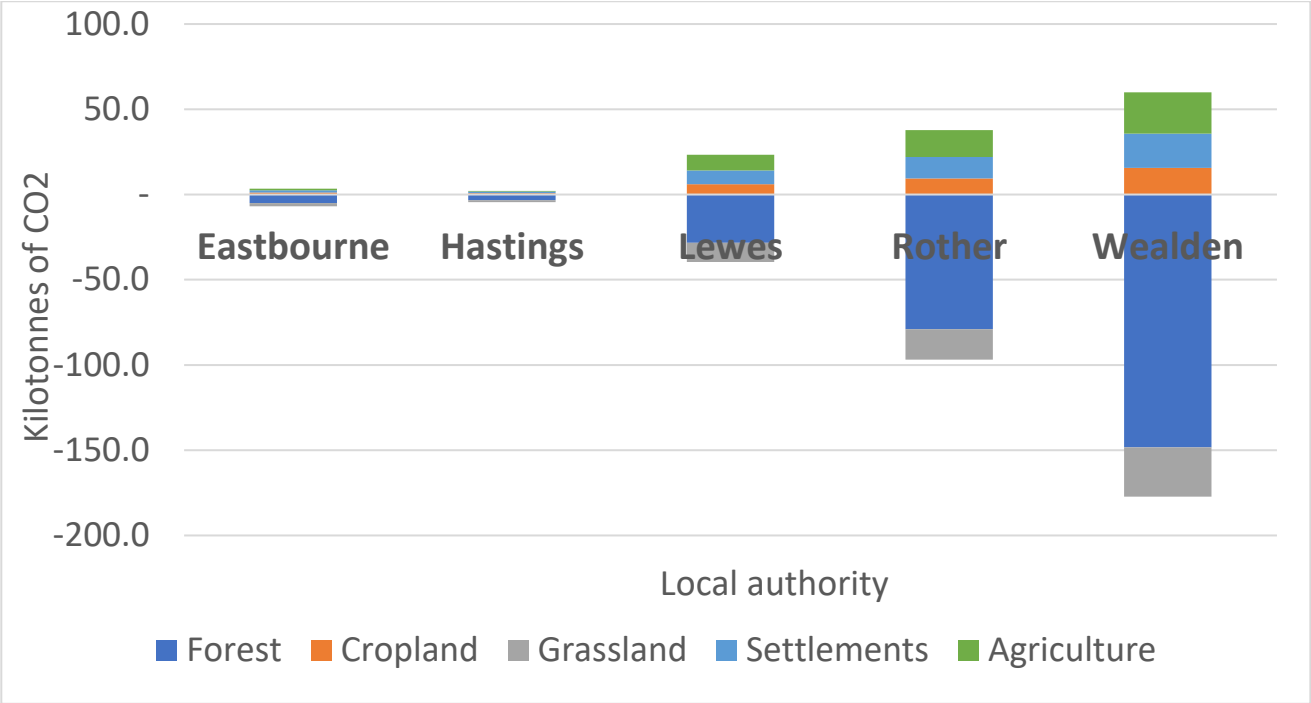

Figure 24. Carbon emissions and sequestration from agriculture, land use and forestry by district and borough in 2018 (BEIS, 2020).

Action

The current baseline and the national and local context indicate that the short-term partnership priorities in East Sussex are to:

- Support programmes for the farming sector to reduce greenhouse gas emissions and encourage investment in farm renewables.
- Increase understanding of local natural capital carbon off-setting opportunities.

Appendix 5 - 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. Both mitigation and adaptation are needed.

Even if all 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 the capacity to adapt. Figure 25 summarises the effects of different levels of climate change, globally and in the UK.

Impacts are already, and will be, felt by all areas of society, but deepest by the most vulnerable. As a result, we need to both reduce carbon emissions in order to mitigate the cause of climate change, but also make changes to our infrastructure, built environment, social systems, economy and natural environment to make us prepared.

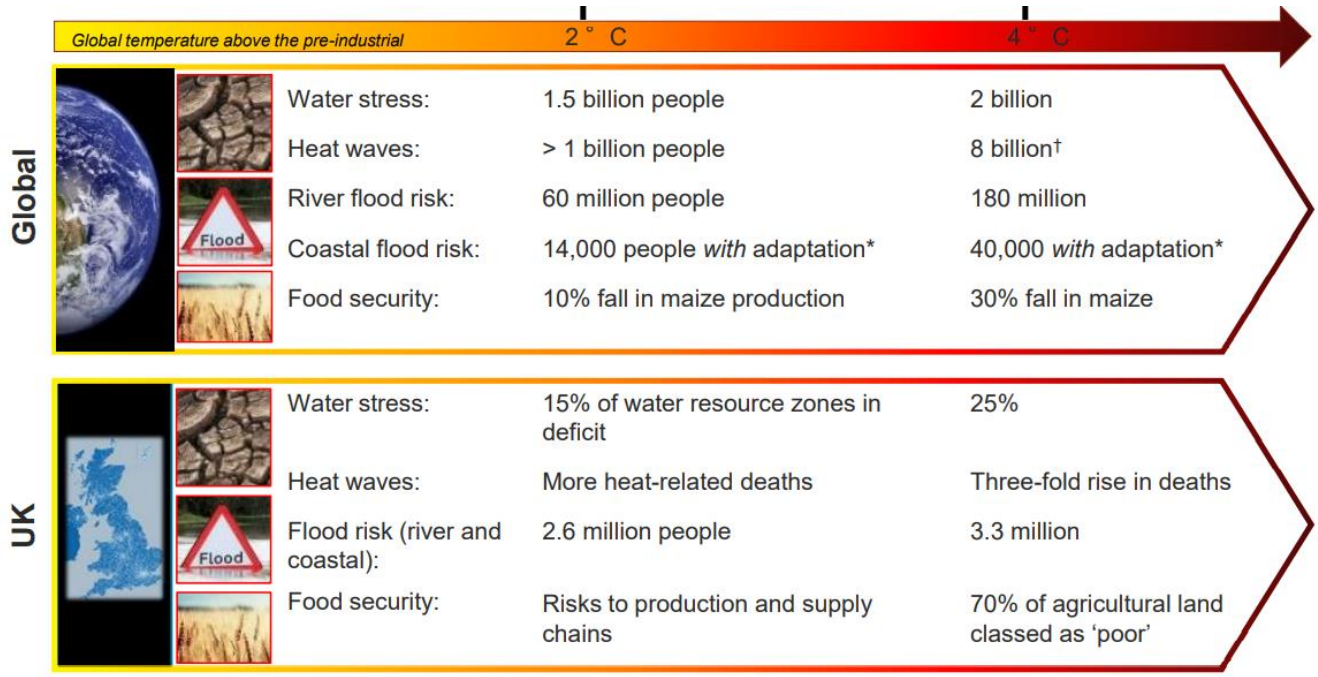

Figure 25. Global and national risks from different levels of climate change (source: Met Office, 2020)

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 their climate projections for the next century based on different rates of greenhouse gas emissions into the atmosphere. 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. For instance, in England around one in six properties and over half of water and sewage treatment works are already in areas at risk of flooding from rivers, the sea or surface water. The greater the increase in climate change the greater will be the need – and the higher the cost – of adaptation. 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, as highlighted in figure 25.

The Climate Change Act of 2008 requires the government to carry out a 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 adaptive approach to building resilience to climate change. 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.

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. The map below shows the likely impact from sea level rise on our communities through 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 rates of people aged over 65 in the UK, which is the group that is most vulnerable to the effects of increasing summer temperatures, and this rate is forecast to increase over the next few decades.

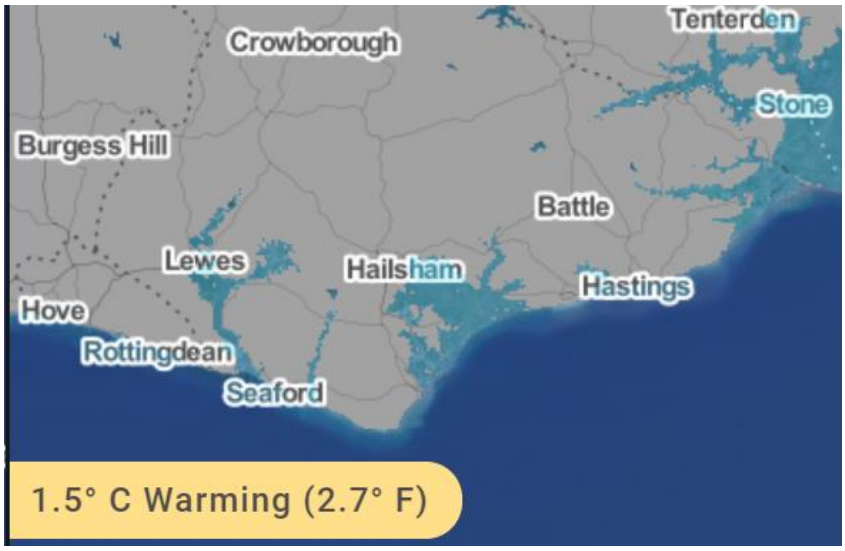

Figure 26. The effect of a 1.5°C warming on flood risk in East Sussex.

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, coastal flood risk is the responsibility of the District and Borough Councils and the Environment Agency, whilst the Sussex Resilience Forum is required to plan for the effects of extreme weather, including storms, flooding, heatwaves and droughts. In addition, a number of organisations are responsible for developing long-term plans to address specific climate change risks, for example water company drought plans. However, currently there is no integrated approach to climate change adaptation in East Sussex.

Action

All East Sussex coastal settlements will be affected by the increasing risk from flooding of the coastal plain, such as at Eastbourne or the Pevensey Levels, or coastal erosion, such as at Peacehaven and Telscombe. The approach being adopted in East Sussex, with a small number of exceptions, is to hold the line and continue to protect coastal towns. The Environment Agency is building on the success of projects such as the £18m flood defences at Newhaven by investing nearly £200m in East Sussex 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 6 – Cross cutting themes

6.1 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 easily kept 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 seems 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 benefits and costs associated with improving behavioural energy efficiency tend to be much more difficult to quantify than technical improvements such as heat pumps.
- 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 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 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 in how we travel and what we choose to eat.

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 easy, 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.

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 ideas and becoming champions of change. This uses the skills, ideas and perspectives of local people, which is more likely to lead to initiatives being more 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.

- Some people's behaviours are much more polluting than others.
- Some people are much more able to pay for the cost of changes.

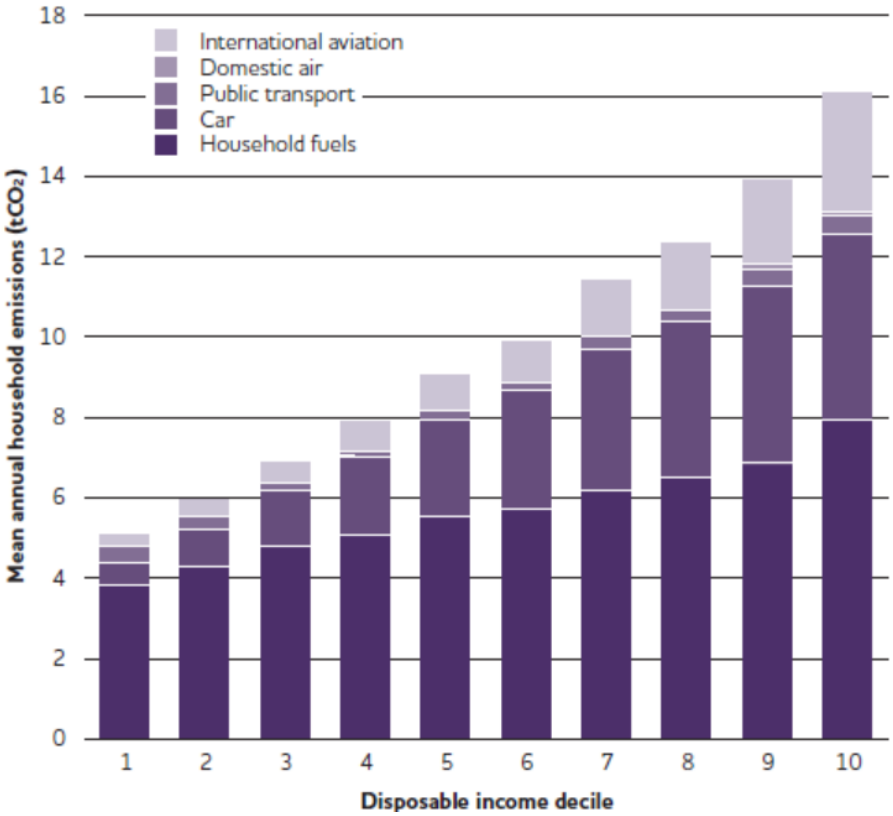

Figure 27. Mean annual household CO_2 emissions by disposable household income decile (source: Joseph Rowntree Foundation).

6.2 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 40,000 new jobs in the next 2 years, and that nearly 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 x 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).

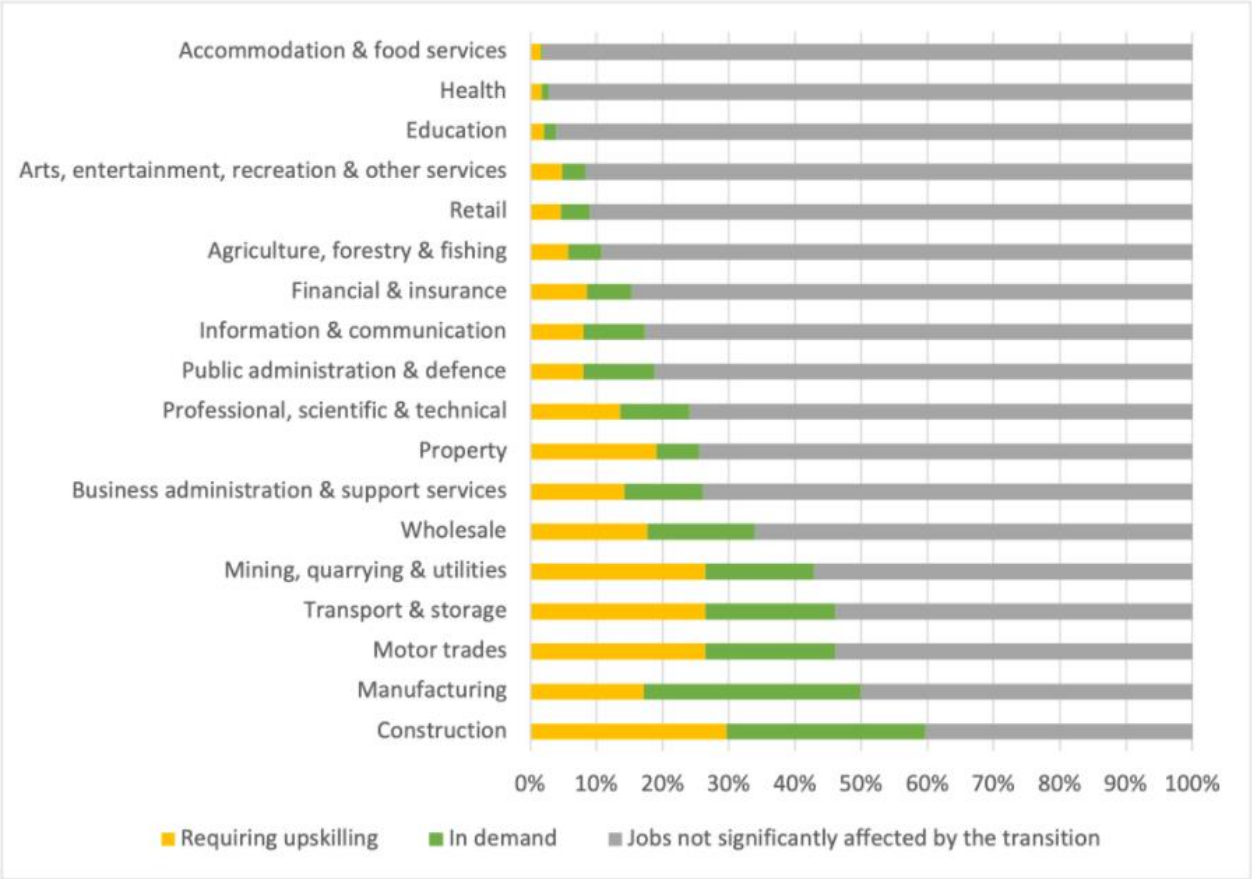

Figure x. (Place Based Climate Action Network, 2020).

The government set up a Green Jobs Taskforce in 2020 to provide an independent assessment of the evidence on 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 is planning to take up the Taskforce's recommendations in its proposed Net Zero Strategy. In the meantime, it has set up a Green Apprenticeship Advisory Panel to identify existing apprenticeships that best support green career pathways, it has included some relevant green jobs in its 'Free Courses for Jobs' offer, such as in construction, forestry and engineering, and is 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 (figure 28). This is about 6% of businesses and GVA in East Sussex. 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 clean growth 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.
- 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 from de-carbonising the economy.
- 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 registered or compliant with PAS 2030 standards or certified under 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 required 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 from developing.
- Need to work out who stands to gain and who stands to lose.

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

- Chichester College Group secured £7m of Strategic Development Funding for a range of low carbon programmes across Sussex, including land management training to be led by Plumpton College.
- the East Sussex College Group will be creating a Green Technology Training Centre at Ore Valley as a centre of excellence in retro fitting and green energy installation though a successful £3m Town Deal bid.
- The Sussex Chamber of Commerce is leading the Local Skills Improvement Plan to help match training with local skills gaps.
- Skills East Sussex established a Net Zero skills working group in April 2021, which will look to pull this information together and undertake mapping of existing and planned educational, training and

skills provision in East Sussex in order to inform a strategy to help address the skills and jobs required for the transition to net zero.

- 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.

A key priority is to develop a strategy for net zero skills and jobs in East Sussex.

6.3 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. The right kind of planning policies can help to support the aspects of decarbonising transport, the domestic and commercial sectors, and support the development of new renewables and carbon off-set schemes. Appropriate local development policies 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, walking, cycling, public transport and electric vehicles.
- Supporting renewable energy development.
- Increasing carbon sequestration through land use requirements.

Last year the government published a White Paper with proposals to overhaul the planning system, largely to support the construction of more housing, with the most notable being the introduction of zonal planning, the refocusing of local plans and the introduction of a new infrastructure levy. A new Planning Bill, which relaxes rules on planning permission, will go before parliament in autumn.

All Local Plans in East Sussex are either being prepared or being reviewed. With a revised NPPF imminent (off the back of the Planning Bill), there is 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 faster change.

6.4 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 improved air quality (e.g. from burning less fossil fuels, particularly in

transport), health improvements (e.g. due to more efficient homes, improved diets and active travel) and jobs in the low-carbon transition. The counterfactual is that if we do not act then we will face massive costs from having to cope with the effects of unabated climate change.

The Committee estimates that getting to net zero will require investment to increase from about £10bn/year in 2020 to around £50bn in 2030. There are very significant barriers to increasing to this scale of investment, including the low price of carbon where markets exist, the current lack of expertise on climate change amongst finance professionals to help ensure that they align finance with climate goals, and the uncertainty in the sequence of investment, notably where there is significant innovation taking place (eg. hydrogen, natural capital off-setting).

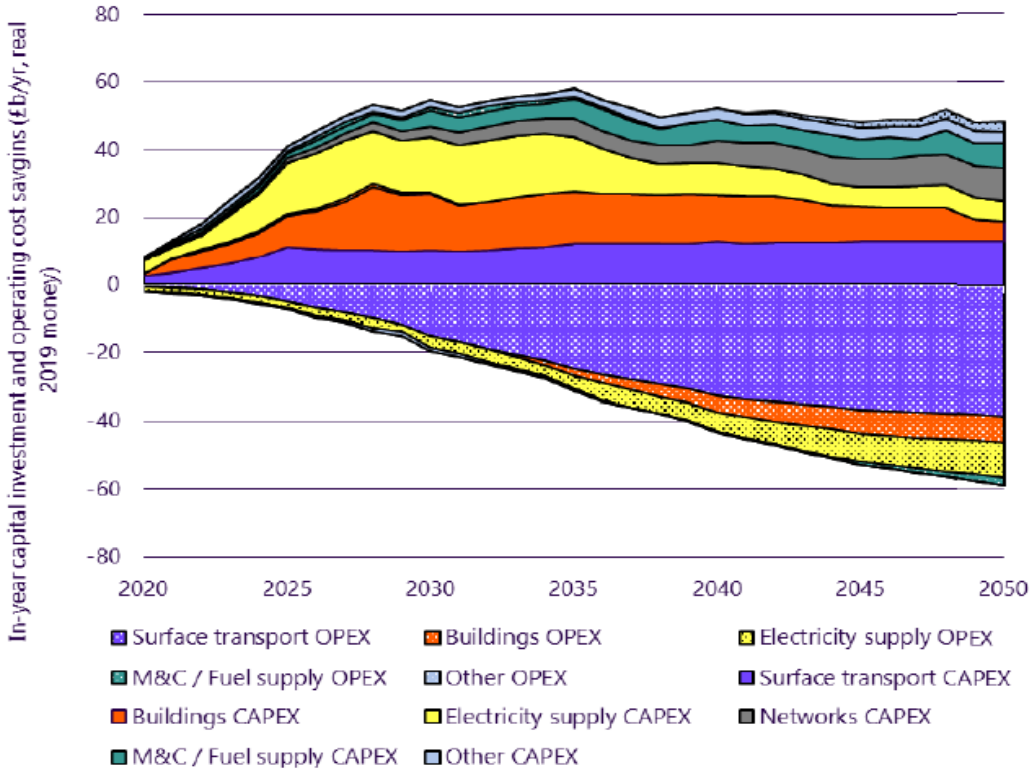

Figure 29. Estimated costs and savings to reach net zero in the UK (CCC, 2020).

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, including from community organisations and individuals, is needed. For example, government uses the levers at its disposal, such as direct risk bearing, tax, regulation, support for research and development and driving public engagement, to provide the right signals and leverage for private capital which, in turn, can drive down costs, as seen, for instance, with the cost of solar PV. It's likely that this kind of public finance will need to be the main source of finance and 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, communities and individuals, particularly as the cost of heat pumps, EVs and so on decrease.

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. 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 expectation as to 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, adds about an additional 13% to household energy bills. Low income households currently pay disproportionately more towards these low carbon policy costs because they spend 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 but not receiving any benefit.

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 share offers from community energy groups in local renewable energy schemes and the consideration of green bonds, or community municipal investments, by one of two 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 net zero infrastructure and activity.

6.5 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 changes to how fuel poverty measures have been funded in the past and 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 achieving net zero.

Many organisations and individuals already lobby their elected representatives or government on climate change. However, there are a number of areas where more collective, partnership lobbying of government by organisations in East Sussex would be beneficial in providing a stronger and consistent message to government and help drive more resources to be allocated to a local level to help address climate change.

Appendix 7 – Electric vehicle strategy

Introduction

This strategy sets out:

- The aims and objectives of working together on an electric vehicle (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 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 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 this work 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 contributing to 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: an average of 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 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 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 is also the sector that has shown the smallest reduction in emissions 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 days lost from work. 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. In July 2020 the East Sussex Economic Recovery Plan was agreed, which includes 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)). This is approximately 4 charge points per 100,000, compared with an average of 27 per 100,000 in England, yet East Sussex has a higher per capita number of EVs. 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 are along the coastal strip with less provision in rural areas.

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 up take of EVs, as well as the fact that most of the current EV owners have off-street parking and so charge at home.

If present provision were to be maintained, over 4 million chargepoints would be required to support the wholesale transition to EVs for all 32 million cars registered in the UK. Whilst improvements in 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 of uptake of EVs in East Sussex, based on low / medium / high levels of uptake that are similar to the national assumptions in the Road to Zero plan on vehicle costs, range, availability of vehicles and charging infrastructure. The low and medium forecasts indicate a modest level of uptake for approximately the next 5 years. 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 would be required to understand how the forecast growth in EVs in East Sussex translates into the number, type and location of EV chargepoints.

The role of the 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. Engaging with key stakeholders will help to understand their plans for their own fleets and for installing charge points.

For example, the wider public sector in East Sussex collectively owns a large number of public car parks and sites such as health, leisure and office sites. Existing partnerships such as the SPACES network provide a useful forum for mapping out key needs.

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 both the public and private sectors will install EV charge points in East Sussex, sometimes with no regard to existing or planned charging infrastructure.

The local authorities will:

1) Integrate their approach to EVs with the Local Transport Plan and the Cycling and Walking Infrastructure Plan.
2) Work with relevant partners to develop an effective spatial distribution of appropriate charge points across East Sussex, to ensure 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 council 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) 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.
7) 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.
8) Ensure EV user needs are central to the development of EV charging infrastructure.
9) Seek to ensure the equitable provision of charge points to communities across East Sussex.
10) ensure that all electricity used to supply EVs is from renewable energy sources.

Actions

The actions that will be taken to implement this approach are summarised in table 2.

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: understand the plans for EVs and charge points from adjacent Highways Authorities, local logistics firms, hospitals, shopping centres, car clubs, key travel destinations (eg. railways, supermarkets, large employers, visitor sites), the taxis trade and local authorities.
	Site selection: develop an agreed prioritised list of sites.
	Procurement: share information on the market and procurement options and seek to develop a consistent offer to EV drivers.

Appendix 8 – 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. 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 a national picture of current progress with the decarbonisation of the transport sector across all English local transport authorities and LEPs to achieve better co-ordination of existing activity and inform their future work. In addition, TfSE has a decarbonisation working group.

- 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 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 is a regional umbrella organisation that supports local community energy groups to generate local energy supplies, for instance community-owned solar PV schemes, reduce fuel poverty and 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 Local Nature Partnership, which is a partnership of public, private and environmental organisations that works to protect and enhance the natural environment (Sussex Local Nature Partnership (sussexlnp.org.uk).

- Hydrogen Sussex, which is a partnership of the private and public sector that aims to develop local green hydrogen production, storage and use, notably in transport (Hydrogen Sussex)

- Sussex Air, which 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.

- 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 all the district and borough councils in addition to a number of interested community groups.

Appendix 9 - 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 the Strategy will be reviewed and reported on every year and, subject to progress and resources, additional actions will be agreed every year. The effect of the actions will be tracked through a small number of targeted performance indicators, to provide reliable and objective information about whether the environment is improving over time or not and where more action may be needed to achieve the long term goals set out in the Strategy. The link between actions taken and environmental change is often not direct or immediate, and data may show year-to-year fluctuations that are difficult to assess. These factors will be addressed in the annual progress report and the indicator framework will be kept under review so that it continues to be relevant and provide a useful, transparent and cost-effective way of assessing progress.

The road map will be updated every 2 years in light of changes to legislation, policy, technology and resources, and notably to consider the opportunity to accelerate delivery. Monitoring will be carried out by the partners that form the East Sussex Environment Board.

Key metrics:

- CO2: by area, sector, per capita (BEIS).
- Transport: distance travelled by mode, change in modal share, EV share of fleet (ESCC & DfT).
- Domestic buildings: EPC ratings (C-Path).
- Non-domestic buildings: EPC ratings (tbc) (C-Path)
- Waste: household data (ESCC).

Glossary

Acronym	
ASHP	Air source heat pump
BAU	Business-as-usual
BEIS	Dept of business, energy and industrial strategy
CCC	Committee on Climate Change
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
SCATTER	Setting city area targets and trajectories for emissions reduction
SELEP	South East Local enterprise partnership