



Environment & Energy Board

Date: Wednesday 10 March 2021

Time: 10.00 am **Public meeting** Yes

Venue: This meeting will be conducted virtually using Microsoft Teams
[Click here to view the meeting](#)

Membership

Councillor Ian Courts (Chair)	Portfolio Lead for Environment, Energy & HS2
Councillor Oliver Butler	Walsall Metropolitan Borough Council
Councillor Maria Crompton	Sandwell Metropolitan Borough Council
Councillor Ian Kettle	Dudley Metropolitan Borough Council
Councillor Andy Mackiewicz	Solihull Metropolitan Borough Council
Councillor Barbara McGarrity	City of Wolverhampton Council
Councillor Jim O'Boyle	Coventry City Council
Matthew Rhodes	Energy Capital
Suzanne Ward	Environment Agency
Councillor Waseem Zaffar	Birmingham City Council

Quorum for this meeting shall be the Portfolio Lead for the Environment, Energy & HS2 *and* at least three other members.

If you have any queries about this meeting, please contact:

Contact Dan Essex, Governance Services Manager
Telephone (0121) 214 7505
Email dan.essex@wmca.org.uk

AGENDA

No.	Item	Presenting	Pages
Items of Public Business			
1.	Apologies for Absence	Chair	None
2.	Declarations of Interest Members are reminded of the need to declare any disclosable pecuniary interests they have in an item being discussed during the course of the meeting. In addition, the receipt of any gift or hospitality should be declared where the value of it was thought to have exceeded £25 (gifts) or £40 (hospitality).	Chair	None
3.	Chair's Remarks (if any)	Chair	None
4.	Minutes - 1 February 2021	Chair	1 - 2
5.	Climate Neutral Malmo	Jackie Homan/Jonas Kamleh	Verbal Report
6.	WM2041 Five Year Plan: 2021 - 2026	Jackie Homan	3 - 368
7.	Natural Capital Action Plan	Jackie Homan/ Maggie Fennell	To Follow
8.	Active Travel Update	Mitch Robinson	Verbal Report
9.	De-carbonising Transport - A Critical Objective for a New Local Transport Plan	David Harris/Alex Greatholder	369 - 374
10.	WM2041 Programme Update	Chair	375 - 388



West Midlands
Combined Authority

Environment & Energy Board

Monday 1 February 2021 at 2.30pm

Minutes

Present

Councillor Ian Courts (Chair)	Portfolio Lead for Environment, Energy & HS2
Councillor Oliver Butler	Walsall Metropolitan Borough Council
Councillor Maria Crompton	Sandwell Metropolitan Borough Council
Councillor Ian Kettle	Dudley Metropolitan Borough Council
Councillor Andy Mackiewicz	Solihull Metropolitan Borough Council
Councillor Barbara McGarrity	City of Wolverhampton Council
Matthew Rhodes	Energy Capital
Councillor Waseem Zaffar	Birmingham City Council

In attendance

Councillor Peter Fowler	Overview & Scrutiny Committee
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35. Apologies for Absence

Apologies for absence were received from Marc Liddeth (Environment Agency) and Councillor Jim O'Boyle (Coventry).

36. Minutes

The minutes of the meeting held on 9 December 2020 were agreed as a correct record.

37. WM2041: Five Year Plan (2021 - 2026)

The board considered a report from the Director of Inclusive Growth & Public Service Reform summarising the independent advice and outcomes for the development of the five year plan that came out of the consultation on WM2041 that took place between January - March 2020.

Following the approval of 'WM2041: A Programme for Implementing an Environmental Recovery' on 5 June 2020, the WMCA and stakeholders committed to producing five-year delivery plans (four in total) with interim carbon budgets and other metrics in support of delivering the net zero carbon target for the West Midlands by 2041. The aim of the five year plans was to provide clear guidance on the types of measures that would need to be implemented to reach net zero by 2041. The five year plans would indicate how the right conditions would be created for accelerating delivery and raising ambition to position the West Midlands as a leader in addressing climate change and futureproofing the region, generating excitement about the potential to invest in the region's future, creating jobs, better social outcomes, and healthier and happier places to live.

Three scenarios had been identified for achieving net zero carbon emissions: moderate, accelerated and maximum. The independent advice provided by WSP recommended the WMCA should adopt the accelerated scenario in the first five year plan and the report set out the measures this would result in. It was intended that a further report would be issued with the summary paper and the full five year plan text for approval at the WMCA Board on 19 March 2021.

Resolved:

- (1) The independent advice given to the WMCA by WSP on the first five year plan be noted.
- (2) The need to adopt the 'accelerated' scenario to deliver the first five year plan and to set the region on course for net zero carbon by 2041 be supported.
- (3) The report and recommendations to adopt the WM2041 Five Year Plan 2021 - 2026 be presented to the WMCA Board on 19 March 2021.

34. Date of Next Meeting

The next meeting of the board be held on Wednesday 10 March 2021 at 10.00am.

The meeting ended at 4.00pm.



Environment & Energy Board

Date	10 March 2021
Report title	WM2041 Five Year Plan: 2021 - 2026
Portfolio Lead	Environment, Energy & HS2 - Councillor Ian Courts
Accountable Chief Executive	Deborah Cadman, West Midlands Combined Authority email: deborah.cadman@wmca.org.uk tel: (0121) 214 7200
Accountable Employee	Ed Cox, Director of Inclusive Growth & Public Service Reform email: ed.cox@wmca.org.uk tel: 07788 224179 Jacqueline Homan, Head of Environment email: jacqueline.homan@wmca.org.uk tel: 07584 449339

The text of this report is the draft text of the proposed report to WMCA Board on 19 March 2021.

Recommendation(s) for action or decision:

The WMCA Board is recommended to:

- (1) Receive the independent advice given to the WMCA by WSP on the first Five Year Plan.
- (2) Agree the need to adopt the 'Accelerated' scenario to deliver the first Five Year Plan and set the region on course for net zero carbon by 2041.
- (3) Agree the delivery plan presented in this paper to accelerate the WMCA work on net zero.

- (4) Agree the Investment Programme funding option to be applied to the development of priority initiatives as detailed within Section 3.
- (5) Note the availability of Investment Programme funding is subject to the increase in the affordable limit being approved following consideration of the Financial Monitoring Report at this Committee.

1. Purpose

- 1.1 The development of the Five Year Plan (FYP) to meet the WM2041 net zero ambition has been supported by the commissioning of WSP to provide an independent evidence base as to how this might be achieved. This report summarises the independent advice and outcomes from that work for the Combined Authority Board. The report also provides an outline of the next steps for delivery.

2. Background

- 2.1 Following the approval of *WM2041: A Programme for Implementing an Environmental Recovery* in June 2020, the WMCA and stakeholders committed to producing five-year delivery plans (four in total) to indicate the programmes that would need to be put in place to deliver the overall goal of net zero carbon target for the West Midlands by 2041.
- 2.2 A tender was issued for consultancy support for the FYP in July 2020. This was developed with input from low carbon leads in the constituent local authorities as well as with a WMCA cross-directorate working group. WSP were awarded the contract and work began in September 2020. They have since presented updates of their work to the October 2020 and December 2020 Environment and Energy Boards, as well as Strategic Transport Board in November 2020 and Energy Capital Board in December 2020. In February 2021, the Environment and Energy Board had a special meeting to review the evidence base and WSP's proposals for a FYP.
- 2.3 The FYP aims to indicate how we create the right conditions for accelerating delivery and raising ambition to position the West Midlands as a leader in addressing climate change and futureproofing the region. This is done through exploring the social and economic, as well as environmental, benefits for delivering net zero, e.g. creating jobs, achieving better social outcomes and, building healthier, happier and better connected places to live. The plan presented here will be challenging but presents significant opportunities for people and businesses in the West Midlands, for example by 2026 we could see 21,000 new jobs across numerous sectors – in the first FYP, these will particularly be in the domestic retrofit sector and in the electrification of transport.
- 2.4 In addition, this FYP enables the WMCA to position itself favourably to respond to, and deliver, ambitions being set out by the UK government in recent (and upcoming) policy initiatives and legislation, all of which carry economic opportunity. These include the Ten Point Plan for a Green Industrial Revolution; the recent Energy White Paper; and in 2021, it is also expected that the Environment Bill will receive Royal Assent. The WMCA is also making preparations to have a high profile as part of the COP26 activities this year.
- 2.5 The development of the FYP has involved a huge stakeholder engagement exercise. WSP, and the WMCA Environment Team, have engaged extensively with constituent local authorities on the plan to ensure that people are aware of the findings and the areas where we are suggesting that coordination at a regional level makes sense for delivery. This has included presenting findings to respective climate change boards at Birmingham, Dudley, Sandwell and Wolverhampton. Engagement has also taken place through 1:1 meetings and working groups with industry, universities, environmental NGOs etc. In total, over 240 individuals across 97 different organisations and institutions have been consulted as part of the plan.

2.6 This FYP report represents independent advice from WSP to the WMCA from which we will work to deliver the recommended actions (outlined in Paragraph 2.14 below) in collaboration with stakeholders from across the region.

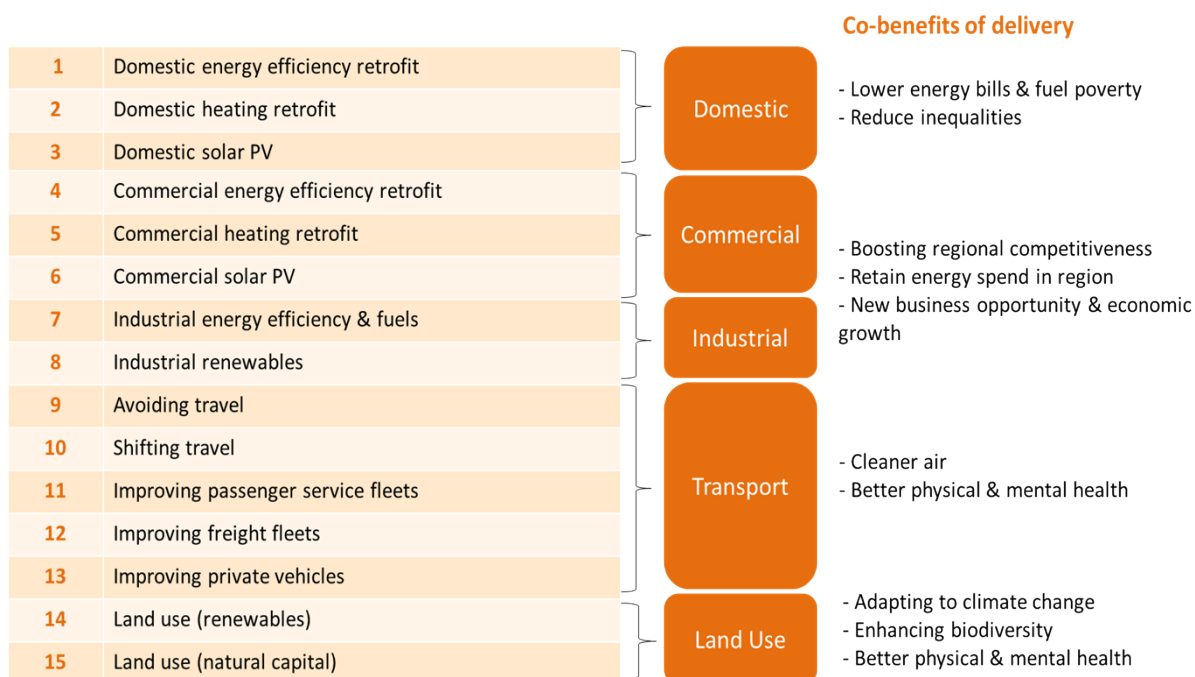
Modelling and goals for 2021-2026

2.7 The modelling that has taken place to produce the first FYP has identified the measures that will need to be taken to reach net zero. These take into account: the maturity of technology, public acceptance of measures, ensuring a just transition, enabling the creation of jobs, and the transition of the West Midlands economy to a net zero future.

2.8 The modelling takes business as usual (BAU) as the starting point, on which the other recommended measures build. BAU includes:

- The carbon factor of the electricity grid as it continues to decarbonise
- Minimum Energy Efficiency Standards (MEES)
- Housing growth
- Commercial growth
- Electrification / hydrogen use in transport
- Local authority decarbonisation targets for their own estate
- Other organisation’s decarbonisation targets
- Other committed projects across the region (including renewable energy projects etc).

2.9 From the modelling, the additional recommended measures fall broadly into retrofit (domestic and commercial); addressing industrial emissions; transport-related measures and strategic land use (exploring both tree planting and use of land for large-scale renewable generation). An overview of those goals and some of the co-benefits of delivery is shown below:



*The areas of waste and offsetting are not considered in this analysis

- 2.10 In the WSP report, each goal is taken in turn, exploring the delivery at low, medium, high and very high levels of implementation. The option is there to combine very high outcomes in some areas that are more progressed with medium/ low outcomes in others. A 'West Midlands Carbon Calculator' has been developed by WSP to sit alongside the FYP to enable the exploration of future scenarios. This will be made publicly available for everyone to use.
- 2.11 The top five decarbonisation priorities, which have been identified as having the greatest impact in carbon terms, are:
1. Domestic energy efficiency measures and heating retrofit
 2. Commercial energy efficiency measures
 3. Modal shift towards active travel measures
 4. Increased uptake of electric vehicles
 5. Planting trees and enhancing natural capital
- 2.12 Understanding what needs to be prioritised, dependencies and the sequencing of implementation will also be important. For example, planting trees and enhancing natural capital will not reduce carbon significantly by 2026, but we know we need to do this at significant scale in the context of reaching net zero by 2041. An example of a key dependency would be that effective heating retrofit is dependent on energy efficiency measures also having been undertaken in homes.
- 2.13 Using a combination of the measures identified, 3 scenarios have been developed to achieve net zero. These are:
- Moderate: this is beyond 'business as usual' delivery pace, and accelerates activity in selected sectors, but will only achieve a 37% reduction in carbon emissions from 2021 - 2041. This is not the recommended route for delivery.
 - Accelerated (outlined in more detail in Paragraph 2.14). A much more rapid and aggressive delivery pace across sectors, with most goals set at a "high" implementation rate. This will achieve a 94% reduction in carbon emissions by 2041 with the final 6% currently needing to be addressed through offsetting, although as new technologies emerge we will update how this could be met.
 - Maximum. It is at the limit or beyond what it is technically possible, even ignoring legislative competence and finance restrictions. It would require large behaviour change from people and could create unintended consequences for a just transition. For this reason, this has not been recommended, but can be explored by those seeking to understand what is required and whether the 2041 ambition can be achieved through a more aggressive trajectory.
- 2.14 The independent advice, provided by WSP, recommends the WMCA should adopt the Accelerated scenario in the first FYP. Modelling for the goals and scenarios provides an indication of the delivery required to reach net zero. The specific level of interventions will be developed through policy and business cases, for example, the detail of the transport goals will be subject to development of the new Local Transport Plan and they are only intended as an indication of how the West Midlands could decarbonise each sector.

Required level of interventions on different goals to achieve the Accelerated Scenario

	1. Domestic Energy Efficiency	2. Domestic Heating Retrofit	3. Domestic PV	4. Commercial Energy Efficiency	5. Commercial Heating Retrofit	6. Commercial PV	7. Industrial Energy Efficiency	8. Industrial PV	9. Avoiding Travel	10. Shifting Travel	11. Improving Travel (Bus / Taxi)	12. Improving Travel (HGV)	13. Improving Travel (Accelerate)	14. Land Use - Renewables	15. Natural Capital
Very High															
High															
Medium															
Low															

In practical terms, this means:

Goal	Accelerated scenario deployment to 2026	Accelerated scenario deployment for net zero
1. Domestic energy efficiency	294,000 homes	1.1m homes (100%)
2. Domestic heating system	292,000 homes	1.1m homes (100%)
3. Domestic photovoltaics	415MWp (116,000 dwellings, out of 1,178,260)	830MWp
4. Commercial energy efficiency	37,000 buildings	73,400 buildings
5. Commercial heating retrofit	37,000 buildings	73,400 buildings
6. Commercial photovoltaics	353MWp (7,060 buildings, out of 74,040)	705MWp
7. Industrial energy efficiency	10% energy efficiency, 17% deployment of H2 and 20% CCS for high temp.	15% energy efficiency, 33% deployment of H2 and 40% CCS for high temp.
8. Industrial microgeneration	96MWp (960 systems, out of 27,180 industrial buildings)	96MWp
9. Avoid	9% people telecommuting and 6.25% reduction in trips	35% people telecommuting (50% of the time), 25% less personal / retail trips

10. Shift	59% trips of by car	Shift to 35% of trips by car
11. Improve travel (bus and taxi)	100% electrification by 2030	100% taxis & buses electrification
12. Improve travel (HGVs)	25% of HGVs are electrified	100% of HGVs are electrified
13. Improve travel (accelerated EVs)	15% of cars are electrified	100% of cars are electrified
14. Land use - renewables	30MW wind and 224MWp solar	59MW wind and 448MWp of solar potential
15. Land use - natural capital	13% forest cover/20% peri-urban areas	13% WMCA tree coverage

2.15 Following this Accelerated path to net zero will mean a 33% emissions reduction by 2026 (against a 2016 baseline). This will result in a highly ambitious route to net zero by 2041, allowing for the commitment to ensure a just transition that does not leave anyone behind (our commitment in *#WM2041: Actions to meet the climate crisis with inclusivity, prosperity and fairness*). The forecast cost of this ambition is £4.3bn by 2026 and delivery could create 21,000 additional new direct jobs in low-carbon sectors.

2.16 Successful delivery of many of the goals is dependent on a number of conditions, in particular having:

- public hearts and minds support for the policies and actions e.g. in transport, land-use and domestic goals;
- integrated infrastructure planning and place-based input to regulatory mechanisms governing transport, housing and energy, e.g. requiring further devolution from a UK Government, working with Local Highway Authority and Planning Authority; and
- the mechanisms and political support in place at all levels to secure the necessary increased funding levels which will needed to be found in terms of revenue and capital expenditure;
- a supply chain that is engaged with the transition and a skilled workforce able to meet demand.

Investment and financing

2.17 The gross investment cost (excluding issues around system management, industry and some transport goals) is estimated to be **£4.3bn by 2026** and **£15.3bn** over the 20-year period. Costs associated with transport are only covered in a limited sense, with detail to be developed in the upcoming Local Transport Plan (LTP) review.

The £4.3bn gross investment cost identified for the FYP does not represent costs to the CA directly but will need to come from multiple sources depending on the nature of the intervention/ programme. In some instances there are business cases for the costs to be covered by the private sector (e.g. broadband for home working). In others WMCA and other public sector bodies will be needed to play different roles, which will all require revenue funding:

- to facilitate delivery (e.g. investment in renewables);
- provide support through regulation to drive the transition (e.g. through planning and building regulations);
- resource to access central government funding (e.g. for EV charging);
- to unlock private investment through blended green finance mechanisms;
- provide direct funding, especially where there is significant social value in doing so.

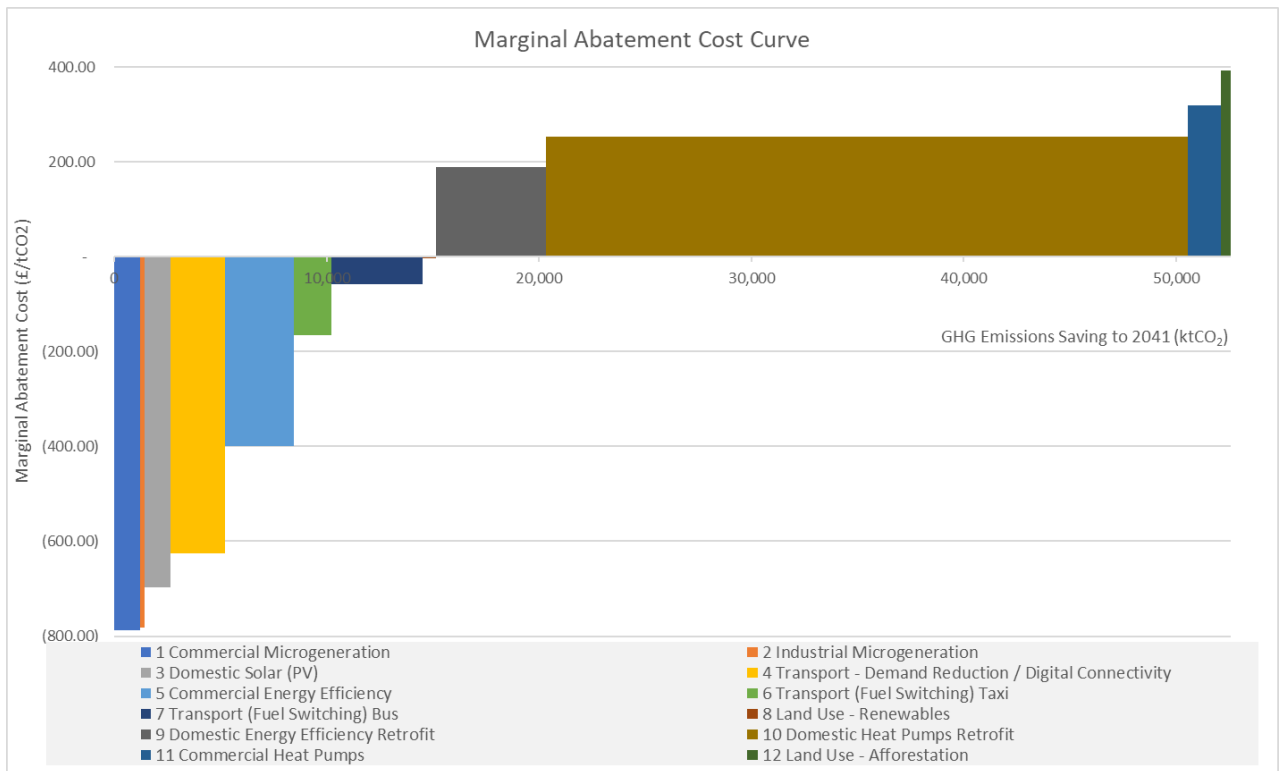
2.18 Addressing the 15 goals identified will mostly require initial investment to get programmes up-and-running. Some of this will need to come from public sector sources, including devolution of resource from national government as part of the UK's programme for carbon reduction. However, for many things there may also be a commercial return on investment, which will require us to continue to develop relationships with industry, landowners and the finance sector in order to realise the opportunities that reaching net zero in the West Midlands presents.

The table below indicates the variety of potential funding sources that could be used to deliver the goals.

Name	Gross Investment Costs to 2026	Gross 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

2.19 The Marginal Abatement Cost Curve (MACC) in the report indicates broadly which measures will be more or less cost effective:



The areas to the left of the graph are those where there is a commercial return on investment. The width of the bar on the chart indicates the potential carbon saving that could be achieved. It is important to note, however, that the costs do not include the start-up and management of the programme itself (e.g. the resource/ staffing requirements, business case development etc) and so should be used as a guide only.

- 2.20 No significant additional funding has yet been secured for this although some potential small-scale investment opportunities are being worked through, such as the roll-out of all-electric buses in Coventry. The FYP will require investment through a variety of routes, including local authorities, central government, private sector investment as well as WMCA. Many of the interventions outlined in this document will require comprehensive business cases to be developed in order to ascertain more accurate costs/benefits and produce the detail for the financing and delivery. The WMCA is currently working to explore the different financing mechanisms that will need to be put in place in order to deliver on all aspects of the plan, through a Green and Social Finance Working Group.

There is also the need to resource the delivery programme set out in section 2.22 below and following and to put in place the capacity required to co-ordinate such an ambitious agenda. To this end, it is proposed that resources are made available from the Investment Fund, subject to the extension to the Investment Programme affordable limit, to drive forward this programme.

Investment Fund Proposals

- 2.21 It is proposed that Investment Fund resources are used for the following purposes:

a) *Net Zero Neighbourhood Demonstrator*

Evidence suggests that retrofit-at-scale is unlikely to be achieved in the short-term without significant incentive and intervention and that this will be most likely achieved at a neighbourhood scale. Our proposal is to invest in a 'demonstrator' neighbourhood where we can show the potential to unlock a place-based approach to achieving several decarbonisation goals. The Net Zero Neighbourhood might include some of the following:

- A programme of street-by-street 'deep retrofit' and domestic heat and energy initiatives;
- New build investment in Zero Carbon Homes;
- Future mobility innovations, EV charging infrastructure and car-sharing clubs;
- Smart energy, micro-generation and digital infrastructure;
- Investment in the public realm, natural capital and green space.

There is significant scope for using this approach to unlock co-investment through a range of sources including existing housing and transport programmes; private sector investment; government retrofit programmes including LAD2; the Network Innovation Challenge fund; and other green investment vehicles. Similar approaches are being developed in West Yorkshire and Edinburgh. There is also consideration that the programme could be developed as a competition. Any programme of this nature will also include detailed arrangements concerning monitoring and evaluation, returns on investment and governance and accountability structures.

A more detailed proposal will need to be worked up in partnership with local authority officers and would be subject to detailed financial and legal due diligence and formal agreement by the Investment Board.

b) Sustainable Market for Affordable Retrofit Technologies (SMART) Hub

Despite the scale of the challenge concerning domestic energy efficiency and retrofit, the market remains under-developed with significant challenges both in terms of generating demand and stimulating supply chains. This proposal is to create a core capacity in the region to unlock funding and activate a sustainable market for affordable retrofit technologies. This will involve:

- Creating dedicated capacity to work more closely with local authority housing and retrofit teams to access government funding, take a more systematic approach to stock assessment and streamline complex referral routes and procurement frameworks;
- Working closely with the retrofit supply chain to develop and produce heat pumps and other new retrofit products at scale in conjunction with wider MMC initiatives;
- Working closely with skills providers to ensure we maximise training and apprenticeship opportunities in relation to this burgeoning market.

c) Core capacity to drive forward the wider Five Year Plan Delivery Programme

Section 2.22 below and following sets out a broad programme of activity across many of the FYP goals stimulating new activity and unlocking finance to support investment. At present the large majority of this programme is being driven by 3 dedicated staff in the Environment Team and 3 in Energy Capital who are not funded by the Combined Authority. To this end we propose a carefully targeted increase in core capacity in a small number of key priority areas including:

- Energy infrastructure including smart energy networks and EV charging;
- Green manufacturing, industrial decarbonisation and the circular economy;
- Green finance and investment;
- Natural capital and place-based approaches;
- Behaviour change, business engagement and lobbying;
- Energy and environment data, innovation and economy.

d) Community Green Grants Scheme

The importance of natural capital in both mitigating climate change, as well as boosting resilience to it, is highlighted in the FYP. In addition to this, we know natural capital provides significant co-benefits in terms of health and well-being to people and communities. And yet access to good quality green space varies significantly across the region as has been highlighted in a recently commissioned study. To this end we propose creating a grants programme that would provide capital investment to enhance green space in targeted areas around the region. Grants of up to £50,000 would be provided to support projects where there is significant local support and community engagement as well as green and social benefit.

A more detailed proposal will need to be worked up in partnership with local authority officers and would be subject to detailed financial and legal due diligence and formal agreement by the Investment Board.

Delivery ‘next steps’ and governance structures

2.22 The FYP will require new routes for delivery; these are sketched out in outline delivery plans in WSP’s report. The recommendation to the CA Board is that we accelerate work focused on 17 ‘next steps’, aligned to the main priorities of FYP Accelerated Scenario, many of which are already underway:

FYP Theme	Delivery next steps
Domestic	<ul style="list-style-type: none"> • SMART Hub for Retrofit Delivery and Net Zero Neighbourhood Model • Warm Homes Save Lives Programme
Commercial	<ul style="list-style-type: none"> • Commercial Green Energy Taskforce • Local Area Energy Planning & Network Connections Fund
Industrial	<ul style="list-style-type: none"> • Industrial Decarbonisation and Green Manufacturing Taskforce • Circular Economy Roadmap
Transport	<ul style="list-style-type: none"> • Updated Local Transport Plan • Infrastructure for Zero Emissions Vehicles (IZEV) Strategy
Land Use	<ul style="list-style-type: none"> • Natural Capital Board and WM Natural Capital Programme • Community Green Grants programme • Large-scale Renewables Programme
Systems Management & governance	<ul style="list-style-type: none"> • Green Skills Strategy • WM2041 Behaviour Change and Business Pledge roll-out • Place-based data hub • Net Zero Citizens’ Panel • WMCA Carbon Literacy Programme • Whole-system governance including Net Zero Delivery Board

2.23 Domestic Retrofit and Energy Efficiency

2.23.1 Establish a SMART Hub for retrofit delivery

This would be a partnership programme between the WMCA housing and environment teams and Energy Capital, to develop a long-term market for retrofit that is supported by manufacturers in the region. It also means that we should not be building new homes that will require retrofit in a few years’ time. The SMART (Sustainable Market for Affordable Retrofit Technologies (SMART) Hub will bring together dedicated capacity to work more closely with local authority housing and retrofit teams and drive forward the regional retrofit agenda.

The next steps involve demonstrating ambition across both retrofit and new build at scale, showing how advanced technologies can be deployed, but also stimulating the able to pay market, encouraging consequential behavioural change activity and establishing the scale of financing and delivery vehicles necessary to stimulate the manufacturing and installation supply chain to invest and grow over the long term.

2.23.2 Net Zero Neighbourhood Demonstrator.

A Net Zero Neighbourhood would focus on delivery of energy efficiency and retrofit for buildings, it is at this spatial level that the finance can be unlocked and the benefits of a programme can be realised in terms of a wider contribution to place-making that cannot be achieved through a 'one home at a time' approach. This could therefore also include opportunities for community energy schemes, public realm and natural capital improvement, active travel, EV car clubs and digital infrastructure that all contribute to the creation of a truly net zero neighbourhood that brings broader health and wellbeing and economic outcomes. This programme could potentially be kick started by helping Local Authorities to draw down their funding allocations available under the Local Authority Delivery (LAD) 2 Scheme funded by BEIS. The criteria for selecting the neighbourhood within the West Midlands will be developed, but would include opportunities for adjacent investment (e.g. in transport, housing, natural capital and energy), level of deprivation and fuel poverty, housing stock type and tenure and availability of LAD 2 funding for area based programmes.

2.23.3 Warm Homes Saves Lives fuel poverty programme

The West Midlands has the highest fuel poverty gap of all the English regions and the second highest incidence of fuel poverty. Without addressing these foundations, the energy efficiency measures outlined in the FYP will be undermined and the carbon savings sought from the domestic market will not be achieved. Building on our existing programme, new work will include the demonstration of new CRM referral system, better targeted energy efficiency measures delivered through partnerships with providers, potentially through a more co-ordinated provider framework, the development of an innovative Social Impact Bond mechanism for fuel poverty and lobbying of BEIS for future ECO funding to be further devolved to LAs. This co-ordinated approach will help to shape and access national programmes and ensure the long-term funding is directed to where it is needed most in the West Midlands.

2.24 Commercial Efficiency and Local Area Energy Planning

2.24.1 Commercial Green Energy Taskforce.

The WSP report indicates that there are significant carbon savings to be made in the commercial sector. Whilst the technologies might be the same as the domestic sector, the approach to delivery is different. Establishing this taskforce will be the first step in developing a clear understanding of how we accelerate this work in the West Midlands in terms of retrofitting and realising the renewable potential of commercial buildings.

2.24.2 Local Area Energy Plan and a revolving Network Connections Fund

This would address the pressing short-term cost barriers to decarbonisation and green growth to overcome the problem of high cost of network connections for electric charging infrastructure, new developments such as the Giga Factory and other demands on the energy networks, through demand aggregation. Building on the Energy Transition project supported by the SED Board in August 2020, in order to identify where investment should take place, the WMCA should develop a Local Area Energy Plan and investment in shared expert capacity through Energy Capital to map out the implications of transport, housing and industry's decarbonisation plans and represent the requirements of the region through the Distribution Network Operators Business Planning processes, which determine where investment is made in the region's energy infrastructure and where it is left to the market to invest. This would need to be expanded beyond Coventry City, where Energy Capital's current innovation project (RESO) is focused, and to enable deeper engagement with Western Power Distribution and Cadent across the whole region and

identify ways to affordably fund network connections that support the region's decarbonisation plans.

2.25 Industrial Decarbonisation and the Circular Economy

2.25.1 A LEP-led Industrial Decarbonisation and Green Manufacturing Taskforce.

The WSP report indicates that there are significant carbon savings to be made in the industrial sector, but exploration into this issue has shown the complexity of solutions, including new technology and circular economy opportunities. There is an opportunity to share learning from the Black Country Industrial Cluster Decarbonisation programme funded by BEIS. It is therefore recommended that the WMCA works with the LEPs to establish a special Taskforce to develop a collaborative work programme on these issues and supports the Black Country in accessing future funding and explore opportunities for expanding solutions identified across the wider West Midlands.

2.25.2 Circular Economy Routemap.

The circular economy was highlighted as a priority in the June 2020 CA Board paper, *WM2041: A Programme for Implementing an Environmental Recovery*. Since then, a circular economy taskforce has been established and Useful Projects have been commissioned to support the development of a routemap by mid-2021, to understand where the West Midlands is uniquely placed to accelerate work on the circular economy. This will build on regional strengths, including: the circular economy work in Wolverhampton (including Wolverhampton University); the Repowering the Black Country work, exploring the potential of circular economy in industrial processes; and the activity that supports business engagement, for example International Synergies' work on industrial symbiosis. The routemap will provide a clear understanding of what our next steps should be, the 'big wins' for the West Midland and the investment required to deliver.

2.26 Transport

2.26.1 **An updated Local Transport Plan.** WMCA Board approved the approach for an updated LTP at its meeting on 24th July 2020. A review of the LTP is underway and is being progressed with the constituent authorities. Developing and managing the West Midlands LTP is one of WMCA's key statutory functions undertaken by TfWM. The current LTP, *Movement for Growth*, was adopted in 2016 but significant developments and changes have taken place in the last 5 years including increasing concerns regarding the climate emergency. The FYP outlines indicative mode shares and desirable reductions in transport carbon emissions. These could be progressed by enabling changes in consumer choices in line with the proposed "avoid, shift, improve" framework for reducing emissions and already adopted re-mode, re-route, re-time and remove journeys approach in the WMCA adopted Congestion Management Plan (containing a significant behaviour change programme). The scale and pace of change will be heavily dependent on public hearts and minds support for demand managed policies in transport and land-use policy changes required to support such a scale of change. The new LTP will be published in early 2022.

2.26.2 Infrastructure for Zero Emissions Vehicles (IZEV) Strategy.

This strategy, due to be completed in March 2021, builds on the West Midlands & Warwickshire ULEV Strategy approved by WMCA Board in January 2020, the decision by the CA Board to support the development of a Network of Transit Charging Stations across the region and the work of Midlands Connect. The strategy will recommend a partnership programme which reaches beyond TfWM's current role in strategic action planning for the Park and Ride estate and exploring options for collaboration in delivery of chargepoint infrastructure, into integrated infrastructure planning and delivery. It recognises the regional priority to facilitate the decarbonisation of public sector transport options and support modal shift, whilst at the same time enabling those individuals and service providers that do require private vehicles, to confidently make the transition to zero emission vehicles, and supporting vehicle manufacturers in the transition from the production of internal combustion engine to electrically powered vehicles.

This programme recognises the unique role that local authorities have in being able to bring together operators with complimentary charging requirements to establish charging hubs, supported by OZEV funding, which can be developed around the needs of the users and the availability of network capacity. A template for this approach can be seen in the development of Coventry and Warwickshire's Low Carbon Transport and Energy Hub or Tyseley Energy Park. This programme recognises the value of collaboration between transport and energy network operators, both to overcome short term barriers such as electrical network capacity costs and set the region on a pathway to achieve longer term goals in transport decarbonisation such as the provision of infrastructure to support the development of biofuel and hydrogen solutions.

2.27 Land Use

2.27.1 Natural Capital Action Plan and Board.

We will bring together stakeholders from across the region to provide support for work on biodiversity net gain and nature-based solutions. This will include a wide range of issues, including: tree planting, taking responsibility for a Local Nature Recovery Strategy and work to support funding and roll out of community green grants. Delivery will happen in conjunction with local partners and also in working with large scale infrastructure projects like the Commonwealth Games and HS2. An initial natural capital action plan for the WMCA is being presented to the March 2021 Environment and Energy Board.

2.27.2 Large-scale renewable energy projects.

The FYP identifies opportunities to use land within the WMCA area that is ideally suited for utility scale solar and wind electricity generation. The areas identified should be mapped, investigated further and prioritised where considered suitable. Working closely with key stakeholders including local authorities, communities and landowners, the WMCA and Energy Capital public sector can play an important role though helping developers to link up with end users to establish Power Purchase Agreements, supporting community energy groups to bring forward schemes, and even investing in schemes to create a return on investment which could be reinvested to support other areas of delivery of WM2041. This programme can be scaled up depending on the availability of funds, from a small neighbourhood community scheme to support the SMART hub programme, to larger developments supporting industrial and commercial decarbonisation.

2.27.3 Community Green Grants.

The importance of natural capital in both mitigating climate change, as well as boosting resilience to it, is highlighted in the FYP. In addition to this, we know natural capital provides significant co-benefits in terms of health and well-being to people and communities. However, access to green space is not equitable, a situation that has been brought into sharp relief during the Covid-19 lockdowns. Using data that WMCA and other regional partners have available, we know the neighbourhoods where there is currently deficit of access to green space and are seeking to work with delivery partners across the West Midlands to provide community grants to roll out projects to create, enhance and improve access.

2.28 Skills, Systems Management and Governance

2.28.1 Green Skills Strategy.

Work with Colleges West Midlands and the Jobs and Skills Delivery Board to develop a Green Skills Strategy linked closely with investment and job growth, introducing skills training in key areas that exhibit early job demand and demand for new or updated skills, in particular:

- Vehicle manufacture / technology (including Battery operatives and increased EV/ hybrid vehicle maintenance and repair)
- Transport (including Planning, management and co-ordination)
- Built environment (including Heat pump installers – specifically F gas, Retrofit co-ordinators and customer management, Electrical installers, Commercial, procurement, project management)
- New industry / manufacture (including Product design)
- Energy (including Solar installers)
- Tech (including Smart systems, data analysis, software design, Use of 5G)

2.28.2 Behaviour change and business pledge roll out.

There was a strong message coming through the original consultation on WM2041 that people across the region wanted more information on what they could do to reduce their carbon footprint. Behaviour change has also emerged very strongly as a crucial part of delivering net zero in the UK Climate Change Committee's 6th Carbon Budget, being implicated in 59% of the UK's actions to reduce emissions. The WMCA Environment Team has commissioned the national Behavioural Insights Team to advise us with this work. We will be working with key stakeholders such as TfWM who will deliver sector specific activity to drive a step change in this area of work. In addition to this, the WMCA has worked with regional businesses from the Mayor's Economic Impact Group to develop and launch a 'Net Zero Business Pledge' to support businesses in building action plans to reach net zero and to showcase some of the excellent work already being led by business in this area.

2.28.3 Create a place-based 'Centre for Climate Data'

We propose working closely with regional partners to bring together information to inform decisions on net zero and produce independent models and predictions. Relevant data could cover private and public emissions, utilities rollout and repair (particularly energy and fibre), planning, transport, public health, and supply/demand in key parts of the economy (e.g. domestic heat pumps, retrofit firms). This will be linked with the Digital Roadmap and plans for a WM Datastore.

2.28.4 Net Zero Citizens' Panel.

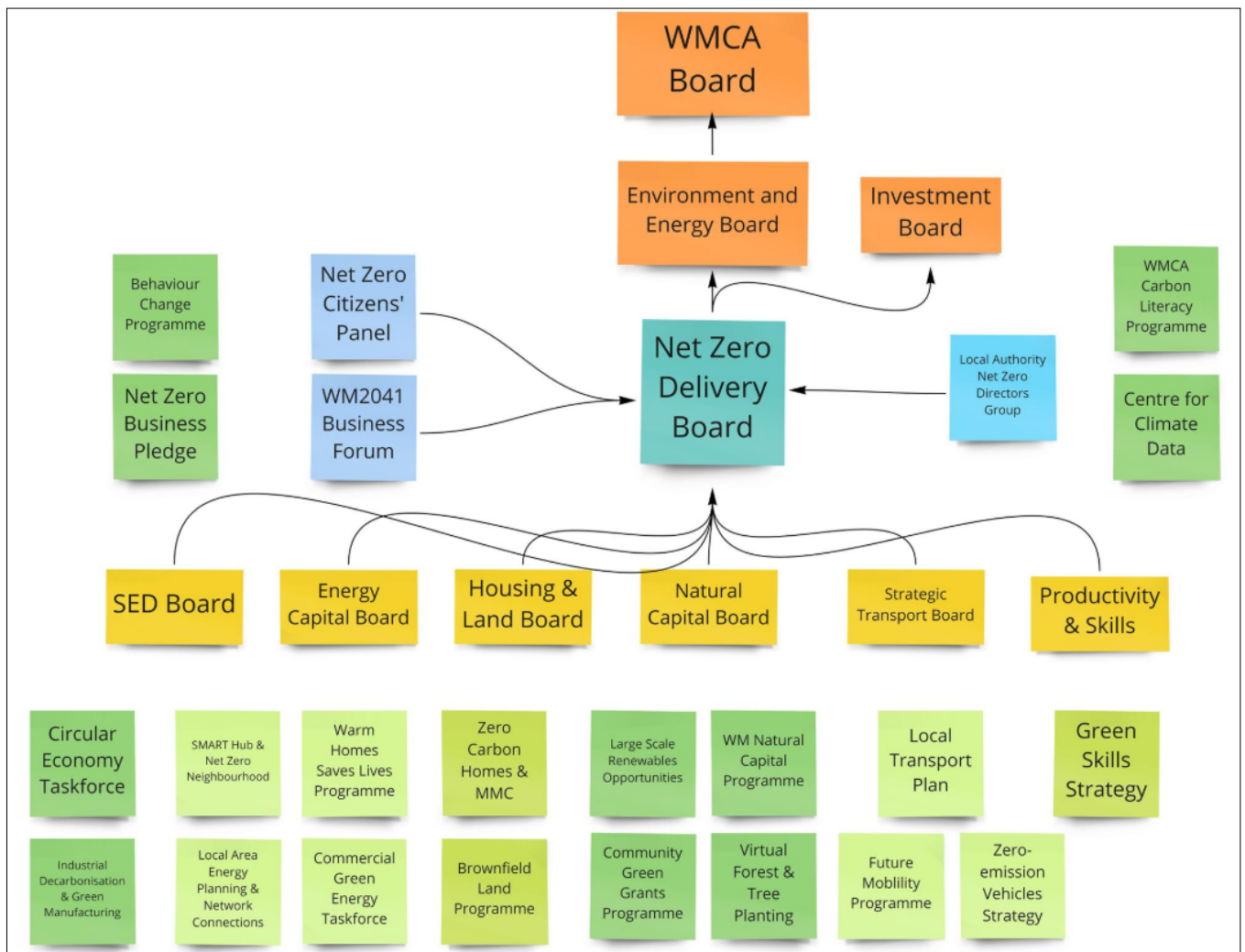
Citizens' panels and assemblies have proven to be a valuable part of the decision-making process around climate change solutions and driving behaviour change initiatives. They have been used at national level (e.g. the UK Climate Assembly, which reported in September 2020) as well as at the local authority level – for example, in Wolverhampton. Birmingham has also recently announced its intention to develop a citizens' assembly for the climate emergency to develop their climate change plans. A Net Zero Citizens' Panel, will form an important part of testing solutions and informing decisions on programmes developed from the FYP. In particular, it will ensure that we are upholding the WM2041 principle of achieving net zero without leaving anyone behind.

2.28.5 WMCA carbon literacy programme.

As well as working with stakeholders across the region to deliver on the net zero ambitions, the WMCA will show leadership through a carbon literacy programme being established and rolled out for all staff. This will be happening from March 2021 onwards and will be an important part of the behaviour change work. The business pledge will encourage all organisations to complete carbon literacy training.

2.28.6 Whole system governance.

The key 'systems managers', from a WMCA perspective are: Energy Capital; Transport for West Midlands and the WMCA Environment Team. Achieving net zero will require more than just a series of initiatives by each of these organisations though; it will require systems integration and whole systems change, to ensure that West Midlands citizens are able to make zero carbon choices. It will also require the generation of systems data to support the systems governance. A proposed structure to enable this is a Net Zero Delivery Board. It is suggested that this is a Technical Board with responsibility for achieving the 2041 target. This Board should have an outward focus, with the aim of creating an informed interface between the WMCA and the wider systems of which the West Midlands is a part; including our electricity network, gas network, communications network, transport system and planning system at a local level.



- 2.29 Crucially, these agencies will need to work increasingly closely with BEIS, Ofgem and key energy infrastructure agencies such as WPD and Cadent. There will also need to be close collaboration with other teams across the WMCA, for example Housing and Land and Productivity and Skills. These different parts of the programme will be brought together in the WM2041 Net Zero Delivery Board. The Environment and Energy Board will remain the main governing body for guiding the programme and approving workplans.
- 2.30 Local authorities have a key role to play in delivering net zero. The WMCA will need to seek joint approaches with local authorities to deliver at scale, where appropriate, to set the conditions for net zero delivery, respecting subsidiarity and relevant duties and powers.
- 2.31 It is of critical importance to recognise that this is not just a plan for the WMCA, however. Whilst the work has focused on what the role for the WMCA might be in the journey to net zero, action and delivery will be required by individuals, communities, local authorities and business. There is a role for everyone in delivering the net zero ambition and the report also outlines delivery plans for each of the areas in turn. The key message is that we need to act fast, together in order to make net zero by 2041 a reality.

3. Financial Implications

- 3.1 The FYP document estimates that the indicative gross cost of transition during 2021-26 is £4.3bn. The overall cost of the programme to 2041 is being estimated at £15.3bn.
- 3.2 The FYP will require investment through a variety of routes, including local authorities, central government, private sector investment as well as WMCA. Many of the interventions outlined in this document will require comprehensive business cases to be developed in order to ascertain more accurate costs/benefits and produce the detail for the financing and delivery. The WMCA is currently working to explore the different financing mechanisms that will need to be put in place in order to deliver on all aspects of the plan, through a Green and Social Finance Working Group.
- 3.3 No significant additional funding has yet been secured for this although some potential small-scale investment opportunities are being worked through, such as the roll-out of all-electric buses in Coventry.
- 3.4 Options for use of Investment Programme funding are available however, subject to the extension to the Investment Programme affordable limit, which is the subject of a separate report to this Committee.
- 3.5 The distribution of the increase in the Investment Programme affordable limit is provisionally laid out in the Financial Monitoring Report which makes an allowance of **£20.5m** to fund recovery priorities such as WM2041, Town Centres Programmes, Co-invest and the CWC City Learning Quarter.
- 3.6 Options for use of the Investment Programme funding for WM2041 initiatives have been developed for consideration by WMCA Board as follows:

	Option A £m	Option B £m	Option C £m
Net Zero Neighbourhood	1.60	2.10	2.10
SMART Hub	0.68	0.68	0.68
Energy & Environment Core Capacity	0.83	0.83	1.50
Community Green Initiatives	-	0.50	0.75
Total	3.11	4.11	5.03

*Remaining Balance of **£20.5m** Recovery Funding for Other Initiatives (i.e. Town Centres / Co-invest / CWC City Learning Quarter)* £17.39m £16.39m £15.47m

- 3.7 The options detailed above are affordable in the context of the available funding from the Investment Programme but will leave a reduced balance for other recovery initiatives as detailed above.
- 3.8 All of the work-streams above demonstrate a clear link to the WM2041 strategy and Five Year Plan. In order to facilitate decision making, each of the options detailed above will deliver the following:

Option	Deliverable
Option A	This will deliver a Net Zero Neighbourhood demonstrator and will provide the minimum required capacity for the SMART Retrofit Hub. It will also provide additional capacity and capability required across Energy Capital and the Environment teams to deliver the Investment Programme proposals and to mobilise the work on the FYP delivery for one year.
Option B	Option B will deliver all of the above plus additional investment into the Net Zero Neighbourhood programme, which will both enable more activity as well as increase opportunity to leverage in additional investment. This option will also support the roll out of a programme of Community Green Grants to increase access to green space where there is currently a deficit. The grants programme will also support the natural capital elements of the FYP, tree-planting, micro-generation and biodiversity net gain across the West Midlands.
Option C	Option C will deliver all of the above plus additional community green grants to extend impact across the WMCA region. It will also provide additional capacity to Energy Capital and the Environment teams to deliver the Investment Programme proposals and to mobilise the work on the FYP delivery for two years.

3.9 Should WMCA Board agree a funding allocation from the Investment Programme, assurance on cost outputs and approval to spend the budget will be obtained via the WMCA Single Assurance Framework.

3.10 This funding will help develop some of the interventions outlined in the FYP.

4. Legal Implications

None from this FYP. We will work closely with colleagues in the Legal Team during business case development as these progress for each of the priority interventions.

5. Equalities Implications

The equalities implications of this paper – and the activities it proposes – should create net positive effects in terms of the impacts on citizens and communities. Underpinning all the work on WM2041 is the need for it to be a ‘just transition’ (deliberately mitigating the cost of changes for those least able to bear it) and it seeks to embed environmental goals as part of an overall approach to economic growth that is more inclusive.

6. Inclusive Growth Implications

WM2041 was established as a programme that had inclusive growth embedded within it. The commitment to transition to net zero in the WM2041 plans, as well as the alignment with the UN Sustainable Development Goals, underpin our whole approach to addressing climate change. This runs through the FYP, where we have highlighted co-benefits around addressing climate change. These range from reduction of fuel poverty through an extensive retrofit programme, through to natural capital solutions and widening access to green space for people across the region.

In addition to the solutions themselves, the FYP also outlines the numbers and types of jobs that might be created as part of the region’s actions to decarbonise. This includes reskilling opportunities for people currently working in ‘high carbon’ sectors to ensure that opportunities are available for everyone to be part of the transition to net zero.

7. Geographical Area of Report's Implications

The report concentrates on the seven constituent authorities. Different parts of the FYP may involve non-constituent authorities as part of delivery. These relationships will be developed on a case-by-case basis.

8. Other Implications

None.

9. Schedule of Background Papers

Five Year Plan Summary document
Five Year Plan independent technical report

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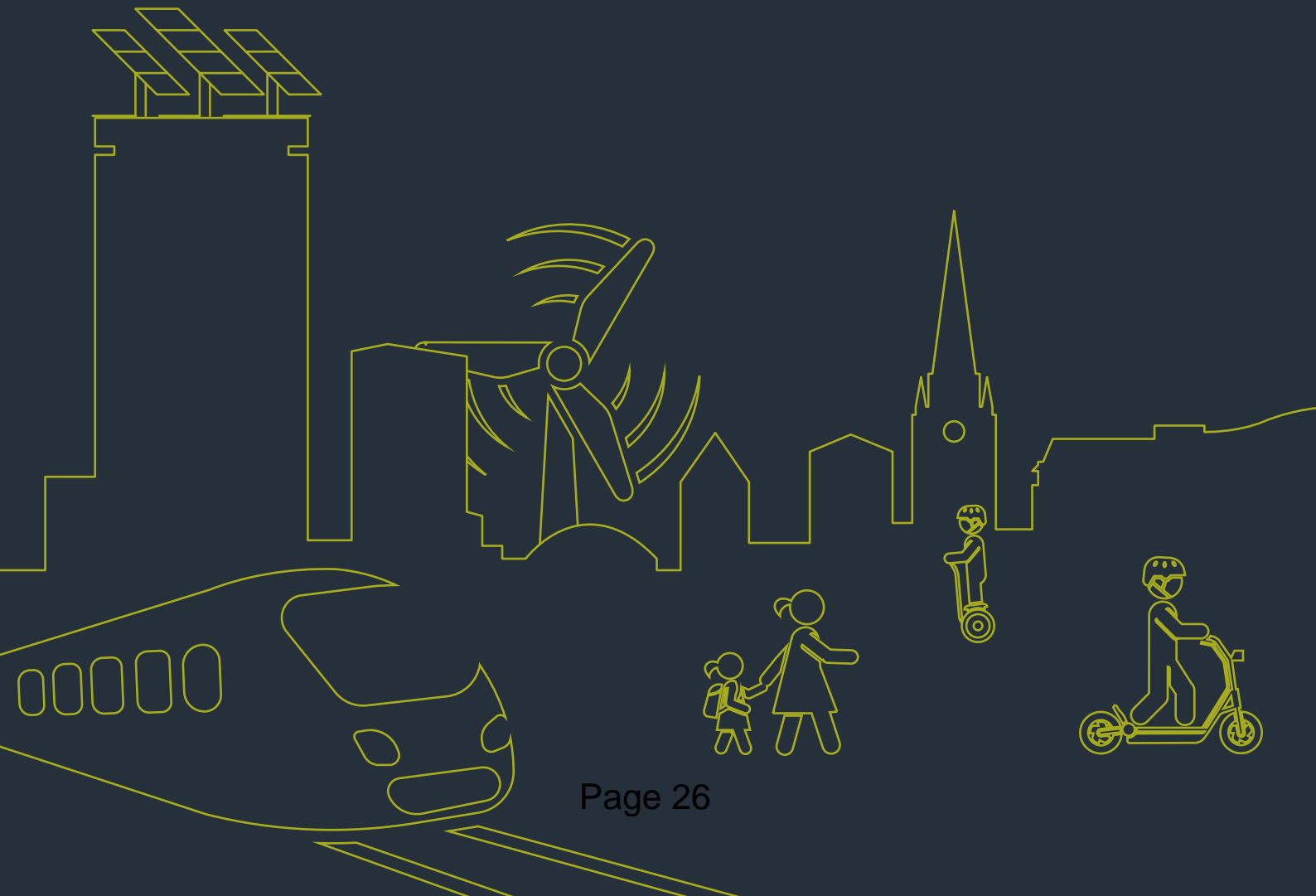
WM2041

FIVE YEAR PLAN 2021-26

Executive Summary



This summary of the first five year plan sets out how the West Midlands Combined Authority area can start to deliver net zero carbon emissions by 2041. It covers:



Summary of the Summary.....	1
Background.....	2
Where are we now?.....	3
Stakeholder Engagement & Data Review.....	4
Sectoral Analysis.....	5
Carbon Modelling Results.....	6
Delivery Plan.....	7
Jobs and Skills.....	8



The Five Year Plan (FYP) – Summary of the Summary

In 2019 the West Midlands Combined Authority (WMCA) set the region a target to be net zero by 2041 and meet the ambitions set out by the Paris Agreement.

This is the first five year plan to demonstrate how the region could deliver the 2041 target and it shows:

- ▲ Under a highly ambitious ‘Accelerated’ scenario, goals in domestic, commercial, industrial, transport and land use sectors could deliver a **33% reduction by 2026 (against 2016 baseline) and net zero by 2041**. The “Accelerated” scenario is recommended to be used as the standard to set the delivery goal ambitions.
- ▲ When considering current efforts and actions and the scale and pace required, the region **is currently not on target**.
- ▲ The **change in delivery pace required is huge and unprecedented**. It requires collaboration and delivery across all sectors well beyond current efforts.
- ▲ Delivery of this five year plan to move the region to a net zero carbon society will represent **an investment in the region’s future** and create a better West Midlands.
- ▲ Although action and investment within the region and by WMCA is crucial, the goals will require **devolution of powers, additional government investment and action by the public**.
- ▲ Gross extra investment required under the ‘Accelerated’ scenario is **£4.3bn by 2026**. However, net investment will be much lower due to operational savings.
- ▲ 41% of delivery is related to technology, 16% requires behaviour changes and 43% is a combination of both. (Taken from Committee on Climate Change, Sixth Carbon Budget)
- ▲ Delivering the ‘Accelerated’ scenario could create **21,000 jobs by 2026 and 72,000 by 2041**.


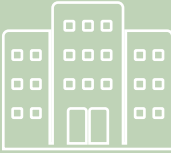

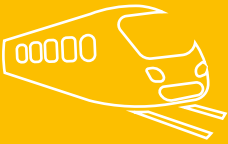




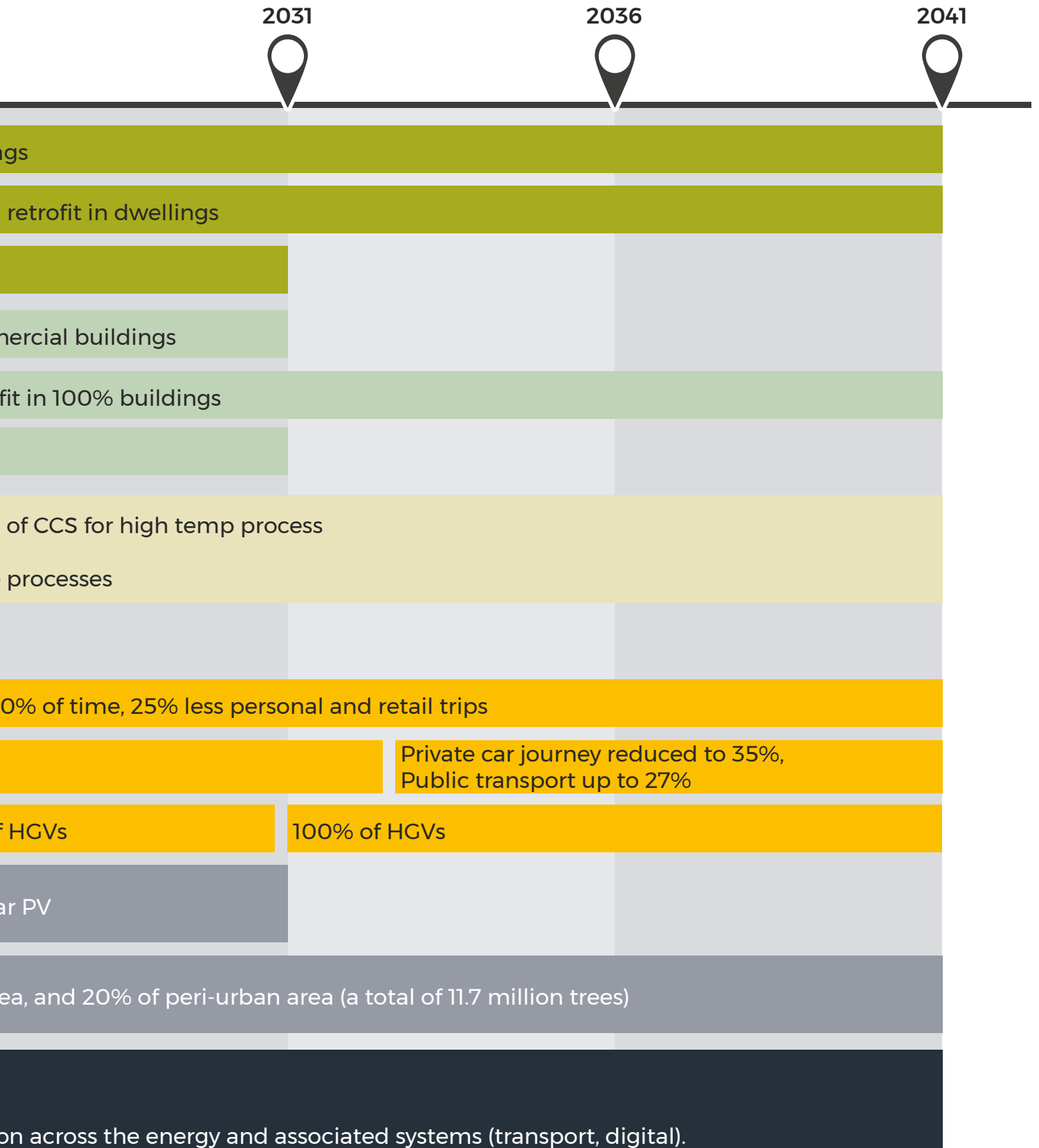
To set the region on course to deliver the net zero target by 2041, WMCA have identified key priorities for delivery, working with regional stakeholders.

1. Set up a **regional approach** to work with stakeholders to unlock investment to deliver energy efficient homes for up to 294,000 dwellings, with low carbon heating in 292,000, at a total cost of £3.6bn, reducing energy bills, fuel poverty and creating jobs.
2. Unlock investment of up to £70m in land based renewables and £483m on rooftop PV by 2026.
3. Energy Capital will support local authorities, LEPs and stakeholders to undertake and implement local area energy planning, enable net zero energy systems and renewables delivery.
4. Be a **pathfinder for energy devolution and regulatory change** to drive competitiveness of the region's industrial and commercial sectors, positioned as a global leader in the net zero transition as part of the WM industrial strategy.
5. Support changes in the way we travel through reduction in car usage and a much higher modal share of public transport and cycling. TfWM will continue to work with local authorities to deliver improvements to **active travel and public transport** as set out in the existing Local Transport Plan (LTP), Movement for Growth, as well as producing a new LTP aligned to WM2041.
6. Implement the **Zero Carbon Homes Routemap** which provides clear actions and targets for reducing operational, embodied and whole life emissions for new residential development.
7. Work with stakeholders to secure inward investment that supports green growth, including a battery **Gigafactory** and electric vehicle charging facilities, powered by clean energy infrastructure.
8. Launch a **Net Zero Business Pledge** to enable businesses in the region to become champions and understand how they can play their part.
9. Establish a regional natural capital board to produce a **natural capital plan for the West Midlands** to increase forestry cover from 1.5 to 13% at a cost of £60m up to 2026.
10. Work with stakeholders to develop and drive **behaviour change initiatives** across the region.
11. Work with colleges, universities and employers to develop the skills and training programmes required to provide the work force for the net zero transition.

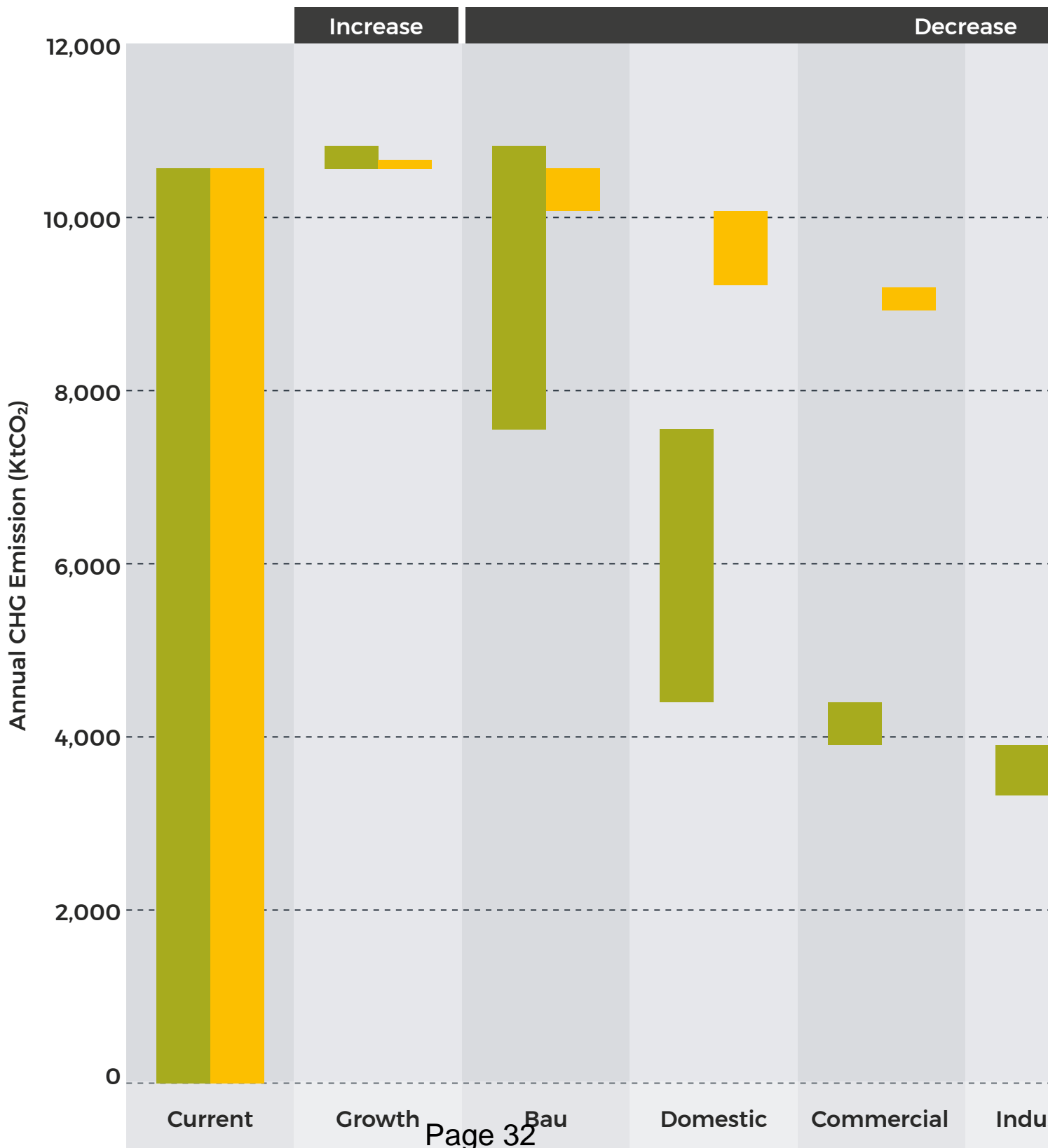


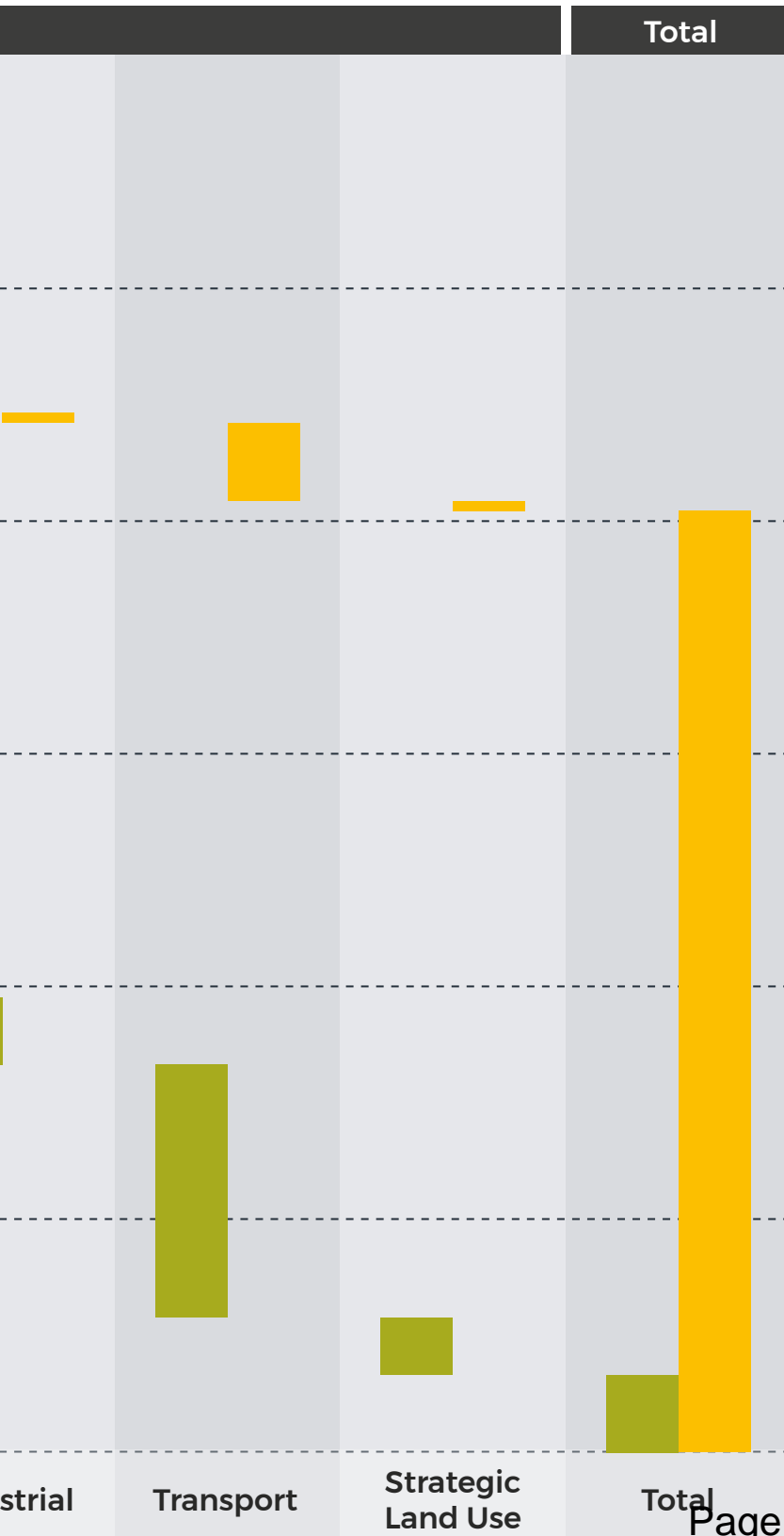
Timeline of actions under 'Accelerated' scenario by 2041

			2021	2026
	Domestic	Energy Efficiency	Energy efficiency in 100% dwellings	
		Heating Retrofit	100% low-carbon heating system	
		Solar PV	830 MWp of rooftop solar	
	Commercial	Energy Efficiency	Energy efficiency in 73,400 commercial buildings	
		Heating Retrofit	Low-carbon heating system retrofits	
		Solar PV	705 MWp of rooftop solar	
	Industrial	Energy Efficiency and Heating Retrofit	16.7% deployment of H ₂ and 40% 10% energy efficiency 100% electrification for low temperature processes	
		Solar PV	96 MWp of PV	
	Transport	Avoid	35% of people tele-commuting 50% of people working from home	
		Shift	Bike increase to 10% of trips	
		Improve	100% electric taxis, buses, 50% of trucks	
	Land Use	Renewables	59 MV Wind and 448 MWp of solar	
		Natural Capital	Tree coverage in 13% of WMCA area	
	Systems Management		Upgrade and manage coordination	



Carbon modelling results for 2041 and 2026 (Accelerated scenario)





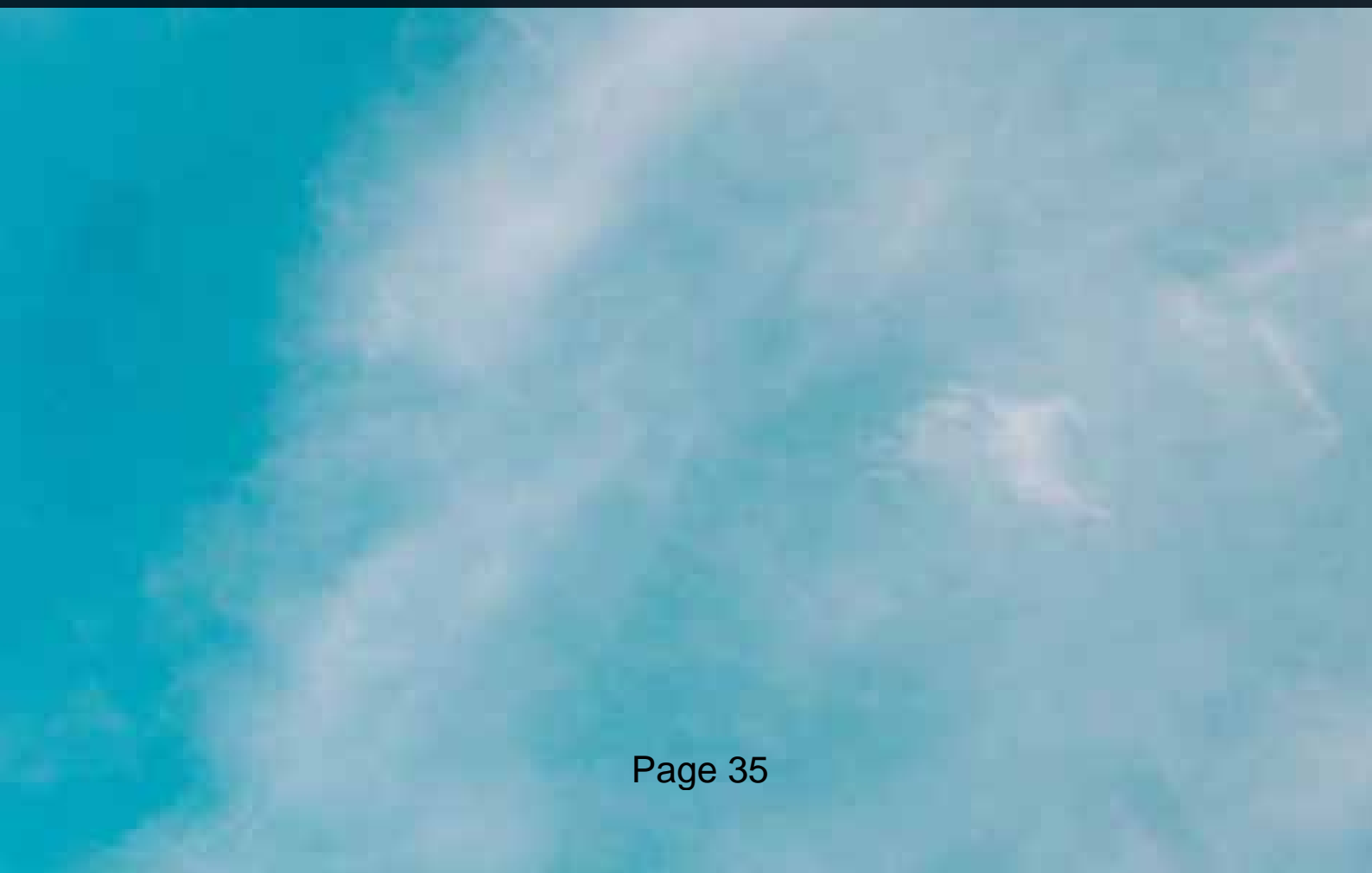
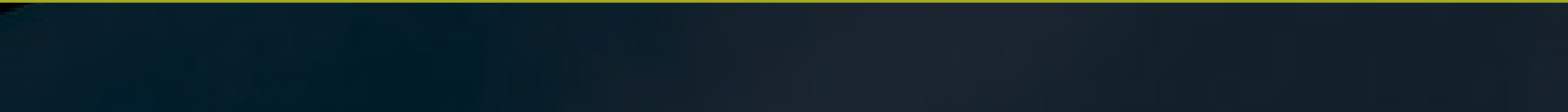
Modelling shows implementing all goals gives a **94% reduction by 2041 – net zero is realistic.**

The ‘accelerated’ scenario results in a **33% reduction to 8.1 MtCO₂ per year by 2026** (against a 2016 baseline).

Carbon modelling shows that there is a **gap between what is technically possible and socially tolerable** and the Tyndall target of 4.9MtCO₂ per year by 2026.



BACKGROUND



Background

Following the approval of the **‘WM2041: A Programme for Implementing an Environmental Recovery’** in June 2020, the WMCA and stakeholders committed to producing five-year delivery plans in support of delivering the **net zero carbon target for the West Midlands by 2041**.

The aim of this first Five Year Plan (FYP) is to provide clear guidance on the types of measures that will need to be implemented in the 2021-2026 timeframe to reach net zero by 2041.

The West Midlands Combined Authority and stakeholders, must understand where and how investment is required in programmes of delivery and policy changes to support the 2041 target.

The West Midlands Combined Authority also needs to understand how this should be sequenced and the combination of approaches that will need to be taken to get them to a position of net zero by 2041.

#WM2041 – goals and principles

The original WM2041 plan (published in January 2020) suggested that becoming zero carbon needed to take account of wider social, economic and environmental principles. These are:



Alignment with the UN Sustainable Development Goals

Investing in mitigating and adapting to climate breakdown is essential for the future of the WMCA region.

The WMCA is committed to a model of inclusive growth which judges economic activity by the quality of its outcomes for people and place, aligned with UNSDGs.

1 Unite people across the region by creating common cause and **addressing inequalities**



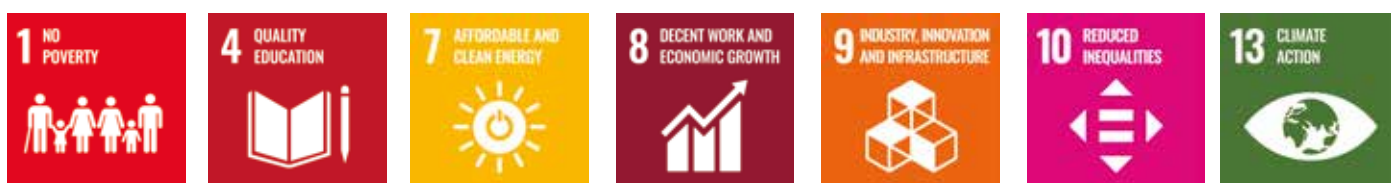
2 Make space for **sustainable transport**



3 Invest in **comfortable homes and buildings**



4 Build wealth, and recycle it throughout the region through **skills and community ownership**



The first Five Year Plan aims to:

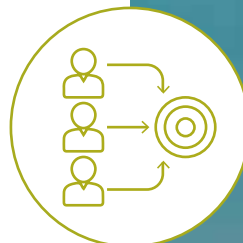
Evidence based plan

Provide an **evidence based plan**, linking up WM2041 and local authority delivery plans, projects and investment programmes.



Common vision for stakeholders

Create a **common vision for stakeholders** across 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 potential new routes to delivery** and where this is best led by communities, the public sector, the private sector, or a mixture.



Funding sources, financing and investment

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



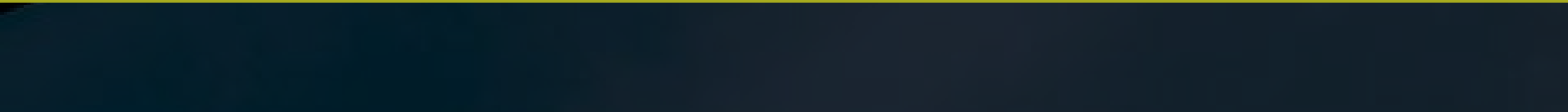
A step change

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

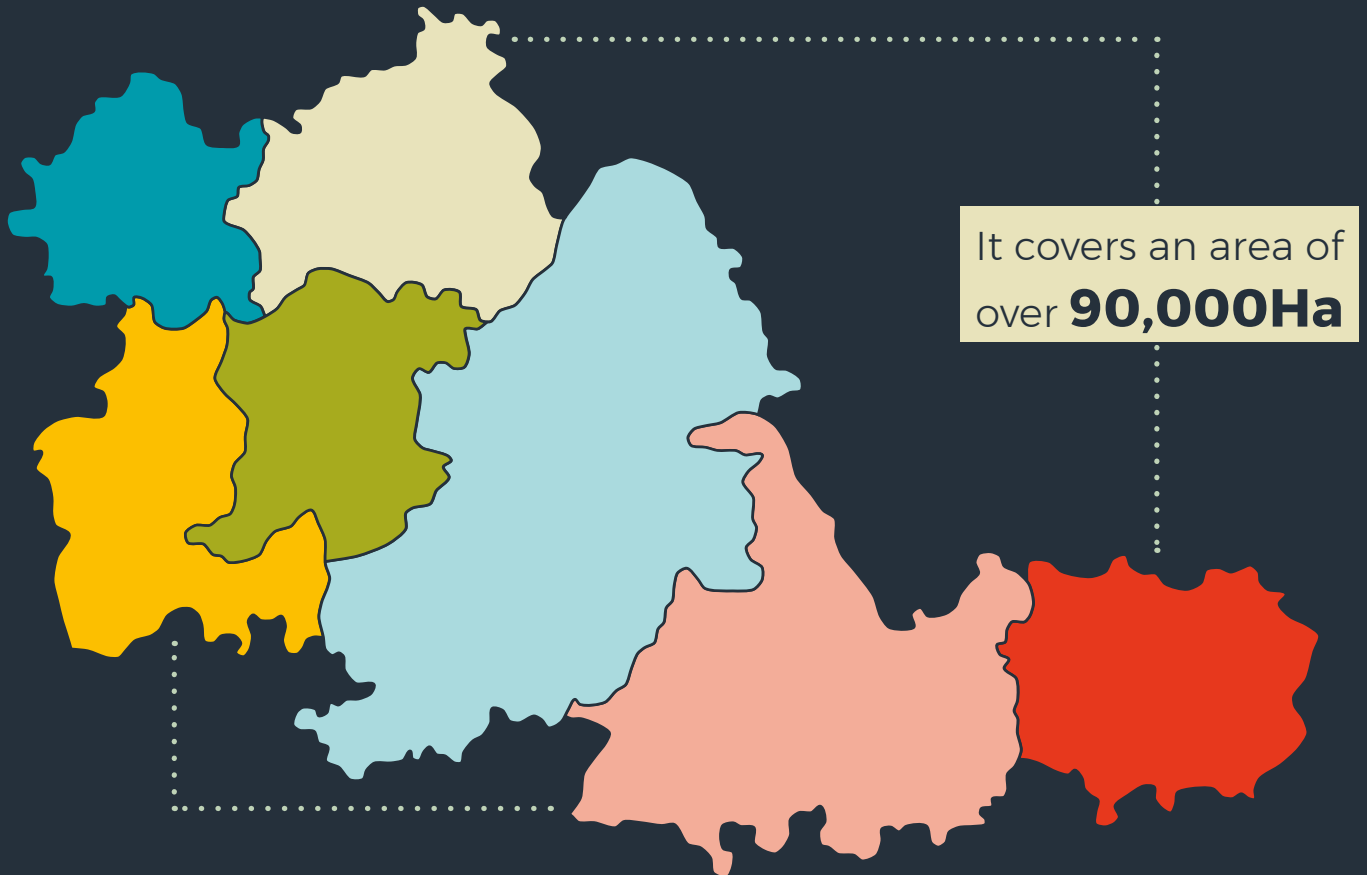




WHERE ARE WE NOW ?



About the West Midlands Combined Authority region



**2.9m people in
1.15 million homes**

Birmingham

Coventry

Dudley

Sandwell

Solihull

Walsall

Wolverhampton

Page 42

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).



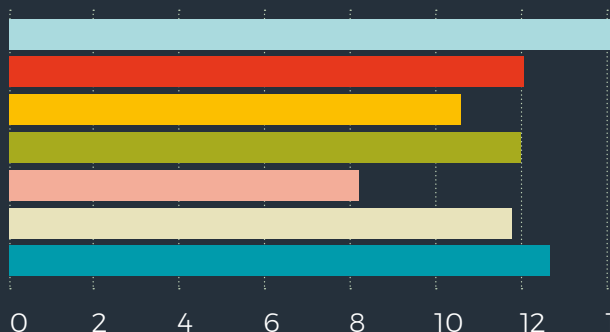
75 million vehicle miles taking place annually in the West Midlands Combined Authority. Over 60% of all journeys are made by car.

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

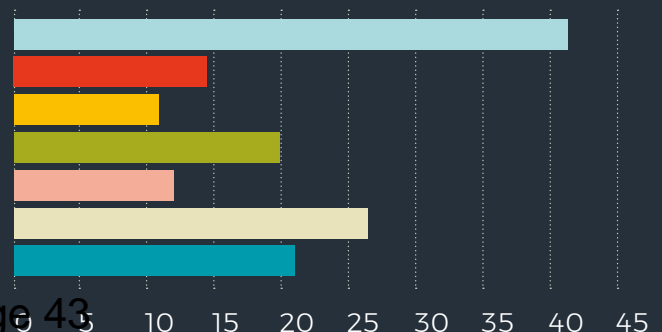


There is significant **variation across the seven local authorities** including the levels of fuel poverty (the national average for fuel poverty is 10.3%) and in the indices of multiple deprivation.

Proportion of households fuel poor (%)

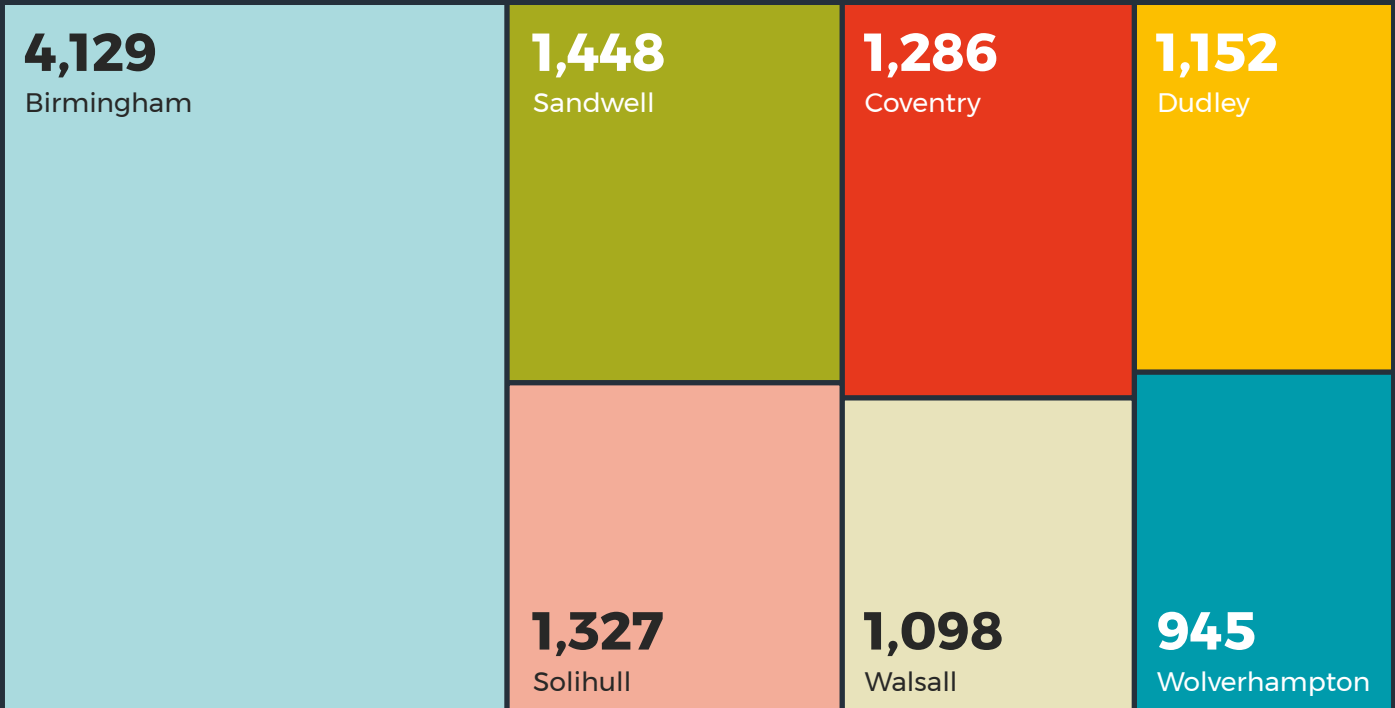


Proportion of LSOAs in most deprived 10% nationally



GHG emissions in the West Midlands Combined Authority

2018 Share of GHG Emissions (ktCO₂)

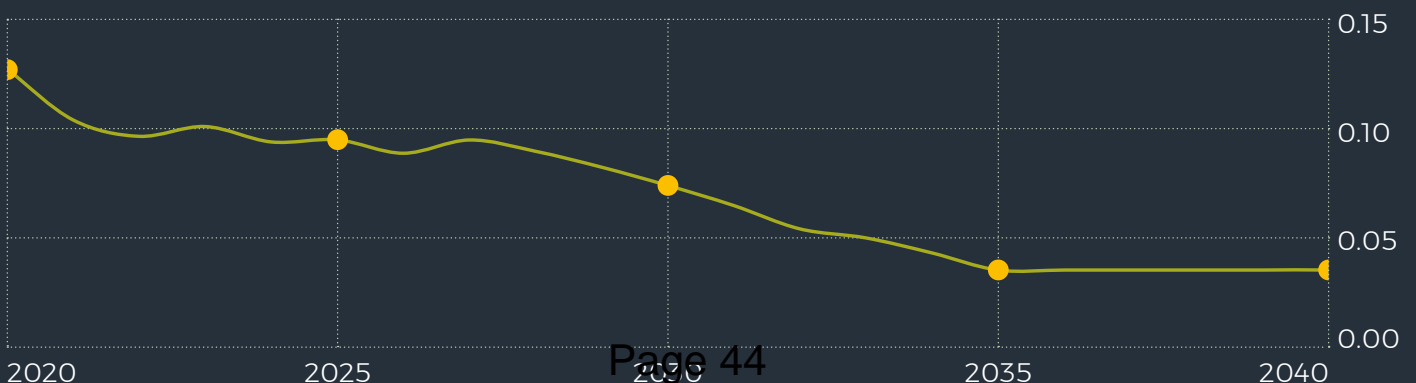


11,385 ktCO₂ emitted across
The seven boroughs in 2018

The split in energy consumption of **50,238 GWh**

Projected Decarbonisation of Electricity

(kgCO₂/ kWh)

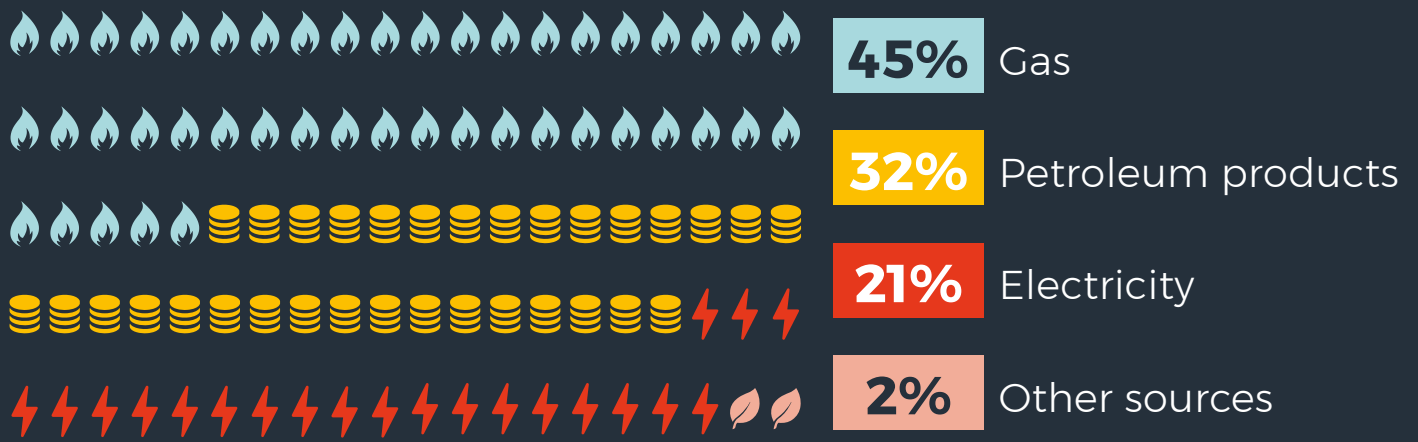


Energy Use

by End User

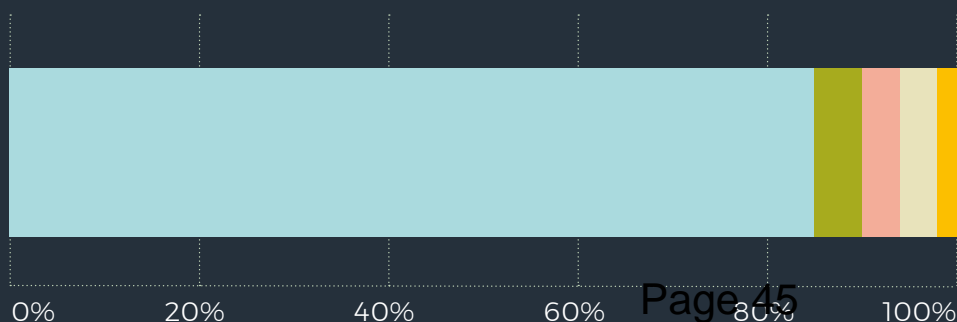
Energy consumption is split evenly between -

- 29%** Transport
- 39%** Domestic
- 32%** Industry & Commercial



UK Heating Appliances in Homes (%)

- Gas Central Heating
- Electric Storage Heating
- Oil Central Heating
- Other
- Communal Heating



The vast majority of gas consumption is for space and water heating, and cooking, whereas petroleum is almost completely used for transport.

Scope of carbon emissions in FYP

▲ **To estimate carbon emissions from the seven constituent local authorities** by considering fuel use within the local authority geographic area only. This is a standard method for regional analysis.

▲ **The rationale for this methodology is that:**

- The dataset has been developed for use by local authorities and devolved administrations for targeting and monitoring carbon reduction and energy efficiency policies
- Sub-national energy use and GHG emissions data are available from central government.
- There is a level of consistency between the reporting from local authorities and allows for easier comparison and benchmarking.

▲ **The four main fuel categories considered are:**

- Natural gas
- Electricity
- Road transport fuels
- Residual (non-electricity, non-gas and non-road transport) fuels

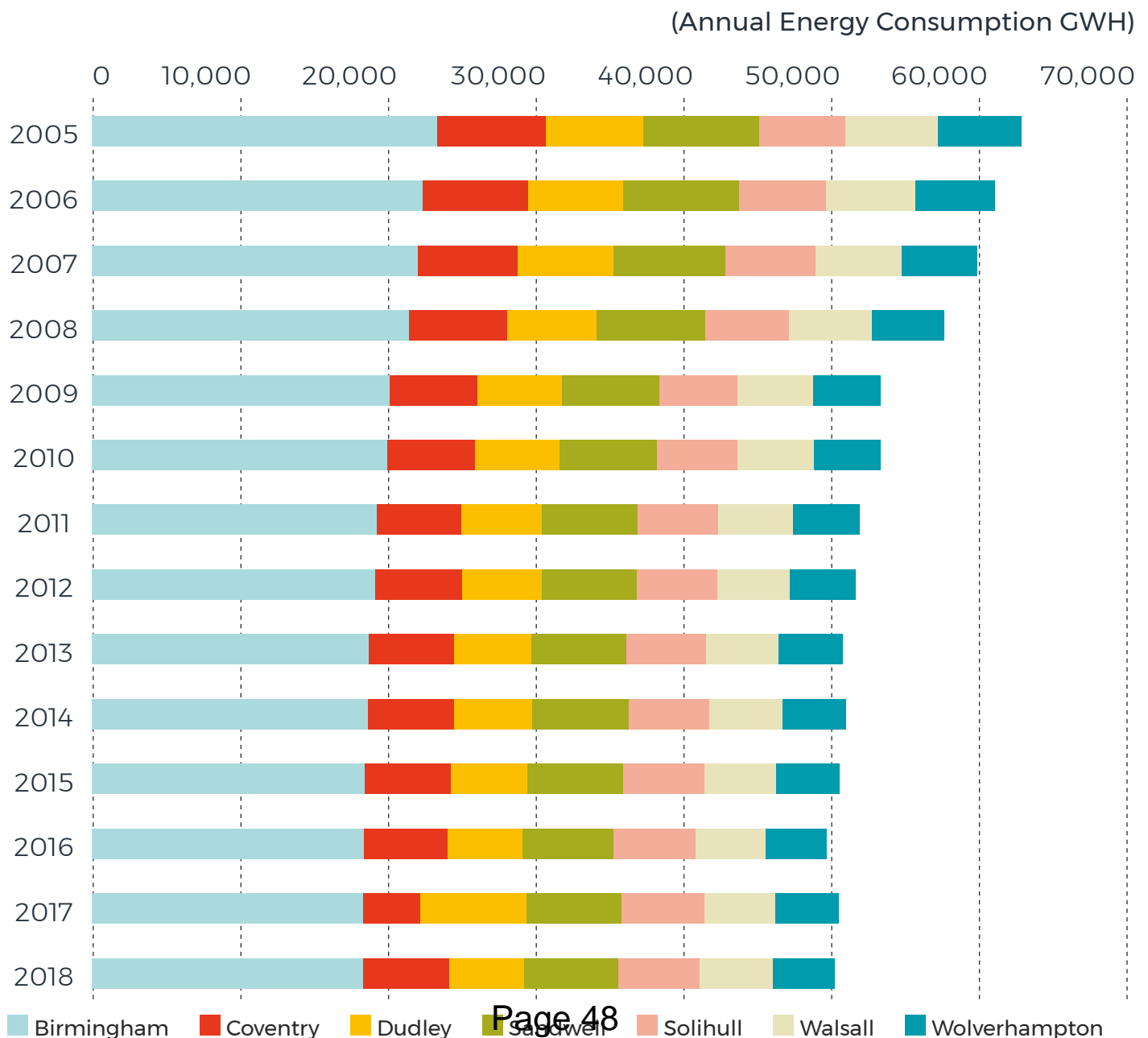
▲ This approach does mean, however, that **only energy use undertaken within the physical boundary is considered**. Other emissions, such as from the release of fluorinated gases, often used in refrigeration, are omitted.





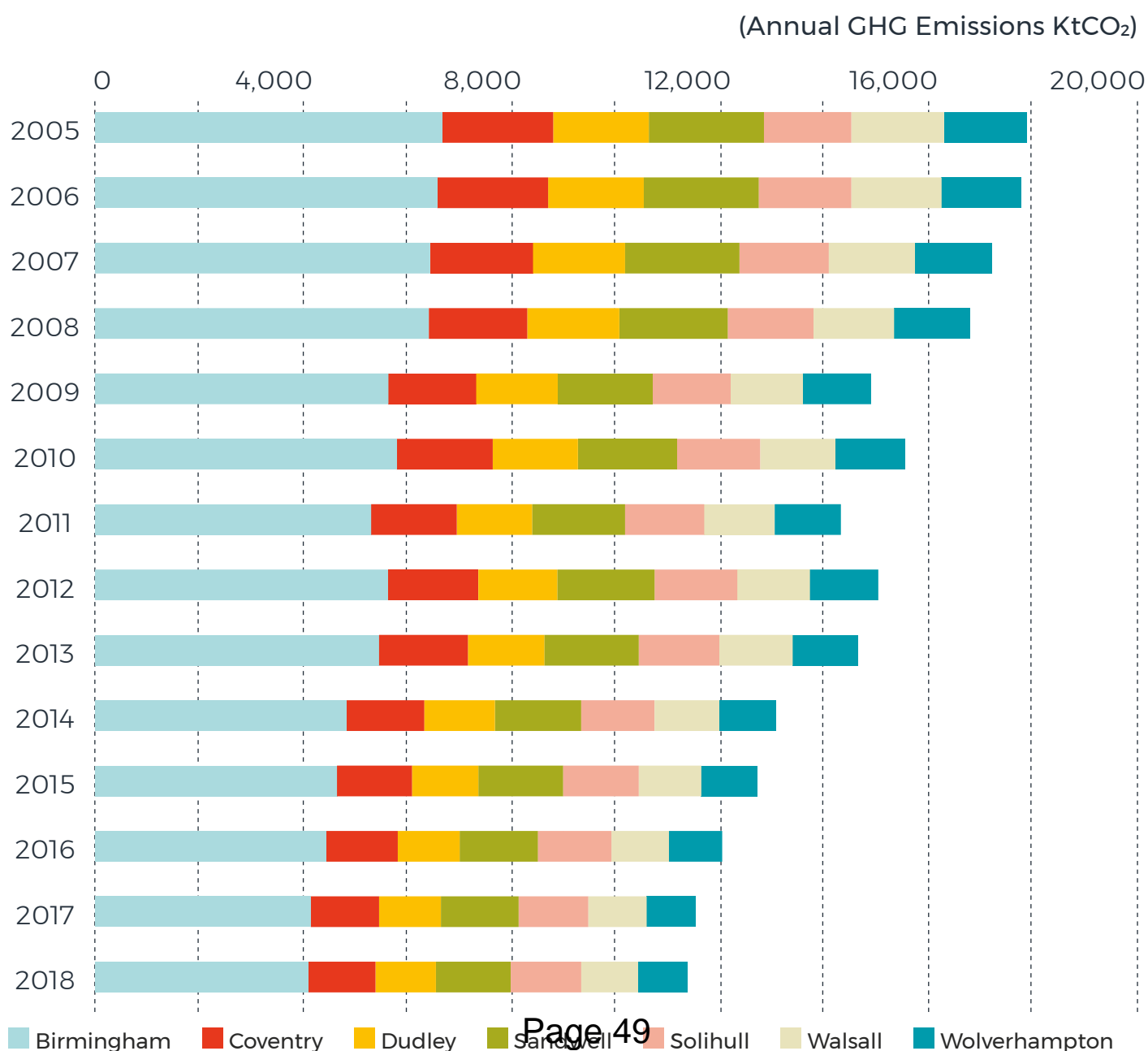
West Midlands Combined Authority area energy consumption

Energy consumption in the region	Fallen since 2005	The split of emissions by end-user		The split of emissions by fuel	
50,000 GWh per annum	↓ 20%	Domestic	39%	Natural Gas	45%
		Commercial/Industry	32%	Electricity	21%
		Transport	29%	Petroleum	32%



West Midlands Combined Authority area GHG emissions

Greenhouse gas emissions in the region	Fallen since 2005	The split of emissions by end-user		The split of emissions by fuel	
11 KtCO ₂ per annum	↓ 36%	Domestic	34%	Natural Gas	37%
		Commercial/Industry	30%	Electricity	22%
		Transport	36%	Petroleum	36%



The region is doing a lot already

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

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



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

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)

Birmingham

Solihull

Coventry

WMCA investment and programme development

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**.



Buildings

- ▲ **Regional retrofit programme** development to outline investment and opportunities to deliver energy efficiency in buildings. WMCA also helped secure £1m funding to support people in fuel poverty.
- ▲ **Zero Carbon Homes Charter** and Routemap produced to show how the region can deliver zero carbon homes by 2025.



Energy

- ▲ **Energy Capital** board brings together key stakeholders for the region's energy transition, ensuring it supports green growth and removes barriers at the local level. The board is developing the regulatory and devolution requests to government.



Circular and Green Economy

- ▲ **Circular Economy task-force** established Nov 2020 to identify the business and social opportunities by adopting more circular, less wasteful approaches.
- ▲ Developed a **Green Innovation Challenge** with WM5G & 5PRING Accelerator to support new business solutions to our WM2041 challenges that could make use of 5G.



Natural Capital

- ▲ **WM Virtual Forest** website launched to accelerate tree planting with regional stakeholders.
- ▲ £2m WMCA investment to support **Wildlife Ways** in Solihull.
- ▲ Developed **West Midlands National Park** concept with Birmingham City University.

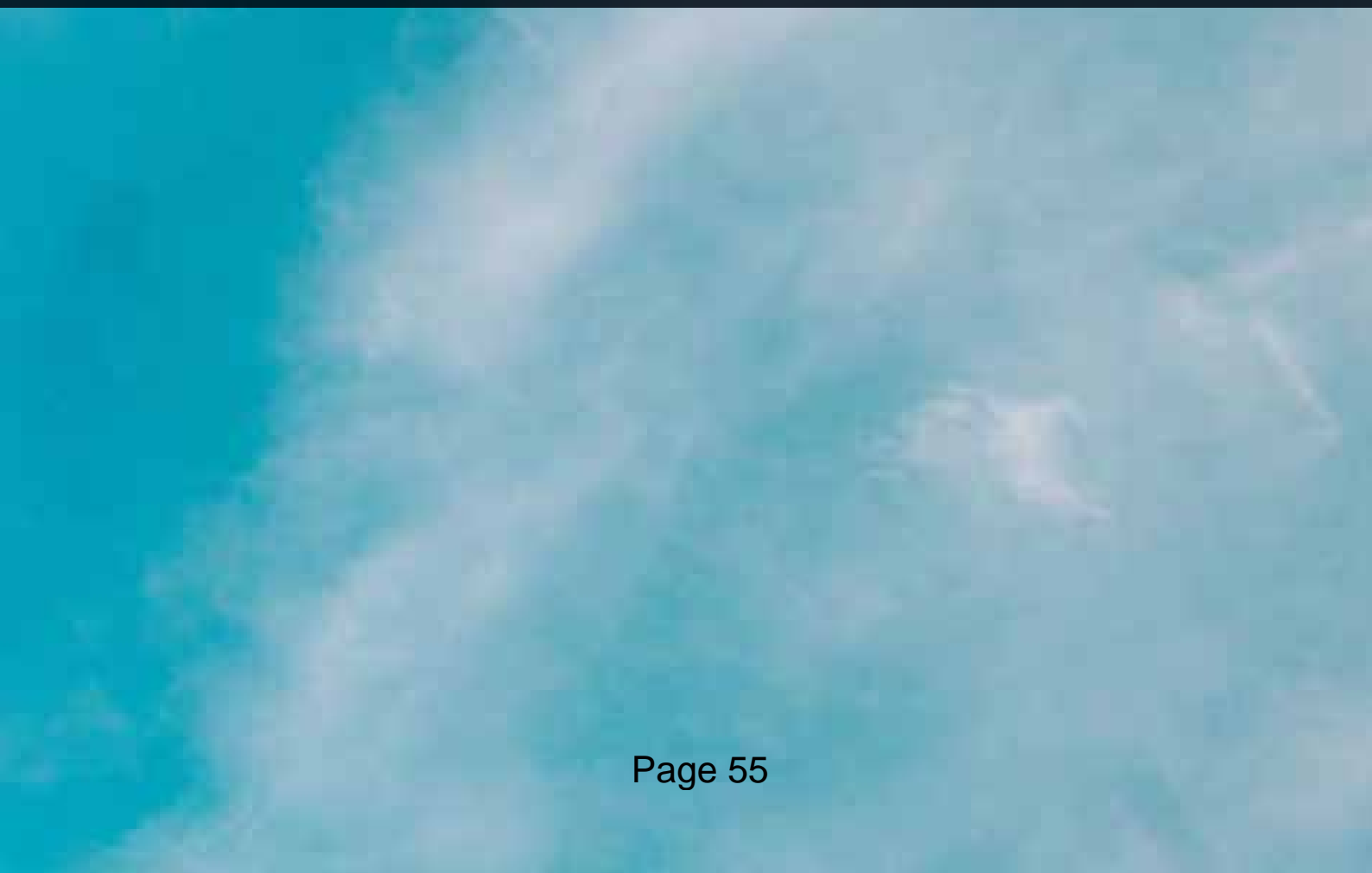
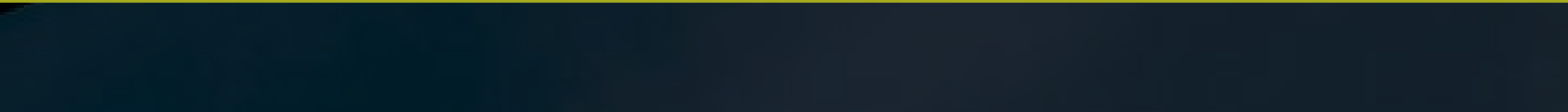


National policy timeline

Pre 2020	<ul style="list-style-type: none"> ▲ Minimum energy Efficiency Standards (MEES) for new let of at least EPC E
2020	<ul style="list-style-type: none"> ▲ MEES expanded to cover existing Private Rental Sector ▲ Green Home Grants for dwellings ▲ Grid Carbon of 233gCO₂/kWh
2023	<ul style="list-style-type: none"> ▲ MEES expanded to cover existing non-domestic lets
2025	<ul style="list-style-type: none"> ▲ MEES expanded to minimum EPC C for Private Rental Sector, new lets only ▲ Future Homes Standard for construction of new dwellings ▲ Grid Carbon of 175gCO₂/kWh
2026	<ul style="list-style-type: none"> ▲ National policy could result in 7% reduction by 2026 for the region
2028	<ul style="list-style-type: none"> ▲ MEES expanded to minimum EPC C for all Private Rental Sector ▲ Heat Pump target installation of 600,000 per year
2030	<ul style="list-style-type: none"> ▲ MEES expanded to minimum EPC C for non-domestic lets ▲ Grid Carbon of 137gCO₂/kWh ▲ New Car Ban for petrol and diesel engines ▲ 10 Point Plan delivered
2035	<ul style="list-style-type: none"> ▲ Clean Growth Strategy as many homes at EPC C as possible ▲ New Car Ban for hybrid engines ▲ Grid Carbon of 68gCO₂/kWh
Post 2040	<ul style="list-style-type: none"> ▲ De-carbonised Railways mainly electrified in the West Midlands by 2040 ▲ National Net Zero target by 2050 ▲ Grid Carbon continues to decarbonise



STAKEHOLDER ENGAGEMENT & DATA REVIEW



The role of WSP...



240
individuals
actively engaged



97 different
organisations

Methods of engagement



Regular progress
meetings



One to one virtual
meetings



Surveys



Presentation at an
existing West Midlands
network or meetings



Virtual Workshops
(specifically to present on
the WM2041 Five Year Plan)

“

We know and understand that the green agenda is a priority and the direction of the broad ambitions, however there is limited precision on the details and so, unfortunately little gets done.

“

Current committed actions will only move the dial a little - there is a need to go beyond business as usual.

“

Consideration of people's mindset is important; they are generally supportive of climate change until they either have to change their ways or spend money.

Page 56

Key findings from stakeholders



Interventions

- ▲ Energy efficiency, alternative modes of transport and alternative fuels need to be the focus.
- ▲ Recognition of the importance of nature-based solutions, which should go beyond just tree planting.
- ▲ Interventions should not just be technological – behaviour change is key.
- ▲ There are existing commitments around net zero, and varying degrees of implementation that should be included.

Delivery Mechanisms

- ▲ Integration and alignment across the region is vital – we all have a role.
- ▲ Local authorities need to have a central role in delivering and supporting private organisations.
- ▲ Importance of having a regional approach with the West Midlands Combined Authority.
- ▲ Engagement and collaboration with suppliers and wider industry seen as key to delivery.
- ▲ Behaviour change and acceptability of interventions and how they are delivered is important.
- ▲ There is a need for support through the planning system and consistent policy on land use.

Jobs and Skills

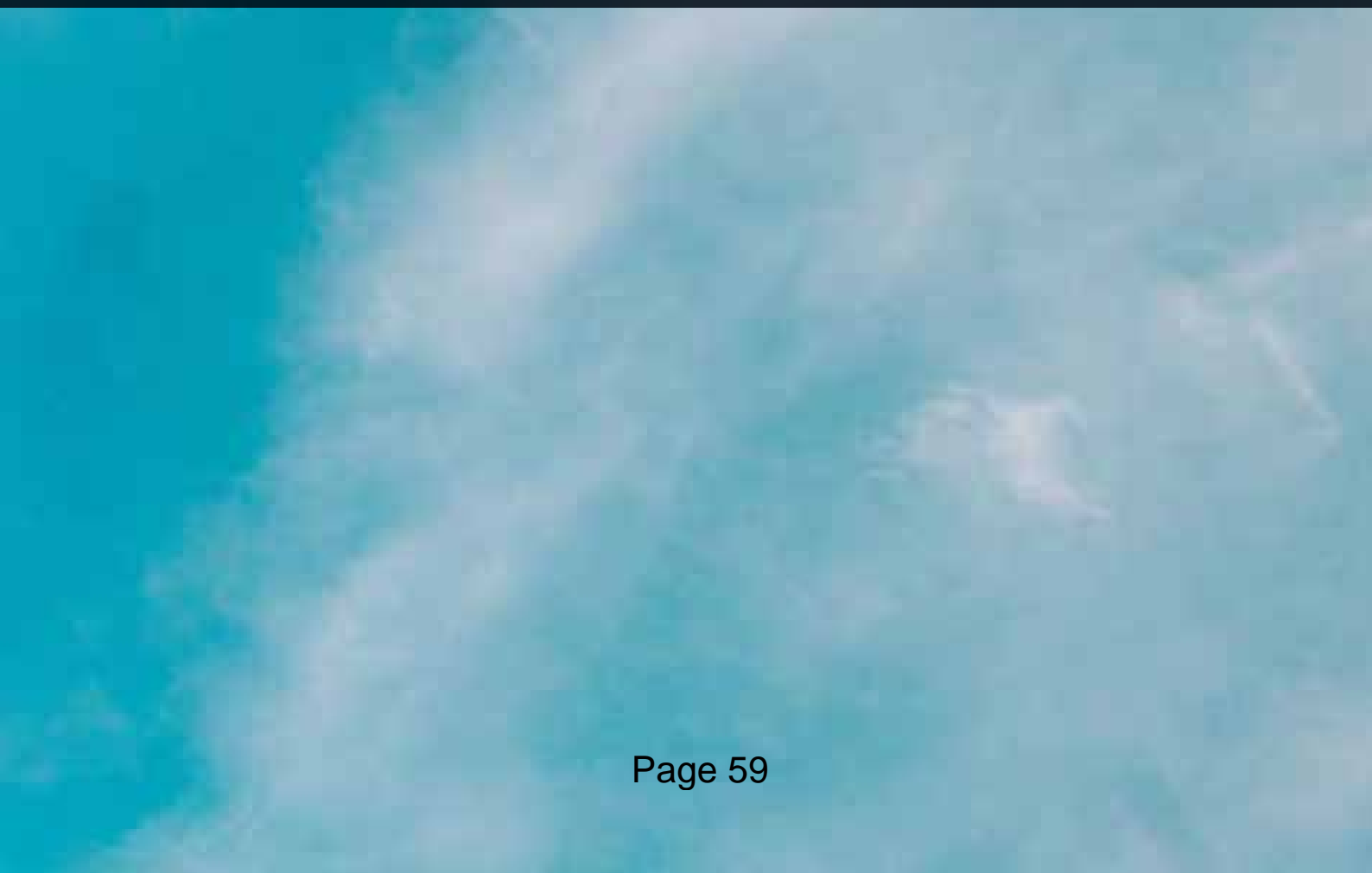
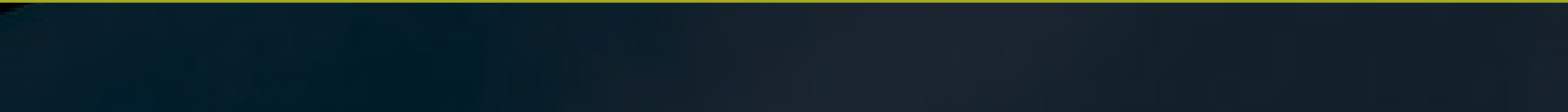
- ▲ Engagement and alignment between educational institutions and employment providers is key.
- ▲ The partnerships and delivery mechanisms are already in place.
- ▲ Low carbon jobs and skills is still in its infancy with limited confidence and understanding of what the 'Green Recovery' actually means in terms of jobs and skills.
- ▲ Renewable energy and automotive skills perceived as most important, by most respondents.

Resources

- ▲ Main barriers – access to finance & funding structure, followed by regional powers & infrastructure.
- ▲ Clear structures and avenues for funding for each intervention would instil confidence.
- ▲ There is a need for national grid to be able support energy efficient transitions.
- ▲ The plan needs to include real costs, practicalities, accessible funding options and constraints.
- ▲ Concerns were raised around paybacks and how much time these might take to be realised.



SECTORAL ANALYSIS



Sectoral Breakdown

Net Zero



System Management

Page 60

These are the 15 main goals and modelling of carbon reduction.

Co-benefits of delivery -

1	Domestic energy efficiency retrofit
2	Domestic heating retrofit
3	Domestic solar PV
4	Commercial energy efficiency retrofit
5	Commercial heating retrofit
6	Commercial solar PV
7	Industrial energy efficiency & fuels
8	Industrial renewables
9	Avoiding travel
10	Shifting travel
11	Improving passenger service fleets
12	Improving freight fleets
13	Improving private vehicles
14	Land use (Renewables)
15	Land use (Natural Capital)

- ▲ Lower energy bills & fuel poverty
- ▲ Reduce inequalities

- ▲ Boosting regional competitiveness
- ▲ Retain energy spend in region
- ▲ New business opportunity & economic growth

- ▲ Cleaner air
- ▲ Better physical & mental health

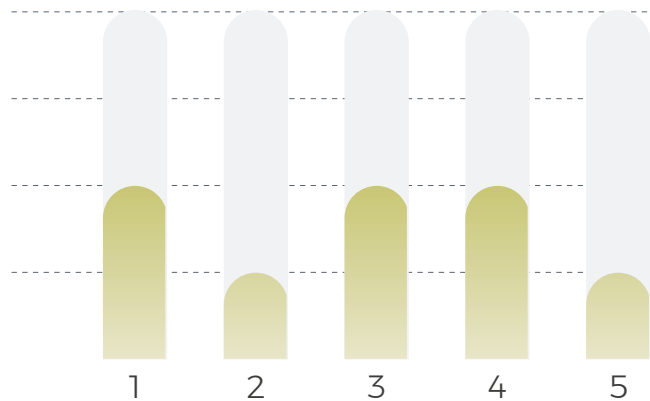
- ▲ Adapting to climate change
- ▲ Enhancing biodiversity
- ▲ Better physical & mental health

Delivery Scenarios

Moderate

Sector delivery levels for each goal are mainly set at 'Medium' or 'Low' but are still beyond the business as usual delivery pace.

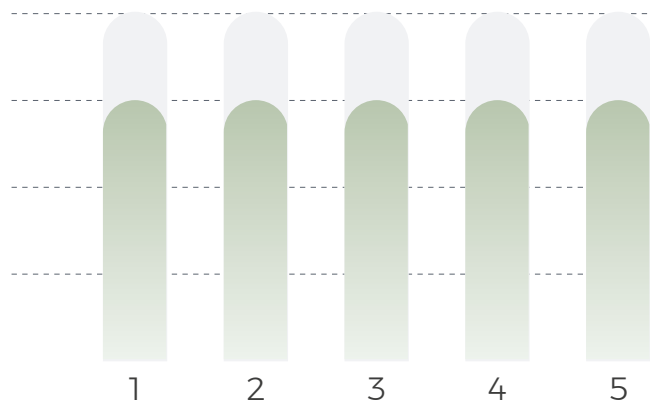
❌ Achieve 2026 goal ❌ Achieve 2041 goal



Accelerated

A much more rapid and aggressive delivery pace across sectors, with most set at a "High". Energy efficiency and fuel switching for industry is medium as the majority of technologies required are at an early stage of development. Due to its much smaller scale, solar PV in industrial buildings has been set at a very high level. **This reference scenario for the plan - it is hugely ambitious.**

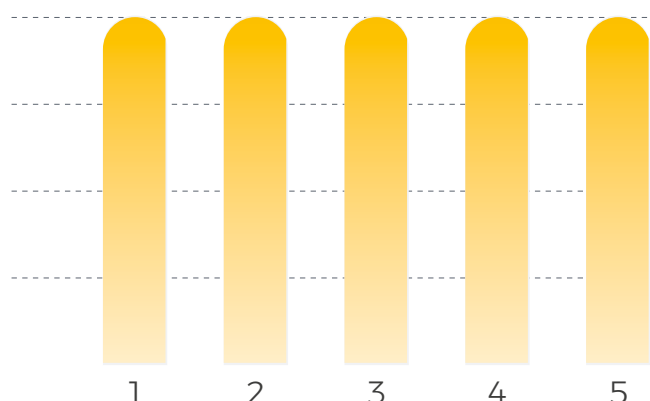
❌ Achieve 2026 goal ✅ Achieve 2041 goal

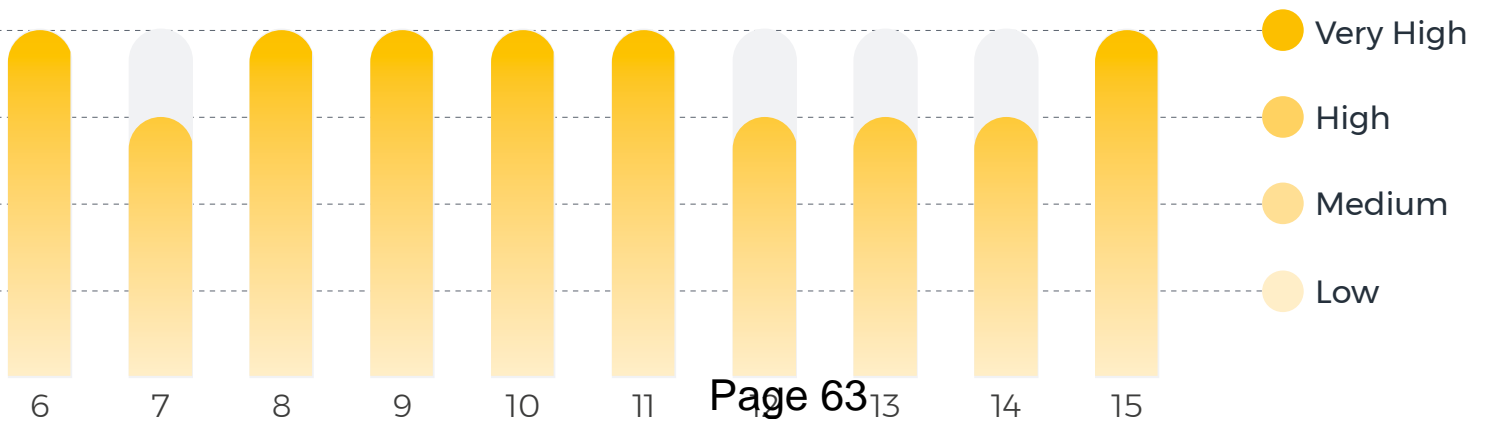
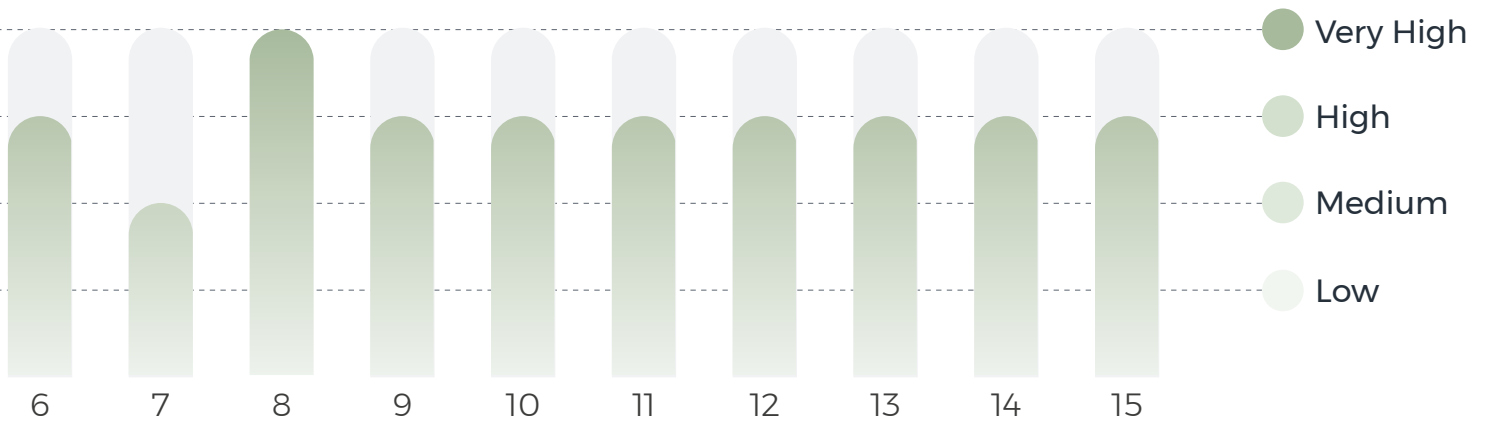
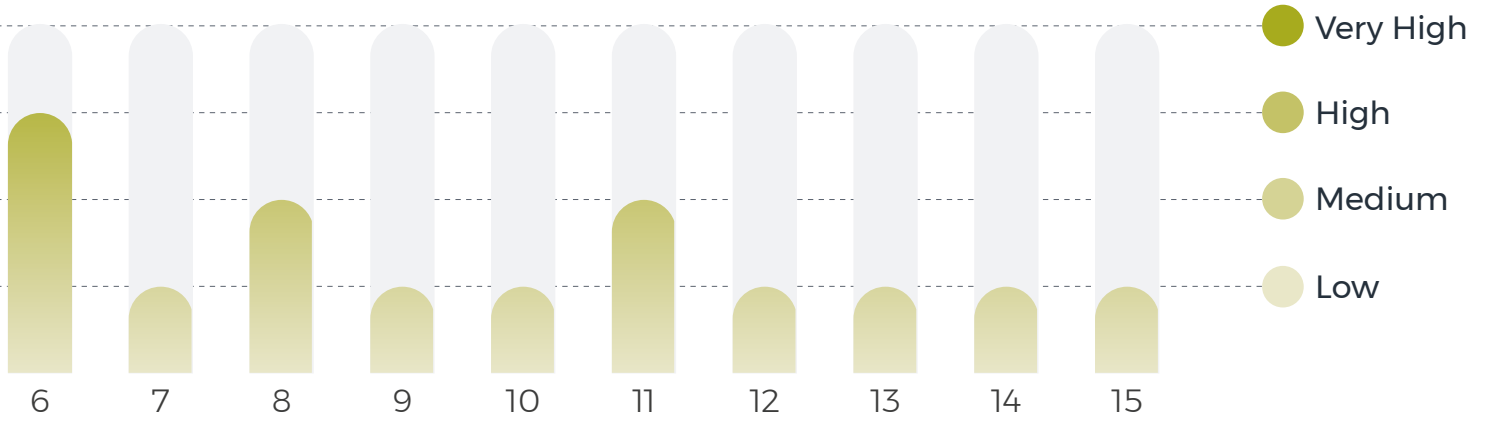


Maximum

This scenario was developed to illustrate what would be required to meet the 2026 target. It is at the limit or beyond what it is technically possible, even ignoring legislative competence and finance restrictions. It would require large behaviour change from people and could create unintended consequences. It has not been used, but can be explored by those seeking to understand what is required.

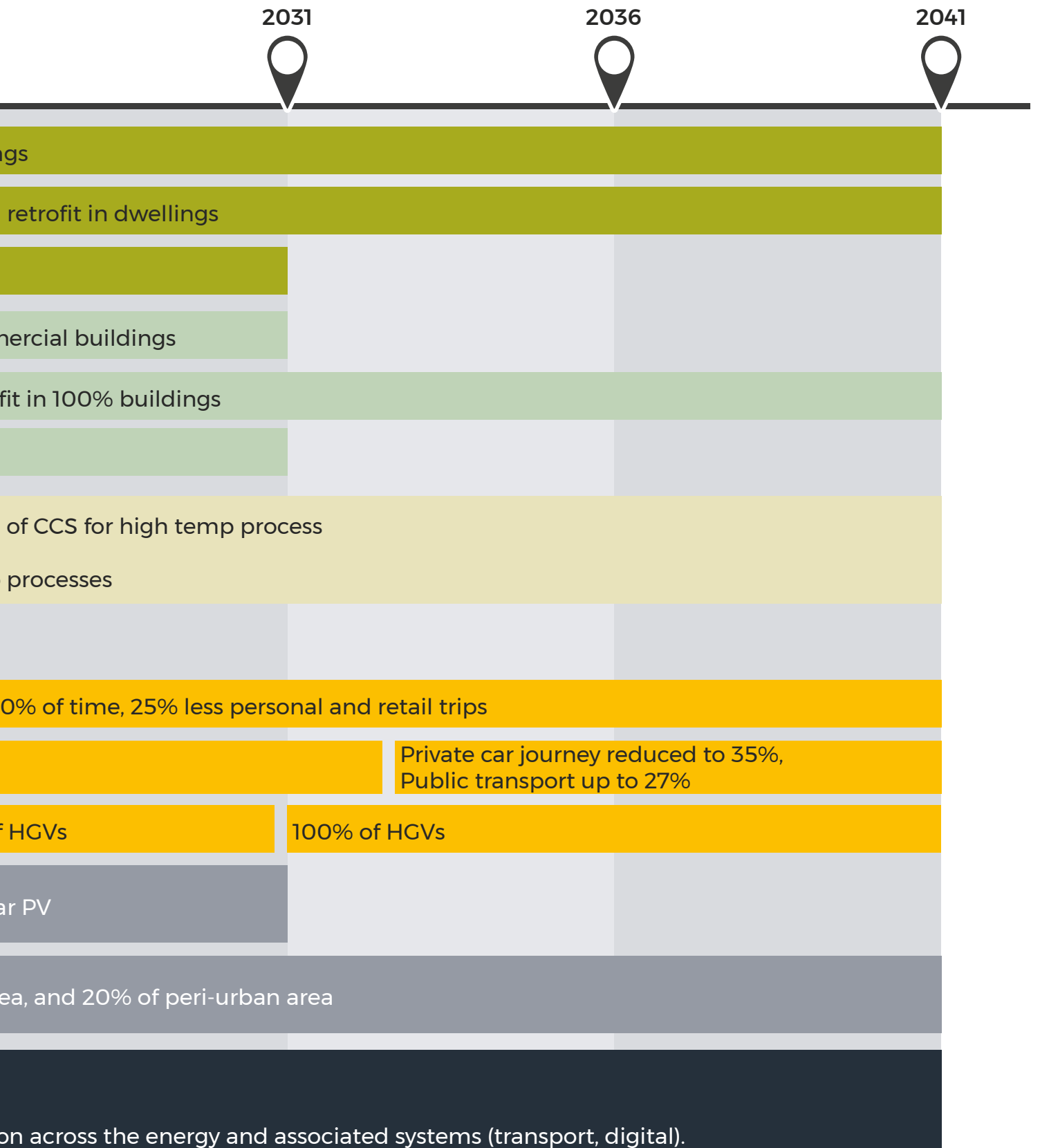
✅ Achieve 2026 goal ✅ Achieve 2041 goal





Ambition and timeline under 'Accelerated' scenario to 2041

			2021	2026
	Domestic	Energy Efficiency	Energy efficiency in 100% dwellings	
		Heating Retrofit	100% low-carbon heating systems	
		Solar PV	830 MWp of rooftop solar	
	Commercial	Energy Efficiency	Energy efficiency in 73,400 commercial buildings	
		Heating Retrofit	Low-carbon heating system retrofits	
		Solar PV	705 MWp of rooftop solar	
	Industrial	Energy Efficiency and Heating Retrofit	16.7% deployment of H ₂ and 40% energy efficiency	
		Solar PV	100% electrification for low temperature processes 96 MWp of PV	
	Transport	Avoid	35% of people tele-commuting 5 days a week	
		Shift	Bike increase to 10% of trips	
		Improve	100% electric taxis, buses, 50% of other vehicles	
	Land Use	Renewables	59 MV Wind and 448 MWp of solar	
		Natural Capital	Tree coverage in 13% of WMCA area	
	Systems Management		Upgrade and manage coordination	

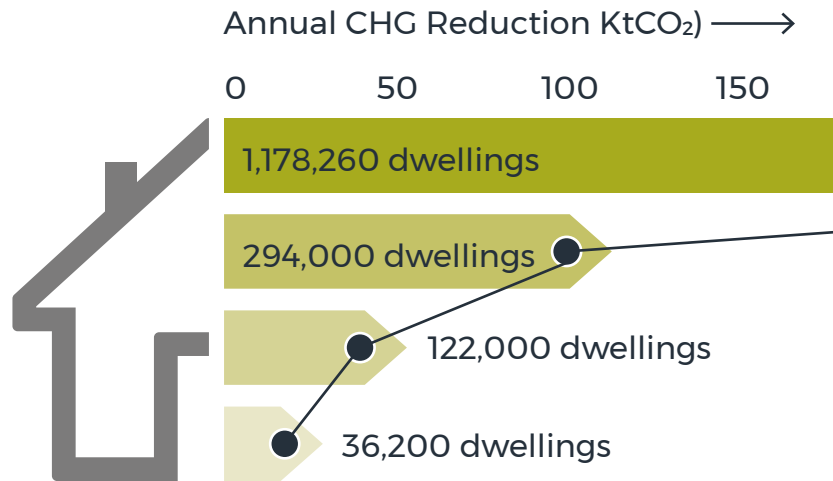


Domestic Retrofit

Goal 1 – Energy Efficiency Retrofit



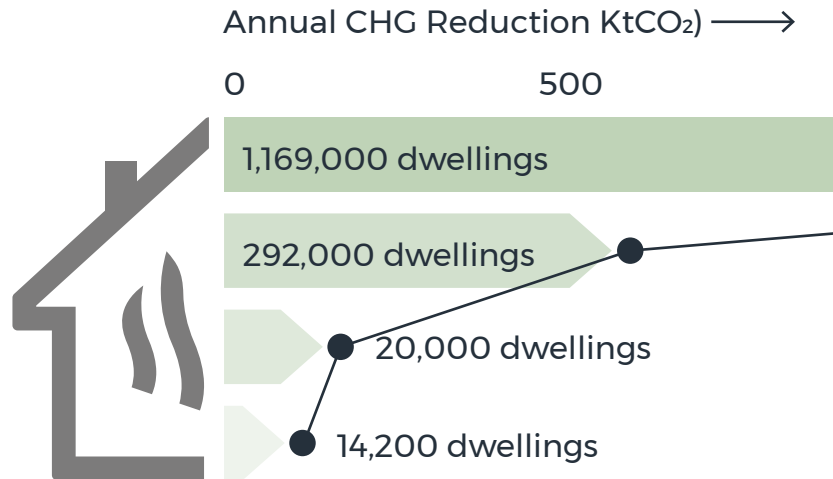
The installation of specific measures including **smart meters, smart thermostats, cavity and solid wall insulation, loft insulation, double glazing and behaviour change.**



Goal 2 – Heating Retrofit



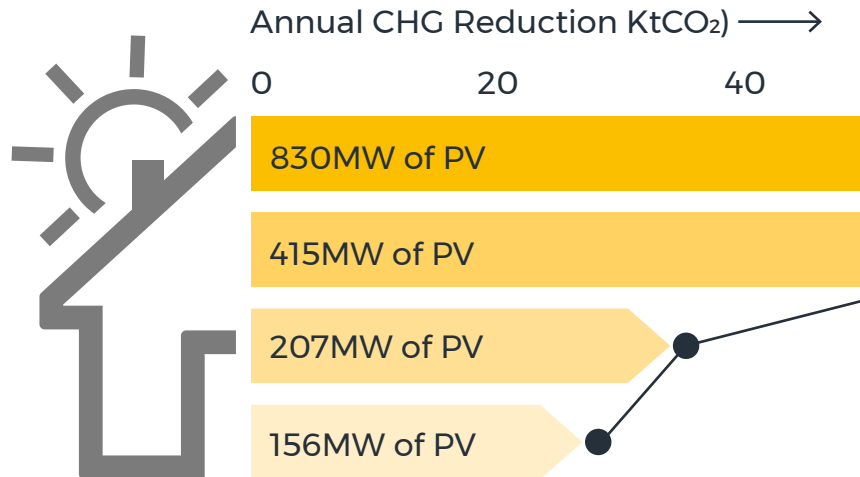
Alongside energy efficiency measures, the installation of renewable heating (nominally air source heat pump) to provide heating and hot water. **Hydrogen as an alternative after 2026.**



Goal 3 – Solar PV



Micro-generation within homes consisting primary of rooftop solar. Photovoltaics will be the vast majority. Could include storage but this doesn't change the carbon impact.

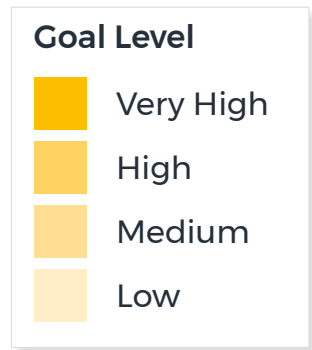




● <CO₂ 2026



● <CO₂ 2026



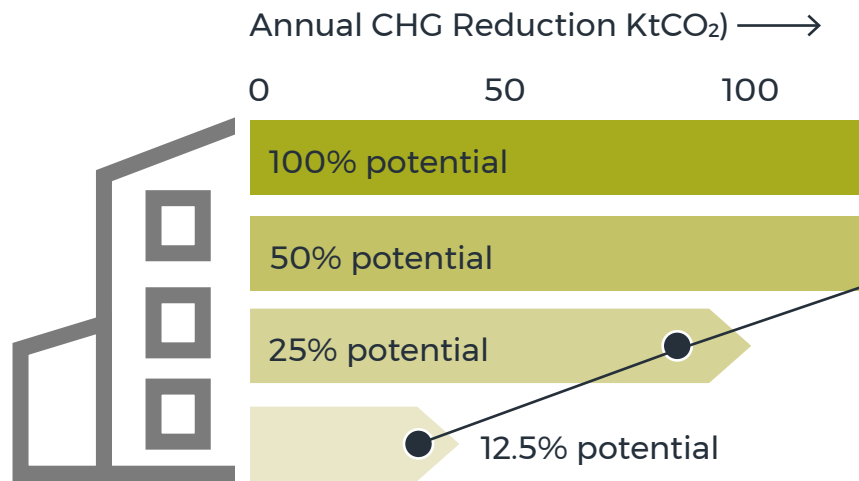
● <CO₂ 2026

Commercial Retrofit

Goal 4 – Energy Efficiency Retrofit



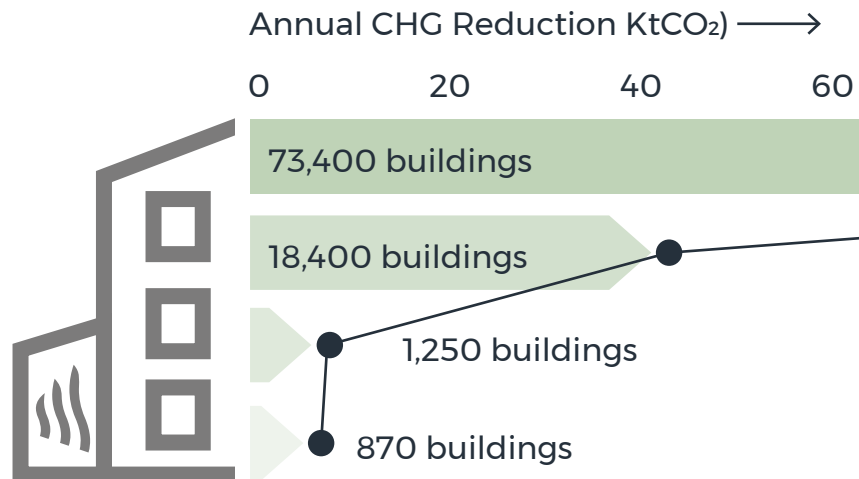
Energy efficiency measures applied to offices, retail and other commercial property types, as identified in the Building Energy Efficiency Surveys



Goal 5 – Heating Retrofit



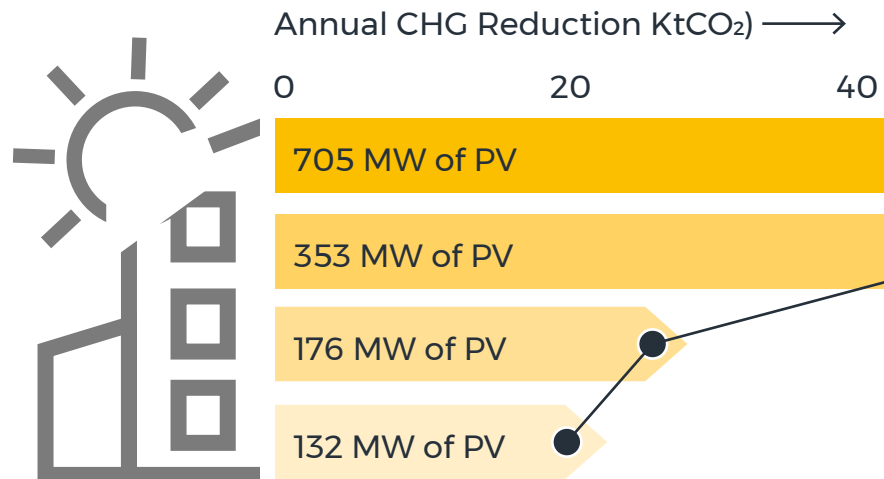
Applied to a 26,000 retail and 18,000 offices (excluding industry). Replacement of fossil fuel boilers with nominally air source heat pumps. Heat pump COP of 2.75



Goal 6 – Solar PV

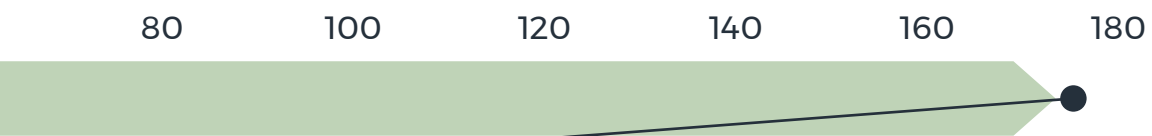


Rooftop Solar PV on commercial properties. Photovoltaics will be more beneficial in the shorter term as the grid is still comparatively high carbon





● <CO₂ 2026



● <CO₂ 2026



● <CO₂ 2026

Industrial Retrofit

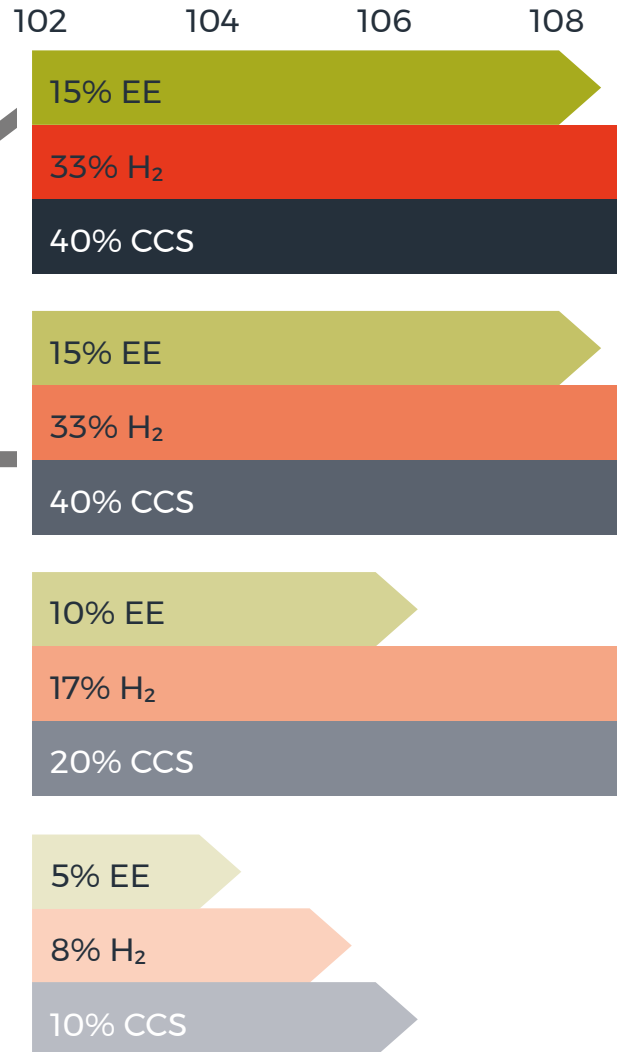
Goal 7 – Energy Efficiency & Fuels

Covering steel and iron, mineral products, chemicals, mechanical / electrical engineering, vehicles manufactures, textiles, food and beverages, printing, paper and other industries.



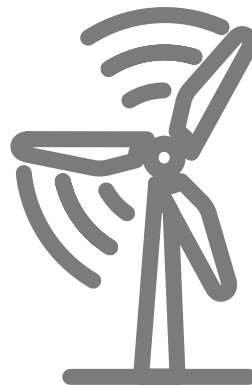
- Energy Efficiency
- Hydrogen
- CCS

Annual CHG Reduction (KtCO₂) →

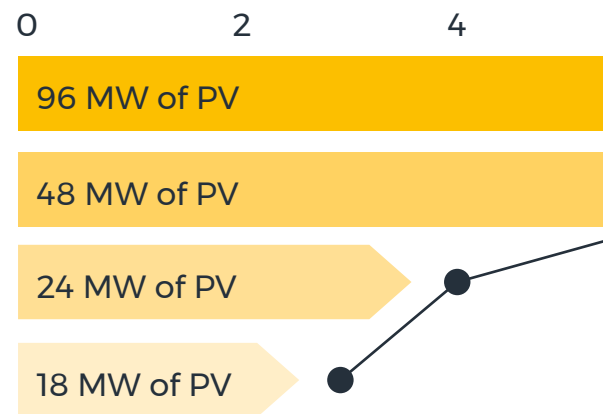


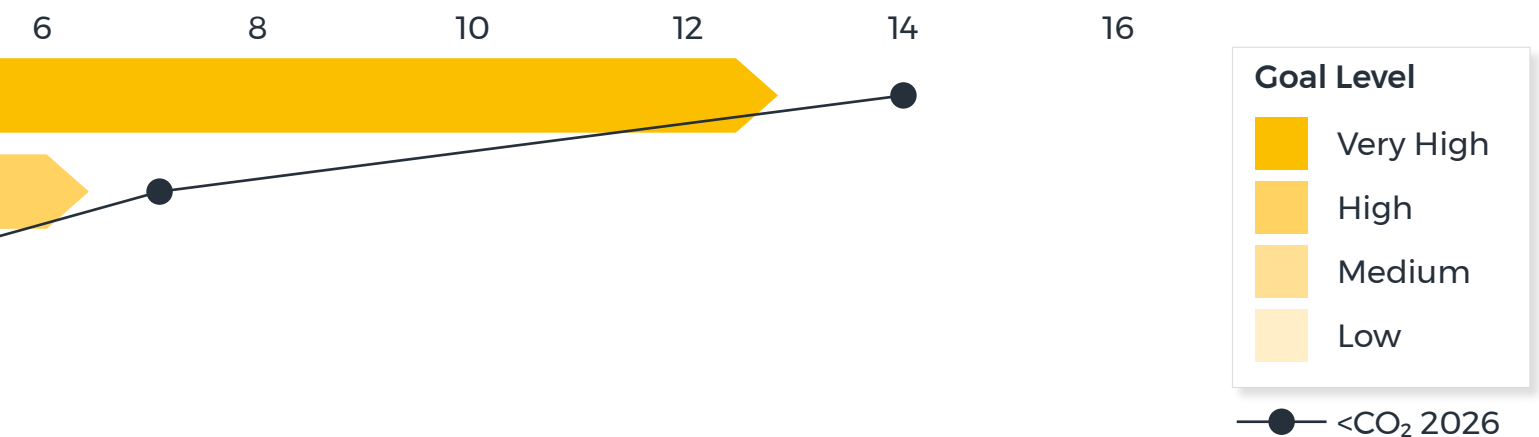
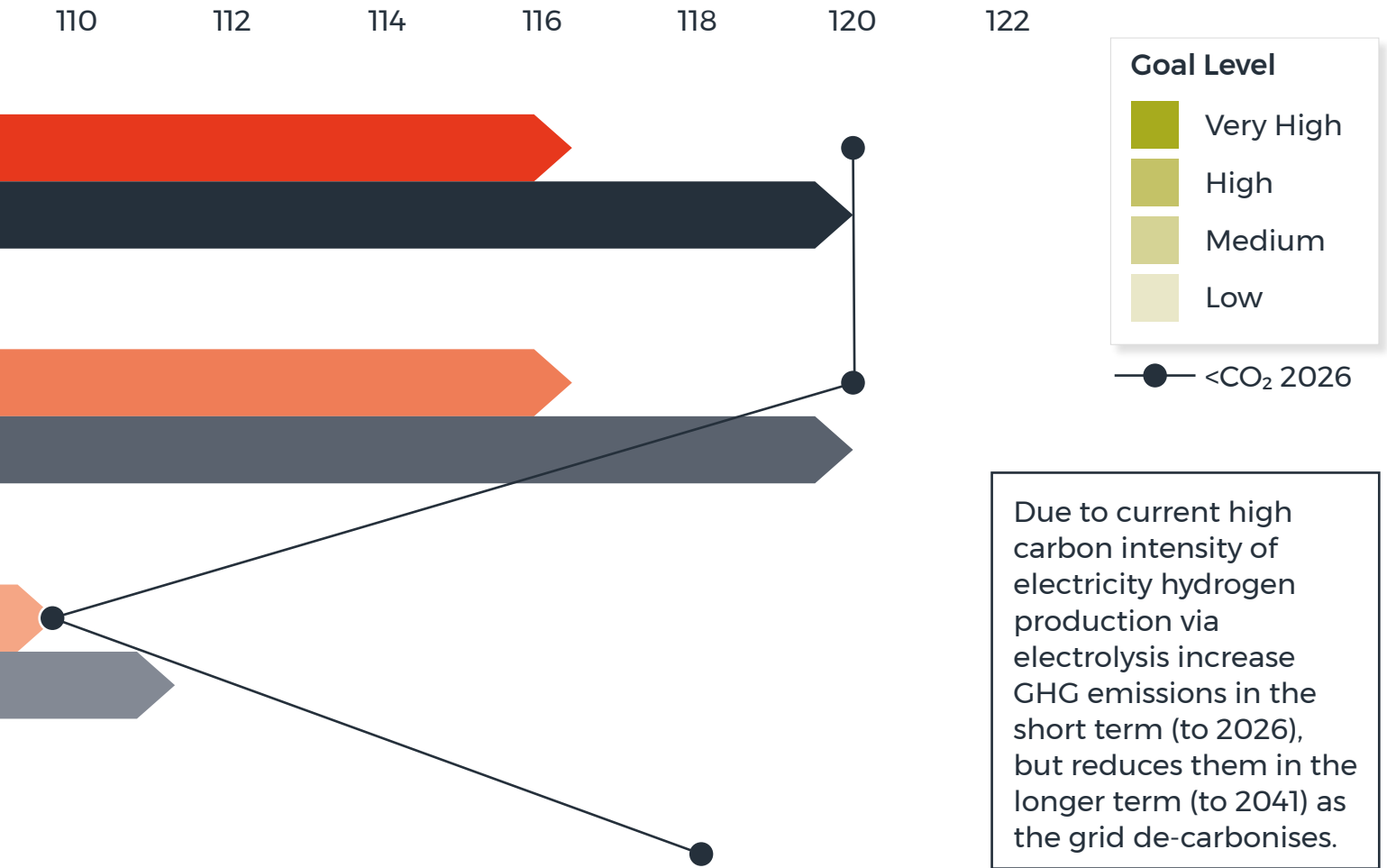
Goal 8 – Solar PV

Rooftop Solar PV on industrial properties. Other opportunities such as waste to energy also likely, but not captured here.



Annual CHG Reduction (KtCO₂) →





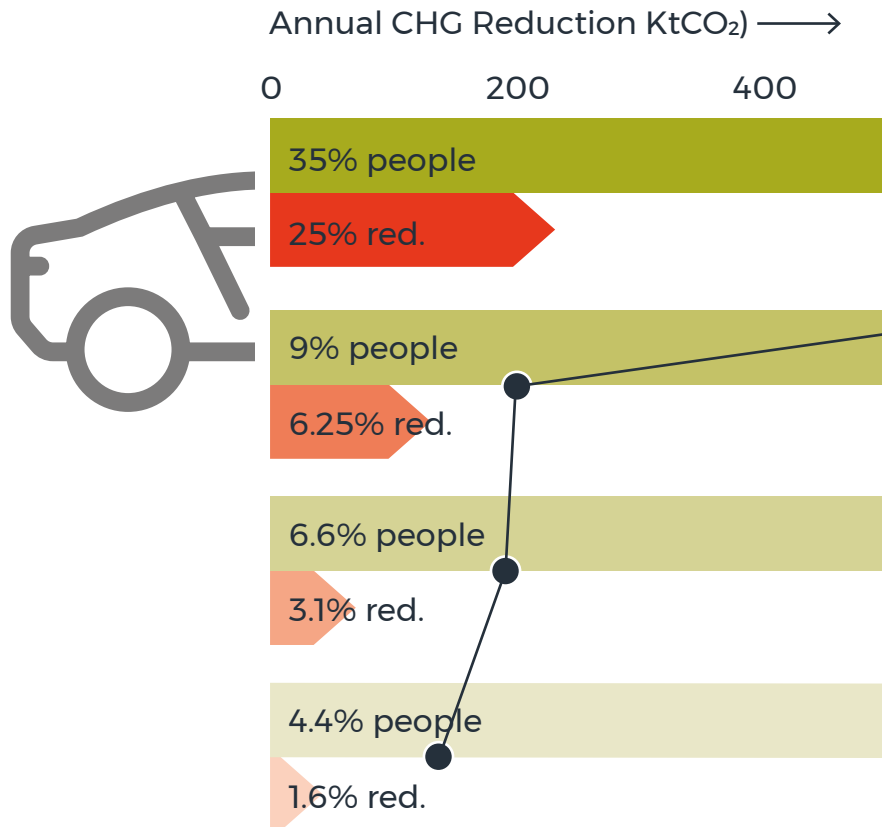
Transport

Goal 9 – Avoiding travel

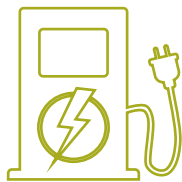


Increased take up of working from home or working at local hubs. 5-10% work from homes (pre-pandemic levels). Reduction in travel by 25% for retail and business (excluding commuting)

- Car
- Cycling

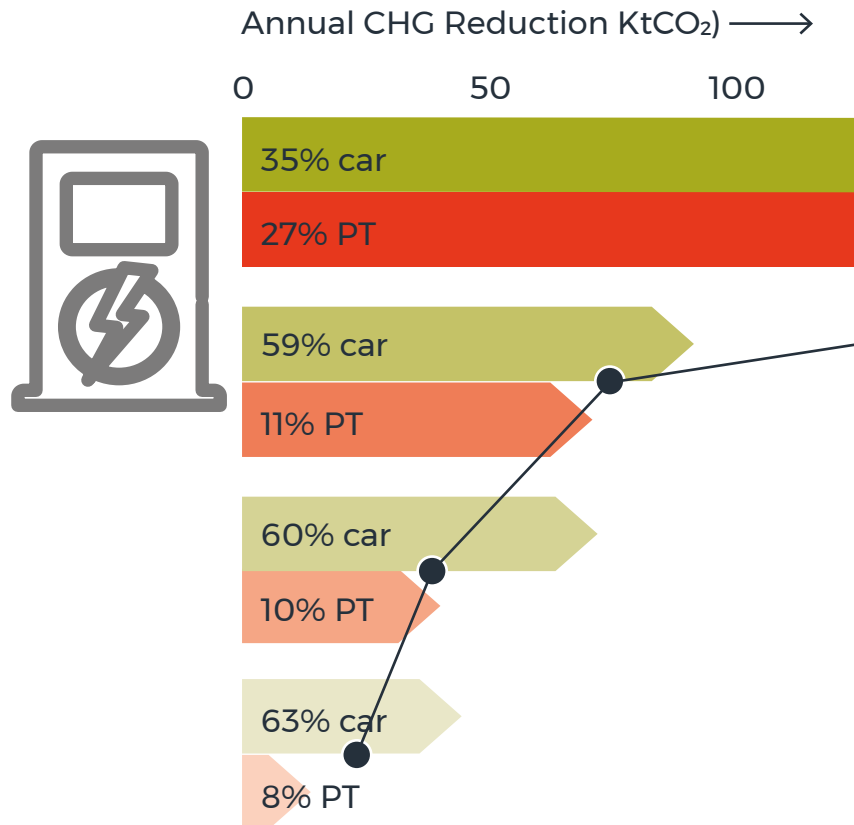


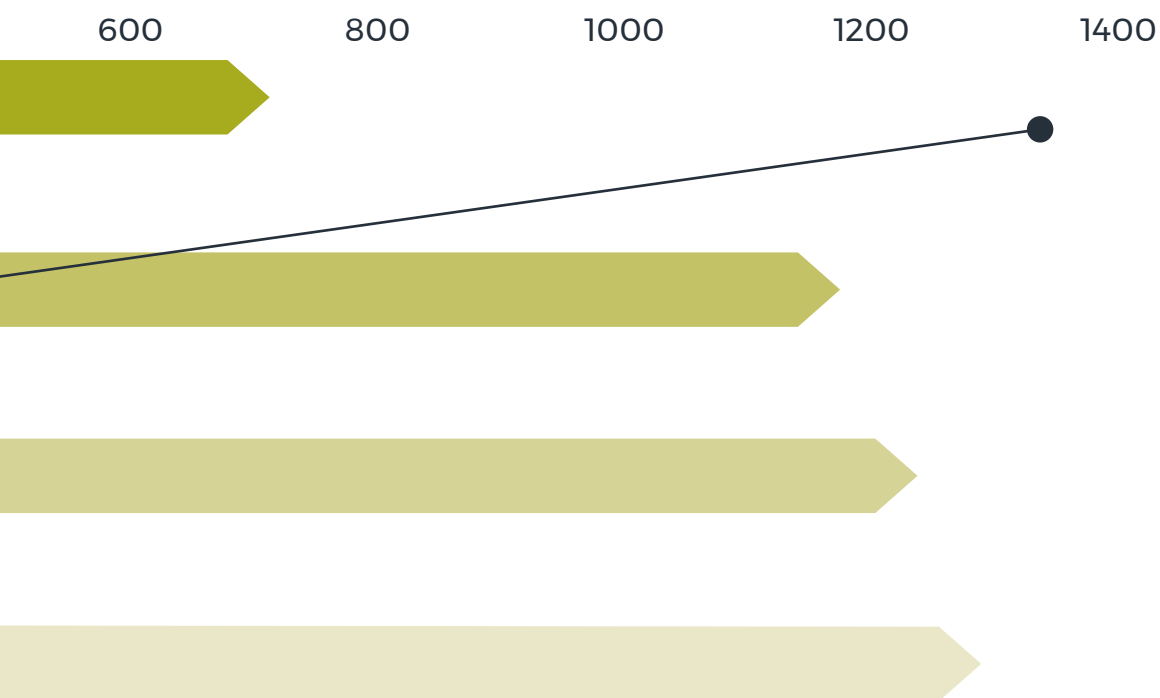
Goal 10 – Shifting travel



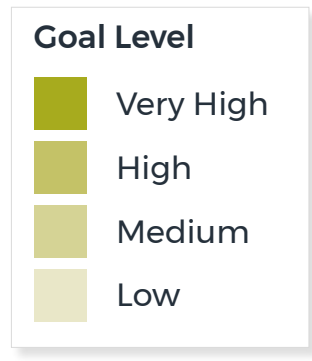
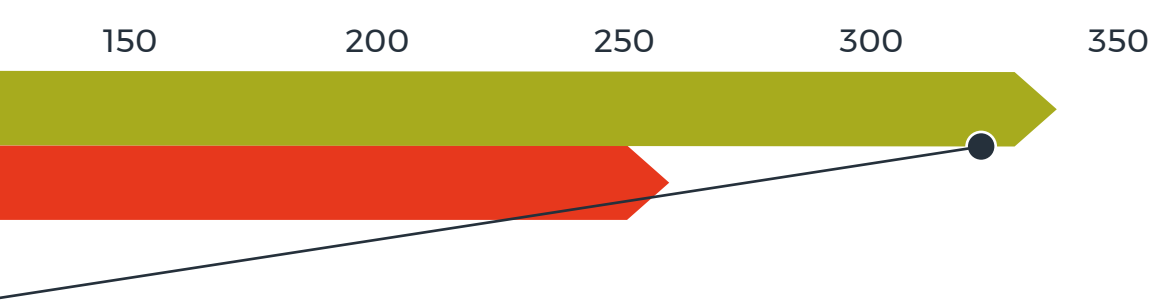
Long term strategy shift in travel in line with city regions such as Munich, Stuttgart and Dusseldorf, where car use accounts for typically 35 - 45% of all journeys, compared to 67% in WMCA.

- WFH
- Trips Reduction





● <math><CO_2</math> 2026



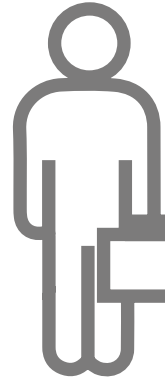
● <math><CO_2</math> 2026

Transport

Goal 11 – Improving passenger service fleets



Mandate the electrification of 21,300 taxis and 2,300 buses throughout the region.



Annual CHG Reduction (KtCO₂) →

0 20 40 60

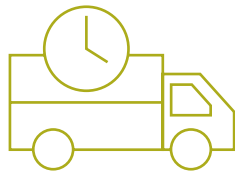
2025 Target

2030 Target

2035 Target

2041 Target

Goal 12 – Improving freight fleets



In line with Midlands Connect Tool, consider the decarbonisation of HGVs nationwide. Assumed electrification, but realise the solution may be a mix of technologies



Annual CHG Reduction (KtCO₂) →

0 20 40

25% of HGVs

25% of HGVs

17% of HGVs

12.5% of HGVs

Goal 13 – Improving private vehicles



An accelerated uptake during the 2020s, ahead of the 2030 ICE Ban, will increase carbon savings in the shorter term. The CCC projections were used as trajectories.



Annual CHG Reduction (KtCO₂) →

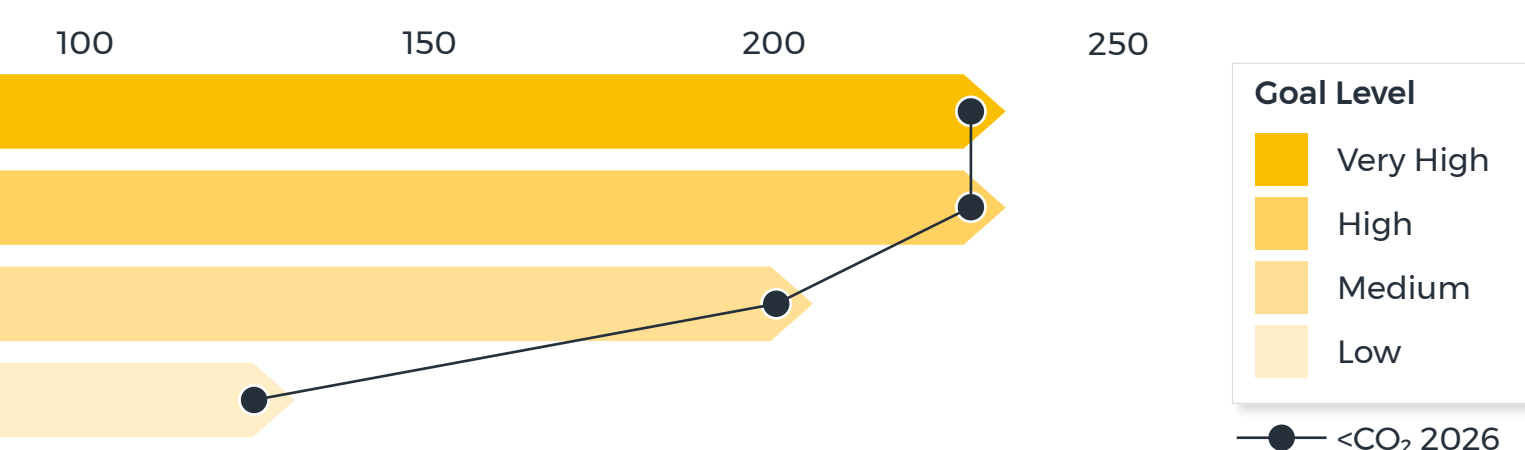
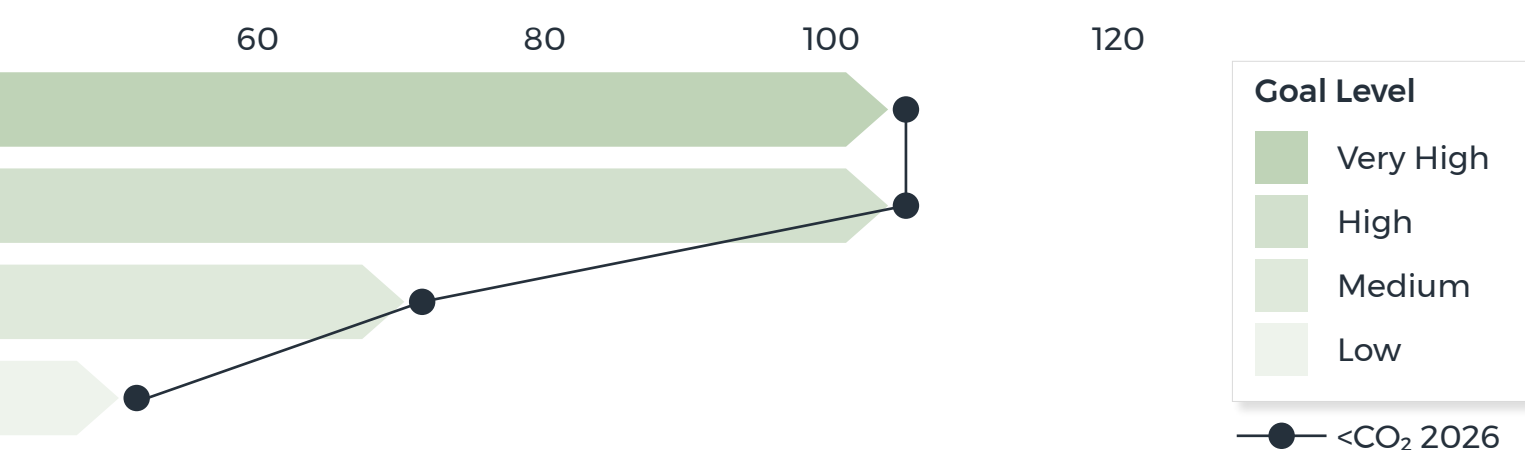
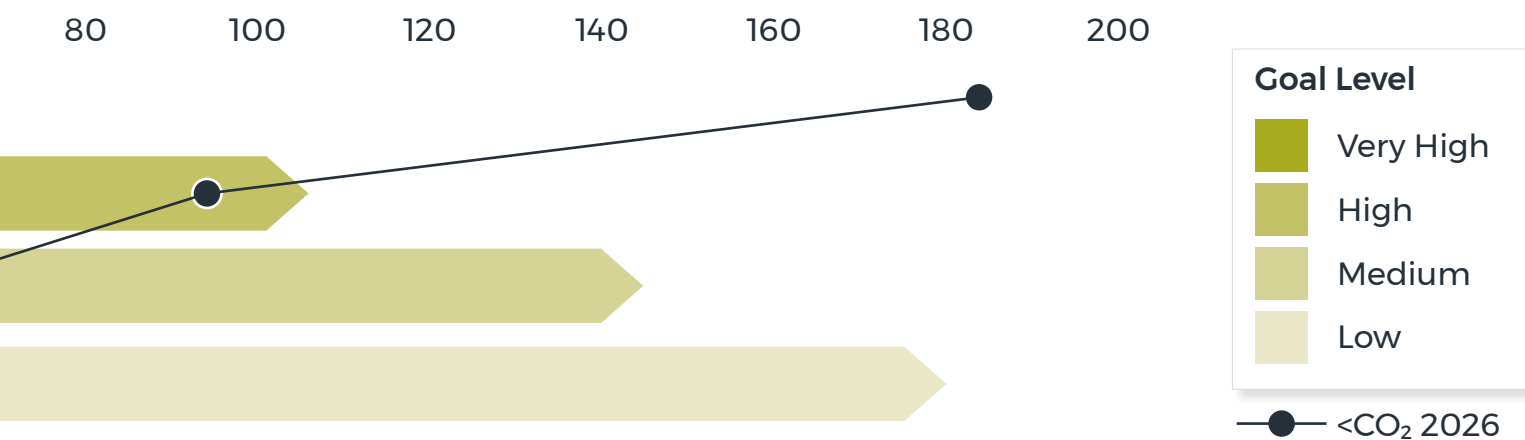
0 50

15% by 2026

15% by 2026

13% by 2026

8% by 2026

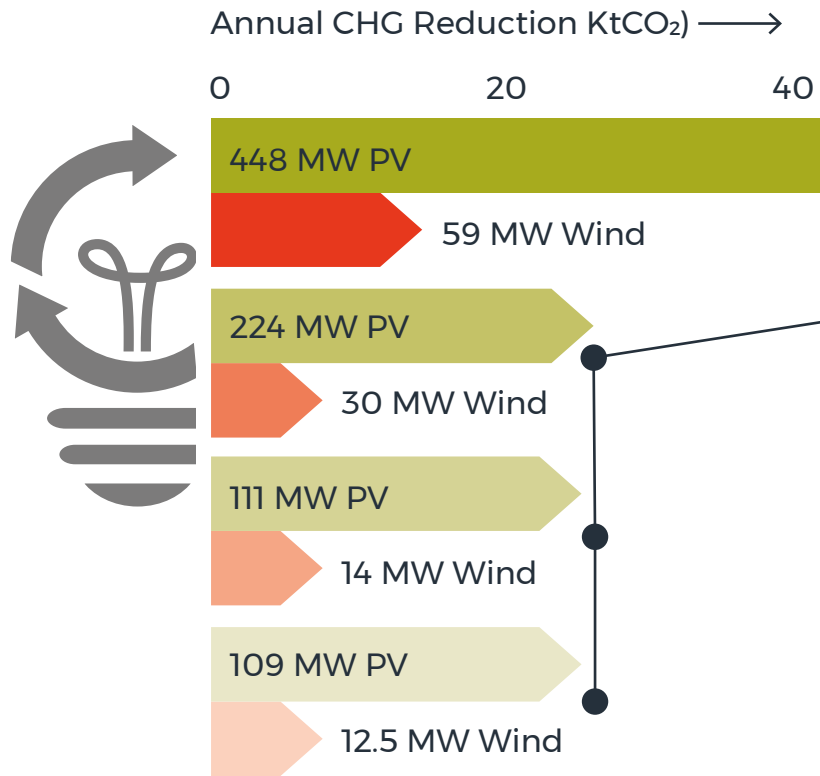


Strategic Land Use

Goal 14 – Renewables

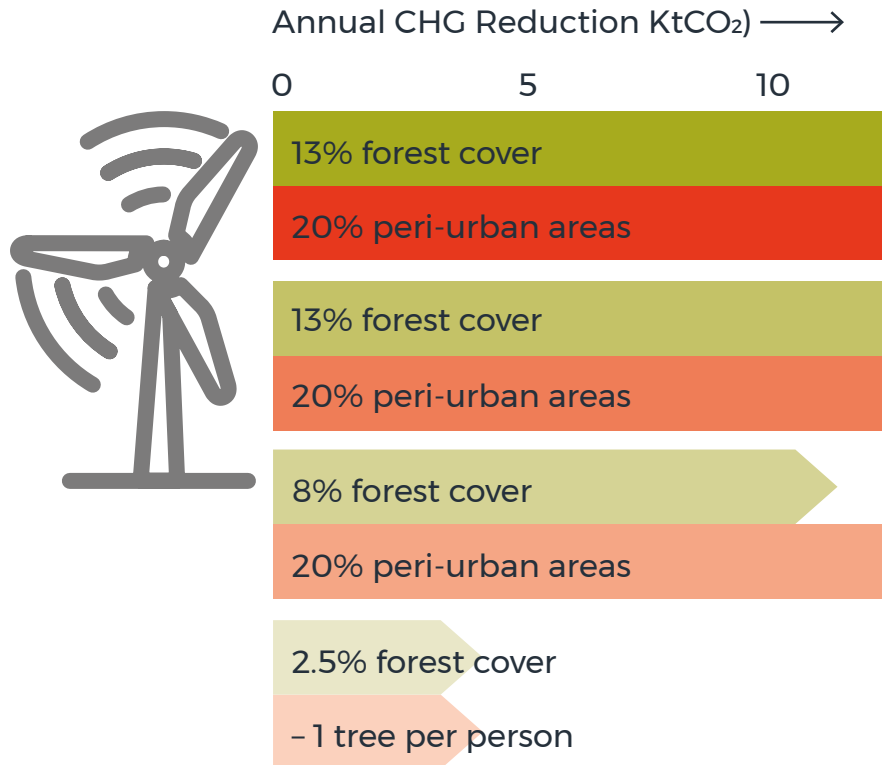
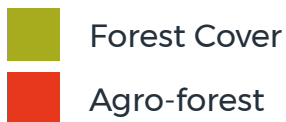
Utility scale Solar PV and Wind across the region on poorer quality land.

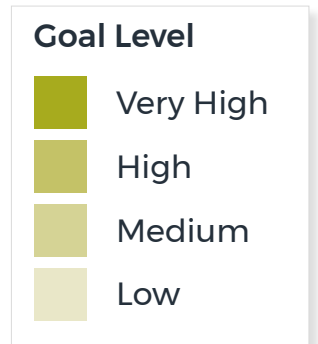
GIS mapping has been undertaken to understand what area is most suitable.



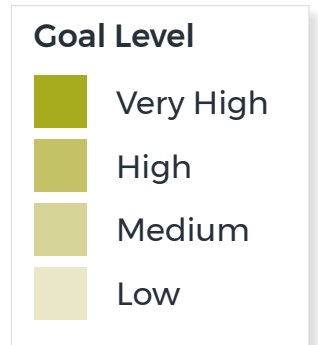
Goal 15 – Natural Capital

Enhancing natural capital to sequester carbon. While reducing carbon will be one of the benefits. Wider ecological benefits should be realised as part of this effort.



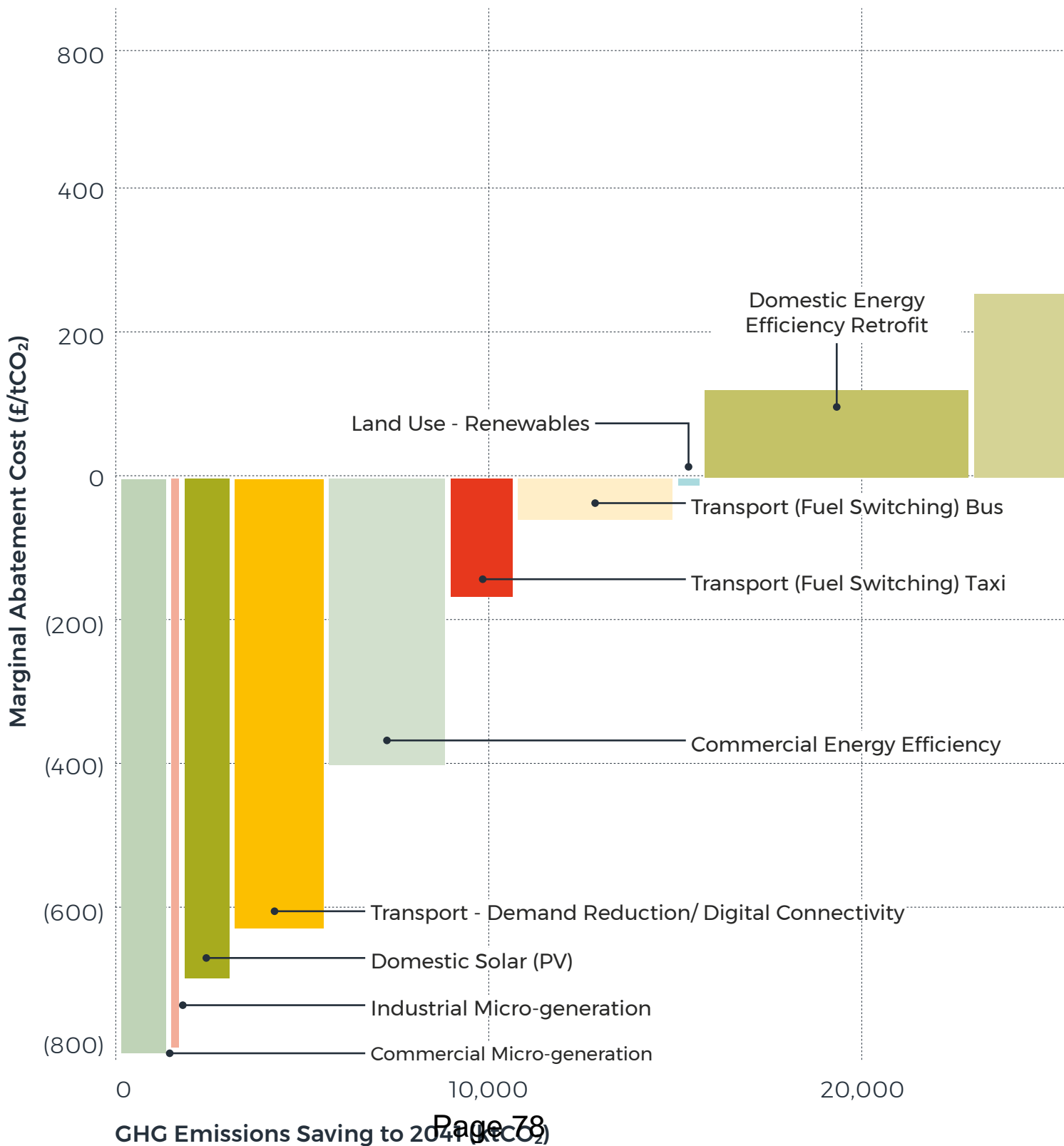


—●— <CO₂ 2026



—●— <CO₂ 2026

Marginal abatement cost curve (MACC) of 'Accelerated' scenario to 2041



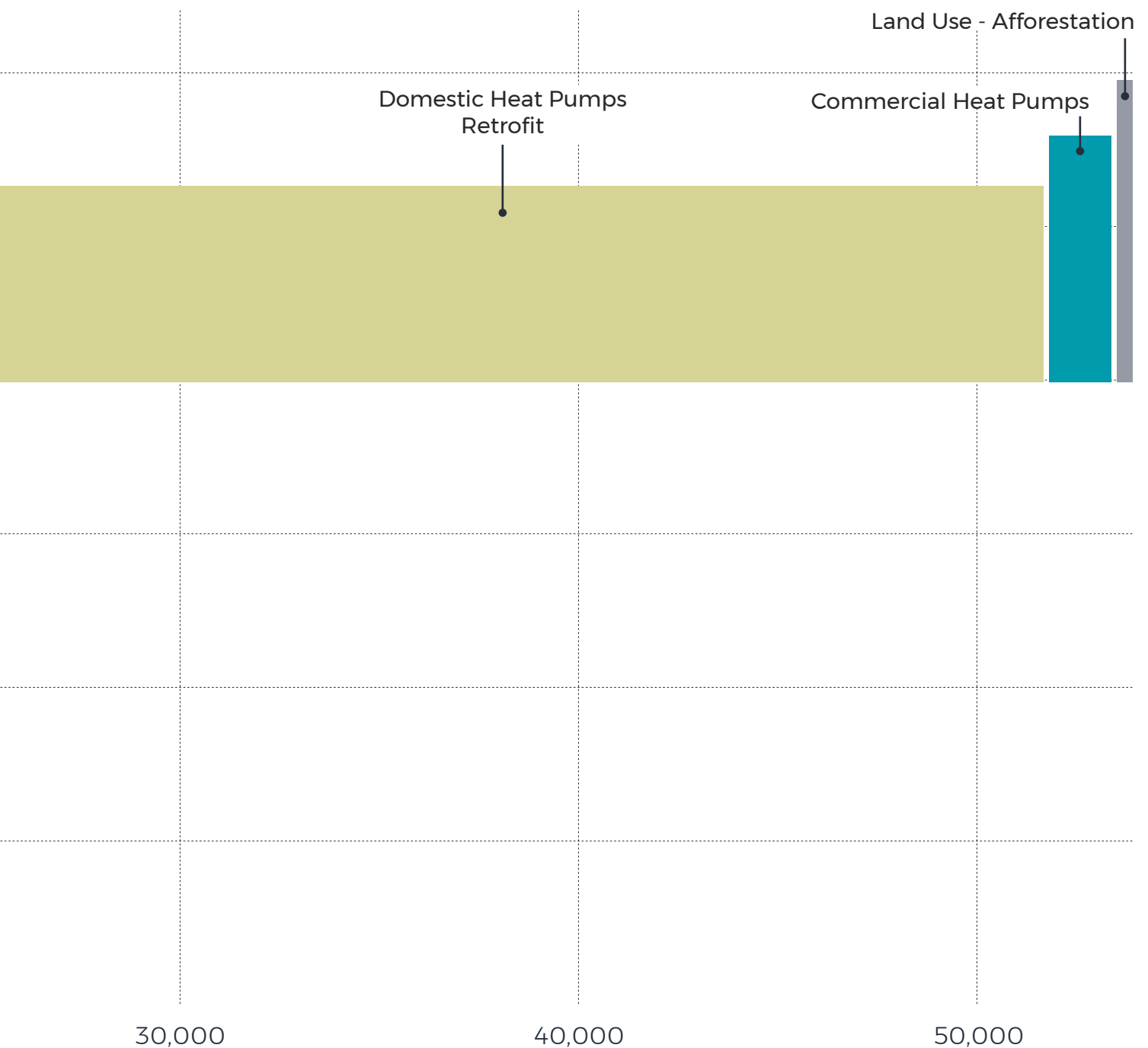
The MACC indicates broadly which measures will be more or less cost effective in terms of emissions reduction. These are ranked left to right.

Economic modelling goes to 2041 to allow time for payback beyond 2026, those some measures may have savings well beyond that.

Areas below the x-axis are those where there is a commercial return on investment; while the width of the bar indicates the potential carbon saving that could be achieved.

Costs do not include the start-up and management of the programme itself (e.g. the resource/ staffing requirements, business case development etc.). In addition the investment and savings may be attributed to different parties.

The MACC provides the basis for further business case development, highlighting key projects and roles for the WMCA.

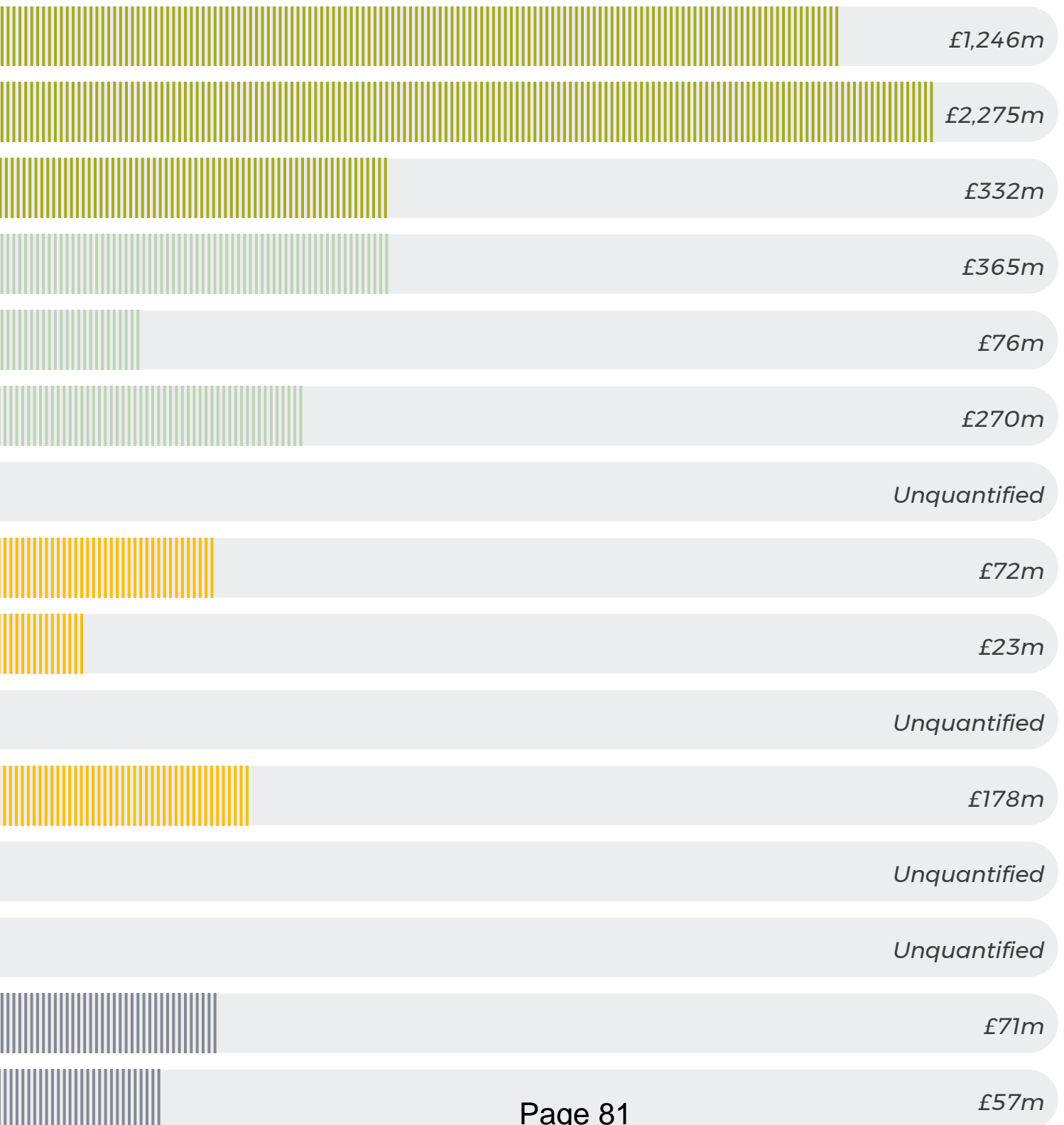


Summary of investment required and delivery outcome to 2026

Measures

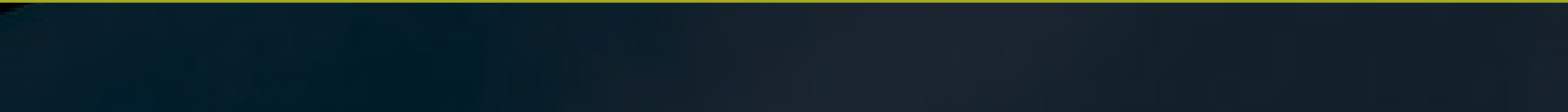
	1	Domestic energy efficiency retrofit
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	4	Commercial energy efficiency retrofit
	5	Commercial heating retrofit
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	9	Avoiding travel
	10	Shifting travel
	11	Improving passenger service fleets
	12	Improving freight fleets
	13	Improving private vehicles
	14	Land use (Renewables)
	15	Land use (Natural Capital)

Investment to 2026



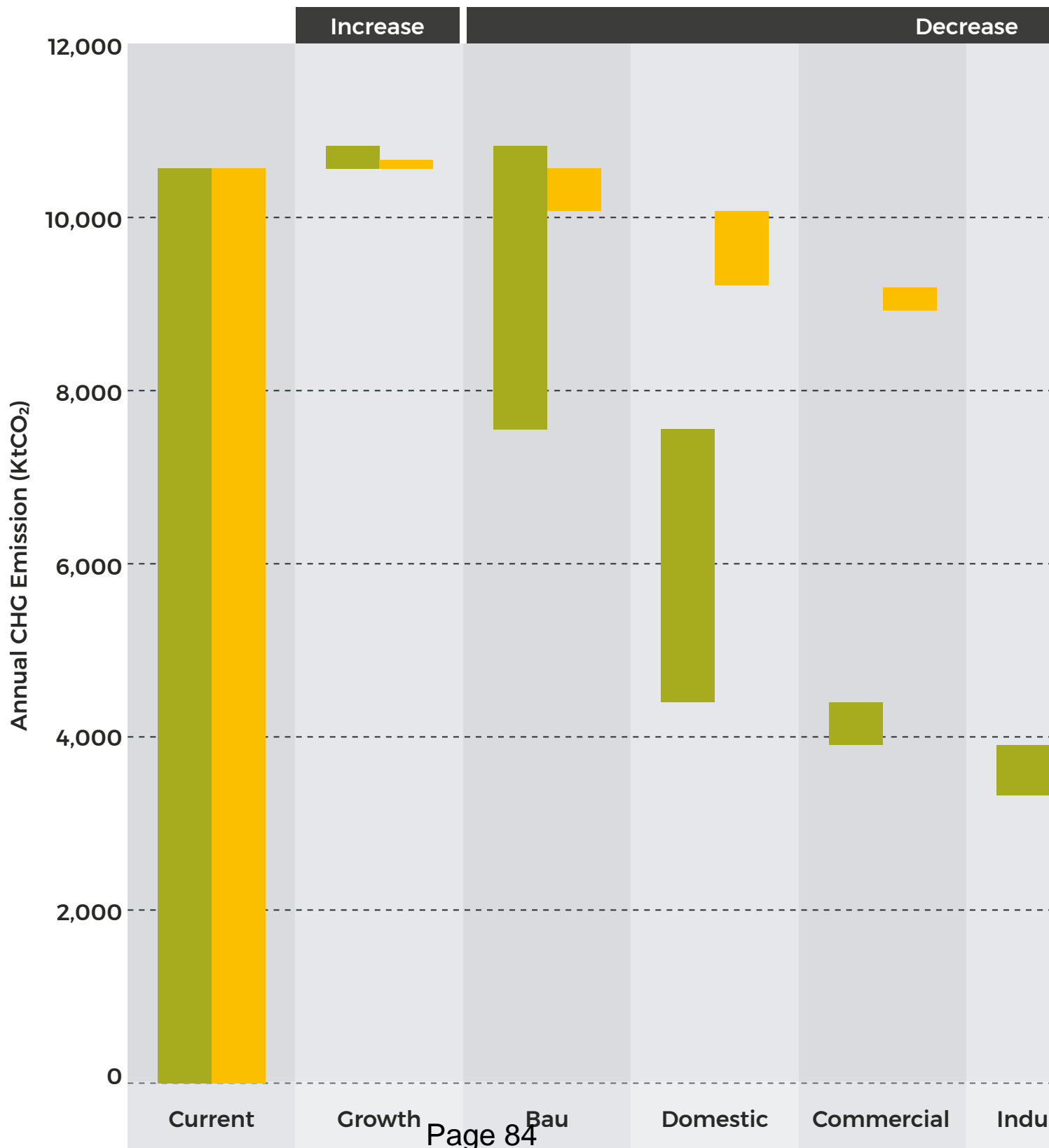


CARBON MODELLING RESULTS —



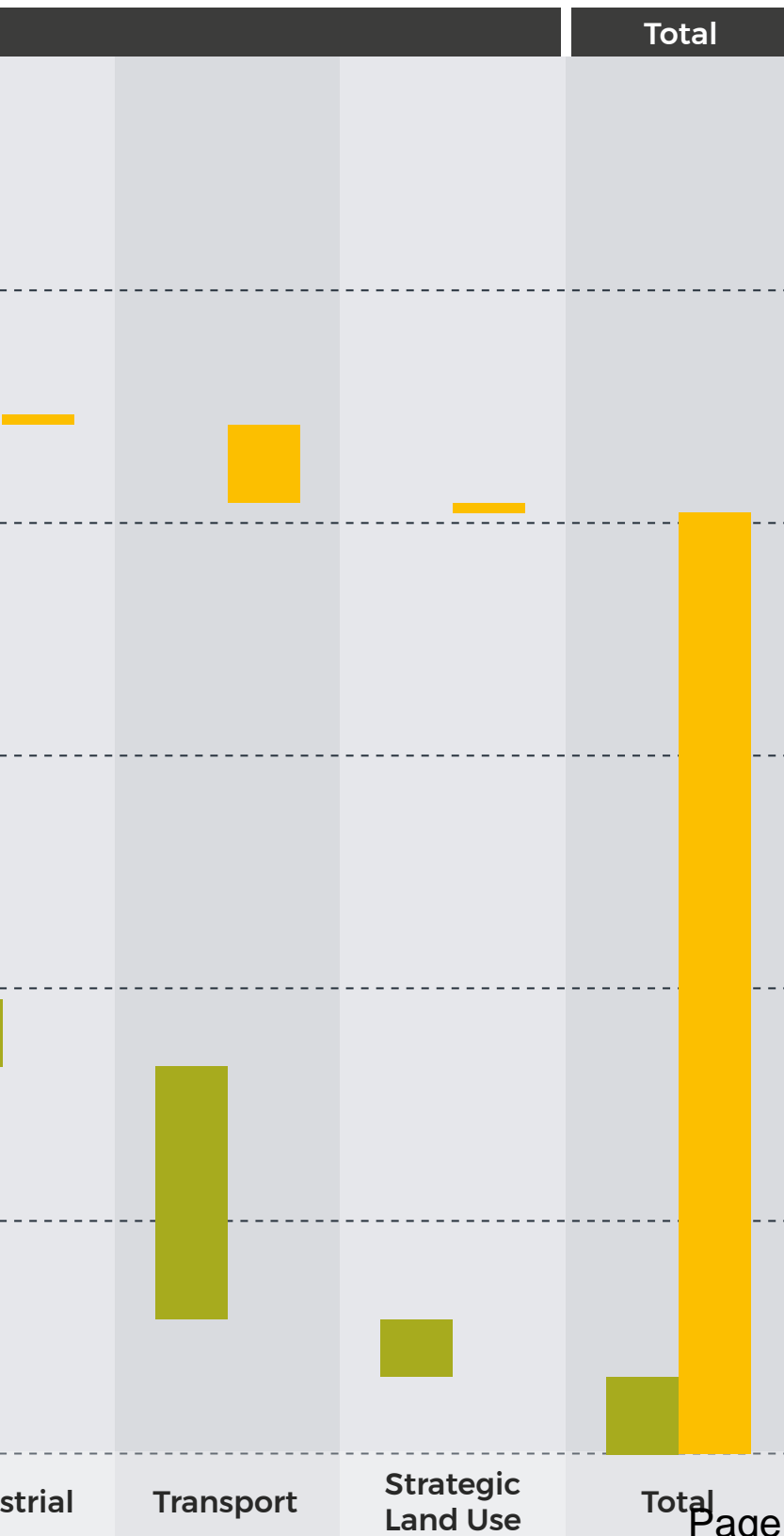


Modelling shows the region needs to commit to the central **'Accelerated'** scenario to deliver a **94% reduction by 2041.**





What does this mean for **the first FYP by 2026?**



Modelling of the 'Accelerated' scenario shows that a **33% reduction** is possible by 2026 (against a 2016 baseline).

The region would be emitting **8.1Mt CO₂ per year.**

The suggested Tyndall Centre target for the region to stay within the Paris Commitment is to emit no more than **4.9Mt CO₂ by 2026.**

This would require radical actions, some of which are not thought feasible in the timescale due to legal, social and financial requirements.

What we would need to do reach 4.9Mt CO₂ by 2026?

Retrofit all 1.1 million homes by the end of 2025 and install **heat pumps** at the same time.



Retrofit 100% of retail, offices and a range of other non-domestic properties to their **maximum potential**.



Maximise rooftop solar across domestic, commercial and industrial sites as well as ground mount - **2.1GW potential of solar** to be installed.



Electrify 100% of taxis (21,000) and buses (2,300) within the region.



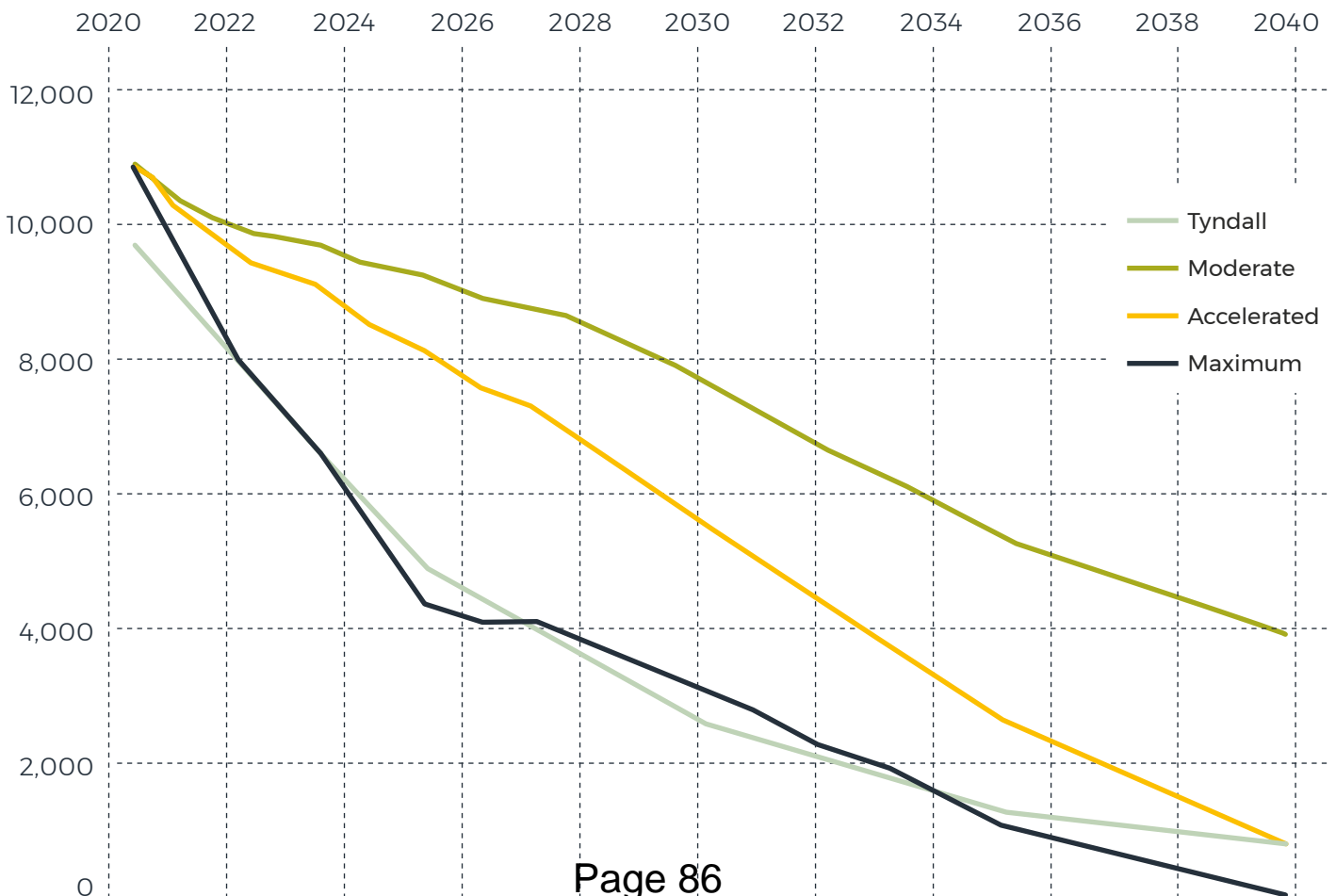
Demand management to encourage reduction in travel, and mode and destination shifting, and to avoid demand rebound.



Cutting car share from 63% of trips to 35%.



Historic and Projected (Inc. Actions) vs. Budgeted GHG Emissions



Ambition and Timeline under 'Accelerated' Scenario to 2026

Given the impetus to de-carbonise as soon as possible the report sets out a hugely ambitious, but realistic 'Accelerated' to net zero by 2041.

The WMCA recognises the urgency of carbon reduction and will push the region to accelerate net zero delivery in sectors, where feasible, especially where they bring other benefits to people, the economy and our environment.

		2021	2026
Domestic	Energy Efficiency	Energy efficiency in 25% dwellings	
	Heating Retrofit	Low carbon heating system retrofit in 292,000 dwellings	
	Solar PV	415 MWp of rooftop solar	
Commercial	Energy Efficiency	Energy efficiency in 50% buildings	
	Heating Retrofit	Low-carbon heating system retrofit in 18,000	
	Solar PV	350 MWp of rooftop solar	
Industrial	Energy Efficiency and Heating Retrofit	4% deployment of H2 and 5% of CCS for High Temp process, 2.5% energy efficiency, 25% electrification for LT processes	
	Solar PV	48 MWp of PV	
Transport	Avoid	9% of people tele-commuting 50% of time, 6% less personal and retail trips	
	Shift	Bike increase to 5% of trips, Car decrease to less than 60%	
	Improve	50% of taxis, buses and 25% of HGVs	
Natural Capital	Renewables	30 MW Wind and 225 MWp of solar PV	
	Natural Capital	Tree coverage in 3% of WMCA area, and 5% of peri-urban area	
Systems Management		Upgrade and manage coordination across the energy associated systems (transport, digital)	

What does net zero look like?



WHERE DO WE NEED TO BE?

	Goal	Deployment required for net zero
Domestic	Energy Efficiency	1.1m homes (100%)
	Heating Retrofit	1.1m homes (100%)
	Solar PV	830MWp
Commercial	Energy Efficiency	100%
	Heating Retrofit	73,400 buildings
	Solar PV	705MWp
Industrial	Energy Efficiency	15% energy efficiency
	Heating Retrofit	33% deployment of H2 and 40% CCS for high temp. 100% electrification of low temp
	Solar PV	96MWp
Transport	Avoid	35% people telecommuting 50% of time, 25% less personal / retail trips
	Improve	100% taxis & buses electrification
	Shift	Shift to 35% trips by car
Natural Capital	Renewables	59MW wind and 448MWp of solar potential
	Natural Capital	13% WMCA tree coverage

Delivering a net zero society will require significant and unprecedented change. The changes will directly affect people and we need to ensure the transition is fair.



WHERE ARE WE NOW?

Currently installed in West Midlands

Accelerated scenario delivery for 2026

Smart thermostats at 6% of homes . Smart meters at 31% homes. 27% of homes with cavity walls have them unfilled. 18% of lofts are insulated and easy to treat . 7% of homes do not have double glazing.

294,000 homes

Almost all homes are on fossil fuel boilers

292,000 dwellings

Approximately 63MWp to date.

415MWp

TBC

50% potential

77% of heating and hot water by gas or oil in offices, similarly 63% of heating and hot water by gas for retail

37,000 buildings

Approximately 26MWp to date across non-domestic in total

353MWp

Emerging technologies

10% EE, 17% H2, 20% CCS

Not yet commercialised technology

17% H2, 20% CCS.

Approximately 26MWp to date across non-domestic in total

96MWp

5-10% work from homes (pre-pandemic levels)

9% people telecommuting and 6.25% reduction in trips

~1% of buses

100% electrification by 2030

65% of trips by car currently

59% trips by car

<20MW of solar

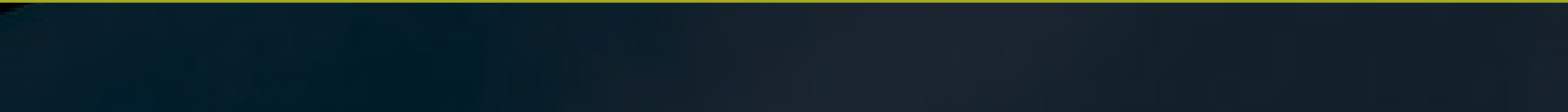
30MW wind and 224MWp solar

1% WMCA tree coverage

13% forest cover/20% peri-urban areas



DELIVERY PLAN



To enable FYP delivery,
the West Midlands
Combined Authority will:





Deliver

Lead on or work with others in the region to deliver carbon emissions reduction



Enable

The West Midlands Combined Authority can support others to deliver



Influence

Using the West Midlands Combined Authority to influence action by others indirectly

Delivery requires significant acceleration across all sectors by all stakeholders if we are to achieve the 2041 target.

Local authorities have a key role to play alongside the WMCA. The WMCA is seeking joint approaches to deliver at scale and set the conditions for net zero delivery.



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

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





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


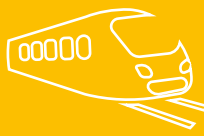


Private and voluntary sector are needed to **collaborate and deliver projects**



The Delivery Plan for 2026 (1/2)

	 Domestic	 Commercial
Lead Role and Delivery Route	WMCA to fund business case and Energy Capital lead the work, through Fuel Poverty and Regional Retrofit Steering Group (FPRR). <ul style="list-style-type: none"> ▲ Promotion of the campaign and opportunities. ▲ Cross-disciplinary co-ordination team with stakeholders. Managing finances ▲ Developing clear single programme for domestic sector and managing and administrating 	WMCA to fund business case and Energy Capital lead the work. <ul style="list-style-type: none"> ▲ Promotion of the campaign and opportunities to businesses ▲ Cross-disciplinary co-ordination team with stakeholders. Managing the financial streams from national government and other incentives ▲ Developing clear single programme for sector and managing and administrating.
Investment required to 2026	£3.5bn in first FYP	£0.4 bn gross investment in first FYP
Stakeholder	Housing associations, local authority housing, homeowners and private landlords, supply chain, public, national government - BEIS	Commercial forums (e.g. Better Buildings Partnership, supply chain, Federation of Small Businesses), LEPs, Energy Capital, BEIS, WPD
Local Authority collaboration	Work with FPRR, receive funding, work with installers and householders, lobby for funding. Retrofit own housing stock and zero carbon policy for new build	Work with Energy Capital and LEPs to develop local area energy planning
Next Steps	Establishing the Fuel Poverty and Regional Retrofit (FPRR) Centre of Excellence and developing investable propositions to stimulate the market and scale-up efforts to tackle fuel poverty.	WMCA should fund the development of a strategy to support, persuade and incentivise business organisation representatives.

	 Industry	 Transport
<p>and Energy and the on aging ational tives amme</p>	<p>The regional role will be led by Energy Capital, building on the expertise and research developed through work with the Black Country Consortium.</p> <ul style="list-style-type: none"> ▲ Co-ordinating with UK government ▲ Finance - Management of finance, grants, private investment ▲ Co-ordination with industry 	<p>Delivery of the LTP will require action by TfWM in collaboration with partners. They will work with our 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.</p>
<p>FYP</p>	<p>The gross investment cost within the first FYP is difficult to quantify due to the TRL of the proposed interventions</p>	<p>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.</p>
<p>Building ation for Capital,</p>	<p>LEPs, Industry, BEIS, Cadent, WPD, Energy Capital</p>	<p>TfWM, Local authorities, Highways England, Private fleet and transport operators, the public, WPD, Energy Capital, DfT, BEIS</p>
<p>EPS to ing</p>	<p>Work with Energy Capital and LEPS to develop local area energy planning</p>	<p>Work with TfWM as it develops policies for low carbon transport to, from and within the area, and carry out their functions so as to implement those policies.</p>
<p>ment e and ns and</p>	<p>Energy Capital to lead on an industrial de-carbonisation taskforce, building on work started in partnership with the Black Country Consortium.</p>	<p>Proposals for Intra-City Transport Fund. Draft Local Transport Plan consultation, autumn 2021 and adoption in early 2022.</p>

The Delivery Plan for 2026 (2/2)



Land Use - Natural Capital

Land U

Lead Role and Delivery Route

This will be led by the Environment Team at the West Midlands Combined Authority:

- ▲ Promotion of the opportunities around tree planting and other nature-based solutions
- ▲ Co-ordinating with local authorities
- ▲ Programme Management

It is proposed that the... working closely with... and local authorities... to unlock investment... delivery may be differ... the emphasis will ne... and scale.

Investment required to 2026

£60m within first FYP
A budget of ~£200k per annum would be appropriate with 2 or 3 staff dedicated to its management, within the wider team.

£50m gross investment... A budget of ~£200k p... appropriate with 1 or... management, within

Stakeholder

Landowners, local authorities, NGOs, business representatives, universities, developers, DEFRA group (to include Natural England, Environment Agency and Forestry Commission) and LEPs.

Landowners, local au... developers

Local Authority collaboration

Work with WMCA and other stakeholders to ensure existing natural capital plans are joined up with cross-boundary opportunities. Lobby gov. for funding. Develop policies at local level with natural capital group and a natural capital accounting approach.

Work with Energy Ca... and rooftops, as well... to install renewables... to delivery and busin... investment.

Next Steps

The WMCA should fund the initial management and administration to promote this with others through a regional natural capital board, develop the full business case, co-ordinating with the stakeholders.

The WMCA should fu... and administration t... develop the full busin... the stakeholders.



Use - Renewables



Cross - cutting

This is led by Energy Capital, the WMCA Environment Teams and regional stakeholders to identify opportunities. The routes to be pursued for each opportunity but need to be on delivering at pace

This will be led by the Environment Team at the West Midlands Combined Authority and will include:

- ▲ Management of net zero business pledge
- ▲ WM2041 behaviour change, working with communications teams and region stakeholders
- ▲ Programme management, administration and reporting of WM2041 progress, including providing the secretariat function for the WM2041 Net Zero Delivery Board

Staffing within first FYP per annum would be 2 staff dedicated to its delivery within the wider team.

Funding to oversee programme delivery within the WMCA Environment Team. Some elements of the programme may attract external funding, for example, the Net Zero Business Pledge.

Engage local authorities, investors and other stakeholders

Local authorities and key stakeholders such as Sustainability West Midlands to support delivery. All regional stakeholders to be engaged as appropriate

Use Energy Capital to identify available land and explore stakeholder opportunities, develop preferred route and business cases where LA owned

There are opportunities to work with the WMCA Environment Team to deliver the cross cutting work on business engagement, carbon literacy and behaviour change programmes.

Develop and the initial management and administration to promote this with others, develop the full business case, co-ordinating with the stakeholders.

The WMCA should fund the initial management and administration to promote this with others, develop the full business case, co-ordinating with the stakeholders.

Cross-cutting, enabling actions



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.



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.

WM2041 communications & behaviour change

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.

Green Finance

WMCA will lead on the development of **green finance solutions** to support the delivery of this plan.

Monitoring and reporting

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

Reviews on delivery and carbon reduction progress

Data collection, validation and interpretation

Defining methodology for performance monitoring

WMCA's role in systems management & 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.

Auditing including governance, risk management and financial control

Dissemination of learnings

Annual monitoring and scrutinise performance and reporting against targets

Review of changes in national policy

Technological assessments and reviews of emerging best practices

External/independent auditing



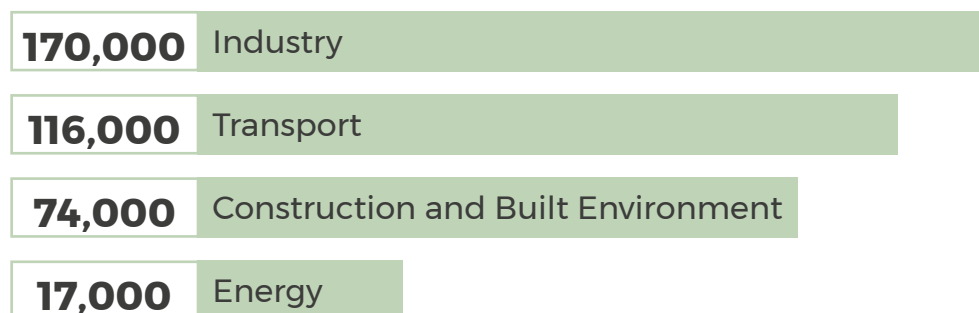
JOBS & SKILLS



Where we are today

Sector	Number of jobs
Agriculture, forestry and fishing	400
Mining and quarrying	300
Manufacturing	133,000
Electricity, gas, steam and air conditioning supply	5,500
Water supply; sewerage, waste management and re-mediation activities	10,800
Construction	58,600
Wholesale and retail trade; repair of motor vehicles	183,200
Transportation and storage	66,600
Accommodation and food service activities	81,000
Information and communication	30,000
Financial and insurance activities	42,100
Real estate activities	24,400
Professional, scientific and technical activities	84,700
Administrative and support service activities	135,100
Public administration and defence; compulsory social security	50,000
Education	126,800
Human health and social work activities	178,500
Arts, entertainment and recreation	23,300
Other service activities	24,800

Automotive, logistics, manufacturing have shaped the sub-regional economy.



(Number of jobs)

Control of own **Adult Education Budget**.

Significant changes in existing occupations will happen at the **low and medium skill** levels.

New and emerging occupations will require **higher-level qualifications**.

Green and low carbon skills

- 1 **Low-carbon electricity**
Wind power, solar PV, hydropower, nuclear, CCS
- 2 **Low-carbon services**
Low-carbon financial, IT, and advisory service
- 3 **Low-emission vehicles & infrastructure**
Low-emission vehicles & infrastructure, fuel cells and energy storage systems
- 4 **Energy efficient products**
Insulation, lighting, monitoring and control systems
- 5 **Low-carbon heat**
Renewable heat, heat networks and CHP
- 6 **Alternative fuel**
Bioenergy and hydrogen production

Around half of **automotive** companies produce vehicle components in the West Midlands



Increased demand for **electric cars** will increase jobs in West Midlands - existing manufacturing capacity



Also install **low carbon heating technologies**, energy efficiency products and solar installations



Most jobs created in the WMCA will be in manufacturing low emission vehicles, battery packs and modules in giga factories situated near existing production sites. Wider mobility services and products may also play a role and affect demand for new vehicles and create opportunities for employment in the wider mobility sector.



New jobs created and others lost

Sector	Goals	Jobs created
Domestic	Energy Efficiency	Retrofit coordinators, installers and designers
	Fuel Switching	Heat pump installers
	Micro-generation	Solar PV installers
Commercial	Energy Efficiency	Retrofit coordinators, installers and designers
	Fuel Switching	Heat pump installers
	Micro-generation	Solar PV installers
Industrial	Energy Efficiency and Fuel Switching	Retrofit coordinators, installers and designers, Heat pump installers
	Micro-generation	Solar PV installers
Transport	Demand Reduction (WFH)	skills, jobs in more rural areas in local digital
	Fuel Switching (HGVs)	Hydrogen, Electric vehicle manufactures
	Fuel Switching (Buses, Taxis)	Petrol and diesel engine manufacturers
	Demand Reduction (Trips)	Increase in LGV services and driver from more deliveries
	Mode Shift	Increased public transport operators & and wider mobility services and products
	EV Uptake	EV vehicle manufacturing
Land Use	Renewables	Solar and wind installers
	Natural Capital	Tree planters, ecologists, environmental managers, woodland managers

Jobs lost



Gas boiler maintenance repairs



Gas boiler maintenance repairs
and gas transmission



Reduced demand for City services
such as food and beverage stores,
Vehicle manufacturers

Petrol and diesel engine manufacturers

Petrol and diesel engine manufacturers

Vehicle manufacturers

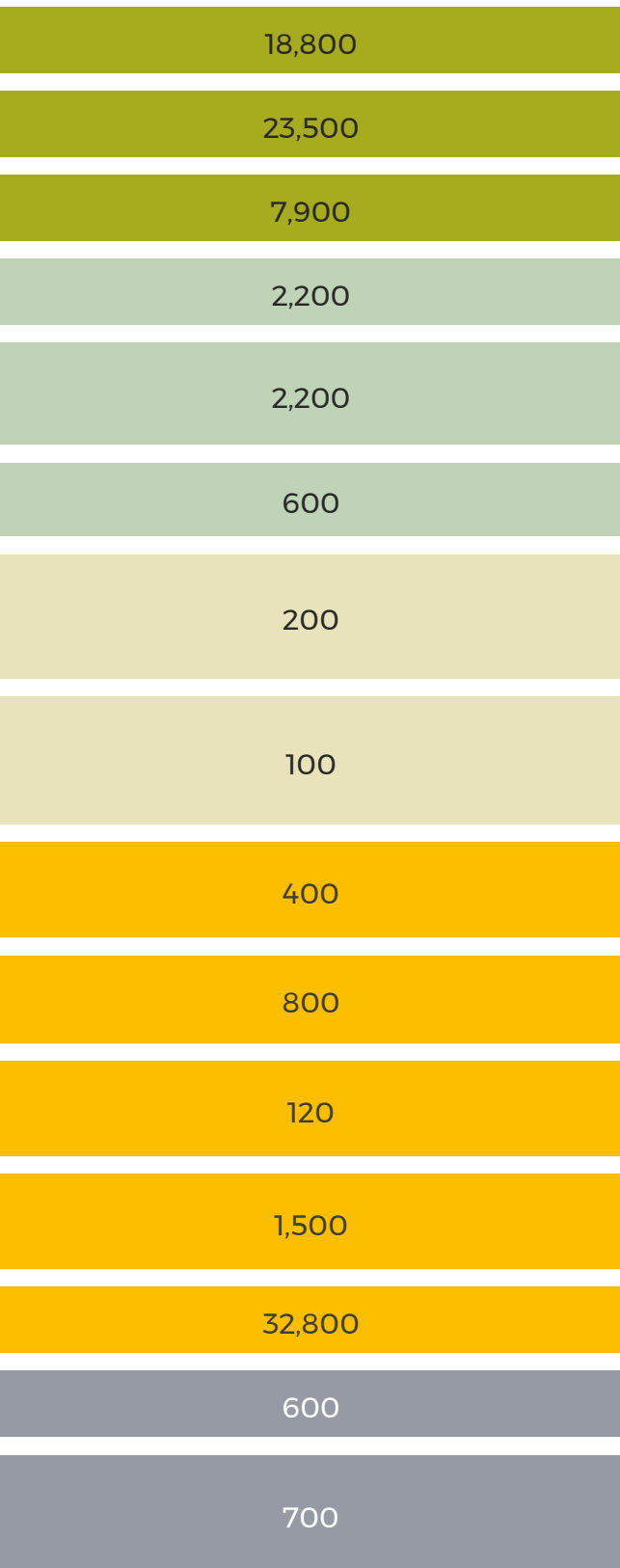
Vehicle manufacturers

Petrol and diesel vehicle manufacturing

A big opportunity for the region

Sector	Goals	Net jobs created by 2026
Domestic	Energy Efficiency	5,500
	Fuel Switching	6,900
	Micro-generation	1,800
Commercial	Energy Efficiency	500
	Fuel Switching	500
	Micro-generation	100
Industrial	Energy Efficiency and Fuel Switching	10
	Micro-generation	10
Transport	Fuel Switching (HGVs)	0
	Fuel Switching (Buses, Taxis)	500
	Demand Reduction (Trips)	40
	Mode Shift	1,500
	EV Uptake	3,400
Land Use	Renewables	40
	Natural Capital	200

Net jobs created by 2041



A real need for **skills & apprentices**

Potential for **21,000** jobs to be created by **2026**

Potential for another **71,000** jobs to be created by **2041**

140,000 jobs need to re-skill as result of transition **(11.1%)**

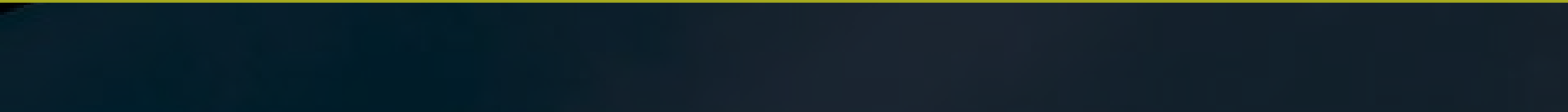
143,500 jobs are aligned to net zero transition **(11.5%)**

283,000 total jobs linked to transition **(22.5%)**





A DAY IN THE LIFE



A day in the life of a West Midlands resident in 2026

Early Morning



7:30 AM

Amelia wakes up in her warm home that she has fully retrofitted with loft and wall insulation and new glazing. She no longer has to worry about condensation covered windows or draughts.

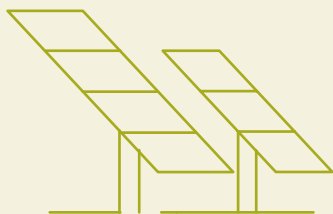
Mid-Morning



8:00 AM

Amelia works flexibly from home and no longer commutes every day. She uses the extra time to start work early and run errands at lunchtime.

Midday



12:30 PM

It's a bright sunny day so the rooftop solar panels are generating all of the electricity the home needs. Amelia puts the washing machine on a low temperature wash to take full advantage.

Afternoon



1:30 PM

Amelia has a busy afternoon so heads to a flexible office space her company has rented. Once she finishes meetings Amelia makes the final arrangements for a community tree planting event at the weekend.

Evening



6:00 PM

Dropping off the bike Amelia opens her phone and turns up the home temperature using her smart thermostat which connects to the heat pump.



Who is Amelia?

Amelia (pronouns: she/her) is in her early thirties working in the professional services industry. She lives in the West Midlands with her partner at their two bedroom home which they own together.



7:55 AM

After breakfast she walks over to her home office, with planning permission from the council she no longer has to work from her dining table!



8:05 AM

Everyone in the street now has ultra-fast broadband so tele-conferencing is a breeze, even when her partner is also connected.



1:00 PM

Amelia stops for lunch in the new community pocket park and then heads round the corner to collect some parcels from her local collection hub.



5:30 PM

There are plenty of electric taxis close by, but instead she rents a bike and uses the newly installed cycle lanes with her parcels in her backpack.



9:00 PM

After dinner, she logs on to the college website to view the new modules available. Amelia is learning new skills to meet the demands of her business clients who want to reduce their carbon impact and improve their competitiveness.

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West Midlands Combined Authority

NET ZERO 2041

Five Year Plan

Independent Technical Report





West Midlands Combined Authority

NET ZERO 2041

Five Year Plan

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70076572

DATE: FEBRUARY 2021

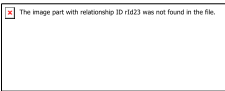
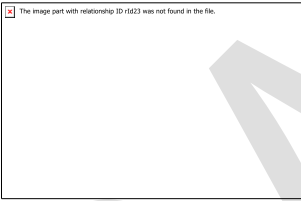

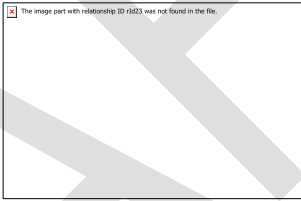
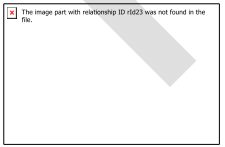
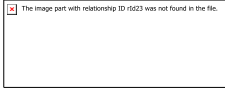
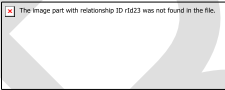


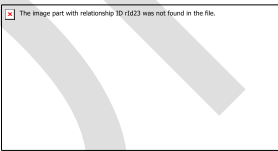
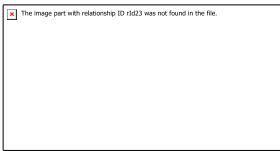
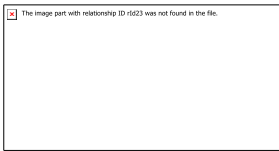
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QUALITY CONTROL

Issue/revision	Draft issue	Final Draft	First Issue
Remarks	Draft Report for Comment	Draft Report for Comment	For Distribution
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Prepared by	Eve Peverley, Sabbir Sidat, Josh Simmons, Adrian Regueira-Lopez	Eve Peverley, Sabbir Sidat, Josh Simmons, Adrian Regueira-Lopez	Eve Peverley, Sabbir Sidat, Josh Simmons, Adrian Regueira-Lopez
Signature	 	 	 
Checked by	Sabbir Sidat	Sabbir Sidat	Sabbir Sidat
Signature			
Authorised by	Barny Evans	Barny Evans	Barny Evans
Signature			
Project number	70076572	70076572	70076572

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1 BACKGROUND AND CONTEXT

WSP have been commissioned by the West Midlands Combined Authority (WMCA) to develop the first 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:

- Summary document
- Technical report
- 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, the way buildings are constructed and the standards to which they are built. The things individuals do will 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 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 Midlands’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 LEAs – 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' (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 Local Transport Authority it has a duty to develop, publish and implement a Local Transport Plan and in doing so have regard to relevant national policy including Environment Acts, 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 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.

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).

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) FYPs 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 their 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 also 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 Five Year Plan is to:

- 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 WM region to ensure an efficient, cost-effective and prioritised approach to delivery.
- 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.
- 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.
- Outline the **funding sources**, financing and investment to deliver the FYP, based on the above.
- 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.

Figure 2 - Project Aims

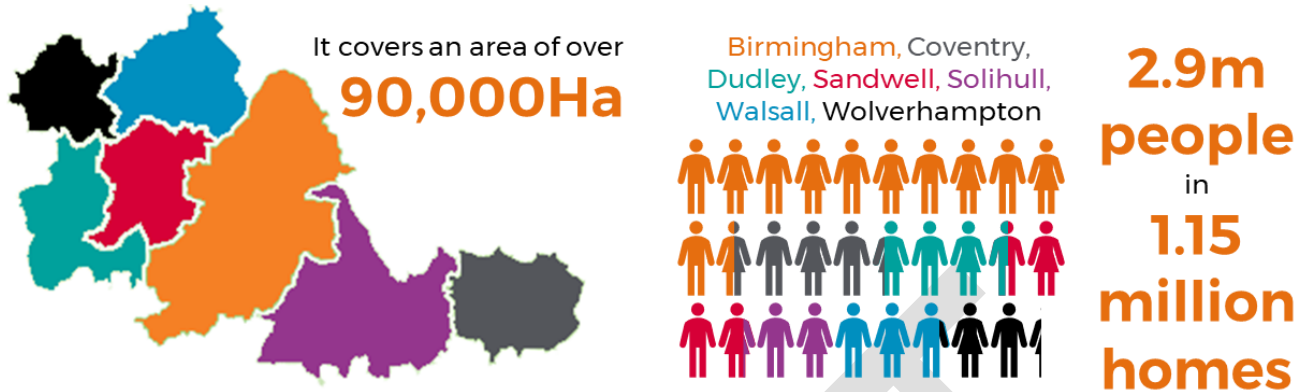


This plan focuses on the seven constituent authorities that make up the WMCA area:

- 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 3 – 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:

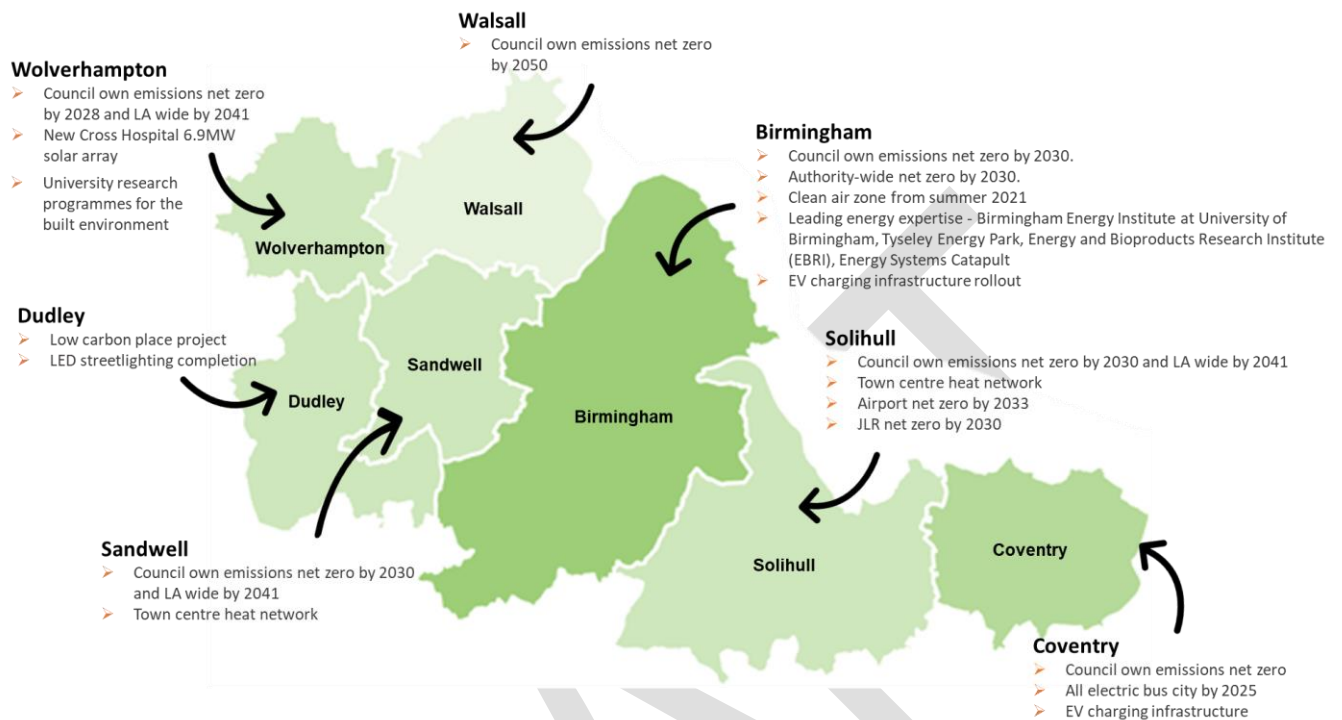
- **UK government** - It is clear that delivery requires a close working relationship with the UK government, including requests for devolution of powers and resources to support the region in achieving net zero.
- **The public** – Public support will be crucial to enable the change through personal 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 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:

Figure 4 – 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 for the WMCA, 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.

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 focus therefore shifts to retrofitting homes. 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.

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.

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 and 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.

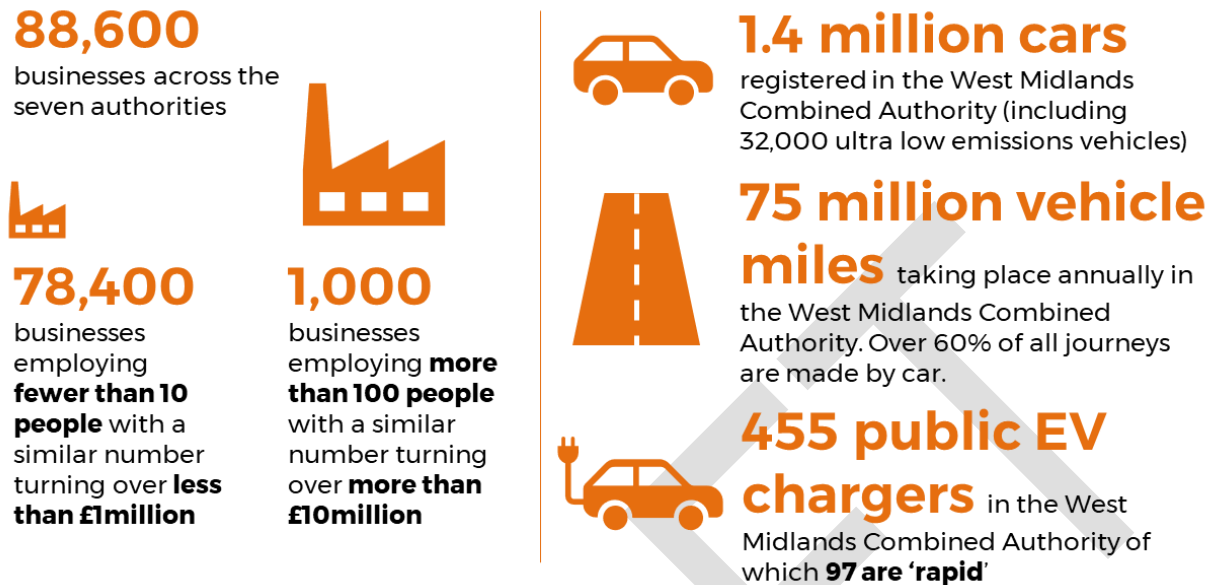
Natural Capital

- 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 points. 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.

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'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.

Figure 5 – Overview of businesses across the West Midlands Combined Authority (left) and the transport challenges (right)



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 were quantified.
- Speaking to the public and private sector 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 which 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 Five Year Plan (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 Five Year Plans 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.

2 ENERGY & EMISSIONS OVERVIEW

2.1 WEST MIDLANDS COMBINED AUTHORITY ENERGY USE

Energy use across the WMCA in 2018 was approximately 50,000 GWh; Figure 4 represents a reduction of around 20% since 2005¹.

Figure 6 – West Midlands Combined Authority Energy Use 2005-2018

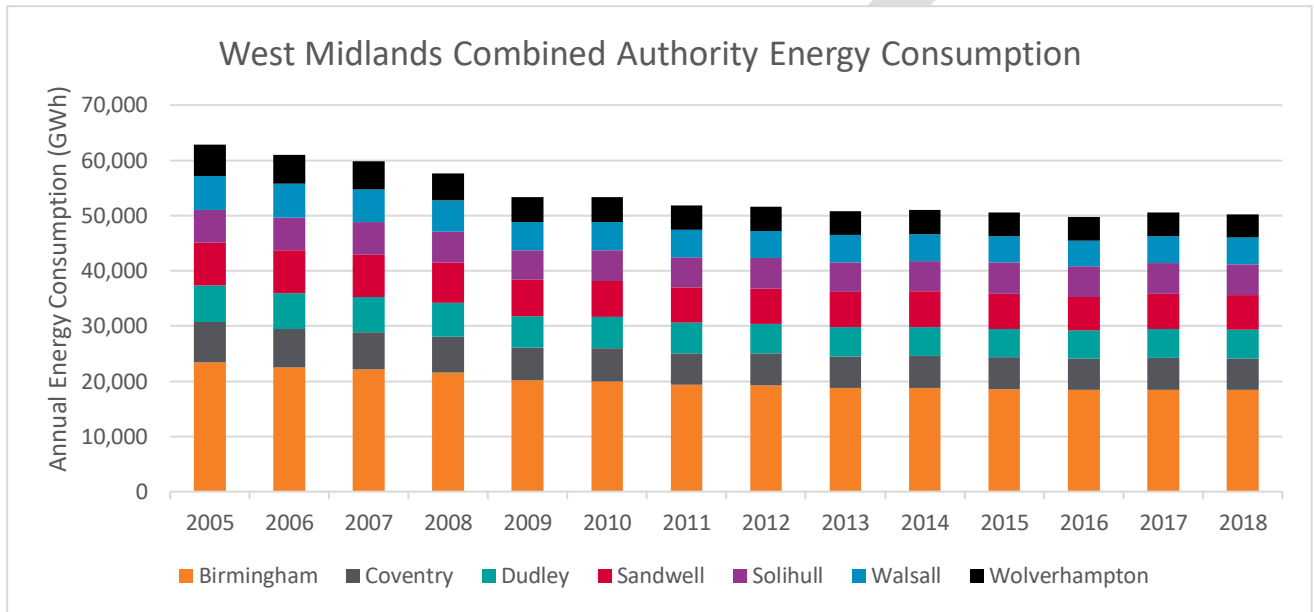
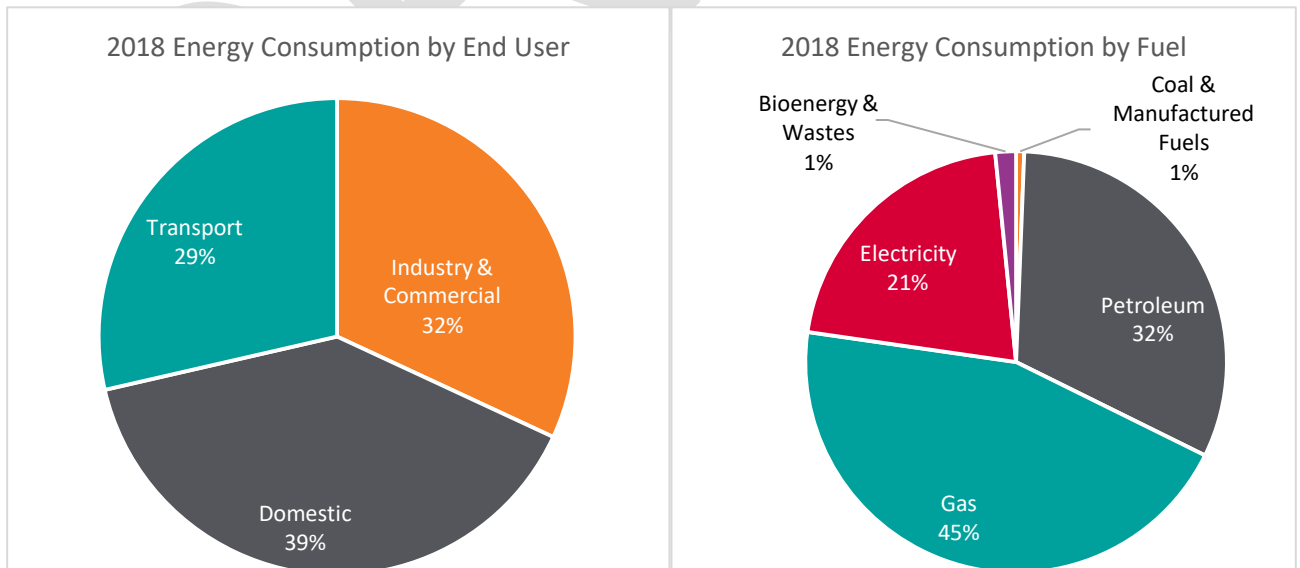


Figure 7 – Annual Energy Consumption Splits 2018



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 8 – West Midlands Combined Authority Annual GHG Emissions

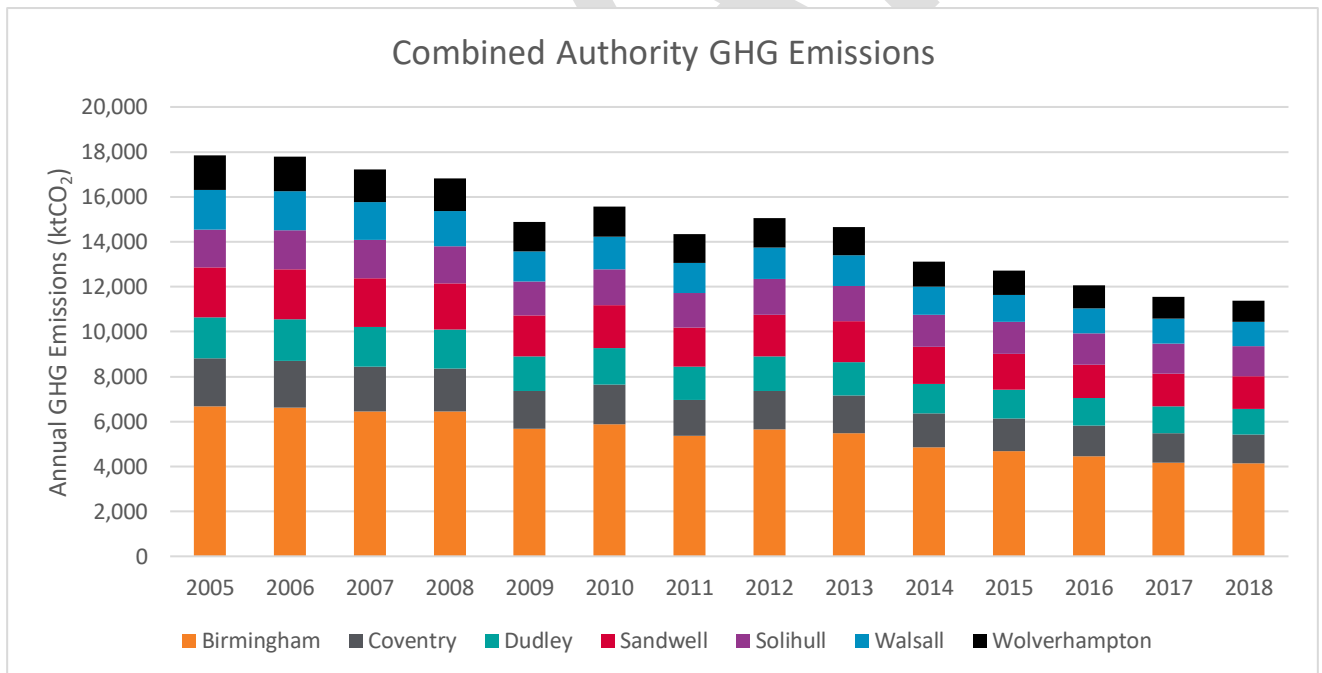


Figure 9 – West Midlands Combined Authority Annual GHG Emissions Splits

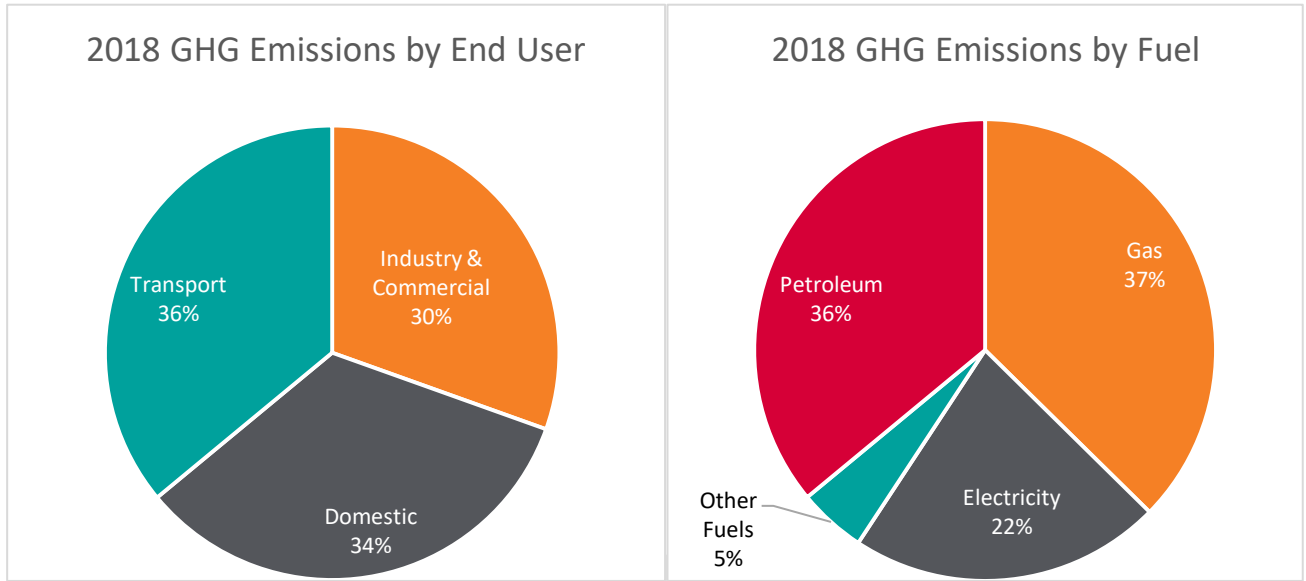
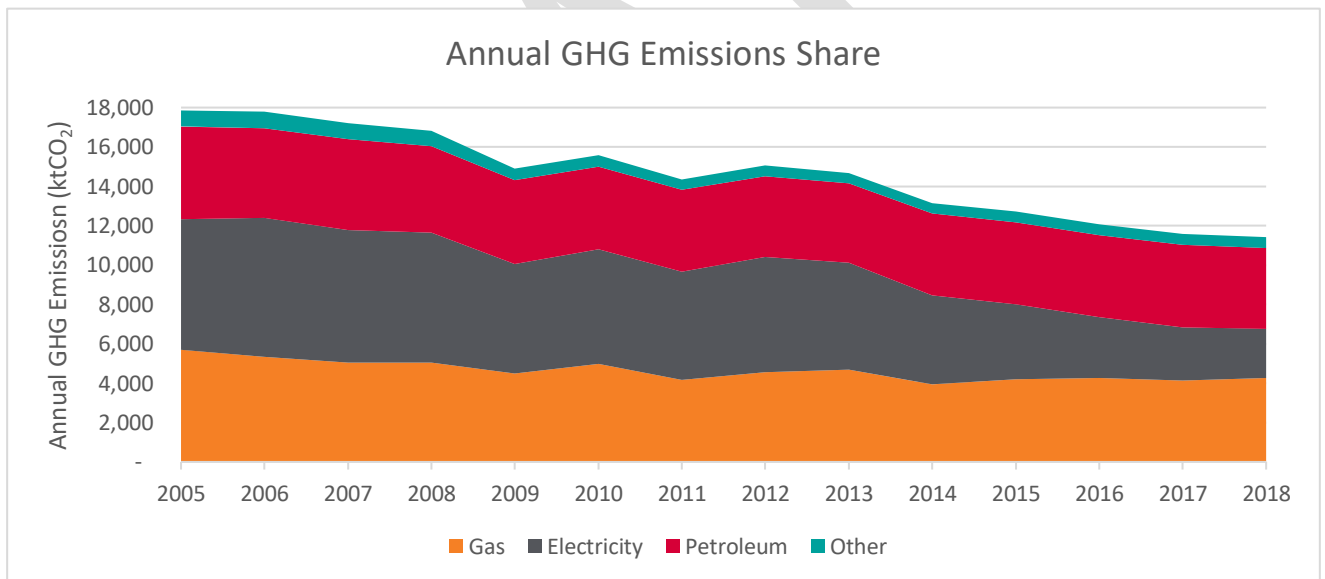


Figure 10 – West Midlands Combined Authority Annual GHG Emissions Share



- 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. Meanwhile electricity consumption only accounts for 22% of emissions in 2018.

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 CO₂ 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 Centre² 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 MtCO₂. 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 MtCO₂** for the period of 2020 to 2100. Using the methodology adopted by the Tyndall Centre, this would give a carbon budget of **34 MtCO₂** for the seven constituent authorities in the 2021 – 2026 budget period.

² <https://governance.wmca.org.uk/documents/s3219/Appendix.pdf>

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.	❖ 30% of GHG emissions in 2018 were from commercial and industrial activities, whilst 36% were from transport and 34% from domestic energy consumption.
❖ Energy consumption was split between domestic (39%), industry and commercial (32%) and transport (29%). Fuel use was also dominated by consumption of natural gas.	❖ 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.
❖ 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.

3 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 Five Year Plan (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
Jobs and Skills	
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.
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.

DRAFT

4 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 METHODOLOGY

4.2.1 SUMMARY OF APPROACH

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)

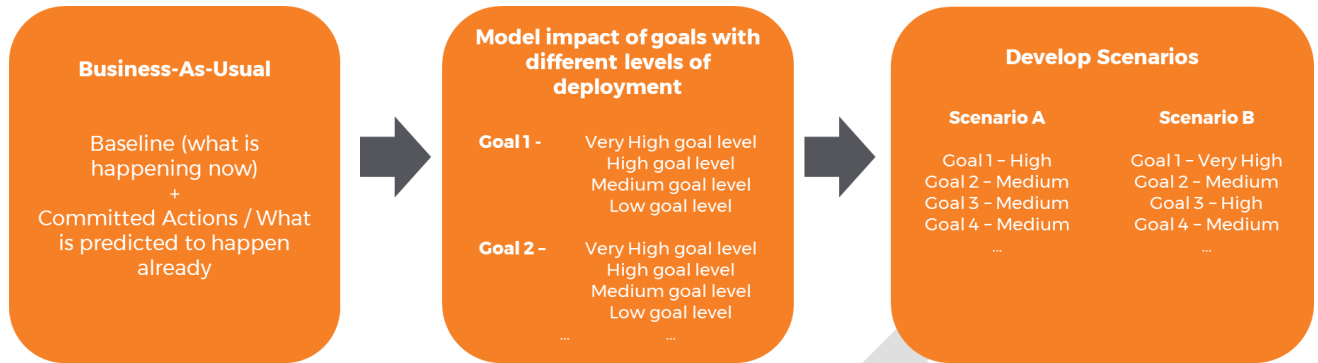
Step 3 – Model goals

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).

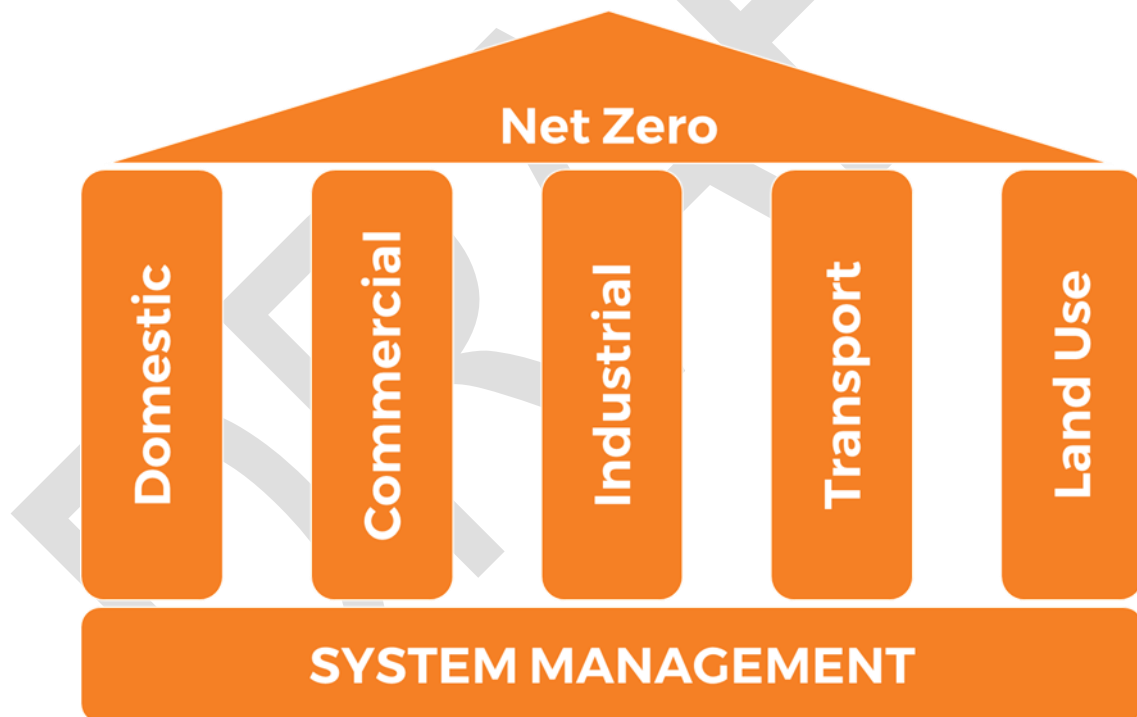
Figure 11 – WSP’s approach to modelling goals and scenarios



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 12 – 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.

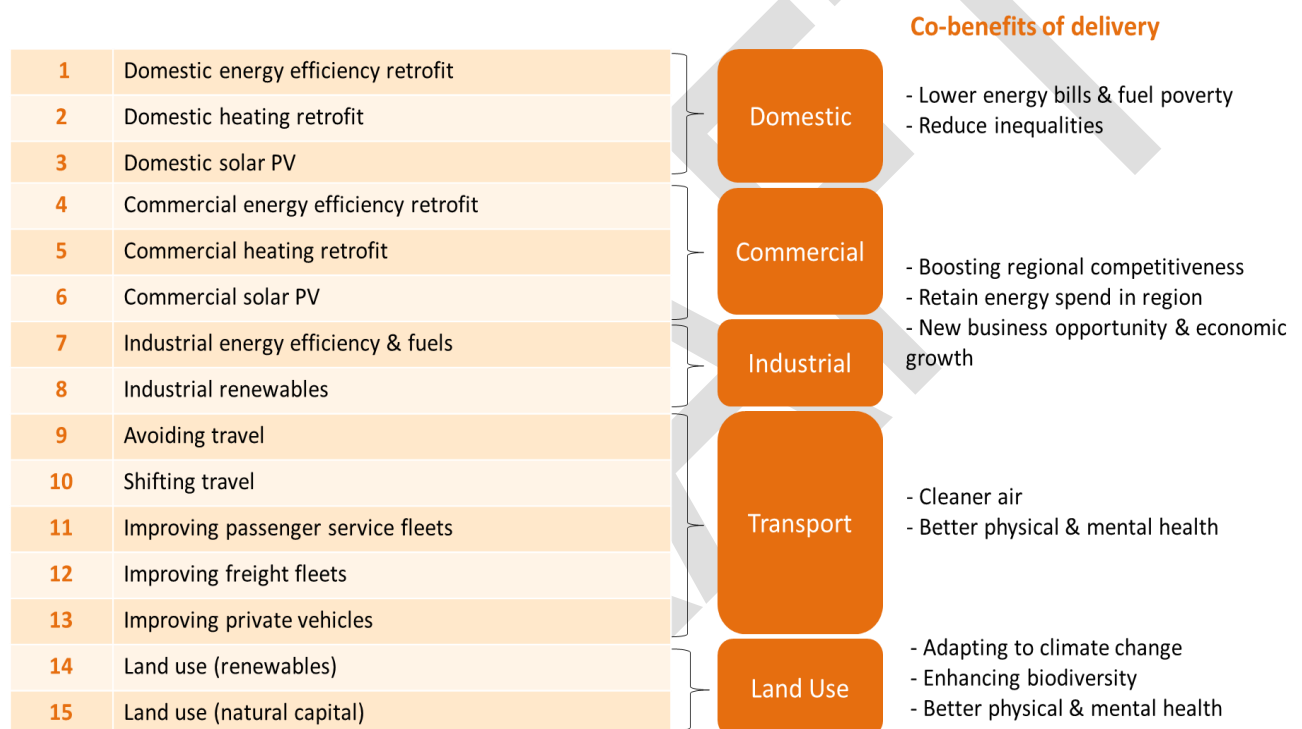
4.4 SUMMARY OF GOALS MODELLED

Goals have been proposed to deliver CO₂ emissions savings and concomitant benefits in line with the wider aims of WM2041. The assumptions which underpin these are described in **Appendix E**.

Modelling for the goals and scenarios provides an indication of the delivery required to reach net zero. The specific level of interventions will be developed through policy and business cases, for example, the detail of the transport goals will be subject to development of the new Local Transport Plan.

A West Midlands Carbon Calculator has been produced so that people can review the goals and scenarios to understand different pathways to achieving net zero carbon.

Figure 13 – Goals and Intervention Areas



*The areas of waste and offsetting are not considered in this analysis

4.4.1 GOAL 1 – DOMESTIC ENERGY EFFICIENCY RETROFIT

Description

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 insulation (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 Implications³

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.

³ This section draws out current planning considerations with regards to implementation rather than suggestions or recommendations for planning policy.

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 14 – Goal 1 GHG Emission Saving and Deployment in 2026

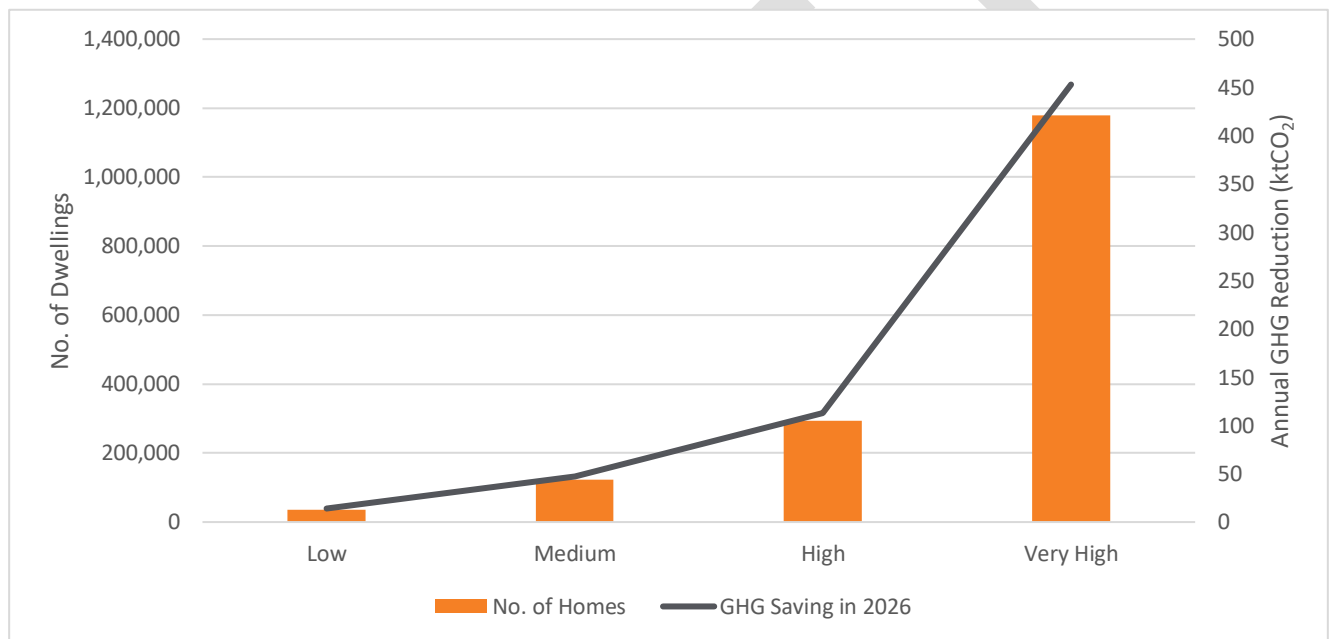
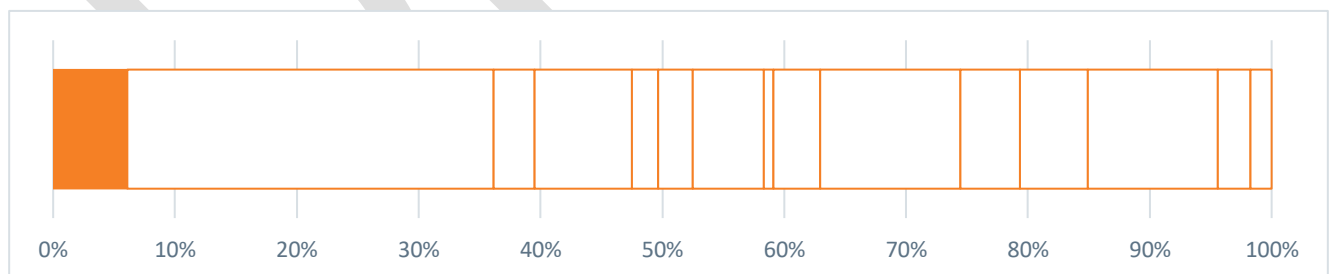


Figure 15 – Goal 1 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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 has the potential will accrue to every resident of this region and has high potential for delivering inclusive growth.

<p>We will change our economy without leaving anyone behind</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Reduction in fuel poverty and improved health and wellbeing – Benefitting the least well off in society the most
<p>We will invest in the resilience of our places</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Reduction of energy demand – Improved building resilience to changes in external conditions
<p>We will use our industrial past to create a new future</p>	<p>Neutral</p>	<ul style="list-style-type: none"> – No impact
<p>We will create places and connections that help us to meet the climate challenge</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Improved climate resilience of buildings
<p>We will decouple prosperity from the consumption of energy and resources</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Reduction in energy consumption

4.4.2 GOAL 2 – DOMESTIC HEATING SYSTEM RETROFIT

Description

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.

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

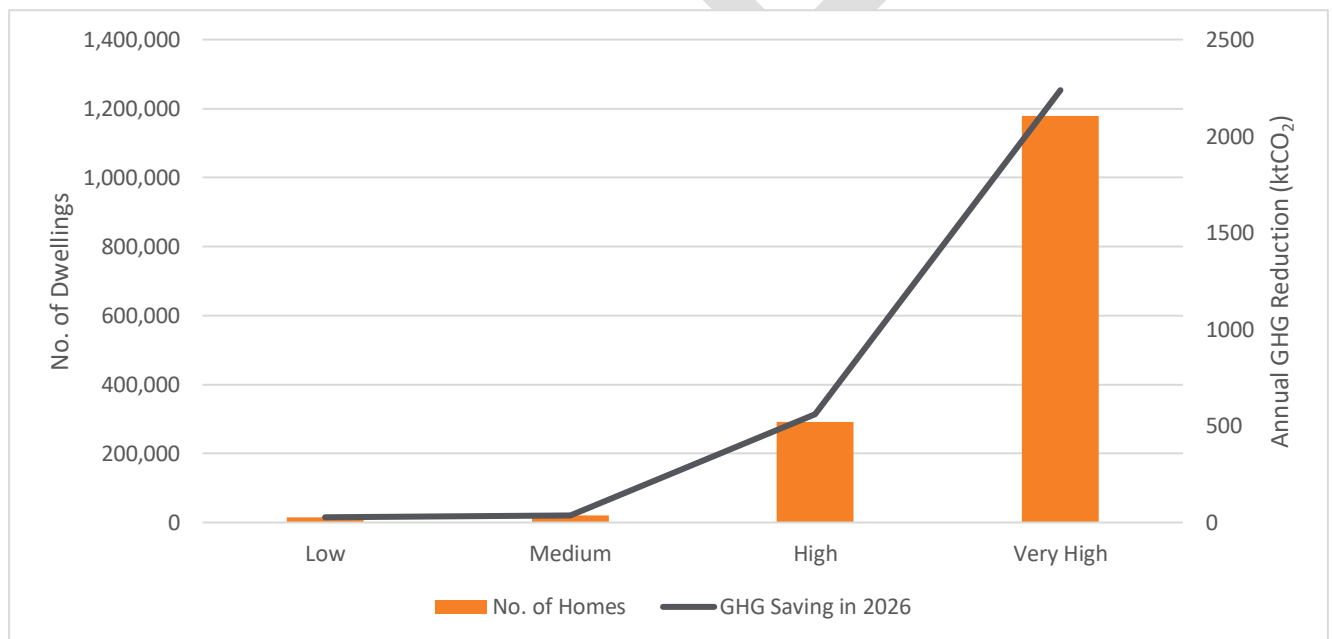
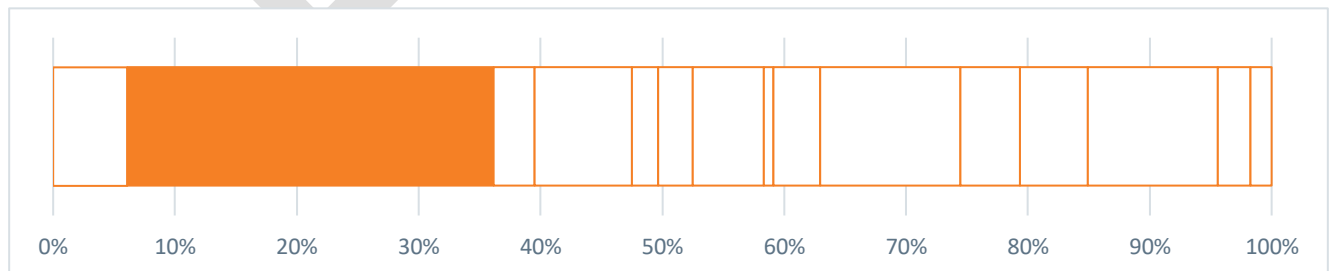


Figure 17 – Goal 2 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits and Inclusive Growth

- This intervention will directly work to reduce air pollution currently generated by gas boilers.
- 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.

<p>We will change our economy without leaving anyone behind</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – In conjunction with Goal 1, delivering affordable heat and thermal comfort
<p>We will invest in the resilience of our places</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Reduction in dependence on fossil fuels – Buildings will decarbonise with the electricity grid making them 'Future Ready'
<p>We will use our industrial past to create a new future</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Using engineering and manufacturing base to develop heat pump manufacture and associated systems.
<p>We will create places and connections that help us to meet the climate challenge</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Buildings will decarbonise with the electricity grid making them 'Future Ready'
<p>We will decouple prosperity from the consumption of energy and resources</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Reduction in use in fossil fuels

4.4.3 GOAL 3 – DOMESTIC PHOTOVOLTAICS

Description

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 investments⁴.

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 or 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.

⁴ <https://www.hecommunityenergy.org/>

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 18 – Goal 3 GHG Emission Saving and Deployment in 2026

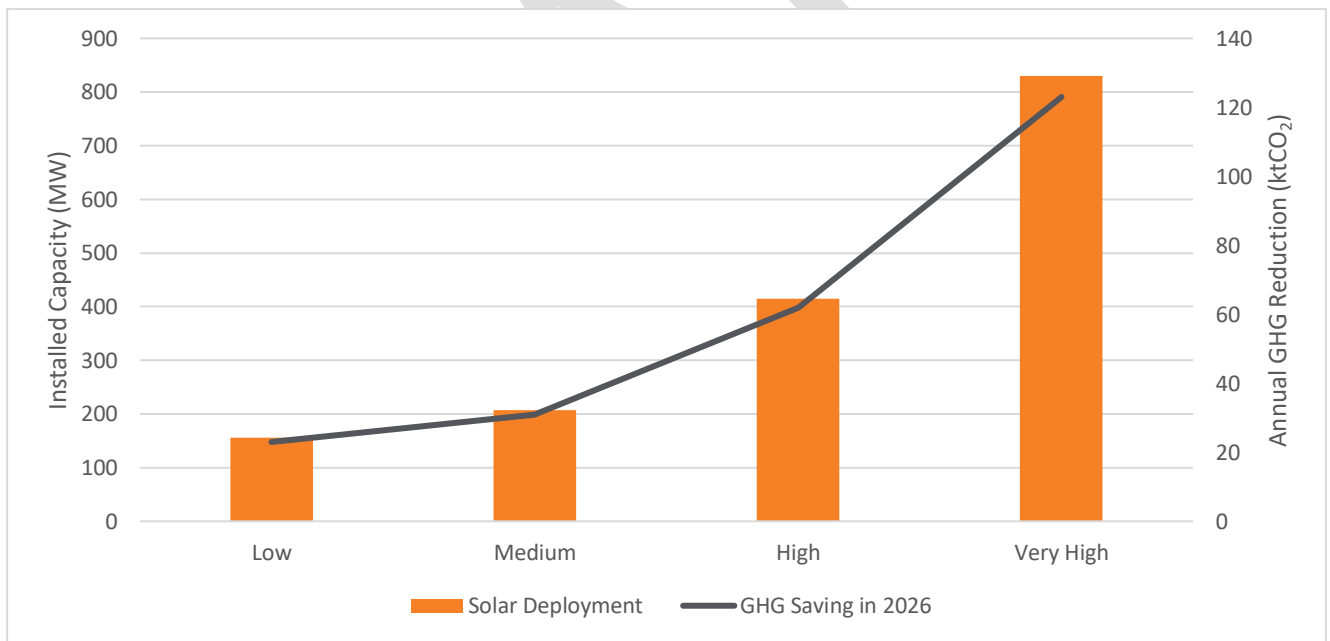
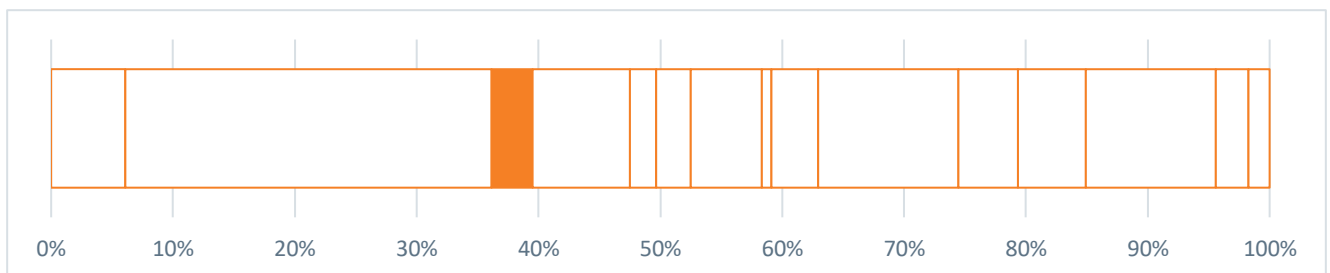


Figure 19 – Goal 3 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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.

<p>We will change our economy without leaving anyone behind</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Generating renewable electricity, offsetting fuel bills and potentially providing source of income
<p>We will invest in the resilience of our places</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Renewable energy generation improving self-sufficiency
<p>We will use our industrial past to create a new future</p>	<p>Neutral</p>	<ul style="list-style-type: none"> – No impact
<p>We will create places and connections that help us to meet the climate challenge</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Reduce reliance on fossil fuel powered electricity generation and work towards decarbonisation of electricity grid
<p>We will decouple prosperity from the consumption of energy and resources</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Improved self-sufficiency

4.4.4 GOAL 4 – COMMERCIAL ENERGY EFFICIENCY RETROFIT

Description

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 measure⁵ 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-effective⁶ 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%

As electricity consumption is much more significant in commercial buildings than domestic buildings, energy efficiency measures achieve less carbon savings as electricity quickly decarbonises in the 2030s, even if in energy terms this goal is of a similar scale to the equivalent domestic one.

⁵https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/565748/BEES_overarching_report_FINAL.pdf

⁶ A measure is socially cost-effective if the total benefits to society outweigh the total costs to society over the lifetime of the measure. The reference study considered the capital expenditure, operational expenditure, social cost of energy, air quality impacts, and value of emissions, all discounted at the social discount rate.

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 20 – Goal 4 GHG Emission Saving and Deployment in 2026

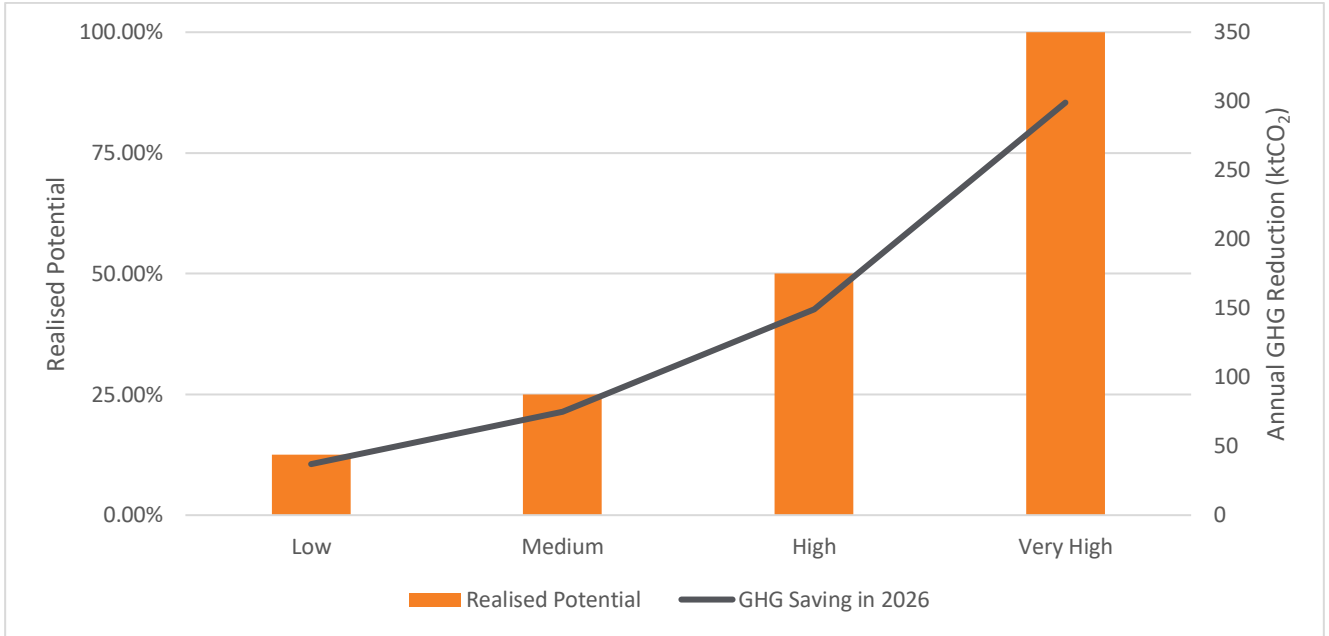
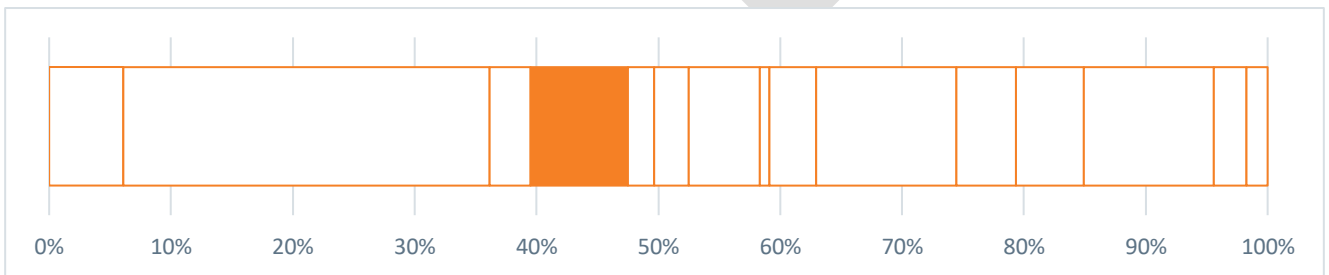


Figure 21 – Goal 4 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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

We will invest in the resilience of our places

Positive Impact

Positive Impact

- Reduction in energy consumption
- Reduction in dependence on energy
- Improved building resilience to changes in external conditions

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

Neutral

- No impact

Positive Impact

- Improved climate resilience of buildings

Positive Impact

- Reduction in energy consumption

DRAFT

4.4.5 GOAL 5 – COMMERCIAL HEATING SYSTEM RETROFIT

Description

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.

- **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.

- **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.

- **Very High** – All 73,400 commercial buildings by 2026.

Figure 22 – Goal 5 GHG Emission Saving and Deployment in 2026

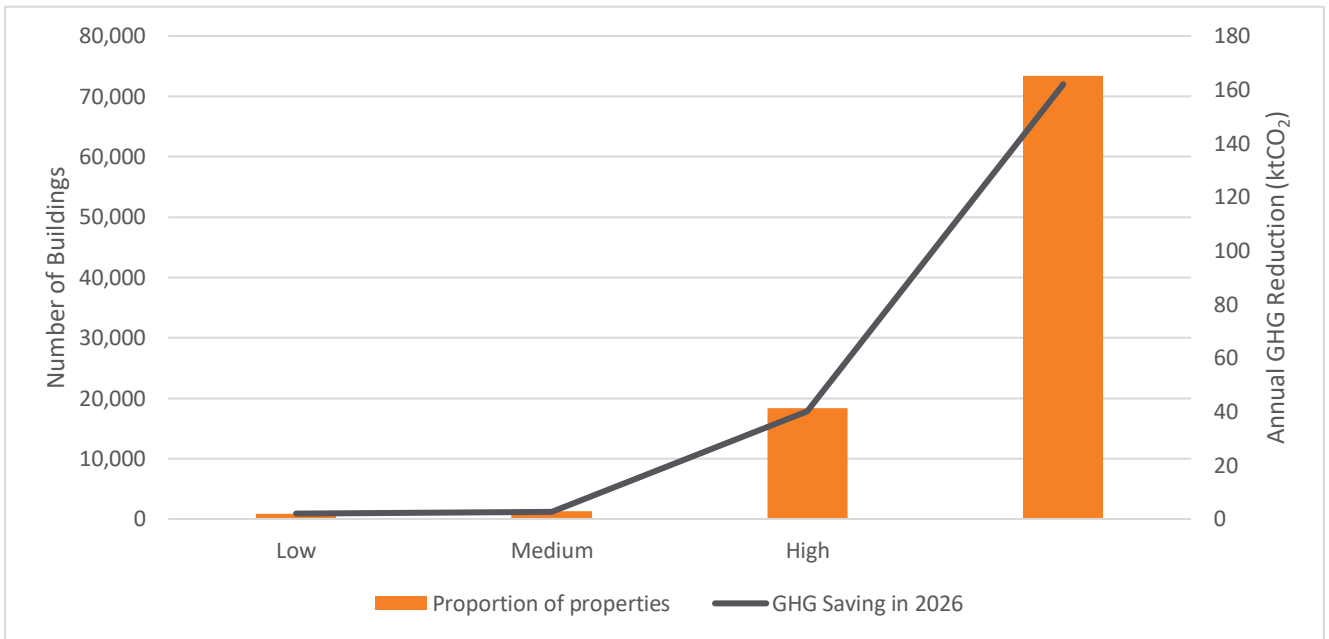
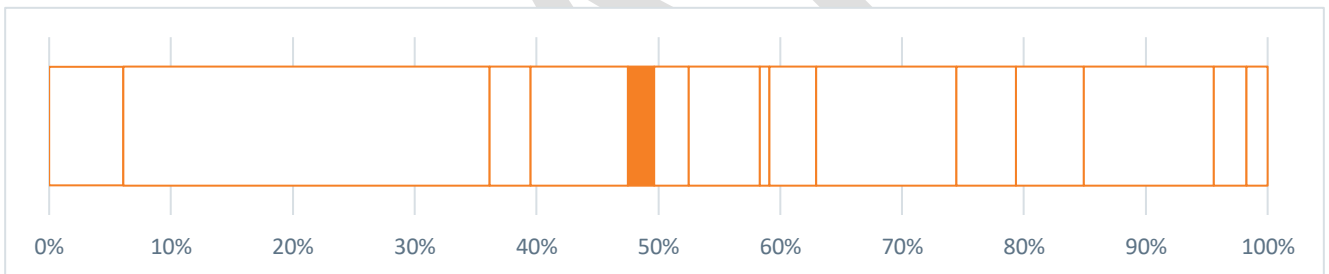


Figure 23 – Goal 5 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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

We will invest in the resilience of our places

Neutral

Positive Impact

– No impact on people

- 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
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

Positive Impact

- Using engineering and manufacturing base to develop heat pump manufacture and supply chain, but will need to compete with internationally established competitors

Positive Impact

- Buildings will decarbonise with the electricity grid making them 'Future Ready'

Positive Impact

- Reduction in use in fossil fuels

DRAFT

4.4.6 GOAL 6 – COMMERCIAL PHOTOVOLTAICS

Description

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 communities⁷.

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.

⁷ <https://artandenergy.org/tag/plymouth-energy-community/>

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 24 – Goal 6 GHG Emission Saving and Deployment in 2026

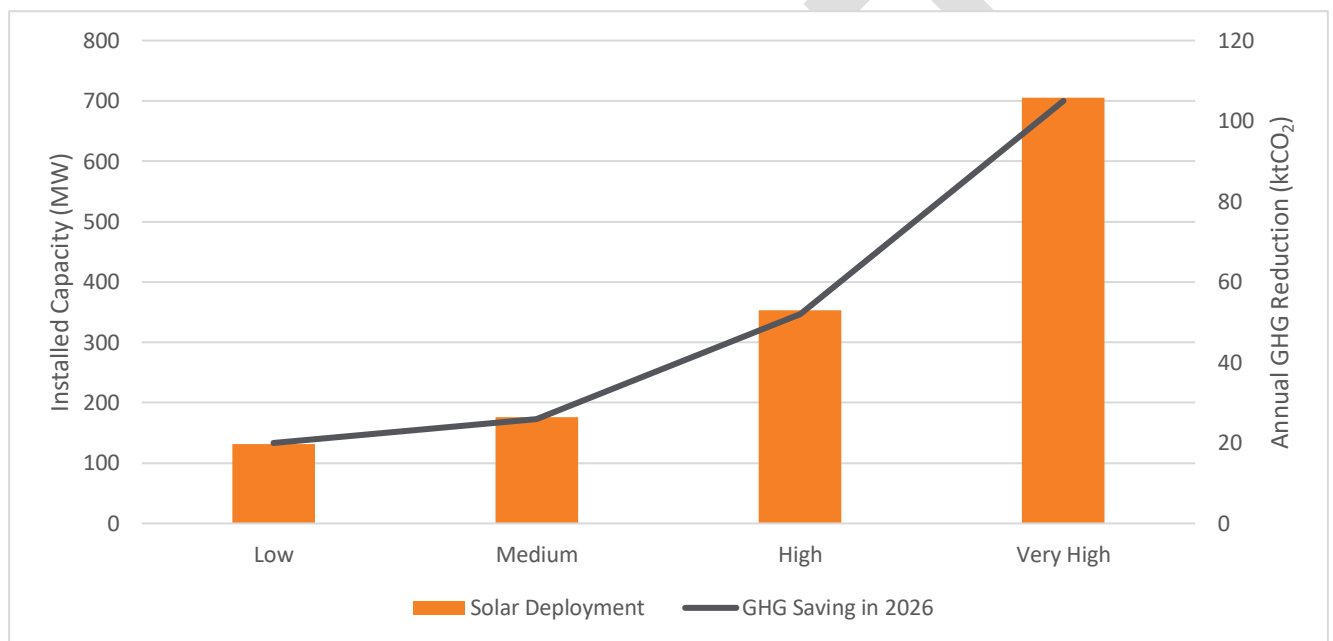
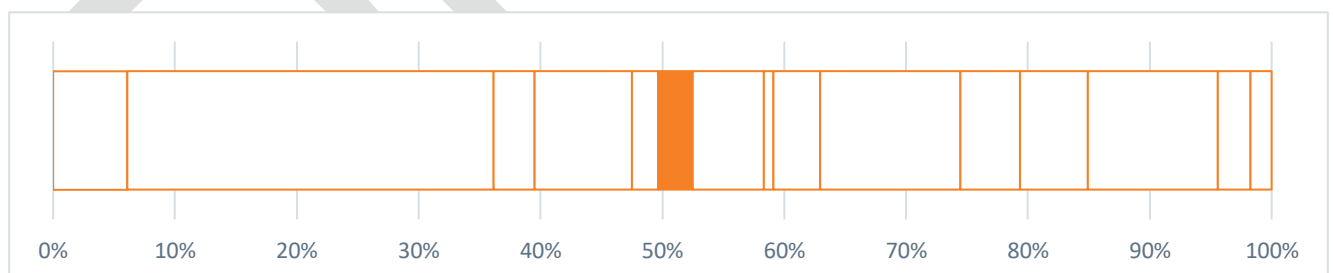


Figure 25 – Goal 6 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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.

<p>We will change our economy without leaving anyone behind</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Generating renewable electricity, offsetting fuel bills
<p>We will invest in the resilience of our places</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Renewable energy generation improving self-sufficiency
<p>We will use our industrial past to create a new future</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Potential to create strong local supply chains
<p>We will create places and connections that help us to meet the climate challenge</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Reduce reliance on fossil fuel powered electricity generation and work towards decarbonisation of electricity grid
<p>We will decouple prosperity from the consumption of energy and resources</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> – Reduced consumption of resources.

4.4.7 GOAL 7 – INDUSTRY ENERGY EFFICIENCY AND FUEL SWITCHING

Description

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 areas 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.

Table 3 – Industrial energy efficiency potential

	No. in 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.

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.

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.
- **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.
- **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.
- **Very High** – No change from the high scenario

Figure 26 – Goal 7 GHG Emission Saving and Deployment in 2026

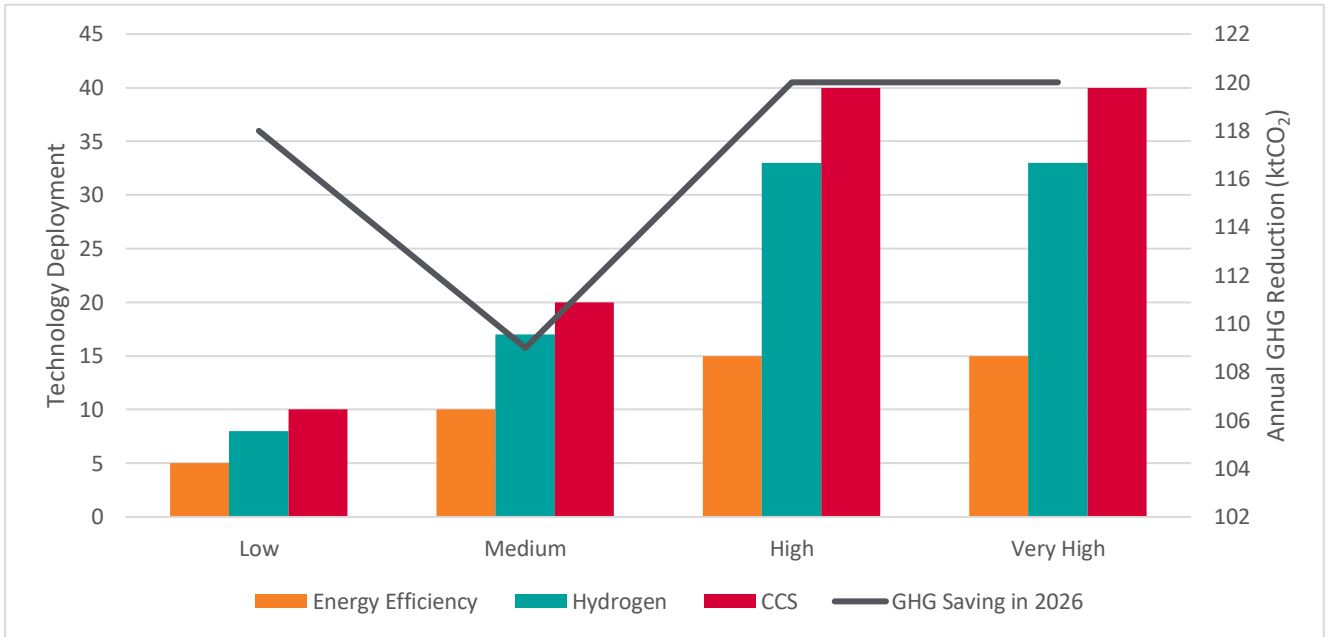
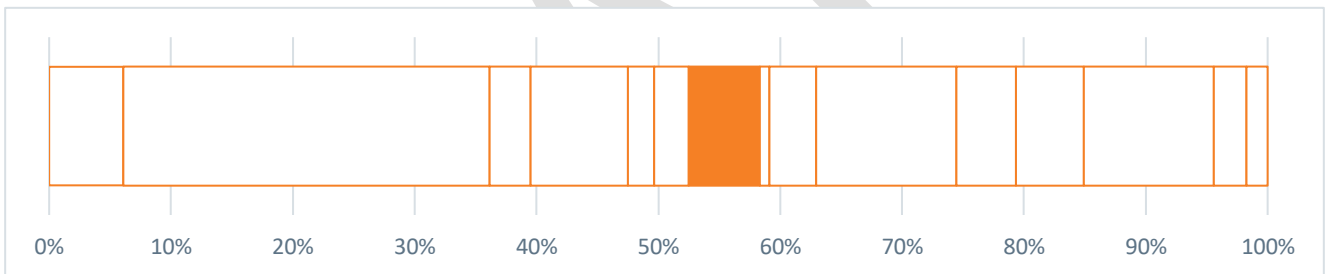


Figure 27 – Goal 7 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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

We will invest in the resilience of our places

Positive Impact
Neutral

- Opportunities for jobs creation
- No impact

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

Positive Impact

- Focuses on industrial presence in the West Midlands

Neutral

- No impact

Positive Negative

- Reduction in energy consumption
- Need to ensure international competitiveness

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4.4.8 GOAL 8 – INDUSTRY PHOTOVOLTAICS

Description

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.

- **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 28 – Goal 8 GHG Emission Saving and Deployment in 2026

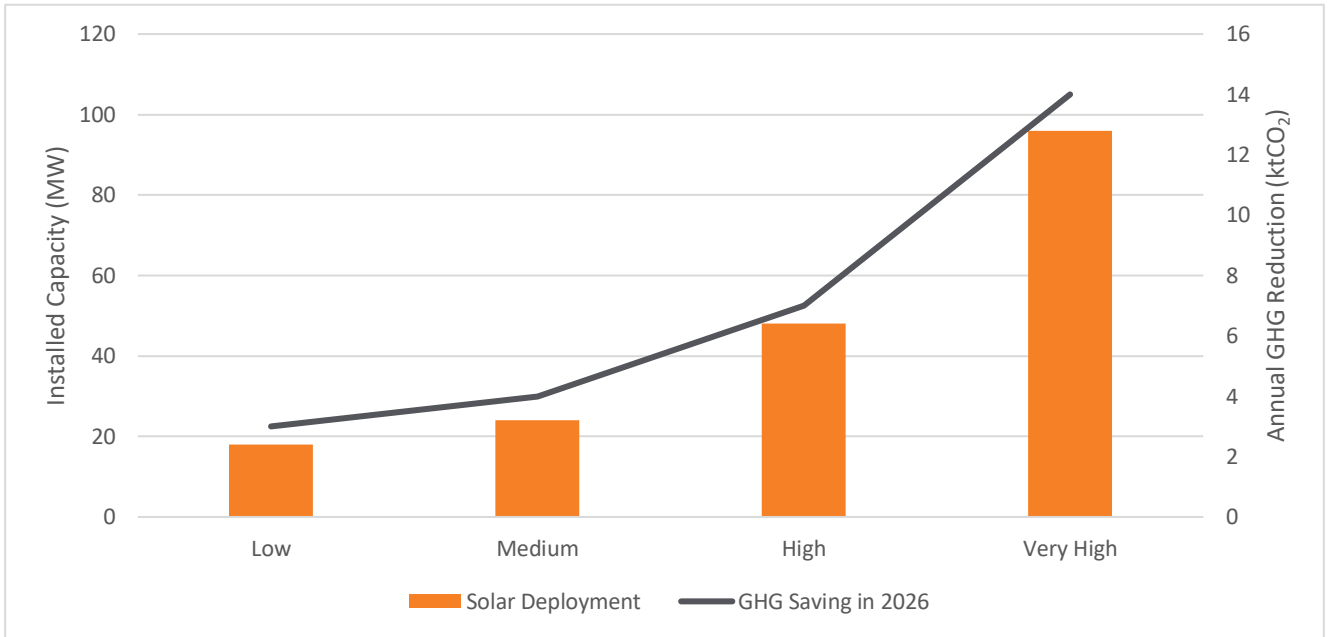
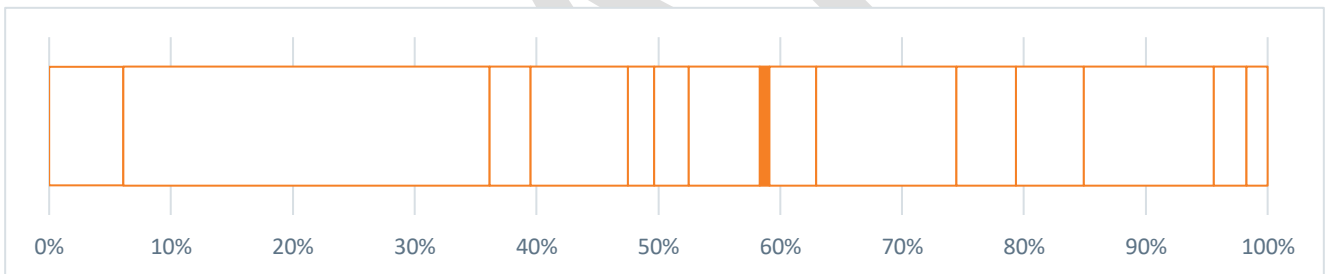


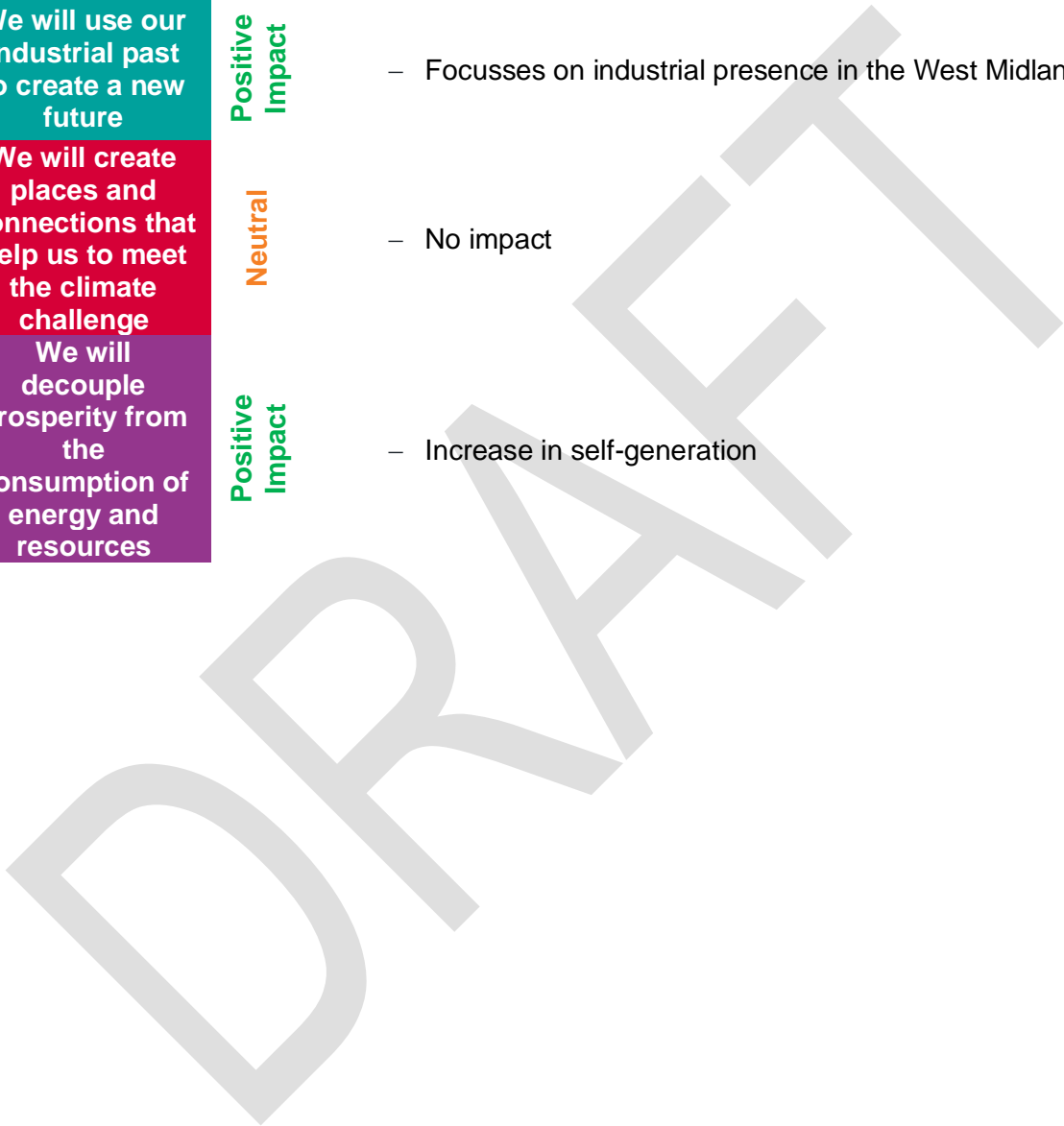
Figure 29 – Goal 8 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



Co-benefits

- 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.

<p>We will change our economy without leaving anyone behind</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - Opportunities for jobs creation
<p>We will invest in the resilience of our places</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - Reduction in reliance on fossil fuels
<p>We will use our industrial past to create a new future</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - Focusses on industrial presence in the West Midlands
<p>We will create places and connections that help us to meet the climate challenge</p>	<p>Neutral</p>	<ul style="list-style-type: none"> - No impact
<p>We will decouple prosperity from the consumption of energy and resources</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - Increase in self-generation



4.4.9 GOAL 9 – AVOIDING TRAVEL (DEMAND REDUCTION/ DIGITAL CONNECTIVITY)

Description

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 such as 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 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 home⁸. 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 roadmap⁹ 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

⁸ This was identified as part of the 'balanced pathway' with car miles reducing through a mixture of avoiding travel and shifting to other modes. More ambitious and plausible scenarios were also considered as part of that study. The study also considered the UK as a whole, whilst the West Midlands Combined Authority area is on the whole much more urban and therefore better able to shift to other modes of transport.

⁹ <https://www.wmca.org.uk/news/wmca-unveils-plan-for-region-s-digital-future/>

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 CO₂ 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 home (who are able to) and 3.1% reduction in retail and personal business trips by 2026.
- **High** – Every person who is able to work from home do (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 30 – Goal 9 GHG Emission Saving and Deployment in 2026

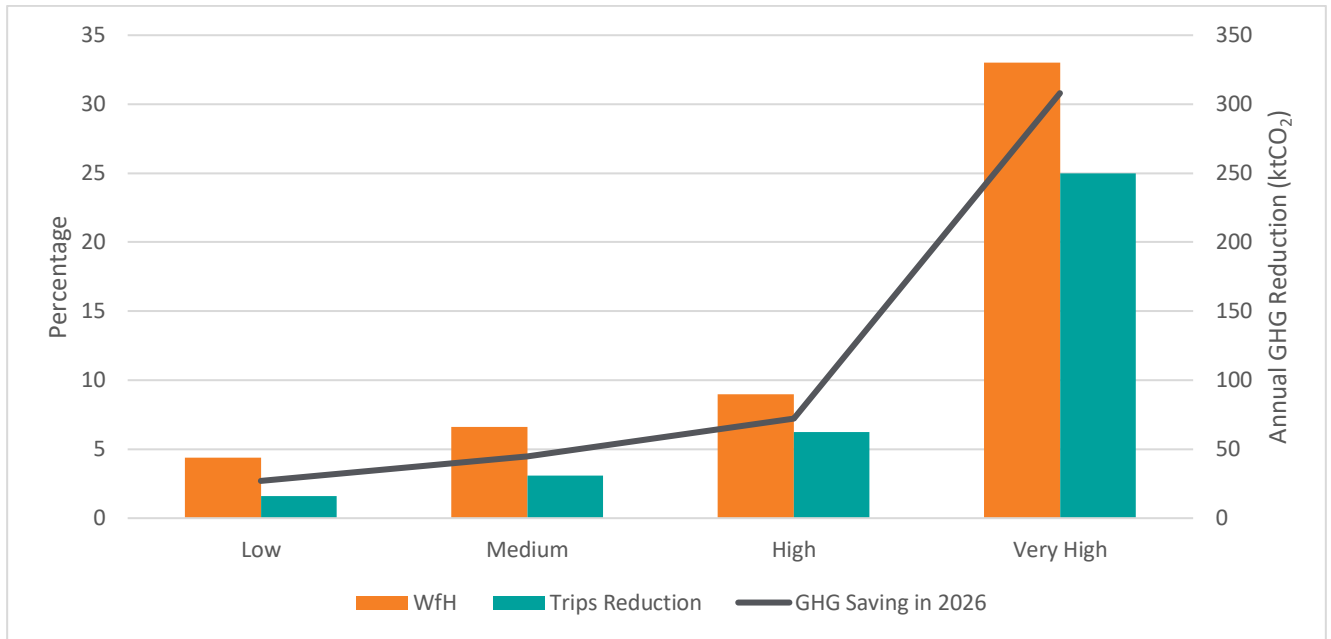
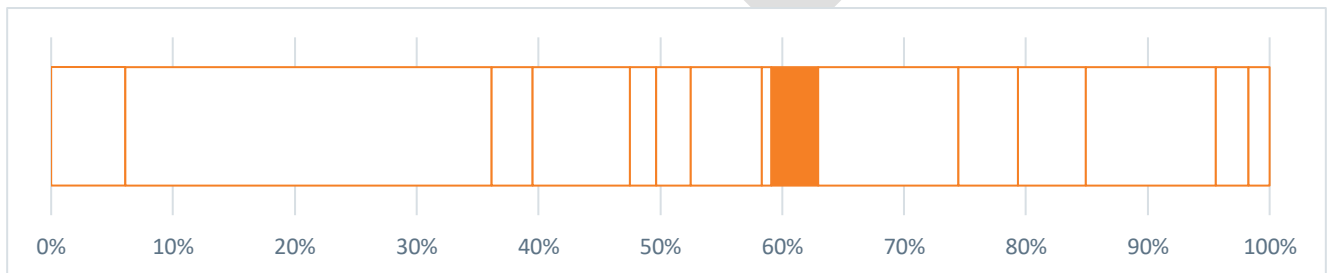


Figure 31 – Goal 9 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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.

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

Positive
Negative

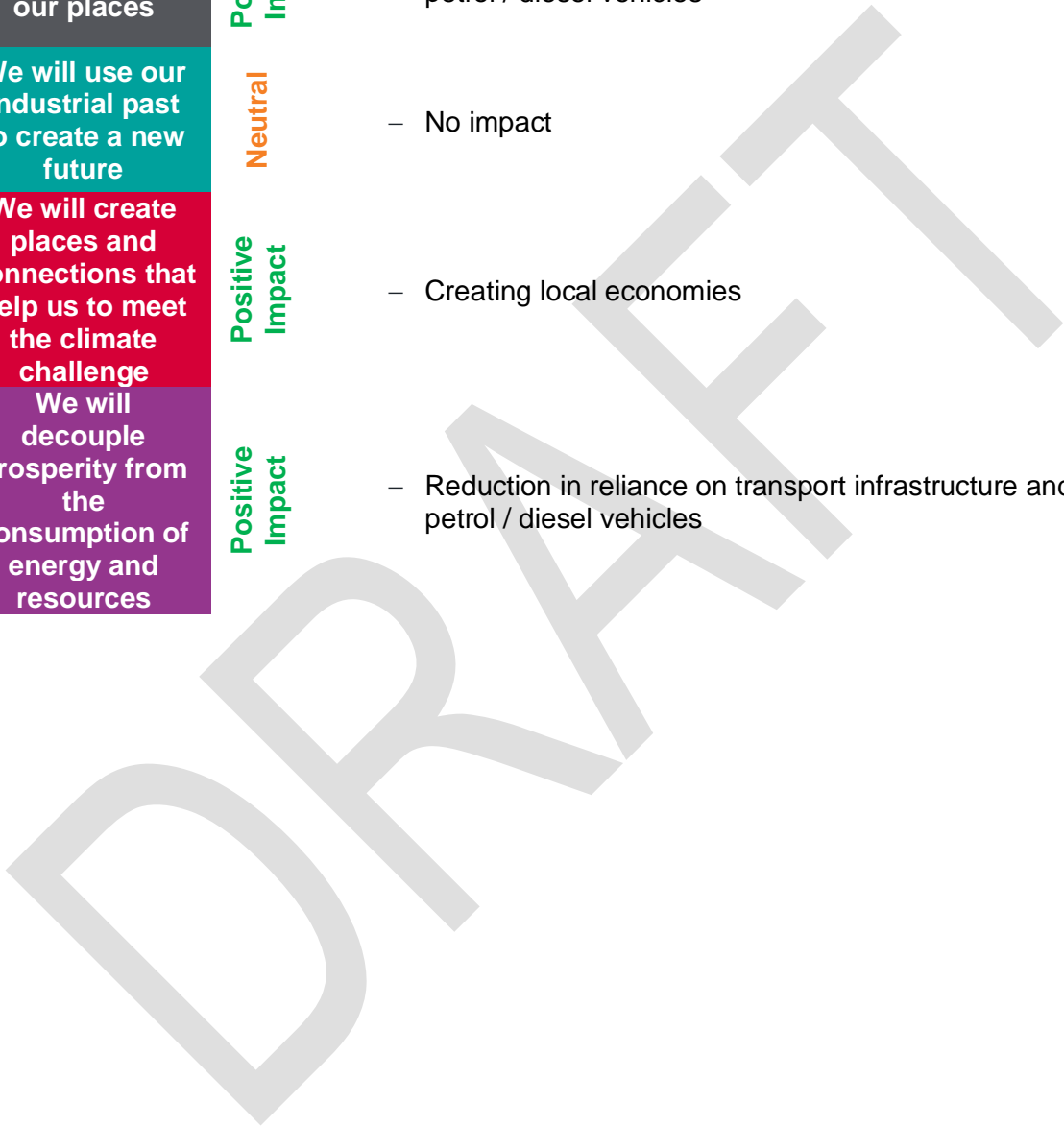
Positive
Impact

Neutral

Positive
Impact

Positive
Impact

- 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
- Reduction in reliance on transport infrastructure and use of petrol / diesel vehicles
- No impact
- Creating local economies
- Reduction in reliance on transport infrastructure and use of petrol / diesel vehicles



4.4.10 GOAL 10 – SHIFTING TRAVEL

Description

Shifting transport to lower carbon models consists of two linked elements. Firstly, shift current trips to use lower carbon modes where feasible is need. 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 65% 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 32 – Goal 10 GHG Emission Saving and Deployment in 2026

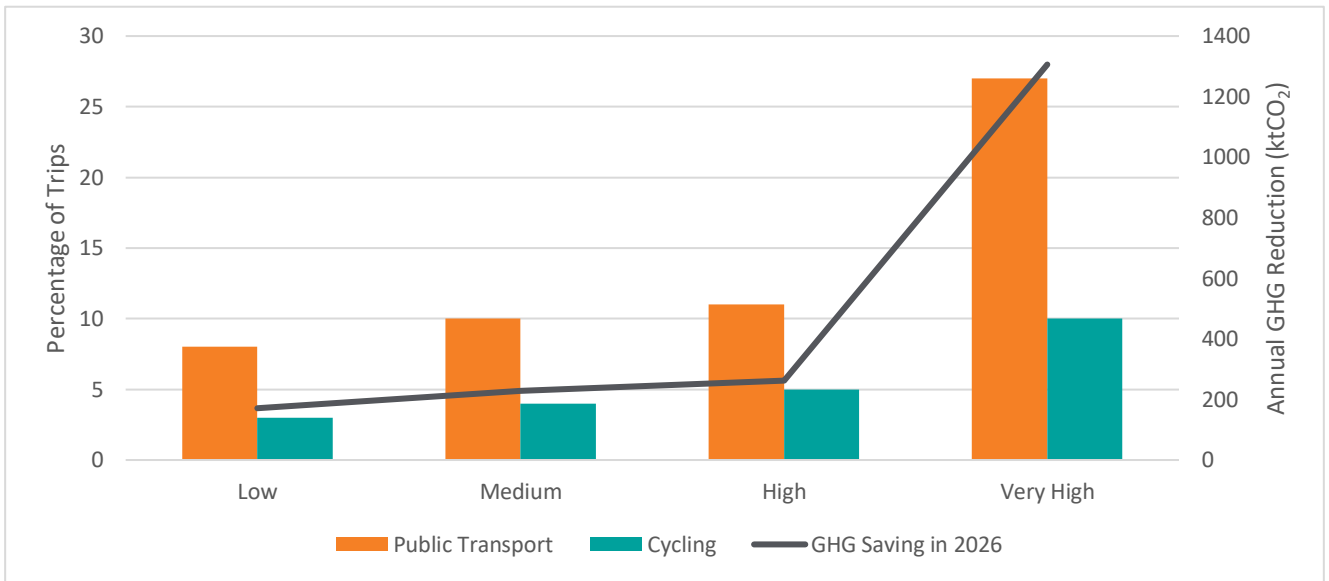
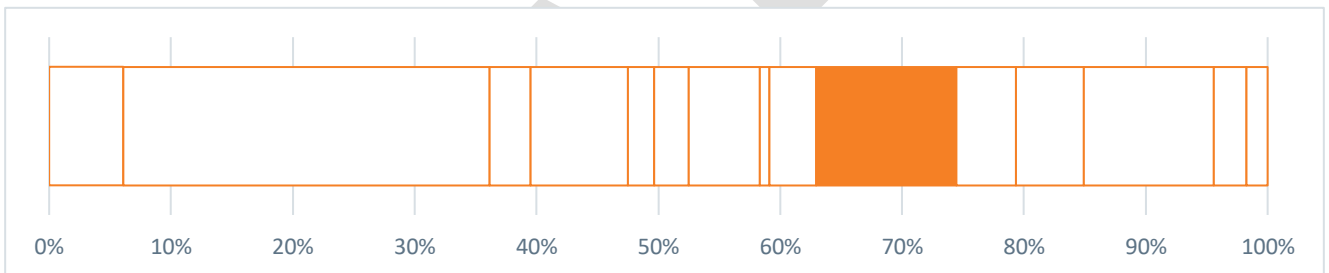


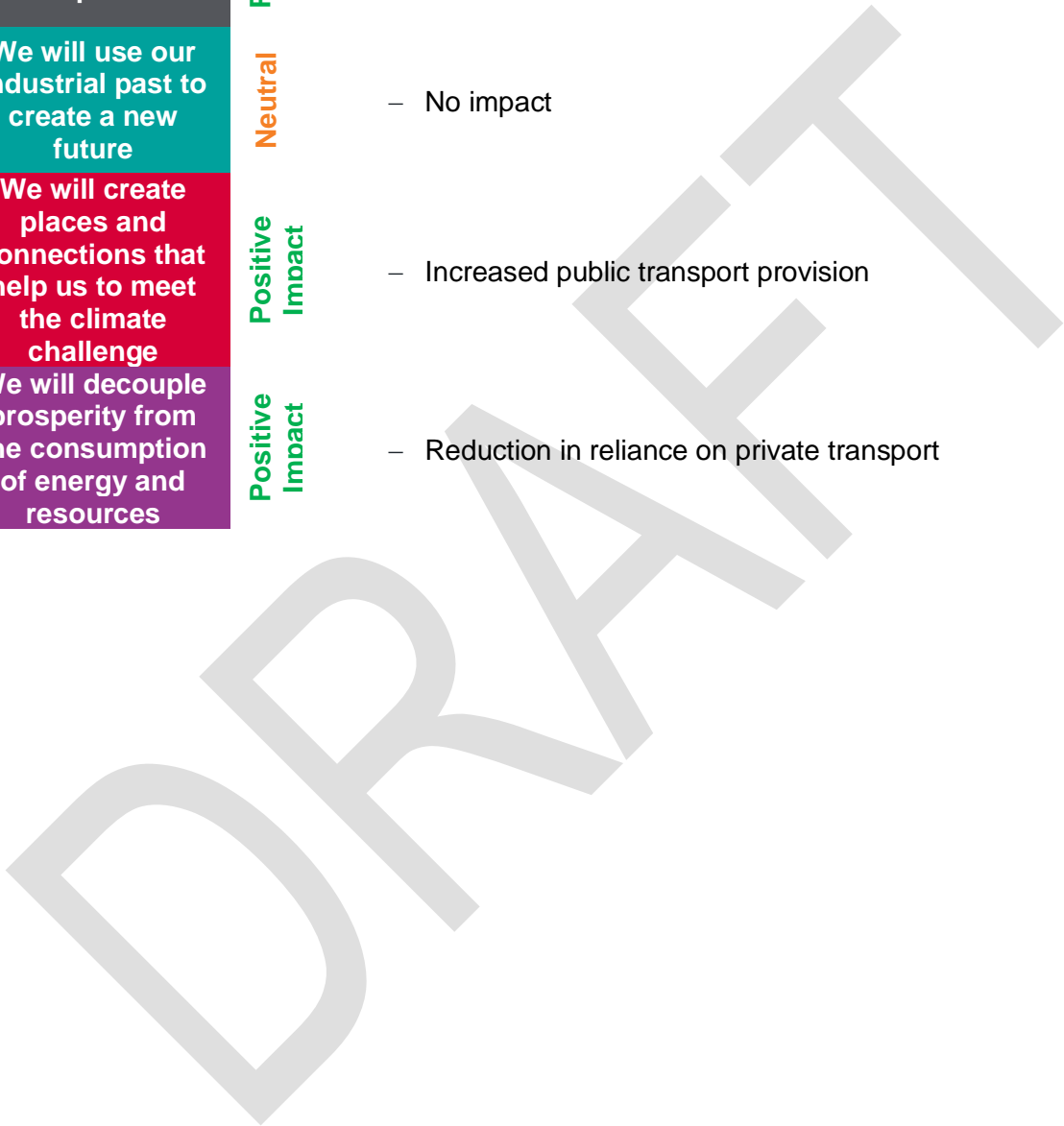
Figure 33 – Goal 10 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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.

<p>We will change our economy without leaving anyone behind</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - Shifting transport away from private car use and increase public transport will positively impact deprived communities
<p>We will invest in the resilience of our places</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - As space is remodelled, opportunities to improve resilience can also be taken
<p>We will use our industrial past to create a new future</p>	<p>Neutral</p>	<ul style="list-style-type: none"> - No impact
<p>We will create places and connections that help us to meet the climate challenge</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - Increased public transport provision
<p>We will decouple prosperity from the consumption of energy and resources</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - Reduction in reliance on private transport



4.4.11 GOAL 11 – IMPROVING TRAVEL (BUS AND TAXI ELECTRIFICATION)

Description

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 and will require careful charging to minimise costs. The Climate on 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 Five Year Plan 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 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 busses by 2026.
- **Medium** – All taxis and buses are electrified by 2036; equivalent to 7,100 electric taxis and 770 electric busses by 2026.
- **High** – All taxis and buses are electrified by 2031; equivalent to 10,650 electric taxis and 1,150 electric busses by 2026.
- **Very High** – All 21,300 taxis and 2,300 buses are electrified by 2026.

Figure 34 – Goal 11 GHG Emission Saving and Deployment in 2026

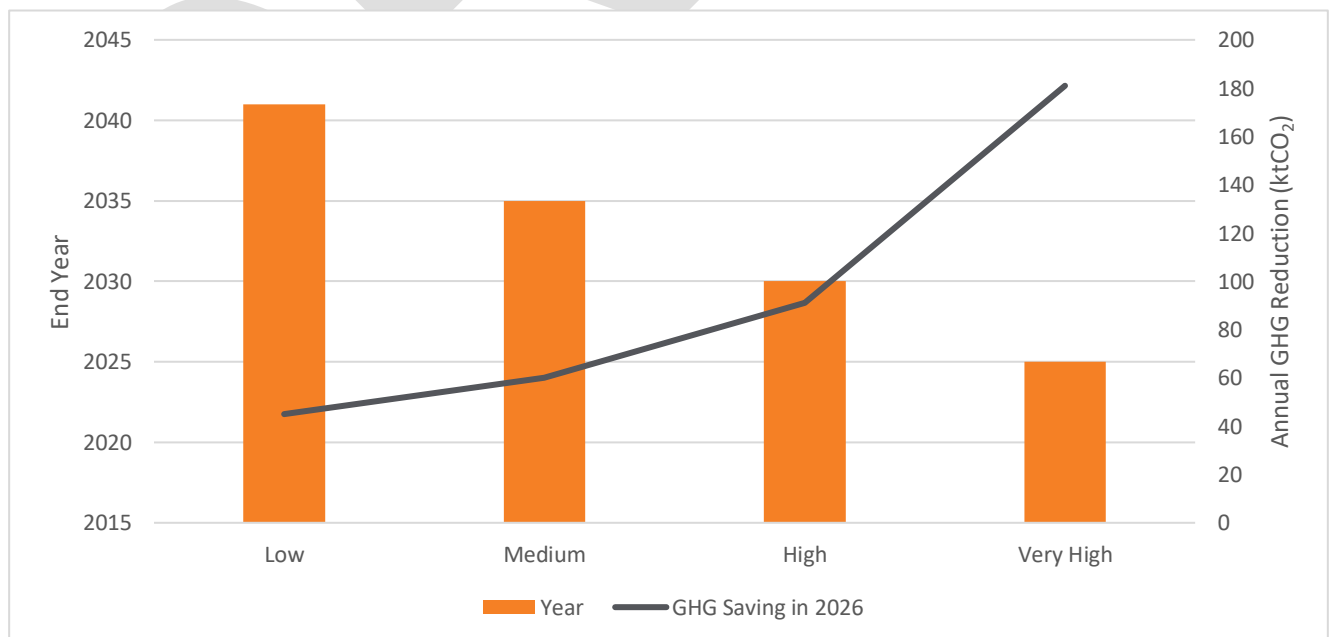
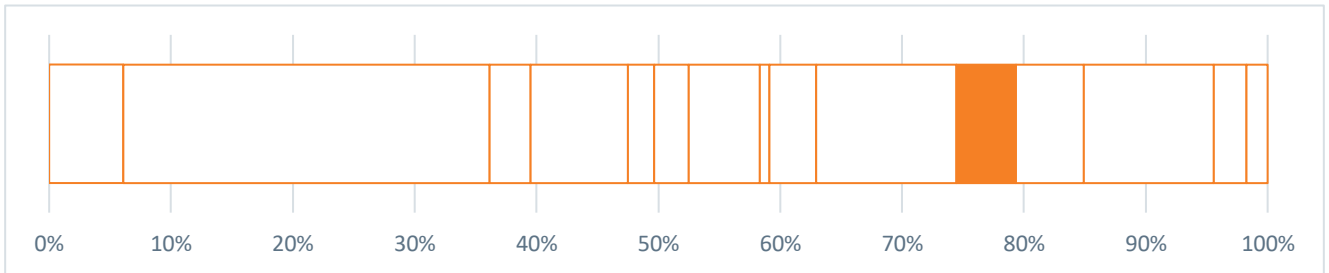
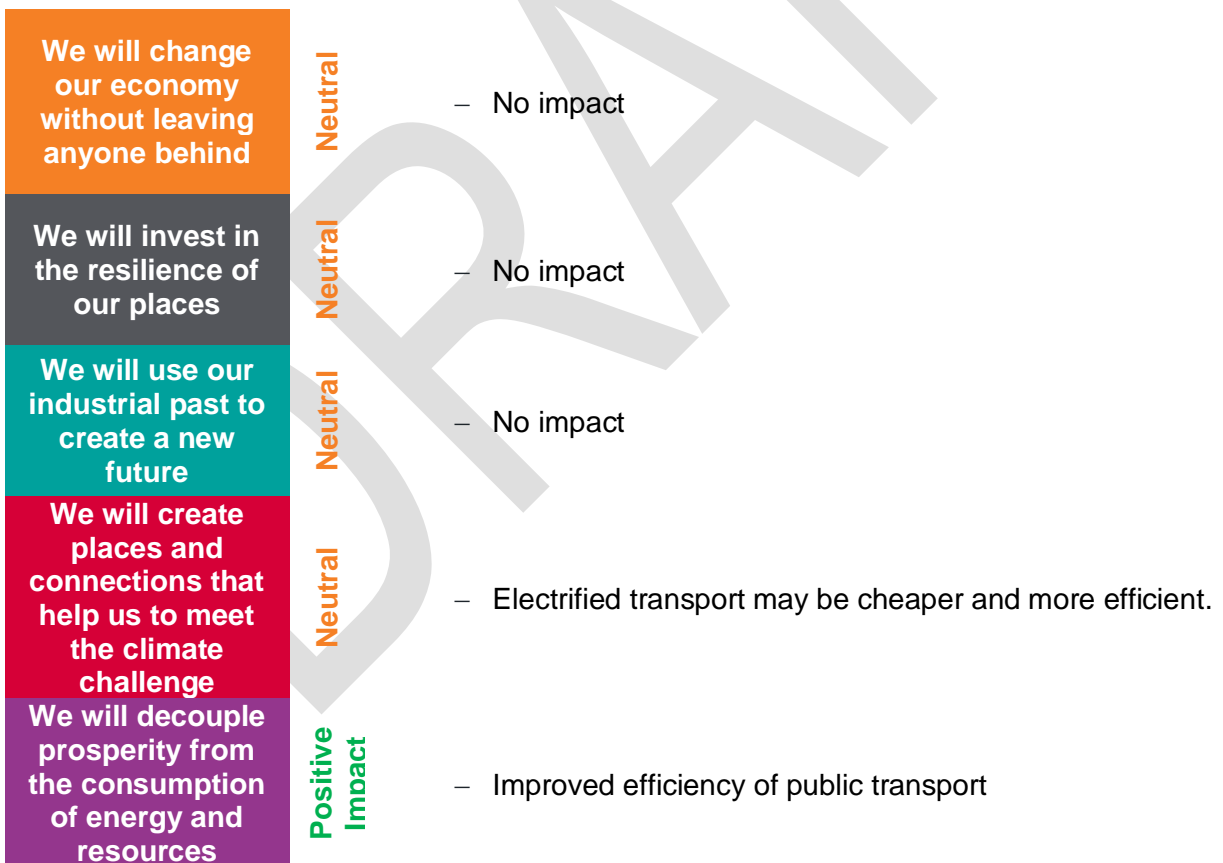


Figure 35 – Goal 11 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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).



4.4.12 GOAL 12 – IMPROVING TRAVEL (HEAVY GOODS VEHICLE ELECTRIFICATION)

Description

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 Five Year Plan 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 Five Year Plan. 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 Five Year Plans.

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 36 – Goal 12 GHG Emission Saving and Deployment in 2026

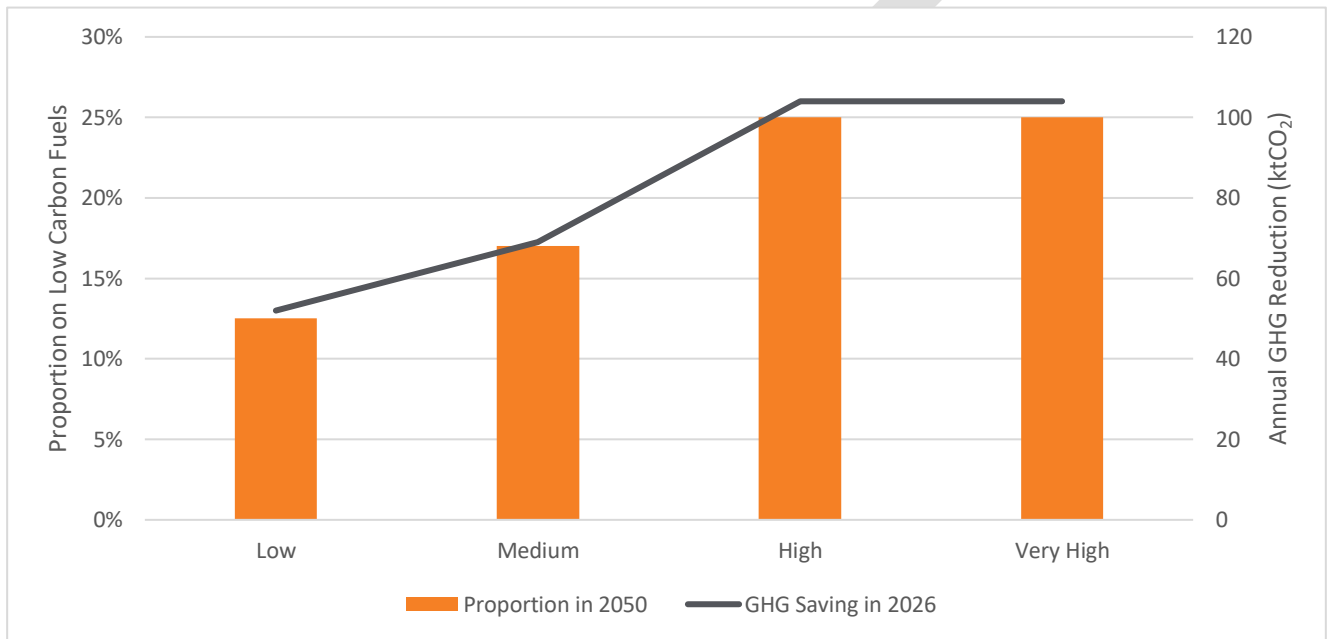
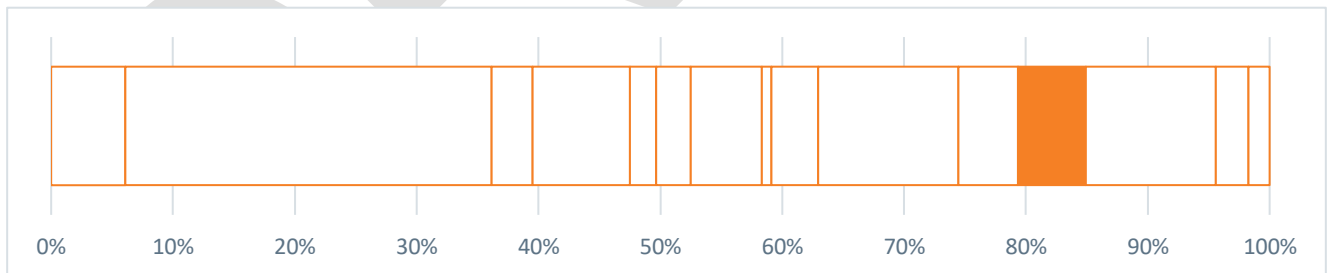


Figure 37 – Goal 12 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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.

<p>We will change our economy without leaving anyone behind</p>	<p>Neutral</p>	<ul style="list-style-type: none"> - No impact
<p>We will invest in the resilience of our places</p>	<p>Neutral</p>	<ul style="list-style-type: none"> - No impact
<p>We will use our industrial past to create a new future</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - Working with commercial and industrial partners as well as the automotive sector
<p>We will create places and connections that help us to meet the climate challenge</p>	<p>Neutral</p>	<ul style="list-style-type: none"> - No impact
<p>We will decouple prosperity from the consumption of energy and resources</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - Reduced use of fossil fuel vehicles

DRAFT

4.4.13 GOAL 13 – IMPROVING TRAVEL (ACCELERATED EV UPTAKE)

Description

The West Midlands Combined Authority 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), 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 Transport for the West Midlands 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 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 Climate change Committee analysis as part of their advice to Government on their Sixth Carbon Budget.

- **Low** – An EV trajectory in line with the Headwinds scenario¹⁰, 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 scenario¹¹, 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 scenario¹², 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.

¹⁰ The CCC's Headwinds scenario, assumed that policies only manage to bring forward societal/behavioural change and innovation at the lesser end of the scale. People change their behaviour and new technologies develop, but we do not see widespread behavioural shifts or innovations that significantly reduce the cost of green technologies ahead of our current projections.

¹¹ The CCC's Balanced Net Zero Pathway, as a scenario that reaches net zero by 2050. It was designed to drive progress through the 2020s, while creating options in a way that seeks to keep the exploratory scenarios open.

¹² The CCC's Tailwinds scenario assumes considerable success on both innovation and societal / behavioural change and goes beyond the Balanced Pathway to achieve net zero before 2050.

Figure 38 – Goal 13 GHG Emission Saving and Deployment in 2026

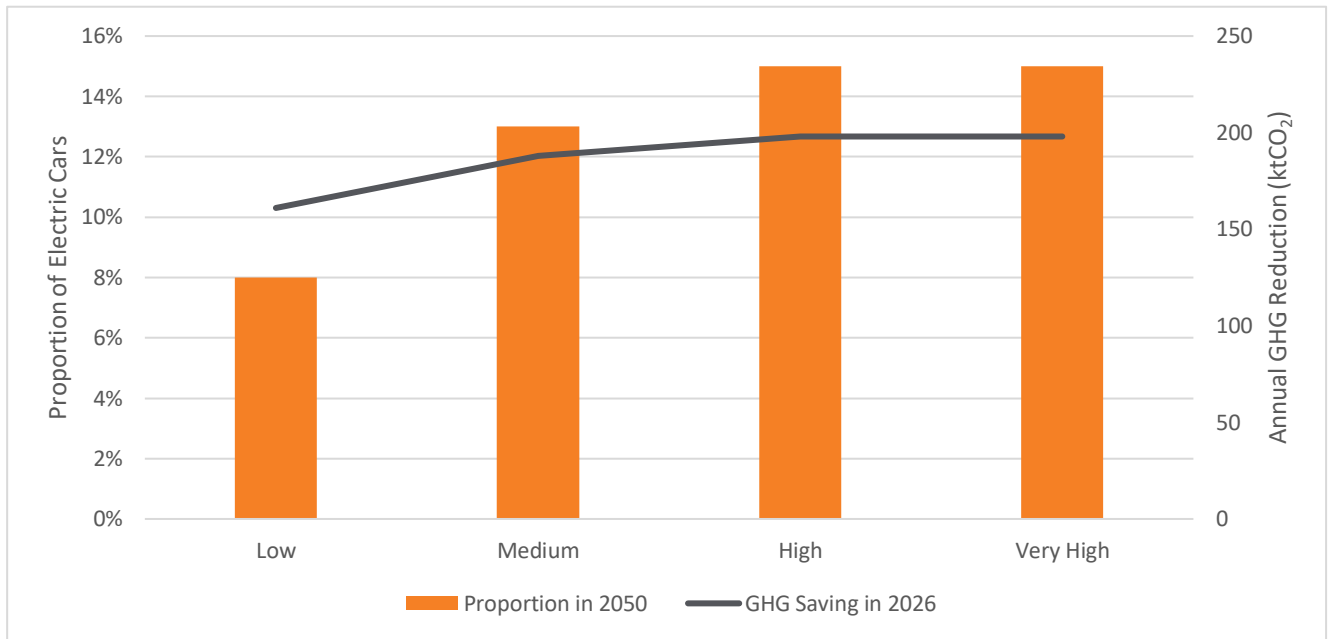
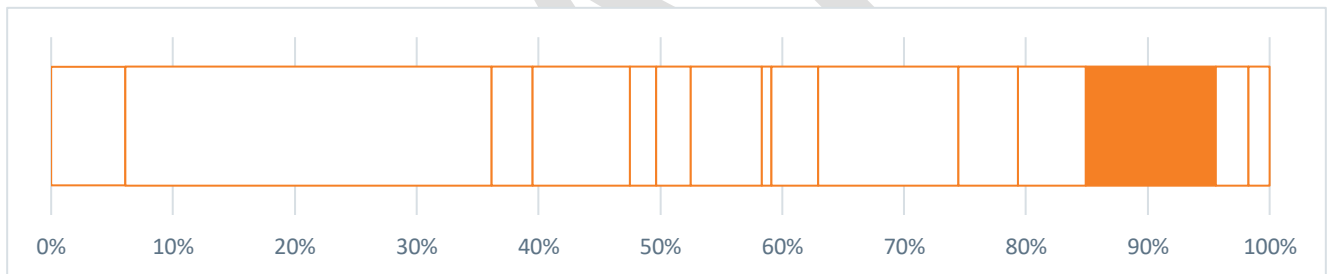


Figure 39 – Goal 13 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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

We will invest in the resilience of our places

Positive Impact

Neutral / Negative

- Potential for re-engineering the internal combustion engine supply chain to support electrification, creating employment and skills opportunities.
- Change in car ownership models.
- EVs can reduce the cost of travel, potentially increasing strain on road networks.

<p>We will use our industrial past to create a new future</p>	<p>Positive Negative</p>	<ul style="list-style-type: none"> - Working with automotive sector and supply chain - May reduce demand for vehicles as a whole
<p>We will create places and connections that help us to meet the climate challenge</p>	<p>Neutral</p>	<ul style="list-style-type: none"> - No impact
<p>We will decouple prosperity from the consumption of energy and resources</p>	<p>Positive Impact</p>	<ul style="list-style-type: none"> - Reduced use of fossil fuel vehicles

DRAFT

4.4.14 GOAL 14 – LAND USE: RENEWABLES

Description

This goal considers the use of land within the West Midlands Combined Authority 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 40 – Identified potential for utility scale wind

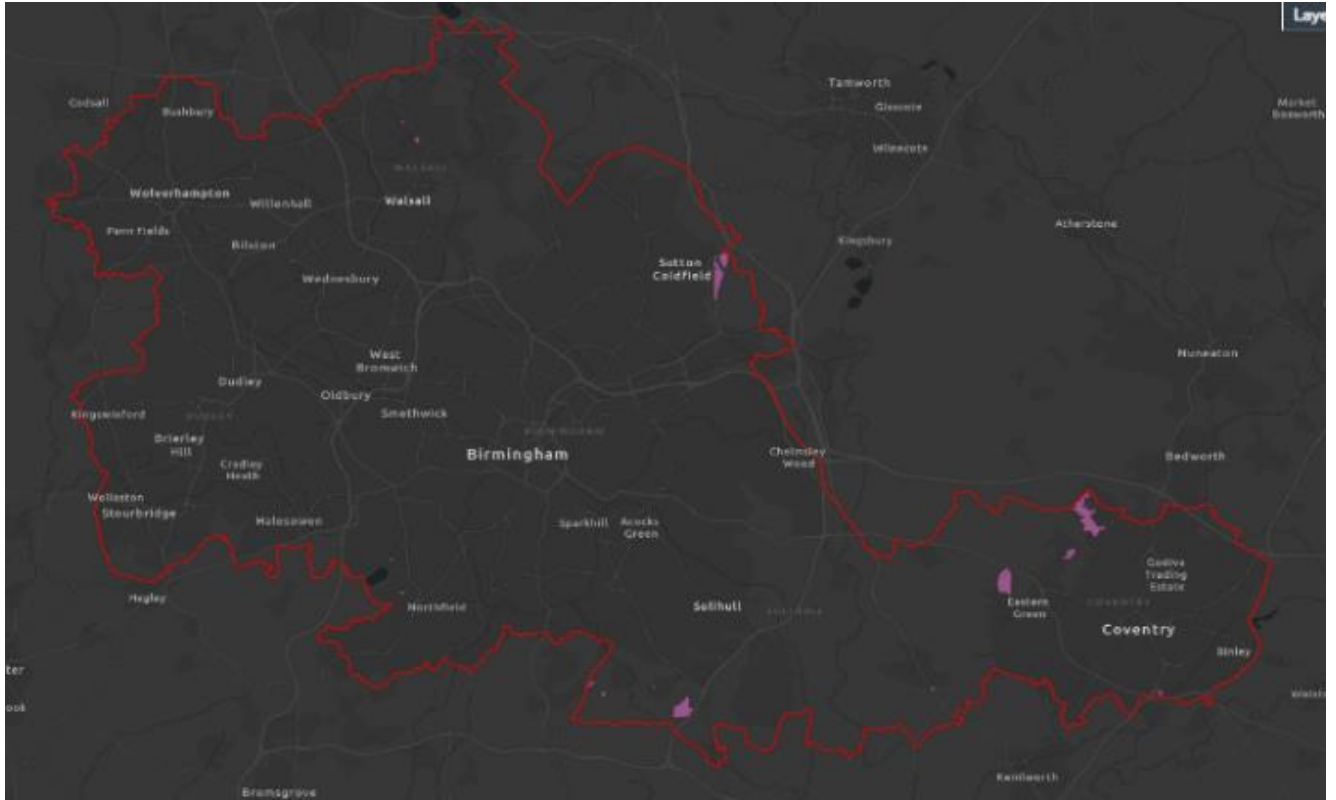


Figure 41 – Identified potential for large ground-mounted solar



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 42 – Goal 14 GHG Emission Saving and Deployment in 2026

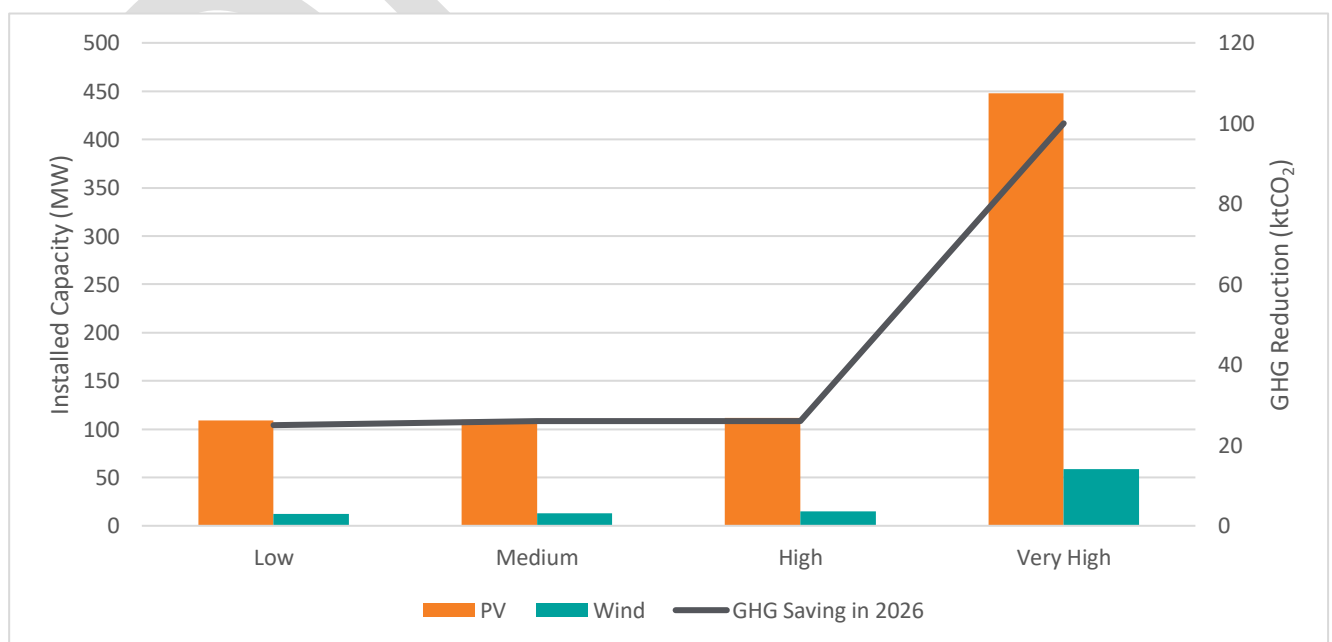
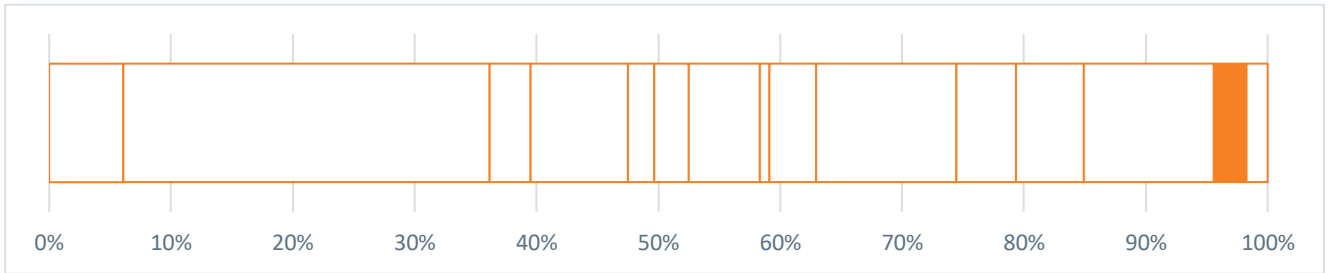
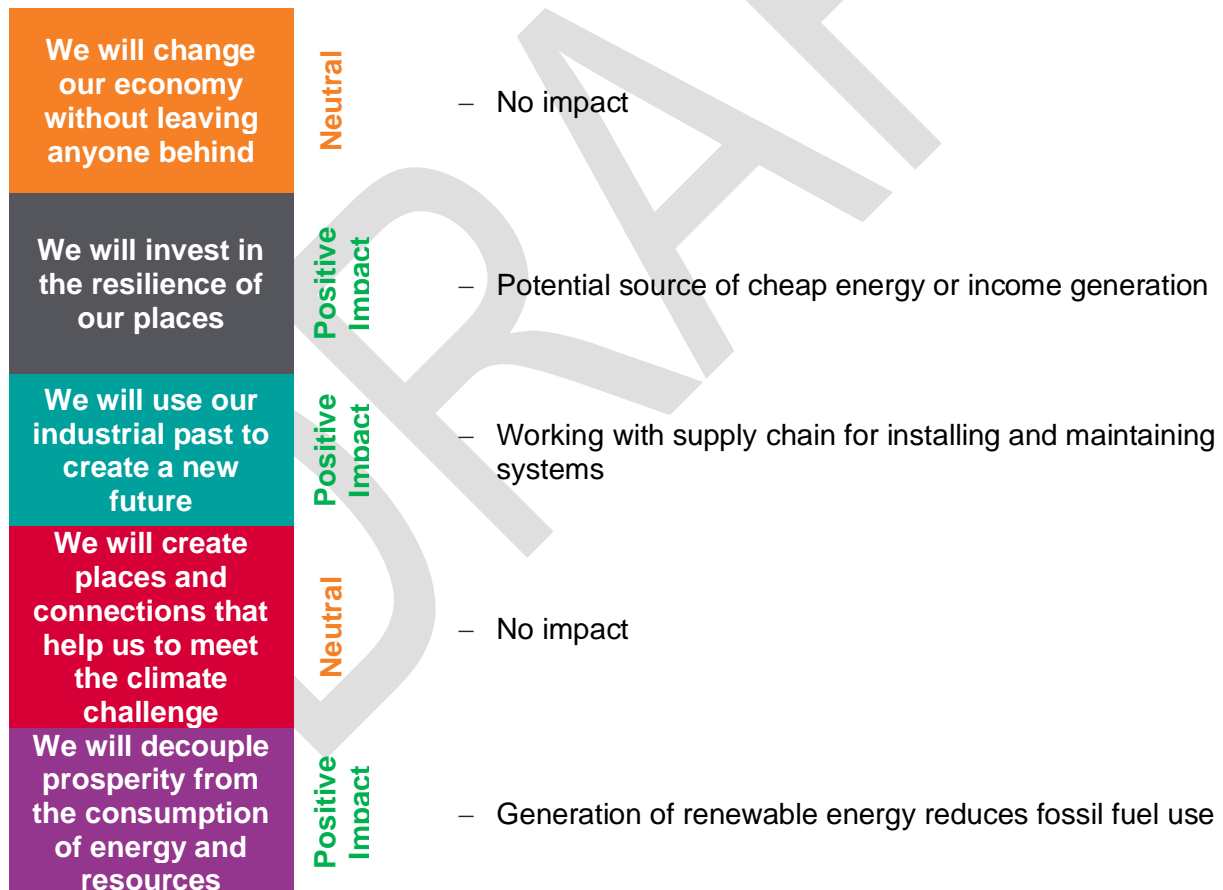


Figure 43 – Goal 14 Proportion of GHG Emission Saving in 2026 (Accelerated Scenario)



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



4.4.15 GOAL 15 – LAND USE: NATURAL CAPITAL

Description

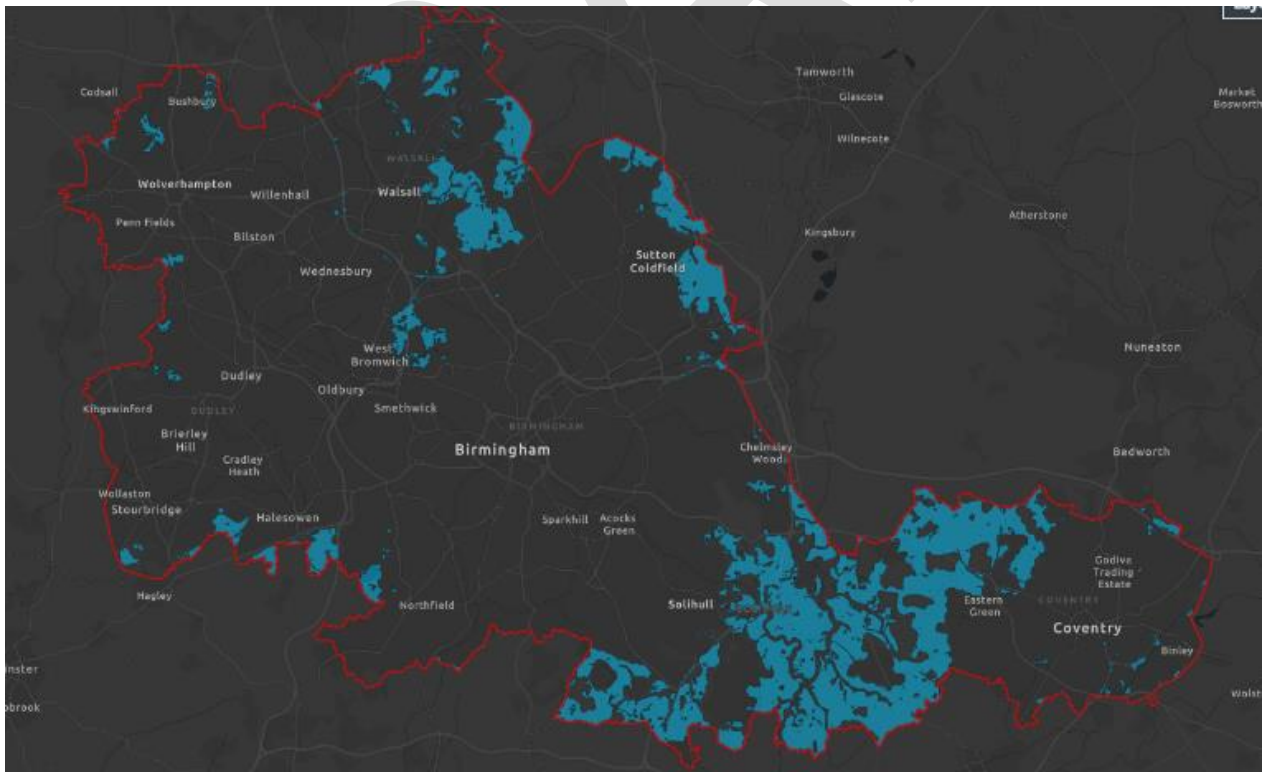
Where greenhouse gas emissions are unavoidable, tree planting and more specifically, increasing the area of sustainably managed forests, has an important role to play in achieving net zero carbon emissions through direct sequestration of carbon dioxide from the atmosphere.

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 area¹³, 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.

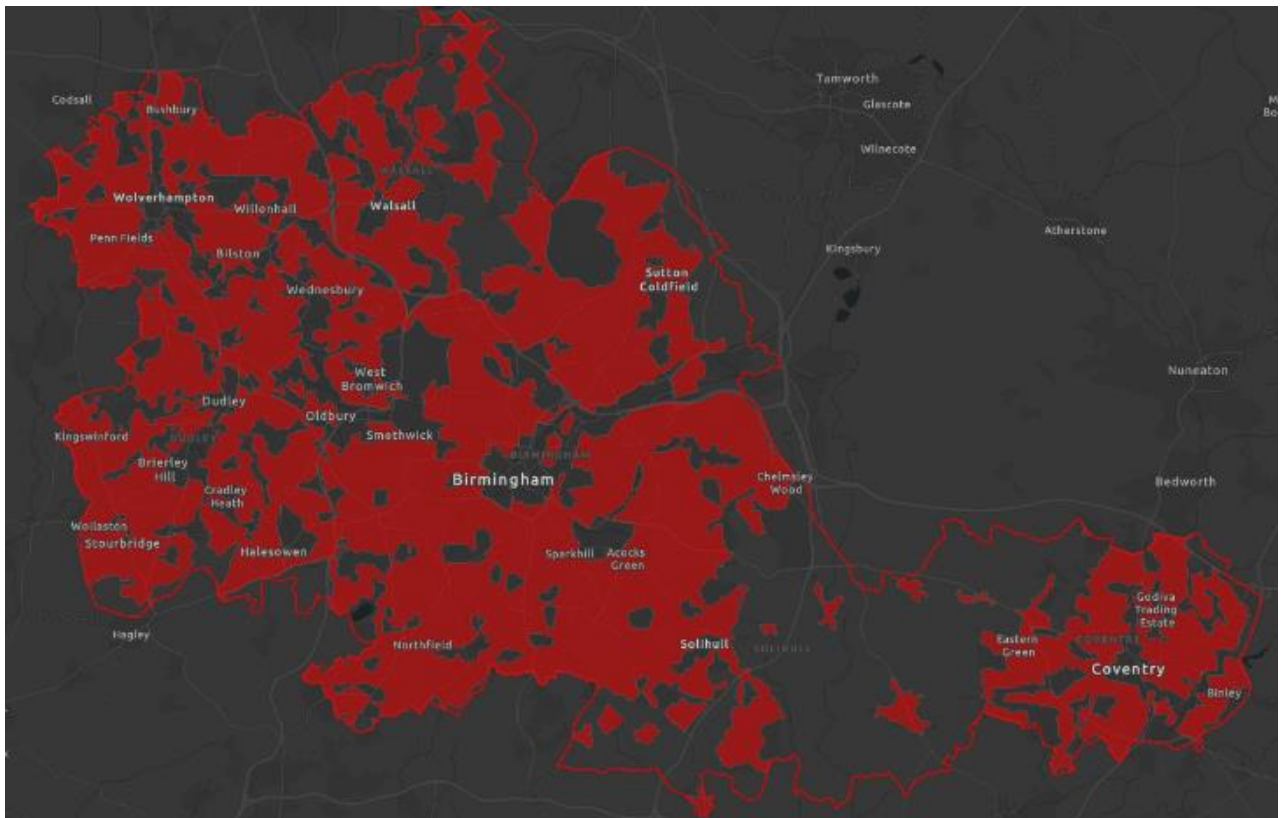
GIS mapping was undertaken as part of this project in order to help quantify the land availability for large-scale afforestation and carbon sequestration. This included agricultural land and peri-urban land, where more street style tree planting can play a role.

Figure 44 – Identified potential for natural capital solutions in agricultural land



¹³ According to Corine land cover map 2018 categories for forests plus the area of land classified as Ancient Woodland Sites. This is aligned with the approach used by the CCC in: Committee on Climate Change, 2018, Land Use: Reducing emissions and preparing for climate change

Figure 45 – 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 Climate Change Committee (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 available¹⁴ (approximately 10,000ha).

- **High** – 5.7 million trees by 2026 and 19 million by 2041.

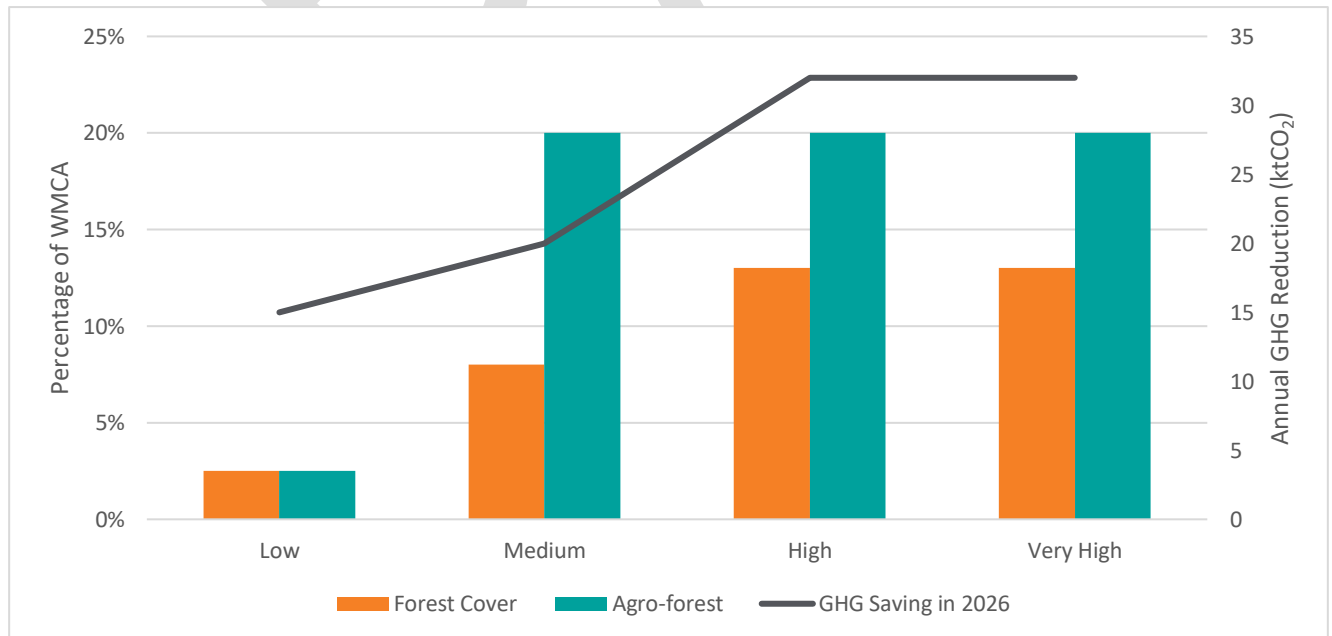
The GIS mapping identified that 15% of the WMCA area is suitable for woodland planting according to the criteria applied. This would meet the previous forestry cover target set by the Independent Panel on Forestry in 2012 but not the latest figure of 17-19% set by the Committee on Climate Change in 2020. 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.

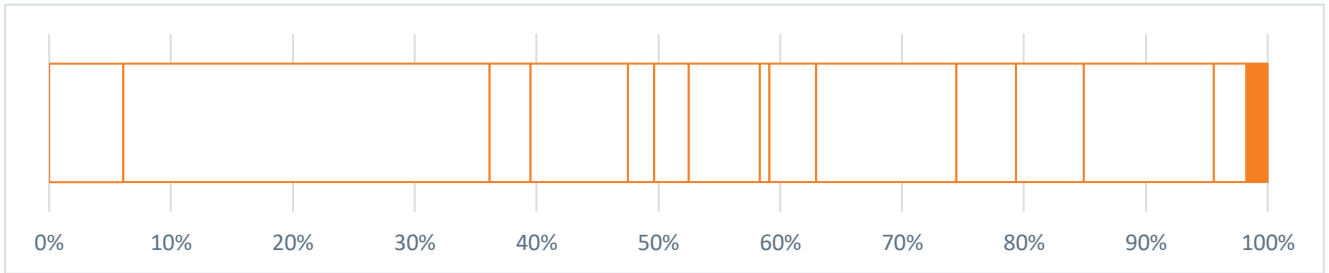
- **Very High** – As high

Figure 46 – Goal 15 GHG Emission Saving and Deployment in 2026



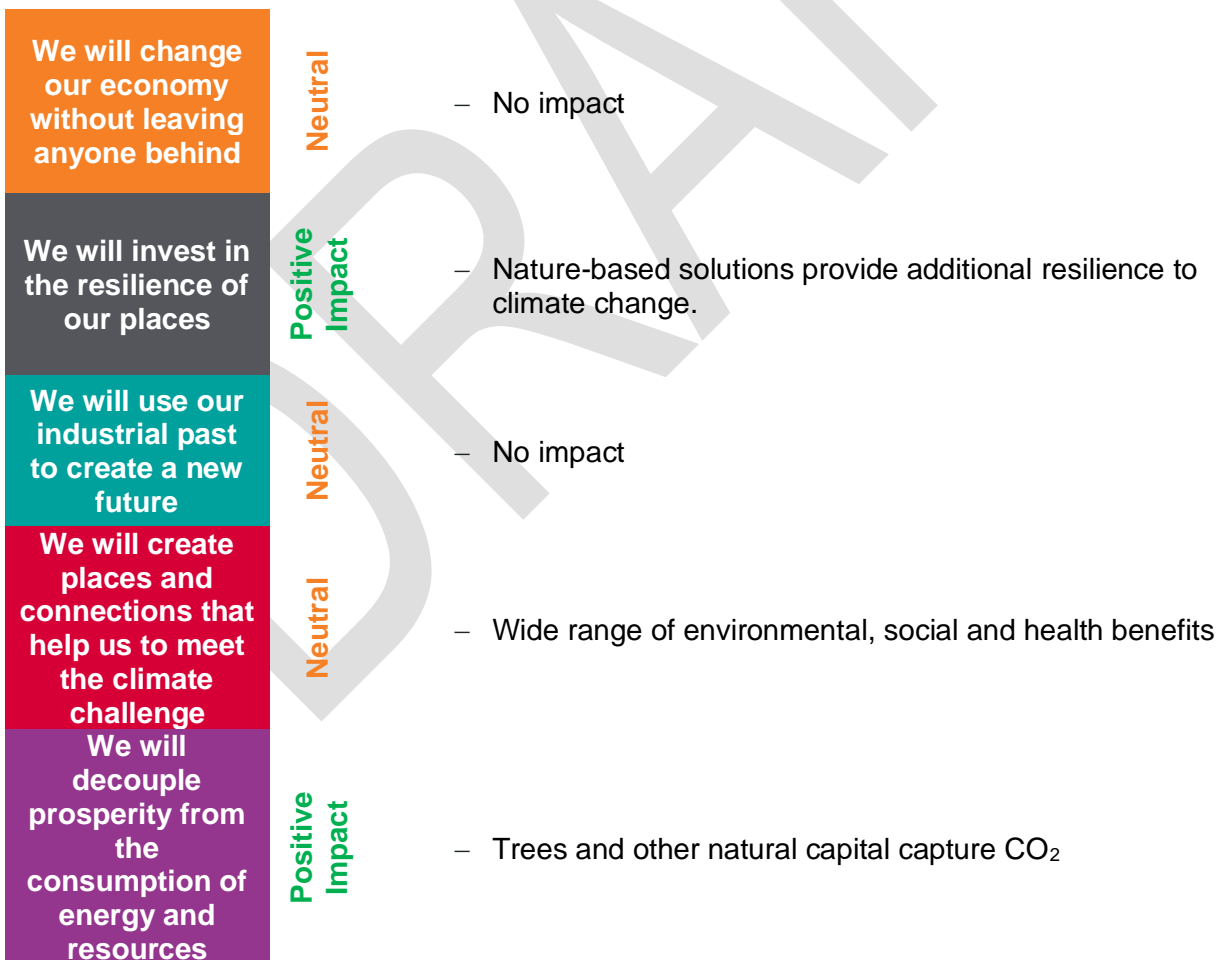
¹⁴ Peri-urban land is taken from the Corine land cover map 2018 layer for discontinuous urban fabric (urban structures and transport networks associated with vegetated areas and bare surfaces are present and occupy significant surfaces in a discontinuous spatial pattern. The impermeable features like buildings, roads and artificially surfaced areas range from 30 to 80 % land coverage).

Figure 47 – 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.



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 the new Strategy 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 £25bn¹⁵. Meanwhile, the Committee on Climate Change 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 year¹⁶. 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 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

¹⁵ <https://nic.org.uk/app/uploads/Element-Energy-and-E4techCost-analysis-of-future-heat-infrastructure-Final.pdf>

¹⁶ <https://www.theccc.org.uk/wp-content/uploads/2019/05/CCC-Accelerated-Electrification-Vivid-Economics-Imperial-1.pdf>

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.

DRAFT

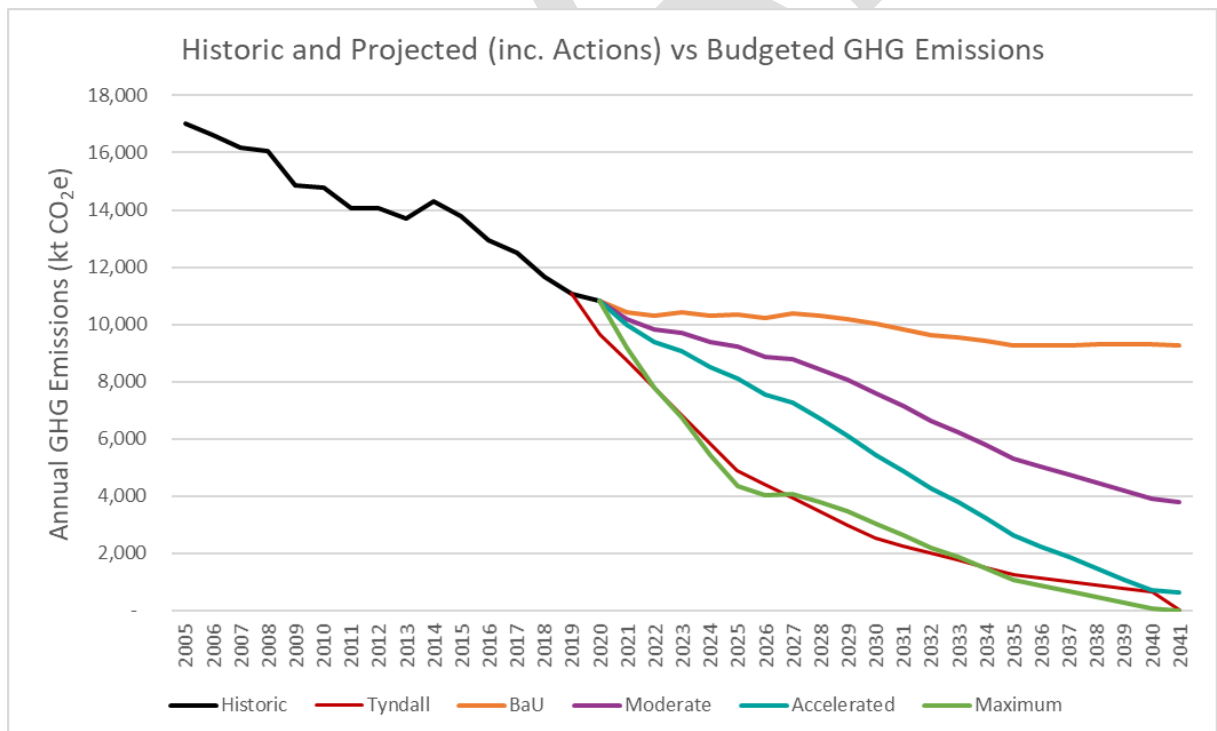
4.5 ASSESSMENT OF SCENARIOS

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 but does indicate the actions required to meet the reductions targeted in 2026 by the much later date of 2041. 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 48 – 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 49 – Moderate scenario

	1. Domestic Energy Efficiency	2. Domestic Heating Retrofit	3. Domestic PV	4. Commercial Energy Efficiency	5. Commercial Heating Retrofit	6. Commercial PV	7. Industrial Energy Efficiency	8. Industrial PV	9. Avoiding Travel	10. Shifting Travel	11. Improving Travel (Bus / Taxi)	12. Improving Travel (HGV)	13. Improving Travel (Accelerate EVs)	14. Land Use (Renewables)	15. Land Use (Natural Capital)
Very High															
High															
Medium															
Low															

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 4.5):

- 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 50 – GHG reduction waterfall chart in 2026 (moderate scenario)

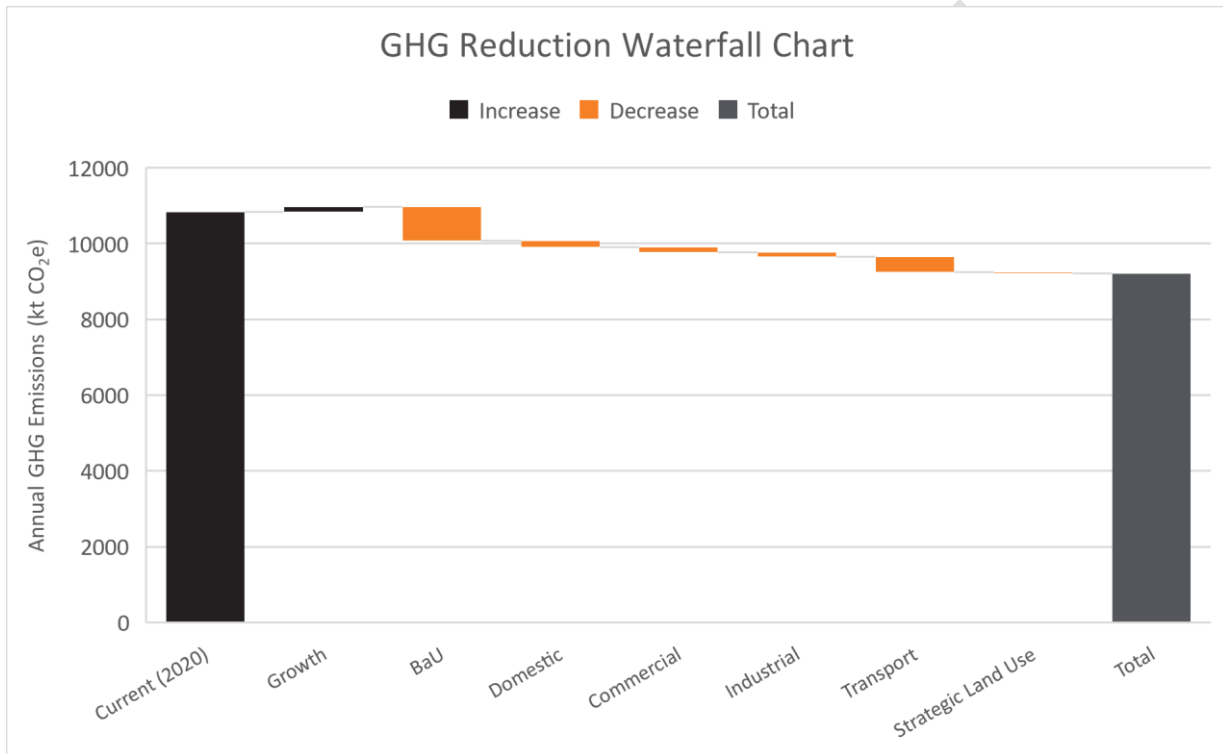
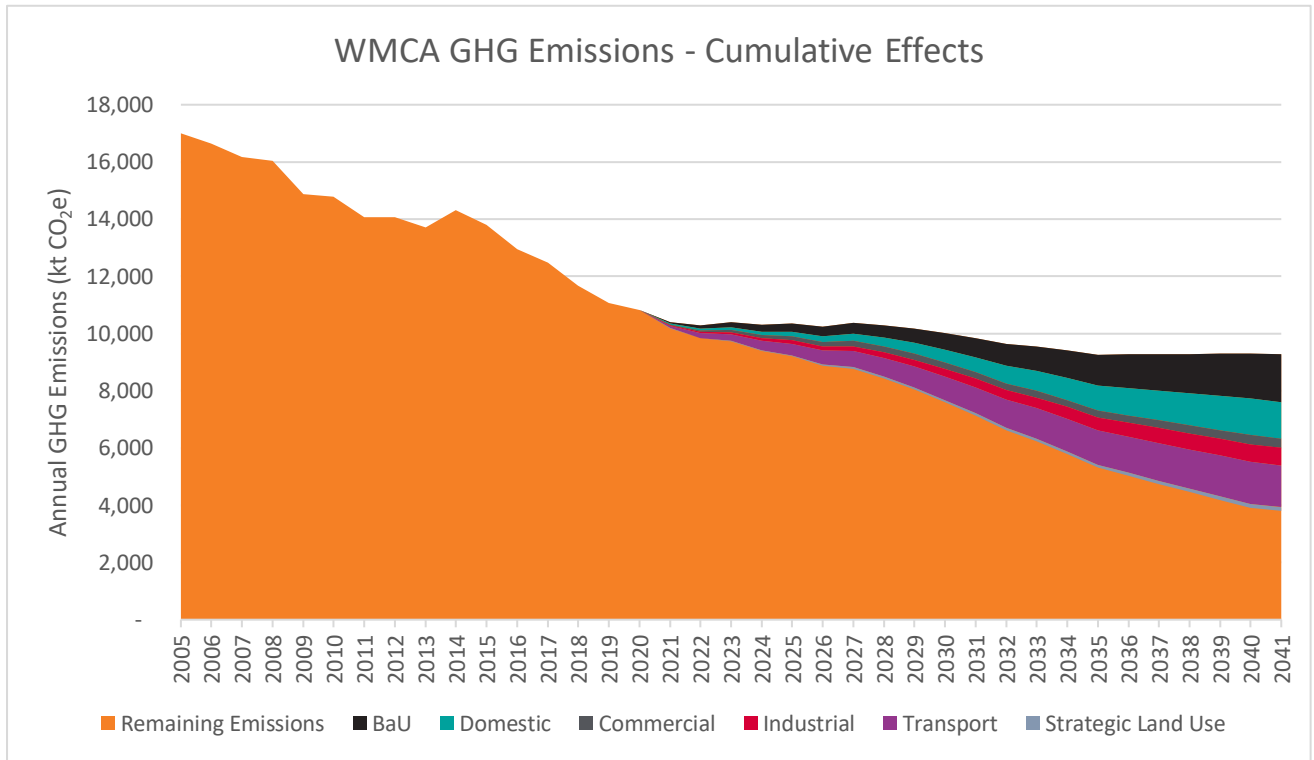


Figure 51 – Moderate scenario cumulative effects



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 52 – Accelerated scenario

	1. Domestic Energy Efficiency	2. Domestic Heating Retrofit	3. Domestic PV	4. Commercial Energy Efficiency	5. Commercial Heating Retrofit	6. Commercial PV	7. Industrial Energy Efficiency	8. Industrial PV	9. Avoiding Travel	10. Shifting Travel	11. Improving Travel (Bus / Taxi)	12. Improving Travel (HGV)	13. Improving Travel (Accelerate EVs)	14. Land Use (Renewables)	15. Land Use (Natural Capital)
Very High															
High															
Medium															
Low															

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).

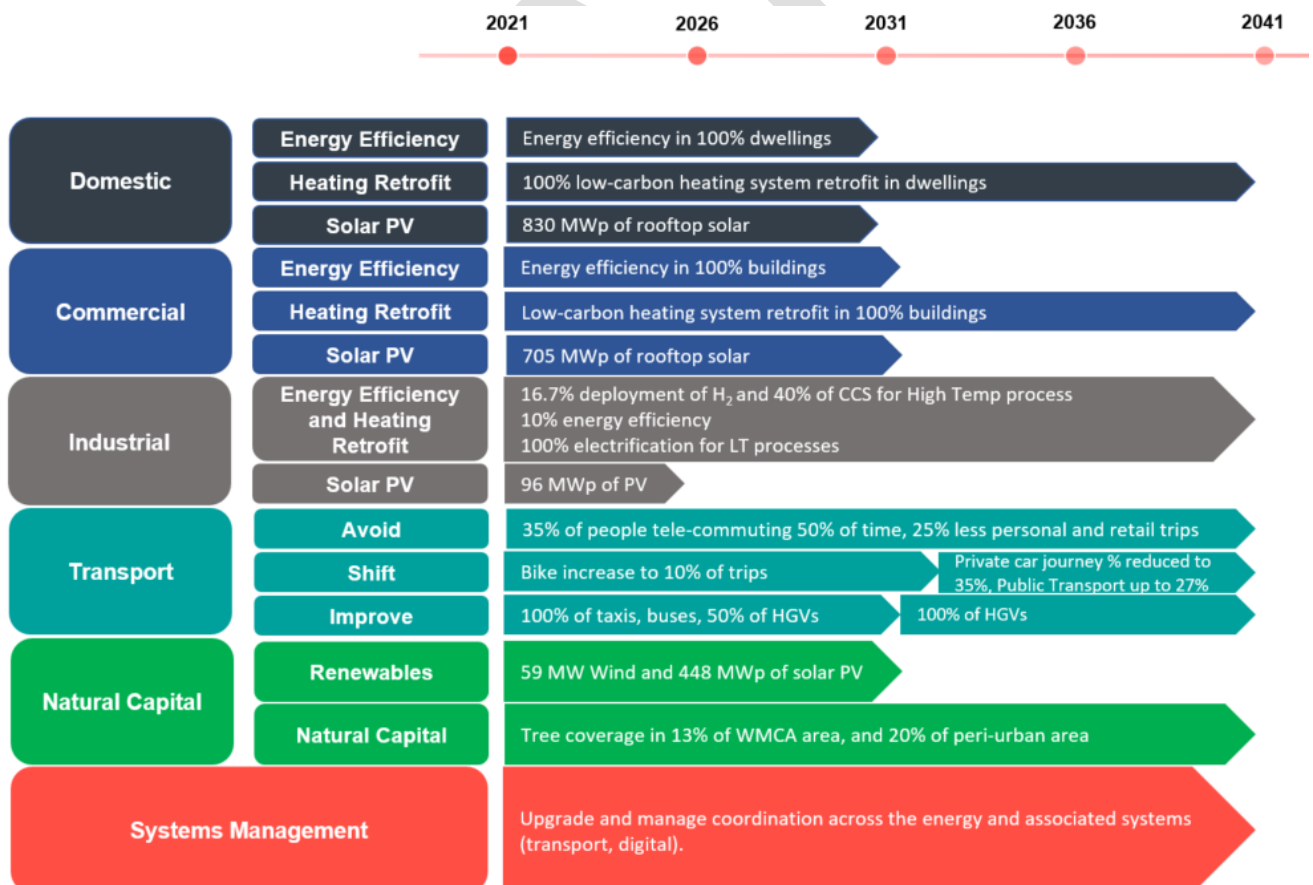
Some of the targets that would need to be achieved are listed below, to illustrate the magnitude of the challenge (a full description of each goal at each goal level is provided in section 4.5):

- **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.

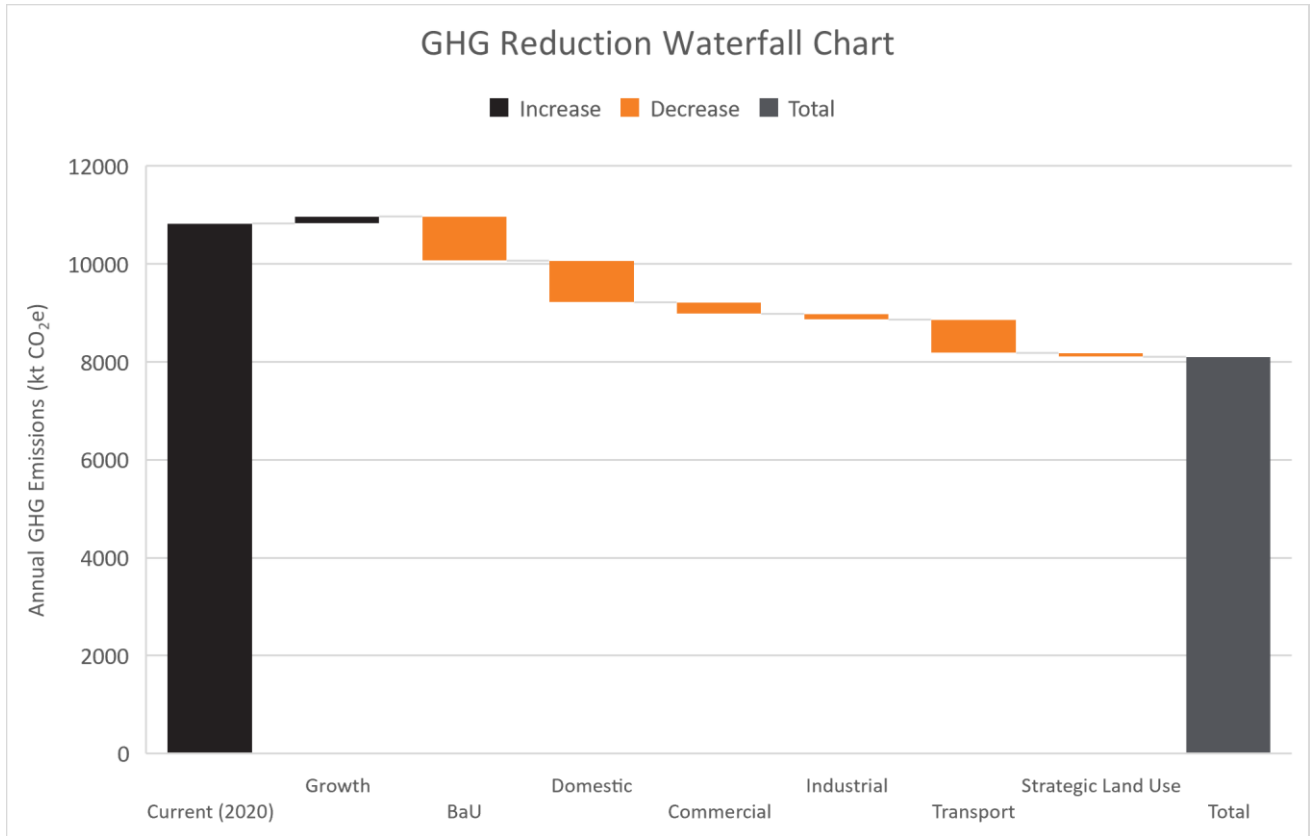
Figure 53 – Proposed timeline of goals



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, as can be seen in the graph below:

Figure 54 – 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 55 – Accelerated scenario cumulative effects

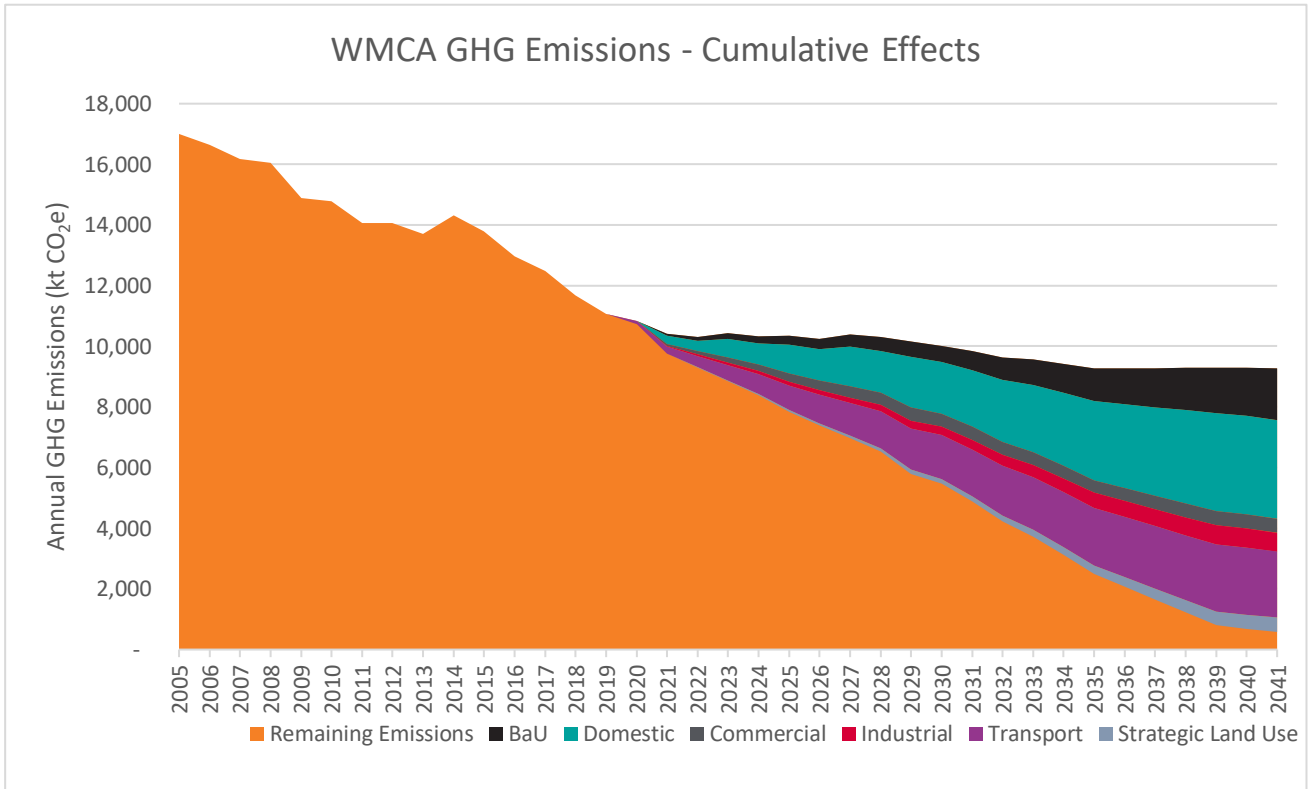
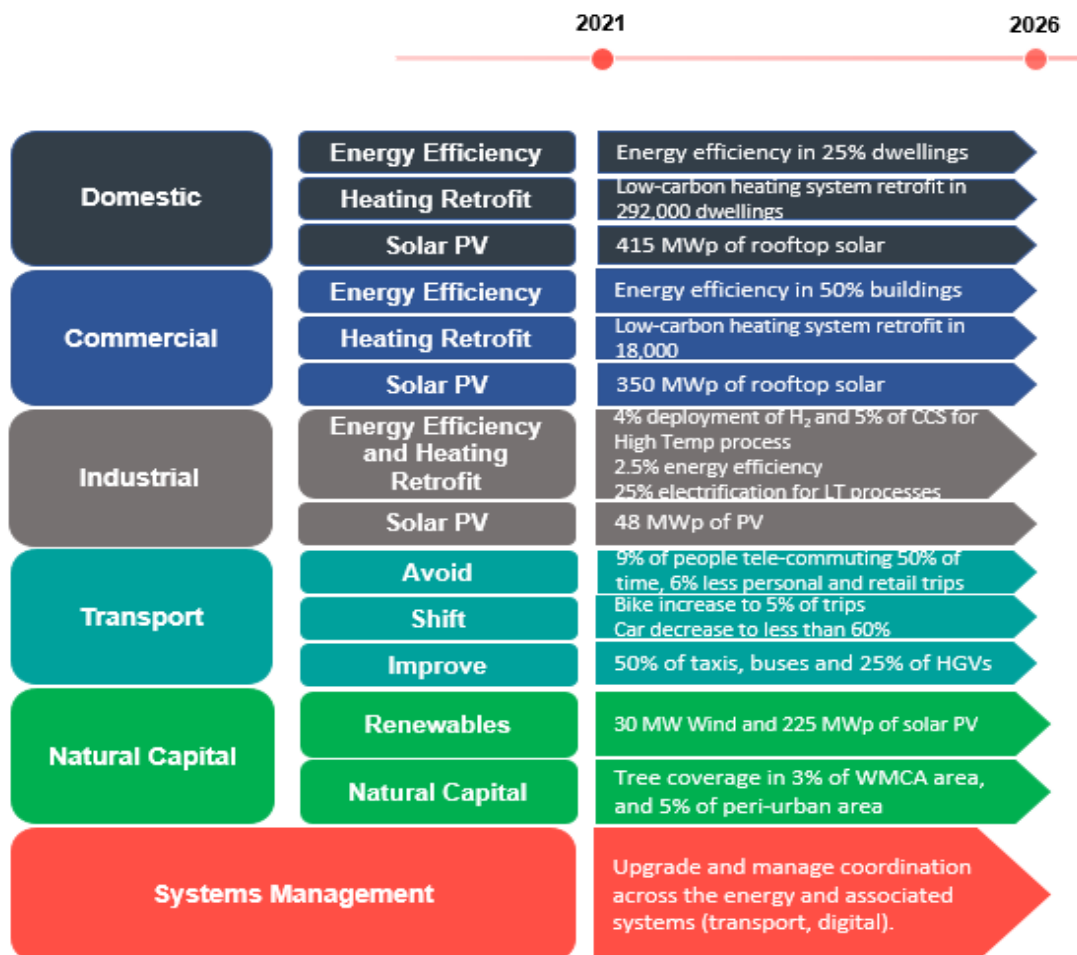


Table 5 – Summary of Accelerated Scenario

Goal	Deployment required for net zero	Deployment required to 2026 (Accelerated Scenario)
1. Domestic energy efficiency	1.1m homes (100%)	294,000 homes
2. Domestic heating system	1.1m homes (100%)	292,000 homes
3. Domestic photovoltaics	830MWp	415MWp
4. Commercial energy efficiency	73,400 buildings	37,000 buildings
5. Commercial heating retrofit	73,400 buildings	37,000 buildings
6. Commercial photovoltaics	705MWp	353MW p
7. 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.
8. Industrial photovoltaics	96MWp	96MWp
9. Avoid	35% people telecommuting (50% of the time), 25% less personal / retail trips	9% people telecommuting and 6.25% reduction in trips

10. Shift	Shift to 35% trips by car	59% trips by car
11. Improve travel (bus and taxi)	100% taxis & buses electrification	100% electrification by 2030
12. Improve travel (HGVs)	100% of HGVs are electrified	25% of HGVs are electrified
13. Improve travel (accelerated EVs)	100% of cars are electrified	15% of cars are electrified
14. Land use - renewables	59MW wind and 448MWp of solar potential	30MW wind and 224MWp solar
15. Land use - natural capital	13% WMCA tree coverage	13% forest cover/20% peri-urban areas

Figure 56 – Summary of Accelerated Scenario to 2026



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 57 – Maximum scenario

	1. Domestic Energy Efficiency	2. Domestic Heating Retrofit	3. Domestic PV	4. Commercial Energy Efficiency	5. Commercial Heating Retrofit	6. Commercial PV	7. Industrial Energy Efficiency	8. Industrial PV	9. Avoiding Travel	10. Shifting Travel	11. Improving Travel (Bus / Taxi)	12. Improving Travel (HGV)	13. Improving Travel (Accelerate EVs)	14. Land Use (Renewables)	15. Land Use (Natural Capital)
Very High	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange
High	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange
Medium	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Orange
Low	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange	Light Orange

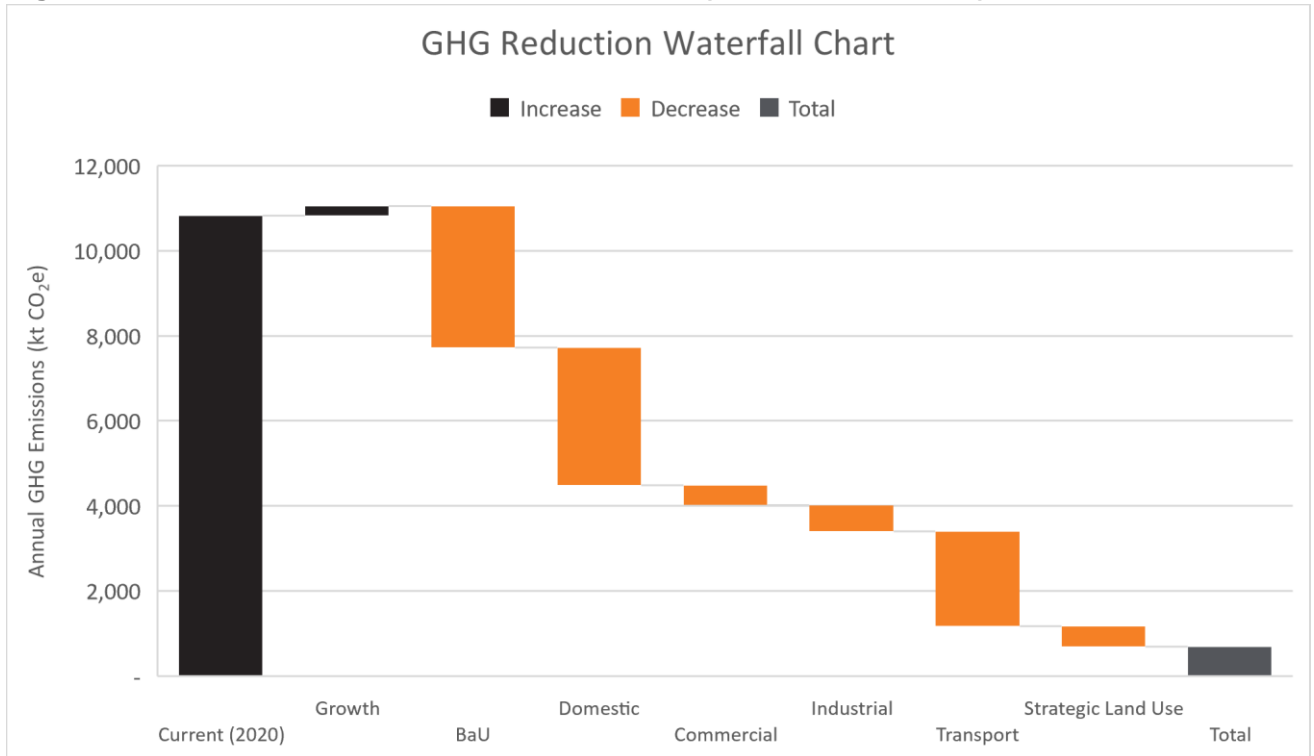
This scenario sets most goals at a “very high” level, with the exception of areas where technologies required are not yet mature, such in industry or HGVs, and afforestation, as carbon sequestration from afforestation requires longer time frames. Lastly, the EV uptake goal has not been modified, as it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

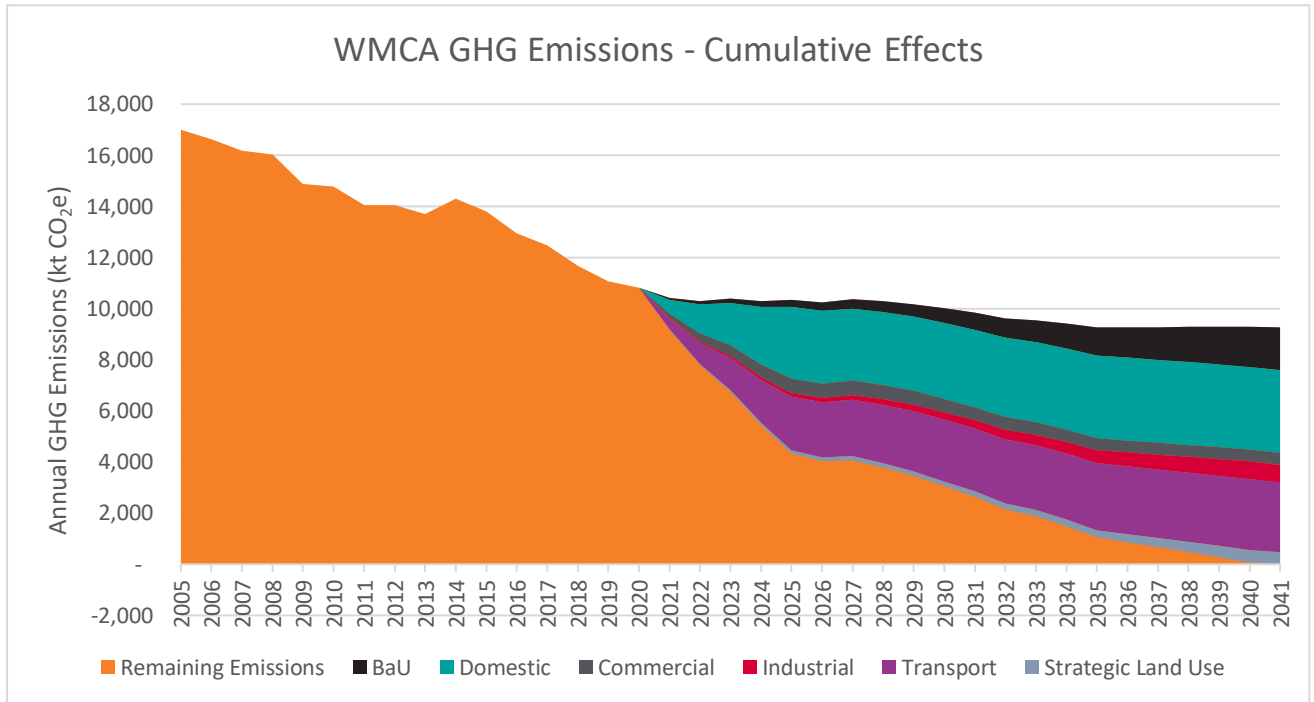
- The installation of about 1.6 GW of solar across the domestic, commercial and industrial built environment by 2026
- A decrease in car usage to 35% of all trips (from 63% today), and an associated increase of cycling to 10%.

Figure 58 – 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 59 – 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 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 off-setting.

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 CO₂ emissions budget. Therefore, adopting a smaller cumulative CO₂ 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 Committee of Climate Change 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. While they are an important technology to develop and the Combine Authority should consider this as an option as progress is made.

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, legal and technical reasons.

5 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 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.”

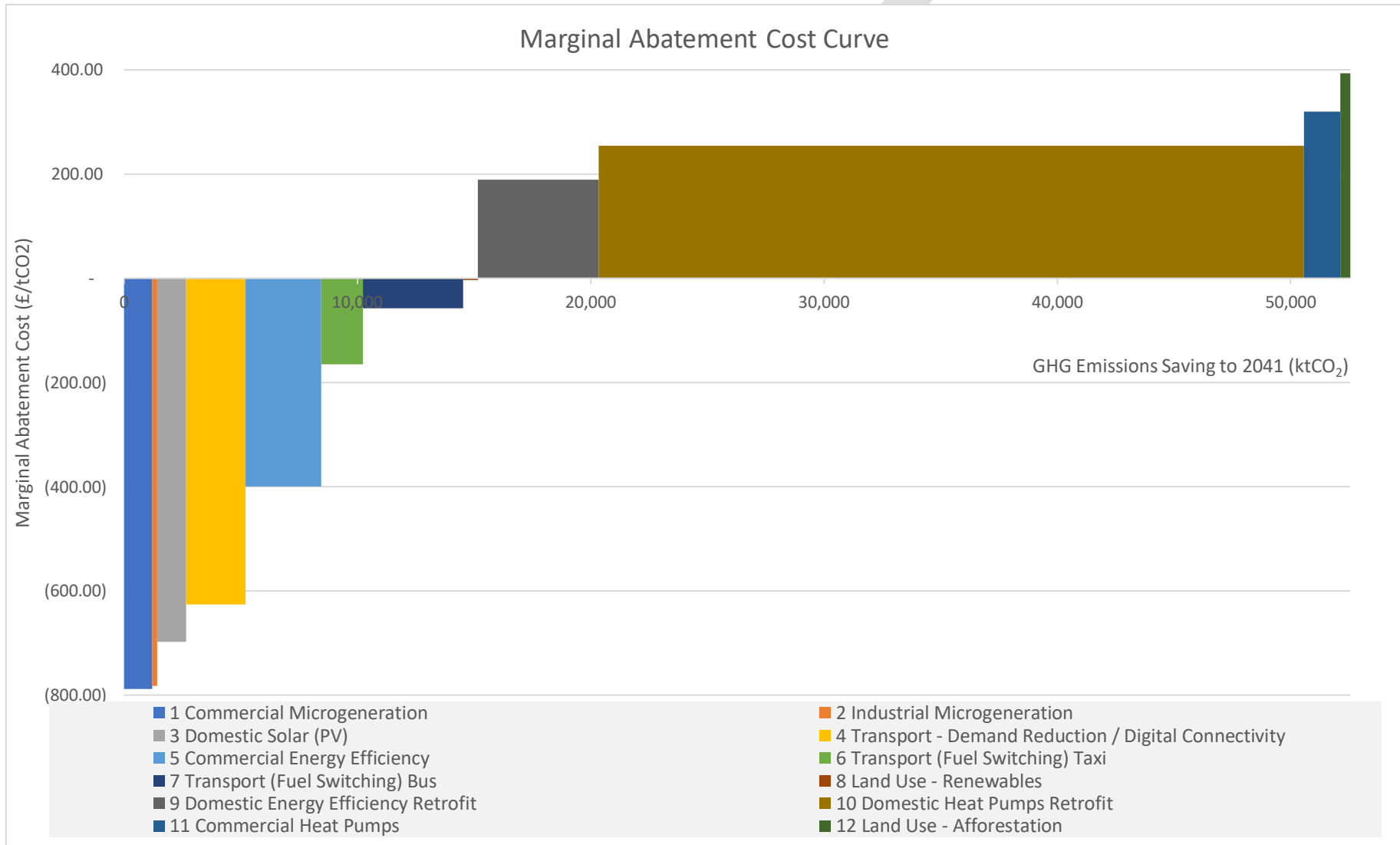
The process is based on the gradual roll out of goals in line with the technical analysis, and so some of the goals will only be implemented in 2040 and so give little opportunity to payback. As such, goals which are implemented over a shorter / sooner timeline have an advantage. The savings from these 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	
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 60 – MACC to 2041 (exc. Goals 10, 12 and 13)



Marginal Abatement Cost Curves

Projects which have the lowest cost per CO₂e 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 represent the majority of GHG emissions savings. As explained in the appending 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, with more detail found 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.

6 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 Five Year Plan (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 sectors¹⁷. 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 Midlands¹⁸. Across the WMCA, current estimates suggest an opportunity for 72,000 new direct jobs to be created in low-carbon sectors in gross terms¹⁹. Most of

¹⁷ Employment Implications of Green Growth: Linking jobs, growth, and green policies, OECD report for G7 Environmental ministers, June 2017

¹⁸ Automotive Council Mapping UK Automotive. Accessed on 8th December 2020. Available from: <https://www.automotivecouncil.co.uk/mapping-ukautomotive/>

¹⁹ Local green jobs – accelerating a sustainable economic recovery, Ecuity, 2020

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 project²⁰ 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 forms 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 om the desired transition to a high-skill,

²⁰ Heat Pump Manufacturing Supply Chain Research Project Report, Research carried out by Eunomia Research & Consulting Ltd on behalf of the Department for Business, Energy and Industrial Strategy, 2020.
<https://www.gov.uk/government/publications/heat-pump-manufacturing-supply-chain-research-project>

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

Sector	Jobs and skills impacts
Transport	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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-CO₂ 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

Further details from the net zero skills literature review are included in the **Appendix G-1**.

6.2.2 JOBS AND SKILLS POLICY IN WEST MIDLANDS COMBINED AUTHORITY

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 West Midlands Combined Authority's Productivity and Skills Commission (which was set up with the aim to tackle the issues surrounding unemployment, job skills and increasing the region's productivity) and ensured the skills needs of businesses are met, with a particular focus on the needs of businesses in transformational sectors such as low carbon technologies and advanced manufacturing. Opportunities identified in the West Midlands Local Industrial Strategy²¹, WMCA Strategic Economic Plan SEP²² and RSP²³ 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 report²⁴ 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,

²¹ West Midlands Local Industrial Strategy <https://www.wmca.org.uk/media/3094/west-midlands-local-industrial-strategy-single-page.pdf>

²² West Midlands Combined Authority Strategic Economic Plan <https://www.wmca.org.uk/media/1382/full-sep-document.pdf>

²³ West Midlands Combined Authority Regional Skills Plan <https://www.wmca.org.uk/media/2274/regional-skills-plan.pdf>

²⁴ West Midlands Local Industrial Strategy, Low Carbon Evidence Base, Sustainability West Midlands, 2018

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 WEST MIDLANDS COMBINED AUTHORITY 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:

- Transport
- Built environment
- Energy
- Industry

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 West Midlands Combined Authority

Sector	West Midlands Combined Authority
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

Source: Office for National Statistics, Business Register and Employment Survey, 2020

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 West Midlands Combined Authority

Sector	West Midlands Combined Authority
Residential and non-residential buildings	15,000
Roads and railways	3,500
Utility projects	40

Sector	West Midlands Combined Authority
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

Source: Office for National Statistics, Business Register and Employment Survey, 2020

Over 24,000 people are employed in real estate related activities in West Midlands Combined Authority 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 West Midlands Combined Authority

Sector	West Midlands Combined Authority
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

Source: Office for National Statistics, Business Register and Employment Survey, 2020

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 West Midlands Combined Authority

Sector	West Midlands Combined Authority
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

Source: Office for National Statistics, Business Register and Employment Survey, 2020

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 employs 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 sectors²⁵. 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 capability²⁶. 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 2050²⁷. 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.

6.4 GOALS – JOB IMPACTS

6.4.1 JOBS CREATED

Analysis has been undertaken regarding the expected job impacts of the goals outlined in section 4.

²⁵ This figure does not include jobs losses as a result of the coronavirus pandemic.

²⁶ ProEnviro, Skills for a low carbon and resource efficient economy: A review of evidence (2007). A report commissioned by Defra.

²⁷ <https://www.climatechangenews.com/2020/02/26/uks-nigel-topping-seeks-broad-movement-drive-global-economy-net-zero-2050/>

A qualitative assessment of the impacts around net zero has been outlined in Table 14.

Table 14 - Goals and high-level jobs impacts

Sector	Goals	Jobs created	Jobs lost/changed	Net Effect
Domestic	Energy Efficiency	Retrofit coordinators, installers and designers		Increase
	Fuel Switching	Heat pump installers	Gas boiler maintenance repairs	Increase
	Microgeneration	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
	Microgeneration	Solar PV installers		Increase
Industry	Energy Efficiency and Fuel Switching	Retrofit coordinators, installers and designers Heat pump installers		Increase
	Microgeneration	Solar PV installers		Increase
Transport	Demand Reduction (WFH)	Opportunity to encourage digital skills IT and service sector jobs in more rural areas in local workspace hubs	Reduced demand for City Centre services such as food and beverage stores Vehicle manufacturers	Nil
	Fuel Switching (HGVs)	Hydrogen / Electric vehicle manufacturers	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 drivers	Vehicle manufacturers	Minimal Increase
	Mode Shift	Increased public transport operators and other non-car services/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 Guide²⁸ 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	Intervention	Jobs created by 2026	Jobs created by 2041
Domestic	Energy Efficiency	5,500	18,800
	Fuel Switching (Heat pumps)	6,900	23,500
	Microgeneration	1,800	7,900
Commercial	Energy Efficiency	500	2,200
	Fuel Switching (Heat pumps)	500	2,200
	Microgeneration	100	600
Industry	Energy Efficiency	Minimal change	200
	Microgeneration	Minimal change	100
Transport	Fuel Switching (HGVs)	Minimal change	400
	Fuel Switching (Buses, Taxis)	500	800
	Demand Reduction (Trips)	Minimal change	120
	Mode shift	1,500	1,500

²⁸ Homes and Communities Agency, Additionality Guide, Fourth Edition 2014
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/378177/additionality_guide_2014_full.pdf (note that several aspects of this additionality guidance are also contained in DCLG’s Appraisal Guide of December 2016)

	Electric Vehicles	3,400	32,800
Land Use	Renewables	Minimal change	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 Midlands²⁹. 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 NICEIC³⁰ and Retrofit Academy³¹. 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 analysis³² 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

²⁹ Local green jobs – accelerating a sustainable economic recovery, Ecuity, 2020
https://www.ecuity.com/wp-content/uploads/2020/06/Local-green-jobs-accelerating-a-sustainable-economic-recovery_final.pdf

³⁰ <https://www.niceic.com/contractor/training-courses/renewables-courses>

³¹ <https://www.retrofitacademy.org/>

³² Employment Implications of Green Growth: Linking jobs, growth, and green policies, OECD report for the G7 Environment Ministers, 2017 <https://www.oecd.org/environment/Employment-Implications-of-Green-Growth-OECD-Report-G7-Environment-Ministers.pdf>

will change³³. 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 Institute³⁴ 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%)

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

³³ Investing in a just transition in the UK, Grantham Research Institute on Climate Change and the Environment, 2019 https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2019/02/Investing-in-a-just-transition-in-the-UK_Full-policy-report_40pp-2.pdf

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 prioritised³⁵. 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, 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 Budget³⁶ 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

³⁵ The Sixth Carbon Budget, The UK’s path to Net Zero, Climate Change Committee (2020)

³⁶ <https://www.wmca.org.uk/what-we-do/productivity-skills/adult-education-budget/>

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 bootcamps³⁷ 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.

³⁷ <https://www.wmca.org.uk/news/contracts-awarded-for-5m-beat-the-bots-fund/>

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.*
- *Believe 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 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 three to level six 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 Academy³⁸ 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

³⁸ <https://www.ncl-coll.ac.uk/world-class-facilities/energy-academy>

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.

While 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 generation³⁹. This will address the huge opportunities for employment and economic growth identified in the low carbon sector through continued investment in enterprise, Research & Development (R&D), and knowledge transfer.

In addition to the research centres the 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 at 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

³⁹ <http://www.wmcu.ac.uk/areas-of-expertise/>

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.	❖ A core economic strength of the WMCA is in advanced manufacturing and engineering, but growing sectors including creative, digital and life sciences.
❖ 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.	❖ The transport sector currently supports over 116,000 jobs, the built environment almost 74,000, the energy sector 16,000 and industry 170,000.
❖ Create industry transition pathways in partnership with local businesses to support industries during the transitional period	❖ The goals have the potential of creating over 20,000 jobs by 2026 and 90,000 jobs by 2041.
❖ 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	❖ 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.

7 DELIVERY AND FINANCE

To achieve the goals and level of delivery outlined in the 'Accelerated' scenario will require a 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 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 are at a standing-start, and delivery will need to ramp-up the supply chain, finance, delivery management and uptake. The later five-year plans should benefit from a strong structure and pipeline. All of the delivery plan summaries are aligned to the 'Accelerated' scenario.

7.1 WEST MIDLANDS COMBINED AUTHORITY 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 Transport for the West Midlands, 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 West Midlands Combined Authority will need to shift away from traditional spending in order to meet the challenge. New funding will need to be secured and they will have to work collaboratively to secure funding for the region and consider how they 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.
- Private and voluntary sector organisations are needed to **collaborate and deliver projects**
- Universities and colleges will need to work with employers to ensure there is no **skills gap**.
- Communities have to come together to meet the challenge and ensure a **just and equitable transition**.
- People will need to make significant changes to their **lifestyles**, most of which will positively affect health and wellbeing. However, systems need to be in place to enable this change.

DRAFT

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

<p>Investment and Funding</p> <p>The required investment is estimated at a gross £3.5bn over the five-year plan, 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.</p> <p>Relevant sources of finance include:</p> <ul style="list-style-type: none"> 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 	<p>Governance</p> <p>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.</p> <p>Stakeholders</p> <p>The main stakeholders are expected to be:</p> <ul style="list-style-type: none"> Housing Associations Local Authority Housing Homeowners and private landlords Supply Chain – Installers, manufacturers and assessors National Government – BEIS, Treasury Midlands Energy Hub <p>Dependencies</p> <p>The goals are dependent on:</p> <ul style="list-style-type: none"> Housing associations Local authorities Homeowners and private landlords Supply Chain National Government – BEIS Midlands Energy Hub 	<p>UN Sustainable Development Goals</p> <div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="width: 30%; text-align: center;"> <p>1 NO POVERTY</p> </div> <div style="width: 30%; text-align: center;"> <p>3 GOOD HEALTH AND WELL-BEING</p> </div> <div style="width: 30%; text-align: center;"> <p>7 AFFORDABLE AND CLEAN ENERGY</p> </div> <div style="width: 30%; text-align: center;"> <p>8 DECENT WORK AND ECONOMIC GROWTH</p> </div> <div style="width: 30%; text-align: center;"> <p>10 REDUCED INEQUALITIES</p> </div> <div style="width: 30%; text-align: center;"> <p>11 SUSTAINABLE CITIES AND COMMUNITIES</p> </div> <div style="width: 30%; text-align: center;"> <p>12 RESPONSIBLE CONSUMPTION AND PRODUCTION</p> </div> <div style="width: 30%; text-align: center;"> <p>13 CLIMATE ACTION</p> </div> </div> <p>Job creation</p> <p>Professional Associations, engineering companies and training providers to maximise opportunities for local jobs and skills around solar, retrofit and heat pump installation.</p> <p>Around 14,000 jobs created by 2026.</p>
<p>Resources</p> <p>vary substantially depending on the level of involvement. Marketing and promotion would require additional funding and may be attracted from funding bodies identified.</p>	<p>Local Authorities</p> <p>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.</p>	

WMCA Role		
Influencing	Enabling	Delivery
Promotion of the campaign and the opportunities, particularly in the private sector.	Provision of cross-disciplinary co-ordination, team with stakeholders. Managing the financial streams from national government and other incentives	Developing clear single programme for domestic sector and managing and administrating. Possibly managing procurement and frameworks for deployment.

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

NEXT STEPS

This will be confirmed by WMCA in the next steps but will depend on resource requirements. Establishing the Fuel Poverty and Regional Retrofit (PRR) 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 all 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

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

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.

Stakeholders

The main stakeholders are expected to be:

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

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

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.

WMCA Role

Influencing	Enabling	Delivery
Promotion of the campaign and the opportunities to business organisations	Cross-disciplinary co-ordination, team with stakeholders. Managing the financial streams from national government and other incentives	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.

Devolution Asks – BEIS funding to be decentralised.

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

<p>Investment and Funding</p> <p>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.</p> <p>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.</p> <p>Relevant sources of finance include:</p> <ul style="list-style-type: none"> • BEIS • UKRI • Private Industry <p>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.</p> <p>Resources</p> <p>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 of energy efficiency.</p>	<p>Governance</p> <p>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</p> <p>Stakeholders</p> <p>The main stakeholders are expected to be:</p> <ul style="list-style-type: none"> • LEPs • Industrial organisations • BEIS • Cadent / WPD • Energy Capital • International sector groups <p>Dependencies</p> <p>The goals are dependent on:</p> <ul style="list-style-type: none"> • 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. <p>Local Authorities</p> <p>Work with the LEPs and Energy Capital and other stakeholders to ensure plans are co-ordinated and benefits of aggregation are realised.</p>	<p>UN Sustainable Development Goals</p> <div style="text-align: center;"> </div> <p>Job creation</p> <p>Professional Associations, engineering companies and training providers to maximise opportunities for local jobs and skills.</p> <p>Few direct jobs indicated by 2026. Many more possible around new industrial hubs, fuel switching and CCS, but dependent on sector development.</p>
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WMCA Role		
Influencing	Enabling	Delivery
Promotion of the campaign and the opportunities to business organisations.	Provision of cross-disciplinary co-ordination, team with stakeholders. Managing the financial streams from national government and other incentives.	Developing clear single programme for commercial sector and managing and administrating. Possibly managing procurement and frameworks for deployment.

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


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 low carbon transport to, from and within the area ensuring the integration with land use, energy and digital connectivity policy Goals 9-13

<p>Investment and Funding</p> <p>The WMCA is investing over £1bn into a programme of transport investment over the next 5 years</p> <p>They have 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.</p> <p>Sources of finance include:</p> <ul style="list-style-type: none"> • 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) 	<p>Governance</p> <p>Development and delivery of a new local transport plan (LTP) will require action by TfWM in collaboration with partners. They will work with our 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.</p> <p>Stakeholders</p> <p>The main stakeholders are expected to be:</p> <ul style="list-style-type: none"> • Local Authorities • LEPs • Transport Operators / Fleet Operators • Highways England / Network Rail • Midlands Connect • NGOs • DfT / BEIS / MHCLG • Private Sector (DNOs, Hydrogen Developers etc.) 	<p>UN Sustainable Development Goals</p> 
<p>Resources</p> <p>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.</p>	<p>Dependencies</p> <p>The goals are dependent on:</p> <ul style="list-style-type: none"> • 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 	<p>Job creation</p> <p>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.</p> <p>About 5,400 new jobs by 2026.</p>
<p>WMCA Role</p>		
<p>Influencing</p> <ul style="list-style-type: none"> • 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 	<p>Enabling</p> <ul style="list-style-type: none"> • 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. 	<p>Delivery</p> <ul style="list-style-type: none"> • 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
<p>Devolution Asks –The WMCA 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.</p>		
<p>NEXT STEPS</p> <ul style="list-style-type: none"> • 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. 		

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. Goals 15

<p>Investment and Funding</p> <p>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.</p> <p>Sources of finance include:</p> <ul style="list-style-type: none"> 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 <p>Investment for broader natural capital approaches will be developed in the work under next steps.</p>	<p>Governance</p> <p>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.</p> <p>Stakeholders</p> <p>The main stakeholders are expected to be:</p> <ul style="list-style-type: none"> 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 <p>Dependencies</p> <p>The goals are dependent on:</p> <ul style="list-style-type: none"> Landowners - willingness for planting DEFRA – Funding and alignment with regional goals Supply Chain Ongoing maintenance and management 	<p>UN Sustainable Development Goals</p>  <p>Job creation</p> <p>Connect with professional associations and training providers to develop skills and unlock the potential for 400 jobs by 2026.</p>
<p>Resources</p> <p>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.</p>	<p>Local Authorities</p> <p>Work with WMCA and other stakeholders to ensure existing natural capital plans are joined up with cross-boundary opportunities.</p> <p>Develop policies at local level with natural capital group and a natural capital accounting approach.</p> <p>Co-ordinate tree planting activity and promote the Virtual Forest</p>	


WMCA Role

Influencing	Enabling	Delivery
<p>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.</p>	<p>Provision of cross-disciplinary co-ordination, resource management, facilitating connections to relevant national or international schemes and bodies, accelerated learning from other regions.</p>	<p>Programme management - a central function to identify opportunities, guide applications and investigate new investment and delivery models.</p>

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.

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.

LARGE SCALE RENEWABLES – Ground mount solar power and onshore wind Goals 14		
<p>Investment and Funding</p> <p>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.</p> <p>Sources of finance include:</p> <ul style="list-style-type: none"> • 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 	<p>Governance</p> <p>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.</p> <p>Stakeholders</p> <p>The main stakeholders are expected to be:</p> <ul style="list-style-type: none"> • Landowners – farmers, public bodies, Severn Trent Water • Local Authorities/ LEPs/ LNPs • NGOs - RSPB • BEIS • Community energy organisations • Midland Energy Hub • Renewable Investment funds <p>This should include land outside of the constituent members to maximise opportunities.</p> <p>Dependencies</p> <p>The goals are dependent on:</p> <ul style="list-style-type: none"> • Landowners • National Government policy • Local authority planning • BEIS funding • WPD grid connections 	<p>UN Sustainable Development Goals</p>  <p>Job creation</p> <p>Skills and supply chain are largely in place in UK. Employers and education providers to ensure West Midlands organisations can benefit.</p> <p>Potential for approximately 600 jobs by 2041.</p>
<p>Resources</p> <p>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.</p>	<p>Local Authorities</p> <p>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.</p>	
WMCA Role		
Influencing	Enabling	Delivery
<p>Promotion of the opportunities around large-scale renewables, e.g. through mayoral support, communications and advertising identified land areas.</p>	<p>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.</p>	<p>Programme management - a central WMCA function to identify opportunities, guide applications and investigate new investment and delivery models.</p>
<p>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.</p>		
<p>NEXT STEPS</p> <p>WMCA Environment 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.</p>		

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 plan. 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.

8 APPENDICES

Appendix A – Document Review

Appendix B – Stakeholder Engagement

Appendix C – MACC Assumptions

Appendix D – GIS Mapping

Appendix E – Assumptions under Business-As-Usual

Appendix F – Goals Assumptions

Appendix G – Jobs & Skills Appendices

G-1 Transition Literature Review

G-2 Jobs & Skills Policy Literature Review

G-3 Jobs & Skills Baseline Data

G-4 Supply Side Review

G-5 Goals Jobs Analysis

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APPENDIX A – DOCUMENT REVIEW

Key Findings

- There have been many studies on the subject of energy efficiency and GHG reduction in the region especially over the last few years. This coupled with recent national government announcements (i.e. 10-point plan) and Climate Change Committee have built up a strong understanding and evidence of the types of actions that need to be undertaken
- The West Midlands is the largest regional economy outside of London. The combination of energy-intensive industries and high levels of fuel poverty makes the region especially sensitive to energy prices. There are high concentrations of manufacturing and motorways and limited access to renewable generation such as offshore wind. The West Midlands accounts for 9% of manufacturing employment in Britain (with the highest concentration of manufacturers).
- Several local authorities in the region have already pledged to achieve zero carbon status for their estate (under various timeframes). Whilst these, in themselves, have limited impact, there is a strong symbolism and the contribution is valuable.
- Large energy users in the region already have undertaken 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 a regional energy strategy is core to any regional industrial strategy.
- The built environment is a major focus both in terms of actions which reduce fuel poverty but also reducing energy consumption. There are 140,000 households in fuel poverty in the region (rates exceeding 12% in areas of Birmingham, Coventry and Wolverhampton) with large estates of 1950s/60s housing. Improving building insulation levels along with behaviour change advice and energy literacy would have significant benefits.
- New homes and other buildings will be zero carbon or at least not utilising fossil fuel heating in the near future, the focus therefore shifts to retrofitting homes.
- There is a need to a shift in transport modes to reduce reliance on cars and increase accessibility of employment via public and active travel within a 45-minute commute time.
- The long-term strategy 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.
- Whilst a ban on internal combustion engines will come in by 2030, this is likely to be too late to affect the carbon budget greatly over the next few years and demand reduction measures may be needed to curb transport fuel consumption, private car use and increase active travel, public transport, micro-mobility and demand response solutions.
- Waste generated and general consumption patterns are considered in several studies. 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.
- Natural capital and increasing green cover is a focus. The virtual forest goal of planting a tree for every person in the west midlands is a starting point, government's 10-point plan points to greater ambition. Any strategy must be

The following are the main documents and data reviewed as part of the plan process:

Energy

Renewable Energy Capacity Study for West Midlands (March 2011)

The focus of this study is to present the results of the potential of all the technologies considered at a regional scale across the West Midlands. The study reveals potential accessible renewable energy resource of 54.2GW of the West Midlands as a whole.

Powering West Midlands Growth - A regional Approach to Clean Energy Innovation (March 2018)

This document provides an overview of clean energy trends in the UK and Worldwide, and the West Midlands approach to these, along with regional challenges and a strong focus on Energy Innovation Zones (EIZs).

The West Midlands is the largest regional economy outside of London. Its combination of energy-intensive industries and high levels of fuel poverty makes the region especially sensitive to energy prices. Meanwhile it has a high concentration of manufacturing and motorways, with limited access to renewable generation such as offshore wind.

Four EIZs are proposed across West Midlands; with strictly only clean energy being consumed and generated within the zone. Each EIZ would be proposed by a group of businesses/organisations with the size determined by local priorities, i.e. energy poverty/industrial energy prices/low-carbon transport infrastructure.

Energy as an Enabler (March 2018)

This document outlines the linkages between local energy strategy, productivity and growth whilst having an economic focus. To reduce industrial energy costs, like in Germany, they must be passed on to customers - unfeasible in this region due to large pockets of fuel poverty levels. A regional energy strategy is core to the regional industrial strategy.

There is a need for a strategic focus on encouraging modern/smart energy infrastructure to support large-scale deployment of future mobility technologies and clean growth technologies

Distributed generation and demand study (January 2018)

Technology growth scenarios to 2030 are presented. Technologies covered include solar PV, onshore wind, hydropower, energy-from-waste, anaerobic digestion, gas and diesel peaking plant (which have had significant growth in the last 18 months of network connection applications for these plants in particular). Detailed growth scenarios are presented and analysed for each. Offshore generation is not included as West Midlands is landlocked with landfill gas, sewage gas, CHP and biomass assessed as unlikely to have material effect on distribution network, so growth of these is not considered in the report.

There is a general downward trend in energy demand though EV & heat pumps could have a regionally specific impact on demand.

A Regional Energy Strategy for the West Midlands (November 2018)

The aim of this document is to deliver a vision for energy across the region by 2030. The focuses of this strategy include:

- Reducing energy costs for strategic industrial sectors
- Reducing fuel poverty across region, hit government energy efficiency targets 5 years ahead of schedule
- Reducing regional carbon emissions
- Creating regional energy infrastructure that adds £1bn to GVA by 2025

There are several lessons learned from initiatives such as Energiesprong and Catapult's Smart Systems including the need for a diversity of approaches, attention to detail (especially around skills programmes, training, cultural changes) and new business models. There are also significant opportunities for leading the way in terms of electric vehicles in the area such as potential for a £80M National Battery Manufacturing Development Centre in Coventry, with a strong presence from Jaguar Land Rover in the region, strategic strengths in advanced manufacturing, low carbon tech, transport and logistics and construction.

Black Country Utilities Infrastructure Capacity Study (September 2019)

This report specifically covers electricity, gas and telecommunications. It identifies four strategic centres - Wolverhampton, Walsall, West Bromwich and Brierley Hill

There is sufficient power to support all existing planned housing/commercial growth. Potential in most locations to support growth from new Black Country plan (to 2038). Power constraints close to Rushall substation (Walsall). No other potential abnormal costs/technical constraints associated with prospective housing/commercial growth identified.

Powering Growth: Black Country Energy Strategy (February 2020)

This report is the final report for the project to develop an energy strategy for the Black Country Local Enterprise Partnership (BCLEP) as part of a wider regional Energy Strategy for the WMCA. The aims of the strategy include the identification and evaluation of a technical and commercial evidence base; and establishment of a pipeline of projects that could receive future investment.

The report covers the work done in the project from late November 2017 to early February 2018 and includes:

- A summary of the data collected and analysed;
- Findings on the current costs of energy and comparison with other countries;
- Our view on approaches and technologies to help reduce costs, including those that can be applied now and likely to be applied in future. This includes heat and electrical technologies, covering energy from waste, district heating, PV, energy storage and demand management;
- Proposed next steps for this energy strategy.

The work shows where the largest energy demands are currently found and indicates clusters of current and future buildings and businesses where action is likely to be most effective. It is already evident that:

- There are many businesses in the area where the nature of their work means they have large energy demands, and so efforts to reduce their operational costs are important. Greater support for energy efficiency is a key starting point;
- The many buildings with large roofs in the area mean that there are opportunities for significant PV arrays, but this needs to be considered with full knowledge of the strength of the electrical grid and the contractual arrangements that may be necessary;
- There are opportunities to consider around using heat from existing and planned energy from waste plants.

Innovating to Net Zero (March 2020)

The Innovating to Net Zero UK report by Energy systems Catapult modelled 100s of potential pathways to 2050 – ramping up or down different technologies and behaviour changes – to understand the combinations, interactions and trade-offs of competing decarbonisation approaches. This report identifies the technologies, products and services which are most important to meeting Net Zero. It recommends what needs to happen during this Parliament to deliver Net Zero levels of investment, infrastructure and innovation.

Net Zero narrows the set of viable pathways for the future energy system. Where an 80% target allowed considerable variation in relative effort across the economy, with some fossil fuels still permissible in most sectors, Net Zero leaves little slack. Success depends on innovation across the whole system; in technology, land use change and behaviour.

Net Zero requires switching to low carbon technologies wherever we can, tackling demand for hard-to-treat activities (aviation and livestock), and ensuring sufficient carbon sequestration to offset any residual emissions. Each of these elements faces significant barriers and technology and land use changes are constrained by maximum feasible deployment rates and competing uses of land. Net Zero requires society-wide adoption of low carbon heating and transport technologies. It may also mean limiting growth in aviation demand and changing diets. Serious societal engagement is therefore essential to the UK's ability to meet Net Zero

Recharge the West Midlands (June 2020)

This is an investment case to government. In essence harnessing the potential of green technology and electrification there is the potential to unlock 51,700 green jobs with an investment of £614m.

- £250m battery 'Gigafactory' and £35m investment in electric network to develop battery/charging technology to adapt to EVs, creating 10,100 jobs and 29,700 job years in construction
- £100m to eliminate fuel poverty for 50,000 homes by end of 2022, creating 26,000 jobs and safeguard 5,240 jobs
- £95m to accelerate development UK Central HS2 interchange, £70m regenerate wider Curzon St. and Digbeth area (Martinau Galleries development), £61m to develop creative and cultural hub - 30,000 jobs and 4,300 new homes
- £80m investment in cultural sector (to adapt to COVID-19), creating and safeguarding 3,000 jobs
- £330m investment in transport infrastructure schemes: £101 m upgrading the metro scheme, £61m development of 'sprint' bus network, £84m upgrade rail services, £86m accelerate local connectivity, 3,900 job years in construction, improve journey times, improve access to cycle network
- £200m brownfield regeneration, delivery of 15,000 new homes, support 11,720 job years. £24m development of new National Brownfield Institute
- £400m investment in affordable housing, 20,000 additional affordable homes, support 23,400 job years.
- £550 skills investment, help young people get apprenticeships, retraining, upskilling for jobs of the future

Heat Networks Project Pipeline (June 2020)

3 district heat networks are actively being supported, with a further 2 additional not being supported.

Carbon Emission Reduction Study for the City of Birmingham (June 2020)

This report undertaken by Anthesis covers the city of Birmingham. Emissions directly related to Council Scope 1, 2 and 3 activities and operations represent 417,772 tCO_{2e}, just 8% of the total emissions of the city. Meanwhile Scope 3 includes Schools, social housing, commercial properties and leased properties. Although the direct emissions that the Council controls or has strong influence over is relatively small, the Council still has an important role in stimulating and influencing action across the city.

The council declared an aspiration for the city to be net zero carbon by 2030 or soon after as a just transition allows; ensuring communities are engaged in the process; protecting employment; ensuring a just transition and reducing existing inequalities in the city. Policies and projects including the Birmingham Development Plan and Birmingham Connected supporting the reduction of carbon emissions to mitigate against climate change in planning and development, sustainable transport, heating and powering the city, research and partnerships.

Over 3,100 new homes have been built by Birmingham Municipal Housing Trust (BMHT) since 2009 to high design specifications, at least EPC band B. In addition, 60,213 households (c14.7%) had ECO measures installed between 2013 and November 2019. The Birmingham District Heating network, first launched in 2007, has been expanded to comprise three schemes serving a range of building types in the City Centre such as John Lewis, Aston Uni, Birmingham Children's hospital plus council offices and homes. This currently utilised gas-fired CHP and gas boilers and so switching this to a decarbonised source will be a priority.

A new Clean Air Zone 'Brum Breathes' was established within the ring-road being implemented in Summer 2020. Together with this a cycling and walking investment plan for active travel is in place.



Birmingham is a global centre for industry and commerce and the West Midlands is the UK's largest centre for manufacturing and engineering. Its distinctive strengths include low carbon transport innovation, data-driven health and life sciences, and globally competitive supply chain firms. Advanced manufacturing and engineering – particularly automotive – is a defining strength of Greater Birmingham's economy, employing more than 36,500. Supply chain capabilities encompass a range of technologies and sectors including advanced digital design, composites, manufacturing metrology, metal precision manufacturing, advanced robotics, low emissions vehicles, research and development on batteries, energy storage, powertrains, and light-weighting.

Sandwell Climate Change strategy (2020-2028)

The Action Plan covers six key themes:

- Council estate and operations - solar PV, refurbishment, streetlighting LEDs, electrification of fleet
- The built environment - energy efficient, new homes
- Transport - mode shift
- Waste - reduce waste generated, 65% recycling target
- Adaptation - plant 15,000 trees, carbon sequestration, heatwave response, GIS mapping
- Natural Capital

Sandwell Green Space Strategy (2020-2030)

This Green Space Strategy covers the period 2020 to 2030 aligned with the timeframe for the Sandwell Vision 2030. It outlines 52 separate actions for the borough.

Repowering the Black Country (June 2020)

The purpose of this prospectus is to engage partners and funders in a compelling vision to make the Black Country the world's first zero carbon manufacturing cluster. The industrial vision for the Black Country has four interlinked elements:

- 1. Identification and reconfiguration of strategically-significant supply chains within the region using circular economy principles
- 2. Provision of local zero carbon energy infrastructure designed specifically to support these new industrial ecosystems (zero carbon hubs)
- 3. Process optimisation within every individual element of the circular supply chains and hubs coupled with mass engagement of businesses across the Black Country in the vision
- 4. Effectively dovetailing Black Country industrial development into the context of national decarbonisation and the development of complementary clusters across the UK

Indicates growth and circular economy savings. These are very high, not in line with other reporting, and have not been included in growth or business as usual analysis.

A-Z of Midlands Planning (September 2020)

With COVID-19 and a new planning white paper having far-reaching impacts on an arguably already complex, and intricate planning system, WSP put together a series of regional planning guides to help navigate this complicated world of planning.

These high-level, guide cover topics including housing delivery, planning performance, population change and planning policy, and provide a visual overview that can be used to benchmark data against other cities.

There are aims for development of 200,00 homes by 2031, fuelled by an investment in construction skills development, promotions of brownfield remediation (although there are issues concerning viability & deliverability) fund and development of a 'design charter'.

National Centre for the Decarbonisation of Heat (September 2020)

The proposed National Centre for Decarbonisation of Heat (NCDH) can allow the UK to lead in commercialising low carbon heat solutions. It argues that addressing heat decarbonisation is complex and requires a full 'systems' approach. The Centre (based at Tyseley Energy Park) will for the first time bring all aspects of this approach together under a physical centre, convening industry around goals. The 6 core elements will include:

- 1. Start-up incubator (called D4E)
- 2. Digital manufacturing accelerator
- 3. Adjacent 1,000 real-home trial area (Living Lab)
- 4. Skills and training academy
- 5. Standards & verification coordination
- 6. Green Finance Institute strategic alliance

West Midlands Regional Energy System Operator – RESO (October 2020)

The RESO will provide a detailed design for a smart local energy system covering Coventry, a city of 360,000 people, with a business model for rapid rollout of similar designs across the West Midlands and UK. The design will support Coventry's zero carbon policy objectives and show 25% bill reductions for citizens. It will demonstrate the immediate replicability and robustness of our approach by generating a preliminary design for East Birmingham and North Solihull, home to nearly 300,000 people

The delivery partnership brings together local infrastructure providers and authorities including Cadent Gas, Western Power Distribution, Transport for the West Midlands, Coventry City Council and the West Midlands Combined Authority, two universities, one large company and three SMEs.

A regional market system will be developed which enables cross-vector real time trading between gas, electricity and transport assets.

Growth, Carbon & Economy

West Midlands Local Industrial Strategy (May 2019)

The Local Industrial Strategy for the West Midlands builds on the heritage of the region's manufacturing, research and technology sectors. The strategy sets out how the West Midlands will take advantage of the incredible skills, infrastructure and innovation of the region. Most pertinent is the outlook on the future of mobility:

- West Midlands aiming to deploy first fully operational connected autonomous vehicles in the region in advance of 2022 Commonwealth Games
- Manufacturing steer towards batteries, connected autonomous vehicles and electric powertrain components -build on current manufacturing expertise and supply chain strengths
- £20m future mobility zone (between Birmingham, Solihull & Coventry) government investment

There are also commitments to have the highest electric vehicle adoption & connected autonomous vehicles (CAV) share of vehicle use anywhere in UK, to be the national centre for CAV, electric motor manufacture and supply chains for the full range of EVs.

Setting Climate Change Commitments for West Midlands Combined Authority Area (June 2019)

This report by the Tyndall Centre provides an overview of WMCA advisory climate change targets and carbon budget figures, derived from Paris agreement commitments. The recommended carbon is budget based on a 'grandfathering' (most widely applicable regime within UK) allocation regime for sub-dividing UK sub-national energy CO₂ only carbon budget - one common approach ensures consistency across LAs, and to ensures total of LAs budgets does not exceed UK budget (i.e. avoid LAs choosing allocation regime which allows them the largest carbon budget).

Key targets include:

- 1) Stay within a cumulative CO₂ emissions budget of 126 MtCo₂ for 2020-2100
- 2) Initiate immediate CO₂ mitigation programme - to deliver annual emissions reduction rate averaging 13.4%
- 3) Reach zero or near zero carbon by 2041

If aviation and shipping emissions continue to increase, they will take an increasing share of UK carbon budget. Report recommends WMCA consider strategies for significantly limiting growth in these areas.

WMCA State of the Region (July 2020)

This is the most recent annual overview report of the region's current economic and social standing, with particular focus on the impact of covid-19. The geographic make-up of the region includes the 3-LEP area (Greater Birmingham & Solihull, the Black Country, Coventry & Warwickshire), three cities (Birmingham, Coventry, Wolverhampton), four boroughs (Dudley, Sandwell, Solihull, Walsall). Included are details of regional progress on each of the UN Sustainable Development Goals, with figures surrounding economics/commercial growth, employment & business, demographics

Key activities identified include:

- West Midlands Green Financing
- West Midlands Clean Growth Challenge
- WM Circular Economy Taskforce
- Community Green Grants
- Reinforcing the region's energy infrastructure to support green growth
- Active Travel
- Urban Transformation Fund (Brownfield sites)
- Communications and behaviour change

Housing

WMCA Zero Carbon Homes Charter (September 2020)

WMCA's Zero Carbon Homes Charter frames WMCA and its partners' commitment and long-term objectives to deliver zero carbon homes in the region by 2025. The Charter will be incorporated into WMCA's Single Commissioning Framework, defining WMCA's aspirations for new zero carbon development and setting out the approach it would like to see those seeking WMCA investment to undertake.

Principle 1: Zero Carbon Regional Ambition

- All new developments are net zero carbon.
- Commitment to work together with partners (developers, housebuilders, community) to deliver zero-carbon growth.
- Deliver high-quality zero carbon homes (based on UKGBC definition addressing operational energy).
- Nominate zero-carbon champions to lead on specific principles.

Principle 2: Sustainable Growth

- Spatial planning/site allocation considers sustainable development.
- Ensure sustainable density and connectivity.
- Work towards low-carbon mobility, transit-oriented development, promote a shift to active travel modes of transport.
- New development support sustainable growth within the West Midlands.

Principle 3: Energy Efficiency and Water Saving

- Energy efficiency is the most effective long-term guarantee to get a low-carbon emission housing stock.
- Build homes that require no heating (hook for Route map to have a minimum energy efficiency standard for its building fabric/space heating demand based LETI/RIBA targets).
- Optimise fabric performance. Through passive design and high insulation, achieve a low space heating demand.
- Reduce hot water demand, adopt heat recovery solutions and conserve water (low water use fittings reduce energy demand associated with hot water).
- Express wider benefits such as saving money for residents and reducing impact of new homes on water demand in the region.
- Step change to include unregulated emissions (appliances etc).

Principle 4: Decarbonising Heating Systems

- Use of electric-led solutions with efficient heat pumps.
- Invest in decentralised district energy options beyond individual solutions and encourage community-wide energy solutions.
- Explore data-driven energy systems and smart dynamic energy networks
- Supported by decarbonisation of the grid.

Principle 5: Homes Fit for the Future

- Environment modelling to check thermal comfort, avoid over-heating (and address UHI).
- Ensure data-driven smart systems, monitoring and POE (link with reducing maintenance costs).
- Circular principles for construction, reduce waste and reuse materials. Building in layers principle. This has an added benefit of reducing upfront embodied carbon.
- Flexibility/adaptability and climate resilience. Building homes fit for the future.
 - Build in flexibility and adaptability to embed future technological innovation.

Principle 6: Maximising Renewable Energy Generation

- Include off-site and on-site renewable generation:
 - Invest in PVs (individual solution).
 - Invest in large-scale renewable energy networks.
 - Encourage community- based energy solutions.
 - Benefits: Provide competitive price and local supply of renewable energy.
- Complement with battery storage and smart dynamic energy grid.

- Carbon offsetting (based on carbon neutrality definition of first reduce then offset). Offsetting to be clearly stated as a last resort in Charter.

Principle 7: Innovative Supply Chains

- Short-term acceleration of construction supply chain to deliver zero-carbon homes.
- Use procurement powers to strengthen and support local zero carbon supply chain.
 - Embed zero carbon requirements in procurement.
- Early engagement and partnerships with supply chains to deliver zero-carbon homes.
- Embed innovation in construction including MMC/AMC.

Principle 8: Collaboration and Knowledge-Sharing

- Use WMCA power as an anchor institution to boost collaboration and knowledge-sharing and maximise lobbying powers.
- Set up a learning feedback loop to learn from first houses delivered. Ensure proper monitoring to improve future delivery.
 - Potential to set up an industry forum to share knowledge, learning and feedback.
 - Provide quantitative data on carbon savings/cost uplift to inform future projects.
- Create knowledge schemes:
 - Build skills in Passivhaus standards, renewable energy, innovative financing mechanisms, alternative delivery models to accelerate delivery of zero carbon homes.
 - Training for optimal use of heat pumps and other technologies (still a lot of questions around operational heat pumps).
- Pool resources and funding.
 - Potential to set up a carbon fund that can be used to support developers that want to go further (an innovation-led fund).
 - Explore innovative financing mechanism for zero-carbon interventions.

Principle 9: Zero-Carbon Policy

- Longer-term capacity-building of West Midlands economic sectors to support wider transition to zero-carbon.
- Develop strong policy that support transition to zero-carbon (enabling policy landscape).
 - Added benefit of providing certainty to housebuilders to build zero-carbon homes.
- Engage with regional businesses to capitalise on low-carbon opportunities, boost R&D and pace of technological innovations.
 - Link with LEPs, WM2041 aspirations, and regional industrial strategy.
- Support a green new deal for West Midlands.
 - Boost productivity and earning power in a clean and inclusive way.
 - Support reskilling and employment (through policy and funding).
 - Provide funding to businesses to support zero-carbon projects.

Principle 10: Pilot Projects and Energy Innovation Zones

- Embrace low-carbon innovations to help the shift towards zero-carbon.
 - Explore potential of new technologies (AI, V2G, battery storage, solar tiles etc.)
- Designate Energy Innovation Zones.
- Commit to low-carbon innovation regional pilot projects.
- Set up low-carbon innovation hub.
 - Use previous best practice project in area as first case studies to inform pilot projects.
- Launch innovation challenges."

Principle 11: Community Engagement

- Engage community to adopt sustainable behaviours.
 - Reduce energy use, identify where energy is waste (implement POE) and explain benefits (save money/fuel poverty).
- Engage communities with new tech (proper use).
 - Link to white paper and move towards digitalisation.
- Maximise social value (introduce SROI), social equity, ensure everyone benefits from sustainable growth.

Principle 12: Community Stewardship

- Support local community ownership models/alternative models: community companies, CICs etc.
 - Example: Ownership of solar farm etc.
- Support community-led financing models: crowdfunding, community share issues etc.
- Promote shared ownership/local asset management approaches"

WMCA Route to Zero Carbon Homes (October 2020)

This baseline gap analysis has been carried out by Useful Projects. This analysis assesses the region's programme of housing delivery and, based on current standards, their carbon performance. Scenarios for achieving zero carbons are modelled for the pipeline of homes that are planned to be delivered in the region from 2020 to 2031. This includes an appraisal of the CO₂ emission and costs associated with closing the gap between current performance and zero carbon. As part of the baseline study, an interactive tool has been developed so that WMCA can test alternatives and update its pathway to zero carbon as new information comes forward.

This study focuses on the 219,038 new homes being delivered in the region, to be defined as 'WMCA area', by 2031. It focuses on residential properties and does not address retrofitting of existing homes, which is being covered in a separate workstream led by Energy Capital.

Useful Projects conducted a review of the policy landscape across the 17 local authorities within WMCA and found that:

- All local authorities encourage developers to maximise sustainability within development, where it is viable.
- Standards such as BREEAM Excellent, Code for Sustainable Homes (above level 3) and Building for Life are specifically mentioned in policy document for the local authorities.
- Specific policies encourage resource use minimisation including reducing carbon emissions, water and energy consumption. Local authorities have adopted ambitious aspirations but have not set specific targets in terms of CO₂ emissions or resource use minimisation.
- All local authorities encourage high-quality building standards with some mentions of enhancing insulation and airtightness standards. None specifically mention Passivhaus standards.
- All local authorities encourage on-site renewable energy generation and the use of low carbon technologies to help reduce carbon emissions and increase energy resilience.



Jobs & Skills

See separate appendices on Jobs and Skills.

DRAFT

Transport

Movement for Growth (June 2016)

This is the West Midlands Strategic Transport Plan which covers the five challenges and needs around an effective transport system; Economic Growth and Economic Inclusion, Population Growth and Housing Development, Environment, Public Health and Social Well-Being. The objectives break down into the following:

- **ECON1** To support growth in wealth creation (GVA) and employment (jobs) in the West Midlands Metropolitan Area, as a prized national economic asset.
- **ECON2** To support improved levels of economic well-being for people with low incomes in the West Midlands Metropolitan Area to help make it a successful, inclusive, European city region economy.
- **POP1** To help meet future housing needs, by supporting new housing development in locations deemed appropriate by local planning authorities, following their consideration of sustainable development criteria.
- **ENV1** To significantly improve the quality of the local environment in the West Midlands Metropolitan Area.
- **ENV2** To help tackle climate change by ensuring large decreases in greenhouse gas emissions from the West Midlands Metropolitan Area.
- **PUBH1** To significantly increase the amount of active travel in the West Midlands Metropolitan Area
- **PUBH2** To significantly reduce the number and severity of road traffic casualties in the West Midlands Metropolitan Area
- **PUBH3** To assist with the reduction of health inequalities in the West Midlands Metropolitan Area
- **SOC1** To improve the well-being of socially excluded people.

TfWM Transport Briefing Notes (October 2016)

This document builds upon 'Movement for Growth' to outline what is needed in each of the four tiers

- National and Regional Tier - National highway connections, based on Highways England's strategic highway network of motorways and trunk roads. National and regional passenger rail services and coach services, rail freight capacity and rail freight interchanges.
- Metropolitan Tier - An integrated Metropolitan Rail and Rapid Transit Network (Rail, Metro and Sprint Bus Rapid Transit) with high quality main centre interchanges and supporting park and ride provision.
- Local Tier - High quality local bus services integrated with the rail and rapid transit network, accessible transport, local roads, local cycle networks integrated with the Strategic Cycle Network and attractive, safe conditions for walking and cycling.
- Smart Mobility Tier - Intelligent mobility services to help make the most of transport capacity and help inform people of the travel options available to them. This includes the development and delivery of a trial "Mobility as a Service" (MaaS) initiative

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

This strategy is built around a core mission: to put the UK at the forefront of the design and manufacturing of zero emission vehicles and for all new cars and vans to be effectively zero emission by 2040. These bold ambitions need to be matched by bold action which can only achieve them with:

- adequate vehicle supply
- a strong consumer base and the right market conditions
- a fit for purpose infrastructure network

Birmingham Clean Air Zone Full Business Case (December 2018)

This document provides the business case for the clear air zone. While the benefits are primarily focussed around air quality impacts, wider benefits of reduce GHG emissions are also acknowledged.

WMCA Cycling Charter (June 2019)

The Charter aims to raise levels of cycling across the West Midlands Metropolitan area to 5% of all trips by 2023. This represents a 400% increase in cycling journeys from the 1% baseline. This ten-year target is not the end of a journey but a start – to where we see the West Midlands where cycling is naturally commonplace. By 2033, we want to raise cycling to 10% of all trips.

- Leadership - A high-profile local cycling champion, committed Leadership, leadership at all levels
- Cycling Network - A high quality and coherent cycle network across the West Midlands for commuting and local trips that meets the needs of all levels of cyclists. The needs of all road users, including cyclists, are considered from the outset. Through the Planning Process, we will ensure developers cater for the needs of cyclists. Cycling will be better integrated with public transport. The promotion and encouragement of an extension of 20mph speed zones where appropriate in urban areas.
- Promoting - Affordable (and free where possible) cycle training available to all adults and children. Safely sharing our roads. An integrated marketing approach to increasing cycling across the region.
- Funding - Funding and resources will be secured. Funding will be sought to deliver a high-quality strategic cycle network across the region. Cycling will receive a 'fair share of the pot'. Co-ordination of resources and expertise from a range of partners.

Midlands HS2 Growth Strategy 2020 (2020)

This document looks to build on the original 'Midlands HS2 Growth Strategy' that was submitted to Government in April 2015. The original submission outlined key aspirations that the region had as it looked to capitalise on the construction of HS2. The approach considers both the short- and long-term needs of the region, ranging from our immediate response to repair the economic and social damage from COVID-19 through the delivery of the West Midlands' recovery plan, to their role in the global commitment to combat climate change.

Levelling up - HS2 is turbocharging the levels of employment and investment in the West Midlands. These economic benefits will be seen in new jobs, improved places to live, work and visit, and strengthened economic outlook for the region and the UK. We now have the opportunity to work together with HS2 to ensure that our plans can progress in parallel and bring forward the economic benefits, while reducing the cost to the taxpayer through public private funding.

Covid Recovery - By advancing our existing development plans, we have the opportunity to accelerate and maximise the benefits of HS2. This will allow the government to assist in our efforts to rebuild and recharge the West Midlands economy, bringing forward more than 16,000 jobs, build more than 4,000 new homes and deliver an instant boost to the economy of more than £250m.

Climate Change - HS2 through the greener travel it unlocks is critical to the UK's response to global warming, including the net zero target of 2050 and the West Midlands target of 2041. The released rail capacity is essential to our efforts to switch people into public transport, improving our local train services. At the same time HS2 will provide the rail paths for freight, enabling the UK to take 2.6m lorries off the roads each year.

Phase 2 - The full benefits of HS2 come from the whole network. It is essential that Phases 2a & 2b are delivered in full as soon as possible, directly linking Birmingham, Nottingham, Sheffield, Manchester, and Leeds, to create an economic area equivalent to Germany's North Rhine-Westphalia. In addition, the 60 miles of high-speed track, which will link the West Midlands to Crewe should be utilised to bring the forward benefits of HS2 to the West Midlands, North West and Scotland.

Strong Relationships - Delivering HS2 in the region has seen palpable progress in terms of collaborative working between HS2 and the West Midlands delivery partners. A faster, more transparent and joined-up decision making process, facilitates more efficient use of resources both by HS2 and other public and private sector partners, reducing delays and costs.

Recommendation One: That this partnership approach increases further, building on the groups established, to ensure engagement at the critical junctures between HS2 and the regional plans, which will deliver the wider economic benefits of the programme.

Interregional collaboration - The scale of the impact of HS2 in the region has led to the West Midlands becoming a testbed for the delivery of the project. This has led to a shared understanding on the importance of regional ambitions and how they build upon the work of HS2. The vision, governance and funding mechanisms that have been developed form a blueprint for the regions benefiting from future phases of the HS2 network.

Recommendation Two: That going forward there is more importance placed on wider, more collaborative work between the key regions along the route, enabling the learnings from Phase One to be adopted in Phase Two.

National Governance - The recent Oakervee Review revealed the need to ensure transparency, clarity, and openness and that there needs to be a new approach to the delivery of HS2, not just in the Midlands, but across the entire trace. The review also highlighted that there were gaps in our evidence base that in reality mapped directly back to some of the strategic challenges that we are faced with in not only the delivery of HS2 within the Midlands, but also in addressing wider national context.

Recommendation Three: That a National HS2 Growth Delivery Board (NHGDB) be formed, that would look to provide strategic guidance and advice across the entire HS2 programme and would give an objective view on how the programme was progressing. The NHGDB would offer direction and clarity to the existing Places Group. Acting as a 'unitary board' the NHGDB would be expected to act in the best interests of the nation as a whole and to have an impartial input into the decision-making process.

Environment - HS2 has the potential to be a catalyst for the green revolution that is required for the nation to meet its climate targets and shape the emerging economies of the 21st century. The opportunities HS2 enables are much greater than existing approaches, highlighting the need for further thinking in this area.

Recommendation Four: We recommend that we work directly with DEFRA to shape future policy to detail how across the UK, regions can exploit the wider impacts and opportunities, beyond the trace of HS2, to deliver the essential improvements to the and environment and green economy

TfWM ULEV Strategy (January 2020)

Genex was commissioned by Transport for West Midlands (TfWM) and its partner authorities to support the creation of an evidence-based region-wide Ultra-Low Emission Vehicle Strategy. The objectives of the study were to:

- Frame the strategy within the wider context of industrial strategy, alternative fuels, skills provision and traffic congestion;
- Provide a clear analysis of the current direction of travel;
- Develop evidenced projections of the development of the ULEV market;
- Analyse the opportunities this presents to TfWM within its footprint; and
- Review the options available to minimise barriers and challenges.

Climate Emergency and the Transport Policy Gap (February 2020)

Three challenges in the implementation/development/planning of the West Midlands transport system:

- Further climate change risks
- Accounting for 'locked-in' impacts of climate change
- Moving around people/goods while meeting international targets to limit global warming

Government policy focuses on use of ultra-low/zero emissions vehicles to reduce GHG emissions. CCC recommended this should be furthered to all new cars/vans being 'effectively zero emission' by 2030. Stronger policies needed to reduce growth in demand for travel - shift to ULEVs. insufficient.

Key limits:

- pace of change: lower emission vehicles will not 'permeate the vehicle fleet rapidly enough'.
- production carbon footprint: EV production is more carbon intensive than normal vehicle production- 2-6 years before these are outweighed by EV emission savings
- increases to consumption - fuel duty frozen, larger vehicles boom. More demand for larger vehicles could limit carbon savings.

Decarbonising Transport Setting the Scene (March 2020)

The Government is developing an ambitious plan to accelerate the decarbonisation of transport. The Transport Decarbonisation Plan (TDP) will set out in detail what government, business and society will need to do to deliver the significant emissions reduction needed across all modes of transport, putting us on a pathway to achieving carbon budgets and net zero emissions across every single mode of transport by 2050.

Whilst there have been recently published strategies to reduce GHG emissions in individual transport modes, the journey to net zero demands that transport as a whole sector moves further, faster. The TDP will take a coordinated, cross-modal approach to deliver the transport sector's contribution to both carbon budgets and net zero.

Technical measures, such as the need for rapid renewal of the road vehicle fleet with zero emission vehicles, are well understood and will deliver substantial reductions in GHG emissions over the long term. But to deliver the reductions needed now and set us on a credible pathway to net zero, we also need to consider how we travel and how our goods and services reach us today. This is needed in parallel to the rapid development and deployment of clean technology.

The six priorities for the Transport Decarbonisation Plan are:

Accelerating modal shift to public and active transport

- Help make public transport and active travel the natural first choice for daily activities
- Support fewer car trips through a coherent, convenient and cost-effective public network; and explore how we might use cars differently in future
- Encourage cycling and walking for short journeys
- Explore how to best support the behaviour change required

Decarbonising how we get our goods

- Consider future demand and changing consumer behaviour for goods
- Transform 'last-mile' deliveries – developing an integrated, clean and sustainable delivery system
- Optimise logistics efficiency and explore innovative digitally-enabled solutions, data sharing and collaborative platforms

UK as a hub for green transport technology and innovation

- Utilise the UK's world-leading scientists, business leaders and innovators to position the UK as an internationally recognised leader of environmentally sustainable technology and innovation in transport
- Build on expertise in the UK for technology developments and capitalise on near market quick wins

Decarbonisation of road vehicles

- Support the transition to zero emission road vehicles through:
 - regulatory framework
 - strong consumer base
 - market conditions
 - vehicle supply
 - refuelling and recharging infrastructure
 - energy system readiness
- Maximise benefits through investment in innovative technology development, and development of sustainable supply chains

Place-based solutions

- Consider where, how and why emissions occur in specific locations
- Acknowledge a single solution will not be appropriate for every location

- Address emissions at a local level through local management of transport solutions
- Target support for local areas, considering regional diversity and different solutions

Reducing carbon in a global economy

- Lead international efforts in transport emissions reduction
- Recognise aviation and maritime are international by nature and require international solutions
- Harness the UK as a global centre of expertise, driving low carbon innovation and global leadership, boosting the UK economy

Black Country ULEV Strategy (May 2020)

The Black Country aims to lead the West Midlands on the road to net-zero by accelerating and amplifying the EV transition in anticipation of a 2035 ban on the sale of conventional vehicles. The objectives of the study were to:

- Build upon the existing Transport for West Midlands ULEV Strategy Report by Cenex;
- Baseline the current Black Country situation;
- Develop and analyse scenarios projecting the number of EVs, infrastructure, energy demand and grid capacity constraints;
- Calculate the benefits associated with these scenarios;
- Create and agree a five-year ULEV vision; and
- Outline an implementation plan to deliver the vision.

Traction Decarbonisation Network Strategy (July 2020)

The Rail Industry Decarbonisation Taskforce has identified three possible traction technologies which are sufficiently mature to replace diesel – battery, electric and hydrogen. Each of these technologies has different technical capabilities which mean that not all are suitable for all types of rail services. That being said, for the vast majority (75%) will be decarbonised via electrification of the railways including the main routes within the West Midlands.

Accelerating mode shift to public & active transport (July 2020)

This presentation by Jillian Anable (University of Leeds) outlines three routes to travel demand reduction and therefore reducing GHG emissions:

- **Avoid:** reduce the distance people need to travel
- **Shift:** Shift toward sustainable travel
- **Improve:** Improve emissions performance of vehicles

Research shows that more cycling/public transport use doesn't necessarily mean lower car use and doesn't guarantee a smaller carbon footprint. In addition, destination shift is important and should be considered in tandem with mode shift.

TfWM Carbon Calculator and Scenarios (August 2020)

This report by Atkins was commissioned to inform the LTP review by helping to extend understanding of:

- The scale of the transport decarbonisation challenge as expressed in the different net zero targets and trajectories;
- The carbon impact of different approaches to achieving transport decarbonisation and the potential balance required between technological and behavioural measures; and
- The implications of areas of uncertainty in the projections of transport emissions

The report concludes that there is a need for rapid and substantial action – estimated emissions already exceed the trajectory for the WMCA 2041 net zero target, and the position is forecast to worsen through the 2020s.

Electrification of public and private transport is key. The greater energy efficiency of electric vehicles and projected rapid decarbonisation of electricity supply means that efficient use of electric vehicles will maximise the amount of mobility that can be maintained within the limits of the decarbonisation targets.

However, mitigation will be required to ensure that electrification of the fleet does not generate inequality issues by limiting car mobility to the use of new, expensive vehicles. A move to shared mobility with pay as you go access to electric vehicles could be one approach to address this; and/or cause an increase in vehicle production emissions by accelerating the turnover of the fleet.

A substantial reduction in car vehicle kilometres will be required to meet the targets. An equivalent effect to a reduction in car vehicle kilometres could also be achieved by reducing the size and therefore energy requirements of the vehicles used. This would involve reversing the current trend to larger, less energy efficient vehicles such as SUVs and a move towards the use of much smaller vehicles (micro cars and smaller) to retain personal mobility where public transport is not viable, whilst reducing the energy and emissions intensity of each journey.

The reduction in passenger kilometres could also be lower than the required reduction in car vehicle kilometres if occupancy increase and mode shift to more efficient modes is achieved. Shared mobility could again play a role in providing fair access to limited available mobility. Changes in trip patterns and numbers are also likely to be required to contribute to the change, given the scale of vehicle kilometre reduction required. Public transport could not accommodate all of the displaced journeys, even if it served the right movements.

APPENDIX B – STAKEHOLDER ENGAGEMENT

1. STAKEHOLDER LIST AND MAPPING

An initial exercise was undertaken with West Midlands Combined Authority (WMCA) to map the key stakeholders who were prioritised for engagement with as part of the WM2041 Five Year Plan.

The following list outlines the organisations that were identified within the stakeholder map to initially be consulted with.

▪ Accord Housing Association	▪ Network Rail
▪ Birmingham and Black Country Wildlife Trust	▪ Newman University
▪ Birmingham City Council	▪ North Warwickshire Borough Council
▪ Birmingham City University	▪ Nuneaton and Bedworth Borough Council
▪ Birmingham International Airport	▪ Redditch Borough Council
▪ Birmingham Metropolitan College	▪ Royal Society for the Protection of Birds – RSPB
▪ Birmingham Youth Strike 4 Climate	▪ RSSB
▪ Black Country Chamber of Commerce	▪ Rugby Borough Council
▪ Black Country Consortium	▪ Sandwell College
▪ Black Country Local Enterprise Partnership	▪ Sandwell Metropolitan Borough Council
▪ Cadent Gas	▪ Severn Trent
▪ Cannock Chase District Council	▪ Shropshire Council
▪ Cemex	▪ Shropshire Housing Group
▪ Citizen Housing	▪ Sixth Form College Solihull
▪ City College Coventry	▪ Solihull Metropolitan Borough Council
▪ City of Bristol College (Campus in Knowle)	▪ Stourbridge College
▪ City of Wolverhampton	▪ Stratford-on-Avon District Council
▪ Client Earth	▪ Sustainability West Midlands
▪ Climate Action Network West Midlands	▪ Sustainable Housing Action Partnership
▪ Colleges West Midlands	▪ Tamworth Borough Council
▪ Commonwealth Games	▪ Telford and Wrekin Council
▪ Coventry and Warwickshire Chamber of Commerce	▪ The Federation of Small Businesses
▪ Coventry and Warwickshire Local Enterprise Partnership	▪ Trades Union Congress
▪ Coventry City Council	▪ Transport for West Midlands

▪ Dudley College	▪ Transport for West Midlands,
▪ Dudley Metropolitan Borough Council	▪ Tyseley Energy Park
▪ Energy Capital	▪ University College Birmingham
▪ Energy Harmonics	▪ University Hospitals Birmingham NHS Foundation Trust
▪ Energy Systems Catapult	▪ University of Birmingham
▪ Engie	▪ University of Birmingham
▪ Footsteps	▪ University of Wolverhampton
▪ Friends of the Earth	▪ Walsall College
▪ Greater Birmingham and Solihull Local Enterprise Partnership	▪ Walsall Council
▪ Greater Birmingham Chambers of Commerce	▪ Warwickshire College Group
▪ Greener Birmingham Coalition	▪ Warwickshire County Council
▪ Halesowen College	▪ Warwickshire Wildlife Trust
▪ Harper Adams University	▪ West Midlands Combined Authority - Assets
▪ Henley College Coventry	▪ West Midlands Combined Authority - Finance Team
▪ Hereward College of Further Education	▪ West Midlands Combined Authority - Housing and Land
▪ Highways England	▪ West Midlands Combined Authority - Inclusive Growth
▪ Jaguar Land Rover	▪ West Midlands Combined Authority - Policy and Programmes
▪ Job Centre Plus	▪ West Midlands Combined Authority - Productivity and Skills
▪ King Edward VI College Stourbridge	▪ West Midlands Combined Authority Environment Team
▪ Low Carbon Officers Group	▪ West Midlands Growth Company
▪ Midland Engine	▪ West Midlands Housing Partnership (WHAP)
▪ Midland Heart	▪ Western Power Distribution
▪ Midland Metro	▪ Wilmott Dixon
▪ National Express	▪ WM Housing

Of the 110 organisations identified within the stakeholder map, 27 organisations identified could not be engaged. This was due to a number of reasons, including no response to a request to engage, unable to engage with the identified organisation within the given timescales or the stakeholder was not approached to engage on the project.

A full list of stakeholders engaged with on this project is listed below in section 3.

2. APPROACH

2.1 STAGES OF ENGAGEMENT

During the stakeholder mapping process, it was identified that there needed to be two stages of engagement carried out within this limited timescale;

- 1) the listening and information gathering stage and;
- 2) the testing stage.

The first stage of engagement, to *listen*, was the largest piece of engagement. Typically, this included:

- an introduction to the project; and
- some initial information gathered around
 - organisational net zero aspirations;
 - regional programmes and projects;
 - areas of focus; and
 - barriers to implementation

The second stage of engagement, *to present and test*, the findings of the report with selected groups. A set of standard questions were developed for engagement which were adapted as appropriate for each stakeholder dependent upon their responses, type of organisation and their areas of concern.

An initial Request for Information template (RFI) was developed for all seven constituent authorities.

2.2 ENGAGEMENT CHANNELS

Due to the variety and number of stakeholders proposed to engage with, a number of different stakeholder engagement channels were identified for participation, including (online) progress meetings, 1-2-1s, workshops and surveys.

The choice of the engagement channel was influenced by the existence of established meetings/forums that could be used for engagement. From this, the prioritisation rating was established as part of the initial stakeholder mapping.

A standard set of questions were developed to guide conversation and engagement focusing on four key focus areas:

1. Interventions
2. Jobs and Skills
3. Delivery Mechanisms
4. Resources

Those mapped stakeholders were initially contacted through existing networks, introduced through existing contacts or contacted directly. Further detail is provided below on the types of engagement channels.

- Regular progress meetings were used to inform and engage with existing stakeholders on the progress of the project and to update and gain feedback upon the types of interventions. The following regular meetings were periodically used for engagement:
 - Project specific progress meetings with the West Midlands Combined Authority Environmental team and additional less frequent progress meeting with the wider West Midlands Combined Authority team
 - Transport for West Midlands (TfWM);
 - Presentations to the West Midlands Combined Authority Environment and Energy Board and Energy Capital;
 - Low Carbon Officers Group (LCOG); and
 - Fuel Poverty Regional Retrofit (FPRR) programme working group

- One to one meetings included with but not limited to;
 - Various Representatives from all 7 constituent local authorities (e.g. Sandwell MBC, Walsall Council)
 - Private organisations with a strong regional presence (e.g. Birmingham Airport, Jaguar Land Rover (JLR), Cemex,)
 - Representatives from Energy Capital Board (e.g. Cadent, Energy Systems Catapult,)
 - Specialist Interest organisations (e.g. WM Growth company, Severn Trent)
 - Universities.

The Survey

An online survey was drafted that covered the four key focus areas. The survey included a 5-minute presentation about the project and then the survey itself with a mixture of open text response or fixed choice responses. The survey was used to ensure that feedback could be received from those individuals or organisations that could not attend meetings or presentations and to ensure a wider reach of feedback (in particular for end user organisations). The survey was distributed through the following networks:

- West Midlands Combined Authority wider project team networks (to cascade to their own Task forces and working groups, e.g. Fuel Poverty and Retrofit working group, led by Energy Capital)
- Low Carbon officers Group network
- Regional business networks including; Confederation for British Industry, Green Business Clubs Network, Federation of Small Businesses, Chambers of Commerce
- The regions Local Enterprise Networks (LEP)
- Transport networks (e.g. Bus Operators Network, Logistics UK network)
- A number of organisations directly (e.g. WPD, Engie)

Presentation at existing networks/ meetings included:

- Sustainable Housing Association Partnerships (SHAP)
- Mayor’s Roundtable

Online Workshops

- West Midlands Sustainable Housing Association Partnerships (SHAP)
- Universities
- NGOs (including the Wildlife Trust, Natural England, Friends of the Earth)

3. STAKEHOLDER ENGAGEMENT

Overall, across the project 246 individuals were met, across 97 different organisations (some of whom were not originally identified in the stakeholder map), through a variety of different communication channels between October and December 2020. Due to the variety and number of stakeholders proposed to engage with as part of the stakeholder map, a number of different stakeholders’ engagement channels were identified for participation, including:

- Regular progress meetings;
- One to one virtual meetings;
- Online surveys;
- Presentation at an existing West Midlands network or meetings; and
- Virtual Workshops (specifically to present on the WM2041 Five Year Plan).

Individuals from the following organisations have been engaged with through progress meetings, one to one virtual meetings, as part of an existing West Midlands network or meetings or as part of virtual workshops:

Anthesis	Leeds Beckett University
Ark Consultancy	LEVC
Aston University	Low Carbon Homes Ltd
Atkins	Malvern Hills Community Led Housing Group
Barnsley council	Mayors Roundtable
BBC Wildlife Trust	Midland Heart
Birmingham and Black Country LEP (BBCLEP)	Midlands Connect
Birmingham Airport	Midlands Energy Hub
Birmingham City Council	Midlands Metro
Birmingham City University	Natural England
Birmingham Open Spaces	Network Rail
Black Country Housing Group	NHF

Bmet	Orbit
Bournville & Cotteridge Ward	Perkins&Will
Bournville Trust	Pioneer Group
BRE Global	Platform
Bromford	Procure Plus
BT	Red Pillar Group
C&W Wildlife Trust	Rooftop Housing Group
Cadent	RSPB
Calderdale MBC	Rugby Borough Council
Canal and Rivers Trust	Sandwell Metropolitan Borough Council
Climate Action Network West Midlands (CANWM)	Sandwell Metropolitan Borough Council
Cemex	Severn Trent
Citizen Housing	SHAP
Climate Change Members Steering Group Sandwell	Solihull College
Connected to Growth	Solihull Community Housing
Coventry City Council	Solihull Metropolitan Borough Council
Coventry University	Sotherm SMS
Druids Heath and Monyhull Council	Sustainable West Midlands
Dudley and Black Country Unesco	Tamworth Council
Dudley College of Technology	Transport for West Midlands (TfWM)
Dudley Council	Totally Modular Limited
Environment Agency (EA)	Tyseley Energy Park
EcoBirmingham	University of Birmingham
Energy Capital	University of Warwick
Energy Systems Catapult	University of Wolverhampton
Engage Malvern	University of Wolverhampton
EON	Urban Growth Company
Footsteps	Urban Splash
Forest of Mercia Tree Planting	Walsall Council
Forestry Commission	Walsall Housing Group (WHG)
Friends of the Earth	Warwick Business School
Federation of Small Businesses (FSB)	Warwickshire County Council
Greater Birmingham and Solihull LEP (GBSLEP)	Wearablecare
GDHV UK LTD	West Midlands Combined Universities / University of Wolverhampton
Glen Dimplex Heating and Ventilation	West Midlands Growth Company
Housing Plus	West Midlands National Park
IOT	West Midlands Combined Authority
Pick Everard	Wolverhampton City Council
JLR	

This does not currently include the organisations who responded to the online survey, as not all individuals left their details, (this was optional). However, in total there were 51 complete responses to the survey across 43 different organisations or institutions. This included the following:

Organisations	
AS Miles Consulting	Green Business Programme, Coventry City Council;
Accord Housing Association Ltd	Green Party Councillor - Birmingham City Council;
ACETEL (UK) Ltd.;	i-finance;
Arup;	Lawrence Cleaning;
Birmingham and Solihull Clinical Commissioning Group;	McCamley Power Ltd
Birmingham City University;	Midlands Energy Hub;
Birmingham Commonwealth Games 2022	National Express West Midlands;
Birmingham Metropolitan College;	Orbit Group;
Bromford;	Select Windows (Home Improvements) Limited;
Bryt Energy;	SIPS Education;
Built Environment Climate Change Solutions;	South & City College Birmingham;
Cadent Gas Limited;	Stagecoach Midlands;
Central England Quakers - Climate Emergency Action;	Stonewater Housing Association;
City of Wolverhampton Council;	The Pioneer Group;
Climate Action Network West Midlands	The Royal Wolverhampton NHS Trust;
Construction Futures Research Centre (CFRC) University of Wolverhampton;	The Woodland Trust;
Coventry College;	Thomas Dudley Limited;
Diamond Bus Ltd;	Tyseley Energy Park
Dudley MBC;	West Midlands Growth Company
Faraday Battery Limited	Western Power Distribution
First Midland Red Ltd;	Wolverhampton Homes
Fortel Services Ltd	

Further details on the responses to the online survey are provided in the Summary of Findings section below.

4. SUMMARY OF FINDINGS

4.1 REGULAR MEETINGS

The table below shows the organisations with whom regular meetings were held. Key points which arose during these meetings are also summarised under four key categories: interventions, jobs and skills, delivery mechanisms and resources.

Organisation	Interventions	Jobs and Skills	Delivery Mechanisms	Resources
TfWM	<p>WM Transport Plan currently being developed. Atkins are developing a 'Green Paper'. Within this, modal change seen as main method to reduce emissions.</p> <p>Carbon quantification tools in progress of being developed.</p>		<p>Engagement key between transport and net zero carbon.</p> <p>Potential issue with lack of joined up approach in timescales.</p> <p>Pop up stakeholder engagement work undertaken.</p>	<p>Resources: emphasised the need to 'stop talking about carbon targets and start talking about carbon budgets'. Concerns that budgets will be exceeded; transport reduction only option.</p>
Energy Capital	<p>Looking at alternative fuels and transport modes. Emphasise need to not just focus on electrification but also alternative fuels.</p> <p>ULEV programme and strategy (in development).</p> <p>Scaling up retrofit.</p> <p>Overall Steering Group taking strategic lead in this area.</p> <p>3 PFER (Prospering from an Energy Revolution) Innovate UK sponsored projects: Coventry RESO, Rugeley Zero Carbon Housing Estate and Sandwell Greenskies.</p> <p>Antsy Clean Hub development.</p>	<p>Queries raised as to whether new competencies needed.</p>	<p>One to ones with key stakeholders. Existing partnership with energy sector / companies.</p> <p>Regional Energy Strategy. ULEV Strategy and Energy Infrastructure Strategy also discussed.</p> <p>Lobby activity on energy devolution with University of Birmingham.</p> <p>Felt there is no mandate for decarbonisation and no overarching strategy.</p> <p>Queries relating to demand and whether new powers are needed.</p>	<p>Queried whether central Government need to be asked for financial support. But caution also raised about sharing MAC curve; 'risk of politicians to focus on certain projects which have financial benefits rather than big picture'.</p> <p>Resources may be required for the ULEV programme.</p> <p>Queries raised regarding where the public sector might be able to add value and unlock barriers to market development.</p> <p>Needing to go beyond ROI.</p>

			<p>Preparation of the energy system to achieve decarbonisation needs addressing. Query raised in relation to whether certain partners should be worked with.</p> <p>Renewal of contracts.</p> <p>Needs to be an 'overall fundamental shift in the way we work, not bits here and there'.</p> <p>Hydrogen potential also discussed with reference to specific trials.</p>	<p>Electric infrastructure already at capacity in some parts of the Midlands.</p> <p>Lobbying role important for CA; rail industry finite budgets.</p> <p>There is a need to understand what happens to infrastructure and how this is paid for.</p>
<p>West Midlands Combined Authority Energy and Environment Board</p> <p>Page 277</p>	<p>Consideration of supply chain and local procurement key. As are utilities.</p> <p>Recognition of the value of green spaces by people during Covid discussed; 'there has not been equality of access to that green space'.</p> <p>Consideration of blue spaces also discussed.</p> <p>Key focus on landscape and how this is 'a feature of culture and identity'.</p>		<p>Emphasis on the need for people working together.</p> <p>People action and behavioural change is a key element.</p> <p>Consistent message required to engage people.</p>	<p>Financial cost and getting most from investments.</p>



4.2 WORKSHOPS

One-off workshops were also held. The organisations with whom these took place are listed in the below table as above with a summary of their responses in relation to interventions, jobs and skills, delivery mechanisms and resources, where relevant.

Organisation	Interventions	Jobs and Skills	Delivery Mechanisms	Resources
Sustainable Housing Action Partnership (SHAP)	<p>Fuel Poverty and Regional Retrofit Programme (FRRP) in place.</p> <p>Hydrogen unlikely until 2038.</p> <p>Queries raised with regards to placemaking and how this should be factored in.</p>	Switching off the gas network (for hydrogen) may risk jobs and existing manufacturers.	Importance of self-build community led projects highlighted and engaging people around new affordable homes.	<p>Potential local hotspots of shortfalls with regards to grid capacity.</p> <p>Concerns over the carbon budget.</p>
WM Housing Associations and Partnerships (WMHAP)	<p>All respondents were acting on retro-fitting stock and upgrading where they can, but this is limited based on availability of technologies and existing stock characteristics. Only one respondent was already building net zero carbon homes as part of pilot.</p> <p>The immaturity of low-carbon / energy efficiency markets and products were highlighted. Many currently focusing on fabric of existing homes and improving EPC ratings.</p>	There is a lack of knowledge and training among current workforces with regards to design, delivery and implementation of heating and energy efficiency technologies.	Some benefits may be achieved through a combined delivery approach but there is also a need to recognise differences between different organisations.	<p>National energy infrastructure highlighted as a potential barrier or concern and as an area which needs to be developed to enable zero carbon houses to be reality.</p> <p>Higher costs / subsidy and investment requirements flagged as another potential concern with regards to delivery of zero carbon homes.</p>
Wildlife Groups (including: Natural England, Environment Agency, Black Country Consortium, Sandwell Council, Coventry and	<p>Some have set or are in the process of setting net zero carbon, or carbon neutral, targets by specified years.</p> <p>Some groups had not yet established specific net-zero</p>		<p>Respondents were asked 'how can we make it easier for organisations to support delivery of WM2041?'</p> <p>Key points:</p>	<p>Finance and funding structure was highlighted as one of the largest concerns / barriers to delivery. Followed by:</p> <p>infrastructure, technological,</p>

<p>Warwickshire Wildlife Trust, Birmingham and Black Country Wildlife Trust, Dudley Council, RSPB, Friends of the Earth, Canal and Rivers Trust, Birmingham Open Spaces Forum (BOSF), SHAP, Forestry Commission.</p>	<p>targets but are working towards other green goals.</p> <p>Regional projects initiatives: Nature Recovery Network, WM National Park, woodland / tree-planting, Black Country Plan, Black Country UNESCO Global Geopark mentioned, for example.</p> <p>Most important opportunities for achieving net zero in the region believed to be: woodland and tree planting alternative modes of transport, industrial energy efficiency and commercial renewables.</p>		<ul style="list-style-type: none"> - Becoming more open and transparent - Maximising engagement - Clear leadership and coordination - Provision of information and guidance - Provision of resources (e.g. financial support). 	<p>planning restrictions, legislation and human resource.</p>
<p>West Midlands Combined Authority and Universities Meeting</p>		<p>Only one comment regarding productivity knock on effect and inclusivity effect – multiplier effect (unsure to what this relates)</p>		
<p>West Midlands Combined Authority Policy Working Group</p>	<p>Over 160 interventions in total across the West Midlands Combined Authority. Actions plans are in place for 3 LEPS.</p> <p>Atkins undertaking work with TfWM.</p> <p>Method of carbon accounting and monitoring also being looked into.</p>		<p>Query raised on the public sector’s role in de-risking projects and sectors. There is a need to consider systems and leveraging private finance; and for leadership from the West Midlands Combined Authority.</p> <p>MACC will help prioritise; but there is a need to understand ‘what is palatable as well as politically acceptable’.</p>	

<p>Mayor's Roundtable (including representatives from: Birmingham Airport, BT, Cadent, FSB, EON, Severn Trent, Leandlease, Urban Splash, LEVC)</p> <p>Page 280</p>	<p>Various perceived challenges discussed:</p> <ul style="list-style-type: none"> - social acceptance and mindsets towards renewable energy - Defining net zero - Materials - Traditional supply chains <p>What is being done:</p> <ul style="list-style-type: none"> - Use of green electricity and renewable sources of heat - Tree planting - Transition of buildings to be net zero by 2030 - Preparations to become H2 ready - Investments in offshore wind - Removing fossil fuel-based fleet - Engagement with supply chain 	<p>Transformation of the industry may be required.</p>	<p>HS2 and Green Recovery highlighted as potential delivery vehicles.</p> <p>Partnerships seen as key; 'traditional procurement is not great for effecting big change' (EON). Engagement will be required with suppliers.</p> <p>Integration also key, 'need to speak to one voice' (sharing energy demand) (EON).</p> <p>Consumer behaviour seen as important as many small businesses are home-based.</p> <p>Data sharing also seen as important.</p> <p>Energy planning works well at regional authority level.</p>	<p>Good to see paybacks in FYP. Bigger businesses can have longer investment cycles, smaller businesses may need quicker paybacks.</p>
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4.3 ONE-TO-ONE MEETINGS

As above, findings and key discussion points from the organisations with whom one-to-one meetings were also held are included in this section. All seven of the West Midlands Combined Authorities constituent authorities were issued with a Request for Information (RFI) form to complete prior to one to one discussion.

Organisation	Interventions	Jobs and Skills	Delivery Mechanisms	Resources
West Midlands Combined Authority – Various including: Land and Homes, Productivity and Skills, Inclusive Growth, Finance and Investment, Strategic Transport Board 2021	<p>Land and Homes: Zero Carbon Homes by 2025 initiative involving baseline gap analysis and production of a Roadmap. Skeleton Zero Carbon Homes Charter.</p> <p>Zero Carbon Home Officer Working Group established and Zero Carbon House Taskforce.</p> <p>Inclusive Growth: Focusing on East Birmingham and North Solihull corridors. Have developed a Social Economy Business Plan, focusing on social enterprises. There is a Social Economy Taskforce. Community Energy Birmingham.</p> <p>Finance and Investment: There is a need to go beyond ‘business as usual’, current committed actions ‘will only move the dial a little’. In data gathering, accounting for projects where funding is likely.</p>	<p>Productivity and Skills: plans and strategies already exist e.g. Strategic Economic Plan; a work recovery programme ‘Recharge the WM Plan’; a Local Industrial Strategy; and the Fuel Poverty and Regional Retrofit Programme (FRRP) (includes productivity and skills).</p> <p>Need to engage with universities.</p> <p>Engagement with colleges; ‘all colleges should be a high priority on the skills front’.</p> <p>Jobs in region need to be considered with relation to cars. Region utilises a lot of cars as well as manufacturers them.</p> <p>Need to focus on blue collar jobs and upskilling whole economy. Focus on inclusion</p>	<p>Planning White Paper – but still ‘vague’.</p> <p>See existing plans and strategies listed under Interventions.</p> <p>Engagement with other organisations, e.g. Greater Birmingham and Solihull LEP, Birmingham City Council. There is a need for a ‘structured approach in particular to large industry who are members of the Economic Impact Group’.</p> <p>Role of enabler with regards to community leadership.</p> <p>Creation of fund similar to Bristol City Fund.</p> <p>Consideration of crowd funding.</p> <p>Importance of Natural Capital and potential multi-benefits.</p> <p>Cannot leave all to the private sector to avoid people being ‘left behind’.</p> <p>Single assurance framework in place but does not currently include carbon.</p>	<p>Limited data relating to housing.</p> <p>‘Gap between rhetoric and actual response’, employers need to do more.</p> <p>Approach based on Doughnut Economics book. Must be a net benefit from developments. Region can contribute more to self-sufficiency.</p> <p>Constrained resources and capacity. Need to balance long and short-term needs.</p> <p>Quantification process in place, need to differentiate between what is funded or just plans.</p> <p>Value for money important, what will give the biggest impact for smallest investment. There is a need to understand likely payback and returns for different technologies.</p>

	<p>Projects themselves need to be understood first, then funding and pricing.</p> <p>Asset Discussion (with various): Car park lighting Co-location and rationalisation of office space Looking to produce asset register.</p>	<p>and opening up jobs to wider community. There is a need to consider heavy industry, transport, goods and services. Note recent redundancies in manufacturing and automotive sectors. Need to analyse demographics now and consider how this might change to 2041.</p> <p>Commitments will generate jobs.</p> <p>'Asset release' mentioned with regards to jobs.</p>	<p>Each intervention will need different delivery mechanism.</p>	<p>MACC curve to be created for pricing.</p> <p>Mention use of BEIS fund e.g. for car park lighting.</p> <p>OPE8 – funding applications must demonstrate how project meets an ambition; however, no real target so 'loose'.</p> <p>There is a need to consider financing upfront costs alongside lifetime. Risk of recovery should also be addressed; 'some investments are riskier than others'.</p> <p>Positive Net Present Value (NPV) can be privately financed, local authorities need to focus on projects with negative NPV. Costs and benefits may be split between different parties. Local authorities can operate and accept sub-market rates – presenting opportunities.</p>
<p>TfWM/ Atkins</p>	<p>Developing 'Green Paper'. Highlighting gaps in policy and what is needed from central Government. Discussions centred on bans of petrol / diesel vehicles and</p>	<p>Impacts on car manufacturers highlighted, potential spikes in sales ahead of ban or purchasing of LGVs to escape ban.</p>		

	introduction of ICE cars on roads.			
<p>Birmingham City Council (BCC)</p>	<p>Council aiming to be carbon neutral by 2030, but recognise further work required for city as a whole.</p> <p>Further work to be done on retrofitting and procurement.</p> <p>Route to Zero – aiming to be first net zero city.</p> <p>Some actions already happening include:</p> <ul style="list-style-type: none"> - Cargo bike / workplace parking levy - Birmingham Development Plan - Birmingham Local Plan and Future Homes Standard - EV charging network project - Clean Air Zone - Hydrogen buses - Passivhaus pilot project <p>There are a number of major developments in the next 5 years in the City including for example: Commonwealth Games, HS2 and Curzon, Peery Barr Masterplan (transport), metro extension and housing regeneration schemes.</p>	<p>Route to Zero (R20) is the main route.</p> <p>The Covid-19 Recovery plan provides a hook to R20 and linking with the universities.</p>	<p>R20 will be main route for delivery. Movement for Growth to capture Birmingham Plan (update to commence).</p> <p>Birmingham Transport Plan has number of deliverables which should be aligned too.</p> <p>Replacement of Big City Plan is also taking place; to be replaced by Our Future City Plan – Birmingham 2040.</p> <p>Decision to be made with regards to how best to communicate with stakeholders.</p> <p>Working with West Midlands Combined Authority through:</p> <ul style="list-style-type: none"> - lobbying around planning policy - freeing up resources for large scale retrofit - standards for rented properties - regional renewable energy potential - sharing best practice <p>Council alone:</p> <ul style="list-style-type: none"> - reducing own emissions - local transport infrastructure - own social housing <p>Action plan is being developed in line with Anthesis report.</p>	<p>Part of BEIS decarbonisation of heat programme.</p> <p>Proposed WMCA can help support with:</p> <ul style="list-style-type: none"> - Influencing government on areas like housing retrofit and new homes standards / regulations - Support collaboration between different stakeholders and policy agendas - Sharing best practice - Identifying funding sources e.g. for delivery of sustainable transport projects.

<p>Wolverhampton City Council</p>	<p>Declared a Climate Emergency. Carbon reduction target consulted on; set for 2041 target for wider city and 2028 for council activities.</p> <p>Certified green electricity scheme implemented for streetlighting, signals and civic buildings. Office rationalisation taking place.</p> <p>Plans for fleet transformation, working alongside Midlands Energy Hub.</p> <p>Trialling some electric fleet (e.g. bin lorries).</p> <p>Feasibility study for a district heating scheme taking place. Heat mapping has already been undertaken. Plans in place for district heating scheme from council owned EfW plant.</p> <p>Building PV at Beaumont Harbour.</p> <p>EV charging points.</p>		<p>Discuss specifically delivery of district heating schemes; depend upon business case, e.g. council or private partnership.</p> <p>Working groups in place to inform internal climate change emergency strategic group. Also have a separate Climate Change Advisory Group consisting of internal stakeholders only.</p> <p>Delivery action plan in place (on website).</p> <p>Part of the Birmingham and Black Country LEP energy group.</p> <p>To engage with Universities and NHS trusts.</p>	<p>Mention some funding schemes, e.g. CEF financing from European funding for PV at Beaumont Harbour.</p> <p>Fund available for capital work.</p>
<p>Sandwell Metropolitan Borough Council</p>	<p>Have set net zero targets; 2030 for council themselves and wider 2041 target for the Borough. Carbon Plan in process of being updated. High level carbon strategy established which incorporates action plans.</p>	<p>In process of developing a Skills Strategy as part of wider 'Reset and Recovery Plan'. Within this, green skill sectors highlighted.</p> <p>Action plan also in place for 'community wealth building' that covers social value alongside jobs and skills.</p>	<p>Behavioural change important – people making right decisions. Behaviour Change Unit at Warwick University being worked with.</p> <p>Do raise a concern that acceptability of climate change interventions needs to be considered. Consideration of people's mindset is important; People</p>	<p>Won £50,000 for innovation in relation to heat networks (InnovateUK fund).</p> <p>Actions considered to be 'expensive but straightforward' (in reference to FYP).</p>

	<p>LEAP scheme in Sandwell highlighted; installation of over 10,000 energy saving measures in over 800 homes. And ECO3 scheme which helps private sector residents to improve energy efficiency of own homes.</p> <p>Energy from Waste plant project mentioned in relation to 2 projects at West Bromwich and Smethwick. In addition to other smaller development projects.</p> <p>Interest in e-scooters as form of green travel.</p> <p>Only some wind sites realistic. Potential for solar on council buildings being assessed. Currently considering proposals for ASHP based district heating systems to 3 Council-owned high-rise blocks (and surrounding low-rise).</p> <p>Contractor appointed to manage Detailed Project Development (DPD) of two large heat network schemes within Sandwell. Currently procuring a contractor to undertake DPD itself.</p>	<p>Express desire to recognise new skills and discuss growth in logistics, health and welfare.</p> <p>SME manufacturers make up most of area that are looking to future proof themselves.</p> <p>Have a number of employment skills partnerships e.g. with DWP, Chambers of Commerce, Sandwell colleges. Also, a Business Ambassadors group.</p> <p>Construction is key in the area and this provides apprenticeships.</p> <p>Social value with contractors helping a shift toward local jobs.</p> <p>Highlight that there can be miscommunication between industry and colleges with regards to what skills are needed.</p> <p>Black Country Skills Partnership exists as LEP initiative to address skills shortages in advanced</p>	<p>are generally supportive of climate change but can find it difficult to change or spend money on it.</p> <p>Highlight certain schemes 'coming forward' e.g. heat networks and retrofitting schemes.</p> <p>Believe there is a need to work together, Sandwell focus on waste but economies of scale will help for aspects like transport and heat uses. Transport officers working with TfWM.</p>	<p>WMCA can support with the resources to be able to support homes and businesses to become low carbon through energy efficiency measures. Providing sources of funding which can be accessed by either councils, business, residents and schools which support low carbon measures and which are easy to apply for.</p>
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		manufacturing, transport, construction, environmental technologies and business services.		
Walsall Council	<p>Council operations to be net zero by 2050 but no target for wider authority. Declaration of climate emergency in September 2019 and subsequent climate emergency action plan.</p> <p>Schemes include Future High Streets Fund of £25m. Potentially to be invested in Active Travel. No other major delivery plans for decarbonisation. Carbon Reduction paper going to cabinet. Planning electric buses. Number of recycling plants in area. Significant developments include Willenhall and Darlaston station.</p>	<p>Black Country have a Recovery plan that includes green jobs, focused on sites and developments. Walsall College as part of their Capital Investment Plan have asked to expand their Engineering Centre for training around Electric Vehicles / new service centre There is a need to understand more on who the suppliers are. Recognise that "green homes" issue is growing and the need for installation of smart meters, etc. Currently no overall strategy in place.</p> <p>Largest devolution element is in adult education (currently £120,000 in adult skills). Also, huge demand around logistics (HGV drivers).</p> <p>Regional plans focus on engineering, automotive etc. Walsall is focuses on Health and social care, logistics.</p>	<p>Climate emergency action plan derived from climate emergency declaration in 2019 for carbon reduction. Internal working group has since also been established.</p> <p>Feeding back on planning white paper; currently unclear on how this will affect ability to guide.</p> <p>Delivery with regards to transport need to be joint, in partnership with West Midlands Combined Authority. Housing needs to have a regional delivery approach, need to avoid local authorities 'playing each other off with lower standards'. Have a Housing Strategy in place for 2020-2025.</p> <p>Land use requires consistent policy that each local authority can then use and tweak.</p> <p>Other relevant strategies in place / planned: - Black Country Core Strategy - Movement for Growth and Walsall's Transport Strategy 2017-2022 - Walsall Cycling Strategy - Draft Waste Strategy</p>	<p>Creating resource in 'Clean and Green Directorate': business case put together for a fixed term Climate Change Programme Manager into Clean and Green Service Structure; part of wider Proud Transformation Programme.</p> <p>Future High Streets fund mentioned (£25m).</p> <p>Funding secured for re-opening of Darlaston train station.</p> <p>However no major climate change investment programmes currently underway.</p> <p>Place emphasis on aligning ambitions with WMCA in Carbon Neutral Council cabinet paper October 2020; particularly for making cases for investment in the region.</p>

		<p>There is no green jobs and skills plans/ strategy. Although there will be planning documents on how to use the low carbon network. There are also economic plans locally. Regionally there is a sector skills plan developed that call off funding based upon skills plan. Where there are not enough skills in that regional plans, then locally would put in a specific request and follow up with a pilot.</p> <p>With regards to jobs and skills, could be delivered through a number of different mechanisms through - local colleges looking for capital investment e.g. through town deals or growth deals.</p>		
<p>Solihull Metropolitan Borough Council</p>	<p>Have agreed a Climate Change Emergency Statement of Intent which outlined activities. 2030 net zero target for the council; preliminary target of 2041 for region Carbon Management Plan in place; emissions reduction of 49% so far.</p>	<p>Local jobs – but keen to collaborate and be regional. Economic Recovery Strategy in place – emphasise desire to be more linked to West Midlands Combined Authority approach.</p> <p>Working on employment and skills piece pushing ‘forward</p>	<p>Alignment with West Midlands Combined Authority targets for carbon reduction (2041). Net Zero Action Plan development in progress; expected to be finalised in Summer 2021.</p> <p>Carbon Management is governed by a Carbon Board chaired by an Assistant Director. Progress is also monitored</p>	<p>The WMCA can help support with joint access to funding and financing, and access to novel financing.</p> <p>Note they are ready to use funding, when available in relation to social housing.</p>

	<p>Purchasing green electricity to reduce emissions from streetlighting.</p> <p>A Climate Change Prospectus also exists which is reviewed annually and outlines activities which will contribute to Solihull's transition to a low carbon economy, and an Annual Carbon Report.</p> <p>Major projects:</p> <ul style="list-style-type: none"> - UKC hub area – focused on new HS2 interchange station (includes mixed used development) - 15,000 new homes anticipated in next Local Plan cycle - Town centre redevelopments (and other specific areas) e.g. Eastgate / Westgate, Kingshurst Village centre regeneration project. - DHN in town centre to be ASHP based - Renewable energy potential; about to conduct feasibility studies into possibilities - Social housing potential (ready to use funding when available) <p>Other interventions:</p> <ul style="list-style-type: none"> - Kingshurst development aiming for net zero 	<p>thinking' on economy. Key considerations raised in relation to alignment with existing strategies, alignment of delivery plans with workforce and industry, what the 'green agenda' really means, upskilling.</p> <p>Already working with Solihull College, however historically some cases of no jobs materialising. Key employers are NEC, airport and JLR.</p> <p>Refer to a 'green recovery' but emphasise the need to understand 'what are the jobs and when are they going to be available'.</p>	<p>annually by the Council's Budget Strategy Group against an approved carbon budget. Solihull Climate Change Commission also in place for carbon management.</p> <p>Engagement with West Midlands Combined Authority One Home Agenda with regards to social housing.</p> <p>Uncertainty with regards to achieving net zero for housing but note that stock 'pretty good'.</p> <p>Regional approach needed for offsetting.</p> <p>Have JLR, the NEC and the airport, although tend to be more service sector focus.</p> <p>Delivery mechanism for jobs and skills well established, partners in place already (e.g. DWP).</p> <p>Social value elements need to be factored into larger contracts e.g. HS2 mapping out monthly skills to identify what jobs would be required and when. Something similar would be ideal.</p>	
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	<ul style="list-style-type: none"> - UK Central Hub Area HS2 station and 5000 homes - Electrification of airport and JLR by 2030 - Energy Innovation Zone - Use of biomass for tower blocks 			
<p>Page 289</p>	<p>Coventry City Council</p> <p>No climate emergency plan currently in place; however, an existing Climate Change Carbon Reduction Plan was in place which is now due for renewal. This is to focus on whole City as opposed to just City Council.</p> <p>Undertake own greenhouse gas reporting and part of Climate Disclosure Project (CDP) submissions.</p> <p>Potential Joint Venture to address energy issues. Looking into use of biogas and hydrogen for vehicles. Feasibility studies considering solar farm conversion. Regional Energy Systems Operator (RESO) project in Coventry. Using new SPDs (SUDs and energy). 3 main RSLs which focus on discussions around energy</p>	<p>Developing low skilled people to fill new high skilled jobs. Also working with Coventry University through a Social Enterprise Unit.</p> <p>Council also considering how enterprises could provide opportunities for training long term unemployed and low skilled workers to develop new transferable skills. Also focusing on supporting innovation and the development of new environmental technologies, (seen as a source of employment to many in the future).</p>	<p>RESO project to guide – major infrastructure works (see Resources column).</p> <p>Joint Venture commission being proposed to address energy issues across the city. This is yet to be confirmed but they report that this may look at community ownership of infrastructure.</p> <p>Formation of multi-agency commission to lead the development of a city wide Sustainable Coventry Strategy.</p> <p>Highlight importance of a regional approach to maintain standards, e.g. zero carbon homes work, with regards to energy infrastructure, retrofitting homes and transport where there is overlap with the CA.</p> <p>As highlighted in interventions – new Climate Change reduction plan / strategy aimed to be finalised Spring 2021. Key focus of this reported to be</p>	<p>Support of the WMCA and funding from the UK Government’s Innovate UK has enabled the set-up of a Regional Energy Systems Operator (RESO) Project to look at the environmentally sound ways of generating and supplying heat and power across the City. Outcomes of research will provide vital information to help addressing climate change within the organisation.</p> <p>City Council will also establish an independent commission of stakeholders to mobilise businesses, communities and voluntary organisations across the City into developing a new Citywide Climate Change and Sustainability Strategy and Action Plan.</p> <p>Programmes recently announced which are yet to be fully operational:</p>

	<p>efficiency (Midland Heart and Citizen Housing). Bidding for Gigafactory.</p>		<p>buy-in and commitments from key organisations across the city.</p> <p>Also refer to developing / progressing the following:</p> <ul style="list-style-type: none"> - Supplementary planning documents for zero carbon framework - Review of the Local Plan - Pilot of 'people friendly' street transformations - New transport strategy - Social value and sustainability policy - Build a green infrastructure plan and biodiversity action plan for the city; and - a Policy Impact Assessment methodology to assess council decisions against sustainability criteria. 	<ul style="list-style-type: none"> - Green Homes Grant LAD Scheme - ERDF Solar PV Project for Council buildings. - The set-up of the commission of stakeholders will drive investment throughout the City. <p>A lot of resource also invested into the development of EVs. Investment secured for the Gigafactory for the region. Have also invested in Smart Energy Hubs and EV charging – plus the full cycle of VLR (so eventually having it manufactured in and exported from Coventry).</p>
<p>Black Country Local Enterprise Partnership (LEP)</p>	<p>Key focus decarbonisation of industrial cluster. £1.5m for a pilot across the SME sector looking at “sustainability”. Co-locating industry close to each other. Focusing on the circular economy.</p> <p>Discuss two broad sectors associated with building construction and technologies that they focus on: transformational (aerospace, automotive, medial) and enabling (health, education).</p>	<p>Some careers focus though presentations for students which focus on Careers of the Future.</p> <p>Highlight the need for industrial engagement around new jobs and ones where transition will be required.</p>	<p>Discuss interaction with local authorities, Black Country LEP have co-ordinated with the update of the Local Plan which will focus on land use and zero carbon homes.</p> <p>Also engaging with cornerstone businesses and Growth Hubs</p> <p>Also reference the Black Country Economic Strategy and how they are working with Liberty Group on industrial decarbonisation.</p> <p>Working with SHAP on retrofitting.</p>	<p>Highlight a need to capture and measure progress. £1.5m for a pilot across the SME sector looking at “sustainability” – see interventions column.</p> <p>Reference made to Black Country Economic Strategy.</p>

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Page 10</p>	<p>With regards to homes – Black Country Garden City – where they are building 4,000 homes a year, aiming for brownfield land, but trying to ensure that they fit with garden city principles. (63,000 homes across 30 towns.) Aiming for retrofit – SHAP leading but linked to that.</p> <p>Focusing on active travel and EV charging points.</p> <p>Also focusing on environmental aspects and working alongside Environment Agency on flood risk.</p>		<p>Believe the 3 LEP areas or WM need to be ‘scale of focus’ due to size of agenda. Felt that WM ‘show alignment and scale as a framework’ that LEPs and local authorities can then take forward.</p>	
<p>Dudley Metropolitan Borough Council</p>	<p>The Council has declared a climate emergency; however, carbon reduction targets are yet to be set. A working group was launched on the 19th October 2020. An Energy and Carbon Reduction Strategy (2018-2021) which contains an action plan for focusing on reducing energy at corporate sites.</p> <p>There are a number of major developments in the next 5 years, including a Metro Extension and a major mix use development amongst others.</p>		<p>Black Country Plan (replacing the Black Country Core Strategy).</p> <p>Newly formed Working Group (as highlighted in interventions column).</p> <p>West Midlands Combined Authority can support / adopt a joint approach in Transport policy / electric vehicle strategy, approach to decarbonise SMEs / industry, new approach to eco-funding and regional approach to the private sector.</p> <p>Local authorities best to deliver on energy efficiency retrofit of existing</p>	

	<p>£2.5m ERDF project to fit council homes with A rated gas boilers and smart thermostats. Heat mapping undertaken but concluded few opportunities. Similar outcome for wind turbines. (Both looked at as part of Black Country Utilities Infrastructure Study). £2.5m ERDF (£5m total) “low carbon place” project in place which is a joint initiative between Corporate Landlord Service and the council housing department. Council homes are being fitted with A rated gas boilers and smart thermostats that link to a landlord portal. A retrofit contractor has also been appointed and is delivering whole building energy efficiency retrofit to certain corporate buildings, such as the Council House.</p>		<p>estate and social housing (part of Energy extra – vehicle for delivery).</p>	
<p>Connected to Growth Meeting</p>			<p>Potential of travel policies discussed and how politically viable these are.</p>	<p>Economic gain key focus of work.</p>
<p>Cadent</p>	<p>Have committed to be carbon neutral by 2026 (including offsets).</p> <ul style="list-style-type: none"> - Converting emergency response vehicles - Purchasing green energy - Looking into heat and flexible power and transport (recognition 	<p>Replacing pipes is going on until 2032. Once that is done there won't be such an emergency need as they will be safer or just in the replacement market. Are keen to invest in hydrogen and other skillsets.</p>	<p>Hynet being focused on for commercial and industrial.</p> <p>Flexible power – growing power generation required locally to balance and be used with solar and wind. Need a plan for everyone on home heating.</p>	<p>Highlight that 2026 target for own business operations subject to funding.</p> <p>Recognise potential of hydrogen in future. Biomethane also discussed but limited end resources.</p>

	<p>that there is a need to move away from natural gas)</p> <ul style="list-style-type: none"> - Hydrogen indicated as potential for future in relation to vehicles. Looking at also blending 15% hydrogen into gas network but no set date. Envisage late 2030s for complete hydrogen switch out. - Encouraging biomethane for home heating but limited end resources 	<p>There is no skills gaps because it isn't required yet, but there will be.</p>	<p>West Midlands Combined Authority can help by creating Regional Energy System Operator and having local energy plan.</p> <p>National plan also needed however to work beyond regional approach.</p> <p>Need to raise awareness in the public at scale.</p>	<p>Final determination in 2021 on regulated revenue. Will be a mechanism to ask for regulated funding and money for trials.</p> <p>Can unlock net-zero re-opening funding if strategic scale opportunity exists.</p>
<p>Climate Change Members Steering Group Sandwell Page 293</p>	<p>Maintain an Action Log.</p> <p>PV alternative funding stream – public sector decarbonisation scheme (moved from oil / gas fired), and potential pledge to join UK100 scheme.</p>	<p>Expectation FYP to explain what types of jobs we will see, and skills required, don't want to take away from people.</p>	<p>Behavioural change; focus on being inclusive – 'best teachers in our society are children'. Should be getting people to think about choices.</p> <p>Want to ensure alignment of aims of targets with West Midlands Combined Authority and ensure collaboration.</p>	<p>PV alternative funding stream.</p>
<p>WM Growth</p>	<p>There are three main aims of the company:</p> <ul style="list-style-type: none"> - Transformational capital attraction - End-occupier attraction - Visitor attraction (though not really tourism) <p>Currently looking at:</p> <ul style="list-style-type: none"> - Future mobility space - Life sciences - Demographics and device manufacture 	<p>Main growth around 'prof-tech' currently.</p> <p>Megatrends around digitalisation and urbanisation.</p> <p>Long term declines in manufacturing taking place, due to Brexit and now affected by Covid.</p> <p>Systemic change / gear shift projects now a focus (e.g. giga factory, circular</p>	<p>May have more qualitative targets in future. Working on fewer projects. Focusing on green growth and economic inclusion.</p> <p>Mention work with University of Birmingham in relation to demographics and device manufacturing.</p>	<p>Global markets will take long time to recover. Demand for offices changing.</p> <p>Want to move away from facilitation to investment promotion.</p>

	<p>- Digital and creative</p> <p>Also refer to a £23.9 million programme working with the halo effect from the commonwealth games.</p>	<p>economy centre of excellence).</p> <p>Work with Warwick University and University of Birmingham in relation to skill development.</p>		
Page 294	<p>Cemex</p> <p>Refer to a site in Rugby which is responsible for 1.2 million tonnes CO₂ annually.</p> <p>Work undertaken on alternative fuels to help reduce process emissions from clinker. Using hydrogen generated on site (low quantities). Also recirculating high-grade heat.</p> <p>Global target of zero carbon by 2050 for Cemex globally; 35% reduction for cement by 2030 (likely to be achieved sooner in UK).</p>	<p>Net zero brings in contracts for specialist jobs, alongside using the global network and experts (from Cemex) if needed.</p> <p>How CEMEX communicate with employees is their concern; however, work is 'CAPEX heavy which brings confidence'. One of area's biggest employers.</p> <p>Have 3 priorities:</p> <ul style="list-style-type: none"> - Confidence - Reputation - Communication 	<p>In discussions with BEIS (carbon capture team). Conscious that carbon capture technologies need to 'link up' to meet targets.</p> <p>Planning support will be required for new equipment, particularly where residents in close proximity.</p>	<p>Plan needs to include real costs, practicalities, constraints.</p> <p>Within the Tyndall report there is a specific exclusion for cement production which is 'a necessity for growth'; feel therefore this should not be included in FYP budget.</p> <p>Demand for electricity and grid constraints reported as big issues. Carbon capture requires additional electricity demand.</p>
	<p>Energy Systems Catapult</p> <p>Refer to Innovating Net Zero Report (one digitalisation, one nuclear) and an ESME model which factors in energy and costs required in two emissions reduction scenarios.</p> <p>Energy Path Networks tool – what local area energy plans need to do.</p>		<p>ESME model.</p> <p>WM need local energy plan. Example discussed in Newcastle between network operators and local authority. Queries around funding for this.</p>	<p>Energy and costs considered in model for emissions reduction.</p> <p>Useful graph showing policy gaps and subsidies.</p> <p>Discussions around how local authority budgets are restricted for implementation of tools (e.g.</p>

	<p>Have a 6-point plan for steps to zero carbon buildings.</p>			<p>2050 calculator) and local carbon budgets.</p> <p>Price control mechanism through Ofgem. Attempting to lobby government on energy systems.</p> <p>WM lack of capacity; needs to be addressed now.</p> <p>Pace financing – link to property assets – property tax/ council tax. Could use that to finance some of these initiatives. Finance mortgages – could that be used to finance initiatives.</p>
<p>University of Birmingham</p>	<p>Currently working on strategy and have zero carbon target for 2050. Report against UNSDGs. There is a lot of pressure from students who want the University to declare a climate emergency.</p> <p>R20 Task Force – heat task force for Birmingham. Pilot projects with Tyseley Energy Park mentioned and potential for scaling up hydrogen.</p> <p>Also refer to: - Low carbon fuels, and hydrogen buses, hydrogen for rail.</p>	<p>Belief that skills are currently under-invested in however some colleges are helping with this. Many boiler manufacturers in the region; engineers need upskilling (e.g. to fit heat pumps). Currently this seen as a ‘massive’ skills gap. Big opportunities for regional investment in jobs and skills.</p>	<p>Preparing delivery of strategic framework to council June 2021.</p> <p>Discussed potential of joining Mayor Round Table.</p> <p>Raised a query regarding costs / penalties for not meeting 2041 targets.</p> <p>Collaboration with industry / wider organisations mentioned several times (e.g. JLR, Tyseley Energy Park, City Council, Airport).</p> <p>Emphasis placed on understanding ‘realism’ of how to deliver different efficiency technologies (e.g. hydrogen and heat referred to).</p>	<p>Reviewing investment opportunities to 2026 and also in process of identifying funding streams.</p> <p>Need to identify what is ‘reasonably accessible’; what they do or don’t have access to in terms of funding.</p> <p>Critical infrastructure needed to help deliver.</p> <p>Local authority need more resource to help with planning and capacity to deliver.</p>

<p>Severn Trent</p>	<p>Operational target for Scope 1 and 2 emissions reduction by 2030. Looking at alternative power sources (e.g. reducing GHGs from sewage) and heat recovery possibilities.</p> <p>Circular economy and getting more value from sewage.</p> <p>Focusing on water efficiency and behavioural experiences.</p> <p>Big Nature Boost (biodiversity improvements).</p>	<p>Ensuring people are upskilled; no specific gap currently.</p>	<p>Key areas of focus for meeting emissions reductions: electric vehicles, renewable energy sources (purchasing and producing).</p> <p>West Midlands Combined Authority could help by linking up EV and public transport opportunities, and through broader climate change awareness. Believe that overall there are a number of opportunities to work together.</p> <p>Climate Adaptation plans a good opportunity to collaborate.</p>	<p>Believe realistically 10-15 years to make changes.</p>
<p>Low Carbon Officers Group</p>	<p>Aiming to get a routemap completed for journey to zero carbon homes standard and charter. Some PassivHaus housing being developed. Have reviewed planning policies with 17 local authorities in region.</p>			<p>Human capital and technology key. Building Regulations. Query if possible, to build completely zero carbon homes.</p> <p>Capital cost uplift – does not consider economies of scale.</p>
<p>Network Rail</p>	<p>Emissions limited; instead point to relevance of modular shift. Currently looking at ‘rapid response rail’.</p>		<p>Most of Birmingham is accessed by the ports of Southampton and Felixstowe so would be very difficult to get to by train, using the existing network.</p>	
<p>ULEV Strategy Working Group</p>	<p>Queries as to whether focus should be on electrification only.</p>		<p>Encouraging modal shift in transport. Potential co-location of energy infrastructure for this.</p>	<p>Standoff from investors until clear what direction to take.</p>

	Continues to be challenges with regards to decisions about alternative fuels. Potential for hydrogen possibilities in region discussed.		Lobbying role for the West Midlands Combined Authority.	Refer to finite rail budgets which should be spent within the region as opposed to elsewhere. Issues with diesel cars in Birmingham City Centre; a way off electrification yet.
Page 297	Midlands Metro Delivery of tram network. Currently only transport people; would potentially need to consider moving goods too.	Particular concern over jobs and skills within this context. Will employ additional 120 people in next year and 450 by 2023. New jobs will be around maintenance and engineering; currently training own workers for these skills. However unsociable hours and low pay. Would welcome more apprenticeships. Benefit to night time economy (most jobs undertaken during this period).		Discuss investments (£millions) being made in trams and tram extensions over next few years.
	Forest of Mercia Tree Planting Chat about the Forest of Mercia aims, project ambition and progress to date.			
	Midlands Connect Currently refreshing strategy which will have key sustainability theme.	Wider Midlands Engineer perspective – looking to support substantial economic growth	Emphasis importance of the need to target stakeholders to consider end-to-end journeys, currently trying to gather mobile data for this.	Narrative for why and when investment in road schemes required.

	<p>'End to End' journeys project mentioned which looks at stakeholders' journeys. Study planned on offsetting.</p> <p>Also discuss projects relating to their Transport Decarbonisation Pathway work:</p> <ul style="list-style-type: none"> - Carbon Baseline Study and 'MCTool' - Acceleration of EV charging infrastructure - Alternative fuels for freight and logistics - Rail decarbonisation and electrification of the network 		<p>They are considering 'triple planning' which focuses on role of digital mobility.</p> <p>Local strategy review. Need to establish policy position on acceptable impacts of infrastructure on natural capital.</p> <p>Focused on medium to long term opportunities and timeframes and understanding Future Transport Zones; query 'who is responsible for which policy lever?'</p>	
<p>Natural England</p>	<p>Chat about the NE initiative of the Heathland Heartland project to connect Cannock Chase SAC and Sutton Park and some information on carbon storage for different habitat types.</p>			
<p>Birmingham International Airport (BHX) and Urban Growth Company</p>	<p>Sustainability Strategy 2020-2025 in place. Net zero carbon airport by 2033 through focusing on operations and increasing use and generation of renewable energy (solar key). Have already invested in electric vehicles.</p>		<p>For reducing scope 1 and 2: smart meters, building management systems, data management, measuring performance and target setting, behavioural change, asset replacement, energy saving projects, carbon programme manager.</p> <p>Scope 3: review of flight paths, use of green fleet, green airfield strategy.</p>	<p>Nothing seen as coming from hydrogen until 2030s.</p> <p>Money and resources seen as 'immediate' issues. Currently looking into other funding streams.</p>

	Looking at alternative jet fuels – refer to UK Government’s Jet Zero programme. Potential opportunity for heat network also highlighted.		Gas is seen as key challenge. Looking to work with others on innovation and feasibility.	
Virtual Forest	Website records which trees are planted where. Have worked with ESRI UK on new site.		Makes up the 3 LEP areas and non-constituent members (Shropshire) + the Local Authorities. Signposting to the woodland trusts, trees for cities etc. Facilitating the network.	
Anthesis / Solihull / West Midlands Combined Authority	Working on Green Paper currently (same as Birmingham). Members workshop being ran, due for completion February 2021. Main issues on hydrogen and micro-nuclear. Business workshop being undertaken.		Queries raised about inclusion of waste and aviation emissions in Scatter. Query also raised in relation to freight emissions and HMRC lorry park post-Brexit. Including some messages around behaviour change. Interested in nature based solutions and natural capital.	Aside from ‘obvious’ ones (JLR, airport), not much industry in region. More information wanted on: - Local Authority specific projects - Inclusive growth - Budgets / assumptions
Energy Capital Board	Place emphasis on infrastructure and health & wellbeing (avoiding unintended consequences).		Emphasise that ‘we can’t just focus on carbon’. Discussion must be wider on natural capital as a whole.	Need to consider wider impacts such as unintended consequences of energy efficiency relating to health and wellbeing.
Route 2 Zero Task Force (various)	Presentation by WSP and then some questions			
JLR	Looking wider at Net Zero and are producing a renewable energy plan for reinvigorating the heat network and EIZ and partners.	Opportunities for universities to be involved with regards to understanding hydrogen potential. Automotive industry facing skills challenges in terms of autonomous driving and	Supply chain engagement key to reducing carbon emissions (extraction, production and transportation of components). Work with wider hub partners (NEC, Airport).	Pause on energy efficiency projects with greater than a year payback. JLR’s energy bill around £80m per year. Are in process of buying

	<p>Refer to Destination Zero which is part of their internal strategy and comprises various workstreams.</p> <p>Identification of significant carbon emissions pieces – tail pipe emissions and carbon associated with components.</p> <p>Key focus on more efficient boilers and radiant gas.</p> <p>Carbon offsetting done in the UK and abroad.</p> <p>Internally made a commitment, although there is not a formally published target; encouraging sites to aim for net zero. Undertake carbon and energy reporting.</p> <p>Looking at district heating and alternative fuel sources. Partial heat replacement with hydrogen discussed. Use of CHP motors in plants.</p> <p>Have installed solar panels at some sites and looking to expand. Also discuss involvement with EfW.</p>	<p>connected cars. There is a lot of work going on in battery development; R&D in Coventry, electric motors will be developed in Wolverhampton. A lot of skill required in design, also welding etc. Electric cars straighter forward to put together - still have a lot of both.</p> <p>Have a software hub in Manchester and have automation skills centre in Ireland and other pockets in Gaydon and Coventry.</p>	<p>Discuss potential for finance model / commercial relationship with regards to installing solar panels on land adjacent to plants (based on cost per year reductions where JLR buy electricity).</p>	<p>REGOs (carbon free energy for this year).</p> <p>Have an electricity use prediction for each plant but have not estimated what electricity would be needed to replace methane.</p>
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4.4 SURVEYS

An online survey was also distributed through a number of different groups, task forces and organisations to seek engagement from a wider range of stakeholders.

The survey consisted of both open and closed questions, relating to the four key topic areas including proposed interventions, jobs and skills, delivery mechanisms and resources. A summary of the questions asked and the findings from the surveys has also been outlined below.

Individuals who responded to the questions had the opportunity to leave their names and their organisations. The organisations that provided a response to the survey is outlined above.

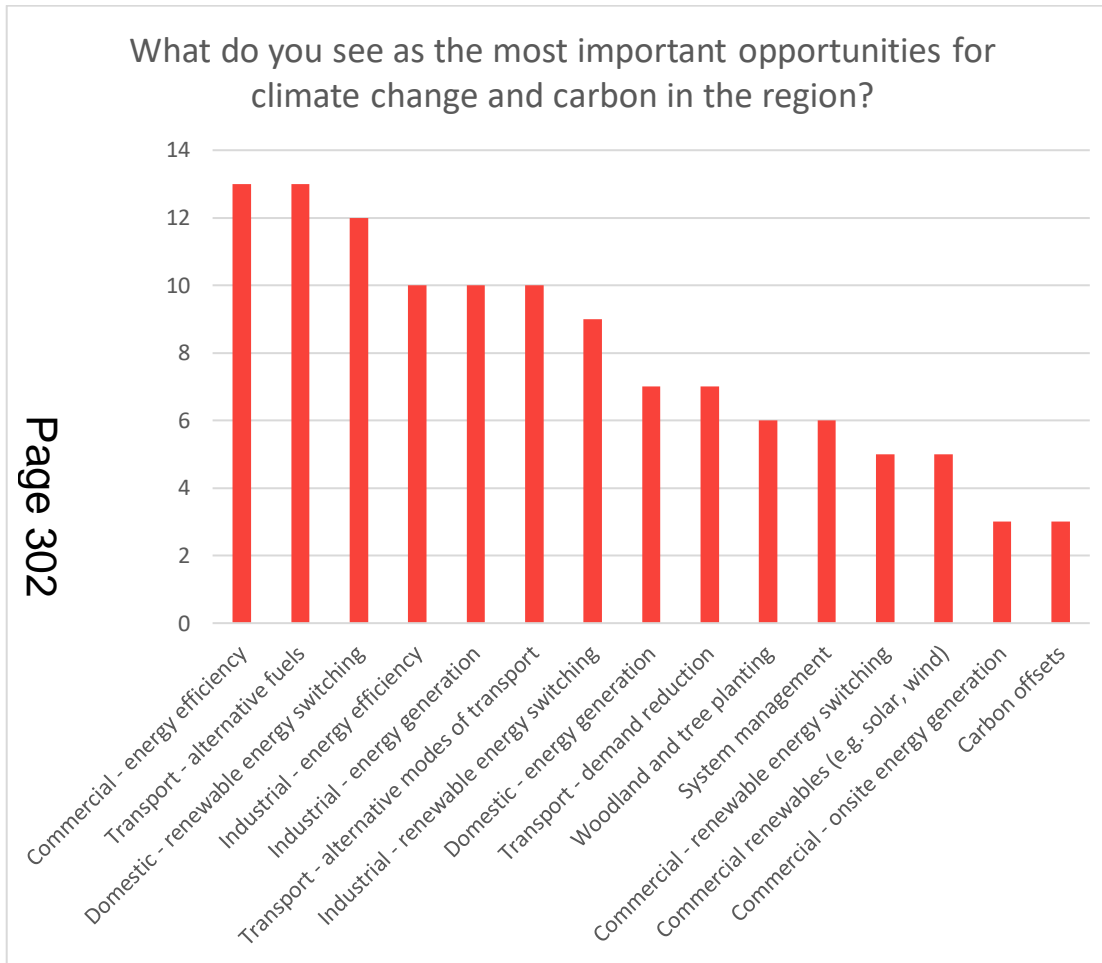
A summary of the findings have been outlined below.

Q1: If you have set carbon ambitions and targets please outline what these are.

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- Zero carbon futures, several mentioned targets to become net zero by particular dates (e.g. 2030, 2050), others point to specific emissions reduction targets across Scope 1, 2 and 3 (specific to individual organisations).
- Common approaches (from housing respondents) to achieving carbon ambitions / targets mentioned include fabric first approaches, minimum EPC ratings (e.g. C or above by a particular date), technological and renewable energy solutions, offsetting. Others mention reducing reliance on fossil fuels (e.g. Stonewater).
- Others point to personal emissions reductions being encouraged, e.g. through transport choices.
- Some organisations (e.g. The Pioneer Group, Central England Quakers, Birmingham Metropolitan College) have no direct carbon targets currently but reductions are planned as part of wider initiatives (e.g. SAP, SHIFT metrics, Eco Church scheme framework, engagement with Carbon Trust).
- Some organisations do not currently have their own specific carbon targets; others however are in the process of formulating (e.g. Bromford, The Woodland Trust, SIPS Education, South and City College Birmingham)
- Some respondents reported no specific targets or were uncertain (e.g. i-finance, Coventry College, Birmingham Commonwealth Games).

Q2: What do you see as the most important opportunities for climate change and carbon in the region?



Q3: What climate change and carbon management plans, strategies and projects have already been completed in your organisation?

- References made to existing environmental and sustainability management systems, strategies and corporate plans / roadmaps which commit to carbon footprint reductions and net zero strategies (e.g. Orbit Group, Stonewater, CFRC University of Wolverhampton, Midlands Energy Hub, Western Power Distribution). Some of these appear to be more developed than others (based on response).
- Many highlight existing commitments and stand-alone policies (Coventry College, Pioneer Group).

- Others mention specifics such as: installation of renewable energy technologies and replacement of fossil fuel sources, use of green energy tariffs and grants to support RE implementation, retrofitting of workplace / public buildings and houses (e.g. Bromford, Stonewater, Central England Quakers, Birmingham City University, South and City College Birmingham, Wolverhampton Homes, City of Wolverhampton Council to name a few).
- Others highlight internal behavioural changes among employees such as staff travel, water and energy usage at workplaces (The Woodland Trust South and City College Birmingham, Birmingham City University), educational efforts also mentioned e.g. posters, climate change champions by Climate Action Network West Midlands and staff training rollouts at City of Wolverhampton Council.
- Some no response or limited information: Stagecoach Midlands, i-finance, SIPS education, Thomas Dudley Ltd, Dudley Metropolitan Borough Council.
- Some mentioned specific forums / groups which have been set up or run with a focus on carbon (or wider sustainability): e.g. City of Wolverhampton Council have held a citizen's consultation to advise on the Climate Action Plan, South & City College Birmingham have established a new Sustainability Focus Group, Climate Change Champions in schools by Climate Action Network West Midlands

Q4 What projects have you delivered, or will you deliver, to reduce carbon emissions?

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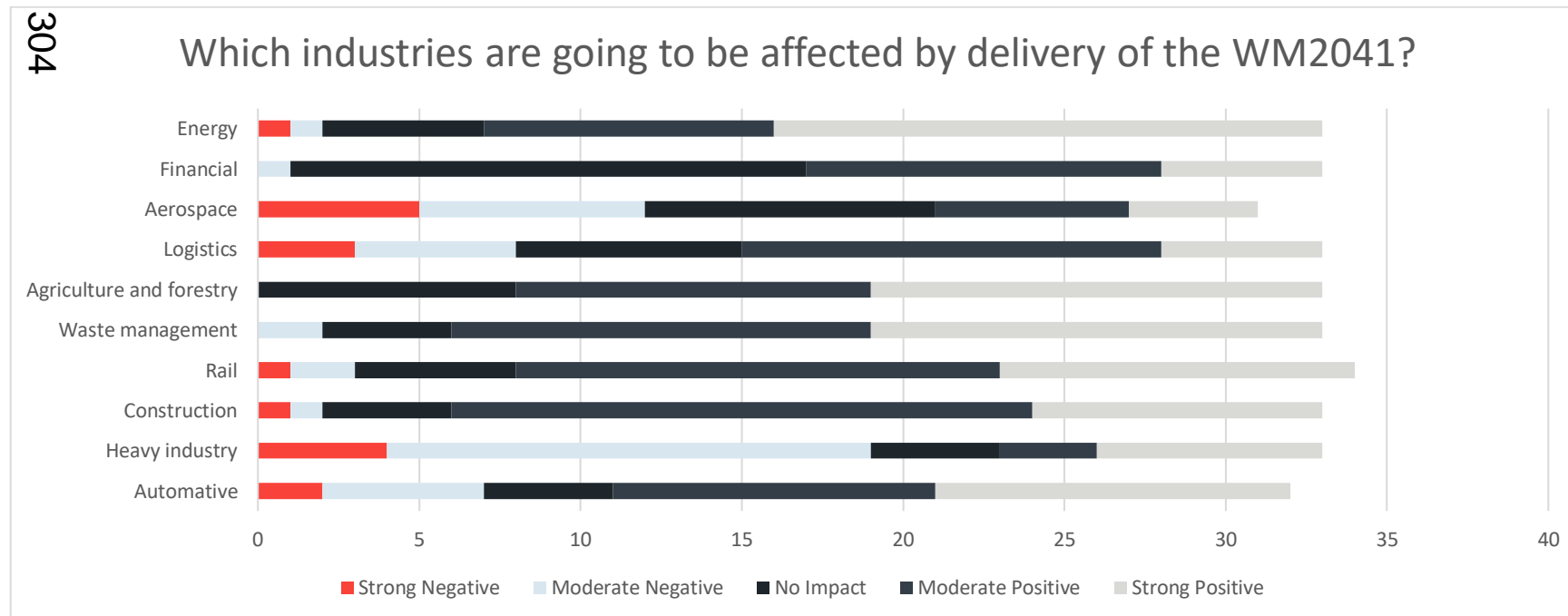
- Key aspects mentioned:
- Corporate commitments and calculation of carbon footprints.
- Procurement approaches e.g. social value in contracts (Orbit Group), specific procurement strategy targets (The Pioneer Group).
- Sustainable transport initiatives e.g. shifts to electric vehicles / hybrids (Orbit Group, The Pioneer Group, BCU, City of Wolverhampton Council); use of technology to reduce travel also highlighted by A S Miles Consulting Ltd specifically.
- Switches being made to purchase renewable energy in buildings and implementation of renewable energy technologies. Dudley MBC also specifically mention determining planning applications which incorporate use of renewable energies.
- Behavioural changes being encouraged among employees – e.g. focusing on transport again, energy use, waste and use of materials (Coventry College, South & City College).
- Creation of specific groups focusing on carbon e.g. Carbon Forum and Innovation Hub by Orbit Group, Woodland Trust Virtual Forest tool.
- Housing association respondents highlighted specific initiatives / projects in new homes e.g. utilising of renewable energy technologies, SAP ratings, modular housing, achieving certain EPC ratings. Built Environment Climate Change Solutions point to battery storage pilots with Wolverhampton Homes for example.

- Some talked about working in partnerships or influencing others e.g. The Woodland Trust working with number of councils to strengthen tree policies, Central England Quakers influence national / local government on achieving net zero, Climate Action Network West Midlands – school carbon champions.

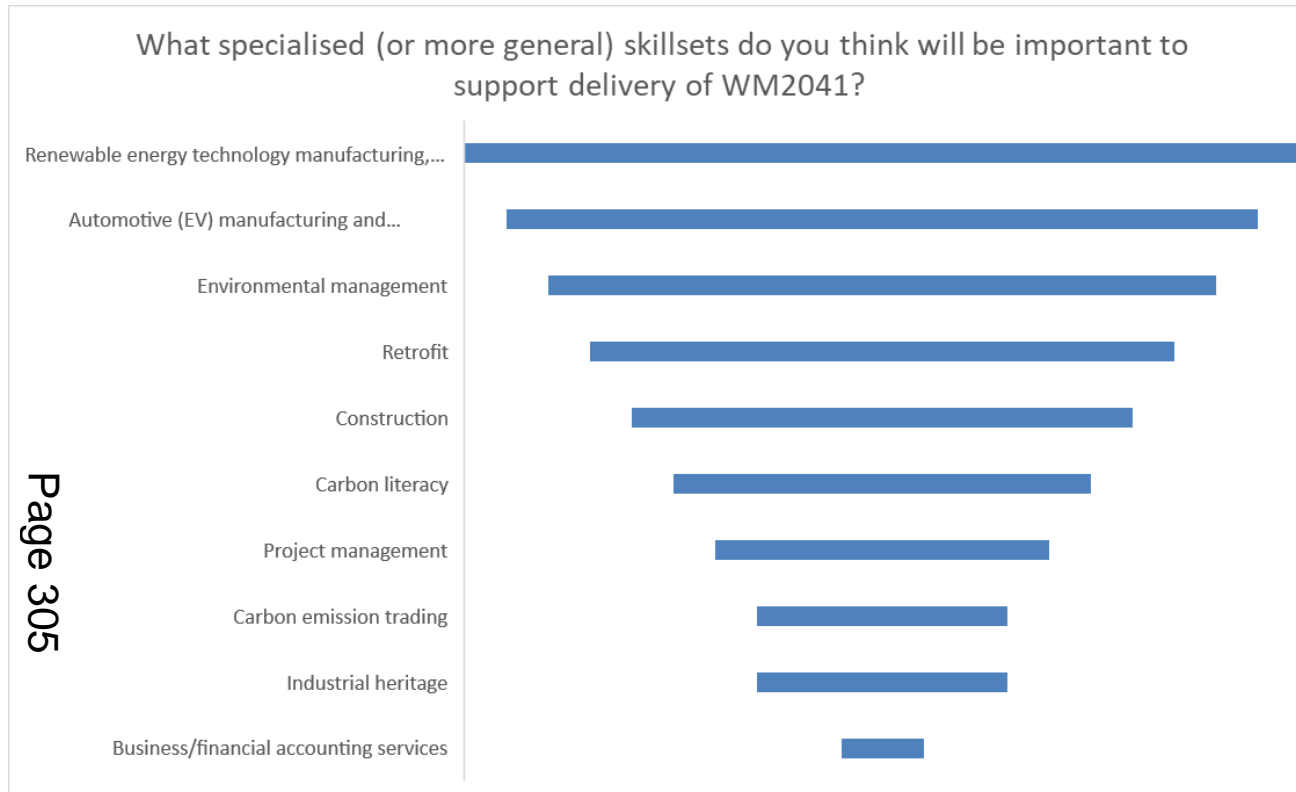
Q5: Which organisations or networks do you think will play a key part in the success of the delivering net zero carbon for the region by 2041?

- Some respondents stated that everyone has a role to play (including authorities, government, general public, housing associations) (e.g. Orbit Group, National Express West Midlands, City of Wolverhampton Council).
- Others were more focused on specific organisations; e.g. the role of local authorities was mentioned by majority of respondents.
- Respondents tended to include themselves in addition to other specific networks and organisations (particularly policy leaders including local authorities and national government, several mentioned local regional networks too like enterprise partnerships and colleges for delivering skillsets).
- Respondents from energy / infrastructure sectors appear to show recognition that their input key to aiding delivery also.

Which industries are going to be affected by delivery of the WM2041 (positively and negatively)?



Q7: What specialised (or more general) skillsets do you think will be important to support delivery of WM2041?



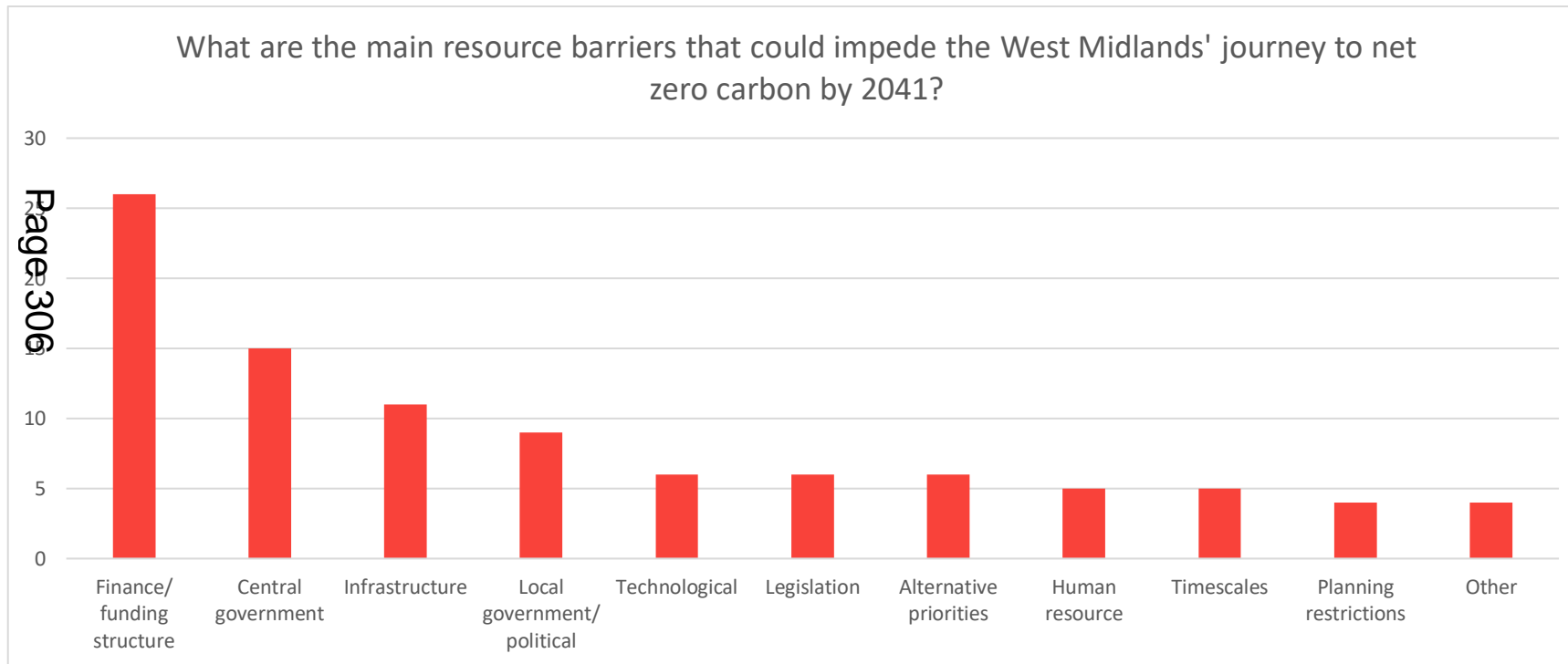
Q8: How do you see the labour market and skills base will change in the West Midlands to adapt to net zero and clean growth?

- General overview that more skills are needed when it comes to developing and implementing renewable technologies / low carbon products. Growth of this market is also required and suitable education / training to be made available.
- Many respondents also discuss the need for upskilling and adaptation of existing workforce, and supply chains for retrofitting, offsite construction, implementation of renewable energy technologies and low carbon products.
- Investment may be required for upskilling. For example, Stonewater summarise that people with existing skills in fossil fuel technology will be required to adapt. Some believe labour market will require restructuring (e.g. Central England Quakers, CFRC University of Wolverhampton, The Pioneer Group).



- Potential loss of traditional engineering jobs highlighted by some (Midlands Energy Hub).
- SMART technology expected to be key.
- Shifts expected to electric vehicles and sustainable transportation methods (The Woodland Trust, Orbit Group, Birmingham Metropolitan College).

Q9: What are the main resource barriers that could impede the West Midlands' journey to net zero carbon by 2041?



Q10: How can we address those resource barriers?

- Many mention more incentives and funding being made available (Bryt Energy, Tyseley Energy Park, Accord Housing, Midlands Energy Hub, Birmingham City University, SIPS education, Stonewater, The Pioneer Group), similarly others pointed to alternative financial sources.
- Lobbying / discussions and collaboration between different organisations and parties (McCamley Power Ltd, Birmingham 2022 Commonwealth Games, Built Environment Climate Change Solutions, Climate Action Network West Midlands, Bromford, Orbit Group). The Woodland Trust mention specifically public engagement in lobbying also.

- Some suggested more training and investment being made to educate (e.g. Dudley Metropolitan Borough Council, South & City College, Birmingham Metropolitan College).
- Others also highlighted changes may be required in legislation / policy (City of Wolverhampton Council, Dudley Metropolitan Borough Council).

Q11: Have potential sources of funding been identified for future projects related to net zero and Clean Growth? If so, what are these?

- Some respondents have identified what funding will be required, some of these also mention specific sources (Orbit Group, CFRC University of Wolverhampton, Coventry College, Climate Action Network West Midlands, Birmingham City University, South & City College Birmingham, Midlands Energy Hub, City of Wolverhampton Council and some more).
- Some respondents left section blank, potentially indicating that this has not been looked into or uncertainty.
- Several said no, with some indicating further clarity is needed (e.g. Dudley Metropolitan Borough Council, Birmingham Metropolitan College, SIPS Education, Stonewater, Select Windows, Accord Housing Association, Birmingham 2022 Commonwealth Games, Western Power Distribution).

Q12: How can the FYP support your aims and ambitions?

- Building infrastructure, providing education and ‘levelling the playing field in planning against other developers’ (Orbit Group).
- Securing and enabling funding central and bringing down costs of innovative low carbon products mentioned by some (Stonewater, Bromford, CFRC University of Wolverhampton).
- Setting clear focus and priorities was mentioned by several respondents, some also pointed to sharing ambitions and knowledge (e.g. South & City College, Midlands Energy Hub).
- Some mentioned specifics, e.g. Birmingham City University focused on transport, procurement and planning commitments and requirements.
- ‘Co-ordination for the deployment of retrofit measures’ (Bromford).
- Several respondents left this question blank. Others were unsure (e.g. SIPS Education, Built Environment Climate Change Solutions).

Q13: Is there anything else you would like to add?

- Orbit Group discussed the importance of working with other social housing landlords, ensuring people have appropriate skills and queried suitable sustainable supply chain frameworks (asking for specific feedback).
- Climate Action Network West Midlands left a comment stating that ‘carbon neutral by 2041 is too late’.
- Birmingham City University indicated that they would like to be ‘kept in the loop’ with future West Midlands Combined Authority developments in this area.
- Midlands Energy Hub wanted to see ‘more ambitious actions’ from West Midlands Combined Authority.



- Accord Housing Association left a comment that ‘There is a need to understand that this will take time and investment to see a ROI, having greater impact.’
- Tyseley Energy Park emphasised the importance of developing an integrated approach to aspects such as power, transport, heat, waste and recycling across the west Midlands.
- Respondent queried whether there should be more appeal to the public for action, and whether there could be more incentives for people to look after planet.
- Bryt Energy raised a concern about the impact of COVID and the fact that some solutions are ‘not breakeven by 3-5 years.’

APPENDIX C – GIS MAPPING

MAPPING LAYERS

Geographic Information System (GIS) mapping was undertaken as part of this project in order to help quantify the land availability for utility scale Photovoltaics and Wind generation as well as large-scale afforestation / carbon sequestration.

The methodology employed considered the area within the boundaries of the seven local authorities as a whole. From this, 35 additional mapping layers were overlaid to exclude locations which were deemed not suitable; these varied for each of the three maps generated. Typically, the approach has been conservative where possible such as not including historic landfill sites for solar and only considering areas with wind speeds @45m >6.5m/s.

Table 1 - GIS Layers

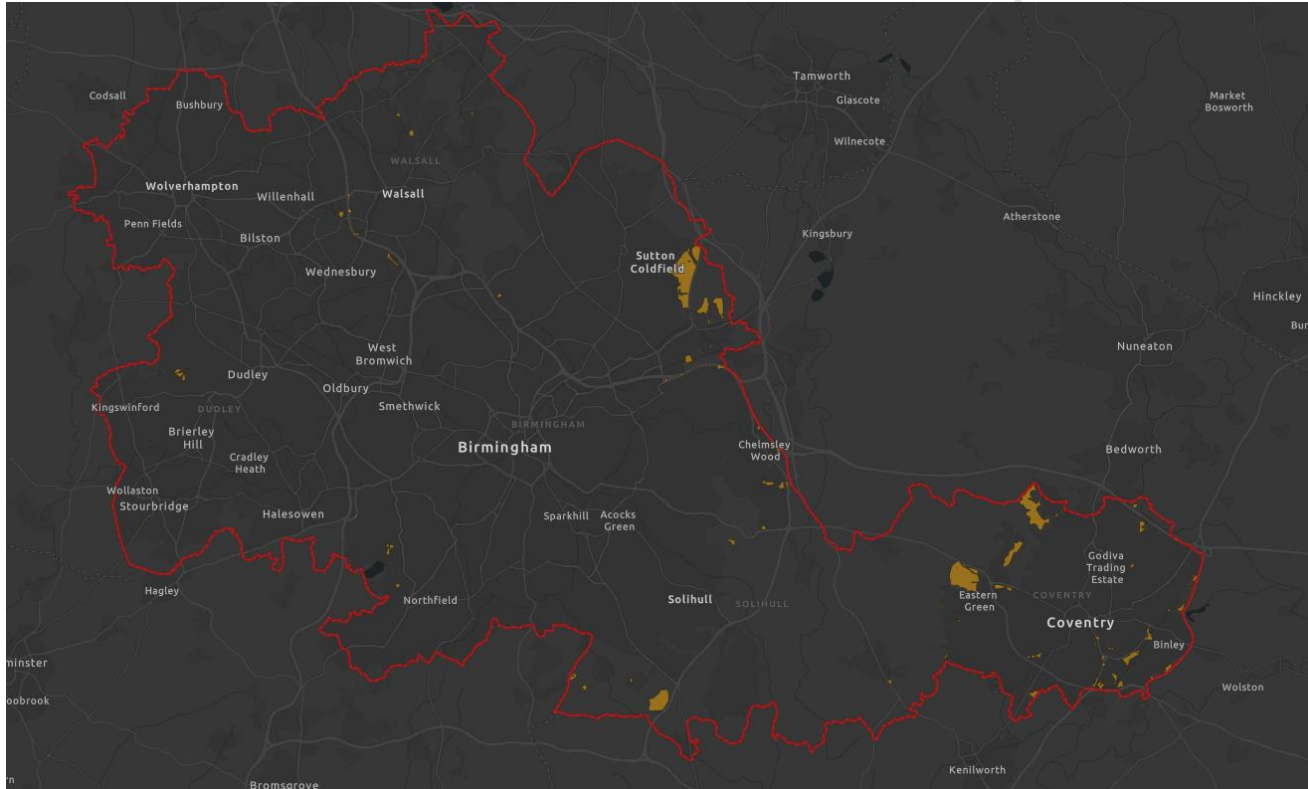
SR. NO	DATASET AVAILABLE FOR		CARBON			REMARK
	ENGLAND	SOLAR	WIND	SEQUESTRATION		
1	Agricultural Land Classification Grades Post 1988 Survey	Exclude Grade 1, 2, 3a & 5	Exclude Grade 1, 2, 3a & 5	Exclude Grade 1, 2, 3a & 5		
2	Ancient Woodland	Exclude	Exclude	Exclude		
3	Areas of Outstanding Natural Beauty	N/A	N/A	N/A	None in Area of Interest (AOI)	
4	Battlefields	N/A	N/A	N/A	None in AOI	
5	Built Up Areas	Exclude	Exclude	Exclude	100m buffer	
6	Country Parks	Exclude	Exclude	Exclude		
7	Countryside and Rights of Way (CRoW)	Exclude	Exclude	Exclude	Areas of Registered Common Land	
8	Doorstep Greens	Exclude	Exclude	Exclude		
9	England Coast Path Route	N/A	N/A	N/A	None in AOI	
10	Flood Zone2	Include	Include	Exclude		
11	Flood Zone3	Exclude	Exclude	Exclude		
12	Heritage Coasts	N/A	N/A	N/A	None in AOI	
13	Historic Landfill	No	No	Exclude		
14	Listed Buildings	No apply 20m buffer around	No apply 20m buffer around	Exclude	20m buffer	
15	Local Authority Greenbelt boundaries	Exclude	Exclude	Include	Greenbelt land can be planted on, do not Exclude	
16	Local Nature Reserves	Exclude	Exclude	Exclude		
17	Millennium Greens	Exclude	Exclude	Exclude	20m buffer	
18	National Grid Tower	Exclude	Exclude	Exclude	20m buffer	

19	National Grid Substation	Exclude	Exclude	Exclude	100m buffer
20	National Grid Cable	Exclude	Exclude	Exclude	10m buffer
21	National Nature Reserves	Exclude	Exclude	Exclude	
22	National Parks	N/A	N/A	N/A	None in AOI
23	National Trails	N/A	N/A	N/A	None in AOI
24	Noabl (Wind Speed)	N/A	Exclude areas <6.5m/s	N/A	Use 45m surface, >=6.5 m/s should be included
25	Parks and Gardens	Exclude	Exclude	Exclude	
26	Permitted Waste Sites Authorised Landfill	Exclude	Exclude	Exclude	
27	Priority Habitat	Exclude	Exclude	Exclude	
28	Provisional Agricultural Land Classification	Exclude Class 1, 2 & 5	Exclude Class 1, 2 & 5	Exclude Class 1, 2 & 5	3 & 4 can be used for all types, do not exclude
29	Ramsar	N/A	N/A	N/A	None in AOI
30	Scheduled Monuments	Exclude	Exclude	Exclude	
31	Sites of Special Scientific Interest	Exclude	Exclude	Exclude	
32	Special Areas of Conservation	Exclude	Exclude	Exclude	
33	Special Protection Areas	N/A	N/A	N/A	None in AOI
34	Statutory Main River	Exclude	Exclude	Exclude	5m buffer
35	World Heritage Sites	N/A	N/A	N/A	None in AOI

MAPPING RESULTS

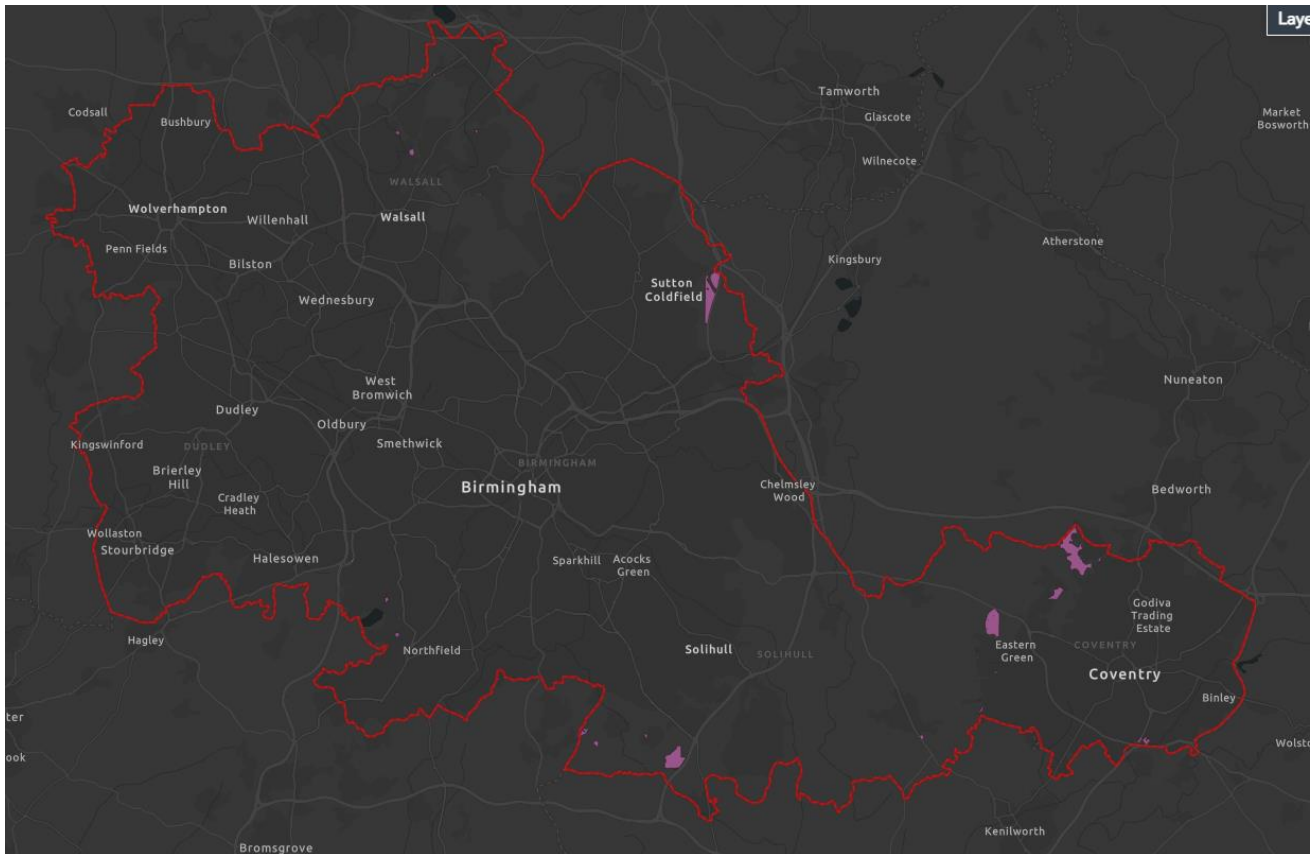
For photovoltaics (solar farms), the 896ha of land was identified (parcels of land over 0.1 ha) and 875ha was identified as being at least 1ha. The trend here was for limited parcels of large areas of land being identified. Eleven parcels of land were identified as part of this assessment as being over 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.

Figure 1 -GIS Mapping of Solar Capacity (Highlighted in Orange)



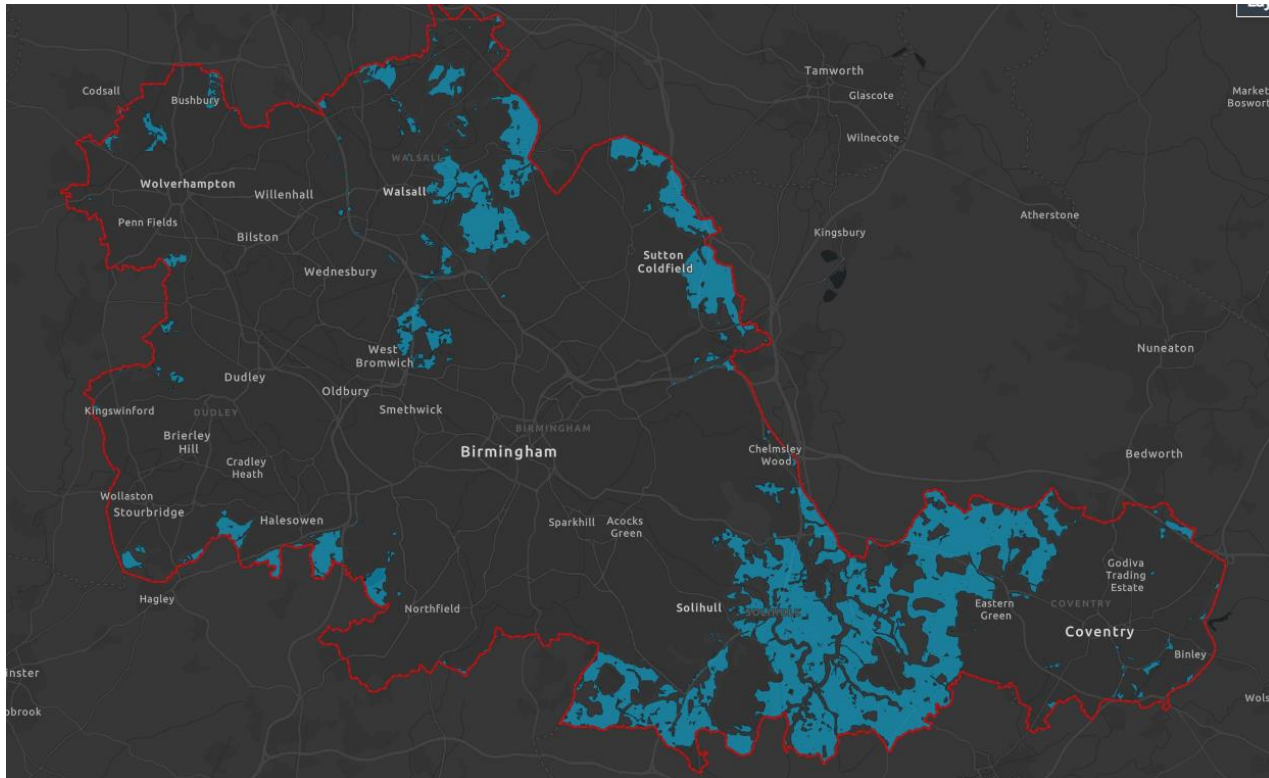
For Wind generation potential, the 389ha of land was identified (parcels of land over 0.1 ha). In total 52 sites were identified. As different wind turbines have different efficiencies, different assumptions were made for the potential of larger land parcels (82% of which was more than 10ha).

Figure 2 - GIS Mapping of Wind Capacity (Highlighted in Pink)



For natural capital (Afforestation), the 13,102ha of land was identified (parcels of land over 0.1 ha) and 13,040ha was identified as being at least 1ha. Again, the trend here was for limited parcels of large areas of land being identified. Nineteen parcels of land were identified as part of this assessment as being over 100ha; and totalling 11,394ha (87% of the total land available).

Figure 3 - GIS Mapping of Afforestation Potential (Highlighted in Blue)



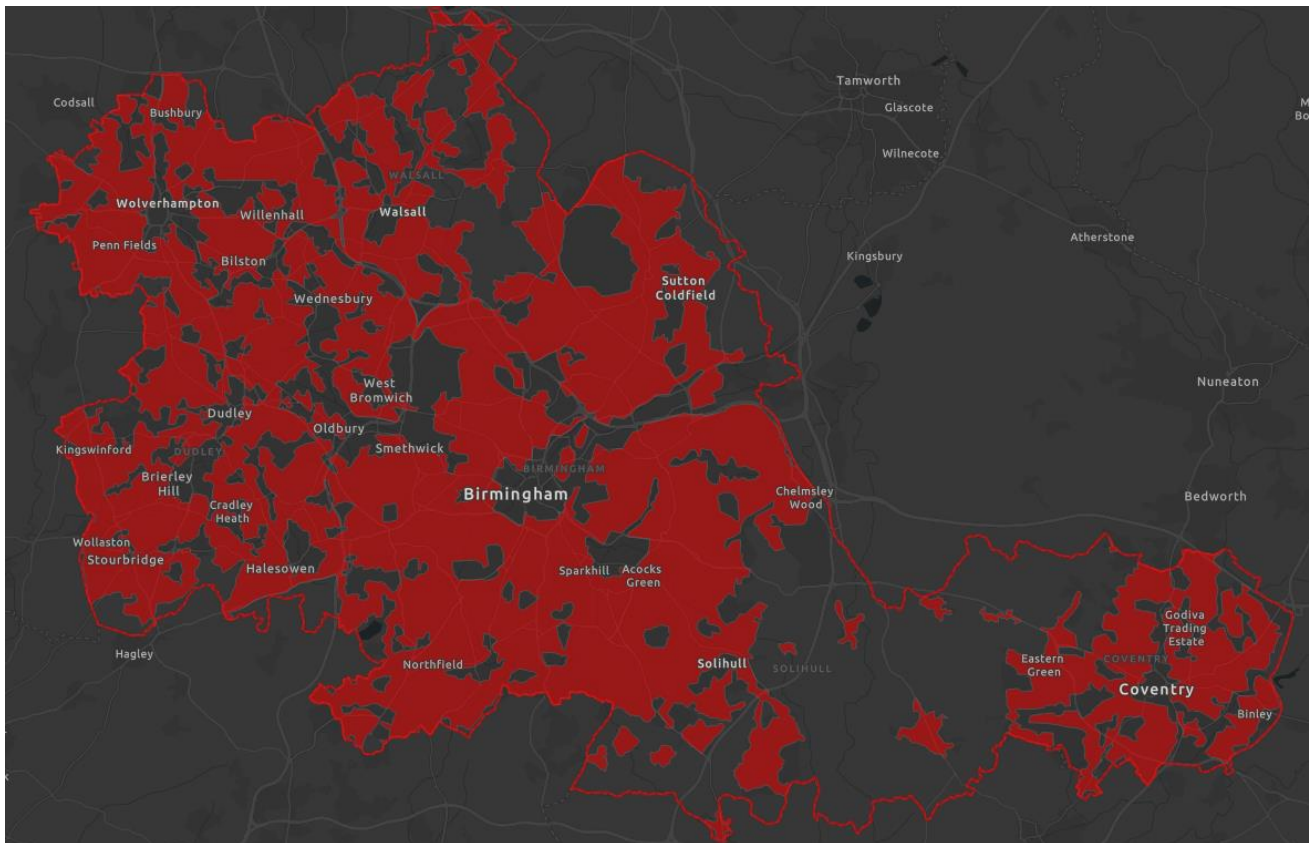
As the three mapping exercises were undertaken independently, there has been no consideration for overlapping areas or prioritisation. As many of the mapping layers considered and criteria used were similar there is overlap in the areas identified. As such it is not viable to undertake all three of these initiatives to their full potential. In addition, this assessment has only considered the techno-economic requirements; practically there are further constraints around land ownership, land use prioritisation and other constraints which will need to be considered.

Table 2 - GIS Summary of Results

	SOLAR FARMS		WIND TURBINES		AFFORESTATION	
PARCEL SIZE	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)
>0.1ha	135	896	52	389	345	13,102
>1ha	76	874	27	379	168	13,040
>10ha	11	631	5	320	59	12,662

In addition to the main afforestation areas available, it was felt important to show how urban trees could provide significant decarbonisation benefits as well as the benefits around the five principles of WM2041, in terms of improving the West Midlands as a place to live across a wider area. To do this the “non-continuous urban” area was identified as locations where trees could be planted, albeit at 3.6% of the density of that used for forestry. These areas are shown below.

Figure 4 - GIS Mapping of peri-urban tree Potential (Highlighted in Red)



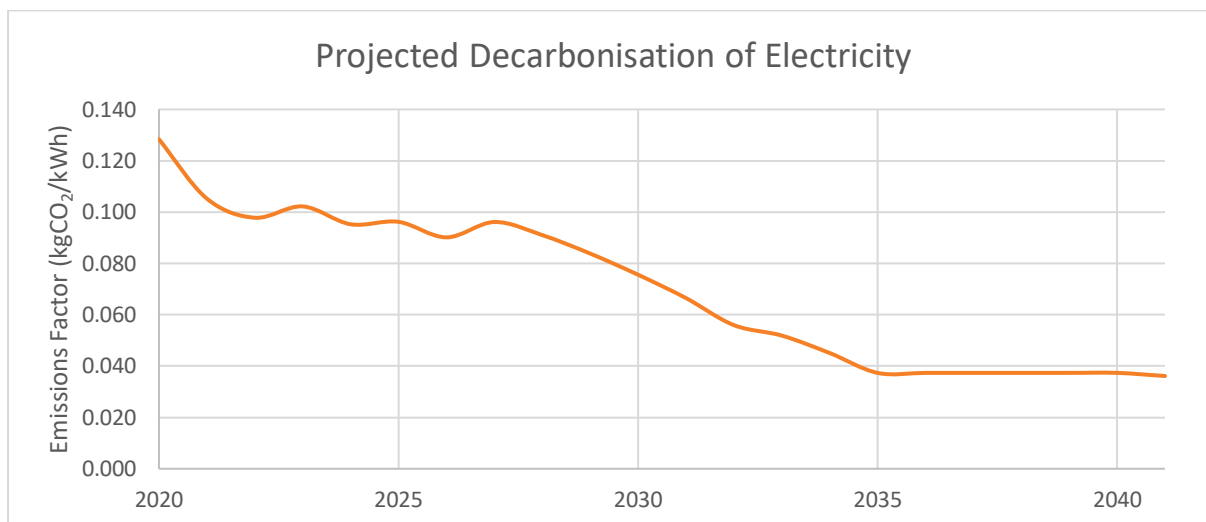
APPENDIX D – ASSUMPTIONS UNDER BUSINESS AS USUAL

After the baseline and targets were established, the next step was to consider where policies, plans and trends would take us, 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 explained below:

Decarbonisation of Electricity

The modelling includes the projected decarbonisation of mains electricity in the UK in the years to 2041. There are a number of data sources available for this that show a similar trajectory. The most recent release by the Department for Business, Energy & Industrial Strategy (BEIS) in their 'Green Book'¹ has been utilised to model the reduction trajectory.

Figure 1 – Projected Decarbonisation of Electricity



Minimum Energy Efficiency Standards

The Minimum Energy Efficiency Standard (MEES) Regulations set a minimum energy efficiency level for domestic private rented properties. From 1st April 2018, phase one of the MEES regulations came into force; as a result of this, it is now deemed unlawful to let properties with an Energy Performance Certificate (EPC) rating below an 'E' rating. Whilst this does currently place an onus on the landlord there is a relatively low spending cap of £3,500 (inclusive of VAT) in place.

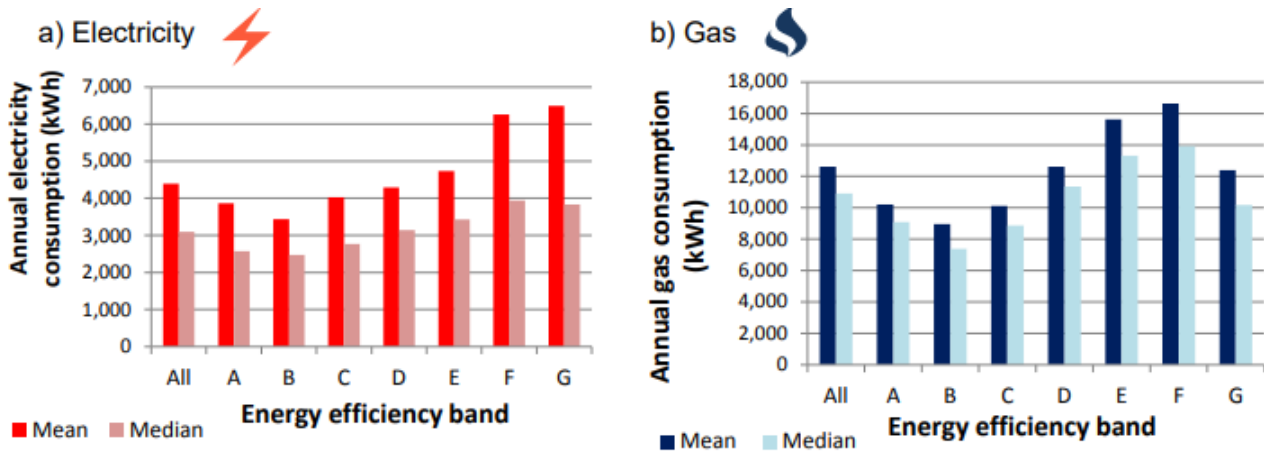
The government is consulting on regulations to enforce higher levels of energy efficiency. The proposals increase the minimum energy efficiency standards for privately rented properties to EPC Band C by 2030, while increasing the spending cap to £10,000.

Non-domestic properties also require a minimum EPC rating of E by 2023, and there are proposals to make it B by 2030, but there is limited evidence of a correlation between rating and energy performance. The Better Buildings Partnership have explicitly stated in a recent report that EPCs are not an indicator of operation energy use and

according to their data there is no correlation between EPC rating and how efficiently a building uses energy². For this reason, a benefit has not been applied in the modelling.

Whilst it is generally true that a property with a better EPC rating would consume less energy (gas and electricity) and the government is pushing a ‘fabric first’ approach, this is not necessarily the case³.

Figure 2 - Average annual consumption of domestic properties by energy efficiency band, 2015



Housing Growth

Each of the seven local authorities within the West Midlands Combined Authority are projecting growth in housing for the foreseeable future^{4,5}. These studies indicate an objective assessment of needs totalling 10,875 dwellings per annum for at least the next decade. The assumption made within the modelling is that this need is fully met each year. The mix of housing types would broadly match the current typology across the region and meet minimum size guidance.

In the short term to 2025, the assumed energy consumption associated with these dwellings is current new build standards and utilising gas boilers to provide heating and hot water. Post-2025, it is assumed the ‘Future Homes Standard’ will be in place and that gas boilers for new build developments will not be allowed. Instead it has been assumed air-source heat pumps would nominally be installed, although the actual mix of technologies may include other types of heat pump in the short term and potentially other technologies further out in time.

²<https://www.betterbuildingspartnership.co.uk/sites/default/files/media/attachment/Call%20for%20evidence%20-%20Energy%20Performance%20Certificates%20in%20Buildings.pdf>

³https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/669734/Domestic_Energy_Consumption_by_Energy_Efficiency_and_Environmental_Impact.pdf

⁴ Greater Birmingham and Black Country Housing Market Area (GBBCHMA) Housing Need and Housing Land Supply Position Statement

⁵ Coventry City Council Strategic Housing Land Availability Assessment (SHLAA)

Commercial Growth

Due to the uncertainty over the last year brought about by the COVID-19 pandemic, there is a degree of caution around the projections for commercial growth. The data used have been provided by the West Midlands Growth Company and are outlined below:

Table 1 – Commercial Growth Assumptions

SECTOR	CURRENT EMPLOYMENT	10-YEAR FORECAST	% CHANGE
Professional Services	200,000	14,823	7%
Business Services	250,000	17,521	7%
Health and Care	400,000	10,000	3%
Hospitality and Leisure	180,000	12,212	7%
Transport and Logistics	190,000	8,333	4%
Construction	160,000	3,939	2%
Education	260,000	2,500	1%
Public Sector	750,000	38,404	5%
Tech and digital	70,000	3,585	5%
Advanced Engineering	50000	4339	9%
Arts and Entertainment	70000	8127	12%
Manufacturing	230000	-27000	-12%
Wholesale and Retail	460000	-6000	-1%

Electrification / Hydrogen use in transport

There are several datasets projecting the change of fuels in surface transport. Although the data used here are focused on electrification, due to the timeline, this may involve hydrogen in the future.

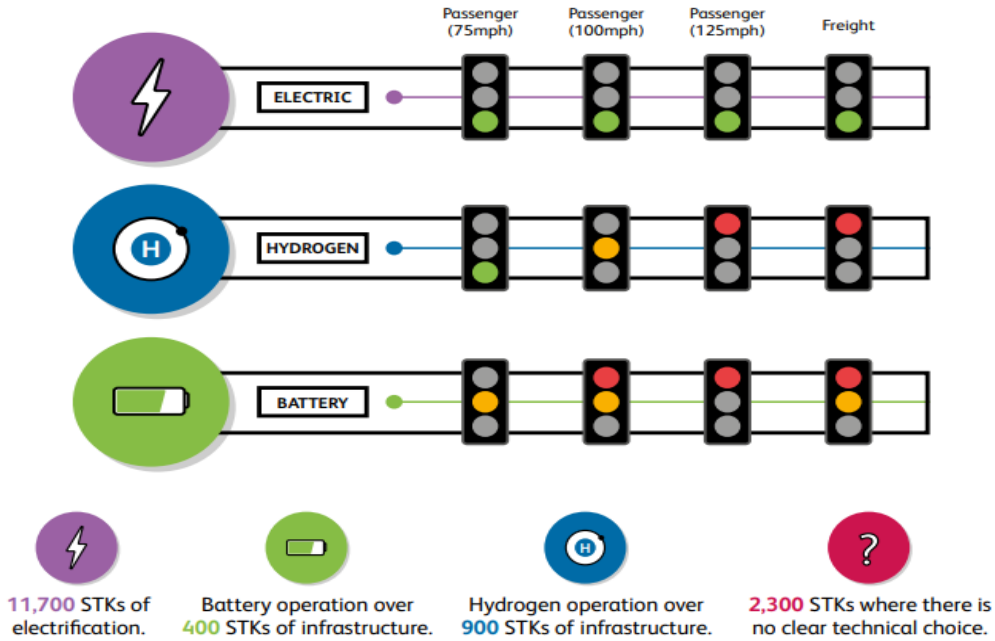
The Transport Analysis Guidance (TAG) data book was used to understand what a conservative outlook on how vehicle fuel use may change to 2041. the spreadsheet produced by the Department for Transport provides the proportion of cars, light goods vehicles (LGVs) and other vehicles mileage using petrol, diesel and electricity. Within this data book, vehicles are projected to electrify such that 34% of cars are powered by electricity by 2041 and 16% of LGVs. It also projects that other types of road vehicles will remain unchanged in fuel use.

More recently there has been announced a ban on the sale of new internal combustion engine cars by 2030. Again, a conservative approach has been considered for this with no change over the expected trajectory, and then the modelling of the effect of stock turnover from 2030.

Assuming electric cars are sold at the same rate as current new cars, we would see almost complete electrification by 2041. That being said, there may be changes in behaviour such as a surge in purchasing prior to the ban (consumers bringing forward purchasing) or stock dumping by retailers or a culture of maintaining ICE cars developing post 2030 which would mean stock turnover would take longer. It is also possible that prior to 2030 the sale of electric cars gradually increases as infrastructure improvements accelerate and acceptance of the technology becomes widespread.

During the stakeholder engagement process, the decarbonisation of railways was also explored. Whilst there are several competing technologies each with their own strengths and weaknesses, of the 15,400 single track kilometres (STK) of unelectrified rail network in Great Britain, the vast majority will be electrified; particularly so in the West Midlands

Figure 3 – Traction Decarbonisation Strategy



Council Decarbonisation

Five of the seven local authorities have committed to decarbonising their estate emissions. These are summarised below where data was available.

Table 2 – Local Authority Estate Emissions

LOCAL AUTHORITY	COUNCIL ESTATE TARGET	SCOPE 1 (TCO ₂)	SCOPE 2 (TCO ₂)
Birmingham	2030	7,595	24,093
Coventry	N/A	4,098	5,805
Dudley	N/A	-	-
Sandwell	2030	10,485	9,841
Solihull	2030	1,514	1,727
Walsall	2050	6,541	11,331
Wolverhampton	2028	7,649	8,043

Organisation Decarbonisation

Several large organisations have also committed to becoming zero carbon over the next 20 years. This includes Birmingham Airport and Jaguar Land Rover. The combined benefit of these commitments has been estimated.

Summary of Committed Projects

As part of the stakeholder engagement and literature review a list of 71 separate actions were identified across the seven local authorities and the West Midlands Combined Authority as a whole. These were filtered to understand a) projects which were sufficiently committed such that there was a decent probability of it going ahead, and b) were of significant size in terms of GHG reduction (i.e. represented at least 0.1% of GHG emissions of the West Midlands Combined Authority).

The result was a set of seven actions, five of which related to local authority estate emissions (as per the above table). The remaining actions include:

- Birmingham airport's commitment to be zero carbon by 2033
- Jaguar Land rover's commitment to be zero carbon by 2030
- The 'Virtual Forest' aims to plant 4 million trees in the wider West Midlands (1 for every person)
- Birmingham's Clean Air Zone

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APPENDIX E – MODELLING GOALS’ ASSUMPTIONS

The modelling carried out as part of this project was done using WSP’s local authority carbon model (which can also be applied to multiple local authorities, as it was done in this project). This model was created to assist in the quantification of baseline GHG emissions as well as the potential cumulative benefits of a range of project-specific carbon reduction measures or goals. Some of these processes have been automated. The main sources of this model are the sub-national dataset of total final energy consumption statistics¹, journey to work statistics², and government conversion factors³.

In addition, for each of the measures or goals modelled, four levels ranging from “Very High” to “Low” have been developed, which vary the level of ambition for each goal. This was automated so that each scenario selected the right level of ambition for each goal.

The measures or goals were largely based on specific West Midlands literature or reports, input from the stakeholders consulted throughout this project, as well as wider available projections, such as those from the CCC, and WSP’s own calculations.

A breakdown of the results is shown below, with carbon reductions provided for each goal and each scenario.

Table 1 - Summary Goal CO₂ Emission Reductions

Sector	Goal	Scenarios							
		Very High		High		Medium		Low	
		2025	2040	2025	2040	2025	2040	2025	2040
Domestic	Energy Efficiency Retrofit	-452.9	-452.9	-226.4	-452.9	-113.2	-452.9	-46.8	-187.1
Domestic	Heating System Retrofit	-2237.8	-2741.4	-559.4	-2741.4	-37.3	-1395.6	-26.5	-777.3
Domestic	Solar PV	-123.2	-47.8	-61.6	-47.8	-30.8	-47.8	-23.1	-35.9
Commercial	Energy Efficiency	-298.7	-218.3	-149.4	-218.3	-74.7	-218.3	-37.3	-218.3
Commercial	Heating System Retrofit	-161.5	-204.4	-40.4	-204.4	-2.7	-96.3	-1.9	-58.0
Commercial	Solar PV	-104.8	-40.7	-52.4	-40.7	-26.2	-40.7	-19.7	-30.5
Industrial	Energy Efficiency and Fuel Switching	-120.1	-682.2	-120.1	-682.2	-108.9	-619.2	-117.6	-610.6
Industrial	Solar PV	-14.2	-5.5	-7.1	-5.5	-3.6	-5.5	-2.7	-4.1
Transport	Demand Reduction (Digital Connectivity)	-148.1	-115.0	-37.0	-115.0	-27.8	-86.2	-18.5	-57.5
Transport	Bus and Taxi Electrification	-181.1	-181.1	-90.6	-181.1	-60.4	-181.1	-45.3	-181.1
Transport	Demand Reduction	-160.1	-156.7	-34.7	-107.4	-17.3	-53.7	-8.7	-26.8
Transport	HGV Electrification	-103.8	-499.1	-103.8	-499.1	-69.2	-332.7	-51.9	-249.6
Transport	Mode Shift	-1306.0	-1306.0	-213.3	-772.2	-187.9	-661.8	-146.4	-444.4
Transport	Accelerated EV Uptake	-197.5	-513.7	-197.5	-513.7	-188.1	-516.7	-161.2	-511.3
Land-Use	Afforestation	-31.6	-442.4	-31.6	-442.4	-19.9	-278.3	-14.9	-101.0
Land-Use	Renewables	-100.1	-38.9	-50.1	-38.9	-24.4	-38.7	-23.7	-38.5

¹ <https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level>

² <https://www.nomisweb.co.uk/census/2011/qs701ew>

³ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

A full breakdown of all assumptions per goal is provided below:

Domestic Energy Efficiency Retrofit

This goal considered a basic retrofit package considering the potential of a number on measured designed to reduce heating consumption. This goal considered the fact that some homes will have already had some of these measures installed. The energy efficiency measures are considered to only impact on energy consumption for space heating. The energy savings for each measure have been taken from a variety of sources, which is provided in the table below. Behavioural change is not captured in this goal, and as such the energy efficiency savings from each measure have been assumed in full. However, it is widely recognised that energy consumption typically increases after energy efficiency measures are installed (i.e. the ‘rebound’ effect), thereby reducing the amount of energy savings eventually achieved. Energy efficiency improvements from Minimum Energy Efficiency Standards regulations have been included under Business as Usual scenarios, and as such discounted from the effect of this goal.

Household energy use has been taken from NEED Framework data (End-Use tables). The number of properties in the West Midlands Combined Authority has been taken from Council Tax Data (Table CTSOP3.0). In addition, the number of properties per ownership type was obtained from Government data.

Table 2 – Energy savings and applicability of energy efficiency measures considered in the Domestic Efficiency Retrofit goal

Measure	Energy Saving	Applicability	Total Saving
Smart Thermostats	6.7% ⁴	94.0% ⁵	6.3%
Smart Meters	2.2% ⁶	69.1% ⁷	1.5%
Cavity Wall Insulation	10.2% ⁸	14.0% ⁹	1.4%
Solid Wall Insulation	17.7% ⁸	27.0% ⁹	4.8%
Loft Insulation	6.3% ⁸	18.2% ⁹	1.1%
Double Glazing	15.0% ¹⁰	6.7% ¹¹	1.0%
MEES	-1.5%	41.3%	-0.6%

Domestic Heat Pump Retrofit

This goal considers the benefit of replacing current fossil fuel heating systems (assumed as gas boilers as they are the predominant technology) within dwellings with heat pumps. It has been assumed that the majority of them will be air source heat pumps, and a conservative heat pump seasonal CoP of 2.65 has been used.

The energy consumption of dwellings was based on that of the previous goal (based on NEED framework data¹²), with the effect of energy efficiency measures already considered, in order to avoid double counting. The pace of the energy efficiency goal is higher than that of the domestic heat pump retrofit, so it has been assumed that energy efficiency measures have taken place before or at the time of retrofitting a heat pump.

The number of dwellings considered was based around current targets set by the CCC¹³ (of around a million heat pumps installed per year, nationally, by 2030) and the Government’s Ten Point Plan¹⁴ (of 600,000 heat pumps installed per year by 2028). In addition, the high scenario assumes a linear deployment trajectory to 2041, where all homes will be retrofitted (except the fraction which already has a heat pump). The number of installed heat pumps currently installed and total number of heat pumps installed were based on data from the Heat Pump Association¹⁵.

⁴ <https://www.bi.team/publications/evaluating-the-nest-learning-thermostat/>

⁵ http://campaign.yougov.com/rs/060-QFD-941/images/YouGov_UK_2018_08_smart_homes.pdf

⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/830668/smart-meters-benefits-realisation.pdf

⁷ <https://www.gov.uk/government/statistics/smart-meters-in-great-britain-quarterly-update-june-2020>

⁸ <https://yougov.co.uk/topics/technology/articles-reports/2018/08/10/almost-quarter-britons-now-own-one-or-more-smart-h>

⁹ <https://www.gov.uk/government/statistics/household-energy-efficiency-statistics-detailed-report-2018>

¹⁰ <https://energysavingtrust.org.uk/home-energy-efficiency/energy-efficient-windows>

¹¹ <https://www.gov.uk/government/statistics/english-housing-survey-2018-energy-report>

¹² <https://www.gov.uk/government/statistics/energy-consumption-in-the-uk>

¹³ <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

¹⁴ <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution>

¹⁵ <https://www.heatpumps.org.uk/wp-content/uploads/2019/11/A-Roadmap-for-the-Role-of-Heat-Pumps.pdf>

National figures were scaled down to the West Midlands Combined Authority based on the number of dwellings, obtained from UK¹⁶, Scottish¹⁷ and Northern Irish¹⁸ Government sources. The uptake trajectories are provided below (new-build installations have been removed, as those are already considered under the Business as Usual scenario):

Table 3 – Domestic heat pump installation trajectories per scenario

Year	Annual Installations		
	High	Medium	Low
2020	809	809	809
2021	55,645	1,700	1,575
2022	55,645	2,266	1,874
2023	55,645	2,954	2,144
2024	55,645	4,249	2,790
2025	55,645	5,828	3,493
2026	55,645	11,493	7,444
2027	55,645	17,280	11,130
2028	55,645	22,825	14,304
2029	55,645	28,288	17,121
2030	55,645	34,804	20,340
2031	55,645	35,896	21,046
2032	55,645	37,029	21,778
2033	55,645	38,163	22,510
2034	55,645	39,215	23,190
2035	55,645	40,429	23,974
2036	55,645	41,675	24,780
2037	55,645	42,956	25,607
2038	55,645	44,270	26,456
2039	55,645	45,620	27,328
2040	55,645	47,005	28,224
2041	55,645	48,428	29,143
Total	1,178,260	602,086	365,962

Domestic Solar PV

This goal considers the impact of installing rooftop solar on existing dwellings. For this, the Birmingham PV Study (provided by the WMCA, as it is not publicly available) 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 dwellings¹⁹. The results of this were validated by comparing against regional Western Power Grid projections²⁰ for 2030 for the West Midlands, based on the Future Energy Scenarios methodology, and adjusted CCC projections²¹ for rooftop solar PV potential by 2050 on a national scale.

A conservative capacity factor (which represents the energy yield of a technology) of 9.7% (equivalent to 850 kWh/kWp) was used.

¹⁶ <https://www.gov.uk/government/statistics/council-tax-stock-of-properties-2019>

¹⁷ <https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/households/household-estimates/2019>

¹⁸ <https://www.communities-ni.gov.uk/topics/housing-statistics>

¹⁹ <https://www.gov.uk/government/statistics/council-tax-stock-of-properties-2019>

²⁰ <https://www.westernpower.co.uk/downloads/4025>

²¹ <https://d423d1558e1d71897434.b-cdn.net/wp-content/uploads/2019/05/20200418-CCC-Accelerated-Electrification-final-report.pdf>

A summary of the results of these calculations is shown below:

Table 4 – Results for the Domestic Solar PV goal

Local Authority	No. Dwellings	PV Potential	PV Generation
Birmingham	444,440	312,900 kW	265,965,000 kWh
Coventry	142,770	100,515 kW	85,437,456 kWh
Dudley	138,740	97,677 kW	83,025,794 kWh
Sandwell	133,620	94,073 kW	79,961,847 kWh
Solihull	92,500	65,123 kW	55,354,519 kWh
Walsall	116,210	81,816 kW	69,543,229 kWh
Wolverhampton	109,980	77,429 kW	65,815,027 kWh
WMCA	1,178,260	829,533 kW	705,102,873 kWh

Commercial Energy Efficiency

This goal considered the installation of a series of energy efficiency measures on a range of non-domestic building types. Data for the number and floor area of non-domestic properties per type and per local authority was obtained from UK government data²², as well as energy usage per fuel and end-use for offices, retail and other commercial buildings²³. The energy intensity (per floor area) for each type of building is then calculated at a national level and, using the number of different types of non-domestic properties across the WMCA, the total WMCA energy consumption is obtained. The results for offices, retail and other buildings are shown below:

The 'other buildings' category comprises several types of buildings and sectors, such as education, health, hospitality or arts and leisure. The combined energy consumption of these types of buildings was based on the number of jobs for each subsector, which were provided by WMCA.

The abatement potential for each type of building, (e.g. office, retail, other) was taken from the Business Energy Efficiency Survey²⁴. A breakdown of those savings was provided as part of the description of Goal 5 in the main report.

Table 5 – Total energy usage in office buildings in the WMCA, per fuel and end-use

Energy Usage	Fuel (kWh)					Total
	Electricity	Gas	Oil	District Heating	Other	
Heating	95,431,128	532,719,490	76,938,265	6,424,585	63,875,061	775,388,530
Hot Water	28,477,797	37,901,308	35,818,889	361,088	4,893,086	107,452,168
Cooling	112,117,059	1,095,211	21,509,731	0	0	134,722,002
Fans	73,259,880	0	0	0	0	73,259,880
Lighting	152,260,363	0	0	0	0	152,260,363
Subtotal	461,546,228	571,716,009	134,266,886	6,785,673	68,768,147	1,243,082,943
Other	521,773,114	22,027,976	36,334,532	21,178	17,052	580,139,935
Total	983,319,342	593,743,985	170,601,417	6,764,495	68,751,095	1,823,222,878

²² <https://www.gov.uk/government/statistics/non-domestic-rating-stock-of-properties-2020>

²³ <https://www.gov.uk/government/statistics/energy-consumption-in-the-uk>

²⁴ <https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees>

Table 6. Total energy usage in retail commercial buildings in the WMCA, per fuel and end-use

Energy Usage	Fuel (kWh)					Total
	Electricity	Gas	Oil	District Heating	Other	
Heating	11,302,206	444,668,199	57,743,813	17,427,020	38,783,712	418,537,522
Hot Water	6,674,418	107,918,752	14,407,747	1,789,681	9,251,832	104,616,291
Cooling	12,723,860	117,563	61,147	16,821	0	12,867,453
Fans	27,453,234	0	0	0	0	27,453,234
Lighting	44,945,732	0	0	0	0	44,945,732
Subtotal	100,097,280	405,891,298	53,031,066	14,124,580	35,276,009	608,420,232
Other	39,644,680	57,418,150	4,304,478	1,036,095	10,571,611	112,975,014
Total	139,741,960	463,309,448	57,335,543	15,160,675	45,847,619	721,395,246

Table 7. Total energy usage in other commercial buildings in the WMCA, per fuel and end-use

Energy Usage	Fuel (kWh)					Total
	Electricity	Gas	Oil	District Heating	Other	
Heating	11,302,206	444,668,199	57,743,813	17,427,020	38,783,712	418,537,522
Hot Water	6,674,418	107,918,752	14,407,747	1,789,681	9,251,832	104,616,291
Cooling	12,723,860	117,563	61,147	16,821	0	12,867,453
Fans	27,453,234	0	0	0	0	27,453,234
Lighting	44,945,732	0	0	0	0	44,945,732
Subtotal	100,097,280	405,891,298	53,031,066	14,124,580	35,276,009	608,420,232
Other	39,644,680	57,418,150	4,304,478	1,036,095	10,571,611	112,975,014
Total	139,741,960	463,309,448	57,335,543	15,160,675	45,847,619	721,395,246

Commercial Heat Pump Retrofit

This goal considers the benefit of replacing current fossil fuel heating systems (predominantly gas boilers) within commercial properties with air source heat pumps. It uses energy consumption data from the previous goal, in order to avoid double counting. The heating CoP of the replacement heat pumps has been assumed to be of 2.75.

The replacement trajectories have been assumed to be equivalent to those in the domestic heat pump retrofit goal, adjusted to cover all 74,040 retail, office and other commercial buildings. A breakdown of non-domestic buildings in the WMCA seven local authorities is provided below:

Table 8 – Breakdown of non-domestic buildings across WMCA's local authorities

LA	Type				
	Retail	Office	Industry	Other	All
Birmingham	11,230	8,960	9,980	17,510	47,680
Coventry	2,630	1,660	2,220	2,350	8,860
Dudley	2,790	1,730	3,760	2,380	10,670
Sandwell	2,920	1,030	4,490	2,790	11,220

Solihull	1,520	1,760	720	1,490	5,490
Walsall	2,480	1,080	3,080	1,960	8,600
Wolverhampton	2,430	1,630	2,930	1,710	8,690
WMCA	26,000	17,840	27,180	30,200	101,220
England and Wales	515,960	430,170	538,740	619,710	2,104,570

Commercial Photovoltaic Systems

This goal considers the impact of installing rooftop solar on existing commercial properties. For this, the Powering Growth: Black Country Energy Strategy was used to assess the solar PV potential for Dudley, Sandwell, Solihull and Wolverhampton. In addition, the Birmingham Solar PV Study was used for Birmingham City Council, and was extrapolated to Coventry and Walsall, for which no specific data was found, based on the number of non-domestic buildings for each local authority.

A conservative capacity factor (which represents the energy yield of a technology) of 9.7% (equivalent to 850 kWh/kWp) was used.

A summary of the results of these calculations is shown below:

Table 9 – Results of the Commercial Rooftop Solar goal

LA	PV Potential	PV Generation
Birmingham	397,500 kW	337,875,000 kWh
Coventry	70,011 kW	59,509,019 kWh
Dudley	45,000 kW	38,250,000 kWh
Sandwell	45,000 kW	38,250,000 kWh
Solihull	45,000 kW	38,250,000 kWh
Walsall	58,202 kW	49,471,353 kWh
Wolverhampton	45,000 kW	38,250,000 kWh
WMCA	705,712 kW	599,855,371 kWh

Industrial Energy Efficiency and Fuel Switching

This goal explores efforts to decarbonise energy consumption used as part of industrial processes. Energy consumption data by fuel for a range of industrial was obtained from BEIS data²⁵ (NEED End-Use Tables). This was scaled down to the West Midlands level using data for the number of businesses within each industrial sector from ONS data²⁶. It was then scaled down to the WMCA level based on the number of industrial buildings. The results are shown in the table below:

Table 10 - Industrial Energy Use in the WMCA, per fuel and sector

Industry Sector	Number of Enterprises	Energy Usage				Total
		Solid Fuel	Oil	Natural Gas	Electricity	
Steel and iron	153	340 GWh	17 GWh	600 GWh	542 GWh	1,500 GWh
Mineral Products	183	190 GWh	87 GWh	581 GWh	255 GWh	1,113 GWh
Chemicals	139	15 GWh	55 GWh	771 GWh	577 GWh	1,419 GWh

²⁵ <https://www.gov.uk/government/statistics/energy-consumption-in-the-uk> (From Use%20Data%20Tables)

²⁶ <https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation>

Mechanical Engineering	2,387	5 GWh	0 GWh	742 GWh	428 GWh	1,176 GWh
Electrical Engineering	354	1 GWh	0 GWh	124 GWh	243 GWh	369 GWh
Vehicles	319	21 GWh	118 GWh	338 GWh	253 GWh	730 GWh
Food and beverages	380	17 GWh	42 GWh	718 GWh	407 GWh	1,184 GWh
Textiles, leather	315	16 GWh	18 GWh	101 GWh	95 GWh	229 GWh
Paper, printing	486	25 GWh	14 GWh	172 GWh	387 GWh	599 GWh
Other industries	1,709	205 GWh	29 GWh	495 GWh	1,325 GWh	2,054 GWh
Total	6,425	836 GWh	381 GWh	4,643 GWh	4,514 GWh	10,373 GWh

The role for each of the technologies and measures identified has been defined based on a literature review, which included Element Energy and Jacobs' Industrial Fuel Switching Market Engagement Study²⁷, WSP's Industry Decarbonisation Pathways report series²⁸, the EU hydrogen strategy²⁹ and an academic paper on the potential for electrification of industrial heat³⁰. Further detail on how this goal was modelled is provided in this goal's description.

Industrial Photovoltaic Systems

This goal considers the impact of installing rooftop solar on existing industrial properties. The 2050 potential for rooftop PV³¹ at a national scale, as estimated by Vivid Economics, is scaled down to the WMCA level based on the relative number of industrial buildings³². The amount of PV installed on industrial premises relative to domestic and commercial buildings is taken from Ofgem's FiTS data³³ from September 2020 on historical installations.

While there is potential for solar PV to contribute to industry's electricity demand, this is something that hasn't significantly been taken up so far in the WMCA area – with existing installations under the FiT scheme only amounting to 2.5 MW across 25 installations. This is also a trend at a national level, with only slightly over 5% of solar PV being installed in an industrial setting (as per the Ofgem data).

Transport Demand Reduction

This goal considers the potential of reducing the number of commuting, retail and personal business trips from increased remote working and digitalisation of services. This is assumed to be enabled by increased availability of fast broadband connections, a higher flexibility in public and private sector policies around working arrangements and other actions such as the creation of local flexible working spaces, thereby reducing commuting distances and the need for public or private transportation.

Working population, employment level data and the fraction of people who can work from home (35%) was identified from ONS research³⁴, and the frequency they are able to from an academic paper³⁵ from the Global e-Sustainability Initiative. The emissions savings are based on the number of miles saved across cars and public transport, taken from Government data³⁶, as well as fuel efficiency data for petrol and diesel cars³⁷. Fuel efficiency data for buses was taken from real fuel consumption averages³⁸ of buses across a number of routes, published by Transport for London. Changes to the way in which we will travel in the future are considered to avoid double counting.

²⁷ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/824592/industrial-fuel-switching.pdf

²⁸ <https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050>

²⁹ https://ec.europa.eu/commission/presscorner/detail/en/FS_20_1296

³⁰ <https://iopscience.iop.org/article/10.1088/1748-9326/abbd02/pdf>

³¹ <https://d423d1558e1d71897434.b-cdn.net/wp-content/uploads/2019/05/20200418-CCC-Accelerated-Electrification-final-report.pdf>

³² <https://www.gov.uk/government/statistics/non-domestic-rating-stock-of-properties-2020>

³³ <https://www.ofgem.gov.uk/environmental-programmes/fit/contacts-guidance-and-resources/public-reports-and-data/fit/feed-tariffs-quarterly-report>

³⁴ <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/regionallabourmarket/march2020>

³⁵ <http://www.gesi.org/research/download/13>

³⁶ <https://www.gov.uk/government/statistical-data-sets/tsgb01-modal-comparisons>

³⁷ <https://www.gov.uk/government/statistical-data-sets/energy-and-environmental-data-sets>

³⁸ <https://tfl.gov.uk/info-for/media/press-releases/2014/october/new-routemaster-buses-on-route-453>

Data on the total retail and personal business trips distance is obtained from Government data. Reduction of car trips considers the increased penetration of electric vehicles over time, in order to avoid overestimating carbon savings.

Transport Modal Shift

This goal analyses the carbon savings that can be achieved through a modal shift in the way we travel. It specifically uses targets from the Movement for Growth strategy³⁹ for car and bicycle usage, set for 2041 and 2033, respectively, with car usage reducing from around 65% of trips to 35-45%, and bike trips make up 10% of all trips. In addition, public transport is envisaged to cover a much larger proportion of trips. This is in line with some other European cities, such as Munich, as reported in an academic paper⁴⁰.

The number of trips for the West Midlands and fuel efficiency data has been obtained from Government data^{41,42} (specific to the West Midlands) to calculate savings. The total energy saving is split across fuels (petrol, diesel and electricity) on an annual basis to avoid double counting carbon savings from electrification of transport.

The present and future distribution of trips in the WMCA (as per the High scenario) is compared to that of Munich in the graph below:

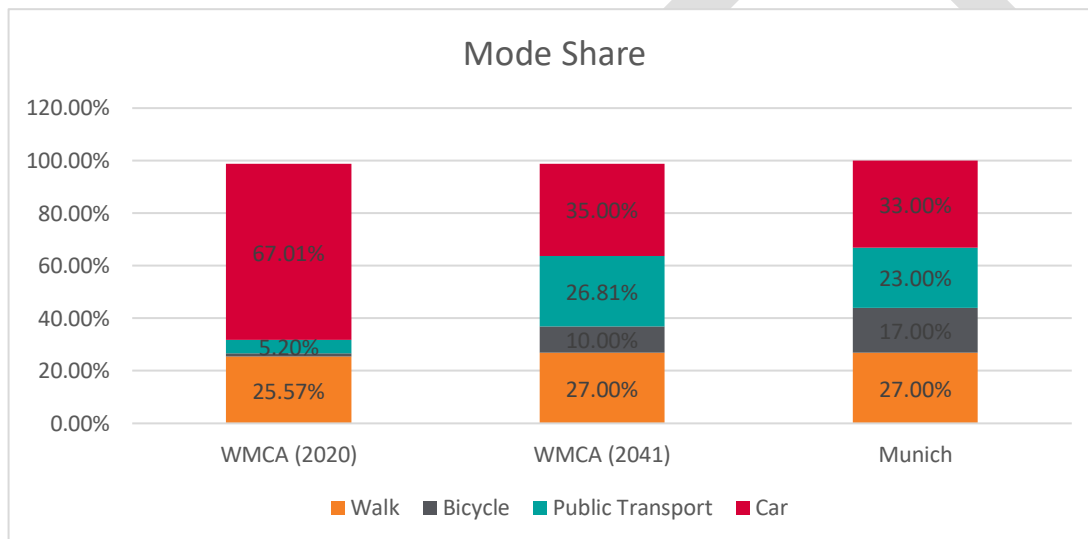


Figure 1 – Comparison of transport modal share distribution in WMCA (current), in WMCA by 2041 and in Munich.

Bus and Taxi Fleets

This goal explores the electrification of buses and taxis in the WMCA area. The number of licensed taxis and average distanced travelled per person in the WMCA is taken from Government data^{43, 44}. Fuel consumption and efficiency data for ICE⁴⁵ (Government data) and electric cars⁴⁶ (Low Carbon Vehicle Partnership data) is used to calculate gasoline and diesel savings and increased electricity consumption.

Petroleum total consumption for buses in the WMCA is available from the model (based on sub-national Government data⁴⁷) and fuel efficiency from London buses' consumption averages⁴⁸. Electric bus energy consumption is taken from LowCVP data⁴⁹.

³⁹ <https://www.tfwm.org.uk/strategy/movement-for-growth/>

⁴⁰ https://www.researchgate.net/publication/301903071_Reducing_car_dependence_in_the_heart_of_Europe_Lessons_from_Germany_Austria_and_Switzerland

⁴¹ <https://www.gov.uk/government/statistical-data-sets/nts03-modal-comparisons>

⁴² <https://www.gov.uk/government/statistical-data-sets/energy-and-environment-data-tables-env>

⁴³ <https://www.gov.uk/government/statistical-data-sets/taxi01-taxis-private-hire-vehicles-and-their-drivers>

⁴⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/833569/taxi-and-phv-england-2019.pdf

⁴⁵ <https://www.gov.uk/government/statistical-data-sets/energy-and-environment-data-tables-env>

⁴⁶ <https://www.lowcvp.org.uk/initiatives/lceb/local-policy/lta-toolkit.htm>

⁴⁷ <https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level>

⁴⁸ <https://tfl.gov.uk/info-for/media/press-releases/2014/october/new-round-trip-times-for-buses-on-route-453>

⁴⁹ <https://www.lowcvp.org.uk/initiatives/lceb/local-policy/lta-toolkit.htm>

Heavy Goods Vehicle Fleet

This goal considers the decarbonisation of HGVs and its associated carbon reduction from lower consumption of diesel. While there is still uncertainty in terms of the technology which will displace conventional HGVs, it has been assumed that a direct-electric solution will be used, as it will provide the lowest operational costs. However, it is acknowledged that other solutions, such as hydrogen, could have a role in the decarbonisation of HGVs. A hydrogen solution will result in higher electricity requirements to decarbonise HGVs, owing to the energy lost in the production, transportation and storage of hydrogen when compared to a direct-electric solution.

Petroleum total consumption for buses in the WMCA is available from the model (based on sub-national Government data⁵⁰). Fuel efficiency for HGVs is taken from Government data⁵¹, and energy efficiency for electric HGVs is taken from an academic analysis carried out by Transport & Environment⁵². The amount of required electricity to decarbonise HGVs can therefore be calculated.

Accelerated EV uptake

The Business as Usual scenario already considers the 2030 ICE ban for cars and vans announced by the Government in November 2020, as part of their Ten Point Plan⁵³. This has been modelled as a slow, natural replacement cycle of vehicles over their life period out to 2050. However, the CCC's most recent analysis, published in December 2020, to meet their advised Sixth Carbon Budget, projects a much higher uptake of electric vehicles during the 2020s and 2030s. As such, this goal considers the shift in carbon savings from the updated timeline.

This goal uses data from the CCC's recently released Sixth Carbon Budget⁵⁴ on the projected trajectory for new EV car sales⁵⁵. Car sales in 2020 are taken from Government data. Car life is assumed as 14 years. The high goal uses the Tailwinds scenario, the medium goal uses the Balanced Pathway scenario and the low goal uses the Headwinds scenario. The EV uptake trajectory for each scenario can be seen below:

Table 11. EV uptake trajectories according to each of the CCC scenarios.

Year	Tailwinds	Balanced Pathway	Headwinds
2020	1.19%	1.19%	1.19%
2021	1.48%	1.45%	1.37%
2022	2.43%	2.31%	2.01%
2023	3.96%	3.66%	2.89%
2024	6.45%	5.80%	4.11%
2025	10.48%	9.16%	5.80%
2026	14.95%	13.02%	7.98%
2027	19.93%	17.44%	10.81%
2028	25.47%	22.51%	14.50%
2029	31.65%	28.34%	19.32%
2030	38.54%	35.05%	25.64%
2031	45.37%	41.81%	32.03%
2032	52.14%	48.61%	38.50%
2033	58.85%	55.35%	45.04%
2034	65.50%	62.03%	51.68%
2035	71.57%	68.17%	57.97%
2036	77.26%	73.96%	64.05%
2037	82.38%	79.26%	69.86%
2038	86.60%	83.82%	75.32%
2039	89.40%	87.23%	80.30%
2040	91.75%	90.16%	84.79%
2041	93.60%	92.53%	88.65%

⁵⁰ <https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level>

⁵¹ <https://www.gov.uk/government/statistical-data-sets/energy-and-environment-data-tables-env>

⁵² https://www.transportenvironment.org/sites/te/files/publications/20180725_T%26E_Battery_Electric_Trucks_EU_FINAL.pdf

⁵³ <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution>

⁵⁴ <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

⁵⁵ <https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01>

Land Use Natural Capital

This goal and the assumptions behind the calculations have been provided separately in Appendix C.

Land Use Renewables

This goal considered the potential for the development of large-scale renewable installations, namely onshore wind and solar PV. This goal used input from the GIS analysis, which identified areas that are ideally suited for solar and wind development. The list of constraints includes requirements on the type of land as well as resource constraints.

For wind developments, a density of 9 ha per MW was used, as per the West Midlands Renewable Capacity Study⁵⁶. This was validated against a range of UK wind farms (Whitelee⁵⁷, Scout Moor⁵⁸ and Cefn Croes⁵⁹). For areas of less than 20 ha, a density of 1 MW per 3 ha was used, as projects with very few turbines (e.g. in a farm) require less spacing. The average UK wind factor of 26.6% was used to calculate energy generation (conservative assumption, as new wind farms are better designed), taken from BEIS data⁶⁰.

For solar developments, a density of 2 ha per MW⁶¹ was used. The average UK solar PV factor of 11.1% was used to calculate energy generation, taken from BEIS data⁶².

⁵⁶ <https://www.stratford.gov.uk/doc/205885/name/ED481%20Renewable%20Energy%20Capacity%20Study%20for%20the%20West%20Midlands%20March%202011.pdf>
<https://www.stratford.gov.uk/doc/205885/name/ED481%20Renewable%20Energy%20Capacity%20Study%20for%20the%20West%20Midlands%20March%202011.pdf>

⁵⁷ <https://www.scottishpowerrenewables.com/pages/whitelee.aspx>

⁵⁸ <http://www3.lancashire.gov.uk/council/meetings/displayFile.asp?FTYPE=M&FILEID=8454>

⁵⁹ <https://www.thewindpower.net/wind-farm-1452-cefn-croes-inc-devils-bridge-bryn-du-nffo-contract-nd-nd.php>

⁶⁰ <https://www.gov.uk/government/statistics/energy-trends-section-6-renewables>

⁶¹ [https://www.solar-trade.org.uk/solar-farms/#:~:text=Some%20facts%20about%20solar%20farms&text=%E2%80%93%20For%20every%205MW%20installed%2C%20a,megawatts%20\(MW\)%20of%20installation](https://www.solar-trade.org.uk/solar-farms/#:~:text=Some%20facts%20about%20solar%20farms&text=%E2%80%93%20For%20every%205MW%20installed%2C%20a,megawatts%20(MW)%20of%20installation)

⁶² <https://www.gov.uk/government/statistics/energy-trends-section-6-renewables>

APPENDIX F – MACC ASSUMPTIONS

Marginal Abatement Cost Curves (MACC) are regularly used by organisations concerned with the climate change. They help visualise complex data about carbon costs and emissions volumes. It is a way of ranking and comparing different technologies, actions or projects by cost and GHG saving. The MACC is an aid to decision making that provides a simple way of identifying which projects are the most cost effective per unit of CO₂e abated and which options offer the greatest abatement potential.

Projects which have the lowest cost per CO₂e 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 development of a MACC allows the size and cost of carbon reduction options to be compared.

The creation of the MACC curve for each of the goals modelled for the Combined Authority involves a number of steps. The following parameters are considered:

- total project costs (CAPEX)
- project implementation year (i.e. when CAPEX is committed/savings start)
- project lifetime (i.e. how long savings continue for)
- annual energy or other OPEX savings, split by fuel (excluding carbon price or other financial incentives / support mechanisms)
- fuel prices
- carbon emission factors for the fuels

From the above data, the Net Present Value (NPV) of each intervention and the lifetime GHG savings can be calculated.

In (NPV) calculations, cash inflows are traditionally shown as positive values and cash outflows are negative values. However, the notation for MACC curves is that a positive NPV equates to a negative carbon abatement cost (i.e. the lifetime cost is a net saving).

The Marginal Abatement Cost is therefore calculated by dividing the negative value of the NPV of the cashflows by the lifetime GHG savings, which is not discounted. The NPV value considers the current year (e.g. 2021) as year 0, with all cash flows discounted back to this year using the specified discount rate (3.5% in this case). Discounting reflects the fact that the cost or savings today are more valuable than a similar cost or saving in the distant future. Low discount rates increase the long-term net benefit of a technology compared to its initial cost and so brings more technologies under the zero line of the MACC.

The Marginal Abatement Cost in £/tCO₂e is obtained by dividing the negative of the NPV of the project (in today's prices) by the total CO₂e abated by the project over its lifetime. In line with current World Bank guidance, the CO₂ saving itself is not discounted over time.

The results for each measure are then stored in ascending order of £/tCO₂e (y-axis of MACC curve) with the largest negative figure first (i.e. measures which result in a net cash inflow) and the largest positive figure last, (i.e. measures with a net cash outflow). Next to each of the projects the lifetime and annual carbon savings (tCO₂) are presented (x-axis of MACC curve).

A MACC can be used to aid decision making; however, it does not replace technical knowledge and experience; it does not tell you which projects to implement and which not. It simply provides a graphical representation of the least cost approach to meeting carbon targets. Similarly, it does not necessarily consider which technologies are mutually exclusive or inter-dependent or factor in risk in any way.

In preparing the Marginal Abatement Cost Curve for each of the goals, a number of assumptions were made. These are listed below.

Global Assumptions

The following data sources were used across the model

- Retail Gas Prices - Treasury Green Book, Table 5, Central Estimate
- Retail Electricity Price - Treasury Green Book, Table 5, Central Estimate
- Retail Petroleum Price – BEIS Fossil fuel price assumptions: 2019
- Gas Emissions Factor (static value) – BEIS Greenhouse gas reporting: conversion factors 2020
- Electricity Emissions Factors to 2041 - Treasury Green Book, Table 1
- Petroleum Emissions Factor (static value) – BEIS Greenhouse gas reporting: conversion factors 2020

Domestic Energy Efficiency

This goal considered a basic retrofit package considering the potential of a number on measured designed to reduce heating consumption. These have been assumed to be applicable to homes which currently do not have the technology and where it may be installed (e.g. 14% of dwellings with cavity walls are insulated). Whilst the key measures are listed below there are other methods of reducing heating and domestic hot water consumption such as improving air tightness or fitting tap aerators. Behavioural change is also not captured below; this has the potential to have significant impact but will require long-term, continual action to maintain. Alternatively, whole-house retrofits (such as enerphit) may be employed and have even larger impact.

	APPLICABILITY	BUNGALOW	FLAT	TERRACED	SEMI-DETACHED	DETACHED	OTHER
Smart Thermostats	94%	£150	£150	£150	£150	£150	£150
Smart Meters	69%	£-	£-	£-	£-	£-	£-
Cavity Wall Insulation	14%	£500	£300	£350	£480	£550	£436
Solid Wall Insulation	27%	£5,000	£4,300	£5,500	£7,000	£8,900	£6,140
Loft Insulation	18%	£430	£180	£180	£180	£220	£238
Double Glazing	7%	£5,800	£1,200	£3,200	£4,800	£5,000	£4,000

Energy savings are based on a reduction in gas consumption, though broadly similar savings could be achieved if an air source heat pump were assumed.

	2021 TO 2041	2021 TO 2026
Discount Rate	3.50%	3.50%
NPV	-£874,128,835	-£1,027,110,445
Total Carbon Saving (tCO ₂)	7,425,781	33,908
Marginal Abatement Cost (£/tCO ₂)	£117	£1,620

Domestic Heat Pump Retrofit

This goal considers the benefit of replacing current fossil fuel heating systems (predominantly gas boilers) within dwellings with nominally air source heat pumps. An average (existing) gas boiler efficiency of 75% is assumed and

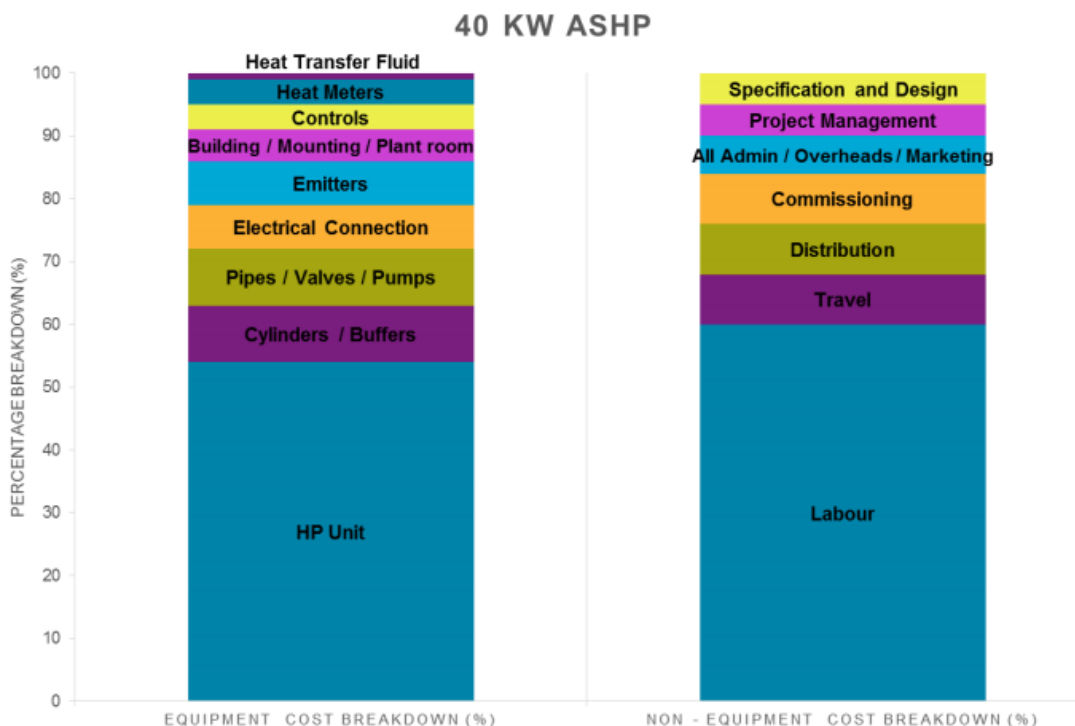
heat pump COP of 2.65. wider costs around modifying heating distributions systems are not considered as are electrical infrastructure upgrades.

	BUNGALOW	FLAT	TERRACED	SEMI-DETACHED	DETACHED	OTHER
Capex per unit	£7,700	£6,900	£8,100	£8,100	£10,800	£6,934
No of Properties	48,390	251,980	358,610	373,520	130,660	15,100

The capital costs above are based on present day installation costs for individual units. These are like to reduce, because:

- **Legislation** – the ban on gas boilers due to come in force in 2025 will push widespread take up of this technology allowing for further competition (new entrants into the market place) and economies of scale
- **Training** – currently there are relatively few heating engineers qualified to install a heat pump. As the number of people trained up increases the labour costs are more likely to fall.
- **Standardisation** – Standardisation of installations may mean less time is required to design and maintain systems while also opening up installation to less qualified personnel.
- **Mass Rollout** – By undertaking a mass roll out, the economies of scale could be further achieved via centralised purchasing
- Removing the 20% VAT rate on heat pump equipment and the 5% VAT rate on heat pump labour costs¹

Figure 1 - Current cost breakdown of a 40 kW ASHP (retrofit)²



Domestic Photovoltaic Systems

This goal considers the impact of installing rooftop solar on existing dwellings. An installed cost of £800 per kWp has been assumed here which is less than the current market rate for domestic systems. There are several bulk solar

¹ <https://www.london.gov.uk/sites/default/files/heat-pump-retrofit-in-london-v2.pdf>

² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/498962/150113_Delta-ee_Final_ASHP_report_DECC.pdf

purchasing schemes operational within the UK. Data from Solar Together London suggests that on average bulk purchasing has reduced costs by 35%. The 35 per cent average discount of the panels over market prices ranges from 10 per cent discount for the smallest solar photovoltaic system in the scheme (four panels) to 41 per cent for the largest system of 36 panels. The most common system of 10 panels comes in at 31 per cent below the baseline market price³.

What is proposed by this project is an order of magnitude higher than the reference projects, so there are potential further savings to be had, but, as this is already a commercialised technology this will be more on the installation costs than the cost of equipment.

Commercial Energy Efficiency

This goal considered the energy abatement potential of a range a non-domestic building types. The cost for abatement were pro-rated from the table below for the building stock in the Combined Authority.

Figure 2 - Abatement Potential by Sector⁴

Sector	Capital Expenditure required to deliver abatement potential (£ billion)	Baseline		Abatement potential		
		Annual electrical energy consumption (GWh/year)	Annual non-electrical energy consumption (GWh/year)	Annual electrical energy savings (GWh/year)	Annual non-electrical energy savings (GWh/year)	Overall reduction (%)
Retail	5.8	21,670	5,670	7,250	2,180	34
Offices	6.8	18,840	8,780	6,270	4,280	38
Hospitality	1.8	8,760	8,230	2,040	2,260	25
Industrial	4.6	11,320	14,410	4,520	7,190	46
Storage	2.5	7,440	5,670	2,430	2,690	39
Health	1.7	6,240	11,140	2,350	4,730	41
Education	2.1	4,930	10,100	1,670	5,090	45
Emergency services	0.6	1,260	2,970	530	1,610	51
Military	0.3	690	1,150	380	610	54
Community, arts & leisure	2.2	3,680	8,110	1,450	3,640	43
Total	28.4	84,820	76,240	28,870	34,290	39

Commercial Heat Pump Retrofit

This goal considers the benefit of replacing current fossil fuel heating systems (predominantly gas boilers) within commercial properties with nominally air source heat pumps. A slightly higher CoP of 2.75 is assumed here. A cost of £27 per sqm is assumed here for a building level air source heat pump system with refrigerant distribution to fan coil units and a separate system for domestic hot water preparation.⁵

³ <https://www.london.gov.uk/press-releases/mayoral/mayor-expands-solar-panel-scheme>

⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/565748/BEES_overarching_report_FINAL.pdf

⁵ https://www.london.gov.uk/sites/default/files/low_carbon_heat_heat_pumps_in_london.pdf

Commercial Photovoltaic Systems

This goal considers the impact of installing rooftop solar on existing commercial properties. An installed cost of £750 per kW has been assumed here which is typical for a medium sized commercial system.

Industrial Energy Efficiency and Fuel Switching

This goal has not been included within the MACC due to the level of uncertainty around the costs for full implementation. Resources should be devoted around research and development as well as working with local actors to trial projects and technologies.

Industrial Photovoltaic Systems

This goal considers the impact of installing rooftop solar on existing industrial properties. An installed cost of £750 per kW has been assumed here which is typical for a medium sized commercial system. Other renewable technologies are also possible especially around usage of biomass and wastes as well as via the use of circular economy principles.

Transport Demand Reduction

This goal considers the potential of reducing the need to demand and digitisation of services. This is already underway with the increase in working from home, (especially during the recent pandemic), as well as growth in online shopping. The cost attributed to this goal is related to providing ultrafast broadband to all dwellings within the WMCA. The current penetration of ultrafast broadband varies across the seven local authorities from 71% to 93% of dwellings⁶. In total the number of dwellings that are still without are in the region of 180,000. The cost of providing broadband to homes averages less than £500 per dwelling⁷, though it is likely the outstanding dwellings are those considered harder to reach.

The true cost of this goal is associated with ensuring rebound effects are limited. This includes:

- Creating local flexible working spaces which reduces commuting distances and allows people to reach offices by walking or via active travel. It is likely that in the future many people would still choose to not fully work from home and this would facilitate this and provide a halfway house between working from home and travelling to large central offices.
- Many homes also do not have adequate space for a home office and so working from home in the long term would be unsustainable (working from bedrooms, in noisy environments or on kitchen counters may have physical and mental health implications). There is a role in planning in ensuring all new dwellings have adequate home working spaces and also understanding the changes that may be needed to existing dwellings.
- Creating local community spaces which centralise deliveries. The key here is to reduce the number of LGV deliveries that go street to street and instead have local delivery locations where people can reach via walking. This goes hand in hand with other freight exchange initiatives.

Transport Modal Shift

This goal has not been included within the MACC due to the level of uncertainty around the costs for full implementation and indirect impacts. There are some known costs associated with providing additional infrastructure say to facilitate active and public travel (cycle pathways, BRT routes etc). But wider costs are more difficult to estimate. In order to create transport modal shifting, there will also require a change in planning such that destinations

⁶ <https://www.wmca.org.uk/media/2230/infrastructure.pdf>

⁷ <https://www.ispreview.co.uk/index.php/2019/06/ofcom-uk-examines-the-cost-of-deploying-full-fibre-broadband.html>

are co-located next to public transport rather than only being accessible by cars (transport-orientated developments). This would be a rapid shift in how cities are planned. Another consideration is demand management measures to reduce the reliance on cars; this includes increasing the cost of driving to make it less desirable.

Bus and Taxi Fleets

There are over 21,000 licensed taxis in the Combined Authority and the analysis is based on each operated 30,000 miles per annum. The figures have been obtained from the Low Carbon Vehicle Partnership⁸ and only the additional costs (over what is assumed to be committed) included.

	CAPEX	OPEX
Electric Taxi (e.g. Nissan Leaf)	£25,190	£1,255
Normal Taxi (e.g. Skoda Octavia)	£19,810	£2,936
Additional cost	£5,380	-£1,681

A similar source was used to estimate the capital and operational cost for electric buses. The capex was assumed to be £105,000 more to purchase and £18,000 per annum cheaper to operate⁹.

In both of these cases the infrastructure costs associated with developing charging hubs at key locations are not included.

Heavy Goods Vehicle Fleet

This goal has not been included within the MACC due to the level of uncertainty around the costs for full implementation. As HGVs operate nationally as well as internationally there is a wider need for co-operation and linking thinking to prevent stranded assets.

Accelerated EV uptake

This goal has not been included within the MACC due to the level of uncertainty around the costs for full implementation. The goal is linked to the assumptions made by the Committee on Climate Change and would need considerable resources to ensure adequate infrastructure is in place. Planning will also play a major role as will local initiatives similar to the electric vehicle experience centre in Milton Keynes.

Land Use Natural Capital

The costs presented here includes the cost woodland planting and establishment costs and woodland management costs. The cost of these activities exceed £230 million. The key point here is that there is no nature payback or income stream mechanism considered. It is likely income will be available either from sale of timber or the proposed government ELM scheme.

Land Use Renewables

⁸ http://www.lowcvp.org.uk/assets/reports/LowCVP_Low_Emission_Taxi_Guide-March_2019_Update.pdf

⁹ <http://www.lowcvp.org.uk/assets/presentations/7-%20Fast%20Charging%20in%20Nottingham%20-%20Steve%20Cornes,%20NCC.pdf>

The present-day costs of photovoltaics include cost of modules, inverters, grid costs, balance of system costs etc. the rental of land is also included as a minor cost. The total cost is estimated to in the region of £500,000 per MWp. Equipment costs are likely to drop over the next ten years.

BEIS electricity generation costs are used to estimate the installed cost of wind at £1m per MW¹⁰.

There are no obvious income mechanisms currently and therefore it is assumed there is an income from Power Purchase Agreements (PPA) at around £50 per MWh.

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¹⁰ <https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020>

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APPENDIX G – JOBS & SKILLS APPENDICES

APPENDIX G-1 – TRANSITION LITERATURE REVIEW

As part of the literature review approximately 20 studies, policy documents and academic papers relating to net zero jobs & skills and the green economy have been reviewed. However, for the purposes of the Five Year Plan not all items that were reviewed are included as part of this appendix; only the material most relevant to the West Midlands Combined Authority Five Year Plan have been included.

SKILLS TRANSITION

Skills related to jobs in the renewable sector, construction and waste management are amongst those required for a low-carbon economy. “Green skills” were defined and listed by the government report for a Green Economy¹ as follows:

1. Resource efficiency,
2. The low-carbon industry,
3. Climate resilience; and
4. Skills to manage natural assets.

Current government policy hasn’t always matched demand for green skills with supply of green skills. A National Open College Network report highlighted the need to address skills across all sectors with a focus on:

- **Management skills** to enable identification of potential and confidence pushing forward performance improvements and digital changes,
- **Employability and generic skills**, particularly literacy, numeracy, digital and cognitive skills; and
- **Technical skills and knowledge**, to support the transition to an AI- and digital-based economy.

Meeting Net Zero targets will have a significant impact on the labour market, and it is vital that those in their early years of employments and those in the latter years of their working career are provided with the right education, training and re-training opportunities to meet future job needs. Increased investment in the green sector and increased demand for certain occupations may not affect skills needed in some occupations, for example demand for railway workers may increase due to greater investment in public transport².

Table 1 provides an overview of the levels of skill and occupational change involved in moving towards green jobs. It takes as its starting point the degree of skill change required on the labour market, matches this with corresponding occupational change and specifies the typical skills response required and gives examples for each level.

Table 1 - Changes in skills and occupations for green jobs

Skill change	Change	Examples	Skills response
Low	Changing established occupation	Welder for wind turbines production	On-the-job and short training courses

¹ Cutting Carbon, Growing Skills, TUC (2020)

² Skills for Green Jobs A Global View, International Labour Organisation, 2011

Medium	Changing of emerging occupation	Mechanic for EV/hydrogen vehicles	Training Courses
High	New and emerging	Smart energy systems	Longer training courses and university degrees

The level of occupational change depends on the degree of skills change: from none (for example railway worker) to high when new occupations emerge, (for example that of smart energy analyst or heat pump engineer). In the middle of this range are numerous established occupations whose content is altered with the adoption of new green technologies or of new green methods of production. These include engineers, managers or technicians who install and maintain new technologies or implement new energy efficiency standards.

Emissions-intensive manufacturing, in particular the automotive sector and related supply chains, is shifting focus to electric vehicles. Increased investment in green sector and increased demand for certain occupations may not affect skills need in some occupations, for example demand for railway worker may increase due to greater investment in public transport. 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 technical, managerial, and leadership skills will be important for the transition.

In 2008 a green skills checklist³ was developed by the Government on the skills implications of the transition to a low-carbon and resource-efficient economy. The list includes ten broad groups of skills (tier 1), relevant across sectors, which are broken down into general skills categories (tier 2) and more specific skills (tier 3).

Table 2 - Green skills checklist

Tier 1	Tier 2	Tier 3
Design skills	Eco-design	Design for disassembly, design for recyclability, design for the environment, design for effective energy use, legislation and regulatory compliance.
	Green manufacturing	Legislation and regulatory compliance, integration of process waste
	Materials specification	
	Life-cycle assessment/costing	
Waste skills	Waste quantification and monitoring	Waste production calculations, mass balance, waste audit
	Waste process studies	Material/substance flow analysis, resource utilization mapping life-cycle assessment
	Waste management systems	Objective setting, legislative and regulatory compliance, collection, segregation, waste cycle management, 3R implementation (reduce, reuse, recycle), hazardous waste management, landfill requirements, communications/implementation campaigns
	Waste minimisation	Industrial symbiosis, integration of process waste
	Waste technologies	Recycling, waste-to-energy
Energy skills	Energy minimization	Energy reduction programmes, heat recovery and re-use, energy efficient technologies, energy-efficient practices, communications/implementation campaigns, enhanced capital allowance technologies and schemes

³ Pro Enviro: Skills for a low-carbon and resource efficient economy (LCREE), Report for DEFRA (2008).

	Energy management systems	Objective setting, legislative and regulatory compliance, energy base loads and variable loads, energy audit, energy review, communications/implementation campaigns
	Energy quantification and monitoring	Monitoring targeting and reporting, use of half-hourly data, use of 3. Energy skills sub-meters, computer-based data logging and energy management systems, energy data manipulation software systems
	Energy costs and trading	Energy markets and pricing, carbon trading schemes, climate change levy agreements, energy price trends, enhanced capital allowances, peak oil and impact on energy supplies and prices
	Renewable energy technologies	Solar, wind, biomass, combined heat and power, photovoltaic, ground source heat pump, air source heat pump, hydro, hydrogen, fuel cell, integration into energy supply
	Non-renewable technologies	Nuclear, incineration with energy recovery, clean fossil fuel technologies, carbon sequestration, waste-to-energy
Water skills	Water use minimisation and water re-use	Grey water, water harvesting, wastewater recovery, recycling, cascading, waste/water recovery, effluent treatment, sludge/slurry dewatering, leak detection
	Water management systems	Objective setting, legislative and regulatory compliance, water audit, water consumption review, communications/implementation campaigns
	Water quantification and monitoring	Sub-metering, data collection, water use calculations
Building skills	Building energy management	Monitoring targeting and reporting, use of half-hourly data, use of sub-meters, computer-based data logging and energy management systems, energy data manipulation software systems, building energy assessment
	Integration of renewable energy	Photovoltaics, wind turbines, combined heat and power, fuel cell
	Energy-efficient construction	Insulation (cavity wall, loft, paperwork), regulatory compliance, passive heating, building regulations
	Facilities management	Building energy management systems, management and maintenance of water, waste management
	Calculating building energy efficiency and carbon ratings	U value calculations, building energy assessment, carbon rating
Transport skills	Transport impact minimisation technologies	Hybrid vehicles, biodiesel, electric vehicles, fuel-efficient vehicles
	Transport impact minimisation processes	Alternative transport strategies, communication/implementation campaigns, car-sharing schemes, public transport planning, public transport implementation, cycle network planning, cycle network implementation, transport modelling
	Transport management in business	Transport modelling, route planning and management, distribution and collection system
Material skills	Sourcing	Sources of low-energy materials, sources of low-mileage materials, recyclates (secondary materials), energy-efficient raw material extraction, industrial symbiosis, transport mileage
	Procurement and selection	Use and properties of low-energy materials and of recyclates, industrial symbiosis, low-carbon and resource-efficient

		procurement, cost impact of climate change on material procurement
	Material use and impact quantification	Material usage calculations, life-cycle assessment and costing
	Management systems	Material use planning, material flow process design and implementation, energy-efficient process design and implementation
	Impact and use minimisation	Life-cycle assessment and costing, energy-efficient process implementation, material flows analysis
Financial skills	Investment models	Carbon trading, EU Emissions Trading Scheme, UK Emissions Trading Scheme, enhanced capital allowances
	New/alternative financial models	Energy technologies investment models, carbon derivatives investment models, calculation of payback/return on investment
	Quantification of climate change impacts	Impact assessment of climate change on business finances, impact of climate change on materials availability and cost, carbon neutrality and associated cost/opportunities (costs of doing nothing), risk/opportunity assessment models for adaptation and mitigation, insurance risks/opportunities of a low-carbon economy
	Principles of low-carbon and resource-efficient	Polluter pays principle, externalities economies
	Tools of low-carbon and resource-efficient	Climate Change Levy agreements, enhanced capital allowances, cost – economies benefit analysis, low-carbon and resource-efficient procurement
Management skills	Impact assessment	Energy use calculations, water use calculations, waste production calculations, carbon foot-printing calculations, emissions measurement
	Business planning	RE planning, low-carbon planning, integration of RE and low carbon into business planning cycles, climate change risks, climate change adaptation and mitigation responses (as part of business risk management), understanding low-carbon and resource efficiency skills requirements and long-term planning
	Awareness raising	Communication/implementation campaigns skills
	Opportunities management	Identification of low-carbon and resource efficiency opportunities, cost–benefit analysis
	Risk management	Identification of low-carbon and resource scarcity risks, cost–benefit analysis
	Day to day management	Low-carbon and resource-efficient procurement, integration of low-carbon and resource efficiency skills, due diligence, management systems, low-carbon and resource efficiency skills requirements for recruitment
Policy and planning skills	Built environment master planning and implementation	Low-carbon spatial planning, zero waste planning, resource-efficient planning, low-carbon and resource-efficient urban design, building regulations, public transport planning and implementation, cycle network planning and implementation
	Strategy development	Impact assessment and modelling, principles of low-carbon and planning skills resource efficiency
	Strategy implementation	Understanding of skills needs for HR managers, low-carbon and resource-efficient material sourcing and procurement, awareness raising/communications skills

It is clear both from this checklist and from the definitions of green skills quoted above that the West Midlands needs a broad range of knowledge, technical, managerial and conceptual skills at its disposal. Many of these are specific new skills such as knowledge of sustainable materials, carbon footprinting skills or environmental impact assessment.

It is also clear that some of these skills are not necessarily green or low carbon but are only as green as the context in which they are applied. For example, knowledge of building regulations only leads to more energy-efficient buildings if the right regulations are in place. Building skills may be green only when they are applied in the green building industry. However, this does not make building skills as such irrelevant for green jobs. The essential point is that skills are possessed by the workforce, who can apply them in different contexts.

Training policies are 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 the declining sectors to jobs with similar skills in emerging sectors⁴.

- **Supply side policies** - Active labour market programmes and skill development systems to facilitate a smooth re-integration of jobseekers into employment.
- **Demand side policies** - Strong product market competition and moderate employment protection are important to facilitate the creation of new competitive green sectors.
- **Income support** - Unemployment insurance and in-work benefits can help to ensure that the transition is not achieved at the cost of excessive insecurity or inequality for workers.
- **Regional support policies** - Regions with a heavy reliance on fossil fuel and energy intensive industries might require specifically targeted policy measures to facilitate the transition.

Specifically, targeted labour market policies might be necessary in geographic regions with a high share of the labour force working in fossil fuel and energy-intensive sectors.

Jobs created

Across the UK there could be as many as 694,000 direct jobs employed in the low-carbon and renewable energy economy by 2030⁵.

- Nearly half (46%) of the total low-carbon jobs by 2030 will be in clean electricity generation and providing low-carbon heat for homes and businesses. These jobs will range from manufacturing wind turbines, deploying solar PV, constructing nuclear reactors, installing heat pumps and maintaining energy-system infrastructure.
- Over one-fifth (21%) of jobs by 2030 will be involved in installing energy efficiency products ranging from insulation, lighting and control systems.
- Around 19% of jobs in 2030 will be involved in providing low-carbon services (financial, legal and IT) and producing alternative fuels such as bioenergy and hydrogen.
- A further 14% of jobs will be directly involved in manufacturing low-emission vehicles and the associated infrastructure. These jobs will range from manufacturing electric vehicles and hydrogen vehicles, manufacturing EV batteries from the proliferation of giga factories and sustaining low-carbon mobility by installing electric vehicle charge-points and hydrogen refuelling stations.

The West Midlands is well-known for having a large and dynamic workforce engaged in the manufacturing and production of vehicles. Around half of automotive companies produce vehicle components in the West

⁴ Employment Implications of Green Growth: Linking jobs, growth, and green policies, OECD report for G7 Environmental ministers, June 2017

⁵ Local green jobs – accelerating a sustainable economic recovery, Ecuity, 2020

Midlands⁶. Increased demand for electric cars will increase jobs in West Midlands existing manufacturing capacity lies. This could be in the North West of England and West Midlands where automotive manufacturing supply chains are already well developed.

Across the West Midlands Combined Authority, there could be an estimated 72,000 jobs working in low-carbon sectors⁷. Most of these jobs would be focused on manufacturing low emission vehicles, battery packs and modules in factories situated near existing production sites. Additionally, jobs could 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. There is a relatively robust installer base due to previous boom in the sector, but this will have to increase.
- **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. There is a need for UK higher education institutions to deliver key skills such as engineering, physics and other core STEM subjects within the workforce.
- **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. However, increasingly requiring highly skilled software engineering expertise has anecdotally required a change in a recruitment tactic to broaden recruitment to wider regions
- **Green stimulus** - involves 'retrofit' of millions of homes over the next two decades, involving 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 a need to promote training and qualifications in these areas throughout the WMCA and the UK, otherwise there could be an under-capacity in workers especially in the short to medium term. For example, a recent Government research project⁸ into the heat pump manufacturing supply chain indicated that generally heat pump manufacturers are not concerned with skilling of the UK workforce as other industries (boiler, HVAC, and chiller manufacturers) have transferable skills. 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 of qualified engineers in the UK which could be a significant issue if heat pump growth takes place in the short term as expected. Refrigerant handling in the

⁶ Automotive Council Mapping UK Automotive. Accessed on 8th December 2020. Available from: <https://www.automotivecouncil.co.uk/mapping-ukautomotive/>

⁷ Local green jobs – accelerating a sustainable economic recovery, Ecuity, 2020

⁸ Heat Pump Manufacturing Supply Chain Research Project Report, Research carried out by Eunomia Research & Consulting Ltd on behalf of the Department for Business, Energy and Industrial Strategy, 2020.

<https://www.gov.uk/government/publications/heat-pump-manufacturing-supply-chain-research-project>

manufacturing process requires F-gas (Category 1) certification⁹. Without a promotion and increased levels of training, there could be a shortfall in F-gas certified installation engineers in the short to medium term.

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 livestock and dairy. This could see jobs in some key sectors significantly affected, though in each area there will also be new employment opportunities:

- The oil and gas sector is likely to be heavily affected in by 2041 due to falling international demand for oil and gas. Opportunities in this sector could involve a shift towards offshore renewables, CCUS and hydrogen, with measures to manage the carbon footprint of imported fuels.
- Falling demand for fossil fuelled vehicles, resulting from a transition to electric vehicles, is likely to reduce the number of jobs available in manufacturing and servicing these vehicles. The West Midland’s already produces electric vehicles, and opportunities exist for the UK to have a large share of future electric vehicle, and potentially battery, production and electric vehicle maintenance.
- Jobs in UK aviation and aeronautics sectors could be impacted.
- Income to livestock and dairy farms could be affected if meat and dairy consumption falls by the 20-50% envisaged in our scenarios. The UK’s farms and their 450,000 workers will need to be engaged and supported in the transition to low-carbon farming practices.
- Demand for manufacturing of some products or materials would likely reduce within the more circular economy. This could lead to a shift of some manufacturing towards recycling-based manufacturing and re-use-based services. The transition will also require some industries, such as manufacturing, to change the technologies, fuels or processes they use to costlier ones, while they continue to provide the same type of products or services.

The Governments newly created Green Jobs Taskforce will be at the heart of the transition to net zero. The taskforce forms 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 we 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 gigaplant production operators, heat pump installers and tree planters which have already been identified in this literature review.

Table 3 ~~Error! Reference source not found.~~ Table 3 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 West Midlands Combined Authority economy and the net zero transition.

Table 3 – Jobs and skills sector analysis

Sector	Jobs and skills
Transport	<ul style="list-style-type: none"> ▪ 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.

⁹ PPL Training (2020) F-Gas (Category 1) | City & Guilds 2079-11 (FCAT1), accessed July 2020, available at <https://www.ppltraining.co.uk/training-course/mechanical-and-electrical-technical/f-gas/f-gas-category-1-city-and-guilds-2079>

	<ul style="list-style-type: none"> ▪ 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 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Decarbonisation of the UK's important traditional heavy industrial base will be underpinned by decarbonising the power sector and by the introduction of new technologies ▪ New types of manufactured product, such as those taking plastic electronics and silicon electronics approaches ▪ Application of lean manufacturing methods ▪ Redesign of existing products with a focus on resource efficiency and a cradle to cradle approach, in which materials are continually recycled ▪ Minor reskilling for different treatment and processing of waste to energy ▪ 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

The findings from the literature review show some of the emerging roles that Net Zero will create need specific new skills and training and as such that there will need to train the WMCA labour force. It is also clear, however, that some of these new roles do not necessarily require dramatic increase in skill levels and can even make use of existing strengths in the West Midlands.

APPENDIX G-2 - JOBS & SKILLS POLICY LITERATURE REVIEW

WMCA

Table 4 presents a summary of relevant policies relating to jobs and skills and low carbon economy within the WMCA.

Table 4 – WMCA/LEP’s jobs and skills policy summary

Document	Conclusions
West Midlands Strategic Economic Plan	<p>The SEP sets out the vision for improving the quality of life of everyone who lives and works in the West Midlands with a focus on skills, innovation, transport and inward investment. Priority actions and SMART objectives are focused in the following areas</p> <ul style="list-style-type: none"> ▪ New manufacturing economy ▪ Creative and digital ▪ Environmental technologies ▪ Medical and life sciences ▪ Skills for growth and employment for all ▪ Housing ▪ HS2 growth ▪ Exploiting the economic geography. <p>There are four SMART objectives focused on employment and skills:</p> <ul style="list-style-type: none"> ▪ To improve the balance between the skills that businesses need and the skills of local people so that they have the skills and qualifications to access jobs ▪ Average earnings of working age population will be 13% above UK averages with the living wage as the foundation minimum wage ▪ Proportion of people qualified to NVQ4 or above will have increased to 36% to match the national average and the number with no qualifications will have fallen to 9% to match and then better exceed the national average ▪ Unemployment rate will be below the national average <p>The WMCA’s Productivity and Skills Commission supported net zero by ensuring the skills needs of businesses are met, with a particular focus on the needs of businesses in transformational sectors such as low carbon technologies and advanced manufacturing.</p>
West Midlands Local Industrial Strategy	<p>The West Midlands LIS sets out how the West Midlands will take advantage of the existing skills, infrastructure and innovation in the region to contribute towards the UK’s Grand Challenges. Construction and low carbon and future mobility technology are considered sector strengths in the WMCA.</p> <p>It specifically highlights that low carbon and environmental technology, skills and jobs are important as the sector is considered the most productive sector in the region based on GVA per employee, followed by digital and creative business, professional and financial services. Sets out the five strategic action areas:</p> <ul style="list-style-type: none"> ▪ Prepare young people for future life and work ▪ Create regional networks of specialist, technical education and training to help drive skills and productivity ▪ Accelerate the take up of good-quality apprenticeships across the region ▪ Deliver inclusive growth by giving more people the skills to get and sustain good jobs and careers ▪ Strengthen collaboration between partners to support achieving more collectively
West Midlands Regional Skills Plan	<p>The Skills Plan builds on the targets in the WMCA SEP; by 2030 the region’s productivity, salaries, skills attainment and labour market participation levels 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. 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.</p>
WM2041 - Actions to meet the climate crisis	<p>The framework outlined in this paper summaries the reasons to address climate breakdown and to adapt to climate change the opportunity it provides to create a highly productive, low carbon economy in the West Midlands. It reflects on the potential actions needed and suggests who needs to take these actions. It also highlights a £40bn investment</p>

<p>with inclusivity, prosperity and fairness</p>	<p>programme will be required over the 21 years (2020-2041) to deliver net zero. The high-level actions are as follows:</p> <ul style="list-style-type: none"> ▪ the West Midlands economy needs to shift to one which is zero carbon and abides by circular economy principles, while enabling the people of the region to build and enjoy their prosperity ▪ boost resilience to ‘locked in’ climate breakdown ▪ reconcile strong sectors like automotive without locking the region into congestion, polluted air and climate breakdown. ▪ build more places, and more connectivity between places in the West Midlands ▪ save energy and resources without reducing shared prosperity
<p>Black Country Local Enterprise Partnership - Strategic Economic Plan 2017-33</p>	<p>As part of the SEP the LEP have identified 3 overarching themes and 10 drivers of change to inform the plan. The themes are as follows;</p> <ul style="list-style-type: none"> ▪ People - Raising Employability, Education and Skills ▪ Place -Transforming the Black Country Infrastructure and Environment ▪ Business – Improving Black Country Business Competitiveness <p>As part of the aim to improve skills supply chain in the region there is a desire to extend the existing Black Country Skills Factory model beyond manufacturing to other growth sectors such as low carbon technologies. Expanding training programmes for emerging and changing roles as result of transition to lower carbon economy will be vital in ensuring there is suitable pool of workers in the region to deliver net zero by 2041.</p>
<p>Greater Birmingham and Solihull Local Enterprise Partnership - Strategic Economic Plan 2016-35</p>	<p>The overarching objective of the SEP is to create jobs and grow the economy of Greater Birmingham and in so doing raise the quality of life for its inhabitants. Successful delivery depends on:</p> <ul style="list-style-type: none"> ▪ Increasing business and workforce productivity and competitiveness – particularly by raising skills ▪ Stimulating demand led innovation ▪ Increasing private sector investment including overseas investment ▪ Increasing business survival and growth ▪ Increasing exports particularly amongst Small and Medium Sized Enterprises (SMEs) ▪ More inclusive growth that delivers benefits more widely and reduces unemployment, particularly in those parts of Birmingham and North Solihull with persistently high rates. <p>The plan highlights the importance of low carbon energy technologies clusters to achieving these objectives. The region is developing and commercialising new technologies which will be key to delivering smarter, more sustainable and more inclusive growth.</p> <p>The LEP wants local people to be inspired and skilled to fill employment opportunities that will come forward in future and continue to develop their skills. To do this the LEP have identified three key themes as part of their skills framework:</p> <ul style="list-style-type: none"> ▪ Ignite – igniting interest in jobs, raising awareness of career pathways, inspiring and influencing career choices. ▪ Accelerate – targeting those in work, to make skills and career progression, and drive increased productivity ▪ Retune – targeting unemployed people and those in employment whose skills no longer match labour market demand, ensuring they can gain skills or re-train to access the jobs created.
<p>Coventry and Warwickshire Local Enterprise Partnership – Skills strategy</p>	<p>The overall aim of the Skills strategy is to drive forward growth in the area, remove barriers to growth and to create more high value jobs. The skills strategy seeks to support this by developing a workforce with the right skills to meet employers’ needs. Currently the proportion of the workforce within the LEP area that is employed in Manufacturing and in Energy and Water is above the national average. Within these sectors, the LEP has particular strengths in Advanced Manufacturing and Engineering and Low Carbon Technologies, and in associated R&D supplied by major internationally renowned companies, plus private and public sector research establishments. The two primary goals of the CWLEP Skills Strategy are to:</p> <ul style="list-style-type: none"> ▪ promote significant upskilling of the local population so that it can take advantage of the future job opportunities that are likely to arise ▪ improve the work-readiness of new entrants to the labour market, including those gaining employment in the many lower skills occupations that will still exist <p>The skills strategies outline how the CWLEP plan to achieve this through agreements with employers, local authority’s and provider stakeholders to:</p> <ul style="list-style-type: none"> ▪ provide more apprenticeships, places and work placements;

	<ul style="list-style-type: none"> ▪ support SMEs by clarifying and better tailoring the training available to them, and providing a one-stop-shop for assistance; ▪ encourage local providers, including universities, to align their offer to LEP priorities, and in association with local employers to design tailored programmes linking qualifications to career progression in specific organisations; ▪ strengthen provision for the unemployed and for NEETs, including via involving voluntary agencies alongside mainstream providers; ▪ in conjunction with the National Careers Service and by other appropriate means, strengthen the publicity given to qualification and career paths available via locally based employers; ▪ coordinate as appropriate with emerging skills policies and action plans in adjoining LEPs and Authorities ▪ regular examination of the data relating to skills supply and demand so as to help reach informed judgements about the future directions of skills provision in the area.
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LOCAL AUTHORITIES

Table 5 presents a summary of relevant Local Authority policies relating to jobs and skills and low carbon economy within the WMCA.

Table 5 – WMCA Local Authority’s jobs and skills policy summary

Document	Conclusions
Birmingham Skills Investment Plan	<p>Ambition to get Birmingham residents in new jobs coming to the area from major employers and SME’s. Aims to create 70,000 new jobs by 2026 reduce employment rate and reduce people claiming welfare benefits. Skills and qualifications focus in the following areas:</p> <ul style="list-style-type: none"> ▪ Business and financial services ▪ STEM subjects (Advanced engineering and manufacturing) ▪ Information technology ▪ Health and social work ▪ HS2
Walsall Council: Employment and Skills Board	<p>Brings together key strategic private, public and voluntary sector agencies to address the issues within their agreed priority of ‘Ensuring People Possess the Skills to Work & Support Growth’. They work to ensure support for unemployed and local people possess skills to enter and progress in work.</p>
The Coventry Employment and Skills Plan: response to COVID-19	<p>The plan is a response to the COVID-19 pandemic and sets out the scale of the economic challenge and the local impact this has for the residents of Coventry. This includes:</p> <ul style="list-style-type: none"> ▪ Ensuring all education and training providers have clear progression pathways which are responsive and lead into the local labour market. ▪ Digital skills courses ▪ Increasing the skills courses offer across Coventry and sharing data and resources across FEs, ITPs, and Coventry City Council’s Adult Education Service.
City of Wolverhampton Strategic Economic Plan 2019 – 2024	<p>Wolverhampton’s Strategic Economic Plan will help to drive key priorities of Black Country Strategic Economic Plan</p> <ul style="list-style-type: none"> ▪ People through a working and inclusive city ▪ Business through an enterprising city ▪ Place through a vibrant and future city
Vision 2030 Sandwell	<p>Vision 2030’ sets out ambitions for the borough on ten key themes:</p> <ul style="list-style-type: none"> ▪ Raising aspirations and resilience ▪ Healthier for longer and safer ▪ Young people to have skills for the future ▪ Raising the quality of schools ▪ Lowering crime and antisocial behaviour ▪ Excellent public transport to the region and beyond ▪ Major new housing along transport routes and employment sites ▪ Create environments in the six towns where people choose to live ▪ Hosting industries of the future ▪ National reputation for getting things done

Solihull Council Plan 2020-2025	Delivering Sustainable Inclusive Growth based on: <ol style="list-style-type: none">1. Building a vibrant economy2. Promoting and delivering social value3. Enabling communities to thrive4. Actioning our climate change declaration5. Improving skills and access to good work As part of this plan Solihull plan to undertake education, skills and employment activities and responsive employment support, targeted at people from the most disadvantaged groups and communities in the area.
Dudley Council	Dudley Council declared a climate emergency and are discussing proposals to reduce their carbon footprint

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APPENDIX G-3 - JOBS & SKILLS BASELINE DATA

The core of economic strength of the WMCA is in 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. Table 6 provides a breakdown of key employment sectors in the WMCA.

Table 6 - Employment sectors in WMCA, 2019

Sector	Number of jobs
Agriculture, forestry and fishing	410
Mining and quarrying	295
Manufacturing	132,685
Electricity, gas, steam and air conditioning supply	5,500
Water supply; sewerage, waste management and remediation activities	10,800
Construction	58,590
Wholesale and retail trade; repair of motor vehicles and motorcycles	183,275
Transportation and storage	66,600
Accommodation and food service activities	80,975
Information and communication	30,060
Financial and insurance activities	42,110
Real estate activities	24,400
Professional, scientific and technical activities	84,675
Administrative and support service activities	135,145
Public administration and defence; compulsory social security	50,000
Education	126,750
Human health and social work activities	178,500
Arts, entertainment and recreation	23,250
Other service activities	24,800

Source: Office for National Statistics, Business Register and Employment Survey, 2020

This demonstrates the strengths in the automotive sector, alongside Logistics, Textiles and other specialised Manufacturing which have shaped the sub-regional economy, and all carry inherent transition challenges.

To understand which sectors are of greater or less importance to the WMCA economy, location quotients have been calculated. Location quotients (LQ) indicate which industries or occupations account for a higher share of employment in an area relative to a benchmark location – usually Great Britain. This provides an indication of the degree of specialisation across sectors within a local economy (compared to the national average). LQ is calculated by comparing an industry's share of employment against the national share. The general rule for analysing LQ calculated is as follows:

- Value > 1 – The industry is more important locally than it is nationally
- Value = 1 – The industry is equally important locally and nationally
- A value < 1 – The industry is less important locally than it is nationally

Table 7 - Location Quotient comparing WMCA against Great Britain

Sector	West Midlands: Great Britain
Agriculture, forestry and fishing	0.0
Mining and quarrying	0.1
Manufacturing	1.3
Electricity, gas, steam and air conditioning supply	1.0
Water supply; sewerage, waste management and remediation activities	1.3
Construction	0.8
Wholesale and retail trade; repair of motor vehicles and motorcycles	1.0
Transportation and storage	1.1
Accommodation and food service activities	0.8
Information and communication	0.6
Financial and insurance activities	1.0
Real estate activities	1.1
Professional, scientific and technical activities	0.8
Administrative and support service activities	1.2
Public administration and defence; compulsory social security	0.9
Education	1.2
Human health and social work activities	1.1
Arts, entertainment and recreation	0.7
Other service activities	1.0

Source: Calculated based on the Office for National Statistics, Business Register and Employment Survey, 2020

This shows the importance of the manufacturing, automotive and logistics sectors in the West Midlands compared to Great Britain. It will be important throughout the transition to Net Zero to focus on these sectors and ensure that training and skills programmes for the 5-year plan.

SKILLS LEVELS AND QUALIFICATIONS

High-skilled jobs require more specialised skills to be developed and this is measured by the level of qualifications the person has. Qualifications are defined under the National Vocational Qualifications (NVQ) assessment. The following is a breakdown of NVQs and their associated qualifications:

No Qualifications

No formal qualifications held.

Other Qualifications

Includes foreign qualifications and some professional qualifications.

NVQ1 Equivalent

Fewer than five GCSEs at grades A-C, foundation GNVQ, NVQ 1, intermediate one national qualification (Scotland) or equivalent.

NVQ2 Equivalent

Five or more GCSEs at grades A-C, intermediate GNVQ, NVQ 2, intermediate two national qualifications (Scotland) or equivalent.

NVQ3 Equivalent

Two or more A levels, advanced GNVQ, NVQ 3, two or more higher or advanced higher national qualifications (Scotland) or equivalent.

NVQ4 Equivalent and Above

Higher National Diploma, Degree and Higher Degree level qualifications or equivalent.

No Qualifications

The key areas to observe in terms of determining the skill level of a local labour market are by looking at levels of 'No qualifications', NVQ2 and 'NVQ4 and above'. Higher levels of qualifications generally correspond to higher employment rates with people with degree-level qualifications or above more likely to be working in 'professional' and 'technical' roles where the median gross weekly earnings are higher. According to the last census; fewer than half of those with "no qualifications" were in some sort of employment compared to roughly 80% of people who had at least one qualification.

The WMCA has a high rate of its working population with no qualifications. Solihull is the only authority which performs better than rest of the country. The percentage of the working population with No Qualifications has fallen over the previous 5 years from 16.3% to 13.4%, a decrease of 2.9 percentage points but is still above the Great Britain average of 7.7% respectively.

NVQ2

Having NVQ2 level qualifications is a minimum requirement for most jobs, corresponding to the standard five GCSE's at grades A-C (generally English and Mathematics are required subjects).

The percentage of the working population with NVQ 2 qualifications and above in WMCA is below the Great Britain average. The WMCA had a rate of 67.0% at the end of 2019 compared to 63.2% in 2015 but this is below the GB rate of 75.6%.

NVQ4

It will be bridging the gap between the number of people with NVQ 2 and those with NVQ3/4 which will help drive the transition to Net Zero.

Solihull has the highest share of people with NVQ4 or above in the WMCA with a rate of 44.9%. This is higher than the Great Britain average of 40.3% however the WMCA rate of 31% is below this. The WMCA has experienced a growth in NVQ4 rate since 2015. Bridging the gap between those obtaining NVQ2 and NVQ4 qualifications in WMCA should be the priority as this will help to address some of the existing skills gaps.

COVID-19

COVID-19 impacts on the labour market in the long-term are currently unclear and are still unfolding. To fully understand the impact on the labour market it will take months to see how this has been affected and could take years for some industries to recover fully. The impacts on the UK economy have been significant, however the government and the Bank of England are still trying to help stabilise the economy with a series of employment-related policies. Even with the support of these market interventions, it is estimated that Gross Domestic Product could decrease by up to 11% this year compared to last year.

The October 2020, Claimant Count data (the measure of number people claiming unemployment benefits) released in November 2020 shows the early impacts of COVID-19 on the UK labour market. To understand the full impact on the labour market, observing the monthly Claimant Count data in April and May 2021 will be important as this will show whether the extension of the Job Retention Scheme and the Self-Employment Income Support Scheme has delayed unemployment rather than stopped unemployment from occurring.

Table 8 shows a sharp increase in unemployment, locally, regionally and nationally comparing October 2020 against October 2019. Across WMCA, there has been an increase of 94,000 in the number of unemployed people.

Table 8 - Claimant Count in October 2020 vs October 2019,

Area	Claimant Count, October 2020	Claimant Count, October 2019	Difference
England	2,228,150	1,240,610	+987,540
WMCA	171,450	77,620	+93,830
Birmingham	81,815	34,495	+47,320
Coventry	16,695	9,455	+7,240
Dudley	14,285	6,030	+8,255
Sandwell	19,280	9,420	+9,860
Solihull	7,495	3,880	+3,615
Walsall	14,945	7,055	+7,890
Wolverhampton	16,940	7,290	+9,650

Source: Office for National Statistics, Labour Market Overview, November 2020

The above shows that Birmingham is the area with the largest increase in the number of Claimant Count claims followed by Sandwell. The increase in claims in Birmingham account for 50% of the total increase in claims in the WMCA. Table 9 shows the relative impact comparing the unemployment rate to the working population.

Table 9 - Percentage of population aged 16-64 unemployed,

Area	% unemployed, April 2020	% unemployed, April 2019
England	6.3	3.5
WMCA	9.3	4.2
Birmingham	11.2	4.7
Coventry	6.7	3.8
Dudley	7.4	3.1
Sandwell	9.4	4.6
Solihull	5.8	3.0
Walsall	8.6	4.1
Wolverhampton	10.4	4.5

Source: Office for National Statistics, Labour Market Overview, May 2020

Table 9 shows that Birmingham saw the biggest increase in unemployment rate from 4.7% in October 2019 to 11.2% in October 2020, a year-on-year increase of 6.5 percentage points. In relative terms, WMCA has seen larger increase than the rest of England. The unemployment rate in October 2019 was 4.2% in WMCA and 3.5% in England, and this increased to 9.3% and 6.3% respectively. Due to the extension of the job retention scheme it will not be until the monthly Claimant Count data is released in April and May of 2021 that the impact on unemployment will be confirmed and, therefore, the underlying trends in the data as the Government's two flagship schemes to support furloughed workers will end.

Job Retention and Self-Employment Schemes

On the 11th June, HMRC created two new monthly statistical bulletins showing the number of furloughed employees as part of the Coronavirus Job Retention Scheme (CJRS) and the number of claimants on the Self-Employment Income Support Scheme on a local authority level. The data is correct as of 31st July 2020.

Table 10 - Number of Furloughed Employees by Business Size

Employer size	Total number of employers furloughing	Total number of employments furloughed	Total value of claims made (£million)
1	181,800	182,500	922
2 to 4	286,200	538,700	2,963
5 to 9	132,800	479,000	3,108
10 to 19	79,800	487,300	3,364
20 to 49	61,700	686,500	5,089
50 to 99	19,400	426,700	3,194
100 to 249	11,400	483,500	3,651
250+	7,400	1,803,200	13,889
Unknown	600	6,500	32
Total	781,300	5,093,900	36,210

Source: HMRC, Coronavirus Job Retention Scheme statistics: October 2020

The table above shows the number employers and employees furloughed as of July 31st. At the peak of the crisis the number of people furloughed was higher than the above. In terms of business size, those with two to four employees have been most affected. Large businesses (more than 250+ employees) represented the greatest number of people furloughed.

The impact on sectors has varied greatly with some industries more able to adjust to changing circumstances than others. Many people working in the Professional Services may be able to work from home whilst other services are reliant on being on site or at a specific location.

Table 11 - Top five sectors by number of employees furloughed as of July 31st 2020

Sector	Total number of employments furloughed	Total value of claims made (£million)
Total	5,093,900	36,210
Accommodation & food services	1,028,700	5,730
Wholesale and retail; repair of motor vehicles	801,000	6,914
Business administration and support services	546,000	3,367
Manufacturing	444,400	4,452
Professional, scientific and technical	408,200	2,695

Source: HMRC, Coronavirus Job Retention Scheme statistics: October 2020

The total value of claims since March shows that Wholesale & Retail sector was the most impacted sector in the economy, resulting from the government decision to close non-essential shops making people unable to work and leading to firms putting employees on furlough. Accommodation & Food services and Manufacturing have also been significantly impacted by the Government's lockdown directives. The top five sectors make up 64% of all claims by value.

Geographic breakdowns of number of employees furloughed has been provided by HMRC for CJRS claims. The West Midlands was the fifth most affected region of the UK after London, South East North West and the East of England.

Table 12 - Number of employees furloughed by local authority as at 31st August 2020

Area	Number of people furloughed
United Kingdom	3,274,900
West Midlands	278,400
West Midlands Combined Authority	139,500
Birmingham	55,400

Coventry	16,600
Dudley	14,800
Sandwell	15,900
Solihull	12,600
Walsall	12,800
Wolverhampton	11,400

Source: HMRC, Coronavirus Job Retention Scheme statistics: October 2020

It will take time, effort and investment for the UK economy to recover from the global crisis triggered by the COVID-19 pandemic. Even amidst the current pandemic, there is still an urgent need to respond to the challenges of climate change and deliver Net Zero. Well-designed employment programmes can make distinct contributions to mitigating and adapting to the effects of climate change whilst also creating jobs. These should highlight the potential jobs that the green industrial revolution could bring to regions that have suffered industrial decline from the pandemic such as retail, hospitality and manufacturing. This will help create long-term and sustainable employment in the WMCA.

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APPENDIX G-4 - GOALS JOBS ANALYSIS

JOBS CREATED

WSP have undertaken high-level analysis regarding the expected job impacts of the goals outlined in the main report. A qualitative assessment of the impacts regarding the Net Zero has been outlined in Table 13.

Table 13 – 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
	Microgeneration	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
	Microgeneration	Solar PV installers		Increase
Industry	Energy Efficiency and Fuel Switching	Retrofit coordinators, installers and designers Heat pump installers		Increase
	Microgeneration	Solar PV installers		Increase
Transport	Demand Reduction (WFH)	Opportunity to encourage digital skills IT and service sector jobs in more rural areas in local workspace hubs	Reduced demand for City Centre services such as food and beverage stores Vehicle manufacturers	Nil
	Fuel Switching (HGVs)	Hydrogen / Electric vehicle manufacturers	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 drivers from more deliveries	Vehicle manufacturers	Minimal Increase
	Mode Shift	Increased public transport operators	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
	Afforestation	Tree planters, ecologists		Increase

WSP has undertaken some high-level analysis to forecast the future number of jobs created by each intervention per sector for 2026 and 2041 based on the High carbon modelling scenario. The method adopted is based on research and additionality guidance set out in HCA's Additionality Guide¹⁰. Research has been paired with the inputs and outputs from the carbon modelling for most of the goals to estimate expected jobs created for the five-year plan period and until 2041. Where goals are not expected to have noticeable impact on jobs these have not been modelled.

WSP analysed the goals required to meet Net Zero by 2050. WSP used a mix of sources (more detail can be found in section 5 of the main report) to enable estimation of the uptake of goals by 2041 to meet Net Zero. To inform the pathway over the next two decades WSP developed a time series for the uptake of each goal. For example, the expected percentage of electric vehicles usage in 2026 and 2041 was used to estimate job creation in the EV sectors.

WSP then researched and estimated the employment requirements associated with each goal¹¹ and existing employment levels within the WMCA. While supporting evidence is limited at this stage 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.

The additionality calculations are based on the standard steps set out in the guidance. This covers:

- The level of 'leakage', (i.e. the proportion of new jobs that are expected to be created for residents outside of WMCA);
- The level of 'displacement', (i.e. the proportion of new employment generated that will simply be displaced from neighbouring areas);
- The level of 'substitution', (i.e. the proportion of new employment generated that will be substituted from one activity for a similar one); and
- The economic 'multiplier' impacts, (i.e. the additional jobs generated in supply chains, indirect employment, and through the expenditure of employees, induced employment).

To calculate the extent of additionality, the following assumptions were made and were applied to both the intervention and reference cases:

- Leakage: a Low impact of 10% was selected (based on Table 4.3 in the Additionality Guide: Fourth Edition);
- Displacement: a Low impact of 10% was selected (based on Table 4.8 in the Additionality Guide: Fourth Edition);
- Substitution: a Low impact of 25% was selected (based on Table 4.10 in the Additionality Guide: Fourth Edition); and
- Multiplier: a multiplier value has been chosen based on the Office for National Statistics industry multiplier rates published in 2019.

Using the MHCLG formula for the following additionality rate and multiplier rates have been calculated for each intervention. Additionality is the extent to which the jobs would be created that would not have

¹⁰ Homes and Communities Agency, Additionality Guide, Fourth Edition 2014

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/378177/additionality_guide_2014_full.pdf (note that several aspects of this additionality guidance are also contained in DCLG's Appraisal Guide of December 2016)

¹¹ Transport Demand (WFH and trips) and Land Use (Renewables) goals have not been modelled in the jobs analysis as there is expected to be limited impact.

occurred in the absence intervention such as the net zero goals. Economic multipliers refer to the increased economic activity (jobs, expenditure or income) associated with additional local income, local supplier purchases and longer term development effects from new jobs created as result of net zero goals.

Table 14 - Additionality and Multipliers

Sector	Goals	Additionality	Multiplier
Domestic	Energy Efficiency	0.51	1.97
	Fuel Switching	0.51	1.97
	Microgeneration	0.51	5.71
Commercial	Energy Efficiency	0.51	5.71
	Fuel Switching	0.51	5.71
	Microgeneration	0.51	5.71
Industry	Energy Efficiency and Fuel Switching	0.51	1.97
	Microgeneration	0.51	1.97
Transport	Fuel Switching (HGVs)	0.51	1.97
	Fuel Switching (Buses, Taxis)	0.51	1.47
	Demand Reduction (Trips)	0.51	1.47
	Mode Shift	0.51	1.47
	Electric Vehicles	0.51	3.05
Land Use	Renewables	0.51	5.71
	Afforestation	0.51	3.05

Domestic

- Energy Efficiency – 5,500 jobs created by 2026 and 18,800 jobs by 2041
- Fuel Switching (Heat pumps) - 6,900 jobs created by 2026 and 23,500 jobs by 2041
- Microgeneration - 1,800 jobs created by 2026 and 7,900 jobs by 2041

Commercial

- Energy Efficiency – 500 jobs created by 2026 and 2,200 jobs by 2041
- Fuel Switching (Heat pumps) - 500 jobs created by 2026 and 2,200 jobs by 2041
- Microgeneration - 100 jobs created by 2026 and 600 jobs by 2041

Industry

- Energy Efficiency – 10 jobs created by 2026 and 200 jobs by 2041
- Microgeneration - 10 jobs created by 2026 and 100 jobs by 2041

Transport

- Fuel Switching (HGVs) – no jobs created by 2026 and 400 jobs by 2041
- Fuel Switching (Buses, Taxis) - 500 jobs created by 2026 and 800 jobs by 2041
- Demand Reduction (Trips) – 40 jobs created by 2026 and 120 jobs by 2041
- Mode shift – 1,500 jobs created by 2026 and 1,500 jobs by 2041
- Electric Vehicles – 3,400 jobs created by 2026 and 32,800 jobs by 2041

Land use

- Renewables - 40 jobs created by 2026 and 600 jobs by 2041
- Afforestation – 200 jobs created by 2026 and 700 jobs by 2041

In total the proposed goals could create 21,000 jobs in the WMCA economy by 2026 and just over 92,000 jobs by 2041. However, if the WMCA does not develop pool of potential workers with the skills needed for

the goals such as retrofit these jobs will not be created to this scale or timeframe. There is an opportunity for the WMCA to be at the forefront of Net Zero skills development and to create a competitive advantage over other regions.

Table 15 - Goals and high-level jobs impacts summary

Sector	Goals	New roles created	Jobs created by 2026	Jobs created by 2041
Domestic	Energy Efficiency	Retrofit coordinators, installers and designers	5,500	18,800
	Fuel Switching	Heat pump installers	6,900	23,500
	Microgeneration	Solar PV installers	1,800	7,900
Commercial	Energy Efficiency	Retrofit coordinators, installers and designers	500	2,200
	Fuel Switching	Heat pump installers	500	2,200
	Microgeneration	Solar PV installers	100	600
Industry	Energy Efficiency and Fuel Switching	Retrofit coordinators, installers and designers	10	200
	Microgeneration	Heat pump installers	10	100
Transport	Fuel Switching (HGVs)	Hydrogen and Electric vehicle manufacturers	0	400
	Fuel Switching (Buses, Taxis)	Petrol and diesel engine manufacturers	500	800
	Demand Reduction (Trips)	Increase in LGV services and drivers from more deliveries	40	120
	Mode Shift	Increased public transport operators	1,500	1,500
	Electric Vehicles	EV vehicle manufacturing	3,400	32,800
Land Use	Renewables	Solar and wind infrastructure installers and maintenance	40	600
	Afforestation	Tree planters, ecologists	200	700
Total			21,000	92,420

APPENDIX G-5 - SUPPLY SIDE REVIEW

COLLEGES

Colleges West Midlands is a formal strategic partnership of 20 colleges, including all colleges within the West Midlands Combined Authority. 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 aim to raise the technical skills of young people and adults in full-time education, upskilling in the workplace, undertaking an apprenticeship or pursuing a higher education programme either full or part-time. They drive collaboration across sectors and specialisms to create a network of clusters driving innovation and skills and Further Education providers that are driving multidisciplinary skills development to modernise industrial practice.

Current courses, apprenticeships and qualifications at colleges in the West Midlands Combined Authority cover a number of key sectors:

- 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)
- Manufacturing 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 EVs as there are differences with petrol cars. Currently oSouth & City College Birmingham offer a specific course for EV maintenance. Vehicle training programmes in all colleges will need to incorporate more qualifications relating to EVs. Colleges will also need to roll-out heat pump installation and maintenance training programme as gas boilers will need to be replaced by heat pumps, in both commercial and domestic buildings. Through the stakeholder engagement for the Five Year Plan it's been highlighted that EV and retrofit courses are being currently being developed for colleges in region and some courses in these study areas are now available. This demonstrates the education and training sector in the West Midlands Combined Authority ability to adapt and respond quickly to changing skills requirements. This needs to be matched with employer demand however our engagement indicates that many employers are not able specify their need for skills for net zero.

Two Institutes of Technology (IoT) have been developed to deliver higher technical education in the West Midlands. Dudley IoT has been redeveloped to provide 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 three to level six 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 strong 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 strong focus on areas in which the West Midlands Combined Authority already specialises such as manufacturing. Ensuring that their training is conducive to jobs with local employers in the net zero economy is vital. 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 Academy¹² launched a new strategy to deliver highly vocational, employer-led STEM education and training for the energy sector. A key cornerstone of this strategy is an innovative partnership with Port Training Services in Blyth, and the strategy is further underpinned by employer partnerships with a range of energy sector employers, including Royal IHC and the ORE Catapult. The Energy Academy opened in 2012 as a purpose-built centre of innovation and training for the Energy Sector, delivering qualifications from Level 2 to Level 6 in subsea engineering, renewable energy technologies and fabrication, including a range of apprenticeships.

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. West Midlands Combined Authority 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 Five Year Plan are currently not able to indicate their need for certain jobs roles and skills in the net zero economy.

While 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 the best and appropriate training to deliver net zero, West Midlands Combined Authority must build stronger connections between education providers and employers so that demand-led training programmes can be developed.

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 include:

- Aston University Birmingham
- University of Birmingham
- Birmingham City University
- University College Birmingham
- Coventry University
- Newman University Birmingham
- University of Wolverhampton
- University of Warwick

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

¹² <https://www.ncl-coll.ac.uk/world-class-facilities/energy-academy>

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. With knowledge of the skills gaps currently facing the region, the institutions are ideally placed to provide tailored training to fulfil business needs and connect students and jobseekers with vacancies.

Aligning with the low carbon and net zero economy, 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 generation¹³. 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.

Business and university partnerships will embed digital and creative expertise in electric vehicle design and manufacturing and support the development of new supply chains. For example, Coventry University's National Transport Design Centre and the Advanced Manufacturing and Engineering Institute provide industry ready graduates and research in electric vehicle and powertrain technologies.

There are further opportunities to collaborate with the research capabilities of universities across the Combined Authority in areas of Low Carbon and sustainable developments including:

- **Low Impact Buildings Grand Challenge (Coventry University)** - covering a wide range of aspects from low carbon construction systems to intelligent monitoring and user experience of new building technologies.
- **European Bioenergy Research Institute (Aston University)** - centre of excellence for bioenergy and biofuels by pyrolysis and gasification. High level industrial research and industry test centre.
- **Institute of Enefty Research and Policy (University of Birmingham)** - the University is a world leading specialist in low carbon energy and are particularly strong in bio-fuels bio waste to energy, supercritical fluids and hydrogen fuel cell development, testing and storage.
- **Sustainable Environment Research Group (Aston University)** - SERG brings together experts from backgrounds including civil engineering, mechanical engineering, hydrology, ecology and computer modelling. The group aims to develop tools and technologies that conserve and rehabilitate ecosystems while enabling international development.
- **Bioenergy Research Group (Aston University)** - The objective of the BERG is to apply chemical-engineering science and technology to help provide the world with sufficient energy, fuels and chemicals from renewable and sustainable resources to meet tomorrow's needs. BERG is developing novel thermal processes whereby agricultural wastes, fast-growing wood, annual crops and biogenic wastes can be thermally converted in a biorefinery, using both fast pyrolysis and intermediate pyrolysis, into oils and gases which can, in turn, be used to generate electricity and produce transport fuels and chemicals.
- **Centre for Hydrogen and Fuel Cells Research (University of Birmingham)** - Collaborative research, R&D, testing of fuel cells, student placements, training in hydrogen fuel cell technology, hydrogen storage and hydrogen creation from waste materials.
- **Hydrogen Fuel Cell Vehicles (Coventry University)** - Coventry is at the head of developments in 'green' vehicle technologies. Researchers are also involved with the development of an automotive hybrid power flywheel system; including thermal modelling, vehicle system energy modelling, as well as control and sensor development work.
- **Thermofluid Engineering (Coventry University)** - Thermofluids Engineering group's work is focused on automotive aftertreatment applications. The group provides both technical expertise and dedicated

¹³ <http://www.wmcsu.ac.uk/areas-of-expertise/>

test facilities. The research focuses on the development and validation of simulation techniques to predict the flow performance of after-treatment systems for spark ignition and diesel engines.

- **Warwick Manufacturing Group** - broad range of research including Low Carbon Vehicle Technology Project with industrial and HEI partners. The Vehicle Energy Facility tests hybrid powerplants, sustainable green materials, software integration, integrated power control, mechanical energy conversion. Advanced Manufacturing covers opportunities for research, development, prototyping and practical application in the areas of Advanced Materials, Innovation and Vehicles.
- **Polymer Research (Aston University)** - Polymer processing and performance including development of new materials and effects of accelerated ageing and weathering.
- **Premium Vehicle Lightweight Technologies** - advanced materials to lighten vehicles and cut down on CO₂ emissions. Includes advanced materials for exterior panels, different forms of lubrication, joining technologies, simulation.
- **Manufacturing Technology Centre (University of Birmingham, Lead Partner with Rolls Royce)** - collaborative research and practical applications, manufacturing development, problem solving and improving competitiveness.

In addition to the research centres the universities offer renowned undergraduate and postgraduate degrees that will support development of net zero skills base and strong talent pool in region. Degrees include:

- Civil engineering (BEng and MEng)
- Environmental science (BSc)
- Chemical engineering (BEng and MEng)
- Sustainable engineering (MSc)
- Automotive engineering (BEng)
- Construction project management (BSc)
- Gastronomy and food sustainability (MSc)

These degree will be at the forefront at developing a skills base for newly created roles in the net zero economy. In addition to those institutions in the West Midlands Combined Authority, there also universities in the surrounding areas with strong research facilities and networks in these same fields such as Keele University and Staffordshire University.

LOW CARBON

In 2018 Sustainability West Midlands Based undertook a review¹⁴ and analysis of the low carbon sector in the region to inform the development of the new West Midlands Local Industrial Strategy. Sustainability West Midlands suggests that the following areas should be highlighted to as particular strengths of the West Midlands Combined Authority upon which to build.

- **EIT Climate-KIC** - a European knowledge and innovation community, working towards a prosperous, inclusive, climate resilient society founded on a circular, zero-carbon economy.
- **Energy Innovation Zones** - framework for focused energy infrastructure investment meeting local community needs. They are mechanisms for risk-managed transition to an appropriate energy infrastructure for the future.
- **Energy Capital** - a smart energy innovation partnership for the West Midlands. The aim is to make the West Midlands one of the most attractive locations to build innovative clean energy technology companies in the world.

- **Energy Research Accelerator** - ERA is the UK's first cross-disciplinary energy research hub in the UK drawing on the expertise and world-class facilities of many of the Midlands Innovation group of universities, including Aston, Birmingham and Warwick.
- **Energy System Catapult** - Based in Birmingham, the Energy Systems Catapult supports innovators in unleashing opportunities from the transition to a clean, intelligent energy system.
- **CABLED successor activity** - The CABLED project ran from 2009 to June 2012 and showcased electric cars across Birmingham and Coventry, making ultralow-carbon vehicles available to real users and collected data on everyday use. Government could use this as an opportunity to invest in local trials that focus on innovative low carbon transport technologies, such as rapid charging points or alternative fuels such as hydrogen.
- **Autonomous vehicle development** - Early cluster in the West Midlands with activity and existing assets (such as JLR, HORIBA MIRA, Centre for Connected & Autonomous Automotive Research, Warwick Manufacturing Group etc.), there is an opportunity to make the West Midlands the UK's national centre for autonomous vehicle testing and development.

The West Midlands Combined Authority demonstrates particularly significant activity and expertise in research, development and projects pertaining to low emission vehicles, energy storage and systems, renewable energy and fuel cell and battery technologies. Therefore, further collaboration and investment between the private sector and education is needed to strengthen skills base in these areas.

CHAMBERS OF COMMERCE

The Greater Birmingham, Black Country, Coventry and Warwickshire Chambers of Commerce provide regional business support for firms based within or doing business across the West Midlands Combined Authority. The services and initiatives these agencies provide platforms and opportunities for businesses to grow, connect and become part of a thriving network. They are considered a leading provider of training and development, including apprenticeships for young people and adults as well as higher education and business to business courses. The Chambers of Commerce work with employers to design and develop courses which are up to date and relevant to industry and individual needs. At the moment no training courses are offered around sustainability and the green economy. There will be a need for training providers to offer programmes with a greater focus on sustainability and reducing carbon emissions for local businesses which then can be passed onto their employees. New courses will need to be accredited by the British Chambers of Commerce.

SKILLS HUBS AND PROGRAMMES

Throughout the West Midlands Combined Authority, there are a number of programmes in place to provide training and support for local businesses, especially for Small and Medium Enterprises (SME's). These have been developed with the aim of local businesses to be as successful as they can be by supporting the development of a skilled and talented workforce. A list of the current jobs and skills programmes and short description is provided below.

- **Adult skills for work (ASW)** – This is a programme which provides funded and part funded training which aims to help adults in employment within Birmingham, Coventry, Dudley and Sandwell to improve their skills and improve their future through progression in their work or by finding better paid employment. ASW is funded through the West Midlands Combined Authority Adult Education Budget. The following priority sectors for training have been identified to target in their area; Construction; Digital; Business and Professional Services; Engineering and Advanced Manufacturing.
- **Skills and Apprenticeship Hub** – this is part of the GBSLEP Growth Hub providing advice, guidance, and access to a provider network to support any workforce development needs employers across the

Greater Birmingham and Solihull area. Working with local, regional, and national providers and stakeholders in public and private sectors to deliver skills solutions.

- Coventry & Warwickshire Skills 4 Growth – This is a European Social Fund project managed by Coventry City Council, working in partnership with the Coventry and Warwickshire Local Enterprise Partnership and Growth Hub to deliver accredited training ranging from leadership and management through to technical and soft skills for SME’s. The focus is on the skills needs and gap of a company, with customised packages developed to address business requirements and support growth.
- Greater Birmingham Supplier Skills Programme (SSP) - The SSP is a three-year programme Co-funded by the European Social Fund. Birmingham City Council has selected Skills Training UK as one of a small number of training partners for the employee upskilling programme in the GBSLEP region. The programme aims to improve management expertise, workforce capability and capacity, providing essential tools to help SME’s sustain their performance and productivity.
- The Black Country Skills Factory – This is an employer-led education and training collaboration being coordinated by Black Country Consortium Ltd with funding via the Skills Funding Agency. The aim of the project is to address skills shortages in the five transformational sectors in the Black Country; Advance Manufacturing; Transport technologies; Construction; Environmental Technologies; and Business Services.
- The Elite Centre for Manufacturing Skills (ECMS) - This an employer-led training facility located in the Black Country, designed to support the UK industry in upskilling and multi-skilling the workforce, with particular focus on developing technical skills and knowledge in engineering, manufacturing, casting and metal forming sectors. ECMS is funded by The Black Country LEP and collaboration between, University of Wolverhampton, Dudley College, Cast Metals Federation, Confederation of British Metalforming and Institute of Cast Metals Engineers.
- Skills Support for the Workforce (SSW) - Programme developed to upskill employees within small and medium-sized businesses in the Black Country by providing recognised accredited qualifications and training courses. SSW is co-financed by the Education and Skills Funding Agency and the European Social Fund. SSW in the Black Country is managed by Serco in partnership with the BC LEP.

The majority of the training available in the West Midlands Combined Authority is commissioned through the Adult Education Budget. The skills and qualifications data in Appendix E shows that the proportion of people with qualifications above NVQ2 and NVQ4 in the combined authority has grown since the devolution of the Adult Education Budget. The numerous training programmes that have been put in place over the in recent years are supporting the main aims the Strategic Economic Plan, Local Industrial Strategy and Regional Skills Plan.

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 to support goals outlined in the Five Year Plan. The programmes highlighted above provide a foundation to support the transition to net zero, however more specific sustainability and lower skilled training programmes are needed especially those with lower skills levels.

These will be needed in these transformational sectors:

- Advance Manufacturing – e.g. working in a more automation and with new materials;
- Transport technologies – e.g. EV maintenance and repair.
- Construction – e.g. heat pump fitting and repair;
- Environmental Technologies - e.g. renewable energies;
- and Business Services – e.g. 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 whilst ensuring no one is left behind.

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Environment & Energy Board

Date	10 March 2021
Report title	De-carbonising Transport - A Critical Objective for a New Local Transport Plan
Portfolio Lead	Transport - Councillor Ian Ward
Accountable Chief Executive	Laura Shoaf - Managing Director, Transport for West Midlands email: laura.shoaf@tfwm.org.uk tel: (0121) 214 7444
Accountable Employee	Mike Waters - Director of Policy, Strategy & Innovation, Transport for West Midlands email: mike.waters@tfwm.org.uk tel: 07584 333540

Recommendation(s) for action or decision:

The Environment & Energy Board is recommended to:

- (1) Note the work Transport for West Midlands is undertaking to review the West Midlands Local Transport Plan in partnership with Local Highway Authorities and in light of the climate emergency and wider policy drivers of change.
- (2) Note the next steps with regard to development of a draft new West Midlands Local Transport Plan

1. Purpose

- 1.1 To provide E&E Board with an update on the work on reviewing the West Midlands statutory Local Transport Plan. A key objective for the new Local Transport Plan will be to set out how the West Midlands transport system will be decarbonised in line with local and national targets.

2. Background

Reviewing the Local Transport Plan

- 2.1 WMCA is the local transport authority for the combined area of WMCA's seven constituent authorities. Working through TfWM it has duties to produce and review a statutory Local Transport Plan (LTP) for the area setting out policies to promote safe, integrated, efficient and economic transport to, from and within the area as well as plans to implement those policies. WMCA and the constituent authorities have statutory duties to implement the LTP using their functions.
- 2.2 The current and fourth West Midlands LTP is called Movement for Growth and is comprised of a strategic plan and delivery plan.
- 2.3 Since Movement for Growth was adopted approximately five years ago there has been significant global and local change in policy context. Much of this is reflected in new WMCA policies, particularly:
 - Inclusive growth
 - WM2041
 - Local industrial strategy
 - Recharge the West Midlands (and related COVID-19 pandemic and recovery policies)
- 2.4 TfWM is currently reviewing the LTP. The current high-level programme for developing the LTP is as follows:
 - January-May 2021 – Technical work developing and assessing LTP policy scenarios in co-development with constituent authorities
 - June-August 2021 – wider deliberative engagement with Elected Members, the public and wider stakeholders on policy scenarios, including publication of a transport green paper
 - August-October 2021 – development of a new draft LTP (strategic plan and initial implementation plan)
 - October-December 2021 – consultation on the draft LTP
 - January 2022 – adoption of a new LTP
- 2.5 Whilst WMCA is formally the local transport authority, the combined authority is a partnership and the LTP is developed collaboratively with the constituent authorities. The Strategic Transport Board provides the Elected Member direction for this work, however, changes to the LTP must be approved by WMCA Board and (as a minimum) meet specific statutory requirements on consultation on LTPs.

2.6 Decarbonising transport will be a critical objective in the new LTP. However, there are other systemic challenges with the transport system which also stand in the way of WMCA’s ambitions for inclusive growth. These were set out as five “motives for change”, which were reported to WMCA board on 24 July 2020:

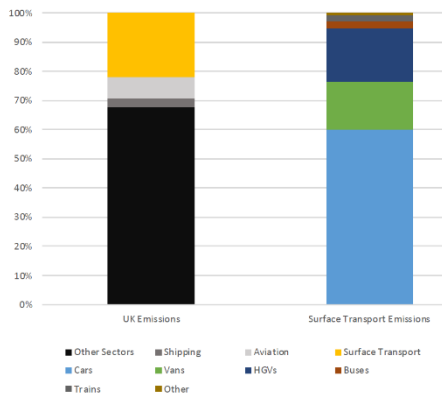
- Tackling the climate emergency
- Creating a fairer society
- Supporting local communities and places
- Becoming more active
- Sustaining economic success

2.7 None of the motives are necessarily a greater priority, and all could justify significant change to the transport system. However, tackling the climate emergency is unique in the explicit and significant pace and scale of desired carbon reductions that have been set out at the local and national level, and the global consequences that are faced.

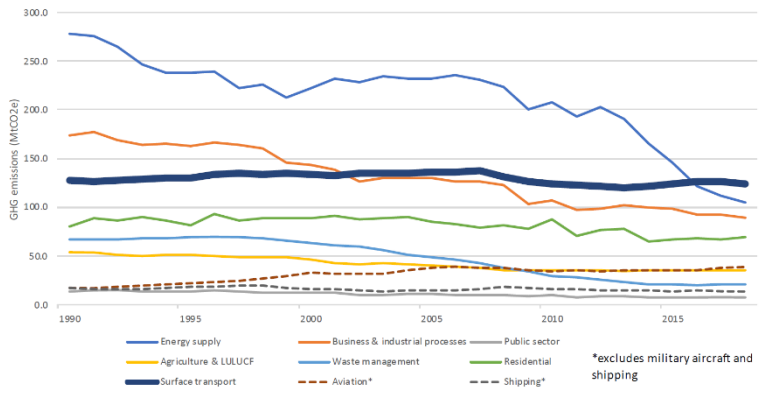
Decarbonising transport – aiming in the right direction

2.8 National GHG emission reporting shows that transport is the greatest source of carbon emissions compared with other sectors. The majority of these emissions are from surface transport (as opposed to aviation and shipping) and the majority of these emissions are from car use (as car travel accounts for the greatest modal share of distances travelled). Despite improvements to engine efficiency driven by regulation, transport emissions have remained stubbornly high for the last 30 years, largely because of increased travel demand associated with economic and population growth, increased car ownership and the increasing weight and power of the cars we drive.

Breakdown of UK and surface transport sector emissions (2018)



Estimated UK GHG emissions (by domestic sectors and aviation and shipping)



Source: UK GHG emissions national statistics (BEIS)

2.9 The shift to Zero Emission Vehicles (ZEVs) is critical in the long term for meeting mobility needs while decarbonising. Meeting WM2041 ambitions would mean that there will need to be virtually no petrol/diesel powered vehicles on our roads by 2041 (including hybrids). However, it will take a relatively long time for ZEVs to permeate our fleets and for the energy sector to decarbonise; as well as the time in service that it will take for these vehicles to offset the additional carbon costs of manufacturing these vehicles.

- 2.10 Because the switch to ZEVs and the delivery of their carbon benefits will take time, we still need to reduce the energy we use for transport to decarbonise. In simple terms, this means using cars less for passenger travel and reducing the miles travelled by LGVs and HGVs – this is the case across all local and national targets.
- 2.11 In the longer term, the shift to ZEVs may allow energy intensive vehicles like cars to be used more again whilst still avoiding climate change. However, sustaining behavioural shifts could support wider aims aligned to the other Motives for Change.
- 2.12 The amount of behaviour change required for decarbonisation depends on how fast we think we need to reduce our carbon emissions. This is not only about our net-zero date but also the path we take to get there, which determines how much carbon we will emit overall:
- The Committee for Climate Change (CCC) has recently advised Government that car mileage reduction of 5% by 2030 and 17% by 2050 would be required for Government to meet its commitments to the Paris Agreement and to be net-zero by 2050. It is important to note that the CCC's car mileage reduction recommendation of 17% by 2050 is relative to the projected level of car mileage expected by 2050 (which is expected to grow by 15% by 2050). The CCC's recommendations nationally rest on avoidance of growth in travel demand.
 - However, research carried out by the Tyndall Centre found that even if all new cars were ULEVs by 2035, a 58% reduction in car mileage between 2016 and 2035 would be required to meet its recommended carbon budget for the UK.
- 2.13 There are a range of other estimates from other sources, including other local transport authorities, which tend to fall within this range and vary depending on core assumptions and carbon reduction targets.
- 2.14 The WMCA's original carbon reduction pathway was based on the Tyndall Centre's research. However, the "accelerated" scenario adopted as a basis to agree the initial five-year delivery plan would require a pace of carbon reduction closer to the CCC's national recommendations.
- 2.15 The WM2041 initial five year plan sets out some indicative goals for transport decarbonisation. These were based on CCC's analysis of behavioural shifts that could support their recommendations to Government on decarbonising by 2050, as well as targets within currently adopted Movement for Growth (LTP). These sought to shift the West Midlands' travel behaviours to be more in line with the then current travel mix in particular European cities. It should be noted that just over 5 years on those same European cities may need to reduce car travel further to meet their own decarbonisation goals.
- 2.16 As TfWM takes forward the development of a new LTP, the indicative goals set out in the 5 year plan will be taken as a minimum target. Scenarios will also be explored to better understand what would be required to deliver decarbonisation of the West Midlands transport system faster.

3. Financial Implications

- 3.1 None from this report.

4. Legal Implications

4.1 None from this report.

5. Equalities Implications

5.1 None from this report.

6. Inclusive Growth Implications

6.1 None from this report.

7. Geographical Area of Report's Implications

7.1 WMCA's is the local transport authority for the combined area of the seven constituent authorities.

8. Other Implications

8.1 None.

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Environment & Energy Board

Date	10 March 2021
Report title	WM2041 Programme Update
Portfolio Lead	Environment, Energy & HS2 - Councillor Ian Courts
Accountable Chief Executive	Deborah Cadman, West Midlands Combined Authority email: deborah.cadman@wmca.org.uk tel: (0121) 214 7200
Accountable Employee	Ed Cox, Director of Inclusive Growth & Public Service Reform email: ed.cox@wmca.org.uk tel: 07788 224179 Jacqueline Homan, Head of Environment email: jacqueline.homan@wmca.org.uk tel: 07584 449339

Recommendation(s) for action or decision:

The Environment & Energy Board is recommended to:

- (1) Review the WM2041 programme update and provide comment/ insight into the work being taken forward.
- (2) Identify areas of particular interest where there could be potential for specific collaboration with other work and stakeholders.
- (3) Provide feedback on how members would like to be engaged or informed on specific areas as the programme develops, outside of any Board meetings.

1. Purpose

- 1.1 The WM2041 programme, approved at the WMCA Board on 25th June, is delivering on a number of priority areas to help the WMCA region achieve net zero carbon emissions by 2041. The projects that comprise this programme are at different stages of maturity, although ultimately there will need to be delivery across all of them to deliver the system changes required to address climate change. This report gives a high-level overview of those projects, most of which will come to future Environment and Energy Board meetings.

2. Background

- 2.1 On 25 June the WMCA Board approved the paper: *WM2041: a programme for implementing an environmental recovery*. This paper outlined the projects and programmes that we would begin to deliver immediately, and that could support the regional recovery from Covid-19; priorities for the next 12 months; as well as those actions that would require medium-term planning.
- 2.2 The first WM2041 Five Year Plan has now also been produced as an independent report by WSP. This is due to be presented to the 19th March CA Board. Alongside this report is a paper on how the recommendations made in the FYP could be translated into action (some of which is already in place). In total, there are 17 proposed programmes of work/routes for delivery identified; these will form the basis for the WM2041 work programme into the future.
- 2.3 In addition to the work on specific projects and programmes, the WMCA Environment Team is also working to develop relationships with a wide range of stakeholders that will be essential to the success of WM2041. Examples of these initiatives include:
- Programmes to support behaviour change; this was something that people asked for support with as part of the WM2041 consultation. The WMCA has just appointed the Behavioural Insights Team to support his work around behaviour change and net zero communications. The work also links into the Commonwealth Games.
 - Work with business, particularly the development of a business pledge and associated action plan to support and work with businesses of all sizes on their climate change plans. The WMCA Net Zero Business Pledge will be launching mid-March, with a dedicated space on the WMCA website for organisations to sign up to the pledge. We are working with Sustainability West Midlands to roll this work out.
- 2.4 The delivery of the WM2041 programme also relies on working closely with the local authorities and their climate change action plans. The WMCA Environment Team works closely with the officers supporting climate change and carbon reduction in each of the constituent local authorities, through a Low Carbon Officers Group, to maximise the potential for collaboration and shared learning around the work being undertaken.

- 2.5 The Single Assurance Framework references the need for thematic boards to have a 'Portfolio Project Pipeline'. The programme overview presented here is that pipeline of projects and programmes that the WMCA Environment Team and partners are working on. If approved, the priority programmes from the FYP will shape the Portfolio Project Pipeline and enable us to monitor progress towards the WM2041 net zero carbon emissions target date as well as the wide programme.
- 3. Financial Implications**
The financial implications will emerge on a project-by-project basis. It is the aim of the Five Year Plans to understand the financing required for delivery and separate business cases will now be developed for delivery.
- 4. Legal Implications**
There are no specific legal implications for the programme as a whole. Legal implications will be understood as part of the programme delivery for each project.
- 5. Equalities Implications**
There are no specific equalities implications from this report – these will be assessed as project plans and business cases are progressed in more detail.
- 6. Inclusive Growth Implications**
We see the delivery of WM2041 as being very closely tied to the WMCA inclusive growth agenda and it will form a key part of the projects and programmes developed. Ensuring the climate change transition is fair and provides opportunities and improvements in quality of life for people across the West Midlands is a fundamental part of our approach to delivery.
- 7. Geographical Area of Report's Implications**
The WM2041 target was produced on a 3 LEP geography. The focus of much of the work will be on the 7 constituent authorities, but there will be some programmes where we will make links with non-constituent members, for example, around natural capital.
- 8. Other Implications**
None.
- 9. Schedule of Background Papers**
Appendix – Item 6 – Programme update

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WM2041 – Programme update

March 2021

This WM2041 programme update provides the latest progress on activity since the approval of 'WM2041: a programme for implementing an environmental recovery', which was approved by the West Midlands Combined Authority Board in June 2020.

Background

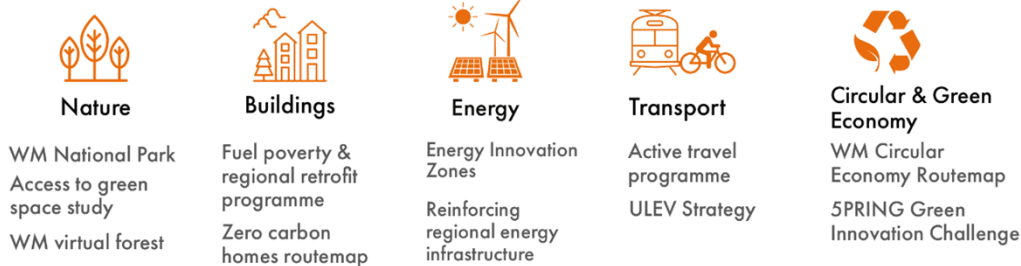
1. In June 2019, the WMCA declared a climate emergency and the Combined Authority Board received a paper from the Tyndall Centre in July, outlining the trajectory that would be necessary in order to reach net zero carbon emissions by 2041.
2. Following the production of the target, a 'green paper' was written to indicate how the region could take action in order to reach net zero carbon emissions by 2041, with 73 actions of varying scale, complexity and investment. This was approved by the Combined Authority Board on 17th January 2020 and formally launched at an event on 23rd January 2020, with a period of consultation until 12th March 2020.
3. The unfolding events of the pandemic resulted in the feedback from the consultation being combined into priority actions for a 'green recovery' from Covid-19; *WM2041: a programme for implementing an environmental recovery*, which was approved by the CA Board in June 2020. The paper proposed three categories for action:
 1. **Urgent action for 2020:** activities that will have immediate impact and/or set a clear direction of travel for the kind of recovery we expect in the West Midlands.
 2. **12-month priorities:** activities that need to be pursued over the next 12 months as key priorities within the wider recovery programme.
 3. **Five year plan 2021-26 priorities:** the mid-long term programmes that need to be developed to ensure we are on track to deliver our net zero carbon target.

Updates for each of the three categories are provided below.

WM2041 Programme



2 2020 Activity



3 WM2041 Five Year Plan 2021-26







1. Urgent action 2020

West Midlands Green Innovation Challenge




- This WM Green Innovation Challenge was set up by WMCA with WM5G's 5PRING Accelerator to support the work of innovative SMEs across the region, particularly in finding solutions to some of our most pressing challenges. 10 SMEs are currently working on the 5PRING programme (touching on energy, natural capital, circular economy, build environment and behaviour change). The WMCA has been involved in meeting some of the companies on the accelerator to see how their technologies could address some of our net zero challenges. See [Ten start-ups pioneering new 5G tech in West Midlands](#)
- The Environment Team is also working with Birmingham Tech as part of a programme to support scale-ups with an interest in low carbon solutions. WMCA is sponsoring firms focused on net zero as part of an action from the Digital Roadmap. See [New 'accelerator' will grow start-ups that tackle climate change](#)




<p>WM Circular Economy</p> 	<ul style="list-style-type: none"> • Circular economy and resource efficiency has the potential to create jobs and economic growth across the region. WMCA Environment Team workshop with 40 regional stakeholders took place in early September and an online survey received 54 responses. The results of these engagements has shaped the formation of a regional Taskforce that will oversee the completion of a routemap by mid-2021 (also see section in 12 month priorities).
<p>Active Travel</p> 	<p>Active travel came out as most popular approach for tackling climate change in the WM2041 consultation process that took place Jan – March 2020. This is a TfWM-led programme which has recently received a large investment from Department for Transport via the Emergency Active Travel Fund (Tranche 1) and the Active Travel Fund (Tranche 2). Tranche 1 awarded the West Midlands a total of £3.45 million which has delivered:</p> <ul style="list-style-type: none"> • 50 infrastructure schemes across all LA's for pop up cycle lanes, pavement widening, cycle parking schemes and road closures. • To support this infrastructure TfWM have delivered a package of 8 supporting measures including: <ul style="list-style-type: none"> ○ Cycle parking to approximately 250 organisations with free cycle parking measures (in conjunction with Park that Bike). ○ Love to Ride, an online engagement platform encouraging more people to cycle and walk. ○ Social prescribing pilot in the Black Country looking at using cycling and walking as an incentive for recovery for patients at doctor's surgeries. • Expansion of the Active Travel Partnerships including a new British Cycling Recreation Officer, a third Living Streets Officer to deliver the Little Feet programme encouraging parents to walk children to nurseries and early years and a third Cycling UK Officer to cover Coventry and Solihull. • Roll & Stroll, a regional campaign launched to promote Cycling and walking. <p>Tranche 2 was announced in November 2020 awarding the West Midlands a total of £13.1 million. The funding will be used to deliver schemes across the region.</p> <ul style="list-style-type: none"> • 39 Infrastructure schemes including making permanent many of the pop-up cycle lanes and Low Traffic Neighbourhoods delivered in Tranche 1. • Delivery of the Supporting Measures works in a targeted approach. Aiming to work in priority areas near to new infrastructure as it is delivered. Some projects will be expanded: <ul style="list-style-type: none"> ○ Expansion of Social Prescribing with Active Travel to 8 CCG's in Birmingham building on the success in the Black Country ○ Continuation of the Cycle Parking for Organisations project adding two new parking options for larger cycles. ○ Promoting the use of the love exploring app across the Black Country

	<p>In addition to the Active Travel Fund TfWM will be delivering a number of community led projects through the Better Streets Community Fund. This £2 million fund is using £2 million of Transforming Cities funding to deliver 31 projects across the West Midlands all of which were suggested by members of the public. To date 9 projects have been delivered including: Upgrading three crossings in Dudley, delivery of Parking Buddies to Clifton Primary School and resurfacing of pathways at Woodgate Valley Park. The remaining 22 projects are all scheduled to be delivered by August 2021.</p> <p>West Midlands Cycle Hire was launched in March 2021 with the first phase launching in Sutton Coldfield with the supplier Serco. There is a phased roll out planned across all 7 West Midland Local Authorities with all areas expected to receive bikes by July 2021. In the initial rollout there will be 1500 bikes delivered 10% of which will be electric bikes.</p>
<p>Reinforcing the region's energy infrastructure to support green growth</p> 	<ul style="list-style-type: none"> • One of Energy Capital's main priorities is to ensure that the cost of connecting to energy infrastructure does not inhibit economic growth across the region. In August, the SED Board endorsed Energy Capital's proposed approach to engaging with the regional energy network operators (DNOs), both with and on behalf of, the constituent members, to get a better outcome for the region from current and future energy infrastructure price control negotiations. • This process recognises that Local Authorities will still need to lead the engagement for their areas and liaise with the DNOs, particularly the spatial planners. Energy Capital will support this process and provide the specialist technical and commercial expertise in energy infrastructure to make sure we get engagement at the right levels and that the data and information provided to local stakeholders is discernible and meaningful. They are now engaging with the DNO, Local Authorities and LEPs to formalise this approach. • On the 11th Sept, Energy Capital also presented to the Devolution Sub-Group and obtained support for seeking statutory recognition for the role of local government in this space, through the devolution process. • Our Devolution ask was submitted to BEIS by Andy Street via the minister Alok Sharma in November. • No response has been received from Government to date, despite it being widely circulated. This programme therefore remains unfunded. However, in anticipation of resources becoming available from Government in the autumn CSR, the Mayor has agreed to declare the region a Net Zero Pathfinder and establish a net zero delivery board which will focus on coordinating infrastructure and investment in the region to enable net zero by 2041.
<p>Community Green Grants pilot</p> 	<ul style="list-style-type: none"> • The data that has previously been provided by the New Economics Foundation has now been turned into a dashboard to support a programme of Community Green Grants across the region. The purpose of these will be to redress the regional inequalities in access to green space. A financial ask for this grant programme is contained within the WM2041 Five Year Plan paper going to the March CA Board.


<p>Communications and behaviour change</p> <p>#WM2041</p>	<ul style="list-style-type: none"> • The WM2041 Communications Plan ensures that progress across WM2041 programmes translates into press releases and engagement with the public and relevant stakeholders to inspire, engage and inform them. WMCA has appointed consultants to support this work and produce a behaviour change strategy and action plan by mid-2021. • WMCA was also a founding partner for the global pledge initiative, Count Us In, that launched on 10th October and seeks to mobilise 1 billion people to take practical steps that when aggregated, will make a significant impact in reducing carbon pollution and challenge leaders to act boldly to deliver global systems change.
<p>West Midlands Green Financing</p>	<p>The Five Year Plans (outlined below) will provide the high level programmes, scale of investment and carbon saved. This will provide us with a better understanding of the financing routes required to deliver on the outcomes. A Green and Social Finance Working Group has been established at the WMCA.</p>

2. 12-month priorities: acceleration and embedding phase

<p>A regional retrofit programme</p> 	<ul style="list-style-type: none"> • Having secured funding from the WMCA Innovation Board, Energy Capital are building a programme across the West Midlands with partners that looks at both the immediate need to tackle regional fuel poverty, and how we scale up retrofit across the region. As part of this collaboration, six working groups have been established to cover these two key work areas, as well as the cross-programme issues of customer engagement, green finance, skills and training, and governance. • The partnership has already been successful in bringing new funding into the region to fill gaps in fuel poverty support provision and invest in scaling up retrofit. The partnership is working on how best to support local authorities to access funding streams which have recently been announced by Government and had submitted one consortium bid to date. Energy Capital is also engaging with central Government regarding alternative regional delivery mechanisms through this partnership. • The above work will be complete by the end of the financial year, with strategic business cases developed to inform a detailed programme of work to build the foundations to address the huge fuel poverty and retrofit challenge (and opportunity) highlighted by the Five Year Plan. This includes a series of actions and associated resource requirements set out in the March 2021 CA Board Paper on the Five Year Plan.
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<p>Zero carbon homes charter and routemap</p> 	<ul style="list-style-type: none"> • In January 2021, the Housing & Land Delivery Board agreed the principles and contents of the Zero Carbon Homes Charter and Routemap. These documents would guide WMCA’s approach to meeting its commitment to delivering a ZCH standard by 2025, and to meet net zero carbon by 2041, with an initial series of priority actions identified for implementation in 2021. • The Charter frames WMCA’s commitment to, and objectives for, net-zero carbon homes in the region. In this regard, the document is vision-setting with a focus on delivering co-benefits such as whole life cost savings, supply chain opportunities, improved health and wellbeing, community enablement and future-proofing of economic sectors. • The Routemap provides an implementation plan for delivering the charter’s vision. It identifies a number of interim low carbon requirements and aspirational targets to 2025 and beyond. The purpose of these requirements/targets is to ease the transition to net zero carbon, beginning this year. • To support this transition, the routemap also sets out short and medium term actions, including priority actions to begin in 2021. Officers are now exploring options for implementing both the requirements/targets and priority actions.
<p>WM Circular Economy routemap and action plan</p> 	<p>Building on the early engagement and formation of a Taskforce, the WM Circular Economy Routemap will outline the opportunities for new job creation and business development in the region, whilst preventing unnecessary waste products and materials. WMCA Environment Team has commissioned Useful Projects to work with the Taskforce to produce the routemap, which will identify the social, economic and environmental opportunities under a more circular approach, as well as the enabling and strategic actions to get there. The routemap will also focus in on three significant investment areas for circular economy opportunities. The routemap will be produced by early summer 2021.</p>
<p>Green neighbourhoods, natural capital and a WM National Park</p> 	<p>There are six different projects within this area of work:</p> <ol style="list-style-type: none"> 1. WM Virtual Forest – the website was relaunched in December 2020 to support efforts to reach 4m trees planted across the WMCA geography and co-ordinate the work of regional tree planting groups. Covid-19 restrictions have limited the amount of trees planted since launch but planting efforts and co-ordination will recommence for the 2021/22 planting season. 2. West Midlands National Park - we have continued to work with BCU to identify a full project pipeline to begin to deliver on the WMNP activity and the governance arrangements around it. 3. Natural Capital Plan – WMCA has been working with regional partners to produce a Plan, which is being presented in draft to the Environment and Energy Board in March 2021. The relevant papers are attached for this meeting.

	<ol style="list-style-type: none"> 4. Community green grants (covered above) – this will begin with a pilot, but we would hope to sustain the work into the longer-term if we can identify a funding source. A funding ask was included in the 2020 CSR submission and also forms part of the funding request to CA Board in March 2021. 5. We are working with Severn Trent to develop the concept of a Commonwealth Games Forest as part of the sustainability legacy from hosting this event. 6. We are also working with the National Trust to support their work on the Eight Hills Regional Park (which will be located in Bromsgrove), which compliments our programme of work on natural capital.
<p>Electric mobility</p> 	<ul style="list-style-type: none"> • The Ultra-Low Emission Vehicle (ULEV) programme being led by Energy Capital and TfWM is developing along two themes; mass roll out and strategic/rapid charging stations. At a strategic level Energy Capital are working with National Grid to position for funding expected to be released by OLEV shortly (Project Rapid). We hope to influence national funding to support schemes in the region such as the strategic/rapid charging station being developed in Ansty, Coventry. Here a number of transport and energy projects are being co-located to maximise benefit to both the system and the locality. Funding to develop the Strategic Outline Case has been obtained through Midlands Energy Hub and a draft report will inform the wider regional strategy. • Energy Capital held a workshop with TfWM on 11 Sept, which mapped all transport transition programmes across the region with the aim of understanding the future impact on the underlying energy system of these projects. This is part of a process to ensure integration of workstreams and cohesion of strategy across Energy Capital, TfWM and #WM2041. • Energy Capital have also been working closely with the data insights team and have compiled the energy and transport data which we have access to, into an online portal, which will showcase the work being undertaken on local energy systems. • The result of this work will be an Infrastructure for Zero Emissions Vehicles (IZEV) strategy which will be complete by April 2021, ready for consultation following purdah. Resources to take this work forward will need to be identified.
<p>Reviewing the West Midlands Transport Plan</p> 	<ul style="list-style-type: none"> • In July 2020 WMCA Board approved the approach and timescale to update the statutory transport plan for the West Midlands in order to reflect the objectives of WM2041 and the regional economic recovery strategy. As part of this Board approved the development and publication for consultation of a transport green paper, which will form part of an on-going dialogue to explore how the transport system can continue to be developed towards an inclusive, de-carbonised and integrated system, connecting lives and livelihoods cleanly and safely. • To support this TfWM have undertaken a programme of market research and engagement to establish the appetite for travel behaviour change, new transport technology adoption, flexible working and uptake of consumer, freight and logistics behaviours in the West Midlands in a post COVID world. • A draft new West Midlands Local Transport Plan is slated for consultation in autumn 2021.

<p>Disclosing carbon emissions to the Carbon Disclosure Project (CDP)</p>	<ul style="list-style-type: none"> • This is a global initiative, which includes private and public sector organisations reporting on their activities to address carbon emissions, as well as their progress towards reduction targets. WMCA Environment Team submitted the report in August and were recently awarded a B. We are already in conversation with CDP on this year’s submission.
<p>WM2041 Business Pledge</p> 	<ul style="list-style-type: none"> • The idea of a WM2041 business pledge came through the Mayor’s Economic Impact Group (EIG) in summer 2020. • The Environment Team subsequently held an online workshop with ten EIG businesses and business network leaders of different sizes and sectors in September, to help shape the scope of a pledge and to propose actions that would support its delivery. Sustainability West Midlands are now engaged in the finalising the pledge and action plan, to ensure it aligns with other regional business networks and provides real value to businesses in the region, whilst supporting delivery of WM2041. • The Pledge will launch in March 2021.

3. Five Year Plan 2021-26

Background

The five-year delivery plans (four in total) will show the actions required to deliver the zero carbon target for the West Midlands by 2041. The first Five Year Plan (FYP) will provide:



Project Delivery

The Environment Team commissioned WSP to help produce the FYP. In addition to the above, the work will also include a detailed study of the jobs and skills that will be required to deliver WM2041 and identify the routes to ensure they are in place.

The FYP is being submitted to the 19th March WMCA Board and relevant papers are attached for this Environment and Energy Board meeting.

WMCA Environment News (since December 2020 Environment and Energy Board)

February 2021

- 25 Feb 2021 - [WMCA funds new training centre for mechanics of electric vehicles](#)
- 25 Feb 2021 - [New 'accelerator' will grow start-ups that tackle climate change](#)
- 24 Feb 2021 - [£30m investment in bus services through Dudley, Sandwell and Birmingham](#)
- 23 Feb 2021 - [Better Streets fund helps Wolverhampton families to get into cycling](#)
- 18 Feb 2021 - [Ten start-ups pioneering new 5G tech in West Midlands](#)
- 16 Feb 2021 - [New Gigafactory planned for Coventry Airport](#)
- 15 Feb 2021 - [Young people launch a vision for the future of the region](#)
- 15 Feb 2021 - [New Dudley bus and Metro interchange given WMCA approval](#)
- 12 Feb 2021 - [WMCA Budget approved and environmental protection given top priority](#)
- 11 Feb 2021 - [HS2 Growth Strategy set to turbocharge recovery](#)
- 9 Feb 2021 - [Plans to restore railway station at Aldridge](#)
- 8 Feb 2021 - [New cycle hire scheme launches in Sutton Coldfield](#)
- 3 Feb 2021 - [Draft 5-year plan published to achieve zero carbon by 2041](#)

January 2021

- 29 Jan 2021 - [WMCA unveils plan for region's digital future](#)
- 27 Jan 2021 - [National Express to run new zero-emissions Sprint bus services](#)
- 14 Jan 2021 - [First glimpse of how Metro extension in Dudley will look](#)
- 6 Jan 2021 - [Coventry bids to become UK's first all-electric bus city](#)
- 4 Jan 2021 - [Black Country takes step towards clean growth revolution](#)

December 2020

- 23 Dec 2020 - [Leading companies come together to set net-zero roadmap](#)
- 22 Dec 2020 - [New homes to be built on brownfield site in Telford](#)
- 14 Dec 2020 - [New hotline to help residents keep warm and cut energy bills](#)