sustainability west midlands

West Midlands Local Industrial Strategy

Low Carbon Evidence Base

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WEST MIDLANDS COMBINED AUTHORITY

Report information

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About Sustainability West Midlands
We are the sustainability adviser for the leaders of the West Midlands. We are also the regional sustainability champion body for the West Midlands, as designated by government. We are a not-for-profit company that works with our members in the business, public and voluntary sectors. Our Board is private sector led and has cross-sector representation; they are supported by our team of staff and associates.

Our vision is that by 2020 businesses and communities are thriving in a West Midlands that is environmentally sustainable and socially just.

Our role is to act as a catalyst for change through our advice to leaders, to develop practical solutions with our members and share success through our communications.

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Contents

Foreword (Updated – May 2019)

This document forms part of the extensive evidence base the WMCA and partners developed to help inform the UK's first Local Industrial Strategy (LIS).

The WMCA asked SWM to help review the existing evidence base around low carbon expertise linked to the developing themes of the LIS to support and inform where the new strategy could accelerate action.

This document and accompanying database was produced in July 2018, and provided an important tool during the ongoing development of the strategy, and also formed part of the SWM submission and recommendations to the WMCA in November 2018.

As a result, in May 2019 when the WMCA and Government launched the West Midlands Local Industrial Strategy, it was recognised by Green Alliance, SWM and others as the UK's first clean and inclusive growth Local Industrial Strategy. We still have a long-way to go, however as this evidence base shows we are building on a strong foundation of local expertise.

Dr Simon Slater
Head of Environment, WMCA, May 2019.

1 Introduction

Sustainability West Midlands (SWM) is the sustainability delivery partner for the West Midlands Combined Authority (WMCA). This report is part of an ongoing support programme to help the WMCA integrate sustainability within its strategy and operations, drawing on good local and national practice.

This report provides an overview and analysis of the evidence related to the low carbon sector that can be used to inform the development of the new West Midlands Local Industrial Strategy (LIS), the development of which is being led by the WMCA.

The Industrial Strategy White Paper, published in November 2017, announced the government's intention to work with the Mayoral Combined Authorities (CAs) and Local Enterprise Partnerships (LEPs) to develop LISs. The broad view is that these strategies should aim to 'boost productivity, earning power and competitiveness' by identifying 'priorities to improve skills, increase innovation and enhance infrastructure and business growth.' The West Midlands is one of three 'trailblazer' areas tasked with co-designing and developing the first of these LISs by March 2019.[1]

The LIS will also demonstrate how the West Midlands will respond to the nationally identified Grand Challenges;[2] these are: Artificial Intelligence and data; ageing society; clean growth; and the future of mobility.

This document pulls together the evidence base that reflects the low carbon strengths and assets that are prominent in the West Midlands region. This evidence comes from a variety of existing sources all of which reflect certain aspects of low carbon activity, policy or networks in the West Midlands, around issues such as energy, transport, waste, construction and manufacturing. As such, this evidence presented in this report directly address the grand challenges of clean growth and the future of mobility, some activity against which is underpinned by artificial intelligence and data. Indirectly, this evidence will also supplement the government's Clean Growth Strategy, published in 2017.[3]

The evidence presented in this report provides a strong argument for continued investment in the low carbon sector and for this to be at the forefront of the West Midlands LIS.

[1] http://www.centreforcities.org/wp-content/uploads/2018/04/2018-04-12-Six-ideas-for-more-effective-Local-Industrial-Strategies.pdf
[2] https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges
[3] https://bit.ly/2N1NPkb

2 Methodology

2.1 What we looked at

SWM reviewed several key documents and picked out the key low carbon assets, projects and initiatives that showcase why the West Midlands is a key location of low carbon growth and development. Many of these publications were written by SWM, or are documents towards which we contributed. Some of these reports offer a greater amount of evidence than others but it was necessary to peruse as many documents as possible to obtain a wide range of evidence.

We started the exercise by analysing key documents that we knew contained significant amounts of evidence; these are listed below under the main sources of evidence heading. We then supplemented this by searching through several other documents listed under the other sources of evidence heading. On several occasions, there were documents that contained the same pieces of evidence. In these cases, we discounted any duplicates and moved on, to avoid double counting.

Main sources of evidence:

- Fit for the Future? II: Local Enterprise Partnerships' Climate Change and Low Carbon Economy Good Practice (2017)
- West Midlands Science and Innovation Audit (2017)
- Low Carbon and Climate Change Research Strengths in the West Midlands (2016)
- West Midlands Low Carbon Investment Prospectus (2012)

Other sources of evidence:

- A Regional Energy Strategy for the West Midlands (draft for consultation, 2018)
- A Regional Approach to Clean Energy Innovation (2018)
- Energy and low carbon activity and structures in combined authority areas (2018)
- Energy as an Enabler: Linkages between Local Energy Strategy, Productivity and Growth (2018)
- A Green Future: Our 25 Year Plan to Improve the Environment (2018)
- Low Carbon & Environmental Sector: WMCA updated statistics (2018) – contact SWM to access this report.
- Combined Authority Sustainability Benchmarking Technical Report – analysis of strategies (2017)
- West Midlands Energy and Low Carbon Strategy Analysis for WMCA and Energy Capital (2017)
- Ingredients for Climate Innovation Clusters: The UK Case (2017 - N)
- UK Clean Growth Strategy (2017)
- UK Industrial Strategy: Building a Britain fit for the future (2017)
- What We Know about Local Authority Engagement in UK Energy Systems (2017)
- Black Country LEP Strategic Economic Plan (2017)
- Energy in the Midlands Engine: Powering a New Energy Future (2017)
- West Midlands Combined Authority Strategic Economic Plan (2016)
- The West Midlands Strategic Transport Plan (2016)
- Greater Birmingham and Solihull LEP Low Carbon Energy Plan (2016)
- Greater Birmingham and Solihull LEP Low Carbon Transport Plan (2016) – contact SWM to access this report.

- Black Country Smart City Strategy (2016)
- Coventry and Warwickshire LEP Strategic Economic Plan (2016)
- Greater Birmingham and Solihull LEP Strategic Economic Plan (2016)
- West Midlands Local Authority Benchmark: Addressing climate change mitigation, adaptation and the low carbon economy (2016)
- Fit for the Future?: Local Enterprise Partnerships' Climate Change and Low Carbon Economy Good Practice (2015)
- Market research on key sectors: sustainable futures (2015 - N)
- The Future We Made: Birmingham and the West Midlands Futures Toolkit 2020-2060 (2015)
- Low-carbon economy: size and performance (2015)
- West Midlands Combined Authority Environmental Strategy (2014)
- The Socio-Economic Performance of the West Midlands in terms of the Low Carbon Economy (2013) – contact SWM to access this report.
- Birmingham's Green Commission Carbon Roadmap (2013)
- The Economics of Low Carbon Cities: A Mini-Stern Review for Birmingham and the Wider Urban Area (2013)
- Low carbon and environmental goods and services: 2011 to 2012 (2013)
- How Green is your Local Enterprise Partnership? (2012)
- Green cities: Using city deals to drive low carbon growth (2012)
- Climate Change Strategy for Coventry (2012)
- Renewable Energy Capacity Study for the West Midlands (2011)
- Low Carbon Economy in the West Midlands (2010)
- Opportunities for the Low Carbon Economy series – local authority profiles (2010)
- Evidence of success: developing the UK's first low-carbon regional economic strategy (2009)
- Low Carbon Economy for the West Midlands: A synthesis report (2009)
- Low Carbon Evidence Base for the West Midlands Regional Economic Strategy (2007)

The publications analysed largely came from the SWM website, either on the internal or external resources pages; SWM publishes the majority of documents that reflect the local evidence base around low carbon growth. We also used the list of strategies that were put together by SWM to support the Energy Capital initiative in 2017 as prompt to identify other potential document that contained relevant evidence.

Upon reading the above publications and finding relevant pieces of evidence, it was usually necessary to then find out more about the evidence by referring to any associated footnote or searching online. The links to these additional sources are available in the master database that captures all pieces of evidence found by this exercise.

2.2 What we were looking for

The publications above, to varying degrees, all demonstrate certain strengths in the low carbon sector across the West Midlands Combined Authority (WMCA) three-LEP geography. However, given that the Local Industrial Strategy (LIS) is being developed to encourage and inject investment into the West Midlands, it was necessary to pick out specific aspects of the low carbon sector that the West Midlands is strong at. This was in the form of three specific types of evidence:

- Activity – this could be a project or initiative related to the low carbon sector that has left an impact on the region (that has either been completed or is underway).
- Policy – this includes evidence of our existing low carbon strengths and assets that demonstrates the region's track record in this sector.
- Network – a body or group of individuals that provides networking opportunities for organisations in the local low carbon sector, accelerating activity and collaboration.

With respect to the latter, SWM is aware of many of the relevant networking agents operating in the West Midlands (as it runs many of them itself) so the presence of networking agents in the database were partly based on our own knowledge. Two documents, those that have the letter N after their name in the list provided in section 2.1., were used to identify any others.

Specifically, we were looking for activity, policy or network evidence that addressed the following key priorities:

- Construction (C)
- Automotive/mobility (AM)
- Clean growth[4] (CG)
- Local carbon technologies[5] (LCT)

These four categories were derived from a combination of an existing piece of work looking at the West Midlands' overall sector strengths and the UK's Industrial Strategy national Grand Challenges.[6] Using these ensured we were focusing on existing local and national priorities and allowed us to ensure that all evidence obtained could be fit into at least one of these categories. They are also broad enough so that most areas of the low carbon sector could be included as evidence. There is also clear overlap between many of the categories, for example, an identified strength in renewable technologies will contribute to both the clean growth agenda and represents evidence of low carbon technology development.

It is also important to note that we were focusing specifically on finding **evidence**, which in this context means activities, policies or networks that have or are running, or strengths that have been calculated or documented based on past or present reality, rather than speculative information that reflects what may happen. The LIS should use this evidence as a prompt to outline the opportunities the West Midlands has in growing the low carbon sector in future.

[4] According to the Clean Growth strategy, this means activity that contributes to "growing our national income while cutting greenhouse gas emissions."

[5] This definition varies depending on source but largely includes any technology that reduces carbon and mitigates the harmful effects of climate change, e.g. renewable energy technologies, low emission vehicles and so on.

[6] https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges

2.3 How the information was captured

SWM developed a database that listed all the activity, policy or network evidence that was captured from the above analysis. This included the title of the evidence piece identified, its geographical coverage, the type of evidence, which of the four national/local key priorities the evidence piece addressed, a description of the evidence and links to its source and to more information. In addition, SWM provided a more granular snapshot of the themes the evidence piece covered and the impact it had on local priorities. More detail on this is provided below.

Thematic coverage

Because the four national and local priorities are rather broad, it was important to note which specific areas of the low carbon economy each piece of evidence reflected. How we broke these priorities down is outlined below. They complement the above broader priorities and were drawn out by the evidence collated.

Main category	Sub-category	Acronym used	Broad priorities potentially covered
Energy	Energy efficiency	EE	CG
	Renewable energy	RE	CG, LCT
	Energy storage and systems	ESS	CG, LCT
Transport	Low emission vehicles	LEV	AM, CG, LCT
	Fuel cell and battery technologies	FCB	AM, CG, LCT
	Lightweighting	L	AM, CG
	Autonomous vehicles	AV	AM, CG, LCT
Construction and buildings	Sustainable construction and materials	SCM	C, CG, LCT
	Sustainable infrastructure	SI	C, CG, LCT
	Manufacturing building products	M	C, AM, CG, LCT
	Sustainable buildings and housing	SBH	C, CG, LCT
Waste	Resource efficiency	REF	CG, LCT
	Recycling and/or reuse of products or materials	RR	C, CG, LCT

Against each of the four broad priority themes and against each of the above sub-themes, we indicated in the database whether the evidence piece clearly addressed this theme, or whether it was less clear or addressed it indirectly. This was done using an asterisk indicator, whereby two stars (**) indicated a strong, clear correlation and one star (*) indicated a less clear or indirect correlation. No stars indicated that this piece of evidence did not address this theme or priority area. An example is provided below:

Evidence (project, asset, intiative etc)	Low carbon strengths and themes													LIS Specialisms / IC Grand Challenges				Description of evidence
	Energy			Transport				Construction and buildings				Waste		C	AM	CG	LCT	
	EE	RE	ESS	LEV	FCB	L	AV	SCM	SI	M	SBH	REF	RR					
Intelligent Transport, Heating and Electrical Control Agent - Itheca	*	**	*	**					*		*				**	*	**	The project will: - Demonstrate the first commercial interoperation of small-scale bioenergy generation with a city wide heat network; - Advance and demonstrate the potential of vehicle to grid (V2G) infrastructure in supporting intelligent localised energy systems; - Demonstrate the increasingly important role of localised energy systems in supporting the traditional energy system through demand side grid management; - Integrate the project innovations into an intelligent control agent that will continuously maximise the system efficiency, service and profit.

Impact

It was also useful to determine the indicative impact that the activity, policy or network evidence piece has/had on various local priorities. Impact categories were developed reflecting local priorities and, as before, scored in the same way using the above asterisk indicator. The impact categories are as follows:

Impact – local priorities	Acronym used	Local targets
Research – does this piece of evidence demonstrate research against one of more of the themes?	R	-
Skills and jobs – does this piece of evidence demonstrate a contribution towards increasing the number of jobs and people with appropriate skills?	SJ	WMCA SEP targets by 2030: • 1.9m to 2.4m jobs • 153k less people with no formal qualifications (fall of 9%) • +1,000 jobs and NVQ4+ qualifications in low carbon sector • -1,000 people with no qualifications in low carbon sector
Economic productivity – does this piece of evidence demonstrate a contribution towards increasing economic productivity?	EP	WMCA SEP targets by 2030: • 20k more businesses • 5% higher GVA than national average • +£2bn GVA in low carbon sector • % of start-ups reaching a turnover of £1m within three years will be above the national average SWM roadmap target by 2020: • 30% increase in economic productivity
Social – does this piece of evidence address any social priorities, such as around health inequality or fuel poverty?	SOC	WMCA SEP target by 2030: • Healthy life expectancy to raise by 0.8 years for men and 1.6 years for women SWM roadmap target by 2020:

Impact – local priorities	Acronym used	Local targets
		• 30% reduction in health inequality gap for males and females
Environmental – does this piece of evidence address any social priorities	ENV	WMCA SEP targets by 2030: • 40% reduction in CO_2 • Reduction in air pollution so that EU standards are breached on just 1 day per year SWM roadmap target by 2020: • 30% reduction in CO_2
Local area benefit – Is the impact /benefit of this activity/policy/network felt mostly/solely in the West Midlands or are some/all benefits being felt outside?	LA	-

As described above, each of these six impact categories was scored using the asterisk indicator and therefore a total score of 12 was possible, whereby the evidence piece would have contributed directly and strongly to all six categories. It is understood that one of the reasons why impact may be lower is due to the amount of available information about each piece of evidence, but overall, it is a useful indicator showing the level of impact of each activity, policy or network evidence piece and its contribution to local targets. An example of what this looks like in the spreadsheet is provided below:

Evidence (project, asset, intiative etc)	Impact						Overall impact and scale	Description of evidence
	R	SJ	EP	SOC	ENV	LA		
Intelligent Transport, Heating and Electrical Control Agent - Itheca	**		*	*	*	**	7	The project will: - Demonstrate the first commercial interoperation of small-scale bioenergy generation with a city wide heat network; - Advance and demonstrate the potential of vehicle to grid (V2G) infrastructure in supporting intelligent localised energy systems; - Demonstrate the increasingly important role of localised energy systems in supporting the traditional energy system through demand side grid management; - Integrate the project innovations into an intelligent control agent that will continuously maximise the system efficiency, service and profit.

The rest of this document outlines the results and recommendations gleaned from this exercise.

3 Results

This section provides a summary of the findings from the research undertaken, as outlined in the methodology.

3.1 Summary

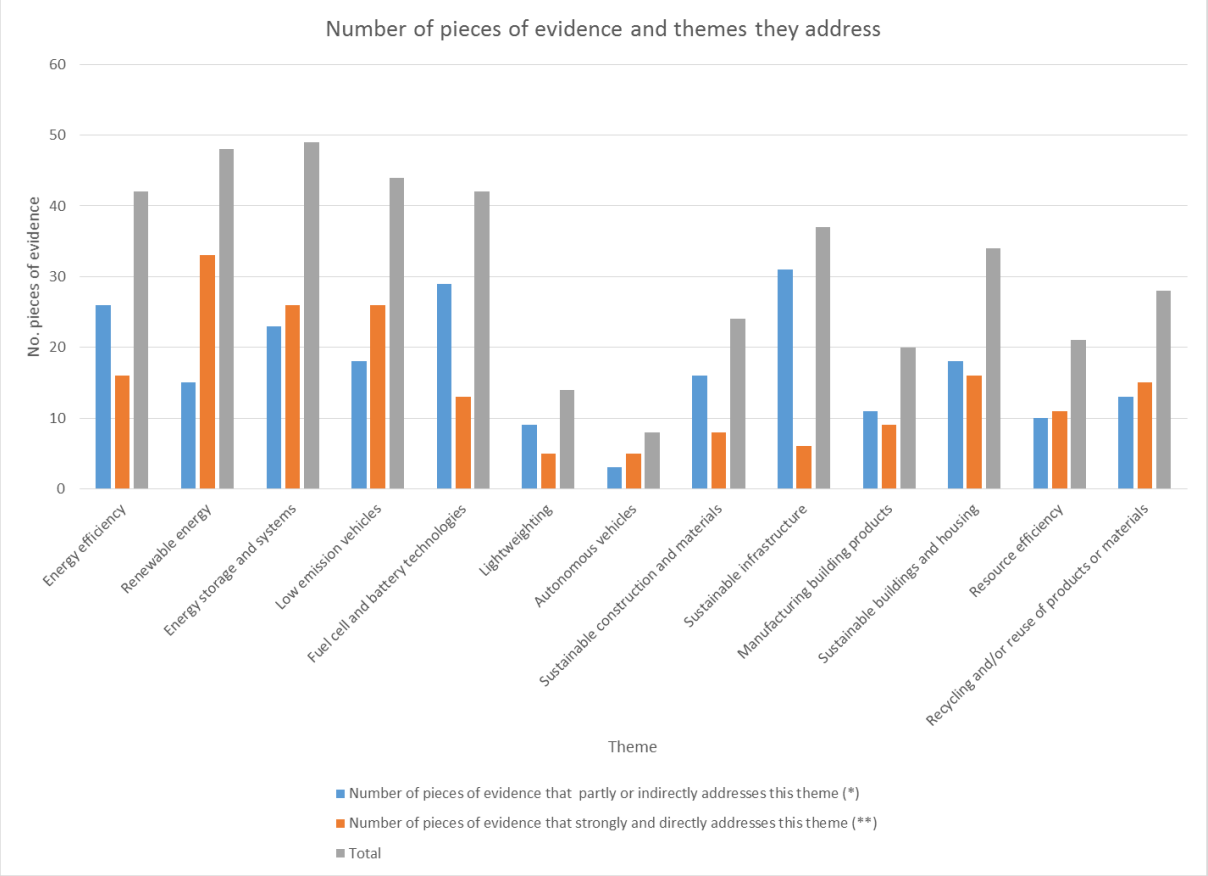
Overall, 93 pieces of evidence were found within the publications outlined in the methodology that reflect strengths matching the four locally and nationally set challenges of construction (C), automotive and mobility (AM), clean growth (CG) and low carbon technologies (LCT) (from this point forward referred to as the low carbon sector). Of these, 56 represented evidence of activities that have taken place that contribute to the sector (projects and programmes), 22 represented policy evidence and 15 networking agents were also identified.

3.2 Thematic patterns

This table shows the numbers of pieces of evidence that were found to address the themes identified from the research.

Main category	Sub-category	Broad priorities potentially covered	Number of pieces of evidence that strongly and directly addresses this theme (**)	Number of pieces of evidence that partly or indirectly addresses this theme (*)	Total	>25% pieces of evidence address this theme	>40% pieces of evidence address this theme
Energy	Energy efficiency	CG	16	26	42	Y	Y
	Renewable energy	CG, LCT	33	15	48	Y	Y
	Energy storage and systems	CG, LCT	26	23	49	Y	Y
Transport	Low emission vehicles	AM, CG, LCT	26	18	44	Y	Y
	Fuel cell and battery technologies	AM, CG, LCT	13	29	42	Y	Y
	Lightweighting	AM, CG	5	9	14		
	Autonomous vehicles	AM, CG, LCT	5	3	8		
Construction and buildings	Sustainable construction and materials	C, CG, LCT	8	16	24	Y	

	Sustainable infrastructure	C, CG, LCT	6	31	37	Y	
	Manufacturing building products	C, AM, CG, LCT	9	11	20		
	Sustainable buildings and housing	C, CG, LCT	16	18	34	Y	
Waste	Resource efficiency	CG, LCT	11	10	21		
	Recycling and/or reuse of products or materials	C, CG, LCT	15	13	28	Y	



The below analysis looks at the geographical strengths in the region and reflects the number of strong and direct (**) pieces of evidence against each theme, and in which geographical area that piece of evidence resides (e.g. was it a project that covered a specific area, an asset located in a specific area, a policy piece reflecting a specific geography or a network that is run across a specific geography?)

Number of pieces of evidence that strongly and directly addresses this theme (**)

	Theme	Black Country	Coventry & W	GBS	WMCA-wide
Energy	Energy efficiency	1	1	4	10
	Renewable energy	3	5	17	11
	Energy storage and systems	3	8	11	5
Transport	Low emission vehicles	3	12	6	7
	Fuel cell and battery technologies	1	6	6	3
	Lightweighting	0	5	1	0
	Autonomous vehicles	0	5	0	0
Construction and buildings	Sustainable construction and materials	1	3	1	5
	Sustainable infrastructure	1	1	4	2
	Manufacturing building products	3	5	3	0
	Sustainable buildings and housing	4	1	7	4
Waste	Resource efficiency	0	2	4	6
	Recycling and/or reuse of products or materials	1	3	7	6

The green shaded areas represent clustering, in terms of where several activities have taken place across one particular area, relative to the total number identified against each theme. In summary, it shows that the Greater Birmingham and Solihull LEP area has particular strengths, activities and networks in renewable energy, energy storage and systems, sustainable buildings and housing and recycling and reuse, with Coventry and Warwickshire demonstrating strengths in various aspects of low carbon transport, particularly low emission vehicles, lightweighting and autonomous vehicles.

4 Recommendations for the West Midlands Combined Authority

Based on extensive research that has reflected evidence of local activity, policy and networks in the low carbon sector that are happening or have occurred in the past ten years, SWM suggests that the following should be highlighted to central government as particular strengths of our region upon which to build. As such, these should be reflected in the WM LIS.

Top priorities and initiatives

The following initiatives were scored highest (7 or 8 out of 10) for their impact, i.e. on a combination of a track record/evidence of: research; enhancing skills and creating jobs; strengthening economic productivity; contributing to social priorities such as health inequalities; environmental benefits such as reducing carbon or air pollution; and ensuring the impact of the activity remains within the West Midlands. Moreover, they all contribute to the relevant Industrial Strategy Grand Challenges and/or the LIS identified specialisms as set nationally or locally. As such, these activities should be explicitly referenced within the LIS as national trailblazing projects being run out of the West Midlands that meet key national and local priorities.

Evidence of activity	Details	Scale of impact
EIT Climate-KIC	EIT Climate-KIC is a European knowledge and innovation community, working towards a prosperous, inclusive, climate-resilient society founded on a circular, zero-carbon economy. One of its main offices is in Birmingham and the organisation has identified Birmingham as one of its key climate innovation clusters.	**R: **** **SJ: **** **EP: **** **ENV: **** SOC: * LA: *
Energy Innovation Zones	Energy Innovation Zones (part of the Energy Capital initiative, see below) provide a flexible 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. Four EIZs are being developed in north Black Country (i54 Enterprise Zone), Tyseley and central Birmingham, South Coventry and southeast Birmingham (UK Central).	R: * **SJ: **** **EP: **** ENV: * SOC: * **LA: ****
Energy Capital	Energy Capital is the smart energy innovation partnership for the West Midlands. By responding to the needs of the local vibrant manufacturing economy and diverse local markets, the aim is to make the West Midlands one of the most attractive locations to build innovative clean energy technology companies in the world.	R: * SJ: * EP: * **ENV: **** **SOC: **** **LA: ****

Energy Research Accelerator	ERA is the first truly embedded 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.	**R: **** SJ: * EP: * ENV: * SOC: * **LA: ****
Energy Systems Catapult	Based in Birmingham, the Energy Systems Catapult supports innovators in unleashing opportunities from the transition to a clean, intelligent energy system.	R: * **SJ: **** **EP: **** ENV: * SOC: * LA: *
CABLED successor activity	The CABLED project ran from 2009 to June 2012. It showcased electric cars across Birmingham and Coventry, making ultra-low-carbon vehicles available to real users and collected data on everyday use. The CABLED project collected data from the vehicles to understand how they were used and assist in the planning of the further expansion of the supporting infrastructure. Building on this expertise around the future of mobility and electric cars should be a priority for the region.	**R: **** SJ: * EP: * ENV: * SOC: * **LA: ****

Given the high impact of these activities, we would expect to the LIS to make the case for further investment, expansion or development of the activities by central government, to significantly strengthen the low carbon economy in the region and enable the West Midlands to be the key place to invest in the UK. Examples of how central government could further develop these initiatives are as follows:

Evidence of activity	**How could the LIS reflect how government could help expand on this activity?**
EIT Climate-KIC	There is uncertainty around how Climate-KIC will maintain its presence and funding following the UK's withdrawal from the EU. Therefore, could the projects and lessons learnt from the current Climate-KIC initiative be expanded upon locally by other means, or a deal done nationally with Europe to ensure Climate-KIC can continue post-Brexit for the benefit of the local economy and skills in the low carbon economy?
Energy Innovation Zones	These are currently concepts that are just coming to fruition and have been backed locally by the WMCA mayor and many key stakeholders. Government should recognise the EIZ concept as a huge opportunity to attract investment, and therefore should itself invest in the concept to allow the EIZs to be developed.
Energy Capital	Energy Capital has already been recognised in the West Midlands' second devolution deal. Any regulatory or structural barriers to implementation should now be removed so that it can be embedded into local devolution

	and given funding and resource to enable – and to help develop the EIZ concept outlined above.
Energy Research Accelerator	ERA's presence and the decision to locate in the Midlands reflects the thought of this area's prominence and existing strengths in the energy sector; recognition of this via future energy investment in the West Midlands should naturally evolve. Government could also support the research findings evolving from ERA by providing investment to help apply these findings to the real world, including businesses and consumers; pilot projects or research findings could otherwise be wasted.
Energy Systems Catapult	As with ERA, the Catapult's decision to base its Energy Systems branch in Birmingham is not an accident and should reflect the need for continuous investment in energy development locally. Further support to continue the work that ESC has already started should be provided by government to ensure this work can be of benefit to consumers and businesses.
CABLED successor activity	As technology is constantly evolving and has moved on since the conclusion of CABLED in 2012, government could see this as an opportunity to invest in local trials that focus on more innovative low carbon transport technologies, such as rapid charging points or alternative fuels such as hydrogen, learning from the CABLED project which demonstrated significant success not least due to being implemented in the West Midlands.

Other areas the LIS should reflect

As a result of their regional impact, their addressing the relevant Industrial Strategy Grand Challenges and/or the LIS identified specialisms and their longevity and track record, the following activities should also be reflected in the WM LIS as evidence as to why further investment should be forthcoming.

- Thematically, the West Midlands demonstrates particularly significant activity and expertise in research, development and projects pertaining low emission vehicles, energy storage and systems, renewable energy and fuel cell and battery technologies. Further investment to strengthen skills and productivity should be sought in all these areas and thus reflected in the LIS.
- Autonomous vehicle development is also beginning to cluster in the West Midlands and given this evolving activity and existing assets (such as JLR, HORIBA MIRA, Centre for Connected & Autonomous Automotive Research, Warwick Manufacturing Group etc.), there is an opportunity here to make the West Midlands the UK's national centre for autonomous vehicle testing and development. This case could be made in the LIS.
- The region also has strengths and a track-record in implementing energy efficiency measures and developing smarter, more sustainable buildings and housing, through projects such as Birmingham Energy Savers and BECCI, and various research strengths on this topic. There is a fundamental need for this to continue, due to high fuel poverty levels, an ageing building stock and a high prevalence of SMEs. The LIS can act as the trigger to ensure this happens.
- The West Midlands contains a major cluster of research institutes that focus on aspects of low carbon, in particular the University of Warwick, University of Birmingham, Coventry University, Aston University and Birmingham City University. Particular assets include the European

Bioenergy Research Institute, the Advanced Propulsion Centre, the National Battery Manufacturing Development Centre and various activities arising from Warwick Manufacturing Group. There are few areas in the UK where a cluster of low carbon related research strengths exist and LIS ought to reflect this accordingly.

- Various studies also show that the low carbon sector, in particular energy and transport, have a high share of employment in the West Midlands relative to English average. The Energy and Environmental technologies sector *"currently account for £2.1bn of annual GVA in the WMCA area and is the most productive of all sectors by value."* Further investment asked for by the LIS will build on this success and further improve local economic productivity in this area.
- Other studies, such as the GBSLEP low carbon energy research uses a different methodology to capture how low carbon goods and services are moving from narrow sectors into all sectors of the economy. As a result, when this local study is multiplied by population across the whole 3 LEP LIS geography, the figure is nearer £9bn of GVA or 10% of the regional economy.

Gaps where further support could be required

- There is a need to ensure that there are opportunities for young people to develop the skills they need so that the low carbon sector can continue to expand in future. This is particularly relevant in the sustainable construction sector which, although being strong in the West Midlands still lacks the skills to adequately innovate. Investment should be made in institutions to ensure these skills can be nurtured. The LIS could ask to build on some of the existing assets that are in place to address the skills gap, such as the Manufacturing Technology Centre and the National Skills Academy for Power.
- The high prevalence of research in the region is an exceptional asset, but translating this into tangible impact on the ground is often a challenge. There are an increasing number of activities (e.g. energy efficiency programmes) being run out of universities that help to support businesses, but it is still the case that much of the research is never applied to the consumer or business world, despite how ground-breaking the research may be. There is a huge opportunity in this region to bridge that gap, given the number of institutes and their respective strengths in the low carbon sector, and the LIS could request mechanisms from central government to do this.
- As demonstrated above, this region has shown plenty of activity and research around low carbon transport and investment is being shown in regional initiatives, such as hydrogen buses in Coventry and the use of battery technology to enable catenary-free running on the Midland Metro. However, there are still challenges with local public transport infrastructure, rising fares and patronage and the reduction in bus provision outside large conurbations which contradict the innovation being demonstrated in this area. Investment in better public transport integration should be part of the investment in the overall innovation in local transport. The LIS could show that better overall connectivity can help to boost jobs and make the area a more attractive place to live and invest.

It should be made clear in all activities into which investment is being injected what the associated environmental and social benefits should be. The West Midlands still has a large health inequality gap, high air pollution levels and emits a large amount of carbon and although most of the projects contribute to one or more of these metrics, few are necessarily developed with these at the forefront of the activity, or monitored accordingly. Achieving projects that do this will, again, bridge the gap between research and reality. The LIS could particularly make the case for further investment in treating hard to heat homes

and rolling out low carbon vehicle technologies into the real world to help address these issues, whilst at the same time continuing to boost the economy.

-END-

ANNEX

See separate excel spreadsheet of the review of the existing published evidence base.