WM2041

FIVE YEAR PLAN 2021-26

Technical Report

BACKGROUND AND CONTEXT

Background and context

WSP have been commissioned by the West Midlands Combined Authority (WMCA) to develop the first Five Year Plan (FYP) to support them in their commitment to achieve net zero carbon by 2041. It was developed, working with the WMCA project team and key stakeholders including the seven constituent local authorities, Transport for West Midlands and Energy Capital. This plan focuses on what the WMCA is best placed to deliver, in partnership, to play its part in securing a low carbon future.

The FYP is split into the following documents:

1. Summary Document
2. Technical Report
3. Technical Appendices

1.1 | Climate Change

It is known that climate change is happening today and is the result of greenhouse gas emissions caused by human activity. Impacts from climate change are already being felt across the globe and will continue to increase in the future. Action to limit future global greenhouse gas emissions will help restrict future changes in the climate system.

Whilst there is no clear threshold where climate change moves from safe to dangerous, it is expected that there will be disruptions and irreversible losses of natural habitats and resources, even with a 1.5 or 2˚C rise in global temperatures. However, with rapid global action to cut greenhouse gas emissions, it is possible to limit rises in temperatures to no more than 1.5 – 2˚C. On the other hand, if no action is taken, global temperatures could increase by 4˚C or more by the end of the century.

Globally, the Intergovernmental Panel on Climate Change has identified a range of concerns for the future, including:

- Irreversible impacts – even at more moderate changes in global temperature, particularly for Arctic ecosystems and coral reefs.
- Extreme weather events.
- Severe impacts on the world's poorest and most vulnerable populations.
- Environmental and economic damage.
- Large-scale singular events (such as further sea level rise as major ice sheets melt over Greenland and Antarctica).

In the UK:

- The average annual temperature is around 1˚C warmer than the pre-industrial period.
- The chances of experiencing hot summers like in 2018 have doubled in recent decades and are now about 10-20% per year. Unchecked this will rise to 50% by 2050.
- Sea level has risen by 16cm since 1900 and will continue to rise due to time lags in the climate system.

1.2 | National Context

The UK is committed to achieving net zero by 2050 – this is a statutory obligation set out in the Climate Change Act of 2008 (as amended 2019). Achieving this target, and delivering the necessary transformative change at scale and pace, will require significant changes to the generation, supply and use of energy for heat, power and transport in all sectors of the economy. There will also need to be a different approach to resources, moving from a linear to a circular model; delivering high quality nature-based solutions and biodiversity net gain; and, in the way buildings are constructed and the standards to which they are built. The way we live as individuals and households will need to change. It will also require changes to the ways that projects are developed, financed and delivered.

In order to drive this change, there have been a number of policy announcements coming from the UK government during 2020, which provide important context for this Five Year Plan. Two of the most significant are:

'Ten Point Plan for a Green Industrial Revolution' by the Department for Business, Energy & Industrial Strategy (November 2020). The plan focuses on advancing offshore wind; driving the growth of low carbon hydrogen, delivering new and advanced nuclear power; accelerating the shift to zero emission vehicles; green public transport; cycling and walking; 'jet zero' and green ships; greener buildings, investing in carbon capture; usage and storage; protecting our natural environment and green finance and innovation. The ten-point plan will mobilise £12 billion of government investment, and potentially three times as much from the private sector, to create and support up to 250,000 green jobs.

'The Sixth Carbon Budget' by the Climate Change Committee (December 2020). The recommended pathway requires a 78% reduction in UK territorial emissions between 1990 and 2035. In effect, bringing forward the UK's previous 80% target by nearly 15 years. The four key steps include the take up of low-carbon solutions; expansion of low carbon energy supplies; reducing demand for carbon-intensive activities and land; and greenhouse gas removal.

Other policies that will have an important bearing include: The Energy White Paper (December 2020) and the upcoming Environment Bill. Given the volume of legislation, regulation and policy coming out from government all the time, it is essential for the WMCA to keep up-to-date with opportunities to influence, engage with and implement change, where relevant.

As the UK prepares to host COP26 in November 2021, there needs to be a clear route to acting on addressing climate change. A key part of this is understanding the right route for delivery. The concept of subsidiarity is an important one for this plan – understanding the best spatial scale to deliver the change needed. This may be a community project; a local authority-led programme; a business change; a national or international effort. This plan focuses on what WMCA is best placed to deliver, in partnership, to play its part in securing a low carbon future. To achieve the West Midland's carbon ambitions, everyone in the region – councils, businesses, government and members of the public – will need to play their part.

1.3 | West Midlands Combined Authority Context

The WMCA is composed of 18 local authorities and three Local Enterprise Partnerships (LEPs). It was established in 2016 and elected its first mayor in 2017. It is led by the Mayor and the leaders of the seven metropolitan constituent authorities, each of whom holds a portfolio. Non-constituent authorities – including eleven local authorities from the wider region and the LEPs – also play a part, and they collaborate to shape and govern the regional economy.

In June 2019, the WMCA declared a climate emergency and, in July 2019, the Combined Authority Board received a paper from the Tyndall Centre outlining the trajectory that would be necessary in order to reach net zero carbon emissions by 2041. This work includes two interim targets of 36% reduction by 2022 and 69% reduction by 2027. The WMCA's response to this was the publication of the paper '#WM2041: Actions to meet the climate crisis with inclusivity, prosperity and fairness: a discussion document'. The paper contained 73 climate actions of varying scale, complexity and investment requirement and was approved by the WMCA Board in January 2020. The local authorities that form the WMCA have varying net zero carbon targets (outlined in Section 1.6), including earlier targets for council operations.

An extensive consultation process followed, which concluded in March 2020, at which point the UK was hit by the COVID-19 pandemic. It became clear that WM2041 had potential for both addressing climate change, but also to support a 'programme for implementing an environmental recovery' (an additional paper that was approved by the CA Board in June 2020). This outlined the short-term actions that would have the potential to bring social and economic, as well as environmental, benefit to the region at a time that has been hugely challenging for communities and business. Along with immediate actions, this paper outlined longer term plans for delivery of WM2041 moving from strategy to delivery at scale.

The WMCA is well-placed to convene stakeholders and to work with local authorities to build the scale required for investment in many of the schemes that will be required to reach net zero. As the Local Transport Authority it has a duty to develop, publish and implement a Local Transport Planand, in doing so, have regard to relevant national policy including Environment Acts, the Climate Change Acts. In June 2018, WMCA's Strategic Economic Development (SED) Board formally tasked Energy Capital, a public-private partnership working on energy infrastructure, hosted by the WMCA, with responsibility for delivering the targets set out in the Regional Energy Strategy, which includes delivering the region's share of carbon emission reductions and leading energy related activities on behalf of the WMCA.

The recent Sixth Carbon Budget from the Climate Change Committee also recognises the importance of local authorities in delivering on carbon reduction, including key powers and duties, for example: planning powers over buildings and transport; enforcement of building regulations; powers to ensure buildings meet basic energy efficiency standards; and, duties and powers to protect the environment, wildlife and heritage.

Inclusive growth and a just transition

The need to recognise wider co-benefits is a central theme of the WM2041 plans. The need for this to be a just and inclusive transition runs through all their work on climate change, which is reflected through alignment to WMCA's model of inclusive growth and to the global context established by the United Nation's Sustainable Development Goals (SDGs).

> Inclusive growth is a more deliberate and socially purposeful model of economic growth – measured not only by how fast or aggressive it is; but also, by how well it is created and shared across the whole population and place, and by the social and environmental outcomes it realises for our people.

Figure 1 **– West Midlands Combined Authority Inclusive Growth Framework and SDGs**

1.4 | Five Year Plans

If WM2041 is the vision of where the WMCA region needs to get to, then the Five Year Plans are how it can get there. They will package up activity under WM2041 into programmes of work with clear milestones and will provide the opportunity to measure progress towards the carbon reduction target.

The trajectory and overall budget for the region was proposed by the Tyndall Centre undertaking a review in line with the Paris COP agreements, and adopted by the WMCA in July 2019. The aim of this first (and subsequent) FYP is to provide clear guidance on the types of measures that will need to be implemented to reach net zero by 2041. The WMCA, along with its stakeholders, must understand where and how to invest in programmes of delivery and develop policy to support the 2041 target. The WMCA also want to understand how this should be sequenced and the combination of approaches that are needed to get to a position of net zero carbon emissions. This needs to be considered in the context of UK policy and regulation and the extent to which it currently enables/ challenges the ability to achieve net zero sub-nationally.

Importantly, the FYPs need to give the people of the region the confidence that these substantial policies and investments are going to unlock positive outcomes for them and their places. **WM2041 expresses WMCA's commitment to a net zero pathway that achieves the following outcomes:**

- We will change our economy without leaving anyone behind.
- We will invest in the resilience of our places.
- We will use our industrial past to create a new future.
- We will create places and connections that help us to meet the climate challenge.
- We will decouple prosperity from the consumption of energy and resources.

The first FYP will set the pace and tone of the WMCA engagement with constituent local authorities and wider stakeholders. The aim of the first FYP is to:

Evidence based plan

Provide an **evidence-based** plan, linking up WM2041 and local authority delivery plans, projects and investment programmes and grouping them into type / location across the West Midlands region to ensure an efficient, cost-effective and prioritised approach to delivery.

Common vision for stakeholders

Create a **common vision** for stakeholders across the whole of the West Midlands with a strategic plan, policies and outline of practical devolution opportunities to deliver WM2041.

Different existing and potential new routes to delivery

Outline different **existing and new routes to delivery** and where this is best led by communities, local authorities, the WMCA, the private sector, or a mixture.

Funding sources, financing and investment

Outline the **funding sources,** financing and investment to deliver the FYP, based on the above.

A step change

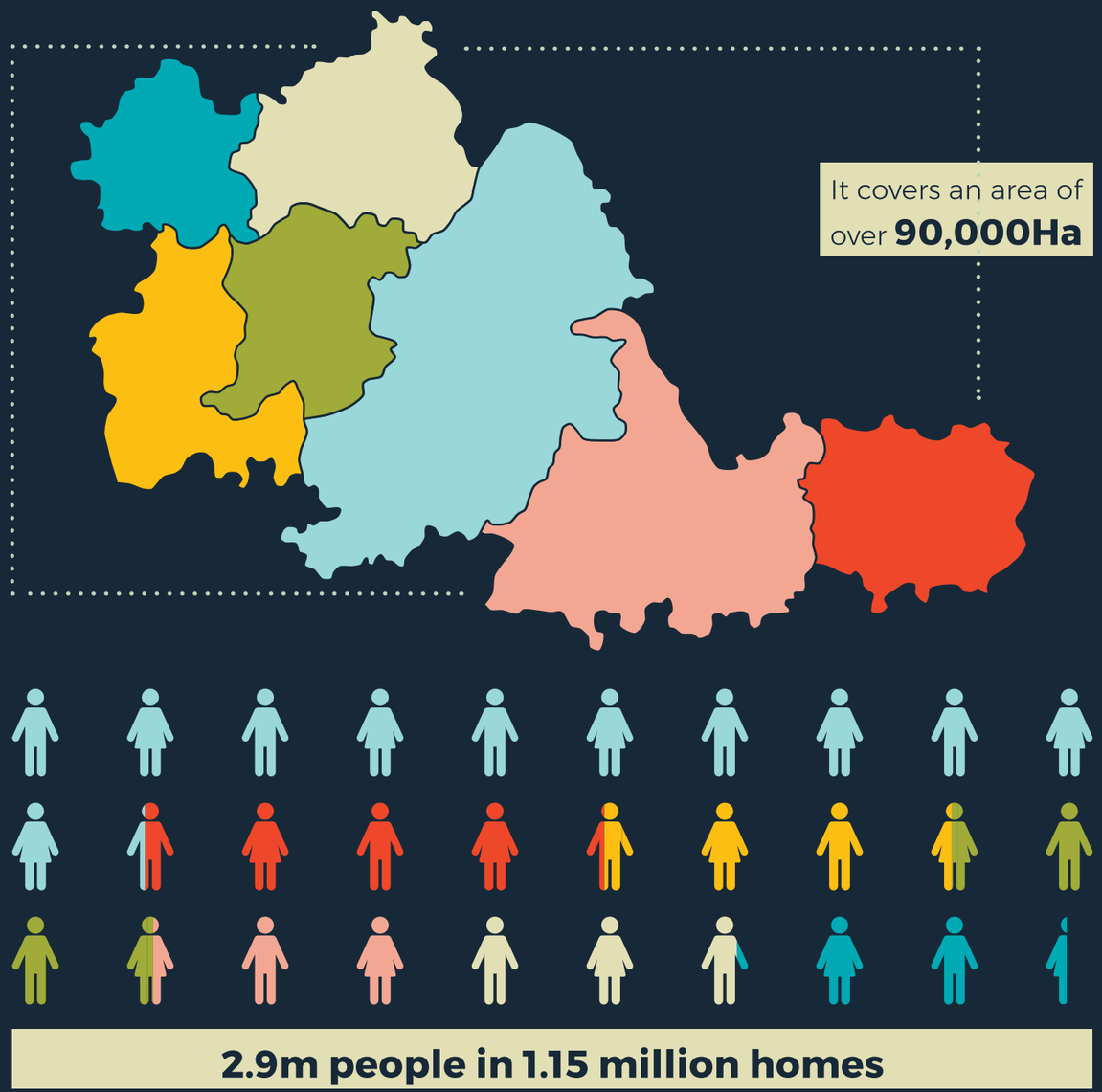
Represent a step change in the way the **region works together** collaboratively to deliver against environmental priorities for an inclusive, prosperous and fair transition to a net zero society and economy.

This plan focuses on the seven constituent authorities that make up the WMCA area:

Birmingham City Council	Coventry City Council	Dudley Metropolitan Borough Council	Sandwell Metropolitan Borough Council
Solihull Metropolitan Borough Council	Walsall Council	Wolverhampton City Council	

The non-constituent authorities are aware of, but are not included, in this piece of work directly. However, some of the plans and investments will support change in wider areas and vice versa.

Figure 2 – Overview of the West Midlands Combined Authority Area (constituent members)



1.5 | Working In Partnership

Addressing climate change will be a collaborative effort. Ensuring that the right governance and engagement in place for delivery will be critical for success. This will need to take place alongside local authority partners to ensure that full account is taken of plans and work happening locally and that regional plans are not replicating or confusing local activity but rather complementing and enabling it. Indeed, several local authorities in the region have already pledged to achieve zero carbon status for their estate and local authority area (under varying timeframes).

In addition to working closely with local authorities, there is a clear role for a range of regional partners in developing the plans, and delivering the projects, to take the region to 2041, including:

UK government - it is clear that delivery requires a close working relationship with the UK government, including requests for devolution of powers and resources to support the region in achieving net zero.

The public – public support will be crucial to enable the change through personal decisions and behaviours.

Business - the private sector has a role to play in its own decarbonisation plans, as well as through project collaboration and financing and investment.

Economic Development Bodies – including LEPs and the Midlands Engine

Other public sector organisations – such as the Environment Agency, and NHS Trusts.

Universities - the West Midlands universities undertake world-leading research in many of the relevant areas of this plan.

Voluntary organisations and environmental non-governmental organisations (NGOs) – some of the areas in the plan will need to work with community-based groups and NGOs who may be best-placed to deliver some of the initiatives that will come from this plan.

1.6 | What is already underway?

Much is already happening across the West Midlands region to work towards a net zero carbon society. Birmingham, Sandwell, Solihull and Wolverhampton councils have all committed to their organisations achieving net zero carbon status by 2030 or earlier. The overall impact of this will be small in percentage terms but provides significant leadership and gives confidence to supply chains to focus on low carbon goods and services.

Other local delivery programmes include:

Wolverhampton

Council own emissions net zero by 2028 and LA wide by 2041

New Cross Hospital 6.9MW solar array

University research programmes for the built environment

Walsall

Council own emissions net zero by 2050

Birmingham

Council own emissions net zero by 2030

Authority-wide net zero by 2030

Clean air zone from summer 2021

Leading energy expertise - Birmingham Energy Institute at University of Birmingham, Tyseley Energy Park, Energy and Bioproducts Research Institute (EBRI), Energy Systems Catapult

EV charging infrastructure rollout

Dudley

Low carbon place project

LED street lighting completion

Sandwell

Council own emissions net zero by 2030 and LA wide by 2041

Town centre heat network

Solihull

Council own emissions net zero by 2030 and LA wide by 2041

Town centre heat network

Airport net zero by 2033

JLR net zero by 2030

Coventry

Council own emissions net zero and at least 55% reduction by 2030 (against 1990)

All electric bus city by 2025

EV charging infrastructure

Developing a national pilot for a Regional Energy Systems Operator (RESO)

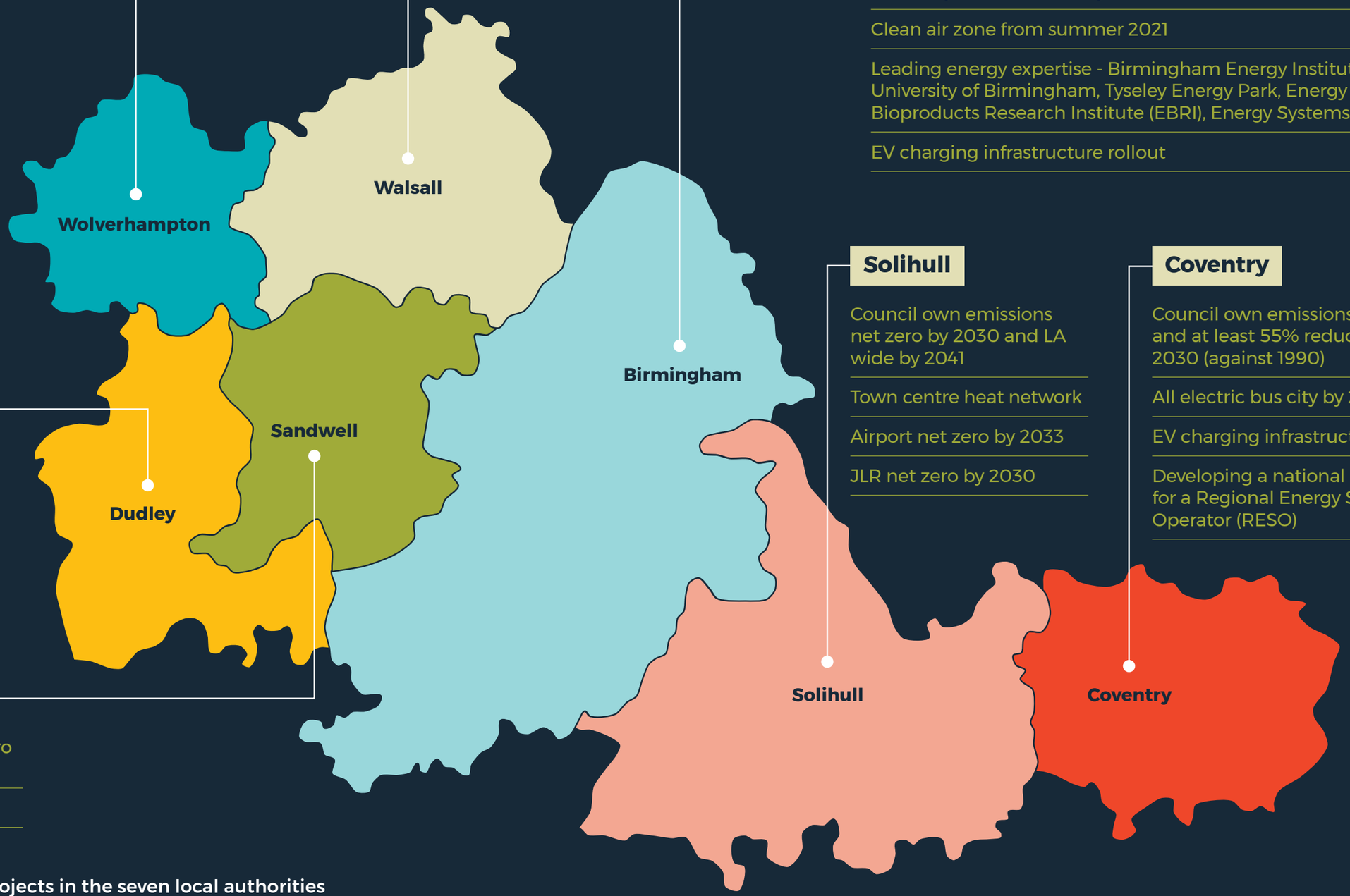


Figure 3 – Overview of key projects in the seven local authorities

WMCA's WM2041 programme activity includes:

Energy

- **Energy Capital** is a public-private partnership working on energy infrastructure, hosted by the WMCA, leading on the delivery of the Regional Energy Strategy and a wide range of energy-related projects, including: defining **Energy Innovation Zones** to support the development of local energy solutions, designing **smart local energy systems** for Coventry and Rugeley and working with government to develop policies and systems to support these. The Energy Capital board brings together key stakeholders to support the region's energy transition, ensuring it enables green growth and removes barriers at the local level. Energy Capital was set up to explore new models of regional energy governance and delivery and is designing and championing the WMCA's regulatory and devolution requests to government to enable the net zero transition for the region.

Circular Economy

- Waste generated and general consumption patterns are considered in several studies. The WMCA has initiated a **Circular Economy Taskforce,** which will have a routemap developed to indicate where there are areas of opportunity, the Black Country programme around industrial clusters also has the circular economy at its heart. Whilst there are opportunities around reusing waste and the circular economy as well as around waste to energy, especially for industry, the starting point is reducing the waste created in the first place.

Buildings

- WMCA has developed a **Zero Carbon Homes Charter** as part of its work on housing and land. This sets out the benefits and costs for improving building standards. New homes and other buildings will need to be zero carbon, or at least not utilising fossil fuel heating in the near future. The Charter aims for all new homes to meet zero carbon standards from 2025.
- A **Fuel Poverty and Regional Retrofit programme** is in development to outline investment and opportunities to deliver energy efficiency in buildings. Retrofitting homes to be fit for purpose is also underway especially around council owned housing stock. There are 140,000 households in fuel poverty in the region (with rates exceeding 12% in areas of Birmingham, Coventry and Wolverhampton) with large estates of 1950/60s housing. The experience already present within councils will be vital in improving building insulation levels along with behaviour change advice and energy literacy all of which will have significant benefits.
- WMCA's Single Commissioning Framework supports a **brownfield first** approach which involves regenerating the region's former industrial sites and vacant urban plots, helping to protect the green belt.
- WMCA launched the **WM Design Charter** which supports the delivery of low carbon developments, climate resilience, and capitalising on low carbon technological innovations to build sustainable communities.

Green Growth

- WMCA is also looking to its industrial heritage to support a low carbon future. This is attracting **new industry** to the region, e.g. a potential new gigafactory for battery production, as well as supporting existing business, e.g. electric vehicle production at Jaguar Land Rover. The West Midlands accounts for 9% of manufacturing employment in Britain (with the highest concentration of manufacturers) which presents an opportunity to lead in this field.
- **Large energy users** in the region have already implemented many of the 'quick wins' when it comes to energy efficiency and are working actively to bring further efficiencies around circular economy and co-location. Ensuring industries remain competitive is also a priority, as such the Regional Energy Strategy is core to any regional industrial strategy.
- A number of private sector businesses in the region are showing leadership in delivering net zero including:
  - **Severn Trent Water's** ambition to be net zero by 2030 and its aim to plant 1.3 million trees by 2030.
  - A pledge by **National Express** to only buy zero emission buses going forward – the company bought its last diesel bus in 2019.
  - **E.on** ditching all fossil fuel generated electricity in 2015 with customers now receiving renewables as standard.
  - **Cadent** switching all its pipes to plastic to transport hydrogen while looking at hydrogen-ready boilers.
  - **BT** has already switched to 100% renewable electricity and is looking to reduce supply chain emissions by 87% by 2030.
- The region as whole is aiming for continued growth, with HS2 stations at Birmingham and Solihull both pledging to achieve net zero as well as a number of new residential and commercial developments, regeneration works, heat networks and transport initiatives.

Transport

- WMCA is investing in a range of transport schemes being delivered by TfWM totalling **£1.1bn** including **active travel** supporting cycling and walking, **Sprint Bus networks,** new and improved **rail stations** and **Midland Metro** tram network.
- WMCA is working with local authorities in the region to co-ordinate and support the transition to electric and alternative fuelled transport. A **ULEV strategy** was developed for the WMCA by Cenex and an energy infrastructure strategy to support this transition is being developed by Energy Capital.
- The current long-term transport strategy in the West Midlands will see a shift in emphasis of travel in line with typical large European city regions where car use accounts for typically 40% of all journeys, compared to 63% in the West Midlands metropolitan area. In addition, the **Cycle Charter** sets a target for 10% of all journeys to be made by bike in the West Midlands Metropolitan Area by 2033. The current committed actions are insufficient to meet these objectives.

Natural Capital

- Natural capital and increasing green cover are a focus. WMCA has launched its **Virtual Forest** tree planting platform to support the goal of planting a tree for every person in the West Midlands, which supports the ambition in the UK government's 10-point plan. This sits within the context of wider greening initiatives, improving air quality and improving biodiversity and habitats. The goal set out here, is to go further.

Figure 4 **– Overview of businesses across the West Midlands Combined Authority (left) and the transport challenges (right)**

88,600 businesses
across the seven authorities

78,400 businesses employing **fewer than 10 people** with a similar number turning over **less than £1million**

1,000 businesses employing **more than 100 people** with a similar number turning **over more than £10million**

1.4 million cars registered in the West Midlands Combined Authority (including 32,000 ultra low emissions vehicles).

75 million vehicle miles taking place annually in the West Midlands Combined Authority. Over 60% of all journeys are made by car.

455 public EV chargers in the West Midlands Combined Authority of which 97 are 'rapid'.

1.7 | Development of Five Year Plan

WSP were commissioned to develop the first FYP. This has involved the following:

- Reviewing the current situation and planned activities in the region both by the public and private sector. This allowed understanding of the current capabilities, knowledge base and ambition levels already present. Where possible, any greenhouse gas emissions reduction associated with these activities was quantified.
- Speaking to a wide range of regional stakeholders to ensure the plan considered their views and addressed key concerns.
- Reviewing reports, policies and data available for the region to build the Five Year Plan effectively on these previous studies and avoid replication.
- A jobs and skills analysis for the region. This meant understanding the existing strengths of the region which could be built upon, the jobs and skills which were under threat as well as those which would be likely to grow and expand.
- Energy and Greenhouse Gas (GHG) emission modelling for the WMCA (covering the seven constituent members) including:
  - Establishing and baseline and understanding of current emissions and sources.
  - Business as usual projection to map out how GHG emissions would change based on existing committed and likely actions.
  - Modelling of each of the goals, policies and interventions to quantify their impact and resultant progress towards the net zero target and ability to meet carbon budgets.
  - Recommended goals which may be targeted in order to meet the WMCA's targets.
- A financial overview of the cost and payback of each of the recommended goals.
- Delivery plans that outline the resources required.

Chapter Summary

The UK is committed to achieving net zero by 2050 – this will require significant changes throughout the economy and in people's lifestyles.	The first FYP will set the pace and tone of the WMCA engagement with constituent local authorities and wider stakeholders.
In June 2019, the WMCA declared a climate emergency and subsequently set a target to reach net zero carbon emissions by 2041.	Much is already happening across the West Midlands region including developing zero carbon homes, circular economy, Energy Innovation Zones and smart energy management.
The FYPs need to give confidence in making the right decisions for people, place and economy.	Challenges remain around energy-intensive industries, fuel poverty, fossil fuels in transport and heating, and the rate of change.

ENERGY & EMISSIONS OVERVIEW

2.1 | West Midlands Combined Authority energy use

Energy use across the WMCA in 2018 was approximately 50,000 GWh; Figure 5 represents a reduction of around 20% since 2005.

Figure 5 **– West Midlands Combined Authority Energy Use 2005-2018**

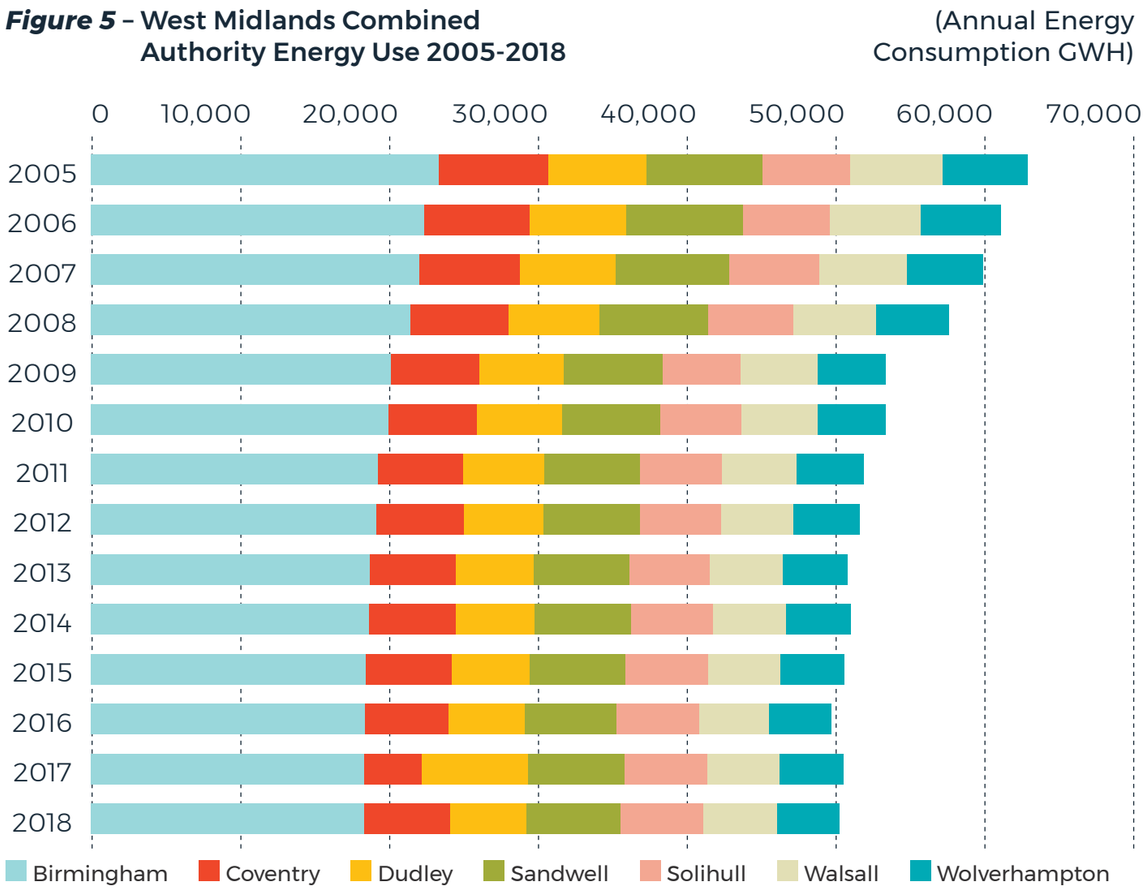
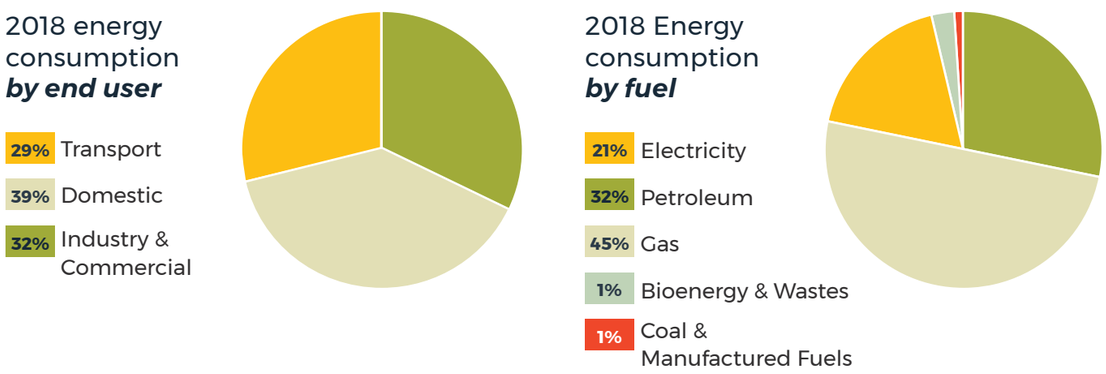


Figure 6 **– Annual Energy Consumption Splits 2018**



[1] 2018 data have been used throughout the analysis available from the Department for Business, Energy & Industrial Strategy (BEIS), which publishes with a two-year lag.

Emissions Scope

To estimate carbon emissions from the seven constituent local authorities, a slightly different methodology is used for setting the boundary rather than the Scope 1, 2, 3 process used by many organisations. It considers fuel use within the local authority geographic area only. This is a typical approach used by many local authorities in the UK.

The rationale for this methodology is that sub-national energy use and GHG emissions data are easily available from central government. This simplifies the process of data collection. Similarly, it means that there is a level of consistency between the reporting from local authorities and allows for easier comparison and benchmarking.

This approach does however mean that only energy use undertaken within the physical boundary is considered. Other emissions, such as from the release of fluorinated gases, often used in refrigeration) are omitted.

The four main fuel categories considered are:

- Natural gas (generally metered data)
- Electricity (generally metered data but excluding energy generated and self-consumed as well as some very large industrial consumers)
- Road transport fuels (estimated based on vehicle and road types)
- Residual (non-electricity, non-gas and non-road transport) fuels (estimated)

The sub-national dataset use has been specifically developed for use by local authorities and devolved administrations for targeting and monitoring carbon reduction and energy efficiency policies. This dataset differs slightly but is broadly similar to data available from the Digest of UK Energy Statistics (DUKES) and Energy consumption in the UK (ECUK).

- It has been assumed domestic energy consumption patterns in the WMCA broadly mirror the country as a whole, that the vast majority of gas use for domestic users is for space heating (76%) and domestic hot water generation (22%) with only 2% used for cooking as per the ECUK datasets.
- In contrast, only 22% of domestic electricity use is for heating and hot water; this is generally in properties with electric panel or storage heaters (Economy 7). The majority of electrical usage within homes is associated with lighting (13%) and appliances (59%).
- As no area-specific data is available for commercial and industrial energy use, national level data has been used for the most recent year available to split fuel usage by end-use. This approach is not ideal, but the region is reasonably representative of the wider country, with an emphasis on manufacturing.
- On that basis, 47% of gas use for commercial and industrial users is for heating and domestic hot water generation, with a further 11% used in high temperature processes, 22% in low temperature processes, 6% for drying/separation, 4% cooking and 10% unknown heat generation.
- Only 11% of electricity for commercial and industrial users is used for heating and hot water with a further 19% used in high and low temperature processes as well as drying. About 5% is used for cooking, 6% for computing, 11% for cooling/ventilation, with the rest attributed to lighting, compressors and motors.
- Transport energy consumption is predominantly road transport petroleum use. As sub-national data sets are being used to quantify energy consumption, aviation is not included or considered within the scope of this assessment in line with the budgeting methodology used.
- Petrol and diesel cars make up the majority of petroleum consumption accounting for 64% of the total, the Heavy Goods Vehicles (HGV) and Light Goods Vehicles (LGV) fleet make up 15% to 17% of the total each with about 4% of petroleum use from the 2,300 buses operating in the region.
- In the last few years energy consumption from light goods vehicles has grown steadily. The full reasons for the growth in van miles are not fully understood but are not all e-commerce.

2.2 West Midlands Combined Authority GHG emissions

GHG emissions associated with energy use have reduced 36% from 2005-2018. These emissions savings are primarily from electricity grid decarbonisation.

Figure 7 – **West Midlands Combined Authority Annual GHG Emissions**

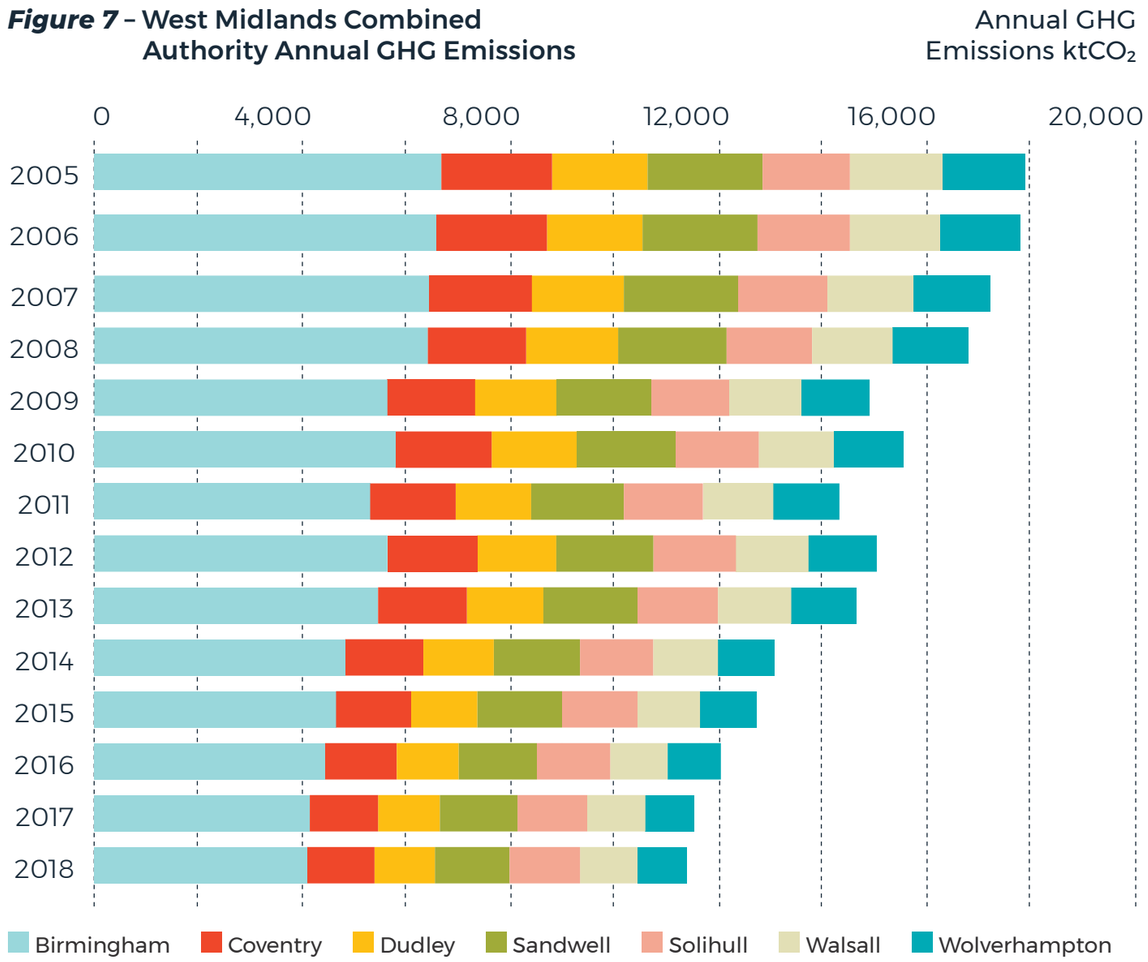


Figure 8 – **West Midlands Combined Authority Annual GHG Emissions Splits**

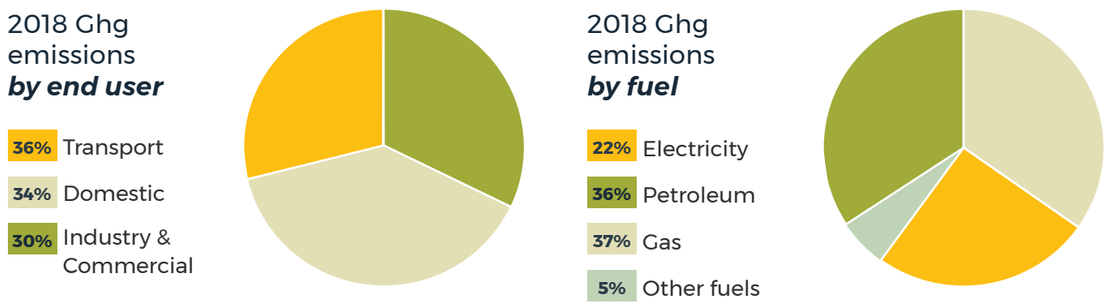
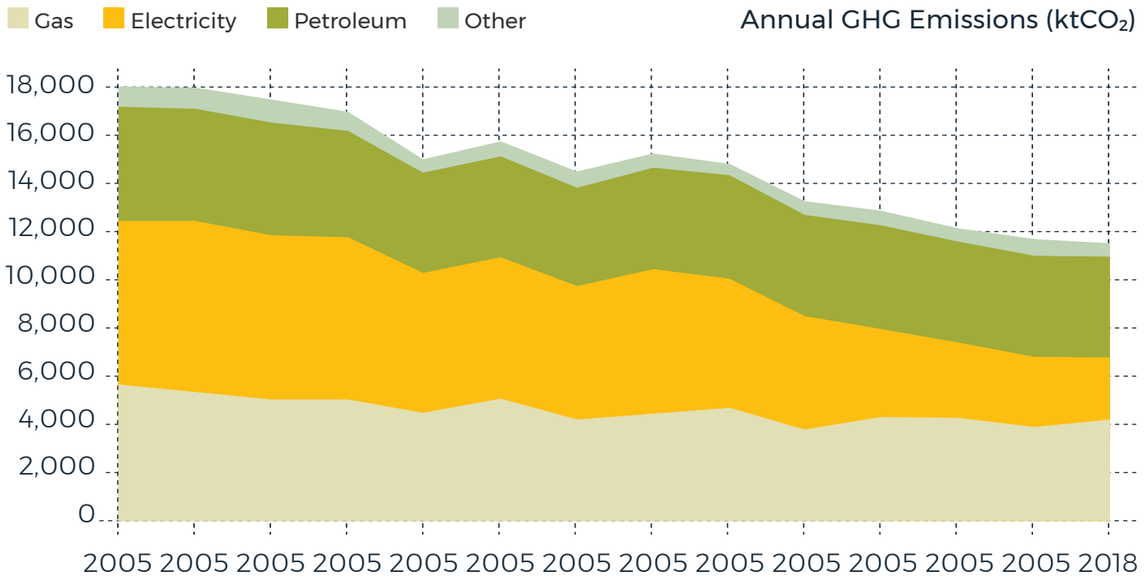


Figure 9 **– West Midlands Combined Authority Annual GHG Emissions Share**



- Whilst emissions from gas and petroleum have remained static, the decarbonisation of the electricity grid has meant that emissions from that sector have fallen rapidly, a trend which is predicted by BEIS to continue into the future, (see Treasury Green Book projections).
- The carbon intensity of electricity is already lower than gas and so, in order to meet the WMCA's and UK wide carbon emissions targets, a shift away from gas use will be a priority for buildings, while shifting away from petroleum is also needed in the transport sector.
- 30% of GHG emissions in 2018 were from commercial and industrial activities, whilst 36% were from transport and 34% from domestic energy consumption. These splits differ from energy consumption owing to the relative carbon factors for the fuels used.
- On a fuel basis, transport emissions (mainly petroleum consumption) represent 36% of emissions, while the combustion of natural gas results in 37% of GHG emissions

2.2.1 | The potential impact of COVID-19

There is a two-year delay between the present day and the most recent data available, therefore the recent shift in energy consumption associated with the COVID-19 pandemic has not been captured in this report.

Although it will not be until 2022 that the data will be available, it is likely that there will be short and long-term impacts on energy use and CO_2 emissions, including on transport, commercial uses and home energy demand. Office, retail, industrial and transport emissions are likely to have fallen whilst dwelling energy use is likely to have risen especially over winter months. There is also the risk of a high carbon rebound as the region emerges from lockdown, with people being able to travel once again and likely to choose to travel by car rather than public transport for reasons of personal safety.

2.2.2 | Tyndall Centre carbon budget work

Whilst the net zero target by 2041 is a clear end target, there is also a projected trajectory to stay within the WMCA's overall carbon budget proposed by the Tyndall Centre.

The Tyndall Centre in 2019 quantified the carbon budget for the wider West Midlands for 2020 to 2100, based on science-based targets and their interpretation of the Paris Climate Change Agreement (December 2015). The projected trajectory in this report was based on translating the "well below 2˚C and pursuing 1.5˚C" global temperature target and equity principles in the Paris Agreement to a national UK carbon budget.

Based on the analysis, for the West Midlands to make its 'fair' contribution towards the Paris Climate Change Agreement, it needed to both reach zero by 2041, but also stay within a cumulative carbon dioxide emissions budget of 126 $MtCO_2$. This is based around the equity principles in the Paris Climate Change Agreement where 'developed' nations have a smaller share of the global carbon budget available than 'developing' nations.

As the subject of this study is limited to the seven constituent authorities, WSP have re-calculated this (using a similar methodology) to a cumulative carbon dioxide emissions budget of **74.1 $MtCO_2$** for the period of 2020 to 2100. Using the methodology adopted by the Tyndall Centre, this would give a carbon budget of **34 $MtCO_2$** for the seven constituent authorities in the 2021 – 2026 budget period.

2.3 | Document review

A number of studies and documents were reviewed as part of this study. A list of documents and details of the findings from each report can be found in **Appendix A.**

Chapter Summary

Final energy use across the WMCA was approximately 50,000 GWh in 2018.

Energy consumption was split between domestic (39%), industry and commercial (32%) and transport (29%). Fuel use was also dominated by consumption of natural gas.

30% of GHG emissions in 2018 were from commercial and industrial activities, whilst 36% were from transport and 34% from domestic energy consumption.

The WMCA region emitted 11,400 $ktCO_2$ in 2018.

Based on Tyndall Centre methodology, it is calculated that the West Midlands has a cumulative carbon dioxide emissions budget of 74.1 $MtCO_2$ for the period of 2020 to 2100 as its 'fair' contribution towards the Paris Climate Change Agreement.

The impact of COVID-19 has not been captured in the most recent datasets. Office, retail, industrial and transport emissions are likely to have fallen whilst dwelling energy use is likely to have risen.

STAKEHOLDER ENGAGEMENT

3.1 | Introduction

Achieving net zero across the WMCA area by 2041 will take a collective effort from all types of organisations. Therefore, it was important as part of this first FYP, that key regional stakeholders were identified, to understand their views, provide an opportunity to input into this plan, and also to identify where existing resources can be used.

3.2 | Stakeholder map

Using experience and knowledge of the region, along with WMCA's existing links and networks, WSP established a long list of proposed stakeholders to potentially engage with on the project.

This list was verified with the WMCA project team and then a rating was applied to the individual stakeholders to identify which stakeholders should be prioritised for engagement.

In total, WSP, with the wider WMCA team, identified 110 organisations with which to engage. This included local authorities, universities, the private sector, NGOs and the WMCA itself. In total 240 individuals across 97 organisations were consulted as part of this project.

Further details on the engagement is included in the **Appendix B.**

3.3 | Summary of findings from engagement

A summary of the information gathered from the first stage of engagement is outlined in the following table. This is split by subject (general, goals, jobs and skills, delivery and resources) while also identifying where the comments came from.

Table 1 **– Summary of Stakeholder Engagement**

	Who	Feedback
General	Local Authorities / Private Sector	There are a variety of regional, individual and organisational commitments relating to the net zero agenda and varying degrees of implementation. Many, even where no specific targets have yet to be established, are recognising it and as a minimum beginning to respond to it. Some of the organisations have publicly committed to net zero targets by specific dates whereas other have not yet set targets.
Goals	Local Authorities, Energy Capital and Housing Associations	Energy efficiency (residential, commercial and industrial) were identified by respondents as being an important area of focus.
	Local Authorities, Energy Capital, Education Providers, TfWM, Midlands Connect and Midlands Metro	Alternative modes of transport and alternative fuel transport (electric and hydrogen for larger vehicles) were identified by respondents as being an important area of focus for many. Demand reduction/ management was also identified as important.
	Local Authorities, Energy Capital, Education Providers, Private Sector	Interventions already taking place include consideration and implementation of renewable and energy efficiency technologies, such as solar and electrification of fleet.
	Local Authorities, Housing Associations, Private Sector	There is uncertainty around the roles of natural gas and hydrogen – the plan needs to allow for that uncertainty
	Local Authorities, NGOs, Private Sector	Recognition of the importance of natural capital solutions – not just tree planting, and the wider benefits for biodiversity and health and well-being
	Local Authorities, NGOs, Housing Associations, Private Sector	Interventions should not just be technological – behavioural change needs to form a key component of this transition.
	Local Authorities	Retrofitting taking place, or plans are in place to undertake, but there are concerns around limitations due to availability of technologies and characteristics of existing stock

	Who	Feedback
Goals	**Local Authorities**	The plan needs to establish a framework for a common alignment between the educational institutions and employment providers. Historically, people have been reskilled and then those jobs have not materialised.
	Local Authorities	The partnerships and delivery mechanisms are there. We just need to identify the specifics on jobs and skills that are needed for employment.
	Local Authorities, Private Sector	Low carbon jobs and skills are still in infancy – there is currently not the demand for the jobs from the private sector. On the other side there are concerns around skills gaps and the need for upskilling, such as with regards to retrofitting and zero carbon homes for example.
	Local Authorities	The plan needs to include for greater engagement with colleges and universities to ensure demand for skills is met in industry.
	Local Authorities	Lack of clarity of what this 'Green Recovery' actually means in terms of jobs and skills.
	NGOs, Education Providers	The skill sets that will be most important to delivery of the WM2041 and FYP are around renewables and automotive. With the main industries that will be most affected by the transition will be energy, waste management, agriculture and forestry, rail and automotive.
	WMCA	The WMCA now has control over adult education budget so have the opportunity to shape skills offering.
Delivery mechanisms	**All**	It has been clear that all have a role to play in the transition to net zero and we need to remember people in this transition. Integration and alignment across the region is vital.
	Local Authorities / All	Local authorities need to have a central role in delivering and supporting this transition.
	Local Authorities	Having a regional approach with the WMCA leading each initiative would be beneficial, although also recognised was a need for flexibility as to how individual organisations might implement / integrate or collaborate, such as offsetting and retrofitting to maintain standards.
	WMCA	Each intervention may require different delivery mechanisms.

	Who	Feedback
Delivery mechanisms	**Local Authorities, WMCA, Private Sector**	There is a need to look beyond short-term and focus on how to deliver medium and long-term aspirations.
	WMCA, Private Sector	Engagement and collaboration with suppliers and wider industry are key, and further development of energy efficiency markets.
	Local Authorities, NGOs, Housing Associations, Private Sector	Behaviour change, acceptability of interventions and how they are delivered is important. We will not be able to do this without support.
	Local Authorities, NGOs, WMCA	There is a need for support through the planning system and consistent policy on land use - the region can be supported by national and local initiatives where the WMCA has no planning powers.
Resources	**Education Providers, NGOs**	The main resource barriers in the region to be considered as part of the plan are around finance and the funding structure, followed by regional powers and infrastructure.
	Education Providers, NGOs	Clear avenues for funding for each intervention would instil confidence.
	WMCA	There is a need for National Grid to be able support energy efficient transitions.
	Local Authorities, Private Sector	The plan needs to include real costs, practicalities, accessible funding options and constraints.
	WMCA, Private Sector, Education Providers, NGOs	Some concerns raised around paybacks and how much time these might take to be realised.

Chapter Summary

- Stakeholders differed in their view of key areas of focus, but work is needed across all areas.
- A regional approach is needed with local authorities being central to delivery
- Behavioural change needs to form a key component of this transition
- Funding is seen as a major barrier

ENERGY AND CARBON MODEL

4.1 | Introduction

A techno-economic model for the WMCA region was created, drawing on data and modelling from various sources. The aim of this model was to characterise the region and understand the total impact of each of the identified goals on it.

4.2.1 | Summary of approach

A techno-economic model for the WMCA region was created, drawing on data and modelling from various sources. The aim of this model was to characterise the region and understand the total impact of each of the identified goals on it.

Step 1 – Prepare a baseline

An energy and GHG emissions baseline was created for the combined seven constituent local authorities. When considering the historical energy and GHG emissions associated with the region, the primary data sources used were:

- Sub-national total final energy consumption data.
- UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2017.
- Government emission conversion factors for greenhouse gas company reporting.

This was projected forward using other data sources, including:

- Projections of changes in energy consumption in both domestic and non-domestic sectors.
- Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for an appraisal (for forecasts for the decarbonisation of electricity).

Using the above data sources, an estimate of the projected GHG emissions associated with energy consumption in the WMCA was generated. (Covered under Section 2).

Step 2 – Business-As-Usual (BAU) scenario

To this baseline, the impact of a 'Business-As-Usual' scenario was considered, including all the actions which are likely to be undertaken or have already been confirmed in the region or nationally.
(Covered under 4.3)

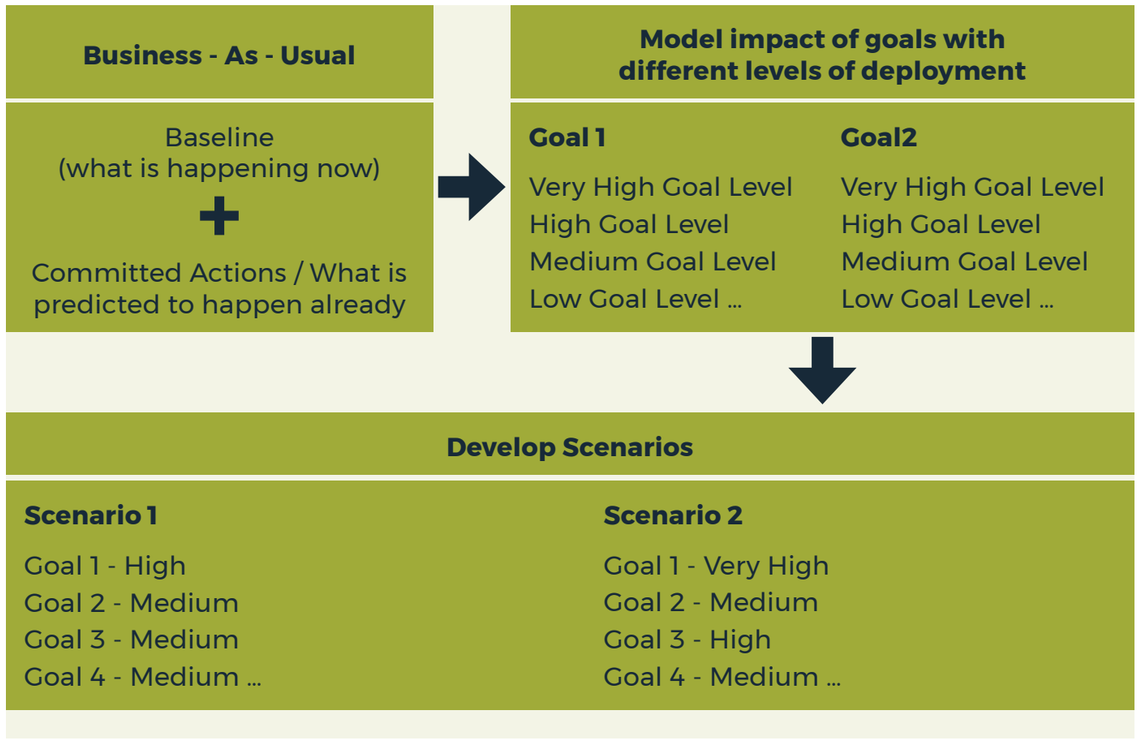
Step 3 – Model goals

15 separate goals were modelled to understand the potential for each on GHG reduction. These goals are based on stakeholder engagement, the literature review undertaken, existing, and understanding of future, government policy and WSP's experience in the field. In each case, there are four separate goal levels; low, medium and high and very high (the latter representing an ambition beyond what is currently considered realistic). (Covered under 4.4).

Step 4 – Model scenarios

Three scenarios were developed, based on a differing level of achievement in each of the 15 goals. These are 'Moderate', 'Accelerated' and 'Maximum'. (Covered under 4.5).

Figure 10 – WSP's approach to modelling goals and scenarios

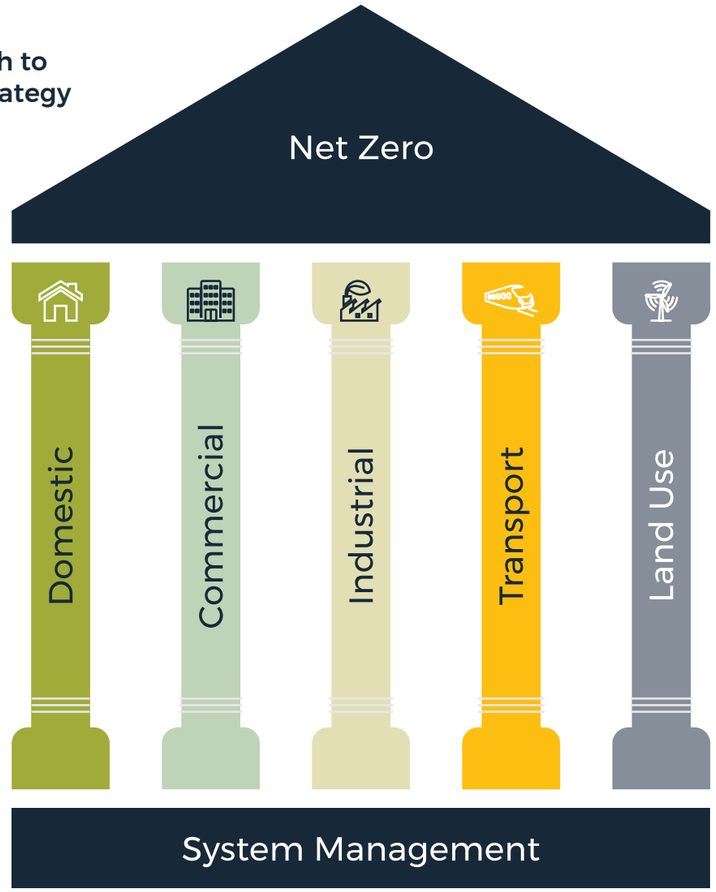


4.2.2 | Intervention areas

The approach undertaken for this study was to split the opportunity areas for reducing GHG emissions under the following headings:

Figure 11 **–**

WSP's approach to the net zero strategy



Domestic

There are opportunities related to energy consumption and generation attached to dwellings. This is further split into energy consumption reduction and efficiency, use of decarbonised fuels (primarily the electrification of heat considering the 5-year timeframe) and lastly renewable energy generation (primarily rooftop photovoltaics).

Commercial

There are opportunities related to energy consumption and generation attached to non-dwellings. This is further split into energy consumption reduction and efficiency, use of decarbonised fuels (primarily the electrification of heat considering the 5-year timeframe) and lastly renewable energy generation (primarily rooftop photovoltaics).

Industrial

There are opportunities related to energy consumption and generation attached to high energy consumption industries e.g. cement manufacturing, steel and iron manufacturing etc. Specifically, the focus is on processes which use high temperatures and therefore may require technologies which are not yet commercialised such as hydrogen and carbon capture and storage.

Transport

There are emissions associated with all forms of personal and goods transport. This was built around the A-S-I concept of avoid, shift and lastly improve. Firstly, opportunities to reduce the need to travel were considered. Next, where travel is needed it should favour active travel and low carbon modes of transport. Lastly, each of the transport modes should switch to low carbon fuel sources, likely to be electrical in the short term, but potentially hydrogen, biofuels or other technologies further out in time.

Land Use

There are opportunities to reduce GHG emissions by considering large-scale land use options. The focus here is on low value land and how this can be used to improve natural capital or the potential for renewable energy generation. (See spatial mapping **Appendix C** for details).

System Management

Underpinning all of these aspects are considerations around system management, ensuring that the infrastructure needed to support the changes is in place. The infrastructure and human management needed to support decarbonisation across the WMCA will need to evolve to meet the needs of the technologies and wider behavioural changes that will be deployed over the next 20 years. The two biggest areas in which significant changes are expected are electricity and gas.

Hydrogen infrastructure upgrades have been considered in this study and could play a role in most of the sectors. They have been assumed only in the industrial sector as an option to support high-temperature process heating, based on on-site container as feedback from the stakeholders was that hydrogen in the mains gas network would not be available until post-2030. The cost of hydrogen fuel (being multiple times higher than natural gas or heat pumps) along with limited availability of suitable boilers means this technology is not considered in the short term for the domestic sector.

Many of the technologies that have been identified involve the replacement of a gas-powered heating system with one that uses electricity. This applies to heat pumps as well as heat networks, and it is assumed that all new heat networks will use a low carbon source of heat rather than gas; as is the case with all three of the networks currently planned for the region. There are existing heat networks in the region for which there is no simple solution to make them low carbon at present.

The combination of electrifying transport and heat will increase electrical demand substantially with estimates, (by the National Grid and others) suggesting a two to three-fold increase in the annual demand, depending on the use of hydrogen and energy efficiency. Although smart energy systems and management could reduce the costs of dealing with this if implemented effectively, achieving net zero will result in significant cost to consumers nationally (see below), as importantly, the electrical and gas infrastructure is regulated nationally and makes local investment for anticipated needs challenging. How costs are apportioned and how energy regulation is changed to enable the achievement of net zero will be an important issue for local areas when determining their route to decarbonisation

4.3 | Business As Usual (BAU)

After the baseline and targets were established the next step was consideration of where policies, plans and trends would take the region, if no other action was taken; the Business-As-Usual Scenario. These actions already represent a significant step change from the way things have happened in the past and would require continued effort in order to bring to fruition. The main factors are listed below and explained further in **Appendix D:**

- Decarbonisation of electricity.
- Minimum energy Efficiency Standards (MEES).
- Housing growth.
- Commercial growth.
- Electrification / hydrogen use in transport.
- Council decarbonisation.
- Organisation decarbonisation.
- Other committed projects.

Modelling for the BAU has not simply assumed that local authority area wide targets are delivered, rather it reflects the activity underway.

Figure 12 **– Goals and Intervention Areas**

		Co-benefits of delivery -
1	Domestic energy efficiency retrofit	Lower energy bills & fuel poverty Reduce inequalities
2	Domestic heating retrofit	
3	Domestic solar PV	
4	Commercial energy efficiency retrofit	Boosting regional competitiveness Retain energy spend in region New business opportunity & economic growth
5	Commercial heating retrofit	
6	Commercial solar PV	
7	Industrial energy efficiency & fuels	
8	Industrial renewables	
9	Avoiding travel	Cleaner air Better physical & mental health
10	Shifting travel	
11	Improving passenger service fleets	
12	Improving freight fleets	
13	Improving private vehicles	
14	Land use (Renewables)	Adapting to climate change Enhancing biodiversity Better physical & mental health
15	Land use (Natural Capital)	

4.4.1 | Goal 1 – Domestic energy efficiency retrofit

The installation of specific measures, (where not already present), including smart meters, smart thermostats, cavity and solid wall insulation, loft insulation, double glazing and other water saving measures, alongside behaviour change.

The savings potential for these measures all vary, but data exists on the average savings that can be attributed to each. No major changes are needed to the overall property construction.

Smart meters can still be installed at 69% of dwellings, smart thermostats (94%), cavity (14%) and solid wall insultation (27%), loft insulation (18%), double glazing (7%). These figures only cover properties classed as 'easy to treat' rather than all remaining dwellings. There may also be restrictions in conservation areas for certain external features such as glazing or external cladding.

This means that while some properties may need several pieces of work undertaken, others may already have the above installed and need no further actions. It is likely the solution would be a multi-measure approach as appropriate to each home, which would be less disruptive, and cheaper.

Planning Implications

Most of the initiatives under Goal 1 would not require planning permission, as they would not lead to external alterations to buildings by virtue of the Town and Country Planning Act 1990 (as amended).

Where proposals relate to Listed Buildings, they are likely to require consent (including insulation and window replacement). Some authorities may also control double glazing in Conservation Areas too, through Article 4 Directions

Goal Levels

The aim is to reach 100% of homes to incorporate all of the above technologies as well as water saving devices.

Low

Local authority owned dwellings, socially rented and private rented dwellings (486,660) by 2041; equivalent to 36,200 dwellings by 2026.

Local authorities are already responsible for their own housing stock and so are undertaking these actions as a matter of course. As such, experience and supply chains already exist. Minimum Energy Efficiency Standards (MEES) already exists for the rented sector. Over the last few years, these have expanded both in coverage and minimum ratings that should be achieved. In addition, the threshold for capital expenditure has also been raised leading to a larger onus on landlords. There is also currently a benefit to installing efficient gas boilers, which may work against the aims of Goal 2.

Medium

All dwellings (1,178,000 dwellings) by 2041; equivalent to 122,000 dwellings by 2026.

The owner-occupied housing stock is the hardest to reach as the responsibility is for the homeowner and as such it will need to be attractive to the homeowner or they must be persuaded of the wider benefits to society.

High

All dwellings in WMCA (1,178,000 dwellings) by 2031; equivalent to 294,000 dwellings by 2026.

The high level would see a much higher deployment rate than the medium scenario and would require a rapid increase in the rate of deployment of energy efficiency, driving the supply chain and demand from owners. The relatively low intrusiveness of the measures considered makes this easier to achieve.

Very High

All dwellings in WMCA (1,178,000 dwellings) by 2026.

Figure 13 – Goal 1 GHG Emission Saving and Deployment in 2026

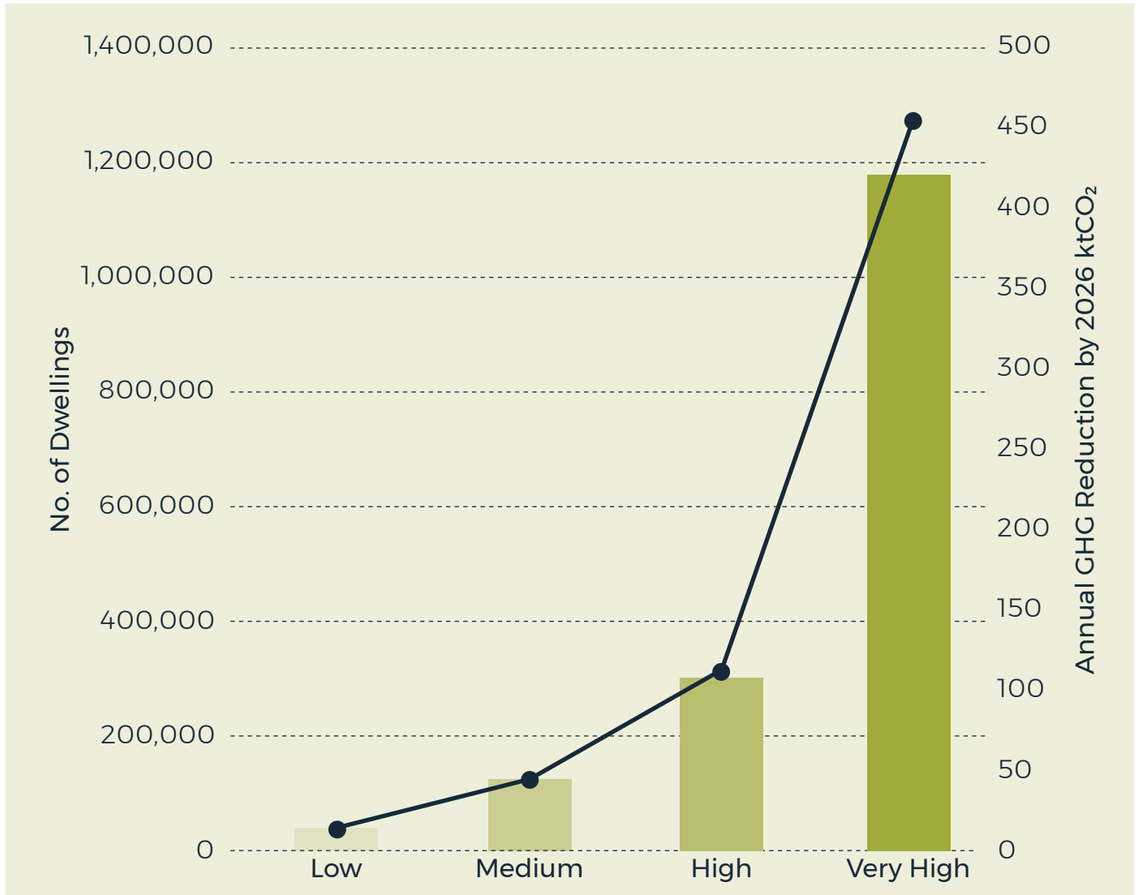
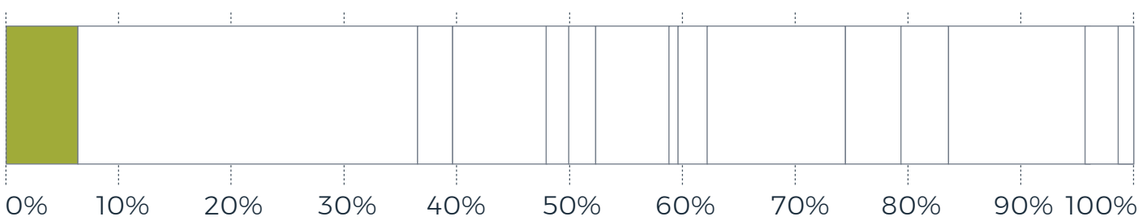


Figure 14 – Goal 1 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits and Inclusive Growth

- This intervention will directly work to reduce fuel poverty and its consequences by reducing energy consumption and increasing thermal comfort.
- The greatest potential for carbon reduction will come from the homes in the worst condition, creating an incentive to prioritise people in poor quality housing.
- A reduction in dwelling boiler use will result in improved air quality.
- The investment required to deliver this goal will create significant employment opportunities at a variety of skills levels, creating opportunities for local people.

Improving dwelling insulation may not directly result in a reduction in fuel use, as people who have been underheating their homes may use the same fuel more effectively. But overall, the benefits of investing into domestic energy efficiency retrofit will accrue to every resident of this region and has high potential for delivering inclusive growth.

We will change our economy without leaving anyone behind	**Positive Impact**	Reduction in fuel poverty and improved health and wellbeing Benefitting the least well off in society the most
We will invest in the resilience of our places	**Positive Impact**	Reduction of energy demand Improved building resilience to changes in external conditions
We will use our industrial past to create a new future	**Neutral**	No impact
We will create places and connections that help us to meet the climate challenge	**Positive Impact**	Improved climate resilience of buildings
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Reduction in energy consumption

4.4.2 | Goal 2 – Domestic heating system retrofit

The retrofit of non-fossil-fuel heating systems in dwellings is one of the key actions necessary to decarbonise the domestic sector and offers significant carbon savings. This goal assumes that heat pumps will be the technology of choice, as they are currently the low-carbon technology with the largest decarbonisation potential. As such, the Government has committed to 600,000 heat pump retrofit installations by 2028 in their recent Ten Point Plan. While hydrogen may be an option in the longer term, it is unlikely to be commercially available in the next five years.

Due to the different way in which heat pumps operate to gas boilers, an important part of retrofitting heat pumps consists in ensuring a good design and installation has taken place, as well as educating the user on how to operate the new system. Heat pump retrofits will generally require other energy efficiency measures installed beforehand or at the same time, which would enable a lower-sized heat pump to be installed (therefore reducing its cost) and operate at lower temperatures, which increases heat pump efficiency. A well-designed heat pump system in a well-insulated home should result in lower running costs. As such, coordination of Goals 1 and 2 will be required.

There are currently a number of Government schemes that financially support the retrofit of heat pumps, such as the Domestic Renewable Heat Incentive, the Green Homes Grant (which has been extended until 2022), as well as an upcoming Clean Homes Grant.

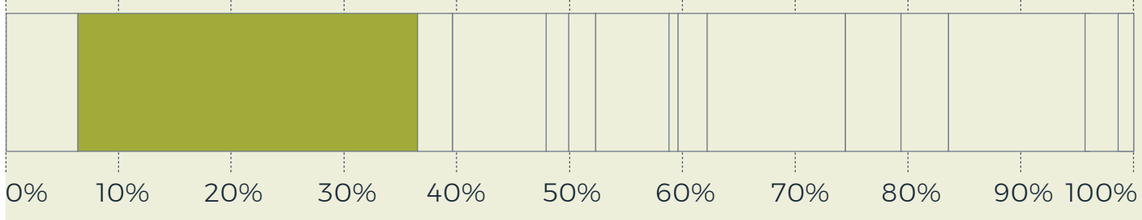
Planning Implications

An air source heat pump on domestic premises is considered to be permitted development (PD), not needing an application for planning permission, provided limits and conditions of Part 14 Class G of the General Permitted Development Order 2015 (as amended) (GDPO), are met (not detailed in full here).

These PD rights apply to the installation, alteration or replacement of an air source heat pump on a house or block of flats, or within the curtilage (garden or grounds) of a house or block of flats, including on a building within that curtilage. A block of flats must consist wholly of flats (e.g. should not also contain commercial premises)

There are further restrictions in Conservation Areas and World Heritage Sites and the rights do not apply to installations within the curtilage of a Listed Building or within a site designated as a Scheduled Ancient Monument. In instances where the rights do not apply the requisite consent would need to be sought.

Figure 15 **– Goal 2 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)**



Goal Levels

The aim is to achieve heating system retrofits in 100% of homes by 2041. This exceeds the national targets, as set out by the Climate Change Committee, to achieve close to 100% decarbonisation by 2050. Rapid action is required this decade to meet this target.

Low

331,000 dwellings by 2041, and 13,850 by 2026.

This scenario assumes a less ambitious installation trajectory, with slow deployment in the 2020s and a ramp up after 2030s. It would be broadly in line with the recently announced UK government Ten Point Plan. Local authorities should aim to undertake these in their own housing stock, in combination with energy efficiency measures.

Medium

550,000 dwellings by 2041; equivalent to 20,000 by 2026.

This scenario assumes the deployment trajectory modelled in the Sixth Carbon Budget report. This trajectory is based on a ban on gas boilers in 2033, and other fuels in 2028. The trajectory is not linear, and the majority of installations take place after 2031. Local authority and socially rented dwellings could be prioritised.

High

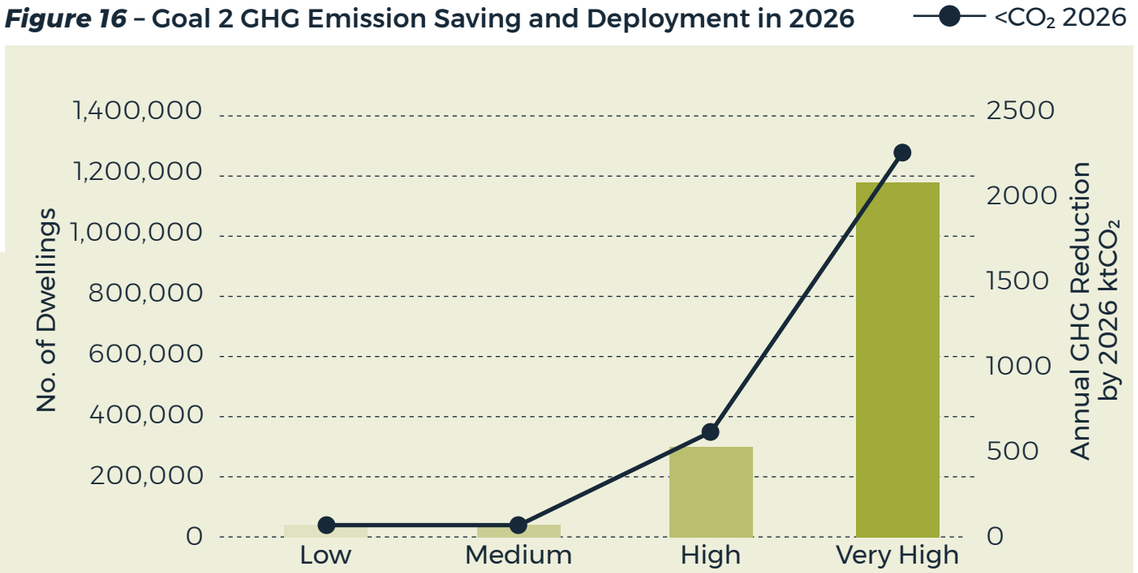
All dwellings in WMCA (1,178,000) by 2041; equivalent to 292,000 by 2026.

This is the maximum deployment that is considered as achievable, as it exceeds national targets and it assumes a linear level of deployment from 2021, in order to match the FYP's aims. It is expected that a small portion of dwellings cannot install heat pumps due to planning issues or lack of technical feasibility, but these may use other sources, and could be dealt with post-2026.

Very High

All dwellings in WMCA (1,178,000) by 2026.

Figure 16 **– Goal 2 GHG Emission Saving and Deployment in 2026**



Co-benefits and Inclusive Growth

- This intervention will directly work to reduce air pollution currently generated by gas boilers.
- In conjunction with Goal 1, it should deliver affordable heat and thermal comfort to their users, improving their health and well-being. However, care must be taken to ensure residents can make efficient use of heat pumps.
- There is an opportunity to create shared heat pump infrastructure for groups of homes in areas of medium and high density, to ensure that any upfront cost is manageable, and efficiency maximised. This also creates opportunities for models of community heat ownership, including co-operative and mutual models
- The growth of the heat pump market will create significant business opportunities and new jobs, such as potential manufacturing plants and design and installation companies. It is also a complementary skill set to many existing jobs: for example, if you know how to fit a boiler, you may learn how to fit a heat pump.

We will change our economy without leaving anyone behind	**Positive Impact**	- In conjunction with Goal 1, delivering affordable heat and thermal comfort
We will invest in the resilience of our places	**Positive Impact**	- Reduction in dependence on fossil fuels - Buildings will decarbonise with the electricity grid making them 'Future Ready.
We will use our industrial past to create a new future	**Positive Impact**	- Using engineering and manufacturing base to develop heat pump manufacture and associated systems.
We will create places and connections that help us to meet the climate challenge	**Positive Impact**	- Buildings will decarbonise with the electricity grid making them 'Future Ready'
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	- Reduction in use in fossil fuels

4.4.3 | Goal 3 – Domestic photovoltaics

With a rapid decline in installation costs in the last few years, PV is a cost-effective way to reduce carbon emissions. It can significantly reduce the amount of electricity a property needs to draw from the network and if combined with energy storage, it can help reduce electricity consumption when it is more expensive and higher carbon.

The government's flagship Feed-In Tariff scheme that led to the installation of over 5.6 GWp of solar PV in the UK, with 2.6 GW on domestic roofs, has come to an end. It was replaced in 2020 with the Smart Export Guarantee, where energy suppliers are obligated to remunerate excess PV generation to the grid, although the greatest benefit remains in the displacement of the need to buy energy from the grid. Average prices for installed systems continued to fall, but the reduction in incentives has dampened the market for residential solar.

Other microgeneration technologies exist, such as micro-wind or solar thermal, but have not been considered due to lack of commercial maturity and their low installation levels at present.

The Birmingham Solar PV Study report (December 2016) used a GIS analysis to determine the potential for solar rooftop and ground-mounted potential across Birmingham City Council. This has been extrapolated to the rest of the WMCA based on the number of domestic dwellings. The results of this were validated by comparing against regional Western Power Grid projections for 2030 for the West Midlands, based on the Future Energy Scenarios methodology, and adjusted CCC projections for rooftop solar PV potential by 2050 on a national scale. Both showed that an estimate was of the same scale and of reasonable accuracy: 830 MW in comparison to 773 MW from CCC projections and 555 MW from WPD (projected only to 2030).

A number of deployment models may be utilised including private investment, self-funding and community solar. In the latter case this could provide a revolving income for the West Midlands Combined Authority for reinvestment into community investments.

A conservative capacity factor (which represents the energy yield of a technology) of 9.7% (equivalent to 850 kWh/kWp) was used. The electricity generated is assumed as zero carbon, with carbon savings resulting from the displacement of grid electricity, which has a certain amount of associated carbon. For this reason, solar PV carbon savings are greater the higher the grid carbon intensity; as such, this goal will be the more effective the earlier it is deployed.

Planning Implications

The installation of solar panels and equipment on domestic buildings can be PD - either building mounted or standalone equipment in curtilage of houses of a block of houses. There are, however, important limits and conditions, which must be met to benefit from these rights (Part 14 Classes A and B of the GPDO).

Panels must not be installed on or within the setting of a Listed Building or on a site designated as a Scheduled Ancient Monument. In instances where the rights do not apply the requisite consent would need to be sought.

Goal Levels

The High aim is to achieve the maximum technical potential by 2030, with the other goal levels working towards a target year of 2041. This is due to the technology already being at maturity and larger benefits for electricity generation in the short term.

Low

622 MW (75% of technical potential) by 2041; equivalent to 156MW by 2026.

This would be equivalent to 248,800 systems of 2.5 kWp, which is an average system size for a rooftop system.

Medium

830 MW (100% of technical potential) by 2041; equivalent to 207MW by 2026.

This would be equivalent to 332,000 systems of 2.5 kWp, which is an average system size for a rooftop system.

High

830 MW (100% of technical potential) by 2030; equivalent to 415MW by 2026.

This would be equivalent to 332,000 systems of 2.5 kWp, which is an average system size for a rooftop system.

Very High

830 MW (100% of technical potential) by 2026.

Figure 17 – Goal 3 GHG Emission Saving and Deployment in 2026 — <CO_2 2026

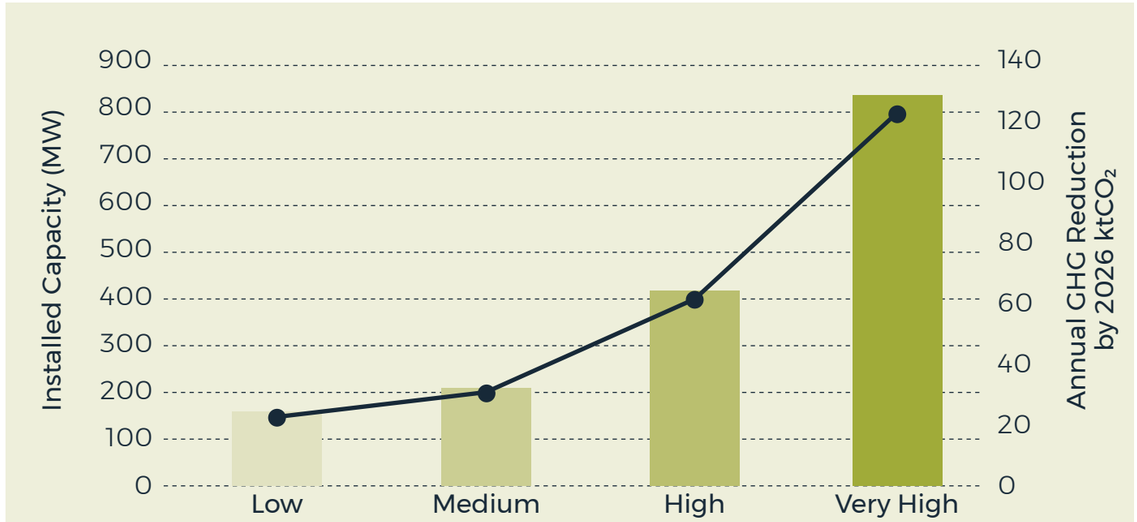
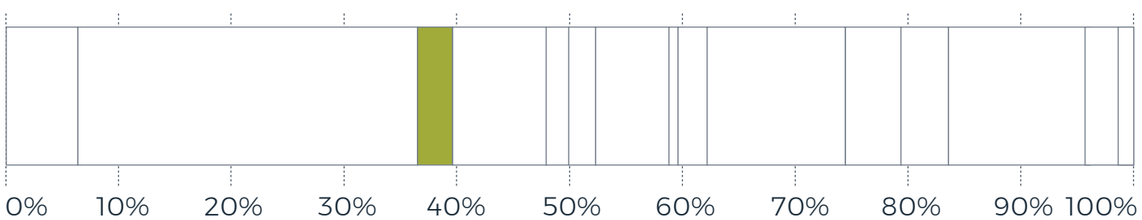


Figure 18 – Goal 3 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits and Inclusive Growth

- This intervention will directly work to reduce energy bills for residents and shield them from price volatility, which can help tackle fuel poverty in the region.
- Solar PV, if paired with energy storage, can also provide flexibility services to the energy system and back-up power in case of power outages. Such a large programme of PV installations could help build capacity and develop a local supply chain of installers.
- It creates opportunities for community, municipal and other forms of local ownership of solar PV and storage equipment.

We will change our economy without leaving anyone behind	**Positive Impact**	Generating renewable electricity, offsetting fuel bills and potentially providing source of income
We will invest in the resilience of our places	**Positive Impact**	Renewable energy generation improving self-sufficiency
We will use our industrial past to create a new future	**Neutral**	No impact
We will create places and connections that help us to meet the climate challenge	**Positive Impact**	Reduce reliance on fossil fuel powered electricity generation and work towards decarbonisation of electricity grid
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Improved self-sufficiency

4.4.4 | Goal 4 – Commercial energy efficiency retrofit

The goal analyses the carbon savings from the installation of a range of energy efficiency measures, such as building fabric, building controls, energy management systems, lighting installation or building services distribution systems. The potential savings from these measures for office, retail and other (education, health, hospitality buildings) types of non-domestic buildings was obtained from the abatement model in BEIS' Building Energy Efficiency Survey. This model considered the applicability of each measure to the particular type of building. This means that while some buildings may need several pieces of work undertaken, others may already have some of them installed and therefore will not need no further actions.

A mechanism by which some of these measures could be delivered are the Minimum Energy Efficiency Standards (MEES) for the rented sector, which requires an EPC rating of E required before granting a new tenancy or by 2023. In addition, the recently announced Public Sector Decarbonisation Scheme should be utilised by local authorities and other public bodies to deliver the less economically-viable measures.

The technical potential and cost effectiveness for energy efficiency measure varies by the type of building, with retail and office buildings having a lower overall potential reduction than health or education buildings. In addition, within those energy reduction opportunities, the proportion of cost-effective and socially cost-effective measures also vary by sector, as can be seen in the table below. The measures include building fabric improvement, building controls, distribution systems, systems management, lighting, ventilation equipment etc.

Table 2 – Commercial energy efficiency potential

Sector	Energy reduction technical potential	Cost effective (<3-year payback)	Socially cost-effective
Retail	34%	23%	41%
Office	38%	20%	20%
Hospitality	25%	39%	37%
Health	41%	55%	60%
Education	45%	32%	64%
Community, arts & leisure	43%	19%	22%

Planning Implications

Most of the initiatives would not require planning permission, as they would not lead to external alterations to buildings, so would not be considered to be development by virtue of the Town and Country Planning Act 1990 (as amended).

All types of insulation are likely to require consent where they relate to Listed Buildings and of course window replacement will certainly need express consent. Some authorities may also control double glazing in Conservation Areas too, through Article 4 Directions. Running new services within a Listed Building would also require express consent.

Goal Levels

The goal is to achieve the maximum technical potential (all of the savings which are possible and are cost effective using current technology) from these energy efficiency measures across all 26,000 retail buildings, 18,000 offices and 30,000 other commercial buildings. Policy and regulatory mechanisms will be required to deliver measures which aren't economically viable.

Low

50% of technical potential by 2041; equivalent to 12.5% by 2026.

This scenario aims to capture carbon savings if mainly only cost-effective social cost-effective measures were applied across all building types. Local authorities will have a role to play buildings such as schools, care homes and other council buildings implement energy efficiency measures.

Medium

100% of energy reduction technical potential by 2041; equivalent to 25% by 2026.

This scenario aims to capture carbon savings if mainly only social cost-effective measures were applied across all building types.

High

100% of overall energy reduction potential by 2031; equivalent to 50% by 2026.

This scenario exceeds the national targets set out in its Clean Growth Strategy of reducing energy consumption in commercial (and industrial) building by 20% by 2030. Additional mechanisms will be required to improve commercial buildings.

Very High

100% of overall energy reduction potential by 2026.

Figure 19 – Goal 4 GHG Emission Saving and Deployment in 2026

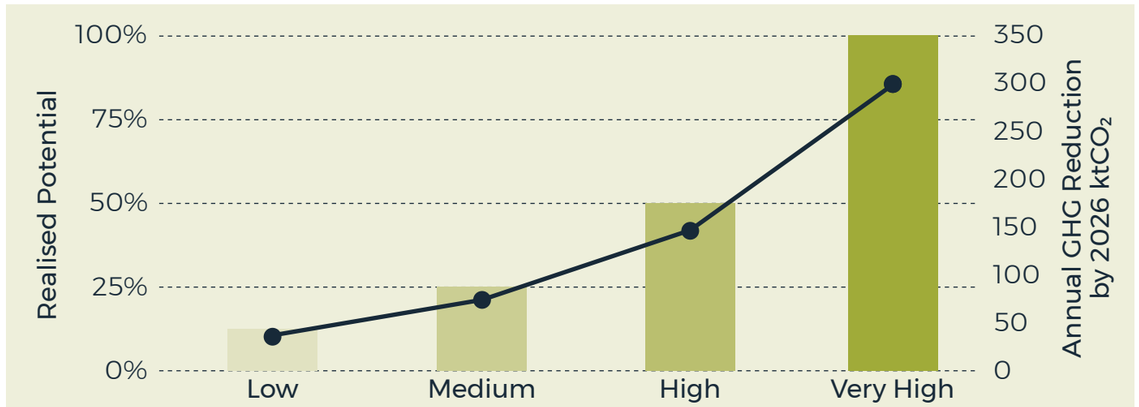
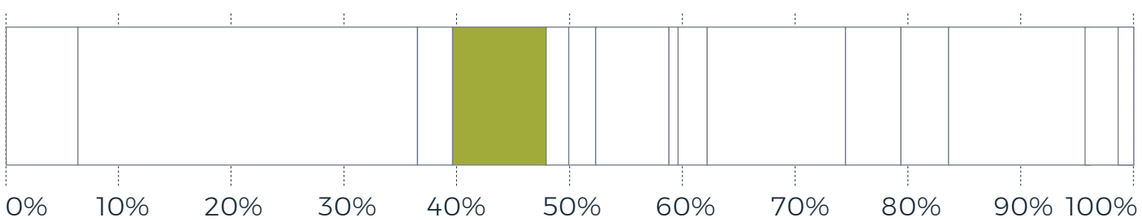


Figure 20 – Goal 4 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits and Inclusive Growth

- This intervention will directly reduce gas and oil consumption, which will result in an improvement in air quality.
- In addition, by reducing expenditure in energy consumption, businesses may improve their competitiveness and exposure to energy price volatility.
- Rebound effects are less likely in a commercial setting, as the level of controls and thermal comfort is typically higher than in residential areas.

We will change our economy without leaving anyone behind	**Positive Impact**	Reduction in energy consumption
We will invest in the resilience of our places	**Positive Impact**	Reduction in dependence on energy Improved building resilience to changes in external conditions
We will use our industrial past to create a new future	**Neutral**	No impact
We will create places and connections that help us to meet the climate challenge	**Positive Impact**	Improved climate resilience of buildings
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Reduction in energy consumption

4.4.5 | Goal 5 – Commercial heating system retrofit

This goal quantifies the carbon emission savings from replacing fossil fuels (natural gas and oil) employed in the generation of heating and hot water in commercial buildings. Energy efficiency savings from Goal 4 have been included to avoid double counting. Heat pumps are assumed as the default technology, as the one with the highest decarbonisation potential amongst available solutions. Where there is a long-term source of waste heat, these could be used with different forms of heat pumps to improve efficiency. Hydrogen may become an alternative at a later date.

As per the previous goal, the mechanisms for delivery may include MEES for the rented sector, or the Public Sector Decarbonisation Scheme. In the private sector the landlord / tenant split of investment / benefit is a challenge. Whilst the Renewable Heat Incentive is currently in place this will likely end within the coming year. The government's Heat Strategy is due to be published in early 2021, while the future Building Standard will also come into place.

The policy ambition on decarbonising heat in commercial buildings is less ambitious; there aren't any specific targets the national Government is working towards. However, the CCC considers that earlier shifts from gas and other fossil fuels to low-carbon heating are feasible, with gas boilers being banned between 2030-2033 and oil boilers between 2025-2026.

Planning Implications

Installations of air source heat pumps on non-domestic land would require planning permission, and where relevant, Listed Building Consent.

Goal Levels

The goal is to achieve heating system retrofits in 100% of properties by 2041, in line with the equivalent domestic goal. Action on this goal during the 2020s is required to meet this target.

Low

21,000 commercial buildings by 2041; equivalent to 870 by 2026.

This scenario assumes an equivalent deployment trajectory to the domestic low scenario, which assumes slow deployment in the 2020s and a significant increase after 2030s.

High

All commercial buildings by 2041; equivalent to 18,400 by 2026.

This assumes a linear level of deployment from 2021, in order to match the FYP's targets.

Medium

34,600 commercial buildings by 2041; equivalent to 1,250 by 2026.

This scenario assumes an equivalent deployment trajectory to the domestic medium scenario, based around the CCC Sixth Carbon Budget report modelling. The trajectory is not linear, and the majority of installations take place after 2031. Local authority and socially-rented dwellings could be prioritised, which would help tackle fuel poverty as part of the WMCA's strategy.

Very High

All 73,400 commercial buildings by 2026.

Figure 21 – Goal 5 GHG Emission Saving and Deployment in 2026

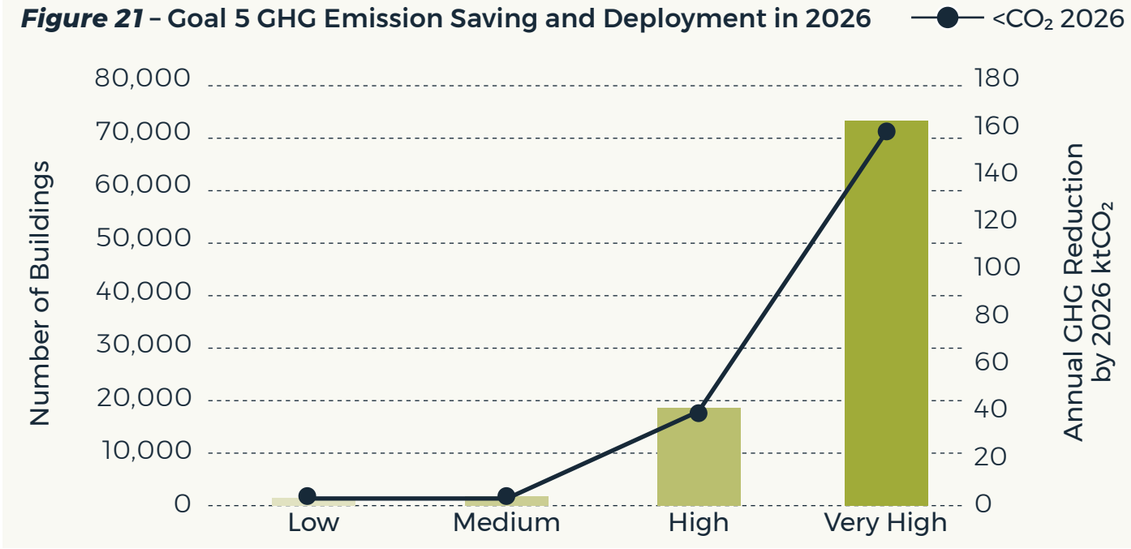
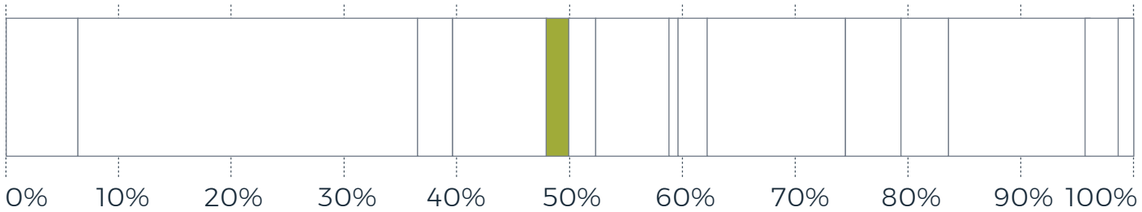


Figure 22 – Goal 5 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits and Inclusive Growth

- This intervention will directly work to reduce air pollution currently generated by gas boilers.
- Commercial heat pumps, though at a smaller scale than domestic, also have the potential to generate significant business opportunities and new jobs, such as potential manufacturing plants and locally based design and installation companies.

We will change our economy without leaving anyone behind	**Neutral**	No impact on people
We will invest in the resilience of our places	**Positive Impact**	Reduction in dependence on fossil fuels Buildings will decarbonise with the electricity grid making them 'Future Ready'
We will use our industrial past to create a new future	**Neutral**	Using engineering and manufacturing base to develop heat pump manufacture and supply chain, but will need to compete with internationally established competitors
We will create places and connections that help us to meet the climate challenge	**Positive Impact**	Buildings will decarbonise with the electricity grid making them 'Future Ready'
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Reduction in use in fossil fuels

4.4.6 | Goal 6 – Commercial photovoltaics

The installation of solar PV on commercial rooftops has been carried out at a similar level to domestic rooftops, with the Government's feed-in tariff scheme delivering around 1.6 GW in commercial installations (excluding ground-mounted) in the UK and 89 MW in the WMCA. PVs are a mature and cost-effective technology and could be deployed widely across commercial buildings to reduce carbon emissions. Other microgeneration technologies exist, such as micro-wind, but have not been considered due to lack of commercial maturity and very low uptake at present. For systems which have a reasonable payback, fully financed options are currently available and so, where commercial organisations do not have the capital themselves, this is not necessarily a barrier. This technology can also be used as an engagement tool within communities.

The Birmingham Solar PV Study report (December 2016) carried out a GIS analysis to determine the potential for solar rooftop and ground-mounted potential across Birmingham City Council, including commercial buildings. In addition, the Black Country Energy Strategy report identified at least a potential for 180 MWp of solar PV across the region. No specific data was available for Walsall and Coventry local authorities, so the potential for Birmingham was extrapolated to these areas based on the number of commercial buildings. This was compared to directly extrapolating the Birmingham study to the rest of the region, with both results within an acceptable margin of each other: 706 MW compared to 781 MW, respectively. The more conservative option was selected.

A conservative capacity factor of 9.7% (equivalent to 850 kWh/kWp) was used. The electricity generated is assumed as zero carbon, with carbon savings resulting from the displacement of grid electricity, which has a certain amount of associated carbon. This leads to the same phenomenon explained in the domestic goal, where carbon savings from PV are greater the earlier it is deployed, as grid electricity continues to decarbonise.

Planning Implications

The installation of solar PV panels on non-domestic premises is considered to be permitted development under Part 14 Classes J and K of the GPDO, provided all the conditions are met. There are also certain restrictions in Conservation Areas and where a proposal relates to a Listed Building consent would be required.

Goal Levels

Low

529 MW (75% of technical potential) by 2041; equivalent to 132MW (2,640 systems) by 2026.

This would be equivalent to 10,580 systems of 50 kWp by 2041, which is an average size for a commercial rooftop system (they have the potential to be much larger).

Medium

706 MW (100% of technical potential) by 2041; equivalent to 176MW (3,520 systems) by 2026.

This would be equivalent to 14,120 systems of 50 kWp by 2041, which is an average size for a commercial rooftop system (they have the potential to be much larger).

High

706 MW (100% of technical potential) by 2031; equivalent to 353MW (7,060 systems) by 2026.

This would be equivalent to 14,120 systems of 50 kWp by 2031 which is an average size for a commercial rooftop system (they have the potential to be much larger).

Very High

706 MW (14,120 systems) by 2026.

Figure 23 **– Goal 6 GHG Emission Saving and Deployment in 2026**

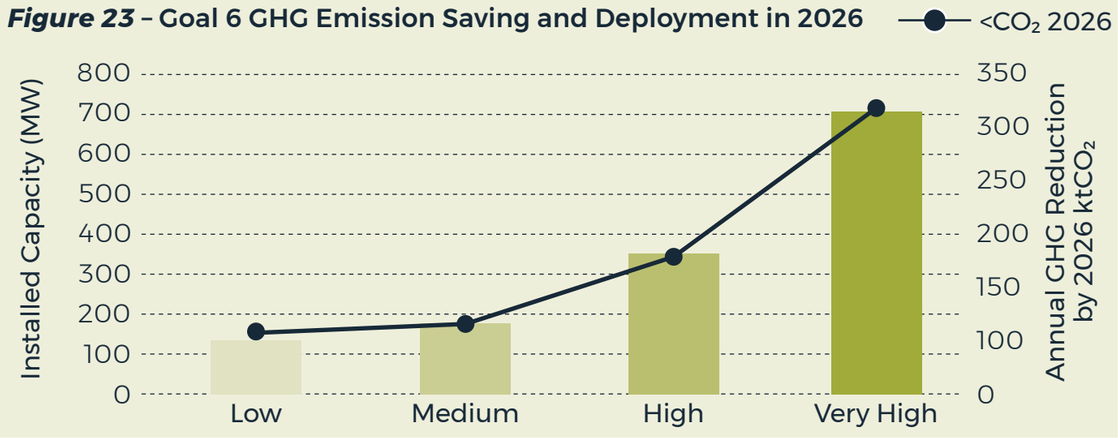
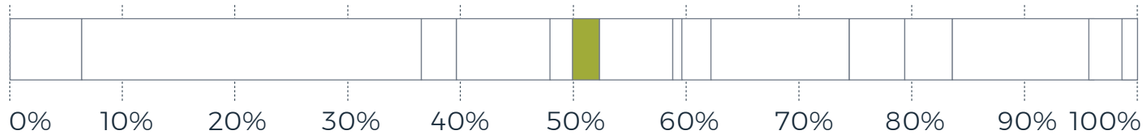


Figure 24 **– Goal 6 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)**



Co-benefits and Inclusive Growth

- This intervention will directly work to reduce energy bills for businesses and reduce their exposure to energy price volatility. Such a large programme of PV installations, together with the domestic goal, could help build capacity and develop a strong local supply chain.
- It creates opportunities for community, municipal and other forms of local ownership of solar PV and storage equipment.

We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Generating renewable electricity, offsetting fuel bills
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Renewable energy generation improving self-sufficiency
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Potential to create strong local supply chains
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Reduce reliance on fossil fuel powered electricity generation and work towards decarbonisation of electricity grid
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Reduced consumption of resources.

4.4.7 Goal 7 – Industry energy efficiency and fuel switching

The West Midlands economy is different from the rest of the UK, due to its unique industrial make up, with a large concentration of jobs in the manufacturing industry. The West Midlands has globally competitive supply chains, including those in equipment manufacturing and component manufacturing. Many of the supply chain firms across the region are leading innovators in new materials and manufacturing processes, working in the aerospace, marine, automotive and rail supply chains. It is estimated that the West Midlands Combined Authority area includes 27,000 industrial buildings and 6,400 industrial organisations.

Industry is one of the most difficult areas to decarbonise, with many of the identified solutions at the early stages of commercial scale or even technical viability. As such, a review on the topic was undertaken, to understand the key technologies and their potential across a number of industries and processes. This included the CCC Hydrogen in a low-carbon economy report and supporting reports, BEIS Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050, the EU Hydrogen Strategy and academic research on the potential for electrification of industrial heat.

Energy intensive industries in the UK are already highly incentivised to be as energy efficient as possible to ensure competitiveness. Despite that, smaller firms often lack the capital or long-term certainty to invest and measures which put industries at a competitive disadvantage are unlikely to go ahead. There are opportunities in the area's symbiotic relationships between industry in the area, some of which are being explored by the Black Country Consortium. These have not been quantified in this analysis, but may be significant, in terms of efficiency and competitiveness.

High temperature processes in industry are particularly difficult to decarbonise. Hydrogen could play an important role in this sector, although only a few pilot projects have been developed. Research for the CCC identified that, of the processes examined where hydrogen could play a role, 16.6% could only be decarbonised through hydrogen (on an energy basis). This was taken as a reference for the medium scenario. In addition, wastes and biofuels are already being used in industry where the opportunity arises, whilst this is expected to continue it is expected that overall the potential from hydrogen is greater. Direct electricity will also play a role, but the cost difference with natural gas makes this limited at present.

The energy efficiency and CCS potential was based on the BEIS Industrial Decarbonisation and Energy Efficiency Roadmaps, carried out by WSP and DNV-GL, which established the potential for CCS and energy efficiency for a range of sectors, as can be seen in the table below. The CCS potential was applied directly to each sector, and an average 10% energy efficiency saving was applied to low temperature and other secondary processes as a medium scenario.

Planning Implications

Considering the type of technology employed, planning permission is likely to be needed for the larger interventions. This may be significant, especially in cases where hydrogen pipeline may be needed externally to the site.

Table 3 – Industrial energy efficiency potential

Industries	No. of Industrial Businesses in WMCA Area	CCS	Energy Efficiency
Iron and Steel	150	45%	0%
Cement	30	62%	9%
Chemicals	140	45%	9%
Glass	40	39%	16%
Ceramics	45	17%	0%
Pulp and Paper	485	41%	0%
Food and Drink	380	0%	36%

Lastly, low and medium temperature applications such as cooling, space heating, steam generation and drying were assumed to be electrified, through a combination of established technologies such as heat pumps, chillers, mechanical vapour recompression, electrical boilers, heaters and furnaces.

Goal Levels

The goal is to achieve a reasonable potential by 2041, due to the lack of maturity of the technologies and their lack of financial viability. Industrial decarbonisation is likely to be driven by national policy, and large-scale trials for some of the technologies used in this goal are likely to take place. The WMCA will ensure that opportunities for these to take place in the region are grasped.

Low

8.3% of energy in high-temperature processes replaced by hydrogen, 10% of potential for capturing remaining emissions through CCS, electrification of low temperature processes and 5% of energy efficiency in low-temperature and secondary processes, by 2026.

High

33.3% of energy in high-temperature processes replaced by hydrogen, 40% of potential for capturing remaining emissions through CCS, electrification of low temperature processes and 15% of energy efficiency in low-temperature and secondary processes, by 2026.

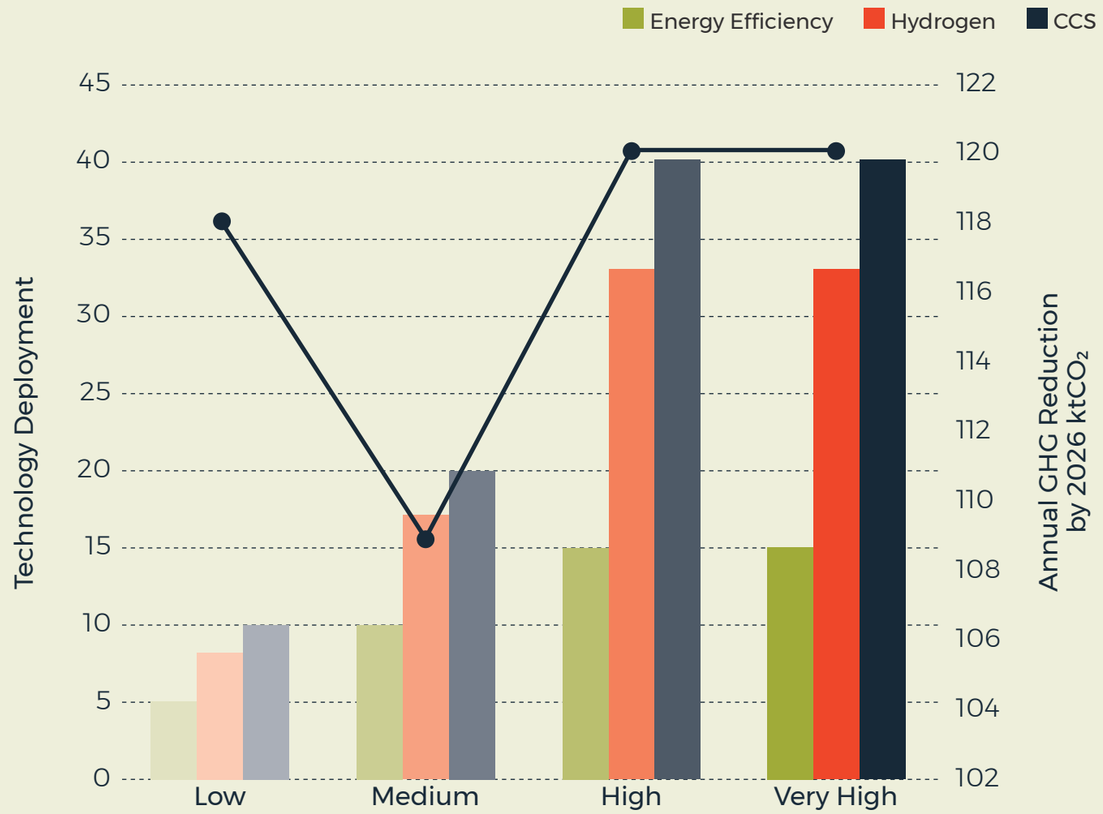
Medium

16.7% of energy in high-temperature processes replaced by hydrogen, 20% of potential for capturing remaining emissions through CCS, electrification of low temperature processes and 10% of energy efficiency in low-temperature and secondary processes, by 2026.

Very High

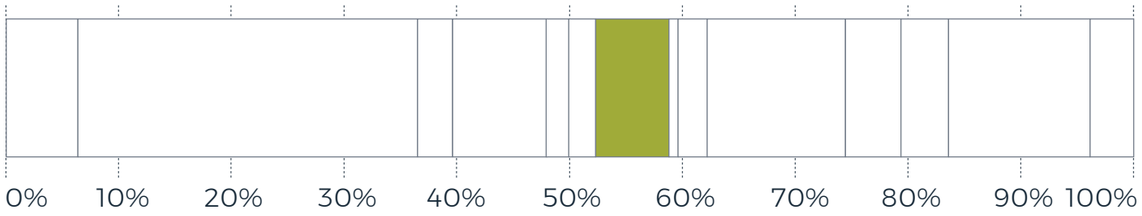
No change from the high scenario.

Figure 25 – Goal 7 GHG Emission Saving and Deployment in 2026 <CO_2 2026



Due to current high carbon intensity of electricity hydrogen production via electrolysis increase GHG emissions in the short term (to 2026), but reduces them in the longer term (to 2041) as the grid decarbonises.

Figure 26 – Goal 7 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits and Inclusive Growth

- This intervention can lead to opportunities for jobs and businesses to be created around the reconversion of industrial processes and in the supply of the necessary technologies. This would be particularly well suited to the West Midlands, given its industrial background and expertise.

We will change our economy without leaving anyone behind	**Positive Impact**	Opportunities for jobs creation
We will invest in the resilience of our places	**Neutral**	No impact
We will use our industrial past to create a new future	**Positive Impact**	Focuses on industrial presence in the West Midlands
We will create places and connections that help us to meet the climate challenge	**Neutral**	No impact
We will decouple prosperity from the consumption of energy and resources	**Positive** **Negative**	Reduction in energy consumption Need to ensure international competitiveness

4.4.8 | Goal 8 – Industry photovoltaics

The installation of solar PV in industrial premises has the potential to contribute to the decarbonisation of its electricity consumption. However, to date, the level of installations has been very low. Through the Government's feed-in-tariff programme, only 294 MW of industrial installations took place, of which only 2.3 MW were installed in the WMCA area. Other technologies, such as micro-wind or energy from waste, have not been considered in this analysis. Fully-financed solutions are also available and so there is good potential for a targeted campaign for large rooftop solar systems.

CCC projections for rooftop solar PV potential by 2050 on a national scale were used to estimate the technically feasible amount of PV which could be expected in industrial settings. A conservative capacity factor of 9.7% (equivalent to 850 kWh/kWp) was used. The electricity generated is assumed as zero carbon, with carbon savings resulting from the displacement of grid electricity, which has a certain variable amount of associated carbon (decreasing to almost zero by 2040).

Planning Implications

The installation of Solar PV panels on non-domestic premises is considered to be permitted development under Part 14 Classes J and K of the GPDO provided the required conditions are met. There are certain restrictions in Conservation Areas and the rights do not apply for Listed Buildings or within the site of a Scheduled Ancient Monument.

Goal Levels

The goal is to install up to 96MW across the West Midlands Combined Authority area. Due so the limited applicable industrial roof area.

Low

72 MW (75% of what was identified as possible) by 2041; equivalent to 18MW by 2026.

This would be equivalent to 720 systems of 100 kWp, which is an average size for an industrial solar system (they have the potential to be much larger).

Medium

96 MW (100% of what was identified as possible) by 2041; equivalent to 24MW by 2026.

This would be equivalent to 960 systems of 100 kWp, which is an average size for an industrial solar system (they have the potential to be much larger).

High

96 MW by 2031; equivalent to 48MW by 2026.

This would be equivalent to 960 systems of 100 kWp, which is an average size for an industrial solar system (they have the potential to be much larger).

Very High

96 MW by 2026.

Figure 27 – Goal 8 GHG Emission Saving and Deployment in 2026

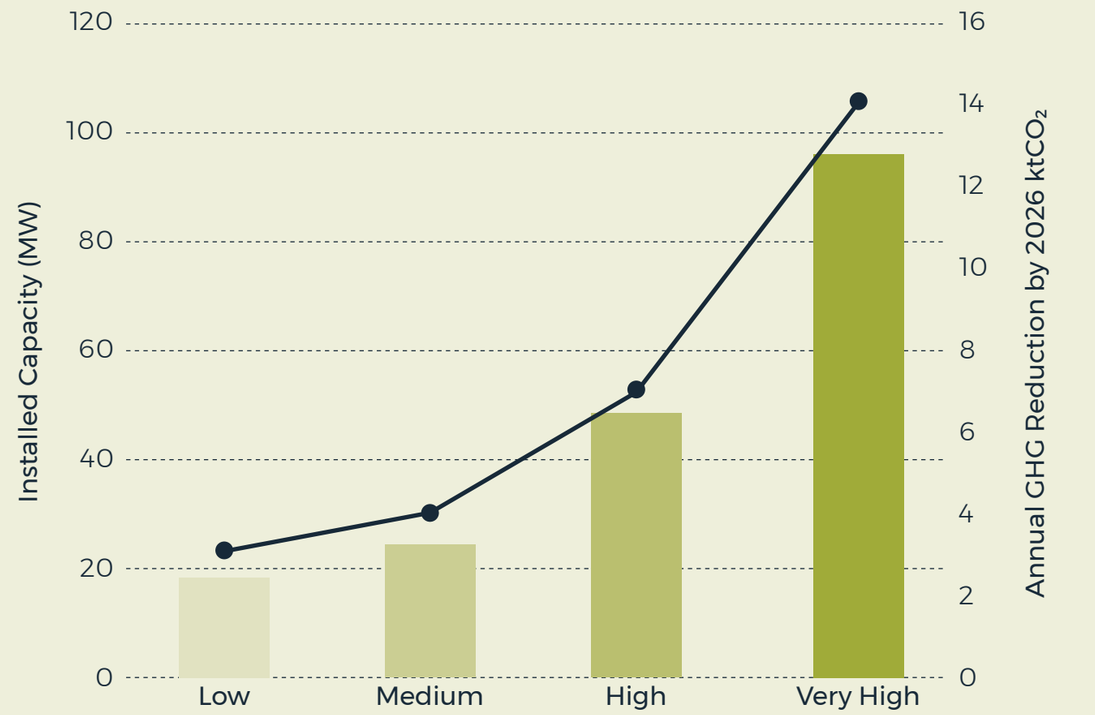
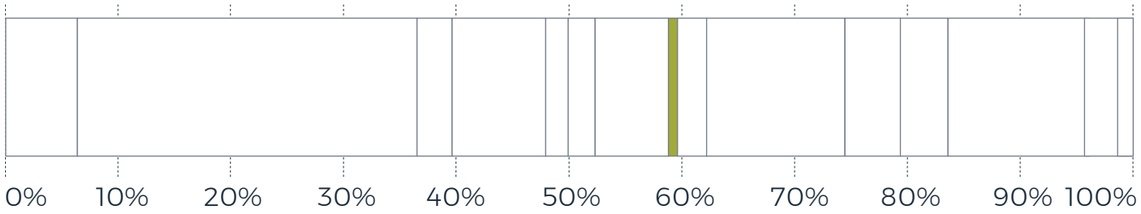


Figure 28 – Goal 8 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits and Inclusive Growth

- This intervention will directly work to reduce energy bills for businesses and reduce their exposure to energy price volatility.
- Solar PV, if paired with energy storage, can also provide flexibility services to the energy system and back-up power in case of power outages.
- This goal is small, but combined with the large programme of PV installations for the domestic and commercial goals, it could help build capacity and develop a strong local supply chain of installers. The manufacture of solar equipment is unlikely to take place in the region.

We will change our economy without leaving anyone behind	**Positive Impact**	Opportunities for jobs creation
We will invest in the resilience of our places	**Positive Impact**	Reduction in reliance on fossil fuels
We will use our industrial past to create a new future	**Positive Impact**	Focusses on industrial presence in the West Midlands
We will create places and connections that help us to meet the climate challenge	**Neutral**	No impact
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Increase in self-generation

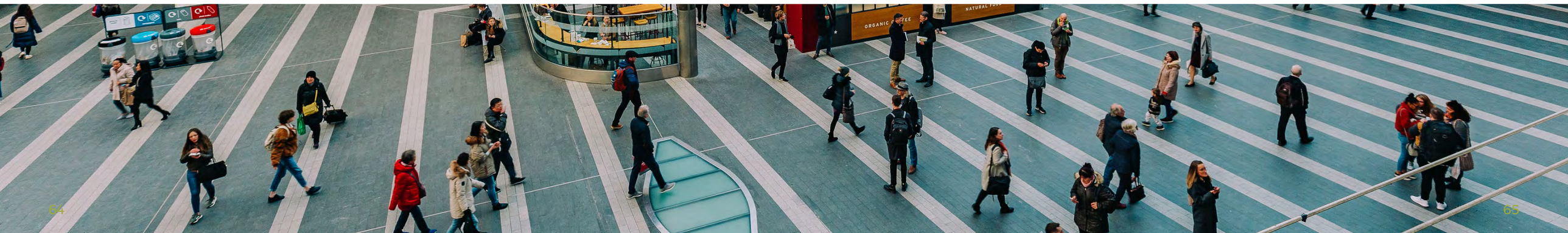
4.4.9 Goal 9 – Avoiding travel (demand reduction/ digital connectivity)

It is possible to avoid travel and in turn to reduce GHG emissions associated with transport. This can be undertaken with limited impacts on economic and social activity by accessing services digitally, accessing goods digitally (which can substitute passenger miles for much fewer freight miles; although action and management would be needed to mitigate this), consolidating trips so that overall fewer trips are undertaken.

This goal explores the decarbonisation potential from trip demand reduction, one of the key routes to decarbonising transport. This has been undertaken by considering specifically reductions in commuting, business trips and personal business trips achieved through digitisation. Whilst this is not an exhaustive assessment of the potential to avoid travel, it does quantify what may be possible. This would result in a large change compared to the status quo. The CCC Sixth Carbon Budget report assumed total car miles falling by 9% by 2035 compared to business-as-usual, due to increased active travel, modal shift to public transport and increased working from home. This goal tackles some of these activities: commuting, personal business and retail trips (and more will be included in later goals), which could reduce their associated transport emissions through the use of digital connectivity which enables people to carry out activities remotely.

The West Midlands Combined Authority recently released their digital roadmap which emphasised the role of digital connectivity both in helping the economy to recover but also reducing GHG emissions. Digital connectivity will improve access to jobs and services for everyone within the West Midlands Combined Authority. The extent to which people can work from home was identified from ONS research which established that 35% of people in the West Midlands were able to work from home to some extent during the first COVID induced lockdown in 2020 (this is lower than the UK average of almost 47%). In addition, data is taken from an academic paper, (Global e-Sustainability Initiative) as to the frequency people are able to work from home. The emissions savings are based on the number of miles saved across cars and public transport.

Data on the total retail and personal business trips distance is obtained from Government data. Assuming a reduction in these trips due to e-commerce and more and more services being available on-line, carbon savings can be calculated. Potential changes to the modal share of car usage have been included to avoid double counting, and the carbon savings calculation considers the up-take trajectory of electric vehicles.



Planning Implications

Planning considerations associated with creating community spaces will be needed, as well as wider consideration of adapting dwellings for home working and ensuring newly constructed dwellings are fit for purpose. Planning implications may also extend to the management of deliveries (ensuring there are secure places for deliveries and consolidation centres).

Within city and town centres, the economy is likely to shift considerably and so changes of use of buildings from offices and retail may also need to be controlled and managed. Wider planning implications are discussed in the forthcoming Local Transport Plan (LTP) Review.

Whilst digitisation may reduce the need to commute or travel for other forms of business, the full benefits may not be realised as these trips often can be replaced by others (such as long-distance leisure trips). To an extent, this can be managed through road space re-allocation to support active travel and public transport.

Goal Levels

The goal is to maximise the potential for transport demand reduction and incorporate the CO_2 emissions savings described above. This would have an impact on other forms of transport that need to be managed, (such as increasing LGV usage) as well as considerations for planning, such as homes having adequate spaces for home-working).

Low

Only half of people who are able to work from home do (17.5%), an average of 130 days per year by 2041. In addition, only 6.25% of retail and personal business trips are reduced. This is equivalent to 4.4% of people working from home (who are able to) and 1.6% reduction in retail and personal business trips by 2026.

Medium

About three quarters of people who are able to work from home do (26%), an average of 130 days per year by 2041. In addition, 12.5% of retail and personal business trips are reduced by 2041. This is equivalent to 6.6 % of people working from

High

Every person who is able to work from home does (35%), as found in the ONS report, an average of 130 days per year by 2041. In addition, 25% of retail and personal business trips are reduced by 2041. This is equivalent to 9% of people working from home (who are able to) and 6.3% reduction in retail and personal business trips by 2026.

This would be a lower level of home-working than seen during the pandemic (35% of people, full-time). Ensuring people have access to fast broadband services and places to work will be key. In addition, the impacts of e-commerce need to be managed, including consolidated delivery centres, efficient delivery services, electrification of LGVs).

Very High

35% of people working from home (who are able to) and 25% reduction in retail and personal business trips by 2026.

Figure 29 **– Goal 9 GHG Emission Saving and Deployment in 2026**

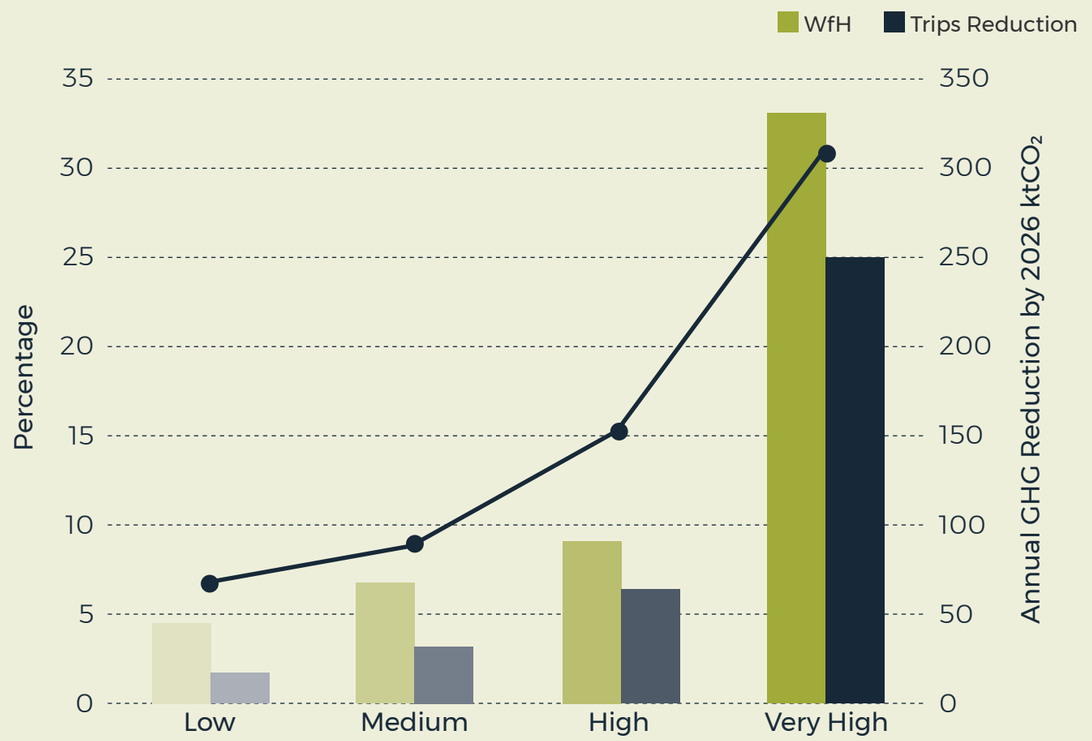
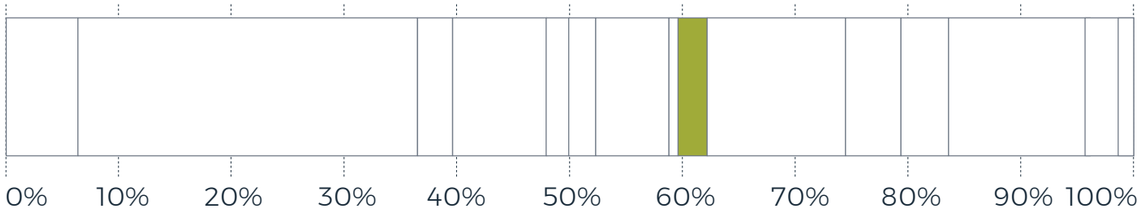


Figure 30 **– Goal 9 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)**



Co-benefits and Inclusive Growth

- This goal will directly reduce the use of transport and associated energy and emissions. This will have a significant impact on congestion, (at peak times in the case of commuting) which will result in an improvement to air quality and safety (of particular benefit in cities).
- In addition, digital connectivity will improve access to jobs and services for everyone, independently of their background or location. This would result in wider benefits to the wellbeing and prosperity of people. However, the regional focus on digital inclusivity will need to deliver at pace.
- There is an opportunity to use demand reduction as a basis on which to strengthen local economies, creating greater local opportunities, improved amenities and increased resident satisfaction.

We will change our economy without leaving anyone behind	Positive Negative	- Digital connectivity has the potential to improve access to jobs - Major impact on city centre economy. The nature of city centres may need to evolve, with some of the economy distributing away from centres
We will invest in the resilience of our places	Positive Impact	- Reduction in reliance on transport infrastructure and use of petrol / diesel vehicles
We will use our industrial past to create a new future	Neutral	- No impact
We will create places and connections that help us to meet the climate challenge	Positive Impact	- Creating local economies
We will decouple prosperity from the consumption of energy and resources	Positive Impact	- Reduction in reliance on transport infrastructure and use of petrol / diesel vehicles

4.4.10 | Goal 10 – Shifting travel

Shifting transport to lower carbon models consists of two linked elements. Firstly, shift current trips to use lower carbon modes where feasible. This could be undertaken by various methods including encouraging active travel to demand management. Secondly, there is a need to increase the number of trips between places that are more easily accessed by lower carbon modes (by changing where trips are going, focusing development in places more easily served by lower carbon modes and investing in transport infrastructure and subsidy to improve provision and affordability of lower carbon modes), and then travelling by those modes.

Estimates of the potential to deliver carbon savings through modal shift are based on sources described. The full potential to shift modes will be explored in the LTP development with greater spatial, place and people understanding of the West Midlands Combined Authority region.

The analysis on transport mode shift was carried out following consultation and a review on the subject, including the Movement for Growth strategy (September 2017), the National Cycling and Walking Investment Strategy (April 2017), the Birmingham Cycling Revolution, the West Midlands Cycling Charter (September 2015), and academic papers on the car usage reduction in European Cities. The Movement for Growth Strategy envisages a shift from around 63% of trips made by car, to 35-45%, as part of a transition to a more typical European city mode share. There is an ambition for bike trips to increase ten-fold by 2033 and public transport is envisaged to cover a significantly larger share of trips in the WMCA. This is intended to be achieved by a significant improvement of public transport infrastructure, such as the introduction of a fully integrated rail and rapid transit network that connects the main city centres, and an aspiration to increase to 100% the amount of people that can reach the three main centres within 45 minutes by public transport in the morning commute (currently 49%). Demand management or restrictions may be needed to enable this level of transition. Micro-mobility can offer further savings if replacing car journeys, but regulation is required before such solutions are adopted.

This goal analyses the carbon savings that can be achieved through a modal shift and uses aspirations from the Movement for Growth strategy for car and bicycle usage, set for 2041 and 2033, respectively. This is used in combination with Government data for the number of trips per distance range for the West Midlands to calculate savings. The total energy saving is split across fuels to avoid double counting carbon savings from electrification of transport. Transport for the West Midlands has a pivotal role in achieving this goal and there is already a prepared strategy with specific plans to ensure this takes place. Investment in infrastructure will need to be supported by other policy measures to help encourage behaviour change to increase the uptake of public transport use as well as increased walking and cycling.

Planning Implications

Planning permission will be required as part of redesigning transport infrastructure and transport-orientated planning of developments. Planning policy should also ensure that additional transport demand from new development is minimised and supports / encourages the use of sustainable modes. This includes considerations of the form of new developments and where they should be (dense, mixed-use developments located close to adequate transport links) as well as the need to retrofit and enable land use change in the existing urban environment, so that the existing urban environment can be adapted to improve local provision of key services and amenities.

Goal Levels

The goal is to achieve the aspirations set out in the Movement for Growth strategy, achieving a car mode share of 35% in 2041 and 10% of trips carried out by bike in 2033. This also results in a large increase in public transport usage as well as a small increase in walking. It is emphasised that a large step change is needed here; although funding and infrastructure are a barrier to achievement, public acceptance and desire for behaviour change is the biggest issue.

Low

Car modal share reduces to 50% by 2041, and only 50% of the cycling target is achieved by 2033. Public transport would cover 18% of all trips. This is equivalent a reduction in car modal share to 63%, public transport up to 8% and cycling at 3% by 2026.

Medium

Car modal share reduces to 40% by 2041, and 75% of the cycling target is achieved by 2033. Public transport would cover close to 25% of all trips. This is equivalent a reduction in car modal share to 60%, public transport up to 10% and cycling at 4% by 2026.

High

Car modal share is successfully reduced to 35% by 2041, and the cycling target is achieved by 2033. Public transport would cover close to 27% of all trips. This is equivalent a reduction in car modal share to 59%, public transport up to 11% and cycling at 5% by 2026.

Very High

This is equivalent a reduction in car modal share to 35%, public transport up to 27% and cycling at 10% by 2026.

Table 4 – Example modal change (selected data)

Mode	Trips per person <1 mile (Current)	Trips per person <1 mile (High Goal)	Trips per person 2-5 mile (Current)	Trips per person 2-5 mile (High Goal)
Walking	174	183	9	10
Bicycle	1	14	3	33
Car Driver	26	13	127	66
Local Bus	1	5	17	86

Figure 31 – Goal 10 GHG Emission Saving and Deployment in 2026

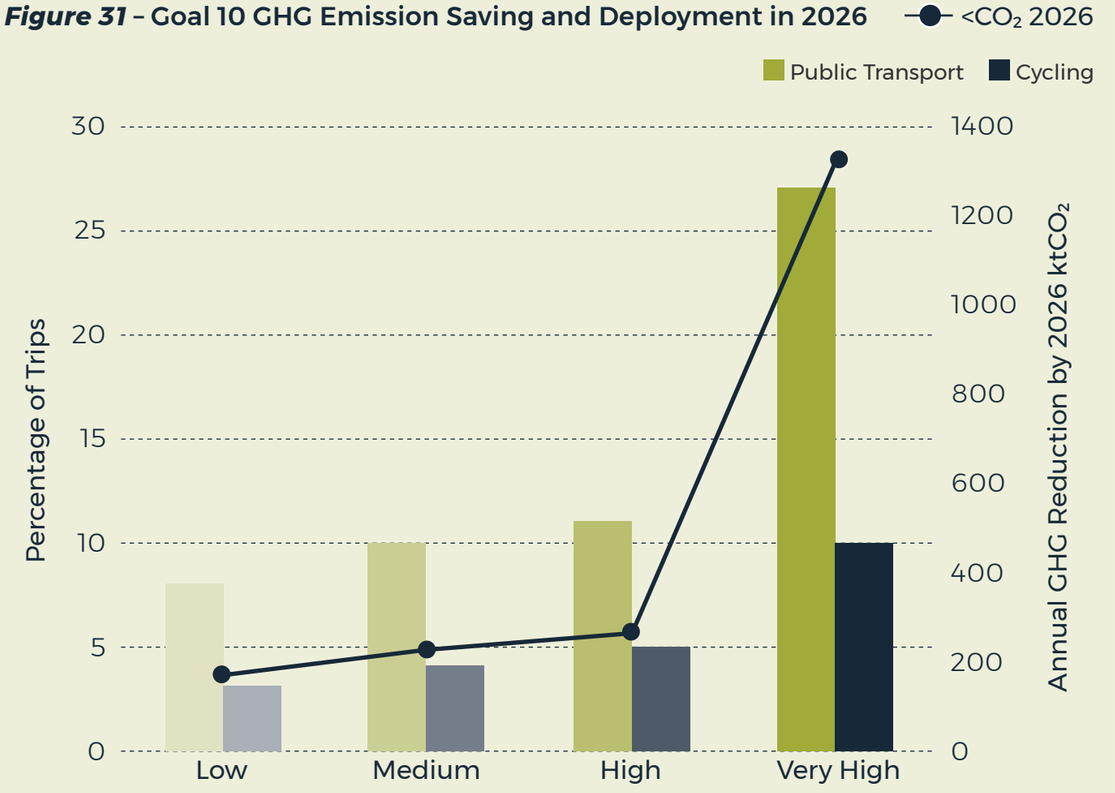
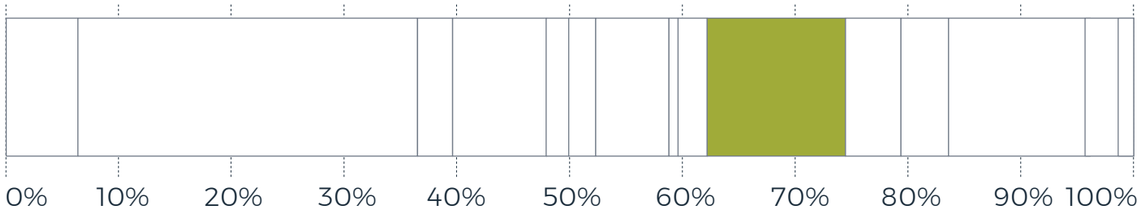


Figure 32 – Goal 10 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits and Inclusive Growth

- This goal will directly reduce the use of energy for travel and their associated emissions, by shifting transport from private, low-occupancy forms of transport to low-carbon options, such as active travel and public transport.
- This will reduce air pollution and associated health issues, as well as road traffic casualties.
- Active forms of travel can help tackle a range of other health issues, such as obesity and mental ill-health, while public transport can provide access to the main centres for more people, increasing prosperity and people's quality of life.
- The redistribution of space away from single occupancy vehicles and towards shared spaces for active travel and public transport creates a more equitable region, where those without cars can access.
- As space is remodelled, opportunities including increased sustainable urban drainage schemes to boost resilience to floods and overheating, and increases biodiversity arise.

We will change our economy without leaving anyone behind	**Positive Impact**	Shifting transport away from private car use and increase public transport will positively impact deprived communities
We will invest in the resilience of our places	**Positive Impact**	As space is remodelled, opportunities to improve resilience can also be taken
We will use our industrial past to create a new future	**Neutral**	No impact
We will create places and connections that help us to meet the climate challenge	**Positive Impact**	Increased public transport provision
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Reduction in reliance on private transport

4.4.11 Goal 11 – Improving travel (bus and taxi electrification)

This goal explores the carbon savings which can be derived from electrification of buses and taxis in the West Midlands Combined Authority area. This is in the context of wider electrification of public transport including railways, (which is planned to take place) and the tram network (which is already electrified). Electric transport solutions offer a much lower operational cost compared to conventional internal combustion engine alternatives, which makes them very attractive where high distances are travelled. The upfront cost is the main barrier to adoption, but with rapidly falling battery prices, cost parity is expected by the mid-2020s.

Local authorities have some limited direct control over taxi licences and the bus services that operate in their districts (around 90% are completely commercially operated). However central government are supportive of all-electric bus cities (with Coventry already receiving funding for this), whilst options to use powers in the 2017 Bus Services Act are also being explored. This could be used to accelerate the uptake of low-carbon solutions. Installation of the necessary infrastructure (mainly charging points) is important and may be led by the WMCA/TfWM and will require careful pricing to minimise costs. The Climate Change Committee projects that there should be around 390,000 charging points in the UK by 2035 to support the electrification of transport, from around 21,500 chargers today. For taxis, charging points will need to be located in suitable locations that do not disrupt routines, such as on-street chargers for overnight charging or during day-time breaks. For buses, centralised charging stations at depots are likely to be the preferred solution. This will comprise a mixture of private and public chargers.

Hydrogen may play a role in the decarbonisation of transport, (particularly of heavier and larger vehicles) and is being trialled in Birmingham. However, large scale change has been excluded from the analysis for this FYP as it is not available at the scale necessary now. This should be re-evaluated in subsequent plans. The electrification of rail is already considered as part of business as usual with a high likelihood of it being undertaken within the next 20 years. However, there may be a role for the WMCA to accelerate this change.

The WMCA may also consider looking at how the electrification of bus and rail services rail can support other transport modes to electrify. For example, through the sharing of electrical capacity and the provision of charging points for vehicles and bikes at stations or depots and whether the use of storage and renewable energy generation on site could support the business case for electrification, by reducing the impact on the electricity network and thus connection costs. By working with the Distribution Network Operators, the WMCA can ensure that future capacity is planned for effectively. Where funding is made available by Government to support the deployment of such charging facilities, the WMCA could play a role in ensuring that the West Midlands accesses its share.

Planning Implications

There are no known planning implications for the installation of individual chargers, unless the technology requires on street charging opportunities or modification is needed to any of the existing infrastructure.

The increase in electrical demand and need for centralised charging may also necessitate the careful planning and locating of depots or charging hubs. There will be a need for public transport operators to have appropriate depot locations and for the introduction of ZEV infrastructure.

Goal Levels

Electrifying buses and taxis by 2030 would involve an upfront investment to replace the fleet of buses and taxis, which would be recovered in the following years due to lower operational costs. Incentives for taxi drivers, as well as mechanisms linked to licensing could be used. Bus replacements should be future-proofed, and any new bus purchased in the WMCA from 2021 should be electric (or hydrogen).

Low

All taxis and buses are electrified by 2041; equivalent to 5,300 electric taxis and 480 electric buses by 2026.

High

All taxis and buses are electrified by 2031; equivalent to 10,650 electric taxis and 1,150 electric buses by 2026.

Medium

All taxis and buses are electrified by 2036; equivalent to 7,100 electric taxis and 770 electric buses by 2026.

Very High

All 21,300 taxis and 2,300 buses are electrified by 2026.

Figure 33 **– Goal 11 GHG Emission Saving and Deployment in 2026**

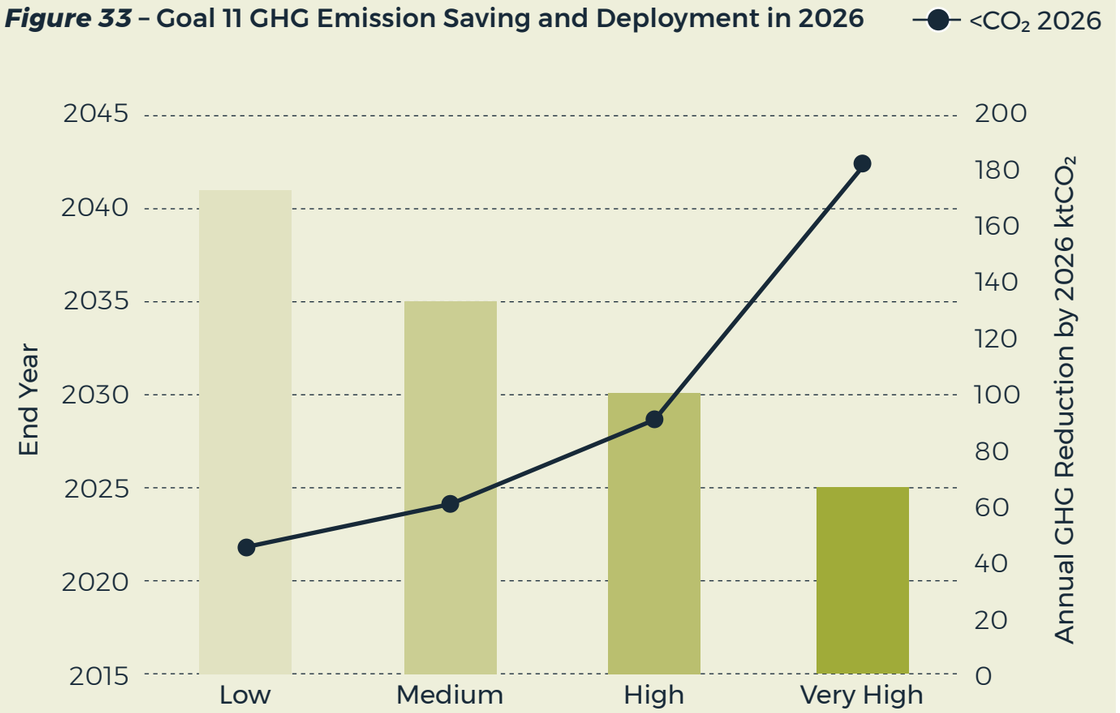
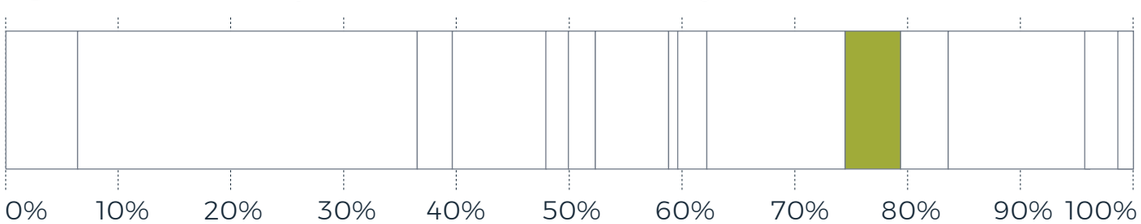


Figure 34 **– Goal 11 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)**



Co-benefits and Inclusive Growth

- This goal will directly reduce the use of fossil fuels for transport and their associated emissions.
- One of the main benefits from electric forms transport is their lack of NOx pollution and noise, improving the health and wellbeing of people (particularly in cities).

We will change our economy without leaving anyone behind	**Neutral**	No impact
We will invest in the resilience of our places	**Neutral**	No impact
We will use our industrial past to create a new future	**Neutral**	No impact
We will create places and connections that help us to meet the climate challenge	**Neutral**	Electrified transport may be cheaper and more efficient.
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Improved efficiency of public transport

4.4.12 Goal 12 – Improving travel (heavy goods vehicle electrification)

This goal looks at the carbon emissions savings which can be derived from electrification of HGVs in the context of the WMCA area. Whilst alternatives to electrification are also under development and are not discounted here, within the first FYP electrification is considered the only realistic option. Similar to the previous goal, the electrification of HGVs will be driven by the much lower costs per mile than diesel alternatives as well as carbon savings. Electric HGVs are less commercially developed, and the upfront costs will also be a barrier, although there has been a recent increase in the number of models available.

The CCC has recently published analysis in which they assume almost 100% of HGV sales to be low-carbon by 2040. Hydrogen may have a role in the decarbonisation of heavy goods vehicles, but due to its lack of availability it has not been included in the analysis for the FYP. In addition, there are concerns around its economic viability due to its low energy efficiency compared to an electric solution. This should be re-evaluated in subsequent FYPs.

The WMCA and the individual local authorities have limited control over the fleet of HGVs which is used but can exert some influence through charging infrastructure and suggested policy on access restrictions, such as Clean Air Zones and Low Emissions Zones. Decarbonising HGVs and providing the necessary infrastructure will require national, and potentially international, action, support and regulation. A starting point may be to focus on a strategy around the first/last mile.

Planning Implications

There are no known planning implications for the installation of individual chargers, unless the technology requires on street charging opportunities or modification is needed to any of the existing infrastructure.

The increase in electrical demand and need for centralised charging may also necessitate the careful planning and locating of depots or charging hubs. There will be a need for hauliers to have appropriate depot locations and for the introduction of ZEV infrastructure.

Planning implications may be pan regional / national. Issues with delivering refuelling / charging infrastructure in surrounding local authorities and on the strategic road network could hinder deployment.

Goal Levels

The goal is to push the electrification of HGVs to 100% by 2041. Some of this share may be taken up by hydrogen in the 2030s but is uncertain. Large-scale national trials are likely to take place in the 2020s, as recommended by the CCC, and the WMCA is well placed to lead the way in this area. The public infrastructure required to support this will include ultra-rapid public charge points and hydrogen refuelling stations, in addition to depot charging points and refuelling facilities. In addition, efficiency from improved HGV logistics to reduce miles driven by lorries, such as the usage of consolidation centres, extended delivery windows and higher loading, will be key to achieving carbon reduction targets.

Low

75% of HGVs are decarbonised by 2051; equivalent to 12.5% by 2026.

Medium

All HGVs are decarbonised by 2051; equivalent to 17% by 2026.

High

All HGVs are decarbonised by 2041; equivalent to 25% by 2026.

Very High

No additional scenario was modelled due to the lack of technical maturity of solutions needed.

Figure 35 **– Goal 12 GHG Emission Saving and Deployment in 2026**

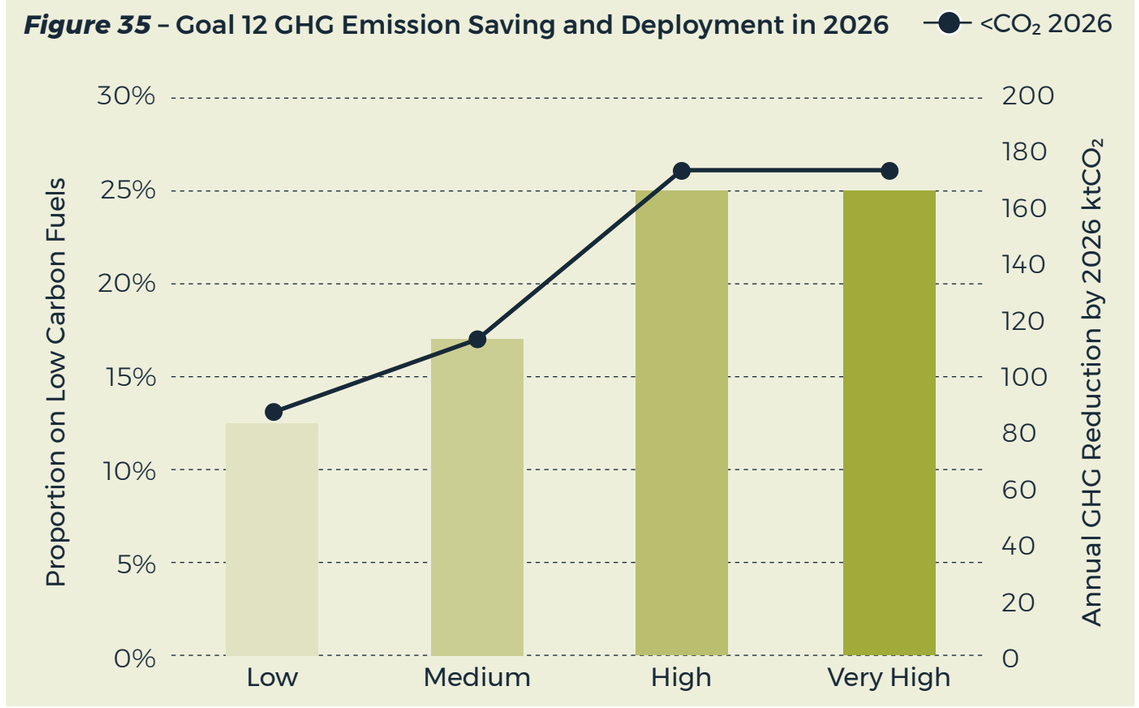
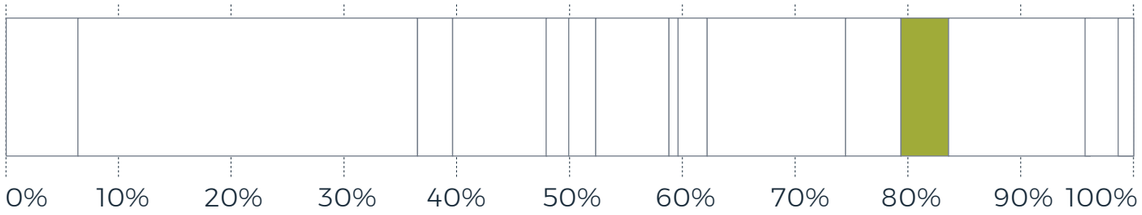


Figure 36 **– Goal 12 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)**



Co-benefits and Inclusive Growth

This goal will directly reduce the use of diesel for heavy goods vehicles and their associated emissions. In addition, this will reduce their air pollution when driving in cities in the case of electric lorries, with significant benefits around health and well-being, as well as noise.

We will change our economy without leaving anyone behind	**Neutral**	No impact
We will invest in the resilience of our places	**Neutral**	No impact
We will use our industrial past to create a new future	**Positive Impact**	Working with commercial and industrial partners as well as the automotive sector
We will create places and connections that help us to meet the climate challenge	**Neutral**	No impact
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Reduced use of fossil fuel vehicles

4.4.13 Goal 13 – Improving travel (accelerated EV uptake)

The WMCA area has a rich tradition in car manufacturing. It is home to more than 430 specialist automotive firms, including 36 of the top 50 global suppliers with 40% of all cars exported from the UK made in the West Midlands. Leading brands including Jaguar Land Rover, Aston Martin, BMW and Tata all have a significant presence in the region. There is a drive to attract new Gigafactory for battery production, as well as to support existing business, such as the new electric vehicle production at Jaguar Land Rover.

The electrification of cars and light goods vehicles is happening at a faster pace than previously anticipated, due to reduced battery prices and a recent increase in UK's ambition. The Government has recently announced the ban on the sale of new petrol and diesel cars and LGVs from 2030, (this has been included as part of business as usual scenario), and the CCC has modelled a feasible pathway for electric cars which achieves significant penetration in the 2020s, with 46% of the car fleet electrified by 2030, as part of their advice to Government on the sixth carbon budget (2033-2037). Therefore, this goal aims to explore the carbon savings available from the electrification of cars according to the CCC scenarios, which take place earlier than the pathways assumed under business as usual scenario. Energy savings from this intervention are linked to those in the business as usual scenario, to avoid double counting from the electrification of cars.

The WMCA and TfWM has a big role in enabling the transition to electric transport solutions by ensuring that charging provision is in place for all, not just where it is the most profitable to locate services and that this capacity is affordable, by working with the Distribution Network Operators to ensure that future capacity is planned for effectively. This will include opportunity charging hubs, intended for longer journeys, as well as destination and residential charging hubs, where off-street parking is not available. Where funding is made available by Government to support the deployment of such charging facilities, the WMCA could play a role in ensuring that the West Midlands accesses its fair share.

Fundamental to this goal will be understanding the role of cars in the future which is linked to modal shift and reduction in car dependency. Whilst there may be an increase in the demand for electric cars proportionally, overall car demand may fall as individual car ownership may become less common in favour of the sharing economy, such as car clubs.

Planning Implications

There are no known planning implications for the installation of individual chargers, unless the technology requires on street charging opportunities or modification is needed to any of the existing infrastructure.

The increase in electrical demand and need for centralised charging may also necessitate the careful planning and locating of depots or charging hubs. There will be a need for fleets, such as car hire clubs to have appropriate locations for the introduction of ZEV infrastructure.

Planning implications may be pan regional / national. Issues with delivering refuelling / charging infrastructure in surrounding local authorities and on the strategic road network could hinder deployment.

Wider aspects around the transition to electric vehicles may also be considered. Decisions around any infrastructure planning or investments should consider that the role of the car in future may be different than today, to avoid the risk of becoming redundant in a few years' time. For example, new models of car ownership may emerge such as private fleets, car clubs or the use of private hire vehicles which could have a more significant role and should be incentivised through the planning system.

Goal Levels

The goal is based around three different scenarios which are part of the latest CCC analysis as part of their advice to Government on their Sixth Carbon Budget.

Low

An EV trajectory in line with the Headwinds scenario, which assumes a lower level of societal/behavioural change and innovation. As such, only 8% of cars are electric by 2026, rising to 88% by 2041

Medium

An EV trajectory in line with the Balanced Pathway scenario, which achieves significant progress throughout the 2020s and a balanced level of societal/ behavioural change and innovation. As such,13% of cars are electric by 2026, rising to 92% by 2041.

High

An EV trajectory in line with the Tailwinds Pathway scenario, which achieves net zero before 2050 and assumes considerable success on both societal/ behavioural change and innovation. As such,15% of cars are electric by 2026, rising to 94% by 2041.

Very High

No additional scenario was modelled for this goal, as it is considered that the High scenario trajectory is as ambitious as possible.

Figure 37 **– Goal 13 GHG Emission Saving and Deployment in 2026**

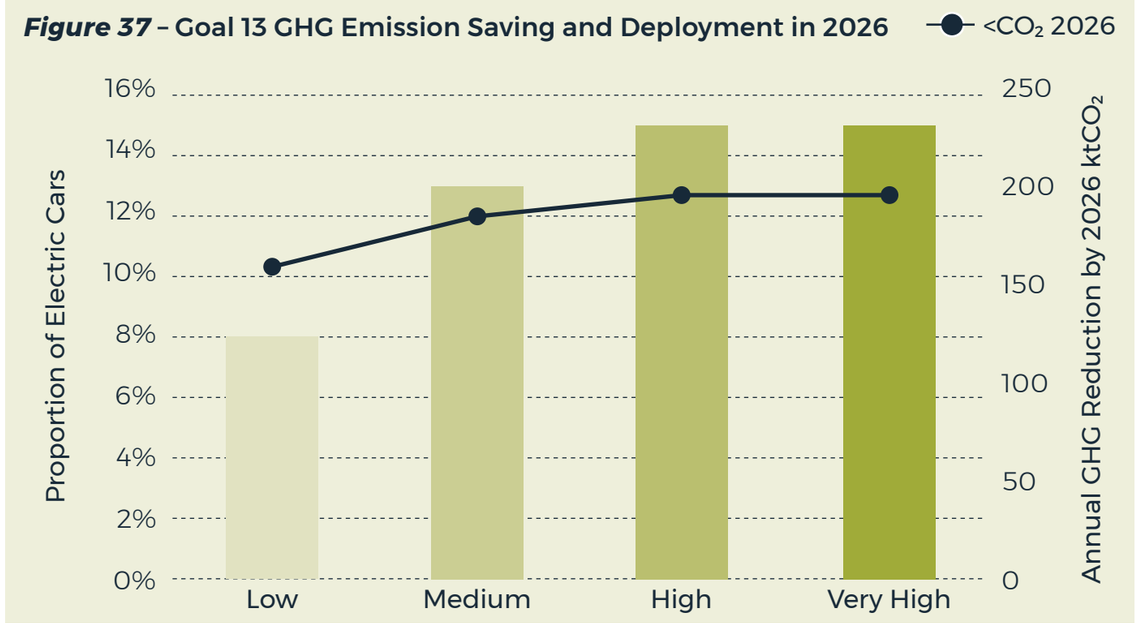
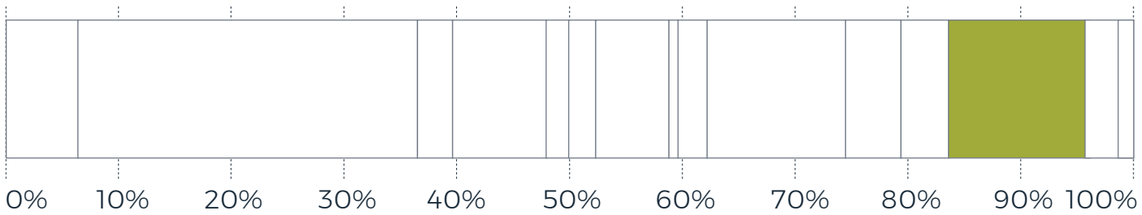


Figure 38 **– Goal 13 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)**



Co-benefits and Inclusive Growth

- This goal will significantly reduce the use of fossil fuels for transport and their associated emissions.
- In addition, one of the main benefits from electric forms of transport is their lack of NOx pollution, and noise, improving the health and wellbeing of people (particularly in cities).

We will change our economy without leaving anyone behind	**Positive Impact**	- Potential for re-engineering the internal combustion engine supply chain to support electrification, creating employment and skills opportunities. - Change in car ownership models.
We will invest in the resilience of our places	**Neutral Negative**	- EVs can reduce the cost of travel, potentially increasing strain on road networks.
We will use our industrial past to create a new future	**Positive Negative**	- Working with automotive sector and supply chain - May reduce demand for vehicles as a whole
We will create places and connections that help us to meet the climate challenge	**Neutral**	- No impact
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	- Reduced use of fossil fuel vehicles

4.4.14 | Goal 14 – Land use: Renewables

This goal considers the use of land within the WMCA for generating renewable electricity. Offsetting and installation of renewable energy generating equipment is considered separately, not as part of this study.

Geographic Information Systems (GIS) analysis was used to identify areas that are ideally suited for utility-scale solar and wind developments as used for this goal. The list of criteria included requirements on the type of land as well as resource constraints. The approach was conservative, not including historic landfill sites for solar and only considering areas with wind speeds above 6.5m/s @45m. The results of the GIS mapping can be found below.

For photovoltaics (solar farms), the 896ha of land was identified, with 875ha being at least 1ha. Eleven parcels of land were identified as part of this assessment as being over 10ha; and totalling 630ha (70% of the total land available). Whilst consideration of DNO connections were not considered at this point, the areas identified should be further investigated and prioritised if considered suitable. ***More detail on the GIS process is provided in Appendix C.***

To calculate energy and carbon savings, a density of 2 ha per MW was used in line with industry standards. An average capacity factor was used to calculate energy generation. For wind generation potential, 389ha of land was identified across 52 sites. A density of 9ha per MW was used. This was validated against a range of UK wind farms. For areas of less than 20ha, a density of 1 MW per 3ha was used, as projects with very few turbines, such as in a farm, require less spacing. The average UK wind capacity factor was used to calculate energy generation taken from BEIS data.

The public sector can play a major role in the delivery of this though helping developers to link up with end users to establish PPAs, working with community energy groups to bring forward schemes, and invest in schemes to create a return.

Figure 39 **– Identified potential for utility scale wind**

Figure 40 **– Identified potential for large ground-mounted solar**

Planning Implications

Utility-scale solar and wind development would require planning permission. Developments of this nature are often landscape sensitive and can be controversial.

Goal Levels

The goal is to push these to 100% of their technical potential. The timeframe varies depending on the scenario.

Low

Only areas larger than 1 ha are used for PV, and 3 ha for wind.

This is equivalent to 437 MW of solar PV, 34 MW of wind in large sites and a further 16 MW in sites smaller than 20 ha. This should be in place by 2041. This is equivalent to 109MW of PV and 12.5MW of wind by 2026.

Medium

Only areas larger than 0.5 ha are used for PV, and areas larger than 2 ha for wind.

This is equivalent to 443 MW of solar PV, 34 MW of wind in large sites and a further 21 MW in sites smaller than 20 ha. This should be in place by 2041. This is equivalent to 111MW of PV and 14MW of wind by 2026.

High

All area available is used for solar PV, and areas larger than 1 ha are used for wind.

This is equivalent to 448 MW of solar PV, 34 MW of wind in large sites and a further 25 MW in sites smaller than 20 ha. This should be in place by 2030. This is equivalent to 224MW of PV and 30MW of wind by 2026.

Very High

This is equivalent to 448MW of PV and 34MW of wind by 2026.

Figure 41 – Goal 14 GHG Emission Saving and Deployment in 2026

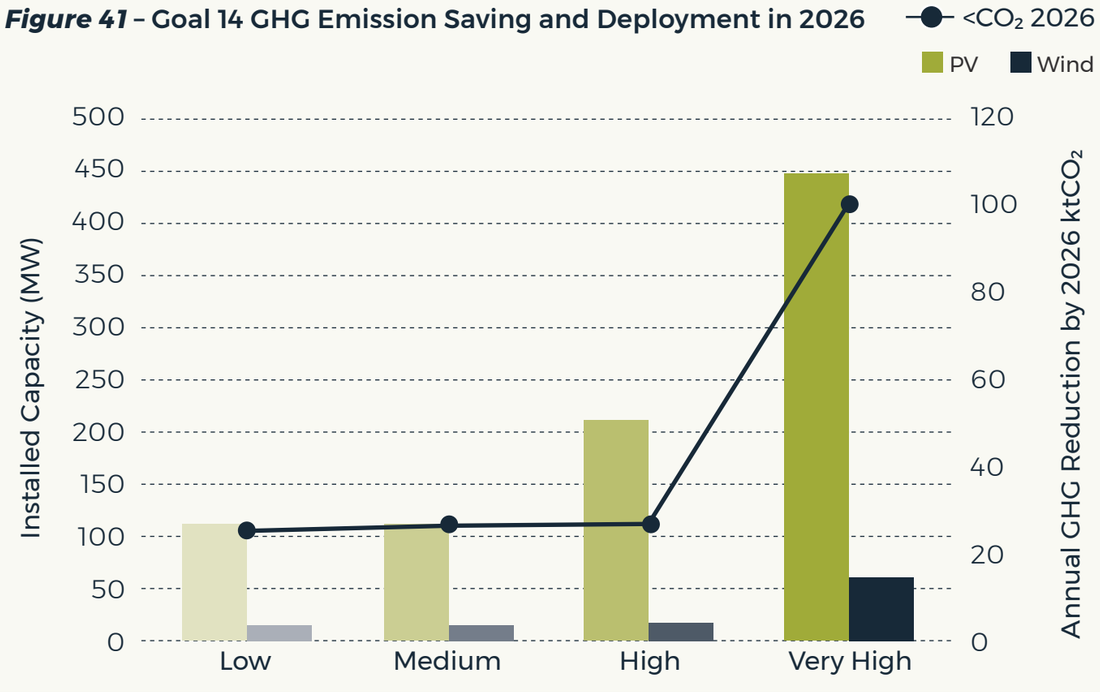
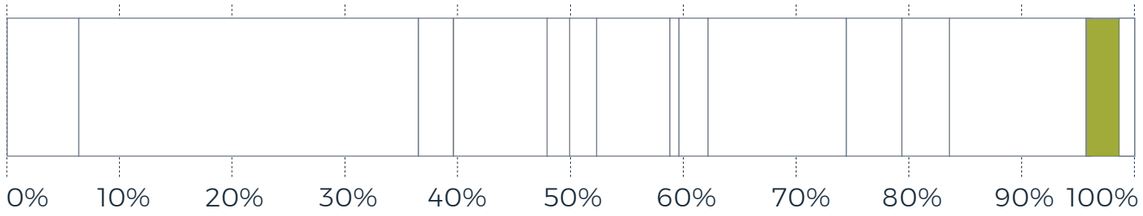


Figure 42 – Goal 14 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits and Inclusive Growth

- Large-scale renewable projects can generate jobs in the region during their construction, as well as for maintenance purposes.
- Electricity generated by these projects could become a source of cheap, clean electricity for large commercial and industrial players in the region through Power Purchase Agreements (PPAs).
- In addition, smaller scale renewable projects can become a source of alternative income for landowners, such as farmers, or for community organisations

We will change our economy without leaving anyone behind	**Neutral**	No impact
We will invest in the resilience of our places	**Positive Impact**	Potential source of cheap energy or income generation
We will use our industrial past to create a new future	**Positive Impact**	Working with supply chain for installing and maintaining systems
We will create places and connections that help us to meet the climate challenge	**Neutral**	No impact
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Generation of renewable energy reduces fossil fuel use

4.4.15 | Goal 15 – Land use: Natural Capital

Where greenhouse gas emissions are unavoidable, tree planting and more specifically, increasing the area of sustainably managed forests, has an important role to play in achieving net zero carbon emissions through direct sequestration of carbon dioxide from the atmosphere.

In addition to afforestation there are a number of broader nature-based solutions that can contribute to meeting net zero targets by locking up carbon over the long term. This includes improved management of semi-natural habitats such as heathland and grassland, better soil conservation and land use for agro-forestry.

Currently, forest cover in the WMCA is about 1.5% of the area, agriculture 20% and urban/ built up areas 70%, of which 57% is discontinuous urban fabric. The best opportunity for afforestation is on agricultural land of poorer quality and which will be repurposed with an associated shift in payments through the Environmental Land Management Scheme. GIS mapping was undertaken as part of this project in order to help quantify the land availability for large-scale afforestation and carbon sequestration. This included agricultural land and peri-urban land, where more street style tree planting can play a role.

Figure 43 – **Identified potential for natural capital solutions in agricultural land**

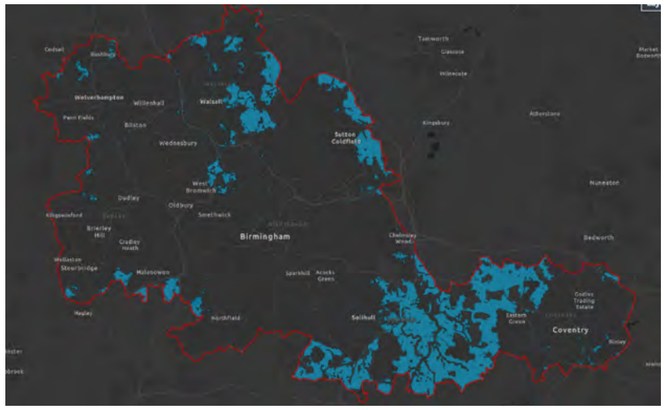
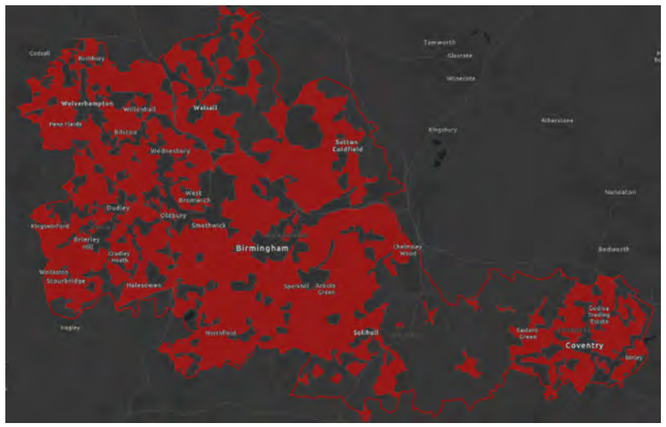


Figure 44 – **Identified potential for natural capital solutions in peri-urban land**



The methodology employed considered the area within the boundaries of the seven local authorities as a whole and used a number of constraints to exclude locations deemed unsuitable. The results of the GIS mapping for the potential for natural capital solutions can be seen above.

Planning Implications

There is an opportunity to identify and secure sites for afforestation through local policy and to incentivise developers to consider planting trees as part of development proposals. Forestry for commercial purposes or on a significant scale that it may be deemed to lead to a change of use of the land may need planning permission.

Goal Levels

Low

2 million trees by 2026 and 2.9 million by 2041.

This would be equivalent to meeting a target of 1 tree planted for every person in the WMCA, in line with the Virtual Forest initiative being led by the WMCA, launched in January 2020. It would be equivalent to planting woodland in 2% of the WMCA area.

Medium

2.9 million trees by 2026 and 11.7 million by 2041.

The CCC advised the UK government to increase UK forestry cover from 13% to at least 17% by 2050. However, England is well behind that target to date at 10%. The medium scenario applies a target of 10% forest cover, to bring it in line with the rest of England. This is equivalent to 9,000 ha.

In addition to repurposing suitable agricultural land, implementation should focus on increasing tree cover and green spaces within urban areas and creating woodland areas close to urban centres, such as through the delivery of the West Midlands National Park. The density of tree cover in urban areas is significantly lower. 28ha of urban tree cover would be equivalent in carbon sequestration of 1ha of woodland but provide more co-benefits.

It was assumed that trees could be planted on up to 20% of the peri-urban land available (approximately 10,000ha).

High

5.7 million trees by 2026 and 19 million by 2041.

The GIS mapping identified that 15% of the WMCA area is suitable for woodland planting according to the criteria applied. This would meet the previous forestry cover target set by the Independent Panel on Forestry in 2012 but not the latest figure of 17-19% set by the Committee on Climate Change in 2020. In addition, some of the land identified will be used for the development of utility scale solar PV and wind installations. These areas have been discounted to avoid double counting.

Therefore, the maximum area which can be utilised is 13% of the total WMCA area, equivalent to almost 12,000 ha. In addition, the same level of tree planting peri-urban areas has been assumed in this scenario.

Very High

As high

Figure 45 – **Goal 15 GHG Emission Saving and Deployment in 2026**

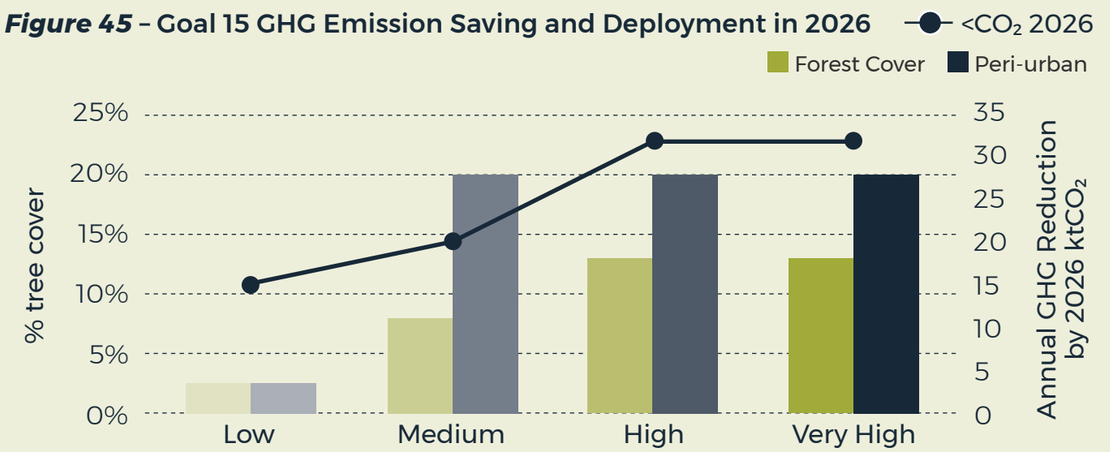
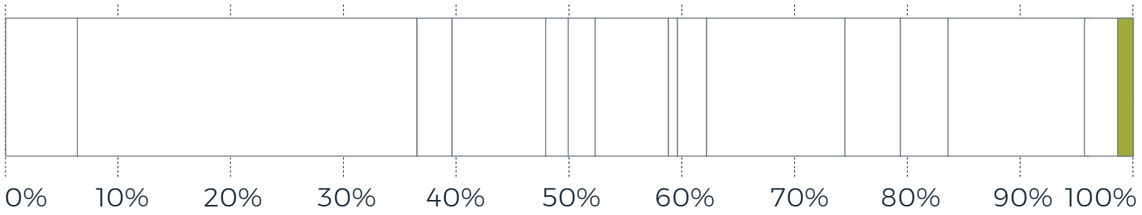


Figure 46 – Goal 15 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits and Inclusive Growth

- Forests and urban planting provide a wide range of environmental, social and health benefits.
- Beyond the climate mitigation benefits of nature-based solutions, they contribute to climate resilience and adaptation and a wide range of other societal benefits including health and wellbeing.
- Ensuring that urban planting is well conceived, carried out and maintained is an important part of ensuring that carbon sequestration and other benefits can be realised – this is an opportunity to create jobs and encourage community ownership and stewardship.

We will change our economy without leaving anyone behind	**Neutral**	No impact
We will invest in the resilience of our places	**Positive Impact**	Nature-based solutions provide additional resilience to climate change.
We will use our industrial past to create a new future	**Neutral**	No impact
We will create places and connections that help us to meet the climate challenge	**Neutral**	Wide range of environmental, social and health benefits
We will decouple prosperity from the consumption of energy and resources	**Positive Impact**	Trees and other natural capital capture CO_2

4.4.16 | System management

The achievement of these goals will require significant investment and dedicated long term resource commitments. To achieve these goals will not simply require new programmes of work, but inherent systems change, particularly in the way infrastructure, including transport, housing, commercial and energy infrastructure is planned for.

In terms of changes to the transport system, local authorities, the WMCA, Network Rail and Highways England have the opportunity to develop policy and strategies to invest in line with the goals identified. The West Midlands Local Transport Plan is under review and will provide a more detailed and developed understanding of the change required to the transport system and the measures required to deliver it.

In the case of electricity and gas, current regulation does not align with local authorities or regions. The infrastructure is run by Distribution Network Operators, the National Grid, and gas distributors. These are regulated by Ofgem and investment decisions are controlled. The costs of upgrading the electrical network in the UK for heat have been estimated to be £25bn. Meanwhile, the CCC estimated that the rapid uptake of electric vehicles and heat pumps could increase total expenditure on distribution networks by up to £50 billion by 2035, or £1.8 billion per year. If this was to be reflected on a per capita basis would mean that the cost of upgrading the electrical network for WMCA would be circa £2.2bn. The gas network is more uncertain with the possibility of conversion to hydrogen, a slow decommissioning process, or a mix.

There are things that the region can do to ensure that energy system costs are not prohibitive and do not result in business cases for schemes being destroyed by hefty network connection charges. Local Area Energy Planning is a vital first step to understand the potential impact of decarbonisation programmes on the local network spatially. Engaging with the energy infrastructure planning process is then required, as energy infrastructure is planned in investment cycles agreed with Ofgem, so it is important to ensure the Distribution Network Operators are aware of deployment programmes years in advance of connection, so that developments can be factored into network upgrade planning. Sharing data between transport, spatial planning and energy planning processes is a vital first step to achieving the system change necessary to remove barriers to decarbonisation.

Smart solutions to decarbonisation

In order to optimally balance the energy networks, it will be necessary to actively manage each of these components; both nationally and locally. Although the expected electrical demand is double or treble current overall amounts, the main issue for network is actually the peak of that demand.

Smart local energy systems can be designed and built to enable cost signals to change usage patterns to address some of these peak systems issues. For example, utilising the storage potential within electric vehicles using vehicle-to-grid technologies, as well as simpler temporal considerations to charging behaviour (so that charging occurs at the most opportune time and not contributing to peaks). Similarly heating systems may also adapt to usage patterns, to use energy when more appropriate (potentially storing heat or preheating homes ahead of predicted demand). Many estimates of the potential energy consumption increase as a result of electrification assume behaviour or the way we use energy is unchanged. Whereas there are large opportunities to reduce demand through initiatives such as hub charging, freight exchange and shared vehicle ownership schemes. These new markets also offer significant new high value jobs and business opportunities.

To make the most of these opportunities new responsibilities for smart local energy systems need to be adopted locally. The goal here is to ensure better understanding across the transport, buildings and energy sectors of the opportunities that exist and how to harness them.

This does not directly affect the modelling results but will be crucial as an enabler. These issues are sought to be addressed in the Systems Management element of the Delivery Plans.

Planning

To be effective the objectives of this programme should be rooted in local planning policy and aligned with national guidance. Local policy in particular can act as a lever to require, incentivise and/ or encouraging change and delivery. The National Planning Policy Framework does reference the need for planning to support the infrastructure required for the transition.

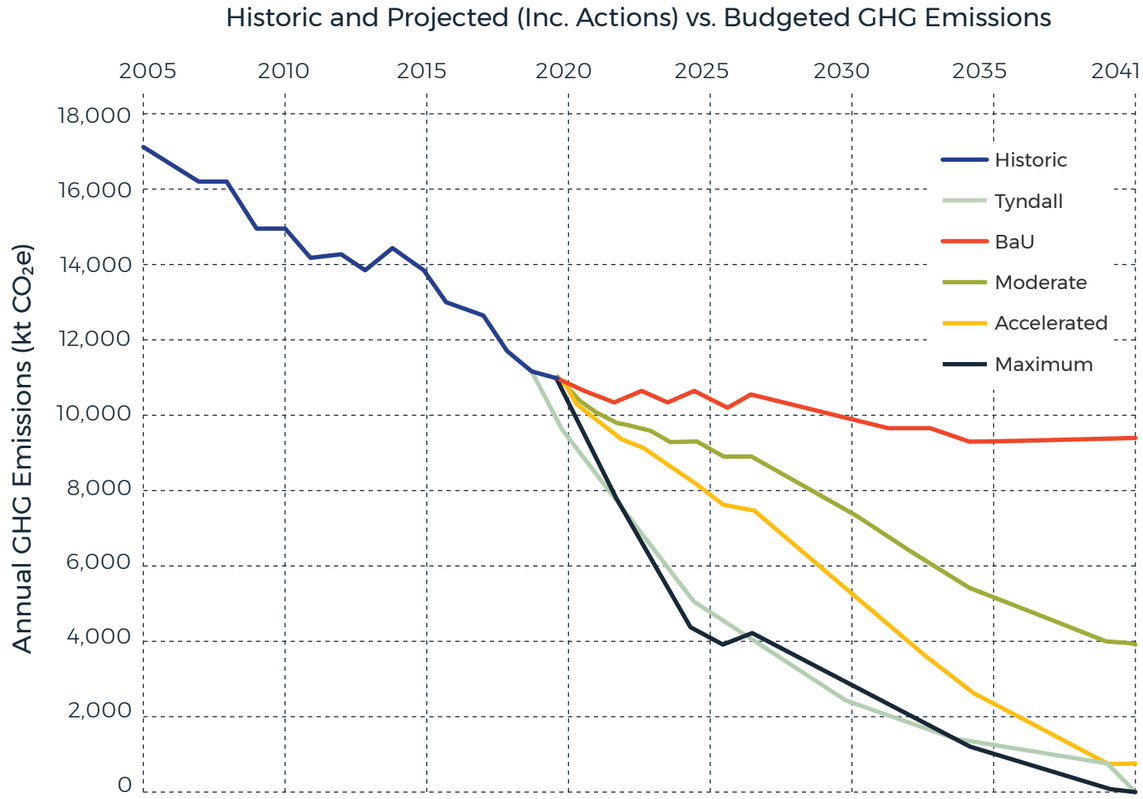
4.5 | Assessment of scenarios

Three scenarios have been considered concerning the pace and trajectory of the required transition, ‘Moderate’, ‘Accelerated’ and ‘Maximum’.

The scenarios are:

- The Moderate scenario sets out a trajectory that would not meet the 2026 or 2041 goal. Even this scenario, which represents the slowest delivery pace, is beyond the current efforts, defined as business as usual in the graph below.
- The Accelerated scenario is the reference scenario for this plan. It is ambitious and will require a step-change in delivery. It will meet the 2041 net zero target but not at the rate of the Tyndall trajectory.
- The Maximum scenario would align with the Tyndall 2026 trajectory, and net zero by 2041. Its reliance on Very High goal levels, almost throughout, means that it is at or beyond the limits of what is technically feasible, even ignoring legislative competence and financial restrictions. Policies associated with this scenario would also not enable a just transition to net zero, which is a key principle of WM2041, because it would lead to large scale job losses or restrictions to current rights. For this reason, it has not been proposed, but can be explored by those seeking to understand what is required.

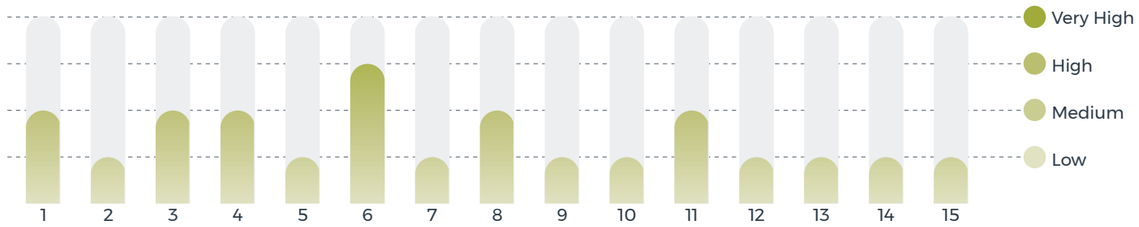
Figure 47 **– Summary of Five Year Plan scenarios VS business as usual and proposed Tyndall carbon budget**



4.5.1 | The ‘Moderate’ scenario

A lower-level goal scenario was defined, with individual levels for each goal defined as per the figure below, mainly set at either ‘Medium’ or ‘Low’, except for commercial solar PV.

Figure 48 – Moderate scenario



While it is the scenario with a lower goal level being considered, it still represents a step-change in progress across many areas. For example, some of the following targets would need to be met (a full description of each goal at each level of goal is provided in section 4.4):

- The retrofitting by 2041 of all local authority owned dwellings (about 145,000), and all socially and privately rented dwellings (about 132,000 and 210,000, respectively) to a reasonable standard, with around a quarter of those completed by 2026.
- The retrofitting of 332,000 heat pumps in existing dwellings by 2041, and 14,000 by 2026 (the assumed uptake trajectory for heat pumps is not linear).
- A 20% reduction in energy use across all 74,000 offices, retail and other commercial buildings (e.g. health, education) by 2041, with a quarter of those completed by 2026.
- The installation of about 1.6 GW of solar across the domestic, commercial and industrial built environment by 2041, with about 400 MW to be installed by 2026.
- The introduction of hydrogen in high-temperature industrial processes to cover 8% of their energy needs, as well as 25% of potential for capturing the remaining emissions with CCS, a 5% improvement in energy efficiency and electrification of low-temperature processes.
- A reduction in car usage to 50% of all trips (from 63% today), and an associated increase of cycling to 5%. The modal share of public transport is expanded to 18% of all trips.

The carbon modelling of the 15 goals at the level of goal in this scenario shows a reduction in carbon emissions of 24% by 2026 from 2016 levels, and close to 68% by 2041 if implementation started immediately. This scenario would not be sufficient to reach net zero until after 2050.

Figure 49 – GHG reduction waterfall chart in 2026 (moderate scenario)

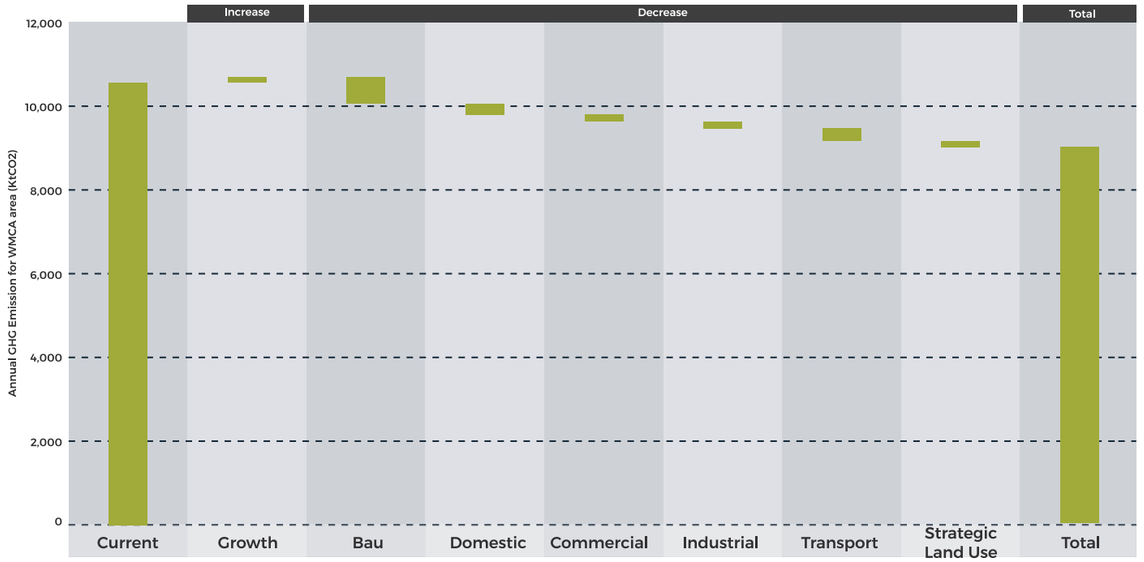
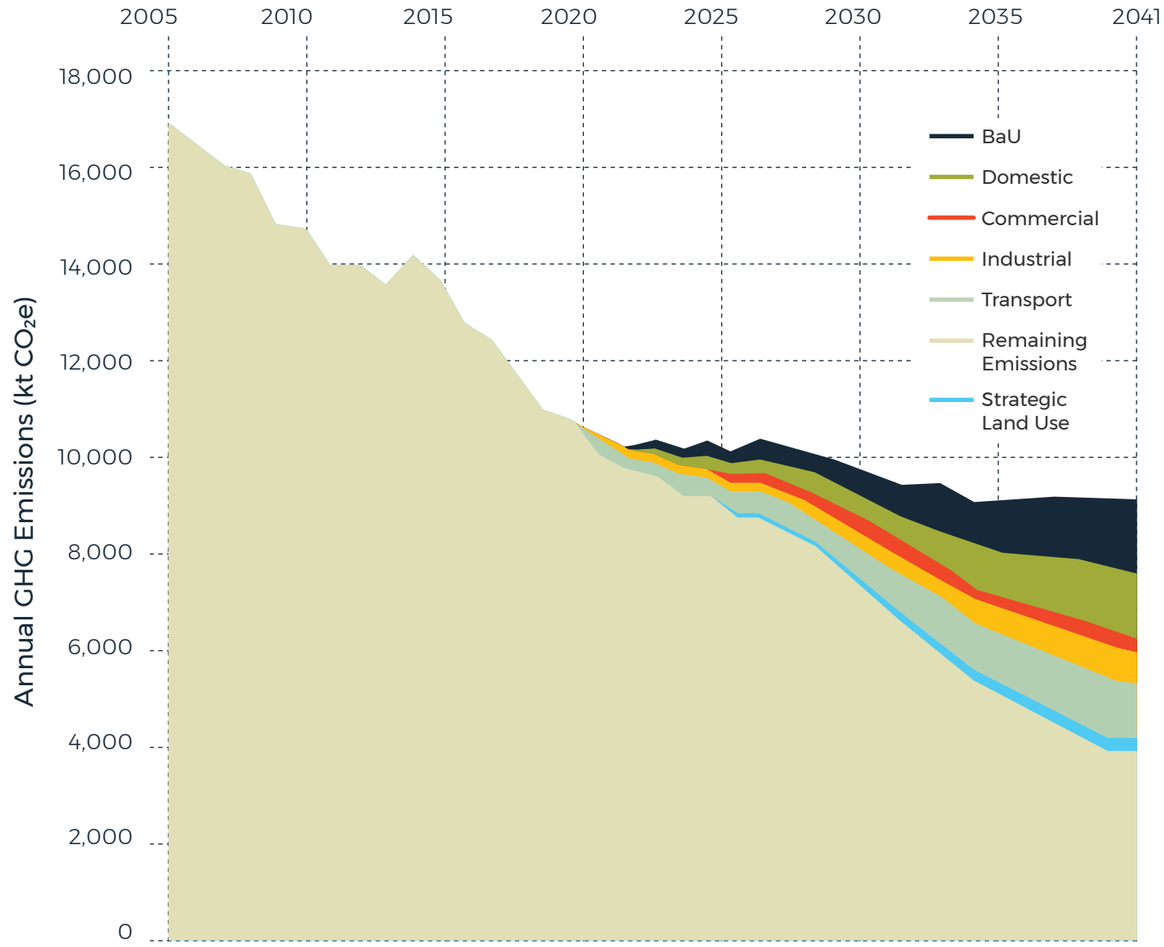


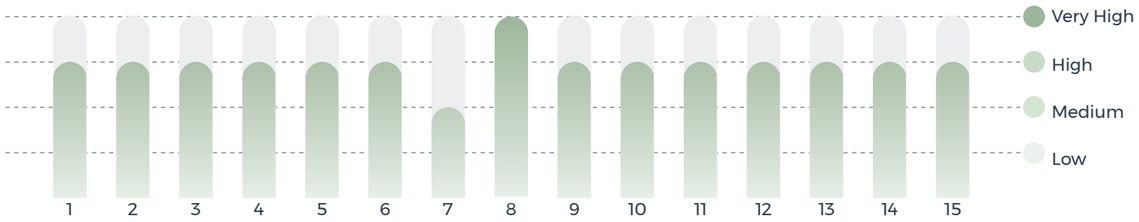
Figure 50 – Moderate scenario cumulative effects



4.5.2 | The ‘Accelerated’ scenario

The ‘Accelerated’ scenario is ambitious and contains a much more rapid and aggressive set of goals across the different sectors, with most set at a “high” goal level. The main exception is energy efficiency and fuel switching measures in the industrial sector, as the majority of technologies involved are at an earlier stage of commercial and even technical development. Solar PV in industrial buildings, due to its much smaller scale, ease of financing incentive for end users, has been set at a very high level.

Figure 51 – **Accelerated scenario**



This is the reference scenario considered in the modelling and contains a set of goals with the necessary ambition to cause a very significant reduction in the region’s carbon emissions, while still being technically feasible. The scale of the changes and actions needed will require the right national and regional policies, access to finance, public acceptance and development of a number of supply chains (e.g. energy efficiency in buildings).

Some of the targets that would need to be achieved are listed below, to illustrate the magnitude of the challenge (a full description of each goal at each goal level is provided in section 4.5):

- Energy efficiency retrofit, to a reasonable standard 294,000 dwellings in the WMCA by 2026 at a cost of £0.6bn.
- The installation of low-carbon heating in 292,000 dwellings completed by 2026. Due to this goal’s timescales, heat pumps (predominantly air-source) are likely to be the dominant technology at a gross cost of £2.3bn within the first FYP.
- The installation of about 863 MWp of rooftop solar PV across the region’s domestic, commercial and industrial buildings by 2026 at a cost of £0.3bn. Additionally, 253.5 MWp of large-scale solar PV and wind farms are deployed in suitable locations identified.
- More aggressive energy efficiency measures in the commercial sector equivalent to 37,000 commercial buildings by 2026 (costing £0.4bn).
- A much more significant role for hydrogen is needed in industrial high-temperature processes, covering 16.7% of their energy demand, as well as 50% of potential for capturing the remaining emissions with CCS. Other secondary and low-temperature processes are made 10% more efficient and electrified.
- Significant transport demand reductions are realised, through 9% of people working from home; £50m has been attributed for the cost to 2026 for the cost of broadband infrastructure upgrade.
- A change to the way we travel is also necessary, with a reduction in car usage (from 63% of trips to 59% by 2026), and a much higher modal share of public transport and cycling: 11% and 5%, respectively. These are based on aspirations set out in the Movement for Growth strategy.
- A very rapid uptake of electric cars, light-goods and heavy goods vehicles, as well as the replacement of current buses and taxis with electric or other low-carbon alternatives: 15% of cars are estimated to be electric. If half of all buses and taxis were to electrify by 2026, the cost would be in the region of £200m.
- In addition, forestry cover would be increased from approximately 1.5% today to 13%, by 2041 aligning as much as possible with the long-term aims for England. This includes repurposing 9,000 ha of agricultural land to increase tree cover, as well as creating green spaces and woodland areas in 20% of urban and peri-urban areas, equivalent to 10,000 ha. The costs to 2026 would be in the region of £60m for a quarter of the planting within the first FYP.

The image below sets out the timeline and targets as proposed as part of this plan in the central 'Accelerated' scenario through to 2041.

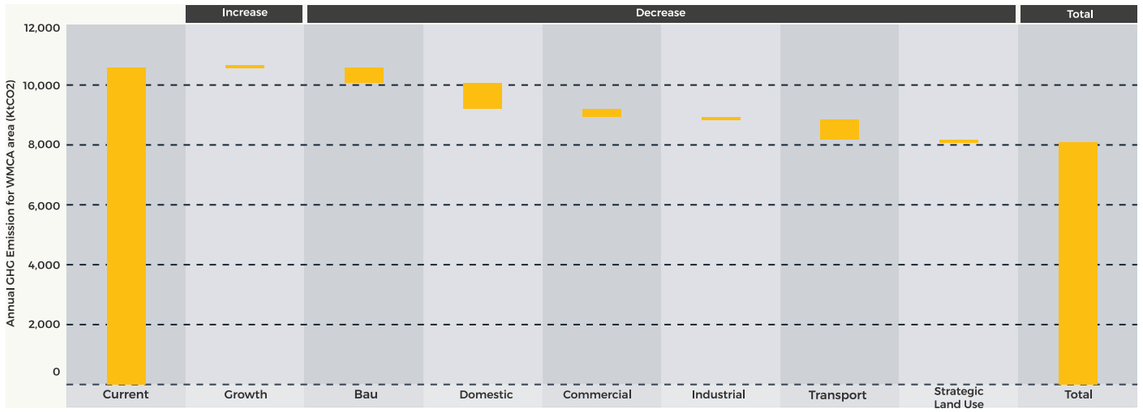
Figure 52 – Proposed timeline of goals

			2021	2026	2031	2036	2041
	Domestic	Energy efficiency	Energy efficiency in 100% dwellings (1.1m homes)				
		Heating retrofit	100% low-carbon heating system retrofit in dwellings (1.1m homes)				
		Solar PV	830 MWp of rooftop solar				
	Commercial	Energy efficiency	Energy efficiency in 73,400 commercial buildings				
		Heating retrofit	Low-carbon heating system retrofit in 100% buildings (73,400 commercial buildings)				
		Solar PV	705 MWp of rooftop solar				
	Industrial	Energy efficiency and heating retrofit	16.7% deployment of H_2 and 40% of CCS for high temp process 10% energy efficiency 100% electrification for low temp processes				
		Solar PV	96 MWp of PV				
	Transport	Avoid	35% of people tele-commuting 50% of time, 25% less personal and retail trips				
		Shift	Bike increase to 10% of trips		Private car journey reduced to 35%, Public transport up to 27%		
		Improve	100% electric taxis, buses, 50% of HGVs		100% of HGVs		
	Land Use	Renewables	59 MW Wind and 448 MWp of solar PV				
		Natural capital	Tree coverage in 13% of WMCA area, and 20% of peri-urban area (a total of 19 million trees)				
	Systems Management		Upgrade and manage coordination across the energy and associated systems (transport, digital).				

Delivering a net zero society will require significant and unprecedented change to how we heat and power our buildings and industry and fuel our transport system. The changes will directly impact people and we need to ensure the transition does not adversely impact anybody.

The modelling of this scenario results in an almost complete decarbonisation by 2041, at 94% compared to the 2016 baseline, and 33% by 2026.

Figure 53 – GHG reduction waterfall chart in 2026 (accelerated scenario)



This scenario shows a much higher reduction in carbon emissions both by 2026 and 2041 than the Moderate scenario, and it indicates that it is possible for the WMCA to meet their goal of becoming net zero carbon by 2041. Achieving the goals considered in this scenario will require an unprecedented effort to decarbonise every sector, in most cases ahead of the rest of the UK. Despite this, this scenario only achieves a 33% reduction by 2026 (compared to 2016 baseline).

The cumulative effects of the different sectors can be seen in the following graph. It is clear that the domestic and transport sectors represent the two sectors with the highest level of reductions, with business as usual (which includes measures such as the 2030 petrol and diesel car and LGV ban) also being significant. This scenario shows that meeting longer term net-zero carbon targets is possible, but that achieving that requires decisive and strong intervention measures and time for their effect to compound.

Figure 54 – Accelerated scenario cumulative effects

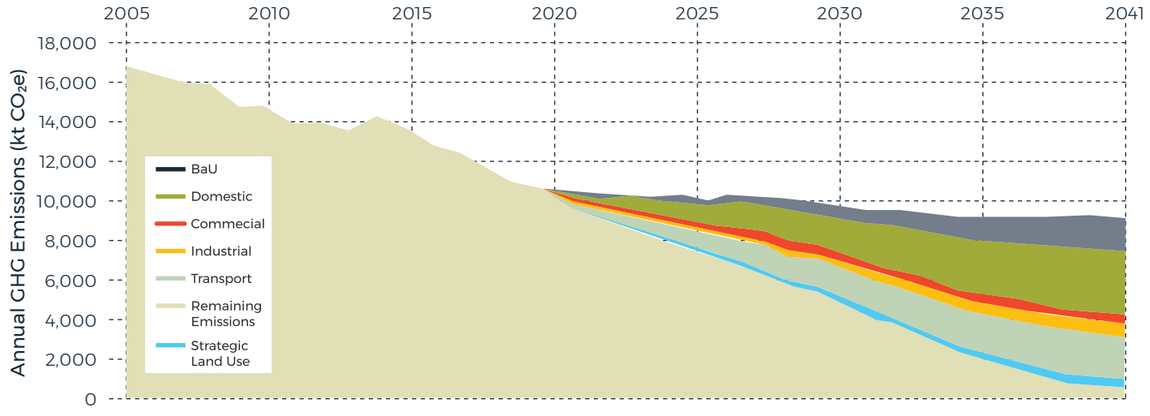


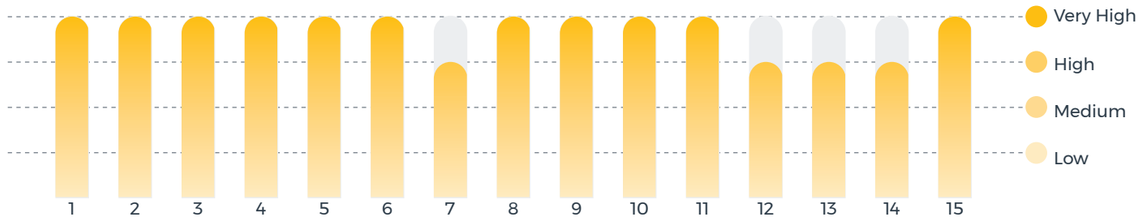
Table 5 – Summary of Accelerated Scenario

Goal		Deployment required for net zero	Deployment required to 2026 (Accelerated Scenario)
Domestic	Energy efficiency	1.1m homes (100%)	294,000 homes
	Heating system	1.1m homes (100%)	292,000 homes
	Solar PV	830MWp	415MWp
Commercial	Energy efficiency	73,400 buildings	37,000 buildings
	Heating retrofit	73,400 buildings	18,400 buildings
	Solar PV	705MWp	353MW p
Industrial	Energy efficiency	15% energy efficiency, 33% deployment of H2 and 40% CCS for high temp.	10% energy efficiency, 17% deployment of H2 and 20% CCS for high temp.
	Solar PV	96MWp	96MWp
Transport	Avoid	35% people telecommuting (50% of the time), 25% less personal / retail trips	9% people telecommuting and 6.25% reduction in trips
	Shift	Shift to 35% trips by car	59% trips by car
	Improve travel (bus and taxi)	100% taxis & buses electrification	100% electrification by 2030
	Improve travel (HGVs)	100% of HGVs are electrified	25% of HGVs are electrified
	Improve travel (accelerated EVs)	100% of cars are electrified	15% of cars are electrified
Natural Capital	Land use - Renewables	59MW wind and 448MWp of solar potential	30MW wind and 224MWp solar
	Land use - Natural capital	13% WMCA tree coverage/ 20% peri-urban areas	13% forest cover/20% peri-urban areas

4.5.3 | The ‘Maximum’ scenario

The ‘Maximum’ scenario was developed as an illustration of what would be required to be in line with the trajectory outlined by the Tyndall Centre, particularly with regards to the speed of implementation of the measures already modelled so far. As such, the main difference between the level of goals set at “very high” with those at “high” is the fact that they are completed by 2026, with the scope remaining unmodified. Doing so is likely to be at the limit or beyond what it is technically possible and would require large behaviour change, legislative change, very large financial investment from government, and private and public collaboration. Following this scenario would, arguably, not allow for a just transition.

Figure 55 – **Maximum scenario**

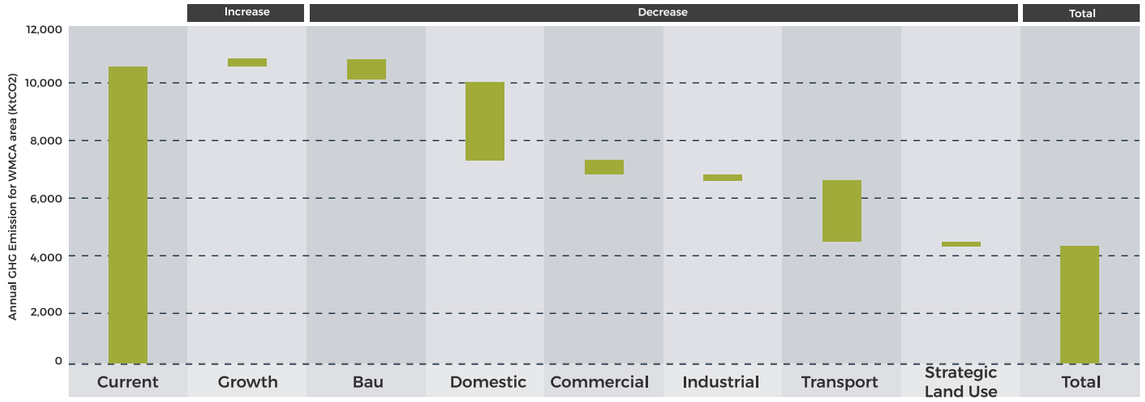


This scenario sets most goals at a “very high” level, with the exception of areas where technologies required are not yet mature, such in industry or HGVs, and afforestation, as carbon sequestration from afforestation requires longer time frames. Lastly, the EV uptake goal has not been modified, as it is already a very aggressive projection in the Accelerated scenario.

The results of modelling this scenario show a 64% reduction in GHG emissions from 2016 by 2026, and virtually 100% by 2040. For example, some of the following targets would need to be met:

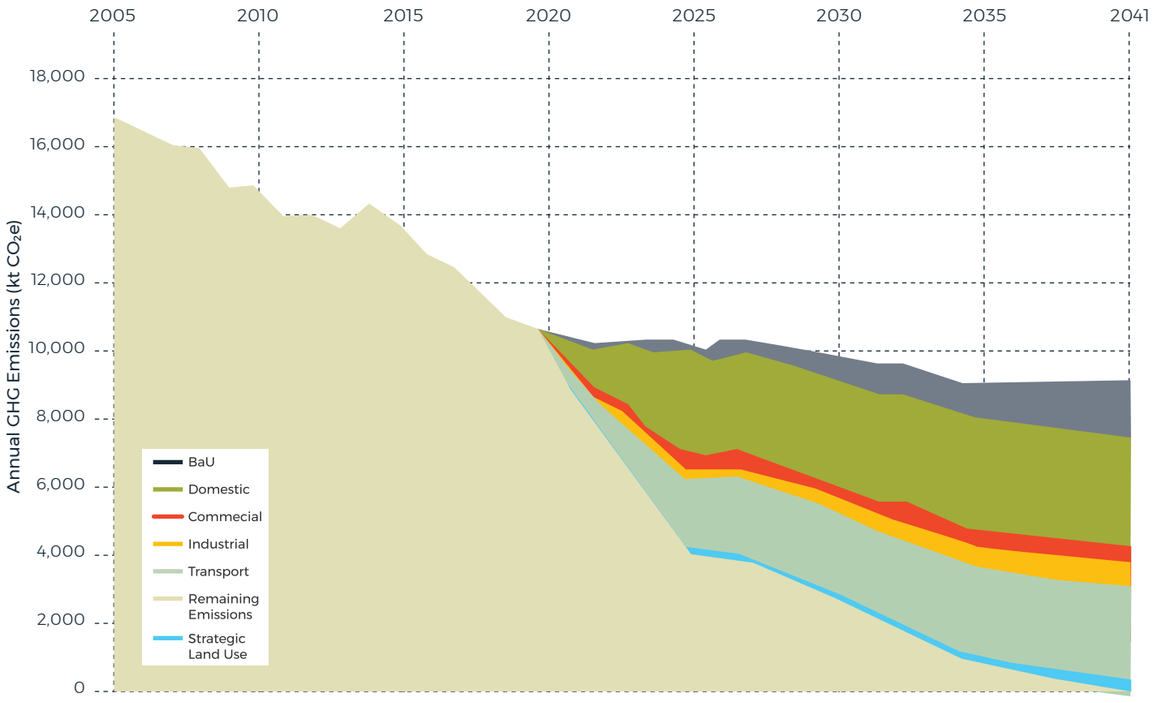
- The retrofitting of all dwellings (1,178,000) to a reasonable standard by 2026.
- The retrofitting of all dwellings with heat pump by 2026.
- A 20% reduction in energy use across all 74,000 offices, retail and other commercial buildings (e.g. health, education) by 2026.
- The installation of about 1.6 GW of solar across the domestic, commercial and industrial built environment by 2026
- A decrease in car usage to 35% of all trips (from 63% today), and an associated increase of cycling to 10%.

Figure 56 – **GHG reduction waterfall chart in 2026 (maximum scenario)**



The nature of this scenario shows aggressive and drastic reductions from 2021, as can be seen in the graph below, which are unlikely to be achievable in practice, but which set the way to meet the 2026 carbon target. The domestic and transport sectors are largely decarbonised by 2025.

Figure 57 **– Maximum scenario cumulative effects**



4.5.4 Approach to carbon offsetting or capture

Where any GHG emissions remain after maximising all opportunities to reduce consumption, the option remains to offset the balance. In this scenario, emissions are instead reduced elsewhere to compensate for emissions released within the WMCA. There are many schemes that are in operation which can facilitate this each with their own standards and accreditation; some are more reputable than others and there is often a concern over the GHG emissions reduction that would have occurred under business as usual.

Some offsetting schemes include the Clean Development Mechanism and the Gold standard amongst many others. The local planning policy regime also offers an opportunity to consider carbon offsetting.

Whilst there are many other standards for carbon offsetting available, the scale of the West Midlands means that offsetting and any large differences would be substantial and have a political dimension. The use of offsetting will be considered separately by the WMCA and is not part of this study.

Carbon Insetting

Whereas carbon offsetting considers GHG reduction by activity outside of the WMCA's direct or indirect operations, insetting refers specifically to GHG reductions that are directly related or within the sphere of influence (including within the geography of the region or within its supply chain).

The Tyndall Centre has advised that the recommended budgets here are the minimum requirement for meeting the Paris Agreement – i.e. the maximum CO_2 emissions budget. Therefore, adopting a smaller cumulative CO_2 budget than the one presented, with accelerated reduction rates leading to an earlier zero carbon year, is compatible with this approach. The use of carbon offsets to meet an earlier target year, are not however considered consistent with this approach.

Carbon removals via negative emissions technologies (such as carbon capture) are not included, but tree planting is. The CCC include a significant role for these technologies in their analysis. Doing so increases the size of a carbon budget and allows the WMCA to exceed budgets in the short term. However, carbon removal technologies are still at a very early stage of development and whether they can be successfully deployed at sufficient scale is highly uncertain.

Chapter Summary

An energy and carbon model was developed for the WMCA area. This considered current and projected future GHG emission to 2041 under Business-As-Usual.

The effect of achieving 15 separate goals were modelled to understand the impact to 2026 and 2041. For each, different goal levels were also considered to understand what combination would be needed to meet reduction targets

The approach considered domestic, commercial, industrial, transport and land use; all underpinned by the requirement for system management.

The target of being net zero carbon by 2041 is achievable but requires considerable effort and a step change in actions according to the 'Accelerated' scenario.

Consideration was also undertaken of the WMCA's role to enable, influence and deliver.

Meeting the Tyndall 2026 trajectory would require a very high rate of change, which is arguably not deliverable, for financial, social, legal and technical reasons.

ECONOMIC MODELLING

In order to understand the potential costs, overlaps and opportunities associated with each of these interventions, economic modelling was undertaken. Here, the major capital investment elements were quantified under the 'Accelerated' scenario, (where known), and any operational savings/costs were captured to 2041 only. Only the key capital flows were captured and there are likely to be many wider considerations that would be needed for a comprehensive economic model. This model did however allow for the understanding of the broad costs and value for money.

The costs associated with system management and transportation have not been incorporated, partially due to the fact that they are already budgeted and due to the complexity of the financial flows. Similarly, the costs of administration and institutional requirements are not included.

A Marginal Abatement Cost Curve (MACC) was developed to aid this process as a way of visualising this data and ranking / comparing different goals and technologies by plotting the marginal abatement cost (the Net Present Value (NPV) over the GHG saving potential – in £ per tonne of carbon) against the absolute GHG saving. The most financially advantageous / cost effective projects appear to the left of the chart, with those below 0, indicating a positive financial return. The MACC does also not take account for set up of the programmes and projects, or their management; this is considered under the delivery section.

Correct use and interpretation and use of the MACC can aid the decision-making process and help with prioritisation but should only be used as part of wider understanding of the goals, inter-dependency and local context. Full details of the assumptions made for each NPV calculation can be found in **Appendix F.**

The costs associated with the various goals represent the gross cost, with many providing a good financial return. In some cases, however, the cost of implementation may be split between various parties, whilst similarly the beneficiary may be wholly or partially different to the investor. As such, even though many actions have a payback, it may not be to the investor.

The figure below shows the most economically advantageous projects, but as all goals are required, it does not indicate optionality. Instead the value is in the figure is in understanding the project financial measures and where the WMCA should focus their resources.

The total net present value of the investment required over a 20-year timeline (from 2021 to 2041 with a 3.5% discount rate) is **minus £3.9bn.** This indicates that there will be only a partial financial return on investment. This does ignore that technological interventions are likely to fall in costs and any saving from reducing the risk of climate change impacts. The Committee on Climate Change have stated that this scale of investment is "appropriate to accept it given the potential consequences and cost of inaction."

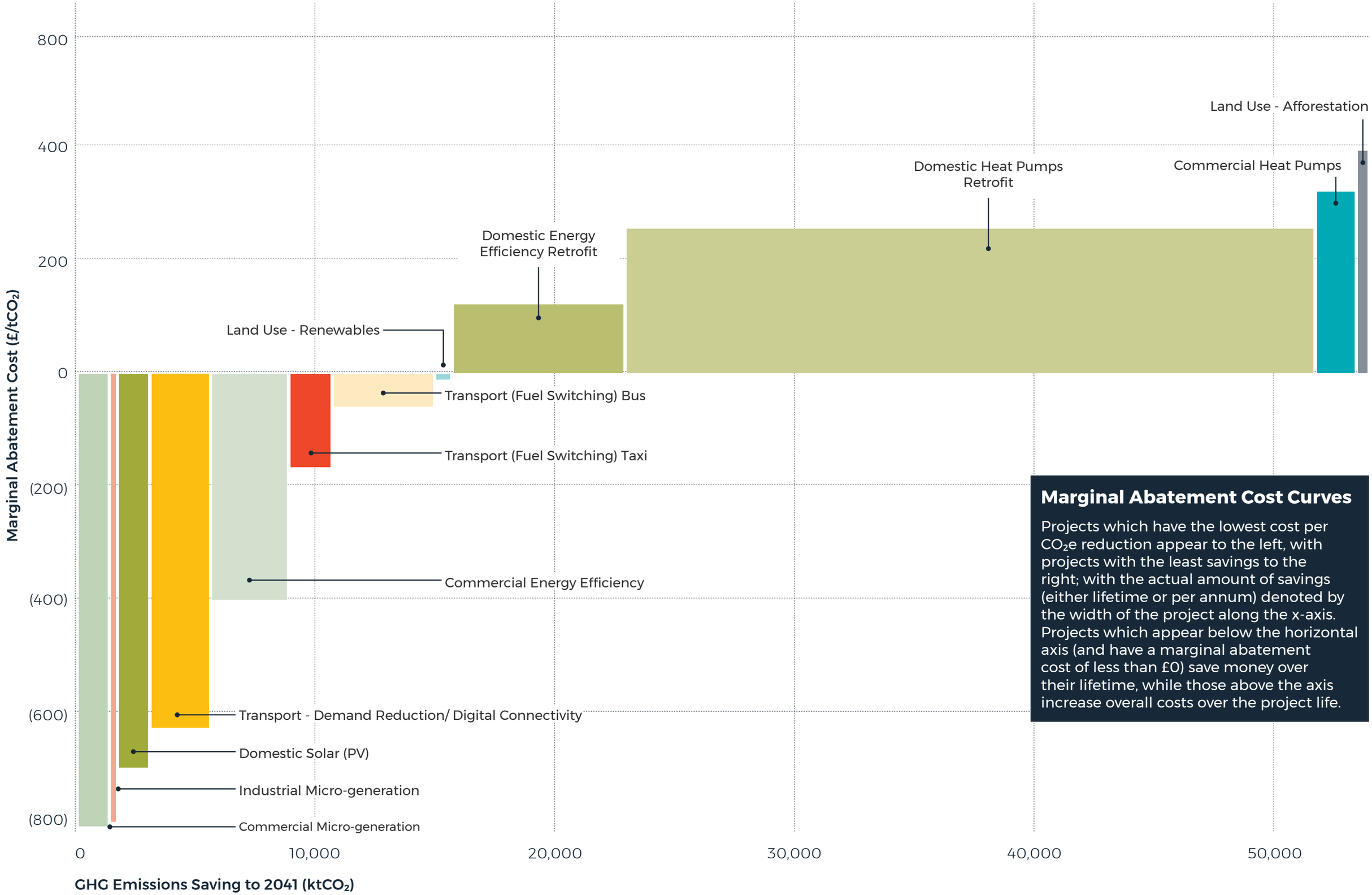
The process is based on the gradual roll out of goals in line with the technical analysis, and so some of the goals will only be implemented in 2040 and so give little opportunity to payback. As such, goals which are implemented over a shorter / sooner timeline have an advantage. The savings from these measures are often long lasting, beyond the 2041 horizon.

For similar reason the total net present value of the investment required over the first Five Year Plan (from 2021 to 2026) is minus **£3.3bn.** Similarly, the sum of the total gross investment required within the first Five Year Plan is **4.3bn.**

Table 6 – Economic Modelling Assumptions

Goal	Included within economic modelling	Not included within economic modelling
Goal 1 – Domestic energy efficiency	Capex for individual measures and resultant fuel savings (assuming a gas boiler counterfactual)	Replacement of equipment at end of life, air quality impact, carbon cost
Goal 2 – Domestic heating system retrofit	Capex for heat pump installation and resultant fuel cost changes	O&M costs / savings, economies of scale, air quality impact, carbon cost
Goal 3 – Domestic solar PV	Capex of installed system and electricity savings assuming 100% self-consumption	O&M costs / savings, inverter replacement at end of life, economies of scale, air quality impact, carbon cost
Goal 4 – Commercial energy efficiency	Capex for individual measures and resultant fuel savings (gas, electricity and oil)	Replacement of equipment at end of life, air quality impact, carbon cost etc.
Goal 5 – Commercial heating system retrofit	Capex for heat pump installation and resultant fuel cost changes	O&M costs / savings, economies of scale, air quality impact, carbon cost
Goal 6 – Commercial solar PV	Capex of installed system and electricity savings assuming 100% self-consumption	O&M costs / savings, inverter replacement at end of life, economies of scale, air quality impact, carbon cost
Goal 7 – Industrial energy efficiency and fuel switching	Not modelled – insufficient data / confidence	0%
Goal 8 – Industrial solar PV	Capex of installed system and electricity savings assuming 100% self-consumption	O&M costs / savings, parts replacement, economies of scale, air quality impact, carbon cost
Goal 9 – Transport demand reduction	Installation of ultrafast broadband to homes currently not connected (181,000) and resultant commuting fuel reduction	Air quality impact, carbon cost, additional vehicle costs savings (maintenance, insurance)
Goal 10 – Transport mode shift	Not modelled	
Goal 11 – Bus and taxi electrification	Additional CAPEX over internal combustion engine equivalent, OPEX saving	Air quality impact, carbon cost,
Goal 12 – HGV electrification	Not modelled	
Goal 13 – Transport accelerated EV uptake	Not modelled	
Goal 14 – Land use renewables	Installed costs of equipment and income at £50 per MWh	Land purchase costs, O&M, equipment replacement, insurance
Goal 15 – Land use natural capital	Cost of woodland establishment and management	Land purchase costs, air quality impact, carbon cost

Figure 58 – MACC to 2041 (exc. Goals 10, 12 and 13)



Marginal Abatement Cost Curves

Projects which have the lowest cost per CO_2e reduction appear to the left, with projects with the least savings to the right; with the actual amount of savings (either lifetime or per annum) denoted by the width of the project along the x-axis. Projects which appear below the horizontal axis (and have a marginal abatement cost of less than £0) save money over their lifetime, while those above the axis increase overall costs over the project life.

The results show that technologies which are well established, such as photovoltaics, represent quick wins (have the best payback / have the best NPVs) but overall are of limited value, denoted by the width of the columns which represent GHG emissions savings. Part of this is due to the decarbonisation of the electricity grid, which means that generation has diminishing returns further out in time.

Energy efficiency measures are more significant in terms of carbon saving, although payback periods are not as attractive. Commercial measures are especially attractive but are harder to influence in the short term due to uncertainty brought about by the COVID pandemic. Domestic energy efficiency measures are shown as having a negative NPV by 2041, owing to the slower payback rates and the deployment curve assumed. Improvements in building fabric have a perpetual benefit not captured within the calculations.

The combination of domestic energy efficiency and heat pump installation represent the majority of GHG emissions savings. As explained in the appendix there is a large scope to reduce the cost of this goal; a capex reduction of at least 30% may be possible for large scale roll outs combined with bulk purchasing, training and changes to VAT. However, the biggest obstacle here is the lack of immediate return from any investment. The operating costs would be broadly similar to that of a gas boiler, until the expected reduction in electricity prices, later in this decade.

Costs associated with transport are only covered in a limited sense; more detail will be provided in the upcoming LTP review. The electrification of taxis and buses both provide a return on investment and therefore there are opportunities to provide private investment. The costs associated with digital connectivity are relatively small however the majority of the effort would be around planning and working with employers as well as ensuring the learnings of being forced to work from home are captured and properly addressed.

The MACC does not capture the actions which will be undertaken as part of business as usual, which will also require significant support and investment. For example, the ban on new homes with gas boilers will come into force in 2025, whilst there will be a ban on new internal combustion engine cars from 2030. Both of these would need support in order to ensure a just transition.

Table 7 – Marginal Abatement Costs of Goals to 2041

Name	Marginal Abatement Cost (£ per tCO_2)	NPV
Domestic energy efficiency retrofit	£189	-£981m
Domestic heat pumps retrofit	£254	-£7,690m
Domestic solar (PV)	-£698	£869m
Commercial energy efficiency	-£400	£1,291m
Commercial heat pumps	£320	-£501m
Commercial microgeneration	-£788	£961m
Industrial microgeneration	-£782	£154m
Transport - demand reduction	-£626	£1,599m
Transport (fuel switching) taxi	-£165	£295m
Transport (fuel switching) bus	-£58	£247m
Land use - natural capital	£394	-£169m
Land use - renewables	£4	£2m

Table 8 – Investment Costs

Name	Investment Costs to 2026	Investment Costs to 2041	Potential Funding Source
Domestic energy efficiency retrofit	£0.62 billion	£2.5 billion	- Green loans where homeowners are able to pay - Public funding for local authority owned stock - Property owners for rented accommodation
Domestic heat pumps retrofit	£2.28 billion	£9.6 billion	- Grant funding or incentives - Social landlords' investment - Private homeowners voluntarily and later mandatorily
Domestic solar (PV)	£332 million	£664 million	- Property owners - Green loans - Private sector investment
Commercial energy efficiency	£365 million	£731 million	- Property owners voluntarily and later mandatorily - Green loans - Private sector investment
Commercial heat pumps	£76 million	£321 million	- Property owners voluntarily and later mandatorily - Public Sector funding or incentives
Commercial microgeneration	£270 million	£540 million	- Property owners - Green loans - Private sector investment
Industrial microgeneration	£72 million	£72 million	- Property owners - Green loans - Private sector investment
Transport - demand reduction	£23 million	£91 million	- Mainly infrastructure providers - Potential gap funding for hard to reach areas - Seed funding for private organisations for community / delivery hubs
Transport (fuel switching) taxi / bus	£178 million	£356 million	- Private finance - Green loans
Land use - natural capital	£57 million	£229 million	- Public Sector – Environmental Land Management Scheme - Private sector – Carbon offsetting - New Development – Biodiversity Net Gain
Land use - renewables	£71 million	£283 million	- Private finance - Public sector investment

The gross investment cost, excluding issues around system management, industry and transport is estimated to be **£4.3bn by 2026 and £15.3bn** over the 20-year period. The sources of funding for this will vary, with much of it coming from individuals, some from business, some from local and regional public investment and in some from national government regulation or incentives. What is clear is that there will need to be a step change in investment, with more detail provided in the Delivery section.

Chapter Summary

High-level economic modelling was undertaken for each of the goals.

The gross investment cost, excluding issues around system management, industry and transport is estimated to be £4.3bn within the first Five Year Plan.

Whilst some goals have a positive NPV, others do not. In addition, there is often a gap between the funder and beneficiary.

The gross investment cost, excluding issues around system management, industry and transport is estimated to be £15.3bn over the 20-year period.

JOBS AND SKILLS

6.1 | Introduction

To meet the 2041 target, and progress towards the more immediate interim targets, there will be jobs lost and created and new skills required. There are unique economic characteristics that mean certain industry-sectors are key to a successful and just transition in the region. Therefore, it was important as part of this first FYP to understand the scale and range of new jobs that are likely to emerge in the WMCA, the skills needs associated with these jobs and the current and potential capacity of the education, training and skills development infrastructures to address these needs. The analysis begins with a critical review of existing research to understand the forms of economic activity that are emerging with regard to net zero.

6.2 | Review

The goals and overall transition to a low carbon economy will create jobs in green sectors, and jobs will be lost or change in their 'brown' counterparts currently with high environmental or carbon footprints. This will have knock-on effects on employment in associated supply chains. Changes in existing occupations are expected to happen at the low and medium-skill levels. New and emerging occupations more often require higher-level qualifications. A review of the latest research and local policy relating to low carbon and green jobs and skills was undertaken to develop the FYP.

6.2.1 | Skills transition

Meeting net zero targets will have a significant impact on the labour market, and it is vital that those affected are provided with the right education, training and re-skilling opportunities to meet future job needs. To prepare well for the long term, education and training policies need to be aligned to meet the future new skill demands. STEM skills, as well as managerial, and leadership skills will be important for the transition. Many of these are specific new skills such as knowledge of sustainable materials and electrification technologies, carbon footprinting skills or environmental impact assessment.

Training policy evolution is important to ensure a smooth transition of workers across sectors in the short term. These programmes will be particularly important to facilitate the transition of low-skilled workers from jobs in declining sectors to jobs with similar skills in emerging sectors. The transition to green growth will need to be managed alongside megatrends such as population ageing, globalisation, an overall shift towards a service- and knowledge-based economy, and increased digitisation and automation of production processes. The West Midlands is well-known for having a large and dynamic workforce engaged in the high-precision manufacturing and production of vehicles. Around half of automotive companies produce vehicle components in the West Midlands. Across the WMCA, current estimates suggest an opportunity for >90,000 new direct jobs to be created in low-carbon sectors in gross terms. Most of these jobs would be focused on manufacturing low emission vehicles, battery packs and modules in the proposed giga-factories, situated near existing production sites. Additionally, jobs will be created installing low carbon heating technologies, energy efficiency products and solar panel installations. The skill requirements for these new jobs include:

Solar - Solar technician skill requirements will be demand led. Level 3 Electrical Installations qualification are required to install grid connected solar.

Hydrogen fuel cells - The primary skill demand is expected to be for highly skilled workers including engineers and scientists that can support innovation and research activities.

Electric vehicles - Job preservation of existing automotive services and growth in need for skills ranging from infrastructure installation, servicing and other high skilled jobs. This sub-sector could feasibly capitalise on existing expertise from automotive manufacturing workers in localities where current automotive operations are downsizing.

Energy Efficient products - Employment in key supply chain operations including in R&D, manufacturing and services is largely satisfied by the regional workforce in the operations' key localities. These increasingly require highly skilled software engineering expertise.

Green stimulus - Involves 'retrofit' of millions of homes over the next two decades, consisting of multiple, integrated building fabric measures, new heating systems such as heat pumps and controls, and the widespread adoption of rooftop solar.

Professional services/ financial services and consultancy - Skill and training requirements are broadly influenced by wider sustainability agenda and infrastructure projects. There is also a need for people with engineering and customer service skills for the retrofit market, including being able to work with vulnerable customers.

Natural Capital - Urban tree management and jobs in forestry/woodland management and environmental management.

There is a need to promote training and qualifications in these areas throughout the WMCA area and the UK, otherwise there will be an under-capacity of people especially in the short to medium term. For example, a recent Government research project into the heat pump manufacturing supply chain indicated that generally heat pump manufacturers are not concerned with training the UK workforce as other industries (boiler, HVAC, and chiller manufacturers) have transferable skills, but there is a potential shortfall in F-gas certified installation engineers that could have an impact on the type of heat pump deployed and the rate of deployment. There are currently around 50,000 qualified engineers in the UK and according to a one heat pump manufacturer a rapid growth in heat pump installations could cause a potential shortfall in F-gas certified installation engineers in the UK.

A transition to net zero will also reduce demand for certain high-carbon services and technologies, such as fossil fuel extraction, processing and distribution, aviation, fossil fuel machinery and vehicles, and livestock and dairy. This could see jobs in some key sectors significantly affected, although there will also be new employment opportunities in each area.

The government's recently established Green Jobs Taskforce will be at the heart of the transition to net zero. The taskforce form part of the government's 10 Point Plan to drive a green industrial revolution and it will set the direction for the job market as the desired transition to a high-skill, low carbon economy. Its key aim is to focus on the immediate and longer-term challenges of delivering skilled workers for the UK's transition to net zero. The taskforce has already highlighted some of the key roles required to deliver net zero. These include gigafactory production operators, heat pump installers and arboriculturalists which have already been identified in this review.

Table 9 presents qualitative assessment of the expected impacts in four broad industry sectors that have been identified in this literature review. These sectors are considered which are vital to the WMCA economy and the net zero transition.

Table 9 **– Broad sector jobs and skills qualitative impact**

Name	Investment Costs to 2026
Transport	⅄ Transition to electric or hydrogen vehicles will create jobs in automotive manufacturing and the transition in the WM will have to be handled smoothly, given the significant size of the industry in the sub-region. ⅄ Many of the existing jobs will have skills or aptitudes that are transferrable. ⅄ Driving and process line jobs are likely to reduce and will need new skills. ⅄ Development, deployment and maintenance of EV charging infrastructure and the electrical and engineering ⅄ R&D related to electrification and hydrogen technologies will also potentially create new jobs across the WM HE and FE sectors in collaboration with national and international research agencies ⅄ An overall modal shift towards public transport and low carbon non-car transport services and vehicles, is also important, generating a need not only for technical engineering and transport planning skills, but also services around transport management and coordination, forecasting and finance/PPP/revenue management
Built Environment	⅄ Commercial and housing retrofit will provide a huge stimulus for new employment creation and skills upgrade ⅄ The skills requirement for professional trades, particularly electrical and shifting to factory construction will be significant ⅄ The national push for investment in major infrastructure will make considerable demands on the civil engineering sector ⅄ Need for people with engineering and customer service skills for the retrofit market, which includes being able to work with vulnerable customers
Energy	⅄ New jobs arising will cover the likes of energy efficiency retrofit, heat pump installation and retrofit, renewable energy design and installation, hydrogen specialists, energy systems balancing specialists and materials specialists ⅄ Technical skills needed for carbon capture and storage may be similar to existing industry skills in sectors such as power generation, chemicals or oil and gas
Heavy industry	⅄ Decarbonisation of the UK's important traditional heavy industrial base will be underpinned by decarbonising the power sector and introduction of new technologies ⅄ New types of manufactured product, such as those taking plastic electronics and silicon electronics approaches ⅄ Redesign of existing products with a focus on resource efficiency and a cradle to cradle approach, in which materials are continually recycled, will require more engineers to create these systems ⅄ Minor reskilling for different treatment and processing of waste to energy ⅄ A low-CO_2 industrial transition can offer similar employment levels to today as circular economy solutions in manufacturing are typically more labour-intensive, so implementing them would create additional jobs in the overall value chains ⅄ Awareness and understanding of sustainable development issues and specialists such as energy managers for larger businesses. ⅄ IT specialists to design and operate systems applicable to logistics, smart operating systems, and environmental control

6.2.1 | Jobs and skills policy in WMCA

The West Midlands Regional Skills Plan (RSP) builds on the key targets in the West Midlands Combined Authority Strategic Economic Plan (June 2016) and West Midlands Local Industrial Strategy (September 2018) that by 2030 the region's productivity, salaries, skills attainment and labour market participation match or exceed the national average. The strategy outlines the plan to achieve this through inclusive growth, ensuring that everyone can gain the skills and support they need to access new opportunities and benefit from a stronger regional economy.

The WMCA's Productivity and Skills Commission was set-up to tackle issues around unemployment, job skills, productivity, and meeting business needs. It focused on the low carbon and advanced manufacturing sectors. Opportunities identified in the West Midlands Local Industrial Strategy, WMCA Strategic Economic Plan SEP and RSP include:

- Targeting people out of work and whose skills do not match labour market demand.
- Engaging with businesses to develop employer-led sector skills strategies to support greater innovation in seven transformational and three enabling sectors including low carbon.
- Use of the devolved 19+ adult education budget.
- Developing further initiatives such as the Black Country Skills Factory.
- Identification of Skills Investment Zones for targeted activity to raise skills and work with unemployed people and those whose skills don't match demand.

The importance of improving skills to match future labour market demand is demonstrated throughout the WMCA's, Local Enterprise Partnerships' (LEPs') and local authorities' skills and economic strategies. The low carbon energy technology clusters are considered a strength in the region and will be at the heart of skills development in the next 20 years. Advanced manufacturing, building technologies, digital and business and professional services are considered to be transformative sectors where there is a desire to increase the number of skilled people and the level of their skills.

The Sustainability West Midlands Local Carbon Evidence Base report highlights the need for opportunities for young people to develop the skills they need so that the low carbon sector can expand in the future. This is particularly relevant in the construction sector which, although strong in the West Midlands, lacks the skills to adequately innovate. Investment should be made in institutions to ensure these skills can be cultivated.

The actions outlined in the RSP will be an important aspect of the transition that will occur in the next two decades as result of net zero however ensuring coordination with local colleges, universities, employers, LEPs and local authorities will be vital to ensure nobody is left behind. Further details from the local jobs and skills policy review are included in the **Appendix G-2.**

6.3 | WMCA jobs and skills baseline

A core economic strength in the West Midlands Combined Authority area is advanced manufacturing and engineering, but a number of growing sectors including creative, digital and life sciences are playing an increasingly significant role in the region's success. For the purposes of this FYP and the jobs and skills analysis we have focused on four key sectors, aligning broadly with the goal modelling:

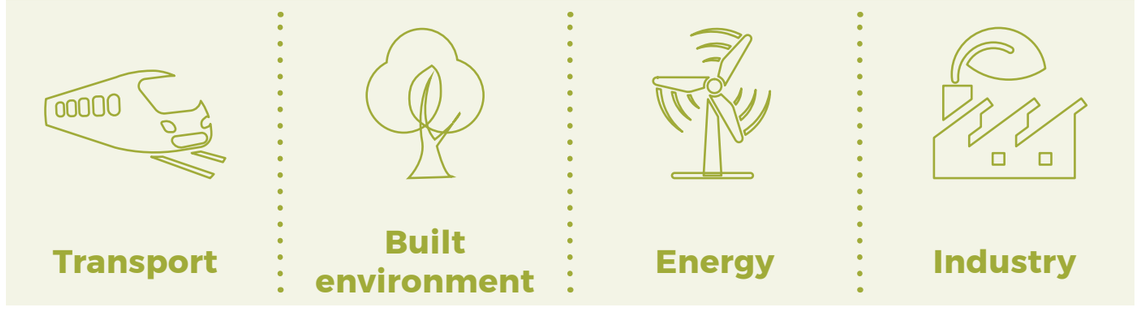


Table 10 to Table 13 provide a more detailed breakdown of employment in each of these sectors for WMCA and the seven local authorities in the region. Further employment and skills data and analysis are available in the **Appendix G-3.**

Table 10 – **Employment in Transport sector in WMCA**

SECTOR	NUMBER OF JOBS
Sale of motor vehicles	21,050
Maintenance motor vehicle repair	10,000
Rail	4,000
Freight - road	13,000
Air transport	3,780
Manufacturing of vehicles	29,350
Warehousing and storage	25,000
Other	10,140
Total	**116,320**

The manufacturing of vehicles is the largest employer in West Midlands Combined Authority area in transport related roles. Automotive manufacturing is vitally important in terms of employment in the Birmingham, Coventry and Solihull economies. Other key employment sectors include logistics and storage and the sales of vehicles, which employ 25,000 and 21,000 people respectively.

Table 11 – Employment in built environment sector in WMCA

SECTOR	NUMBER OF JOBS
Residential and non-residential buildings	15,000
Roads and railways	3,500
Utility projects	40
Other civil engineering projects	2,250
Demolition and site preparation	800
Electrical, plumbing and other installation activities	16,000
Building completion	12,000
Real estate activities	24,400
Total	**73,990**

Over 24,000 people are employed in real estate related activities in WMCA area in the built environment and construction related roles. The next largest area is electrical, plumbing and other construction related roles which employs 16,000 people. Other key employment areas in this sector include construction of buildings and other building finishing activities.

Table 12 – Employment in energy sector in WMCA

SECTOR	NUMBER OF JOBS
Mining and quarrying	295
Electric power generation, trans. and dist.	4,000
Manufacture of gas; distribution of gas	1,500
Steam and air conditioning supply	-
Water collection, treatment and supply	3,500
Sewerage and waste collection	7,300
Total	**16,595**

Approximately 5,500 people are employed in the generation and distribution of electricity and gas in the West Midlands Combined Authority area. During the transition it is expected that these will become key employers in future. Waste and sewage collection roles are important in this sector now and will become increasingly important as we change the way we handle waste.

Table 13 – Employment in industry sector in WMCA

SECTOR	NUMBER OF JOBS
Food and beverage	56,510
Textiles	28,175
Wood	5,800
Refined petroleum products	200
Basic chemicals	1,850
Plastics products	7,000
Building materials	1,310
Metal	38,800
Electronic products	2,440
Machinery	13,850
Furniture	7,000
Other manufacturing	7,140
Total	**170,075**

The top three manufacturing sectors in the West Midlands Combined Authority area in terms of employment are food and beverage, metal and textiles which collectively employ over 123,000 people in the region. Industry accounts for 21% of emissions, with manufacturing representing 11% of this total. As government, investors and consumers push manufacturers to place more importance on what they can do to achieve the net zero targets there will be a need to ensure that jobs in industries are protected or adapted.

Some of the sectors above will be part of the Low Carbon Environmental Goods & Services (LCEGS) sector. Currently estimates of employment in this sector are only available at a national level through ONS. Sustainability West Midlands have recently been commissioned by the Midlands Energy Hub to complete understand the current state of the LCEGS sector in the Midlands and where support is needed to help grow the sector. The outputs which will include information at local authority and LEP level, along with a Midlands wide report should be considered alongside this FYP.

This section shows the importance of these broad sectors in terms of local employment and the local economy with over 350,000 people employed in these sectors. Net zero provides new opportunities for businesses in these sectors to thrive but will require new skills in their workforces. Currently there is a mismatch between demand and skills needs in the green economy. Businesses don't know they have a skill need and are unaware of the opportunities arising from increased workforce capability. The government's appointed climate action champion, Nigel Topping, has said both the private sector and local governments will need to come up with pathways to achieve to net zero by 2050. These pathways must also be created through local skills policy and training in the West Midlands to support businesses in these sectors throughout the transition to net zero to ensure that the goals outlined in this FYP can be achieved.

Goals – Job impacts

6.4.1 | Job created

Analysis has been undertaken regarding the expected job impacts of the goals outlined in Section 4. A qualitative assessment of the impacts around net zero has been outlined in Table 14 below.

Table 14 **– Goals and high-level jobs impacts**

Sector	Goals	Jobs created	Jobs lost	Net Effect
Domestic	Energy efficiency	Retrofit coordinators, installers and designers		Increase
	Fuel switching	Heat pump installers	Gas boiler maintenance repairs	Increase
	Micro-generation	Solar PV installers		Increase
Commercial	Energy efficiency	Retrofit coordinators, installers and designers		Increase
	Fuel switching	Heat pump installers	Gas boiler maintenance repairs and gas transmission	Increase
	Micro-generation	Solar PV installers		Increase
Industrial	Energy efficiency and fuel switching	Retrofit coordinators, installers and designers, heat pump installers		Increase
	Micro-generation	Solar PV installers		Increase
Transport	Demand reduction (WFH)	Digital skills, jobs in more rural areas in local workspace hubs, goods deliveries	Reduced demand for city services such as food and beverage stores, vehicle manufacturers	NIL
	Fuel switching (HGVs)	Hydrogen, electric vehicle manufactures	Petrol and diesel engine manufacturers	Increase
	Fuel switching (buses, taxis)	Petrol and diesel engine manufacturers	Petrol and diesel engine manufacturers	Increase
	Demand reduction (trips)	Increase in LGV services and driver from more deliveries	Vehicle manufacturers	Minimal Increase
	Mode shift	Increased public transport operators & and wider mobility services and products	Vehicle manufacturers	Increase
	EV uptake	EV vehicle manufacturing	Petrol and diesel vehicle manufacturing	Increase
Land Use	Renewables	Solar and wind infrastructure installers and maintenance		Increase
	Natural capital	Tree planters, ecologists		Increase

WSP undertook an analysis to forecast the future number of jobs created by the kind of changes indicated by the modelling for 2026 and 2041 based on the Accelerated scenario. The method adopted is based on research and additionality guidance set out in HCA's Additionality Guide and considers direct and indirect jobs created in the supply chain and local economy. Research has been paired with the inputs and outputs from the carbon modelling for most of the goals to estimate expected jobs created for FYP period and until 2041. Where goals are not expected to have noticeable impact on jobs these have not been modelled.

The Working from Home Transport Demand goal has not been modelled in the jobs analysis as the net effect is uncertain and may even be nil. Increased home working could create employment opportunities to in the IT sector to ensure network can handle the increase demand at local joint working hubs and from home. The reduced demand for travel into towns and cities would have an impact on employment in the food and beverage industry as well as public transport.

While supporting evidence is limited, this aimed to identify and quantify the number of workers required to either manufacture, install and operate and maintain for each goal and in associated supply chains. This included new low carbon technologies, natural capital and transport mode shift to more active and public transport modes. Combining the research and analysis in the carbon modelling with employments enabled an estimation of the number of new jobs required for each goal by 2026 and 2041. A more detailed explanation of the methodology and assumptions is presented in the **Appendix G-4.**

Table 15 – Goals and high-level net jobs impacts

Sector	Goals	Jobs created	Jobs lost
Domestic	Energy efficiency	5,500	18,800
	Fuel switching	6,900	23,500
	Micro-generation	1,800	7,900
Commercial	Energy efficiency	500	2,200
	Fuel switching	500	2,200
	Micro-generation	100	600
Industrial	Energy efficiency and fuel switching	10	200
	Micro-generation	10	100
Transport	Fuel switching (HGVs)	0	400
	Fuel switching (buses, taxis)	500	800
	Demand reduction (trips)	40	120
	Mode shift	1,500	1,500
	EV uptake	3,400	32,800
Land Use	Renewables	40	600
	Natural capital	200	700
Approximate total jobs (net)		**21,000**	**92,420**

In total the proposed goals could create around 21,000 jobs in the WMCA economy by 2026 and just over 90,000 jobs by 2041. These results are broadly similar to jobs impacts analysis undertaken by Ecuity (on behalf of the Local Government Association) which estimated that over 72,000 direct jobs could be created in low carbon technology sectors in the West Midlands. If the WMCA does not develop a pool of workers, however, with the skills needed for the goals such as retrofit these jobs will not be created to this scale or timeframe.

The education and training institutions currently provide a strong starting point in terms of development especially in high skilled jobs. There is, however, need for local colleges and other training providers to provide specific training programmes for these goals. Training in heat pump fitting, solar PV and retrofit is available nationally through training providers such as NICEIC and Retrofit Academy. These same courses are currently not available through local colleges and local training providers in the West Midlands at the scale required to achieve the goals. Section 6.5 discusses this in more detail.

6.4.2 | Protecting jobs

The size of the overall job turnover created by net zero is likely to be relatively small compared to overall labour market movements. OECD analysis suggests that it is unlikely the transition towards greener growth will result in large job skill demand changes outside those experienced during mass motorisation and the digital revolution.

The WMCA labour market must have sufficient flexibility of labour across sectors to smooth employment effects. This means that labour markets need to allow workers to change jobs, location and shift across sectors without long periods of unemployment. This is crucial to reducing the overall costs of the transition to net zero. The net job gains from net zero will depend on how the UK economy is affected by the policy. If overall economic activity is reduced, this puts a negative pressure on employment in all sectors.

The Grantham Institute have estimated the overall proportion of employees in each sector in the UK that will be affected by the greening of employment based on current understanding of how sectors will change. Around a fifth of current jobs (21%) in the UK have skills for which demand could grow in the green economy or could require reskilling – affecting more than 6 million people. Approximately 10% of workers have skills that could be in more demand, while 10% are more likely to need reskilling. Crucially this does not mean these jobs will be lost but does point to the need for a comprehensive UK policy and labour market responses to manage the transition. The West Midlands Combined Authority, through its Skills Advisory Board, will set the commissioning direction for the adult education budget. This is discussed further in Section 6.5.1.

The sectoral impacts are highly varied and show that manufacturing, construction and transport have a high proportion of jobs affected by the transition relative to retail, information, finance and healthcare, as would be expected. Alongside the East Midlands and Yorkshire and the Humber, the West Midlands region is considered to have the highest proportions of jobs that could be exposed to the transition. If the same exposure rates that have been calculated by the Grantham Institute in the for the West Midlands region are applied to the WMCA this suggests that:

c.140,000 jobs need to reskill as result of transition	**11.1%**
c.143,500 jobs are aligned to net zero transition	**11.5%**
c.283,500 total jobs impacted by transition (22.5%)	**22.5%**

The employment sector breakdown presented in Section 5.3 showed the sectors where employment in the West Midlands Combined Authority area is concentrated. Over the next 5 years it is important that jobs and skills policy is also focused on those sectors that identified as likely to be affected most, both positively and negatively by the transition to net zero. These include:

Table 16 **– Industries and jobs impacted**

SECTOR	Approx. No. of Jobs Affected in the West Midlands area
Food and beverage processing and manufacturing	57,000
Textiles	28,000
Metal	39,000
Maintenance and repair of motor vehicles	10,000
Rail	4,000
Manufacturing of vehicles	29,000
Warehousing and storage	25,000
Construction and building finishing	27,000
Electrical, plumbing and other construction installation	26,000
Electric power generation, transmission and distribution	4,000
Water collection, treatment and supply	4,000
Sewerage and waste collection	7,000
Approximate Total	**260,000**

Particular skills gaps have been identified by the Climate Change Committee such as heat pump and energy efficiency installation; further gaps should be identified and action to address these prioritised. Further Education (FE) providers will be crucial in ensuring young people are captured and trained to meet the needs of the evolving labour market. More than ever it will be important for FE providers to clearly show students 'routes for progression', that is, how their training and learning can have a meaningful impact on their employment options and progression prospects.

The other priorities are rapidly to scale up supply chains for heat pumps and to develop the option of hydrogen for heat. Proper enforcement of standards, including avoiding overheating risks, and an effective approach to skills are essential.

Whilst there is some interaction between the supply side (FE/HE/training providers) and demand side (private-sector businesses) there is a need for greater coordination to develop and map career pathways in the net zero economy. It is likely that workers will have transferrable skills who have undertaken apprenticeship or other non-degree qualifications. WMCA and Colleges West Midlands should continue to develop collaborative working with businesses to develop the courses and skills that businesses require.

6.5 | Supply-side

The West Midlands will draw on the expertise of its colleges, universities, Catapult centres and research strengths, to deliver net zero. These stakeholders are central to improving the skills base in the region and there will need to be a strong focus on developing skills alongside improving infrastructure during the transition period. A review of the current and future situation with regards to jobs and skills development in the West Midlands Combined Authority area was undertaken. A summary of this review is presented here. Further analysis is available in the **Appendix G-5.**

6.5.1 | WMCA key levers and stakeholders

Through devolution, the West Midlands Combined Authority holds a circa £130m annual Adult Education Budget through which it funds basic adult (19+) skills provision and higher-level skills provision aligned to priorities set out in the West Midlands Combined Authority Regional Skills Plan (RSP). This will rise to £140m in next financial year.

As set out in the RSP, the West Midlands Combined Authority also aims to accelerate the uptake of good quality apprenticeships in the region through its West Midlands Apprenticeships Levy Fund. The aim is to maximise apprenticeship levy investment for the West Midlands through a regional campaign targeting employers, young people, employees and stakeholders to consider apprenticeships. The WMCA is also unlocking £40m in Apprenticeship Levy funding to support apprenticeships for Small and Medium Enterprises (SMEs), targeting science, technology, engineering and mathematics (STEM) skills in priority sectors and supply chains.

To oversee the RSP, the WMCA brings together major stakeholders from across the public and private sectors as the Skills Advisory Board. This Board also acts as the region's Skills Advisory Panel (SAP). SAPs are local partnerships that work to identify and address local skills priorities. They aim to strengthen the link between employers and skills providers – including colleges, independent training providers and universities.

Reporting to the Board, the WMCA hosts a number of employer-led taskforces in RSP priority sectors, to develop and steer the delivery of additional skills provision for upskilling and reskilling adults. The WMCA has gained over £10m in National Retraining Fund and National Skills Fund grants to this end.

More recently, in response to the impact of COVID-19, the WMCA has established a Jobs and Skills Delivery Board. Bringing together local partners from a range of sectors, this Board will plan the region's recovery actions with regards to jobs and skills, including developing skills provision for emerging green jobs. In 2020 the government announced £375 million for the National Skills Fund in England. This includes funding for a new Level 3 adult offer and to expand skills bootcamps. The skills bootcamps idea is based on the pilot 'Beats the Bots' digital bootcamps run by the WMCA in 2019. The WMCA has received an additional £9m to support the roll out of the Governments National Lifetime Entitlement (as part of the National Skills Fund). This is to increase the delivery of economically valuable Level 3 qualifications to adults aged over 24. This provides an opportunity to fund a boost in training that will support the skills needed for green jobs although many of the current qualifications do not include the new skills needed yet.

These programmes will tackle high unemployment in specific areas by supporting those out of work and on low incomes in targeted communities. Net zero and advanced manufacturing will be hugely important aspect of this. There will be c. £130m of investment in future training and skills provision through the devolved Adult Education Budget and there will be further funding opportunities through the National Skills Fund.

Through the stakeholder engagement and literature review, WSP has identified there is a lack of coordination between the supply-side and demand-side in regard to net zero. Ensuring that training provision is tailored to jobs demand from local employers is vital for an inclusive net zero economy and to achieve the outcomes outlined in 15 goals in this FYP. The Skills Advisory Board need to create stronger connections between local education providers and the private sector to match skills provision with future employment opportunities.

6.5.2 | Colleges

Further education is vital in supporting skills development across the region and providing an infrastructure which offers technical and vocational education from Levels 1 to 5. Colleges West Midlands is a formal strategic partnership of 20 colleges, including all colleges within the WMCA. They drive collaboration across sectors and specialisms to create a network of clusters driving innovation and skills and higher education providers that are driving multidisciplinary skills development to modernise industrial practice. This needs to be replicated for the net zero economy. Current courses, apprenticeships and qualifications at colleges in the WMCA cover a number of key areas related to net zero:

- Construction (Levels 1 – 3, brick laying, carpentry)
- Plumbing and gas (Level 2 and 3 Diploma in Plumbing and Domestic heating)
- Electrical (Level 2 and 3 Diploma in Electrical Installation)
- Manufacture engineering
- Mechanical engineering
- Vehicles maintenance and repair

These courses will need to be adapted for emerging roles in the net zero economy. For example, vehicle maintenance and repair courses will need to focus on electric vehicles (EVs). Currently Solihull College and South & City College Birmingham offer specific course for EV maintenance. Expanding the roll-out of electric vehicle maintenance and repair qualifications to other colleges to ensure accelerated EV uptake (Goal 13) can be delivered.

A recent training competition was run by the Department for Business, Energy & Industrial Strategy where grant funding was awarded to a range of suppliers appointed to deliver accredited training at scale to the low carbon installation sector in support of the delivery of the Green Home Voucher Scheme. As a result of this, Dudley College will now provide training support to those who will be retrofitting housing stock across the Midlands through short and intensive courses including:

NICEIC Heat Pumps and Solar Thermal (NOS aligned)

NICEIC Solar Thermal (NOS aligned)

City and Guilds F-Gas

NICEIC Basic Energy Efficiency for Smart Meter Operative

NICEIC Package for Heating and Water Controls

City and Guilds 239 Inspection and Test

The Retrofit Academy will also deliver the Open College Network West Midlands Level 5 Diploma in Retrofit Coordination and Risk Management with the region. Other colleges will also need to expand the roll-out of heat pump installation and maintenance training programmes to ensure that the residential and commercial retrofit goals outlined in this FYP can be achieved. In the future there may also be substantial needs in hydrogen ready boilers and generation.

Our stakeholder engagement shows that local authorities and colleges, (and employers) are still unclear about what is specifically needed in terms of jobs and skills. Local authorities and colleges need this from employers in order to develop suitable skills provision. If this information can be distilled, Local authorities and colleges partnerships will be able to mobilise fairly quickly using existing channels and mechanisms. Ensuring that training provision is tailored to jobs demand from local employers is vital for an inclusive net zero economy. Stronger connections between local education providers and the private sector are key to matching skills provision and local employment opportunities.

Demand-side stakeholder engagement

As part of the stakeholder engagement, there were one-to-one meetings with significant employers in the area such as JLR and Cemex. The jobs and skills impact of net zero was an important part of these discussions. An online survey was also distributed through a number of organisations. The main findings from the engagement exercises was as follows:

- Low carbon jobs and skills are still in infancy – there is not the demand at present for the jobs from the private sector.
- There are concerns around skills gaps and the need for upskilling, such as with regards to retrofitting and zero carbon homes.
- Belief that heavy industry will be the sector most negatively affected by the transition.
- Need for greater engagement with colleges and universities to ensure demand for skills is met in industry.
- General view that more skills are needed when it comes to developing and implementing renewable technologies / low carbon products. Companies are keen to invest in hydrogen and other skillsets.
- Automotive industry facing skills challenges in terms of autonomous driving and connected cars. More confident that jobs can transition for electric vehicles manufacturing.

More detail on the stakeholder engagement undertaken as part of this project can be found in **Appendix A.**

Two Institutes of Technology (IoT) have been developed to deliver higher technical education in the West Midlands. Dudley IoT has been redeveloped to provide a teaching and research environment for higher level skills programmes in sectors where there are skills shortages and therefore employment opportunities including in advanced manufacturing, modern construction methodologies and medical engineering. The Greater Birmingham and Solihull IoT focuses on advanced manufacturing and industry through greater collaboration of further and higher education and creating pathways from Level 3 to Level 6 apprenticeships. Both IoTs form a key part of creating a world class technical education system in the West Midlands.

Workers are needed to deliver major infrastructure projects such as HS2 that will support net zero. The National College for Advanced Transport & Infrastructure in

Birmingham provides training that will give learners skills and lead to careers in areas such as civil engineering, systems engineering and digital design. It is vital that courses and qualifications have a focus on infrastructure for sustainable and active transport whilst also educating people about new materials projects will be using in the future.

Colleges already have focus on areas in the priority sectors – digital, construction and advanced manufacturing. The Newcastle College Energy Academy is a recent example of a college implementing a strategy for improving the skills base for low carbon technology.

In 2018, Newcastle College's Energy Academy launched a new strategy to deliver highly vocational, employer-led STEM education and training for the energy sector. In recent years, the academy had lost its connections with local industry, but since opening, more than 1,200 students have been trained, with many now working within the energy sector. The initial success of the college was brought about by strong ties with industry; this has not been maintained. WMCA has demonstrated it has the ability to deliver responsive training through its providers however this needs to be paired with employer demand for these skills. As highlighted in engagement with employers as part of the development of the FYP, they are currently not able to indicate their need for certain jobs roles and skills in the net zero economy.

Investing in R&D for education institutions across the country is essential in tackling both regional and racial inequality and ensuring an adequate provision of skills in industrial clusters. However, to ensure best and appropriate training to deliver the 15 net zero goals in the FYP, the WMCA must build even stronger connections between education providers and employers so that demand-led training programmes can be developed.

6.5.3 | Universities

The region's research strengths across its universities are well established. The current sub-regional set-up is able to support provision of new skills and aptitudes for net zero. The West Midlands' mix of universities, anchor companies, research and development facilities, knowledge networks and skilled workforce provides the foundations to support the transition to net zero. The universities in the West Midlands Combined Authority area include Aston University Birmingham; University of Birmingham; Birmingham City University; University College Birmingham; Coventry University; Newman University Birmingham; University of Warwick; and University of Wolverhampton.

The West Midlands Combined Universities group brings together around 100,000 staff and students, offering research, innovation, skills development and technological opportunities. The three universities that make up the group (Birmingham City University, Coventry University and the University of Wolverhampton) have a strong history of connecting organisations with students for jobs and work placements, as well as training and development opportunities for existing workers.

Aligning with the low carbon and net zero future, the combined universities are developing a centre of excellence to support areas of need including sustainable construction methods and materials, low emission transport and fuels, and renewable energy generation. This will address the huge opportunities for employment and economic growth identified in the low carbon sector through continued investment in enterprise, research and development (R&D), and knowledge transfer.

In addition to the research centres, universities offer undergraduate and postgraduate degrees that will support development of net zero skills base and strong talent pool in region. These degrees will be at the forefront of developing a skills base for newly created roles en-route to the net zero economy.

6.5.4 | Skills hubs and programmes

Throughout the West Midlands Combined Authority area, there are a number of programmes in place to provide training and support for local businesses, especially for SMEs.

Across all of these programmes there is common aim to supply individuals with the appropriate skills and aspirations to meet current and future needs of a highly technical industry. Whilst these will address shortages of specific skillsets which support the region's strategic opportunities, there is need to improve skills that will directly support the transition to net zero. Some of the training offered in these programmes will support the transition to net zero however more will need to be done. More specific sustainability and lower skilled training programmes, especially those with lower skills levels, will be needed in these transformational sectors:

- **Advanced manufacturing** – working with more automation and new materials
- **Transport technologies** – EV maintenance and repair
- **Construction** – heat pump fitting and repair
- **Environmental technologies** - renewable energy, such Solar, Hydrogen and Fuels Cells
- **Business services** – improving sustainability in services and products

This will enable the region to take advantage of current growth opportunities in the transformational sectors and "future-proof" the skills base of a workforce.

Chapter Summary

The goals and overall transition to a low carbon economy will create jobs in green sectors, while jobs will be lost in their 'brown' counterparts.

Stakeholder engagement with employers indicates many are currently not able to specify their need for particular skills in the net zero economy; this disconnect needs to be addressed.

Create industry transition pathways in partnership with local businesses to support industries during the transitionary period

c.140,000 jobs need to reskill as result of transition' support is needed to ensure employees are able to transition to the evolving needs of these industries.

It is recommended a net zero skills forum for education providers and businesses to identify trends and work collaboratively to highlight skills gaps and prioritise future training provision

The goals have the potential of creating over 20,000 jobs by 2026 and 90,000 jobs by 2041.

A core economic strength of the WMCA is in advanced manufacturing and engineering, but growing sectors including creative, digital and life sciences.

The transport sector currently supports over 116,000 jobs, the built environment almost 74,000, the energy sector 16,000 and industry 170,000.

DELIVERY AND FINANCE

7 | Introduction

To achieve the goals and level of delivery outlined in the 'Accelerated' scenario will require qualitative and quantitative change in the resources deployed in these areas currently. The rate of increase in uptake required is large in most cases, and in some is at the edge of what is realistic, so the region will need to be bold to achieve its 2041 target. The first FYP is at a disadvantage, because in certain areas the region is at a standing-start, and delivery will need to ramp-up the supply chain, finance, delivery management and uptake. The later FYPs should benefit from a strong structure and pipeline. All of the delivery plan summaries are aligned to the 'Accelerated' scenario.

7.1 | WMCA's role

In terms of the role the WMCA is able to play in meeting the GHG reduction commitments, there are three main areas for focusing efforts:

Deliver

Delivery of the goals would vary from the WMCA taking a complete leadership and delivery role, for example through TfWM, or as a partnership with other stakeholders such as local authorities and business, or as a facilitator with others taking leadership, but the WMCA providing assistance and support.

Enable

Where the WMCA cannot directly reduce GHG emissions, working with others to put in place the necessary infrastructure, policy, controls and wider support for others.

Influence

Where there is no direct method of reducing GHG emissions. Indirectly influencing the behaviour and actions of others.

Fundamentally, the WMCA will need to shift away from traditional spending in order to meet the challenge. New funding will need to be secured and WMCA will have to work collaboratively to secure funding for the region and consider how it can support others to enable change.

7.2 | The delivery plan

The delivery route to 2026 is outlined in the following tables.

In each area, there is an indication where the balance lies between the WMCA delivering, working in partnership with others, or requiring national government to change policy or devolve powers or resources/funding.

Delivery requires significant acceleration across all sectors by all stakeholders if the 2041 target is to be achieved. In some cases, the only realistic route to delivering the goals will be through national government commitment or devolution. Other stakeholders have a key part to play including:

Local authorities have a similarly key role to play alongside the WMCA. The WMCA will need to seek joint approaches to deliver at scale where appropriate to set the conditions for net zero delivery.

Delivery is dependent on adequate **funding and resourcing;** these may come from a variety of avenues and sources.

Businesses and Industries will need to lead the way and work with the WMCA and each other to ensure create mechanisms for change which do not put them at a competitive disadvantage.

Universities and colleges will need to work with employers to ensure there is **no skills gap.**

People will need to make significant changes to their **lifestyles** which will positively impact on their **health and well-being.**

Private and voluntary sector are needed to **collaborate and deliver projects**

Communities have to work to meet the challenge and ensure a **just and equitable transition.**

Domestic — Retrofit energy efficiency measures, install rooftop solar and heat pumps (or other fossil-fuel free heating) to homes i.e. Goals 1, 2 & 3.

Investment and funding

The required investment is estimated at a gross £3.5bn over the FYP, to achieve the required level of deployment. The sources of this will be varied, including the public and housing associations, but a lot of the finance will have to come through either existing, private or new taxpayer funded streams. Some of this money will be deployed as part of the normal replacement cycle and investment in the private homes sector, but current rates of deployment indicate this will be small in the first FYP.

Relevant sources of finance include:

- Private homeowner / landlord investment
- Private Sector - Fit-for-Free solar models and revolving finance
- Green Homes Grant
- ECO funding
- Local Authority Delivery funding
- Social Housing (to meet 2030 target)
- Government funding on heat pump deployment in line with 10 Point Plan - TBC

Local authorities

Work with Energy Capital and other stakeholders to ensure plans are co-ordinated and benefits of aggregation are realised. Develop policies at local level around planning and own homes, receive any devolved funding, work with installers and householders, lobby for funding. Retrofit own housing stock and adopt Zero Carbon Homes Charter for new build.

UN Sustainable Development Goals

Job creation

Professional associations, engineering companies and training providers to maximise opportunities for local jobs and skills around solar, retrofit and heat pump installation. ***Around 14,000 jobs created by 2026.***

Devolution asks

Funding to be decentralised and increased in line with national government commitments.

Governance

Energy Capital to develop the Fuel Poverty and Regional Retrofit Programme structures to develop business case and investment plans to deliver directly where appropriate or persuade and incentivise where ownership is private.

Stakeholders

The main stakeholders are expected to be:

- Housing Associations
- Local Authority Housing
- Homeowners and private landlords
- Supply Chain – Installers, manufacturers and assessors
- National Government – BEIS, Treasury
- Midlands Energy Hub

WMCA role

Influencing - Promotion of the campaign and the opportunities, particularly in the private sector.

Enabling - Provision of cross-disciplinary co-ordination, team with stakeholders. Managing the financial streams from national government and other incentives.

Delivery - Developing clear single programme for domestic sector and managing and administrating. Possibly managing procurement and frameworks for deployment.

Dependencies

The goals are dependent on:

- Housing associations – Upgrades for C rating by 2030
- Local authorities local plans and investment
- Homeowners and private landlords decisions
- Supply Chain – Energy Efficiency and heat pumps
- National Government Policy – om efficiency and Building Regs.
- Underlying energy infrastructure for additional/changed demand.

Resources

This will vary substantially depending on the level of involvement. Marketing and promotion would require additional funding and may be attracted from funding bodies identified.

Next steps

This will be confirmed by WMCA in the next steps. Establishing the Fuel Poverty and Regional Retrofit Centre of Excellence and developing investable propositions to stimulate the market and scale-up efforts to tackle fuel poverty. Delivery of the measures will be undertaken by private contractors, with oversight and co-ordination from Energy Capital, housing associations and local authorities.

Commercial — Retrofit energy efficiency measures, install rooftop solar and heat pumps (or other fossil-fuel free heating) to non-domestic buildings i.e. Goals 4, 5 & 6

Investment and funding

The required investment is estimated at a gross £1.6bn in total, to achieve the required level of deployment, and over £100m per annum in the FYP. The sources of this will be varied, mainly the private sector, but there may also be taxpayer funding for upgrades. Some of this money will be deployed as part of the normal replacement cycle and investment, but current rates of deployment indicate this will be small in the first FYP.

Most of the investment will be driven by private sector decision making. In addition, there are policy drivers that will drive investment in the energy efficiency area:

Minimum Energy Efficiency Standards (MEES) for commercial sector requires an EPC rating of E or better by 2023 and the UK government is consulting on a requirement for a B rating by 2030.

Relevant sources of finance include:

- Private sector investment
- Fit for free solar investors
- BEIS funding for SME energy efficiency
- BEIS funding for heat networks in dense clusters

Local authorities

Work with Energy Capital and other stakeholders to ensure plans are co-ordinated and benefits of aggregation are realised. Promotion to local businesses.

UN Sustainable Development Goals

Job creation

Professional associations, engineering companies and training providers to maximise opportunities for local jobs and skills around solar, retrofit and heat electrification. ***About 1,000 jobs by 2026.***

Devolution asks

BEIS funding to be decentralised.

Governance

Energy Capital to convene sub-group of the wider Fuel Poverty and Regional Retrofit programme to develop strategy to support, persuade and incentivise business organisations and representatives.

Dependencies

The goals are dependent on:

- Delivery in commercial sector is largely dependent on private organisation decision making.
- Delivery will be driven somewhat by national government legislation or devolution around minimum energy efficiency standards (MEES)
- Underlying system management – Large scale heat-pump and solar deployment will require an underlying electrical system that can manage

Stakeholders

The main stakeholders are expected to be:

- Commercial Forums – Better Building Partnership, FSB
- LEPs
- Energy Capital
- BEIS
- WPD

Resources

Resource requirements will vary substantially but will depend on the level of direct involvement. This will be confirmed by WMCA in the next steps

WMCA role

Influencing - Promotion of the campaign and the opportunities to business organisations.

Enabling - Cross-disciplinary co-ordination, team with stakeholders. Managing the financial streams from national government and other incentives,

Delivery - Developing clear single programme for commercial sector and managing and administrating, either directly or through a third party. This may work by offering an advice service, guidance on incentives framework suppliers and an assurance service.

Next steps

WMCA should fund the development of a strategy to support, persuade and incentivise business organisations and representatives. Delivery of the measures will be undertaken by private contractors, with oversight and co-ordination from Energy Capital and business organisations.

Industrial — Industrial energy efficiency, zero carbon fuel-switching for heat (H2 or elec.), carbon capture and storage, and renewable energy, Goals 7 & 8

Investment and funding

The total investment required has not been quantified, except for solar, as the interventions are pre-commercial at present. The Black Country Consortium indicate that £90m of direct enabling funding will be required for the Black Country Cluster to initial industrial decarbonisation programme, including staffing. It is anticipated this will attract £400m of private investment. If successful, this approach could be replicated across the rest of the West Midlands. The initial funding has been provided by UKRI.

All of the investment will require private sector decision making. There are limited policies that are specific in the industrial sector. Minimum Energy Efficiency Standards apply to buildings, and Climate Change Agreements.

Relevant sources of finance include:

- BEIS
- UKRI
- Private Industry

There are limited policy levers around the industrial sector, with no EU ETS scale industry in the West Midlands. Work by the CCC and others highlights the challenge of ensuring emissions reductions without damaging competitiveness and "offshoring" the emissions. Most heavy energy users are focused already on energy efficiency, but many have limited capacity for investment. The Black Country Consortium have a strategy around symbiotic industrial co-location and taking opportunities around the principles of the circular economy, which will be developed both through the energy devolution and circular economy strands of work.

Governance

Energy Capital to convene group to develop business case with the LEPs, building on work from Black Country Consortium. A West Midlands Industrial Decarbonisation Taskforce could extend the consortium's work across the whole region, bringing in the Circular Economy Taskforce

Stakeholders

The main stakeholders are expected to be:

- LEPs
- Industrial organisations
- BEIS
- Cadent / WPD
- Energy Capital
- International sector groups

Dependencies

The goals are dependent on:

- Private sector investment is required at scale to achieve the goals required
- The govt. strategy for transition to hydrogen for the W.Midlands
- Carbon capture and storage will require UK govt. investment
- International collaboration may be required to increase environmental standards globally.

Resources

The staffing resources for this work have not been estimated, partly because much of the investment is pre-commercial. The Black Country Consortium have funding from UKRI to scope out a programme.

Local authorities

Work with the LEPs and Energy Capital and other stakeholders to ensure plans are co-ordinated and benefits of aggregation are realised.

UN Sustainable Development Goals

Job creation

Professional associations, engineering companies and training providers to maximise opportunities for local jobs and skills. Few direct jobs indicated by 2026. Many more possible around new industrial hubs, fuel switching and CCS, but dependent on sector development.

Devolution asks

The WMCA has produced an Energy Devolution Deal which has been submitted to government, including decentralisation of funding.

WMCA role

Influencing - Promotion of the campaign and the opportunities to business organisations.

Enabling - Provision of cross-disciplinary co-ordination, team with stakeholders. Managing the financial streams from national government and other incentives.

Delivery - Developing clear single programme for commercial sector and managing and administrating. Possibly managing procurement and frameworks for deployment.

Next steps

Energy Capital should support the work of Black Country Consortium and the initial funding from UKRI to develop the business case for investment and the necessary resources for the region.

Continue to discuss with national government regarding Energy Devolution Deal.

Use the taskforce to consider how the circular economy opportunities identified by the Black Country Consortium can guide investment and development across the region.

Transport — Develop and implement policies for transport to, from and within the area ensuring the integration with land use, energy and digital connectivity policy Goals 9-13

Investment and funding

The WMCA is investing over £1bn into a programme of transport investment over the next 5 years

It has already set out proposals to Government to go further and faster, with a £2.5bn rolling, five-year single infrastructure package covering £1.5bn of transport investment together with energy and digital interventions.

Sources of finance include:

- Intra-City Transport Fund
- Government grants (e.g. Bus, Cycle, Rail, ZEV, Innovation)
- New potential funding – National Infrastructure Bank
- New potential funding – locally raised revenues
- New potential green and social investment models may access corporate and retail investors.
- Development contributions/CIL/ Infrastructure Levy
- Private sector investment (bus / fleet operators)

Job creation

Some jobs in the WMCA will be in manufacturing low emission vehicles and infrastructure. Opportunities as new and innovative transport models evolve e.g. shared mobility, micro mobility. ***About 5,400 new jobs by 2026.***

Devolution asks

The WMCA/TfWM will need to work collaboratively to develop a rolling five-year infrastructure programme supported with the necessary coherent and consistent funding and relevant local powers and freedoms.

UN Sustainable Development Goals

WMCA role

Influencing -

- Developing an ambitious Local Transport Plan demonstrating leadership in inclusive, zero carbon transport system
- Overseeing and monitoring of the LTP to support WM2041
- Cementing position as a global leader in new transport solutions, technologies and innovations

Enabling -

- R&D supporting robust, evidence led policy development
- Scheme development
- Securing regional funding and investment
- Securing additional powers and financial freedoms
- Cross-disciplinary co-ordination, resource management, facilitating connections to relevant schemes and bodies, accelerated learning from other regions

Delivery -

- Co-ordinating the transport system with partners (Regional Traffic Co-ordination Centre, Bus Alliance, West Midlands Rail Executive)
- Collaborative delivery of schemes within the LTP
- Decarbonise WMCA's transport assets
- Secure bus emissions improvement through partnership or franchising. Continue to deliver travel demand management programme, influencing behaviours through communications and information

Governance

Development and delivery of a new local transport plan (LTP) will require action by TfWM in collaboration with partners. They will work with local partners to establish governance that monitors the policy delivery of all key stakeholders in the area in addition to monitoring the impact of policies.

Stakeholders

The main stakeholders are expected to be:

- Local Authorities
- LEPs
- Transport Operators / Fleet Operators
- Highways England / Network Rail
- Midlands Connect
- NGOs
- DfT / BEIS / MHCLG
- Private Sector (DNOs, Hydrogen Developers etc.)

Dependencies

The goals are dependent on:

- Significant behaviour change in travel patterns
- Policy and infrastructure scheme delivery by local partners
- Political leadership and consensus – national, regional and local
- Funding
- Devolution - powers / financial freedoms
- Job/Skills

Resources

Responding to the climate emergency will require additional resources within the Combined Authority, TfWM and local authorities. Due to the scale and pace required for many of the potential actions will require activity above and beyond existing Business As Usual resources.

Next steps

West Midlands proposals for Intra-City Transport Fund developed that meet the objectives of driving inclusive growth and #WM2041 (net zero carbon emission) goals

West Midlands forthcoming LTP review, starting a conversation on the future of transport in West Midlands

Draft West Midlands Local Transport Plan published for consultation, summer/autumn 2021 and adoption in early 2022.

Large scale renewables — Ground mount solar power and onshore wind Goal 14

Investment and funding

The total investment required is estimated at £250m, assuming no land is purchased. The funding is likely to be mostly third party, although some public and private landowners will be able to invest directly.

Sources of finance include:

- Power Purchase Agreements – Sale to virtual end users
- Large energy users – Direct connection
- Contracts for Difference
- New potential green and social investment models may access corporate and retail investors.
- Rural Community Energy Fund

Governance

WMCA with Energy Capital to convene a regional renewable energy group that builds on existing networks and ensures they are well connected to the natural capital programme, around prioritising land use. Enabling community energy initiatives.

Stakeholders

The main stakeholders are expected to be:

- Landowners – farmers, public bodies, Severn Trent Water
- Local Authorities/ LEPs/ LNPs
- NGOs - RSPB
- BEIS
- Community energy organisations
- Midland Energy Hub
- Renewable Investment funds

This should include land outside of the constituent members to maximise opportunities.

Dependencies

The goals are dependent on:

- Landowners
- National Government policy
- Local authority planning
- BEIS funding
- WPD grid connections

Resources

To convene and manage the approach to unlocking the investment in large scale renewables for the region will require a programme management and co-ordination staffing budget of ~£200k per annum for 2 - 3 staff within Energy Capital or WMCA's Environment Team.

Local authorities

Work with WMCA and other stakeholders to identify opportunities and ensure local planning helps to identify renewables deployment. As appropriate, support or lead on delivery mechanisms and funding routes.

UN Sustainable Development Goals

Job creation

Skills and supply chain are largely in place in UK. Employers and education providers to ensure West Midlands organisations can benefit. ***Potential for approximately 600 jobs by 2041.***

Devolution asks

Large scale renewable deployment can be carried out under current regulatory structures. Local Area Energy Planning may be helpful in ensuring electrical network capacity is available to allow deployment.

WMCA role

Influencing - Promotion of the opportunities around large-scale renewables, e.g. through mayoral support, communications and advertising identified land areas.

Enabling - A local area energy planning approach through Energy Capital could ensure that there is adequate grid connection opportunity and that the opportunity areas are identified.

Delivery - Programme management - a central WMCA function to identify opportunities, guide applications and investigate new investment and delivery models.

Next steps

WMCA should fund the creation of a business plan with key site opportunities, and promote and co-ordinate information and relationships with investors, NGOs, local authorities and landowners as well as working to reduce investor risk.

Natural capital — Increase tree cover to 13% across the WMCA area with a combination of woods and peri-urban planting. Develop a regional natural capital plan i.e. Goal 15

Investment and funding

The total investment required is estimated at £390m, assuming no land is purchased. The funding for planting trees will come from landowners or investors, paid back through schemes, such as those below. In some cases, planting may be carried out as part of regeneration projects, new development or estate improvement, outside any direct support scheme.

Sources of finance include:

- Private sector awards (e.g. Severn Trent Water Great Big Nature Boost)
- Government grants (e.g. Countryside Stewardship Grant, Nature for Climate Fund)
- Smaller grants, (e.g. Tree Council Branching Out Fund for schools and communities)
- New potential funding mechanisms as addressed in UK govt. 10 Point Plan (e.g. ELMS, biodiversity and carbon credits)
- New potential green and social investment models may access corporate and retail investors.
- Community Green Grants
- Investment for broader natural capital approaches will be developed in the work under next steps.

Local authorities

Work with WMCA and other stakeholders to ensure existing natural capital plans are joined up with cross-boundary opportunities.

Develop policies at local level with natural capital group and a natural capital accounting approach.

Co-ordinate tree planting activity and promote the Virtual Forest

UN Sustainable Development Goals

Job creation

Connect with professional associations and training providers to develop skills and unlock the potential for 400 jobs by 2026.

Devolution asks

Allocation of ELMS funding and others to WMCA to manage. Request responsibility for a local nature recovery strategy with the regional natural capital group overseeing.

Governance

WMCA to convene a regional natural capital group that builds on existing networks and ensures they are well connected to adaptation, inclusive growth and industrial programmes and policies.

Stakeholders

The main stakeholders are expected to be:

- DEFRA
- Landowners – farmers, public bodies, Severn Trent Water
- Local Authorities/ LEPs/ LNPs
- NGOs – Wildlife Trusts, Woodland Trust, RSPB, Canal & River Trust
- Local tree planting, nature and parks groups
- Environment Agency, Forestry Commission, Natural England

WMCA role

Influencing - Promotion of the opportunities around tree planting and natural capital, e.g. through the Virtual Forest, health and wellbeing programmes, mayoral support, communications and behaviour change programmes.

Enabling - Provision of cross-disciplinary co-ordination, resource management, facilitating connections to relevant national or international schemes and bodies, accelerated learning from other regions.

Delivery - Programme management - a central function to identify opportunities, guide applications and investigate new investment and delivery models.

Dependencies

The goals are dependent on:

- Landowners - willingness for planting
- DEFRA – funding and alignment with regional goals
- Supply chain
- Ongoing maintenance and management

Resources

To convene and manage the approach to delivery will require a programme management and co-ordination staffing budget of ~£200k per annum for 2 - 3 staff within the WMCA Environment team. Marketing and promotion would require additional funding and may be attracted from funding bodies identified.

Next steps

WMCA should fund the initial management and administration of a natural capital strategic plan for the region in the context of ecosystem services, inclusive growth and post-COVID recovery. Delivery of tree planting will be undertaken by other stakeholders, with support and co-ordination provided by WMCA, building on the networks developed as part of the West Midlands Virtual Forest.

Systems management, behaviour change and governance

A number of initiatives that cut across all areas have been identified through stakeholder engagement and the development of this FYP. These will mostly be co-ordinated by the WMCA Environment Team with extensive stakeholder input, given the cross-cutting nature of delivery.

Initiative	Description & next steps for WMCA	Stakeholder role
West Midlands Net Zero Business Pledge	WMCA will launch a West Midlands Net Zero Business Pledge to highlight existing business leadership, build on region's networks and provide support so all businesses know how they can play their part.	Working closely with Sustainability West Midlands, business leaders and local authorities to develop and support the pledge and its associated programme.
Carbon Literacy	WMCA will commence Carbon Literacy training for staff during 2021 to work towards becoming a "carbon literate" organisation.	All organisations in the region are encouraged to complete the UN recognised training to make the West Midlands a carbon literate region.
Behaviour change and communications	Building on the findings of this plan, WMCA will work with regional stakeholders to develop initiatives and information that will enable people to make a positive contribution to net zero and improve their quality of life. This includes a proposal to develop a regional Citizens Assembly to support decision making for the net zero transition	Work closely with WMCA to align messaging and ensure local plans (local authority, business or third sector) and communications are co-ordinated and supportive of a just transition to net zero. People in the West Midlands will be critical in shaping this work too.
Green Finance	WMCA will lead on the development of green finance solutions and mechanisms to support the delivery of this plan, based on the business cases that result from each delivery plan.	Input expertise and requirements on a project by project basis to support delivery.
Citizens' Panel	WMCA will work with other local authorities to establish a representative Citizen's Panel that can provide opinion and feedback on the plans and delivery.	

7.3 | Monitoring and reporting

There will be an ongoing need to monitor performance and report back findings annually to the Environment and Energy Board, which must then be able to inform project planning, specification and resources, including:

- Reviews on delivery and carbon reduction progress (annually)
- Data collection, validation and interpretation (quarterly)
- Defining methodology for performance monitoring (one-off)
- Auditing including governance, risk management and financial control (annually)
- Monitoring and scrutinise performance and reporting against targets (annually)
- Technological assessments and reviews of emerging best practices (twice per FYP period)
- Dissemination of learnings (annually)
- Review of changes in national policy (quarterly)
- External/independent auditing (annually)

WM2041 GOVERNANCE

- In order to ensure a cross-cutting approach to net zero delivery, it is proposed that a new WM2041 Net Zero Delivery Board is established that will:
  - Provide oversight of progress against strategy, business cases and delivery to achieve both 2026 and longer term 2041 ambitions;
  - Take responsibility for the achievement of net zero goals across the region and advocate for the necessary resources and powers to achieve this.
  - Recognise the importance of and facilitate integrated transport, energy and planning at a local level in delivering net zero.
  - Enable effective intelligence and data transfer between sectors to enable this.
  - Keep an eye on the goal and identify policy and regulatory barriers to the achievement of net zero by 2041 in the region and take action to remove these
  - Bring together local authorities where appropriate to deliver at scale and the pace required, respecting subsidiarity and relevant duties and powers;
  - Recognise the key role of LEPs, businesses, third sectors and education institutions, engaging them in a co-ordinated and strategic way around net zero delivery;
  - Receive input from a Net Zero Citizens' Panel to test solutions and inform decisions developed from the FYP;
  - Get the region behind net zero and communicating a story together which is compelling and demonstrates commitment;
  - Report progress to the WMCA Environment and Energy Board.

Contact

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