

Hastings Climate Emergency Strategy and Action Plan

The Evidence Base

2020

Contents

Contents	Page
1 Introduction	3
2 The IPCC Special Report on Global Warming	3
3 Hastings Climate Emergency	4
4 What does climate change mean for Hastings?	5
5 Where are we now?	5
Fuel Consumption	6
Baseline evidence – the Greenhouse (Carbon) Gas Emissions	6
6 Modelling approach and assumptions	8
7 Key findings of the analysis	11
8 Hastings Council Role in moving towards carbon neutral Hastings	12
References	
Appendix	
Appendix 1 Policy Drivers for Achieving Net Zero Emissions	14
Appendix 2 Fuel Consumption in the Borough	19
Appendix 3 Carbon Projection Modelling methodology	21
Appendix 4 Understanding the interventions to meet net zero carbon emissions by 2030	27

1 Introduction

1.1 The climate is changing due to emissions of greenhouse gases resulting from human activity. The scale of the challenge that climate change presents us with is unprecedented. The bulk of emissions are a result of our demand for energy, where the largest contributor is carbon dioxide (CO₂), emitted when fossil fuels (coal gas and oil) are burnt to meet those demands; other greenhouse gas emissions are associated with industrial processes and agriculture.

1.2 The impacts of 1°C increase are being felt today, including the increased frequency and magnitude of extreme weather events from heatwaves, droughts, flooding, winter storms and wild fires. Average temperatures for the last 10 years have been the highest on record, with 2019 being the second hottest year on record. The risks associated with a 2°C temperature rise include the loss of over 99% of coral reefs, loss of habitats that support pollinating insects essential for crop and plant pollination. The arctic ocean is likely to be completely bare of sea ice once every 10 years and millions of people living in coastal areas will be more vulnerable to sea level rise.

1.3 There are a number of key international and national reports and policy drivers which have provided the context for the need to dramatically reduce greenhouse gas emissions and are important considerations in directing action to address the threat of climate change. These are described in Appendix 1 and include The Climate Change Act 2008, Clean Growth Strategy and South2East Local Energy Strategy 2018. These have been used extensively to inform the analysis that underpins this climate emergency plan and the direction of travel.

2 The IPCC Special Report on Global Warming

2.1 In response to the Paris Agreement, the Intergovernmental Panel on Climate Change (IPCC) special report on Global Warming, published in October 2018, describes the risks that a 2.0°C rise is likely to cause compared to 1.5°C, including increased risks to health, livelihoods, food security, water supply, human security and economic growth. The report found that limiting global warming to 1.5°C would require 'rapid and far-reaching' transitions in land, energy, industry, buildings, transport and cities. The report emphasised that with ambitious action from national and sub-national authorities, civil society, business and local communities, it may still be possible to limit warming to 1.5°C. In addition, the recent Intergovernmental Panel for Biodiversity and Ecosystem Services (IPBES) stated that around 25% of the world's species are now at threat of extinction due to habitat loss and the effects of climate change.

3 Hastings Climate Emergency Motion

3.1 As a direct result of the IPCC report and the growing body of scientific evidence regarding climate change, in 2018 a worldwide movement of climate emergency declarations emerged including a range of organisations and councils from around the

world. In February 2019 Hastings Borough Council passed a motion to declare a 'Climate Emergency' to:

- to make Hastings carbon neutral by 2030
- take advantage of new powers as they are made available to us by central government
- work towards supplying 30% of the town's electricity by 2030
- update the low carbon and renewable energy policies as part of the Local Plan review to deliver energy efficient new developments and renewable energy projects
- Update the Councils sustainable procurement policy to take account of climate change
- Work with partners to increase the EV infrastructure in the town
- Reduce the Councils and towns reliance on single use plastics
- Maintain Council land to maximise species diversity and mitigate species extinction
- Incorporate an evaluation of climate change implications in all reports to council committees
- Appoint a lead councillor 'Climate Change Champion'
- Work with partners to help to deliver the climate change emergency commitments

3.2 To become a carbon neutral borough by 2030 is a very ambitious target and will require the Council to work in partnership with a wide range of stakeholders, businesses, community organisations and residents of the borough. This commitment creates great opportunities and the potential to achieve significant economic, social, and environmental benefits. There are many co-benefits of working towards becoming carbon neutral by 2030, and reducing greenhouse gas emissions. These include reducing the number of fuel poor households and the associated health impacts on local people living in cold homes through energy efficiency measures; the improvement to local air quality associated from vehicles and associated switch to active forms of movement including walking and cycling and their associated health and community benefits.

3.3 There are significant economic gains to be made from moving to a low carbon economy. Hastings residents and businesses currently spend approximately £65 million a year on electricity and gas, this spend is currently exported from the town. There are opportunities to create new skills, jobs and businesses as we switch to an electrified transport network, more local sustainable energy production and electric heating at home and in our businesses. Improving opportunities to cycle and walk makes our communities and neighbourhoods more dynamic places to live and work.

4 What does climate change mean for Hastings?

4.1 While certain parts of the world will have more severe and imminent impacts (such as low lying areas in South East Asia), Hastings and the wider UK are not immune. The UK Climate Projections (UKCP) 2018 provides the most up to date assessment of how the climate of the UK may change over the 21st Century. The projections are based on the latest

developments in climate science and cover both land and marine environments. The findings are an essential tool when considering climate change risk assessments and adaptation plans.

4.2 The Government has established the National Adaptation Programme and the Committee on Climate Change Adaptation Committee July 2019 report 'Progress in preparing for climate change' highlighted that England is not prepared for even a 2.0°C rise in global temperature, let alone more extreme level of warming. In the last few years, the UK has seen and felt the impact of extreme weather events impacting on its national infrastructure.

4.3 In Hastings there are visible impacts of climate change including increased winter storminess, winds and rainfall, storm intensity, as well as hotter, drier summers causing drought conditions. The summer of 2019 was the joint hottest ever recorded in England.

In Hastings, we at most risk from

- Changes to the coastline and flooding
- Heat waves and the associated risks to health and well-being from higher temperatures
- Drought and risk of water shortages
- Impacts on local ecosystems and biodiversity
- Impacts on local food production
- Impact of new disease and pests and non-native species affecting wildlife

5 Where are we now?

5.1 Developing the action for how Hastings can work towards becoming carbon neutral depends on a sound understanding of not only where we have come from, but also where we are now and ultimately where our current plans are taking us. AECOM consultancy have been commissioned to provide the initial evidence base to help us ensure that our collective response to the climate emergency is based on science based targets and expert guidance to ensure we deploy the most effective solutions to help us tackle climate change. This is hugely important to understand which sectors we should collectively be focusing our efforts on. Many of these actions will not be in the gift of the Council to deliver, but it is important that as a key leader the Council has the information required to help shape this transition with local, regional and national partners.

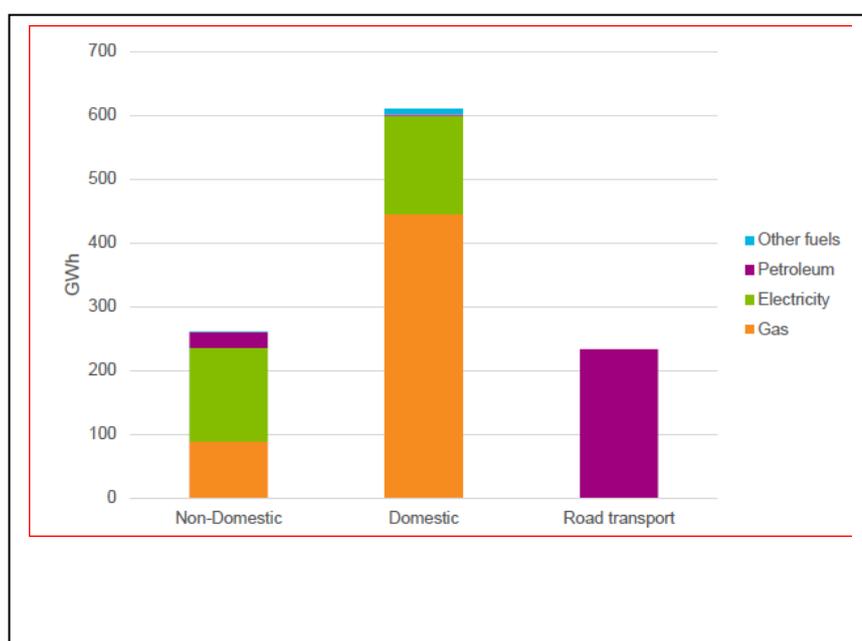
5.2 This section sets out the sectors and fuels that contribute to the town wide emissions within the Borough of Hastings. This helps to provide the context for understanding the carbon emission baseline.

Fuel Consumption

5.3 In 2017, total fuel consumption in Hastings was approximately 1157 GWh – where the largest proportion of fuel consumed was gas (46%)., with electricity and petroleum accounting for 26% and 23%, respectively. Other fuels, including bioenergy and waste, coal, and manufactured fuels make up the remaining 5%. (see appendix 2 for further details of fuel consumption)

Figure 1 below, show that the domestic sector accounts for the highest proportion of energy consumption in the borough, followed by non-domestic and road transport sectors.

Figure 1: Fuel Consumption by sector and fuel type in 2017 (BEIS 2019)



5.4 Within the domestic sector, approximately 73% of fuel consumed is gas and 25% is electricity. In the non-domestic sector, approximately 34% of fuel consumed is gas and 56% is electricity. Petroleum products are predominantly associated with road transport.

Note: Electricity used for transport (e.g. rail and Ultra Low emissions vehicles (ULEVs)) is not represented in the data set

Baseline evidence - The Greenhouse (Carbon) Gas Emissions

5.4 The carbon emission baseline for the borough has been developed using figures provided by the Department of Business, Energy and Industrial Strategy (BEIS). The data set covers Scope 1 and 2 emissions for the Borough, and is published annually: 2017 is the most recent year for which data is available. Historic emissions from 2005 – 2017 are presented for context.

5.5 The data set use data for both energy demand and supply to the town and the associated carbon emissions broken down by sector and by technology type including emissions from energy use as power, heat and road transport.

5.3 CO₂ emission estimates for Hastings area are shown in table 1 below. (UK local authority and regional carbon dioxide emissions national statistics: 200-2017, published in 2019)

Table 1: Hastings CO₂ emissions for 2017 (BEIS 2019) broken down by sector and fuel type.

	Non-Domestic	Domestic	Transport	Total (unadjusted)	Total (adjusted)
Gas	16.4	82.6	-	98.9	
Electricity	37.4	39.2	-	76.6	
Large installations	-	0	-	-	
Other fuels	7.9	1.7	-	9.6	
Agriculture	0.3	-	-	0.3	
Transport	-	-	66.7	66.7	
Total by sector	62.0	123.4	66.7	252.1	249.4
<i>Percent of total</i>	<i>24.6%</i>	<i>49.0%</i>	<i>26.4%</i>		

Land Use, Land Use Change and Forestry (LULUCF)* adjustment: -2.7 ktCO₂

* Note: The adjustment for Land Use, Land Use Change and Forestry 18 (LULUCF) reflects the fact that certain land use activities, such as cutting down or planting trees, result in CO₂ being added or removed from the atmosphere

5.4 Based on the above data total CO₂ emissions in the Borough of Hastings in 2017 were 249.4 ktCO₂. As shown in figure 2 below, emissions for gas and electricity used in buildings together account for nearly 70% of total emissions.

5.5 Figure 3 shows that the domestic sector as a whole accounted for around 49% of total emissions, with transport and the non-domestic sector accounting for 26% and 24% of total emissions respectively.

Figure 2 CO₂ emissions by fuel type in 2017

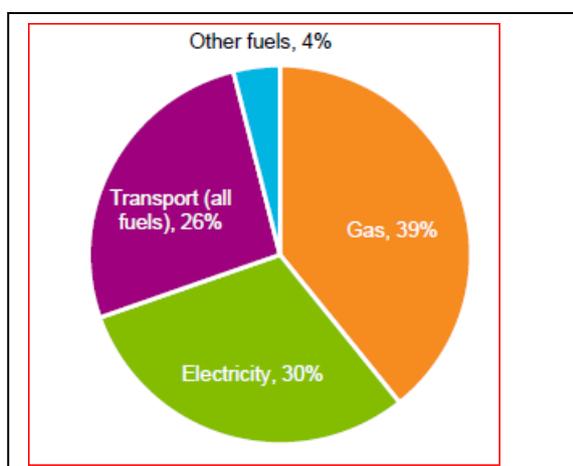
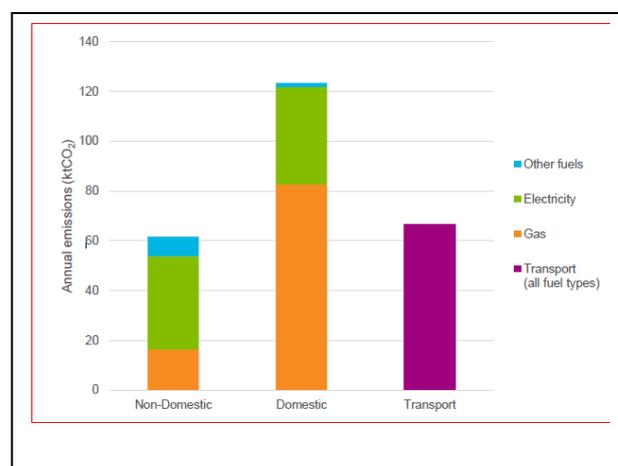


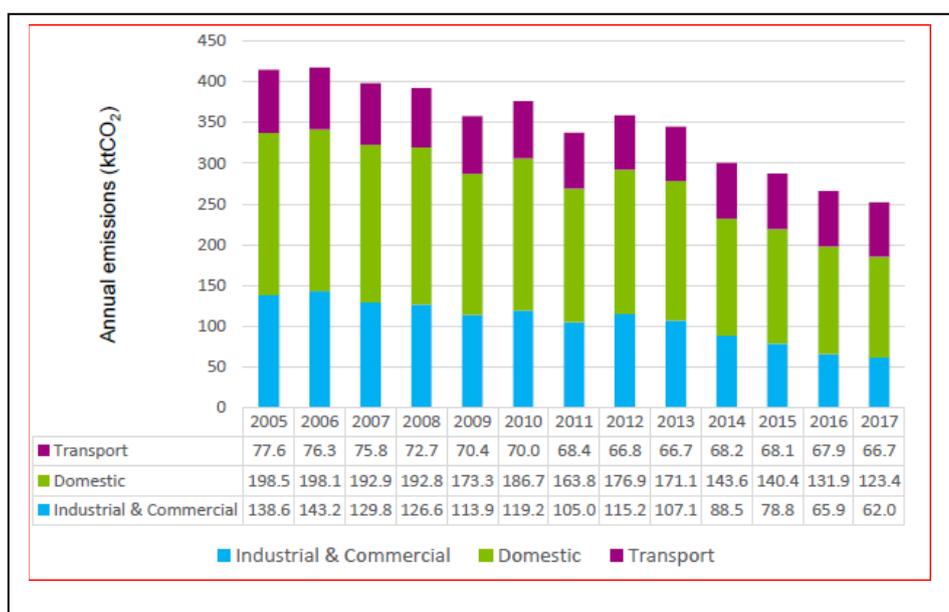
Figure 3 CO₂ emissions by sector 2017



5.6 It is useful to place these figures into context by considering historic trends. The BEIS data set has been used to track a historical trend in emissions in Hastings for the years 2005 to 2017, shown in figure 4 below.

5.7 On average total CO₂ emissions have fallen by nearly 39%, which is both higher than the national and regional reductions of 32% (nationally) and 33% (in East Sussex). For Hastings, as well as the rest of the UK, this is due to changes in fuel consumption and to changes in the carbon intensity of the national electricity grid. If there has been no electricity grid decarbonisation, emissions in Hastings would have decreased by only 19%.

Figure 4 Historic CO₂ emissions in Hastings 2005-2017



When interpreting these results it is important to note that:

- changes in CO₂ emissions do not necessarily reflect changes in fuel consumption or energy efficiency. For example an increase in electricity use could be offset by a decrease in electricity grid emissions
- Similarly, year-to-year changes in fuel consumption relate to factors such as weather and should therefore be interpreted with caution.

6 Modelling approach and assumptions

6.1 Using the data collected in the baseline analysis, working on behalf of the Council, AECOM, has projected carbon emissions to 2030, taking account of committed and planned national interventions e.g. retrofitting existing buildings, decarbonisation of the national electricity grid, heat and transport. The modelling methodology is described in detail In Appendix 3. This modelling work has ensured that the right actions are prioritised to achieve the desired reduction in carbon emissions over the next 10 years.

6.2 The projections consider the relative scale and impact of the following variables:

- National Electricity Grid Decarbonisation
- Energy Demand reduction through energy efficiency measures and behaviour change
- Switching from the use of gas-fired heating to electric systems
- Reducing demand for transport
- Uptake of Ultra Low Emission Vehicles (ULEVs)
- Carbon offsetting through renewable energy generation
- Carbon sequestration

6.3 The model assumes that, in a hypothetical ‘no action’ or ‘business as usual’ scenario no actions are taken to reduce emissions. This is used as a baseline for assessing the cumulative impacts of the intervention measures to reach carbon neutrality by 2030.

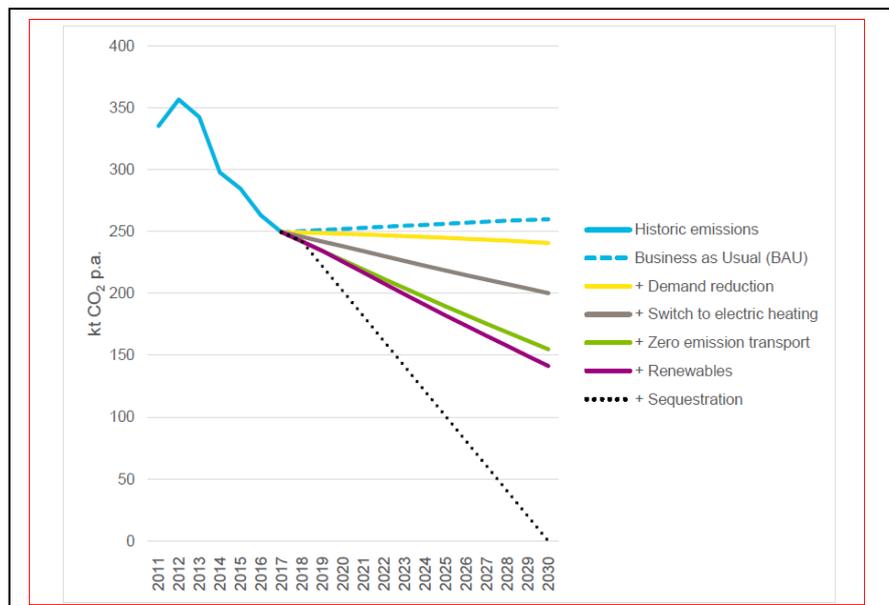
6.4 It is important to note that these scenarios are **NOT** intended to predict actual fuel consumption or CO₂ emissions. Instead, they are used to highlight key issues, providing additional context, and background to inform the actions and recommendations laid out in the Action Plan.

* in reality CO₂ emissions depend on many variables including economic trends, energy prices and weather.

6.5 The following Graphs show the historic emissions for Hastings, along with a hypothetical ‘Business As Usual’ trajectory and routes to new zero, showing the cumulative impact of sequentially adopting measure to:

1. Reduce energy demand in new and existing buildings
2. National grid decarbonisation
3. Switch from gas boilers to efficient electric heating systems
4. Reduce vehicle mileage
5. Switch from petrol and diesel vehicles to Ultra Low Emission Vehicles (ULEV)
6. Install the maximum Low and Zero Carbon energy generation capacity
7. Land sequestration and offsetting

Figure 5 CO₂ emissions in Hastings – No change to electricity grid emissions (2030)



6.6 Figure 5 shows the potential CO₂ reductions that could be achieved assuming there is no change in the national electricity grid. In this scenario, if all measures (excluding renewables and offsetting) are adopted, this would reduce total CO₂ emissions by approximately 43% by 2030. (The residual emissions (141 ktCO₂e p.a.) would need to be made up for through renewable electricity generation and carbon offsetting. For context, this would require around:

- 1,155 MW of ground-mounted PV (i.e. several large solar farms); or
- 425 MW of large-scale onshore wind (several hundreds large wind turbines);
- Approximately 173,300 acres of new woodland. (700 square miles)

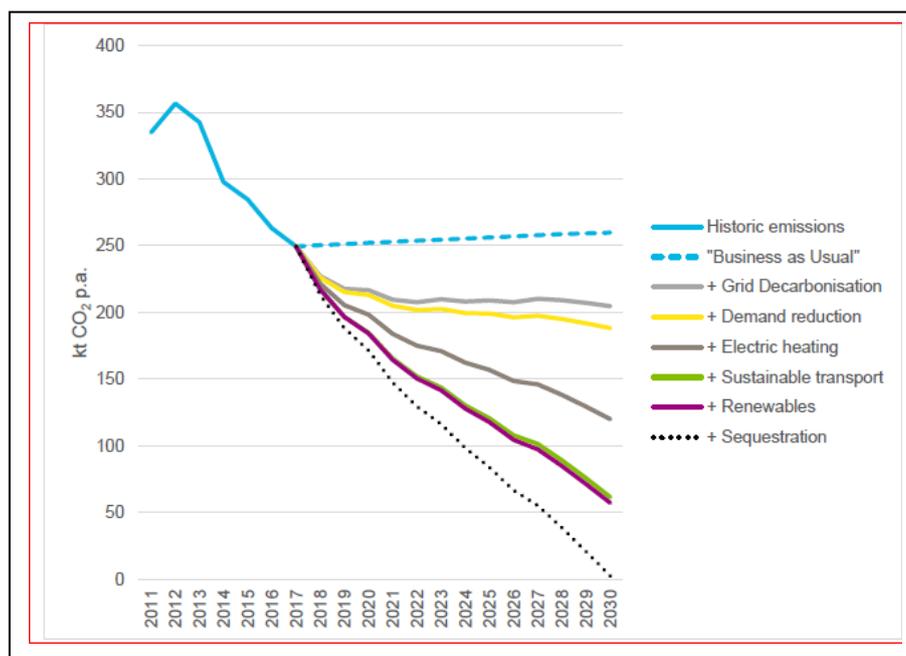


Figure 6 CO₂ emissions in Hastings –Accounting for grid decarbonisation (2030)

6.7 By contrast figure 6 shows what would happen using the same assumptions, and assuming the electricity grid decarbonises at the rate suggested by the BEIS Green Book Guidance. In this scenario, if all measures (excluding renewables and offsetting) are adopted, this would reduce total CO₂ emissions by 77% by 2030. The residual emissions (57 ktCO₂ p.a) would need to be made through renewable electricity generation and carbon offsetting.

6.8 This demonstrates the fact that grid decarbonisations and offsetting will not be enough for Hastings to achieve net zero emissions by 2030– to achieve net zero will require the support of strong actions to reduce demands for fuel in buildings and transportation.

Appendix 3 provides a more detailed discussion of the other trends and changes shown in these graphs. A summary of the relative impacts of each intervention is shown in Table 2

7 Key findings of the analysis

7.1 The table 2 below summarises the potential impacts of the measures described above. It reports the maximum potential percentage (%) reduction in CO₂ that could be achieved through adoption of each measure, compared with a 'Business as Usual' baseline

Table 2 Hastings potential changes in CO₂ emissions by 2030

Potential change in carbon emissions from these measures	Without grid decarbonisation	With grid decarbonisation*
Demand reduction in buildings		
Reduce demand for electricity and heat	-4%	-25%
...and switch to electric heating systems	-20%	-52%
Low carbon transport		
Mileage reduction, no other changes	-3%	-3%
..and switch to ULEVs (excludes HGVs)	-18%	-23%
Renewable electricity generation		
Potential CO ₂ savings from LZC energy generation	-5%	-2%
Total reductions		
All measures implemented (excluding offsetting / renewables)	-43%	-77%
Residual emissions (tCO ₂ e p.a.)	143	58

**Note: The figures quoted for the 'grid decarbonisation' trajectory include the 18% reduction that occurs from grid decarbonisation alone. Therefore, the total reductions may be larger than the proportion of current CO₂ emissions from a given source, and these figures are not directly comparable to those shown for the scenario 'without grid decarbonisation'.*

7.2 These illustrative scenarios are based on a set of assumptions that are considered technically achievable based on current, proven technologies and intervention measures. AECOM advise that in their view, they are not unreasonably ambitious from a technical standpoint. However, in practical terms, achieving this level of decarbonisation over such a short timescale would potentially be very difficult and costly without a significant change in consumer behaviour, along with national-level policies and incentive structures.

7.3 Although CO₂ emissions have decreased in recent years, significant changes must take place across all sectors to achieve net zero emissions by 2030. Based on this analysis, the key priorities prior to offsetting or carbon sequestration are to:

- Reduce the demand for heat and phase out the use of natural gas by switching to heat pumps;
- Reduce demand for transport and switch from petrol/diesel to Ultra Low Emission Vehicles

- Reduce all other electricity demands, in part to minimise pressure on grid infrastructure;
- Meet any remaining energy demands with renewable energy.

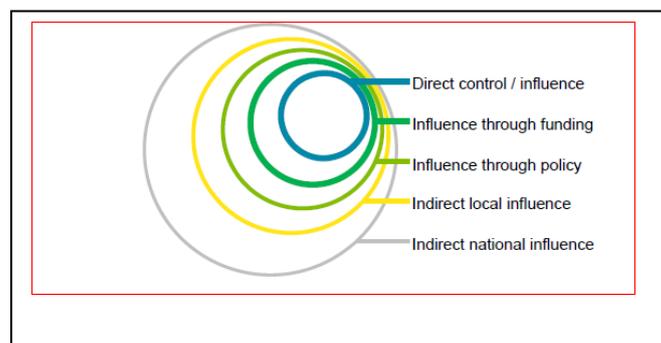
8 Hastings Council’s role in moving towards carbon neutral Hastings

8.1 The Council only has direct control over a small proportion of the total emissions of Hastings, achieving the carbon neutral target will also depend on changes that occur at a regional or national level, and the involvement of the towns business, organisations and residents.

8.2 However, the Council has an important role to play in

- providing leadership to enable, influence, communicate and develop responses that will facilitate the journey towards a carbon neutral Hastings; and
- drive a conversation with our partners and communities about a strong vision and strategy for our carbon neutral future, as well as
- engaging residents, organisations and businesses in taking action now.

Figure 7 Hastings Borough Council Spheres of Influence



For example within the Councils direct sphere of influence are

The Councils Corporate Plan – which sets out the services the Council directly controls
 The Councils funding, policy and local partnership activities
 The Councils regional and national partnerships and relationships and associated influencing role

On this basis potential responses from the Council could include

Direct control/ influence: Taking a leadership by adopting best practices wherever possible by reducing energy demand in our own buildings, adopting behavioural change programmes, switching to renewable energy sources, installing renewable energy on its land and buildings, adopting a zero-emission vehicle fleet, and installing EV charging points in Council-owned car parks.

Influence through funding: ensuring local grant funding , regional and national grant funding takes account of climate change in their delivery and the decarbonisation agenda;

supporting local SMEs that wish to carry out building energy audits through the promotion of local and regional schemes.

Influence through policy for example supporting the delivery of heat networks and renewable energy projects within the area by taking a positive approach to renewable energy generation in planning policies and decision-making. By designing infrastructure and the application of spatial planning policies that reduces the reliance on private vehicles, supporting initiatives that encourage the use of public transport, ridesharing, walking and cycling.

Indirect local influence: supporting higher standards of sustainable design and construction, through awareness and training, working with landlords to encourage the application of whole house retrofitting

Indirect national influence: Lobbying regional organisation and Government to bring forward more ambitious policies e.g. funding for off street EV charging infrastructure, active travel and public transport, national funding for retrofitting and updates to Building Regulations.

9 Action plan

9.1 Given the scale, complexity and urgency of responding to climate change, it is proposed that the 'Action Plan' is seen as something that is phased and iterative in Nature.

9.2 The first phase includes developing the evidence base, identifying the interventions and options to set us on a pathway to become carbon neutral and potential quick wins, as set out in the action plan below.

9.3 The next phase, will include the development of an implementation programme, alongside community and stakeholder engagement to enable the co-design and development of the next phase of the action plan to deliver the level of change needed to meet carbon neutrality. The responsible organisations and partners who are responsible for delivery will develop and become clearer as the plan develops during the coming months and years. Delivery is likely to require large scale mobilisation to deliver projects at scale and drive behavioural change.

References

The Climate Change Act 2008 (2050 Target Amendment) Order 2019':

<http://www.legislation.gov.uk/ukxi/2019/1056/contents/made>

Committee on Climate Change – legal duties <https://www.theccc.org.uk/tackling-climate-change/the-legal-landscape/>

Net Zero the UK's contribution to stopping global warming

<https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>

The Paris Agreement <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

Tyndall Centre 'Setting Climate Commitments for Hastings: Quantifying the implications of the United Nations Paris Agreement' (December 2019)

<https://carbonbudget.manchester.ac.uk/reports/E07000062/>

The Future Homes Standard 2019 Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for new dwellings

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/852605/Future_Homes_Standard_2019_Consultation.pdf

The Road to Zero Next steps towards cleaner road transport and delivering our Industrial Strategy' (2018)

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739460/road-to-zero.pdf

NO2 Plan 'Air Quality plan for nitrogen dioxide (NO2) in UK 2017.

<https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017>

Clean Growth Strategy <https://www.gov.uk/government/publications/clean-growth-strategy>

'Industrial Strategy: Building a Britain Fit for the Future' (2017)

<https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future>

The 'Energy Efficiency (Private Rented Property) (England and Wales)' Regulations 2015 introduced the Minimum Energy Efficiency Standard (MEES) for buildings across the UK. For further information, <https://www.gov.uk/guidance/domestic-private-rented-property-minimum-energy-efficiency-standard-landlord-guidance>

Energy South2East, 'South2East Local Energy Strategy

<https://www.southeastlep.com/app/uploads/2019/03/Local-Energy-Strategy-FINAL.pdf>

Total energy consumption at regional and local authority level

<https://www.gov.uk/government/statistical-data-sets/total-final-energy-consumption-at-regional-and-local-authority-level>

UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2017

<https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2017>

Local and Regional Carbon Dioxide Emissions Estimates for 2005–2017 for the UK
Technical Report

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/812146/Local authority CO2 technical report 2017.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/812146/Local_authority_CO2_technical_report_2017.pdf)

National Statistics Regional Renewable Statistics

<https://www.gov.uk/government/statistics/regional-renewable-statistics>

Statistical data set All Vehicles (VEH01) <https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01#licensed-vehicles>

English Housing Survey Energy Report, 2017-18

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817757/EHS 2017-18 Energy Report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817757/EHS_2017-18_Energy_Report.pdf)

Regional Renewable Statistics <https://www.gov.uk/government/statistics/regional-renewable-statistics>

Green book supplementary guidance valuation of energy use and greenhouse gas emission for appraisal <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

National Energy Efficiency Data-Framework (NEED): Summary of Analysis, Great Britain, 2019

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/812561/National Energy Efficiency Data Framework NEED report summary of analysis 2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/812561/National_Energy_Efficiency_Data_Framework_NEED_report_summary_of_analysis_2019.pdf)

Future Energy Scenarios <http://fes.nationalgrid.com/fes-document/>

A report for the Committee on Climate Change The costs and benefits of tighter standards for new buildings Final report 2019 <https://www.theccc.org.uk/wp-content/uploads/2019/07/The-costs-and-benefits-of-tighter-standards-for-new-buildings-Currie-Brown-and-AECOM.pdf>

Energy Efficiency and Historic Buildings

<https://historicengland.org.uk/advice/technical-advice/energy-efficiency-and-historic-buildings/>

Appendix 1 Policy Drivers for Achieving Net Zero Emissions

International

The Intergovernmental Panel on Climate Change (IPCC) special report on Global Warming, published in October 2018, describes the risks that a 2.0°C rise is likely to cause compared to 2.0°C, including increased risks to health, livelihoods, food security, water supply, human security and economic growth. The IPCC highlighted that there were approximately 12 years, now 10 years, in which to respond to this challenge and reduce global greenhouse gas emissions, to avert this increasing risk of a 2.0°C temperature rise. The report emphasised that with ambitious action from national and sub-national authorities, civil society, business and local communities, it would be possible to limit warming to 1.5°C. Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels. In addition, the recent Intergovernmental Panel for Biodiversity and Ecosystem Services (IPBES) stated that around 25% of the world's species are now at threat of extinction due to habitat loss and the effects of climate change.

National

UK Climate Change Act 2008 and UK Climate Change Act: 2050 Target Amendment Order

The Climate Change Act, legally commits the UK Government to reducing emissions by 100% by the year 2050, compared with a 1990 baseline. The Act provides a legal framework requiring the Government to set five-yearly 'carbon budgets' (identifying the steps needed to reduce and limit emissions over a set period of time, towards the 2050 target) and the development of a climate change adaptation plan.

The Committee on Climate Change 'Net Zero – the UK's contribution to stopping global warming' (2019) written in response to the IPCC findings, advises that this level of carbon reduction is achievable using known technologies, including,

- Reducing demand through resource and energy efficiency
- Societal choices e.g. reducing meat consumption
- Electrification of transport and heating;
- Development of hydrogen gas and carbon capture and storage (CCS) technologies; and
- Land use changes that promote carbon sequestration and biomass production

The Paris Agreement

The UK ratified the Paris Climate Agreement in November 2016, The Agreement seeks to 'strengthen the global response to the threat of climate change by keeping a global temperatures rise this century well below 2°Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°Celsius.

A study produced by the Tyndall Centre for Climate Change Research⁵ found that, to meet the commitments laid out in the Paris Agreement, *‘the recommended energy only CO₂ carbon budget for the Hastings area for the period of 2020 to 2100 is 1.7 MtCO₂.’* This could be achieved by adhering to the 5-year carbon budgets set out in Table 1, although the authors note that, *‘A smaller carbon budget, with accelerated reduction rates and an earlier zero carbon year, is compatible with this approach’*

Table 1 Recommended carbon budget for Hastings (source Tyndall Centre)

Budget Period	Carbon Budget (MtCO ₂)
2018-2022	1.0
2023-2027	0.6
2028-2032	0.3
2033-2037	0.1
2038-2042	0.1
2043-2047	0.0
2048-2100	0.0

National Planning Policy Framework

The National Planning Policy Framework (NPPF) sets out Government planning policy for England. It states that, ‘the purpose of the planning system is to contribute to the achievement of sustainable development, and ‘at the heart of the [Framework is a presumption in favour of sustainable development.’

Building Regulations (Part L)

In the UK, the Building regulations are the main mechanism for prescribing standards for the conservation of fuel and power in buildings, using metrics including the estimated level of energy demand and CO₂ emissions. The Government is currently consulting on a proposed ‘Future Homes Standard’ that would significantly reduce emissions from new domestic buildings in the UK. The consultation, also highlights that the Government intends to make further improvements to Building Regulation requirements for existing domestic buildings as well as new and existing non-domestic buildings.

The Clean Growth Strategy 2017

The UK Clean Growth Strategy set of policies and proposals to meet the grand challenge of ‘clean growth’ set out in the Industrial Strategy. It sets out the Government’s vision for decoupling economic growth from carbon emissions. The strategy includes objectives for increasing renewable energy generation, smart and flexible power and accelerating the shift to low carbon transport, smart grids and energy storage. The delivery of low carbon heating is highlighted as a priority, indicating heat pumps, district heat networks and a hydrogen gas grid could all support the scale of transition needed.

It also discusses the need to improve energy efficiency in existing buildings, including a strategy to progressively increase the minimum Energy Performance Certificate (EPC) ratings that will be considered permissible in order to allow the sale or rental of buildings, as required by the Minimum Energy Efficiency Standards (MEES) regulations.

The Road to Zero: next steps towards cleaner road transport and delivering our industrial strategy (2018)

The Road to zero sets out the Government's mission to *'put the UK at the forefront of the design and manufacturing of zero emission vehicles and for all new cars and vans to effectively be zero emissions by 2040'*. The strategy furthers the ambitions of the NO₂ Plan and Clean Growth Strategy in defining key policies with primary focus upon introduction of low and zero emission vehicles, with the aim that at least *'50% and as many as 70% of new car sales and up to 40% new van sales being ultra low emissions by 203. By 2050 we want almost every car and van to be zero emission'*

It is anticipated that local action will be supported through new policies including the provision of funding to extend ultralow emission bus schemes and taxi charging infrastructure, and the provision of electric vehicle charge points.

Regional

South2East Local Energy Strategy 2018

The South2East Energy Strategy was developed by the three Local Enterprise Partnerships including the South East Local Enterprise Partnership. The strategy outlines a vision for achieving clean growth in the region focusing on the power, heat and transportation sectors.

It highlights several key opportunities for the region, including:

- Renewable energy potential, especially solar, wind, energy from waste and landfill gas;
- Rich natural assets (including a high proportion of woodland); and
- Large amounts of planned new development within the region, offering opportunities for deployment of smart, integrated, sustainable energy system models.

Draft Local Industrial Strategy

South East Local Enterprise Partnership is developing a Local Industrial Strategy (LIS) to promote the coordination of local economic policy and national funding streams, and establish new ways of working between national and local government and the public and private sectors, and will inform a strategic agreement with Government. The aim of the LIS is to increase regional economic activity, and meet regional and national policy commitments, A coastal communities prospectus has been developed to ensure that the coastal communities of the SELEP region are fully included in the LIS and the role they can play in mitigating the impacts of climate change

Draft East Sussex Environment Strategy 2019

The revised Environmental Strategy for East Sussex seeks ‘to contribute to the emerging urgent global and local environmental challenges and to maximise the available opportunities. The strategy identifies local specific challenges and opportunities. The following five priority environmental themes have been identified within the strategy: climate change, natural capital, air quality, water and resource efficiency. The draft Environment Strategy includes:

- Long term aims for each of the environmental themes;
- Actions that the Environment Board will lead on in the short-term;
- Examples of programmes and projects already being delivered nationally and locally;
- Indicators to monitor progress in implementing the Environment Strategy.

East Sussex Local Transport Plan (2011)

The Local Transport Plan¹² (LTP3) covers the years 2011-2026. It includes a broad-ranging strategy for improving transport within East Sussex, through means such as:

‘... promotion and infrastructure for public transport e.g. accessible bus stops, shelters [...] implementation of infrastructure to support integrated sustainable travel –walking, cycling, public transport, car sharing etc. For example –bus priority measures, cycle lanes and facilities, improvements to pedestrian routes to key trip attractors, better rail / bus / cycle interchanges [and] charging points for electric vehicles and smart ticketing initiatives...’

LTP3 also acknowledges the need to ‘look at non-transport measures which reduce the need to travel to access services.’ As evidenced in Section 4, the transportation sector accounts for a significant portion (26%) of CO2 emissions in Hastings and is therefore considered a priority area for intervention measures.

Local planning policy a guidance

Hastings Borough Council is responsible for preparing the strategic development plans for the borough; The adopted Local Plan for Hastings Borough Council comprises several documents, including the ‘Hastings Planning Strategy’ (2014) and the ‘Hastings Development management Plan’ (2015). At the time of writing, the Local Plan is under review, and public consultation on a draft Plan is expected to begin in 2020/21.

Hastings Planning Strategy 2014.

The Hastings Planning Strategy sets out the ambition and vision for development within the borough and provides a long term plan to deliver the regeneration and sustainable growth in the borough until 2028. The plan sets an overall framework for the future of the town.

Development Management Plan 2015.

The Development Management Plan sets out policies for the management of development in the town as well as specific allocations to meet the overall targets set in the overarching Hastings Planning Strategy.

At the time of writing, the Local Plan is under review with public consultation on a draft plan expected in 2020/21. The Local Plan plays a key role in addressing climate change setting out key policies and measures to adapt to and mitigate against climate change.

Appendix 2 Fuel Consumption in the Borough

This section sets out the sectors and fuels that contribute to the town wide emissions within the Borough of Hastings. This helps to provide the context for understanding the carbon emission baseline.

Fuel Consumption

The dataset provides a breakdown of emissions by sector and fuel type. Fuel consumption figures are taken from BEIS publication ‘Sub-national total final energy consumption statistics: 2005 – 2017’ (published in 2018) – 2017 is the most recent year for which data is available. Within the data set non-domestic uses include fuels used in industrial, commercial, public and agriculture sectors, for uses other than transport.

In 2017, total fuel consumption in Hastings was approximately 1157 GWh – where the largest proportion of fuel consumed was gas (46%)., with electricity and petroleum accounting for 26% and 23%, respectively. Other fuels, including bioenergy and waste, coal, and manufactured fuels make up the remaining 5%.

Table 2: Fuel consumption by sector and fuel type in 2017 (BEIS, 2018)

	Non-domestic (GWh)	Domestic (GWh)	Road transport (GWh)	Rail (GWh)	Bioenergy & waste (GWh)	Total (GWh)
Gas	88.1	444.9	-	-	-	533.1
Electricity	147.1	154.0	-	-	-	301.1
Coal	0.8	4.3	-	-	-	5.1
Petroleum	24.7	3.0	232.7	1.3	-	261.6
Manufactured fuels	0.1	4.4	-	-	-	4.5
Bioenergy & waste	-	-	-	-	51.9	51.9
Total by sector	259.5	610.5	232.7	1.3	51.9	1,157.2

Figure 1: Fuel Consumption by fuel type in 2017 (BEIS, 2018)

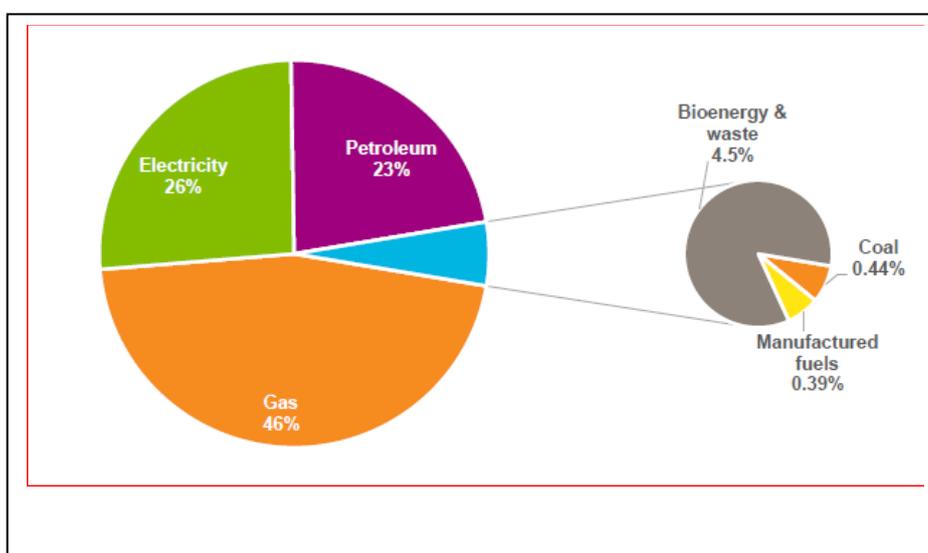


Figure 2 below, show that the domestic sector accounts for the highest proportion of energy consumption, followed by road transport and other non-domestic sectors.

Within the domestic sector, approximately 73% of fuel consumed is gas and 25% is electricity. In the non-domestic sector, approximately 34% of fuel consumed is gas and 56% is electricity. Petroleum products are predominantly associated with road transport. Electricity used for transport (e.g. rail and Ultra Low emissions vehicles (ULEVs)) is not represented in the data set.

Figure 2: Fuel Consumption by sector and fuel type in 2017 (BEIS 2019)

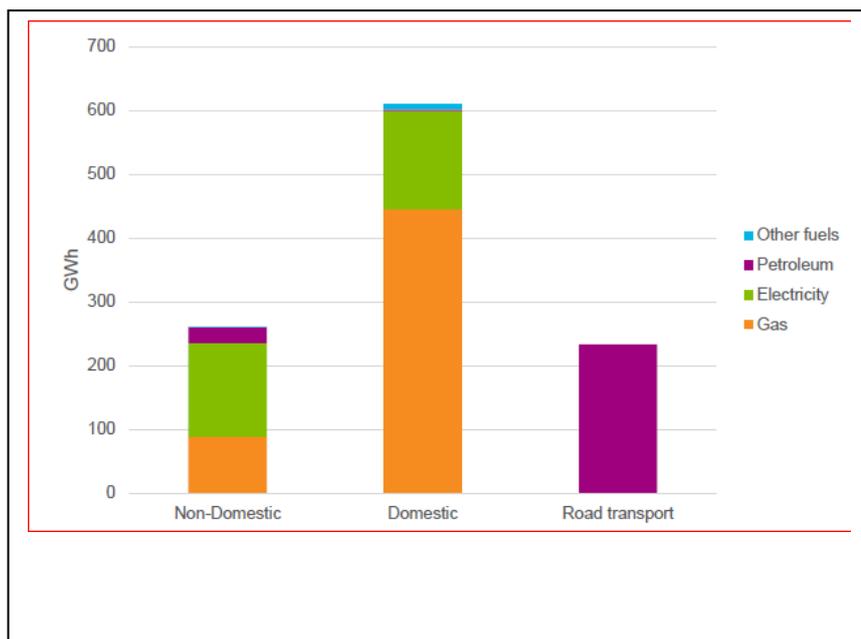
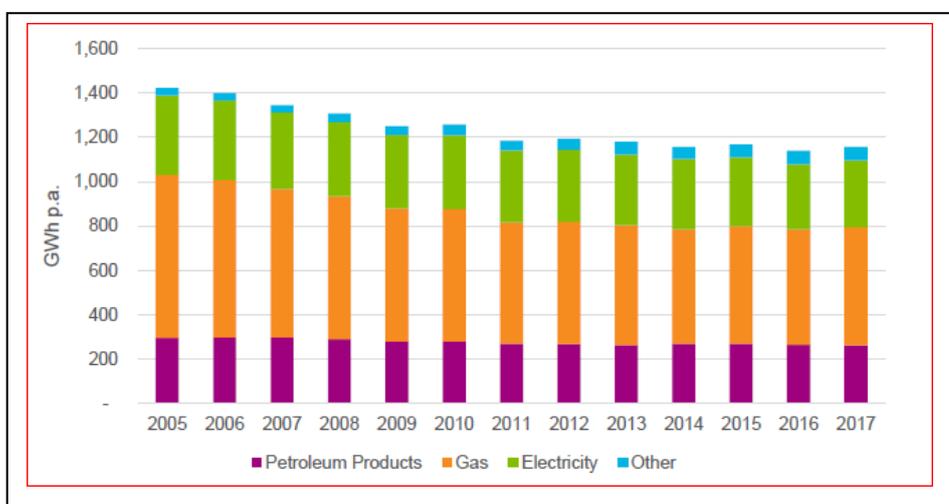


Figure 3 shows the changes in fuel consumption in Hastings between 2005 to 2017. During this period, the use of gas, electricity and petroleum products has decreased by 27%, 16% and 12 % respectively. This can be due to a number of reasons, including consumer behaviour, the uptake of energy efficient measures, economic trends, fuel prices and the weather.



Appendix 3 Carbon projection modelling methodology

Scope of the analysis

For the purpose of greenhouse gas reporting, CO₂ emissions are divided into three categories:

- **Scope 1** – Direct emissions that arise from burning fuels in Hastings. This primarily includes fuel used in boilers to provide heating and hot water, fuel used in any vehicles while they are driving within Borough boundaries, and fuels (other than electricity) used for cooking.
- **Scope 2** – Indirect emissions associated with the use of electricity in Hastings.
- **Scope 3** – Indirect emissions that result from other activities outside the border of Hastings, but that take place as a result of the actions of people or organisations within Hastings, e.g. emissions from commuting, shipping, or aviation.

This report only quantifies Scope 1 and 2 emissions, based on publicly available datasets produced by the Department of Business, Energy and Industrial Strategy (BEIS). This covers a range of sectors and fuel types but does not cover *all* potential sources of greenhouse gas emissions within the Local Authority. For example, in the agricultural sector, it includes the emissions from fuels used in agricultural processes and vehicles but excludes methane emissions from livestock. At the time of writing it is understood that such information is not published by BEIS at a Local Authority level.

The table below shows the categories of emissions reported in the BEIS dataset. In this report, some of the categories representing a small proportion (<1%) of total emissions have been consolidated in order to align the emissions baseline with the fuel consumption figures as much as possible

Category	Sub-categories as listed by BEIS	Sub-categories as listed in this report
Industrial & commercial (Note: This includes public sector and agricultural fuel consumption and is referred to as 'Non-domestic' in this report)	<ul style="list-style-type: none"> • Electricity • Gas • Large industrial installations • Other fuels • Agriculture (Note: Fuel not specified) 	<ul style="list-style-type: none"> • Electricity • Gas • Other fuels Agriculture (all fuels)
Domestic	<ul style="list-style-type: none"> • Gas • Electricity • Other fuels 	<ul style="list-style-type: none"> • Gas • Electricity • Other fuels
Transport	<ul style="list-style-type: none"> • Road transport (A roads, motorways and minor roads) • Diesel railways • Other 	<ul style="list-style-type: none"> • Transport (all fuels)

The methodology used by BEIS to estimate carbon emissions varies depending on the source of emissions under consideration. For example, for gas and electricity, a carbon emission factor is developed for each fuel and applied to the sub-national fuel consumption data to provide an estimate of the CO₂e emissions associated with the use of that fuel. In the case

of transport, emissions are estimated based on the types of vehicles and vehicle movements that take place on each stretch of road within the UK, and these are allocated to a Local Authority dataset based on geographic boundaries. Total emissions may also include point-source estimates for certain consumers, and therefore it is not possible to directly align the fuel consumption data with the emissions data.

It should also be noted that the BEIS dataset *excludes* various potential sources of other GHG emissions. For example, it does not include methane emissions from livestock digestion.⁸⁶ This study has only considered sources listed within the BEIS dataset because at present there is no published information on total GHG emissions for Local Authorities within the UK.

For further information, see the *‘Technical Report: Local and Regional Carbon Dioxide Emissions Estimates for 2005-2017 for the UK’* (BEIS, 2019).

Summary of Key Inputs

The following assumptions have been applied to the projection modelling scenarios:

Topic	Model input	Data source
Demand Reduction		
Potential reduction in gas use in existing buildings over time to 2030	10%	NEED 2019 Report, <i>‘Table 3: Typical savings following multiple energy efficiency measures’</i> suggests 12% reduction in heating is possible; 10% has been used as a conservative estimate.
Potential reduction in demand for heating in new buildings over time to 2030	75%	This reduction is in line with the levels indicated by the Future Homes Standard consultation.
Potential reduction in demand for electricity for appliances and lighting over time to 2030	5%	Assumes that appliance use will increase but a small reduction could be achieved through behaviour change. Research indicates up to 10% possible – low / conservative estimate used.
Fuel Switching		
Existing buildings switch to electric heating over time to 2030	90%	Assumes that, in the next 10 years, it will become a requirement to switch when otherwise replacing boilers. Based on a 15-year replacement cycle, this means that the majority of boilers would be replaced by 2050. 90% is used as a conservative estimate assuming that some heating systems cannot be replaced
New buildings that are built with electric heating	100%	Assumes all new builds will be required to use electric heating.
Proportion of existing building electric heating systems that are heat pumps	50%	Estimate. The remainder are assumed to be direct electric systems where it is not feasible to install heat pumps.
Proportion of new building electric heating systems that are heat pumps	90%	Estimate. The remainder are assumed to be direct electric systems where it is not feasible to install heat pumps.
System Efficiencies		
Typical gas boiler	80%	Low / conservative estimate
Heat pump	250%	Low / conservative estimate
Direct electric heating	100%	1:1 conversion is normal
Transport		
Reduction in mileage over time to 2030	10%	Estimate.
Vehicles that switch to zero emission over time to 2030	92%	Assumes that HGVs do not switch.

Key assumptions

Built environment

Existing buildings

The modelling assumes that existing buildings will continue to have the same gas and electricity consumption in a 'BAU' scenario. Reductions to fuel consumption are then applied to test the relative impact of different intervention measures (described below) as part of the carbon projection modelling

New buildings

The amount of proposed new development (number of dwellings and m2 of employment floorspace) is multiplied by benchmarks to provide an estimate of energy demand.

In order to estimate the impact of new construction / development within the Borough as a whole, benchmarks were used to estimate the fuel consumption of new buildings. For domestic buildings, benchmarks were derived from median consumption figures for Hastings as reported in NEED. For non-domestic buildings, CIBSE Guide F benchmarks were used to estimate gas and electricity demand. In both cases, the heat / gas demand figures were reduced by 75% to reflect higher fabric performance standards. The level of heating demand reduction was informed by the recently published consultation documents related to Parts L and F of the Building Regulations, and the introduction of a Future Homes Standard.

Grid decarbonisation pathway

Carbon emission factors (CEFs) for electricity were taken from HM Treasury/BEIS '*Green Book Supplementary Guidance: Toolkit for valuing changes in greenhouse gas emissions, Table 1*' (2019) which is intended for use by organisations reporting on their greenhouse gas emissions. Note that this trajectory reflects the level of decarbonisation that would be necessary for the UK to meet its current decarbonisation targets. It is not a projection of the likely emissions from grid electricity.

Electricity demand reduction

Evidence suggests that reductions of around 5% can be achieved through measures such as behavioural changes, smart metering, and zone lighting. Case studies suggest that greater reductions are possible for some organisations. However, in recognition of the fact that electricity use has increased in the past decade due to factors such as increasing use of electronic appliances, 5% has been used as a conservative estimate.

The model assumes that total electricity consumption will decrease linearly through to the year 2030, at which point this reduction will be achieved.

Heating demand reduction from energy efficiency measures

Evidence from NEED indicates that installing multiple energy saving measures (such as cavity wall or loft insulation) can reduce heating bills by around 5-12%. From a technical standpoint, higher savings (over 75% in some properties) could be achieved with more ambitious retrofitting strategies,⁸⁷ but 10% has been used as a conservative estimate. This would not necessarily require all buildings to undergo a retrofit – it represents an average across the entire stock. In other words, some buildings could be retrofitted to a higher standard, while others (such as Listed buildings) receive no upgrades.

The model assumes that total gas consumption will decrease linearly through to the year 2030, at which point this reduction will be achieved.

Impact of fuel switching

This calculation assumes that the metered gas consumption is delivered by individual gas boilers (80% efficiency). The total metered gas consumption data is used to provide a rough estimate of the amount of electricity that would be required if this level of demand was instead met using direct electric heating (DEH) with 100% efficiency or heat pumps with COP of 2.5 (this is intended as a conservative estimate that reflects the performance of air source heat pumps (ASHPs) in situ).

The model assumes that 90% of existing buildings will switch to an electric heating system by 2050. This would require an ambitious programme of heating system replacement with significant cost implications. Therefore, the calculation also assumes that 50% of the new heating systems will be DEH and 50% will be ASHP as an illustrative scenario, in recognition of the fact that DEH may be cheaper and more practical to install. Additional carbon reductions could potentially be achieved if more systems were replaced with ASHPs.

The model assumes that gas heating systems will be replaced with electric heating systems at a consistent rate (i.e. linearly) to 2030.

Vehicle mileage reduction

In the baseline scenario, it is assumed that demand for transport remains stable. This will likely tend to increase over time due to factors such as population growth. A stable trajectory would imply that measures are being implemented to mitigate this demand through encouraging other forms of travel such as walking, cycling or public transport.

According to the 'Road to Zero' report: 'Evidence from 60,000 fleet drivers receiving training through the Energy Saving Trust (EST), a key partner supporting the efficient motoring agenda, gave an average 15% saving of fuel and CO2 [...] Organisations that have incorporated a wider package of behavioural and procedural measures in managing their fleets (see the case study below) have delivered typical emission savings of between 10-30%.'

The model assumes that a 10% reduction in either journeys, vehicles, or miles travelled will result in a 10% reduction in CO₂e emissions from those vehicles. A travel strategy aimed at reducing emissions would likely seek to target certain types of trips, vehicles, or users, so this approach should be understood as an estimate. However, for the purpose of this analysis, it is considered enough to show a simple proportional reduction to highlight the relative scale of impact such a measure could have, relative to other interventions. The model assumes that total mileage will decrease linearly through to the year 2030, at which point this reduction will be achieved.

Impact of switching to Ultra Low Emission Vehicles (ULEVs)

Based on the estimated mileage for each vehicle type, we have re-calculated CO₂e emissions using BEIS Green Guide figures for electric vehicles.

Carbon savings from Low or Zero Carbon (LZC) technology energy generation

Carbon savings from Low or Zero Carbon (LZC) energy generation are based on the amount of National Grid electricity that would be offset by renewable electricity. A total figure for the amount of LZC capacity that will be installed by 2030 is inputted into the model, and the model assumes that the total savings will increase linearly up to that point.

An estimate is then made of the potential amount of renewable electricity that could be generated by those technologies (large-scale PV or wind). The electricity generation figure is multiplied by the CEF for a given year to provide an estimate of the total CO₂e savings in a given year.

– *Large-scale PV*: Assumed output of 827 kWh/kWp based on typical performance in the UK

– *Large-scale onshore wind*: Capacity factor of 2,081kWh/kWp

Note that, as the electricity grid decarbonises, more LZC energy generation is required to offset any residual emissions. Therefore, although the amount of LZC capacity is assumed to increase linearly, the savings per MW decrease as the grid decarbonises over time.

Carbon reductions from woodland creation and tree planting

Based on nation-wide statistics from the Woodland Carbon Code, new woodlands created from low-grade agricultural land have the potential to sequester around 356 tCO₂e per hectare over 100 years, or 3.56 tCO₂e per hectare per year on average. In practice, this depends heavily on the type of woodland and its maturity level.

The scale of offsetting has been input in order to target net zero carbon by 2030 assuming all previous measures and changes in market come to pass. This allows HBC to understand the approximate scale of investment in offsetting required to overcome the likely gap shown by our projection modelling. Proposals would need to be backed up with detailed modelling / evidence and supported by a long-term management plan. Therefore, these figures are intended only to provide a rough sense of scale.

Limitations

As stated previously, this study has only considered sources of CO₂e emissions that are listed for Hastings Borough within the published BEIS dataset. Due to lack of information about other GHG emissions at a Local Authority level, therefore, the baseline presented in this report is likely to be an underestimate of the total.

A key overarching limitation of this approach is that any changes modelled would need to be backed up by policies, funding, changes in technology, and user / consumer behaviour which are uncertain.

The analysis does not account for other changes e.g. population growth, energy prices, weather, economic growth, and the many other trends that would impact energy demand – it is primarily focused on built environment measures with consideration given to changes in transportation technology.

Appendix 4 Understanding the interventions to meet net zero carbon emissions by 2030

Impact of grid decarbonisation

A comparison of these results shows that grid decarbonisation is one of the most important variables that will determine whether the decarbonisation target is achieved. This has both positive and negative implications. On one hand, if the BEIS decarbonisation scenario were to occur, Borough-wide emissions could decrease by up to 18% by 2030 even if no other actions were taken. On the other hand, this presents a key risk, because it means that much of the reliance on achieving the net zero target will rely on factors outside of the Council's ability to influence

To address and mitigate this risk, consideration must be given to how the Council can best facilitate the government's objectives in decarbonising the grid as well as what measures it can take to best insulate itself from the eventuality that grid decarbonisation does not happen as quickly and/or as deeply as the Government intends

Impact of new development

If new development in Hastings between now and 2030 uses roughly the same amount of gas and electricity as existing buildings, if all other variables hold constant, this would result in a 4% increase in Borough-wide CO₂ emissions by 2030 (and more than 10% by 2050). Even if they were built to meet the proposed Future Homes Standard, there would still be a small increase.

Therefore, it will be vital to ensure that any new buildings are constructed or retrofitted to be capable of being carbon neutral, or if not, then the emissions need to be mitigated through demand reduction measures, renewable energy generation and other forms of offsetting.

However, as important as it is that all future developments achieve carbon neutrality, the overall impact is relatively small compared to the scale of emissions from existing buildings and transportation, given the planned for number of new homes and commercial buildings within the Planning Strategy.

New buildings are assumed to meet the CO₂ reduction levels described in the Future Homes Standard which include significantly higher targets for energy efficiency and carbon savings.

Future Homes Standard

Under the Future Homes Standard new buildings would be required to meet significantly higher targets for energy efficiency and carbon savings.

The Government has proposed that from 2025 all new homes will incorporate world-leading energy-efficiency levels of performance, incorporating low-carbon heating systems, and that new homes from 2025 will not be able to connect to the gas network.

Changes to Building regulations are planned for 2020 and 2025, where the 2020 changes will be a partial step towards the planned 2025 standard.

By 2025, the energy performance of new dwellings will achieve a 75-80% reduction in carbon emissions over that required by the current Approved Document L1A 2013.

Revised approved documents are expected in Spring 2020 and will likely come into formal use during Autumn 2020.

Changes to existing buildings

Reducing demands for electricity and heating

Emissions from fuel use in buildings accounts for 73% of total gross CO₂e emissions across Hastings. For the purpose of the analysis AECOM have modelled two key changes to the existing building stock – reducing demands for electricity and heating and phasing out gas (switching to electrical-driven heating systems)

The demand reduction measures modelled could result in up 6% CO₂ emissions saving compared to 2017 levels, a relatively small impact compared if considered in isolation of the other interventions. Although this is, a relatively conservative estimate of the reduction in demand that could be achieved from a technical standpoint, the timescale is extremely challenging and would require an immediate and ambitious programme of energy efficiency improvements.

One of the key obstacles would likely be the absence of a policy driver that requires energy efficiency upgrades to existing buildings. The Minimum Energy Efficiency Standards (MEES) regulations are intended to drive progressive improvements in the existing stock but the impact this will have is not yet clear. Therefore, it will be important to identify any potential sources of funding to implement this measure.

At present, owners of existing buildings are not required to introduce energy efficiency measures; incremental changes to a building can be made when planning permission is sought for an extension, or as part of a building control application for major works to the roof or walls.

Minimum Energy Efficiency Standards

Under the MEES regulations, as of 1st April 2018, any properties newly rented out in the private sector must have a minimum Energy Performance Certificate (EPC) rating of E (some exceptions apply). Fines will be applied for non-compliance.

Owners of buildings with a lower EPC rating will be required to implement energy efficiency measures, though consideration will be given to financial viability, the anticipated payback time and impacts on property value.

Over time, the Government intends to progressively increase the minimum EPC rating, meaning that buildings must become more efficient in order to be sold or rented. A recently-published consultation proposed that the minimum rating should be raised to B by 2030, subject to actions meeting a seven-year payback test.

Historically, a range of Government schemes have been implemented to improve the emissions of the existing building stock including

- The Carbon Emissions Reduction Target (CERT)
- The Community Energy Saving Programme (CESP)
- The Energy Company Obligation (ECO)
- Green Deal

As well as local schemes such as the Affordable Warmth programme ‘Keep Warm and Well’ to tackle fuel poverty whilst making home energy efficiency improvements.

In order to meet the 2030 (and beyond target), it will be important to identify potential sources of funding to implement measures to support the delivery of energy efficient measures, and indeed a whole house retrofit approach in the existing buildings, especially local homes.

Hastings has a relatively high number of older properties that are considered ‘hard to treat’ from an energy efficiency perspective, for example there are 933 listed buildings and 18 conservation areas, which can limit the type of measures that can be installed in these properties.

As the existing building stock accounts for such a high proportion of total emissions, and considering the technical constraints to decarbonising heat, reducing our energy demand is a high priority for achieving net zero. In addition, for low carbon technologies such as heat pumps to work properly, it is essential that energy efficiency measures are carried out first.

Electricity demand is expected to increase in the future as a result of increased use of digital technology, electronic devices, the uptake of ultra-low emission vehicles and the transition to electric heating systems.

Interventions such as behaviour change measures and community engagement and the use of smart meters and devices can support the reduction of electricity consumption in buildings.

Phasing out Natural Gas

Unlike electricity, which can be generated from a range of renewable technologies, natural gas is a fossil fuel which unavoidably emits CO₂ during combustion. In order to meet the net zero target, it will therefore be crucial to phase out the use of gas, because the scale of investment that would be required to offset these emissions would be significant.

The Clean Growth Strategy 2017 highlights that in order to meet the carbon emission reductions of the Climate Change Act 2008, it will be necessary to fully decarbonise the supply of heat. There are two main options for delivering this, based on currently available technologies:

1. Reduce the total demand for heat, and
2. A switch to using electrically driven heating systems such as direct electric heating and heat pumps.

Of these, heat pumps are the preferred option due to the lower running costs and smaller impact on the electrical grid. This would have the effect of reducing the Borough's emissions by around 24%, depending on the technology used, assuming there is no change in the electricity grid emissions. As the grid decarbonises, the savings would increase, so fuel switching (with necessary enabling works) could potentially result in a 52% decrease in emissions by 2030 (%% by 2050).

One method of reducing heat demand which has not been included in this Borough-wide analysis would be to develop heat networks. A heat network involves the centralised generation of heat to serve multiple buildings, which can enable the use of larger and more efficient equipment, thereby delivering higher carbon savings with lower capital and operational costs than solutions for each individual building. Although heat networks at present often utilise gas-fired Combined Heat and Power (CHP) systems, future heat networks will need to deliver low or zero carbon heat and therefore are likely to utilise heat pump technology or waste heat sources.

Heat networks can be applied for certain types of development where there is a high and consistent heat demand. The Government provides financial support to local authorities to investigate the feasibility of a heat network and capital construction costs through the Heat Network Delivery Unit and Heat Network Investment Management program

The Future Homes Standard recommends that the use of gas boilers in new buildings is prohibited from 2025 onwards; the impact of this policy has been taken into account in the modelling.

Green Gas

The recently published 'Pathways to Net Zero' sets out a detailed plan to deliver a zero carbon gas grid and highlights that decarbonising the gas network will be critical for the UK to meet its Net Zero targets, with heating being one of the most challenging issues to face.

The Gas Distribution Networks (GDNs) including SGN who provide gas in Hastings are committed to maximising the opportunities to use biomethane and other renewable gas sources in the UK and are working with stakeholders, trade associations, the Regulator and Government to progress this and remove any barriers to entry, both regulatory and financial where possible. It may be possible to decarbonise the gas grid by injecting it with biomethane or hydrogen, but this would require a technological step-change and has therefore not been considered given the timeframe for the Councils to reach net zero.

Changes to transportation

Switching to Ultra Low emission Vehicles

The Government has announced an intention to prohibit the sale of new petrol and diesel cars by 2040, as part of its 'Road to Zero' strategy. There has been a gradual increase in the number of electric vehicles in recent years and Hastings is no exception, where there has

been a ten-fold increase in the number of Ultra Low Emission Vehicles (ULEVs) registered in Hastings between 2011 and 2019 –although with only 140 registrations at the end of 2019.

It is estimated that the price of electric, hybrid and traditional fuel cars could converge within the next decade, which would help to facilitate the shift towards sustainable transport. The National Grid report 'Future Energy Scenarios 2019' suggests there could be between 2.7 and 10.6 million EVs in the roads by 2030, which would present a broad-ranging challenge across all areas of electricity infrastructure. Increasing LZC energy generation, the use of smart EV charging and, potentially, vehicle-to-grid systems could mitigate some of the effects on peak demand and help to alleviate some of this pressure.

Switching to ULEVs would reduce total CO₂ emissions by around 18% if they were charged using national grid electricity. The savings would increase as the electricity grid decarbonises, or if the vehicles were charged using 100% renewable energy – for instance, generated by PV on the roof of a Council-owned car park.

There are of course some CO₂ emissions associated with the electricity used to charge EVs (except where supplied by 100% renewable energy). Further uptake of this technology will rely to some extent on the expansion of existing workplace, public and destination based EV charging infrastructure, accepting that most cars are likely to be charged at home or in neighbourhoods using smart charging technology.

A large-scale shift to the use of electric vehicles must also be accompanied by a significant modal shift towards walking, cycling, ridesharing, and an increase in the use of public transport, as well as spatial planning policies that reduce the need for car travel. This is necessary to reduce electricity demand –with added benefits in terms of air quality and, potentially, improving people's health and vibrant neighbourhoods and community spaces.

Reducing emissions from HGVS

At the time of writing, ultra-low emission HGVs are not widely commercially available and are not expected to become so in the next decade, barring a technological step-change. In the short-term the Government has suggested a target of reducing emissions from HGVs by 15% through efficiency measures such as driver training. Because HGVs represent a small portion of the total emissions in Hastings, this would probably have a relatively small impact.

In practical terms it will be important to consider what the Council and local businesses can do to support the further deployment of appropriate EV infrastructure.

Increasing Renewable Energy Generation

As buildings and vehicles switch away from the use of fossil fuels and towards electricity, it becomes increasingly important to ensure that electricity is supplied from renewable sources. Reasons include:

- reducing pressure on grid infrastructure
- ensuring security of supply, and
- protecting consumers from rising electricity prices.

Offsetting residual emissions – carbon offsetting through land management and afforestation

The modelling has demonstrated that, even with the most optimistic assessment of grid decarbonisation, switching to low emission transport, and uptake of other efficiency measures and LZCs in buildings, there will be significant residual CO₂ emissions that would require offsetting to meet net zero ambition.

The Land Use, Land Use Change and Forestry (LULUCF) (including agriculture land use and forestry) data shows that LULUCF has resulted in a 2.7% net reduction in Borough wide LULUCF emissions to date.

Further work and consultation would be required to identify the most appropriate and cost-effective opportunities, but these might include tree planting or new woodland creation. The UK Woodland Carbon Code, for instance, provides a means of gaining certification for this type of project.

Other opportunities to reduce emissions

These technologies have not been included in the quantitative analysis above, but present further opportunities for the Borough to reach net zero emissions:

District heat networks. Heat networks offer an opportunity to switch multiple buildings on to lower carbon heating systems and use larger and more complex technologies to deliver higher carbon savings with lower overall capital and operational costs than addressing each building separately. However, by virtue of being larger projects they can be more complex to deliver although the Government is providing technical support and funding through the Heat Network Delivery Unit and Heat Network Investment Programme to assist local authorities in delivering these projects.

Smart energy management: The Clean Growth Strategy includes a target to make smart meters available to all homes by 2020. One of the key benefits of smart meters is by improving transparency and user access to their own energy data, making it easier to identify areas of waste. Although it is not clear to what extent this affects user behaviour in the long term, the improved data collection could also facilitate the introduction of demand side response, and on a broader scale, help to balance energy demand and supply, which is particularly important at peak times. In principle, therefore, these have the potential to reduce energy consumption.

Battery storage: There have been significant improvements in battery storage in recent years with implications for energy consumption across all sectors. Although batteries are likely to become crucial to future energy infrastructure, they do not offer CO₂e savings per intermittency of wind and solar energy generation. Combined with EV uptake and the introduction of vehicle-to-grid systems, this could have a transformative effect on the design of energy infrastructure and the built environment.

Carbon capture and storage: At present, carbon capture and storage technologies have been deployed as pilot projects in the UK. Although these form part of the Government's *Clean Growth Strategy* (2017), at present there is insufficient evidence to provide a realistic estimate of their potential contribution towards the decarbonisation target.

A note on overheating, cooling and climate change

Although one of the biggest challenges in decarbonising buildings in the UK relates to heat demand, it is generally agreed that demand for cooling is likely to increase in the future as a result of climate change.

It is important to consider interventions such as

- Passive cooling measures in order to reduce the need for electrically driven cooling e.g. air conditioning
- Deliver any required cooling using highly efficient systems
- Heat pumps offer energy efficient heating and cooling
- Incorporate building mounted solar PV where possible as solar panels can offset the energy demands for cooling systems on hotter days with higher cooling demands