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.

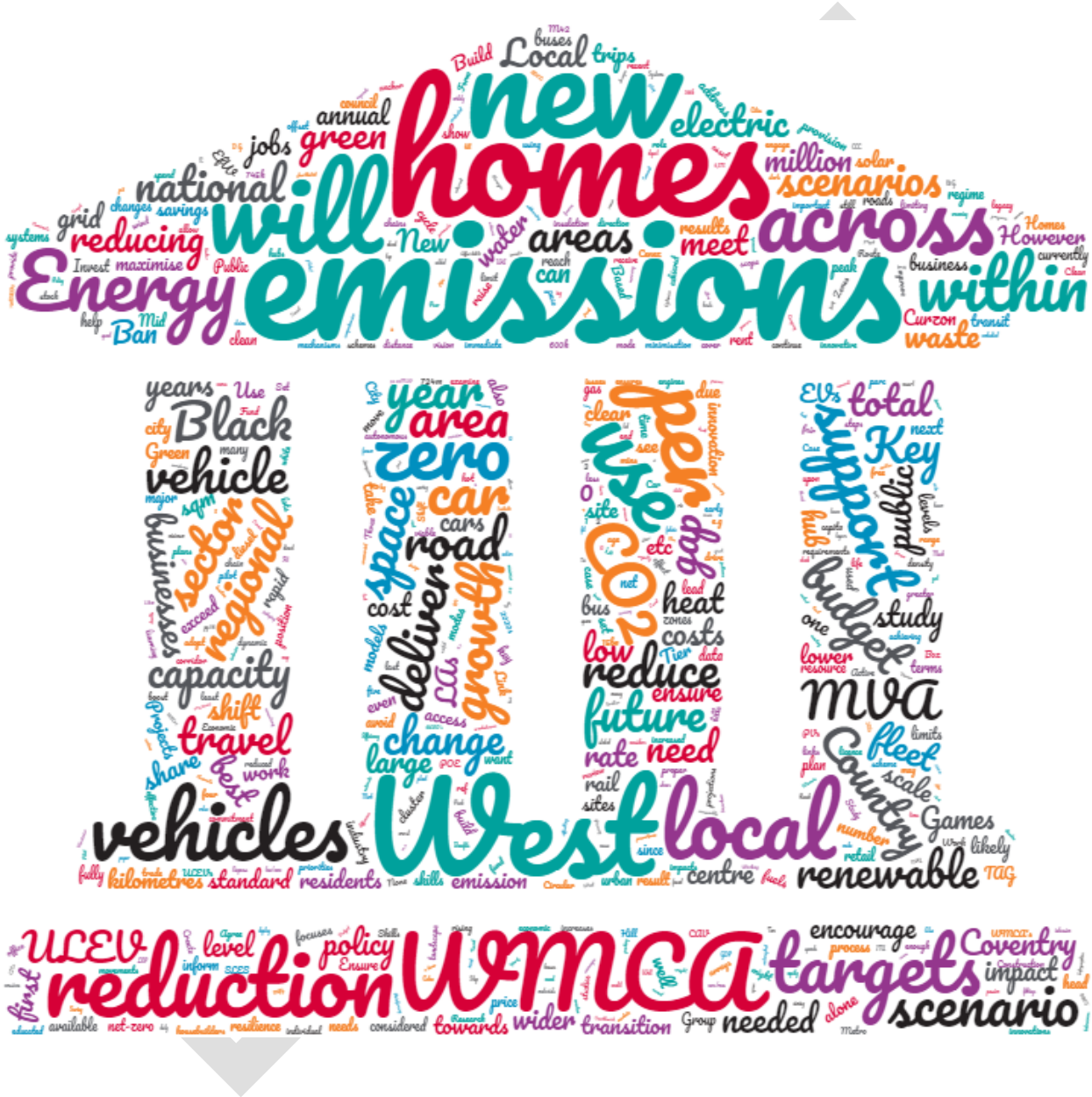
- Whilst a ban on internal combustion engines will come in by 2030, this is likely to be too late to affect the carbon budget greatly over the next few years and demand reduction measures may be needed to curb transport fuel consumption, private car use and increase active travel, public transport, micro-mobility 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

in the context of wider greening initiatives, improving air quality and improving biodiversity and habitats.

- There are a number of initiatives already being undertaken across the region include Energy Innovation Zones (such as at Tyseley) and smart energy management in Coventry. Key industries are also being attracted to the region such as a new Giga Factory for battery production whilst the likes of Jaguar Land Rover have already moved to electric vehicle production.



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 rooves 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 incudes 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 eco-systems (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 CO_2 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 CO_2 emissions budget of 126 MtCo2 for 2020-2100
- 2) Initiate immediate CO_2 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 CO_2 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 CO_2 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.

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)

Cenex 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.