Energy as an Enabler

Linkages Between Local Energy Strategy, Productivity and Growth

MARCH
2018

Black Country *LEP*

Foreword

A more stable, competitive and effective energy system can have a significant enabling effect on the local economy. Energy is a major driver of productivity, but currently acts as a considerable hindrance to many of our businesses due to unsustainably high prices impacting business costs. This report is a vital piece of evidence to inform a growing set of work in the West Midlands to improve the local energy market for the benefit of our key sectors and the overall regional economy.

In the Black Country and the West Midlands, we have successfully positioned ourselves as a leading area in developing the energy agenda, putting us in a prime position to secure significant investment. Managing energy infrastructure planning and investment locally through Energy Innovation Zones (EIZs) is an ambition that will allow the region to provide energy infrastructure that suits local needs. Activity to support our regional energy strategy, including the EIZ vision, is crucial for making a strong case for investment and this report complements the work of the Regional Energy Commission and Energy Capital.

This all comes at a time when energy is an increasingly important policy area both regionally and nationally. Within the government's Industrial Strategy, 'Clean Growth' is identified as one of four 'grand challenges', and the WMCA's initial 'local' Industrial Strategy work has identified energy as a key cross-cutting priority. In order to embrace the opportunities of vehicle electrification, smart cities and a low carbon economy, the West Midlands more than ever needs to provide the right energy infrastructure for local people and businesses.

This is a moment of unique opportunity to impact economic growth through focused energy policy, and one which must be seized. In my role as both a Black Country LEP Board Member and as the Energy & Environment sector lead for the WMCA Productivity & Skills Commission, I fully endorse the content of this report and look forward to continuing to work for a more efficient energy system for the benefit of the West Midlands.

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Black Country LEP Board

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23 March 2018

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Acknowledgements
Many thanks to Matthew Rhodes for utilising his expertise, commitment & hard work in undertaking this in-depth report, and to the assistance provided by Charlie Hopkirk of Black Country LEP and Professor Jun Du of Aston University, particularly regarding the data. Matthew Rhodes as the author takes sole responsibility for any errors or omissions in the contents.

Executive Summary

An effective and well-focused regional energy strategy could contribute between £400M-£820M per year to West Midlands[1] regional GVA across all sectors, underpinning our regional industrial strategy, although it will have the greatest impact in automotive and transport, manufacturing, construction and digital sectors.

Table 1 below summarises how energy can positively impact GVA as part of a wider industrial strategy. Note that 'competitiveness of industry' is where energy makes the greatest potential impact as an enabler, reflecting the benefits of reducing energy costs for existing manufacturing firms.

Potential Benefits of a Focused Regional Approach to Energy as an Enabler of Industrial Strategy	Provisional GVA impact estimate (p.a.)
Accelerated roll-out of commercial developments	£100M
Speed of new market development	£120M
Competitiveness of industry	£155M-£400M[2]
Attractiveness of the region to skilled people	£25M-200M
Total	**£400M - £820M**

Table 1 Summary of potential GVA benefits delivered by a West Midlands Regional Energy Strategy

The West Midlands has an inbuilt natural global competitive advantage in its energy infrastructure, energy sector skills, diversity of local markets and innovation asset base in energy systems. Leveraging this natural advantage to benefit economic activity and opportunities for citizens across the region requires a strong partnership and some regulatory and political freedom, which the devolution of power to the regional mayor could deliver.

Delivering the GVA benefits listed in Table 1 will specifically require:

- Implementation of the proposed Energy Innovation Zone (EIZ) model being developed through the Regional Energy Policy Commission, particularly to support local authority-owned 'DevCos' or similar risk vehicles for infrastructure investment ahead of demand.
- A strategic focus on encouraging investment in modern and smart energy infrastructure for supporting the large-scale deployment of future mobility technologies (such as electric vehicles) and clean growth technologies (such as low carbon and energy efficient housing).

[1] Throughout this report, West Midlands means the WMCA, 3 LEP geography.
[2] The higher figure assumes Helm's national recommendation to establish a legacy bank for historic energy infrastructure investment costs is adopted in the West Midlands.

- Differential energy pricing for strategic industries following international patterns and using the 'Legacy Bank' model proposed by Dieter Helm in his recent review of the Cost of Energy in the UK for the government[3].
- A focus on promoting energy efficiency in industry; open and transparent, competitive local markets for energy; and local private wire and district energy systems where appropriate.
- Imposition and effective policing of energy efficiency standards on new housing developments representing a 10-25% improvement on current national standards, coupled with well-designed incentives for energy efficient improvement of existing stock.

This report also supports the recommendation of the recent government-commissioned Helm review that the UK should establish publicly-owned Regional System Operators (RSO) to procure energy infrastructure. Both RSOs and local energy companies[4] will make all the above recommendations simpler and easier to implement. The West Midlands could offer itself as a pilot for this approach, working in partnership with the existing energy system operators and Ofgem.

Devolution of a degree of power to regions over energy policy (and especially energy infrastructure planning and delivery) is very much aligned with global best practice, industry trends, and UK government policy. There is therefore a moment of opportunity, created by the timing of West Midlands devolution, to establish the West Midlands as a national and international leader in energy systems transition, creating world-leading infrastructure for a 21st century creative and manufacturing economy.

We already have global energy infrastructure partners based in the region, and this report recommends mobilising this partnership through the regional industrial strategy and specific mechanisms (such as Energy Capital and Energy Innovation Zones) to deliver the identified GVA and productivity benefits.

[3] The Cost of Energy Review, Dieter Helm for BEIS, October 2017.

[4] Several local authorities in the region are already working on local retail energy companies, which would be entirely complementary to and supportive of everything discussed in this report.

1. Introduction

Every company in the West Midlands needs energy to power its activity and compete. Every household needs to be able to provide levels of comfort to its occupants at a reasonable cost, so people want to live here and are able to contribute productively to the regional economy. People need to be able to communicate and travel to meet each other to generate and exchange products and ideas, and to understand each other. All this needs energy.

So energy is ubiquitous, and a competitive regional energy system is critical to the region's economic success. This is why energy is recognised as a cross-cutting theme in the developing Regional Industrial Strategy (Figure 1). This report details more precisely *how* the energy system impacts productivity; *why* there is a particular opportunity in 2018 for a focused regional energy strategy to make a significant difference; and *what* specific next steps can make this a reality.

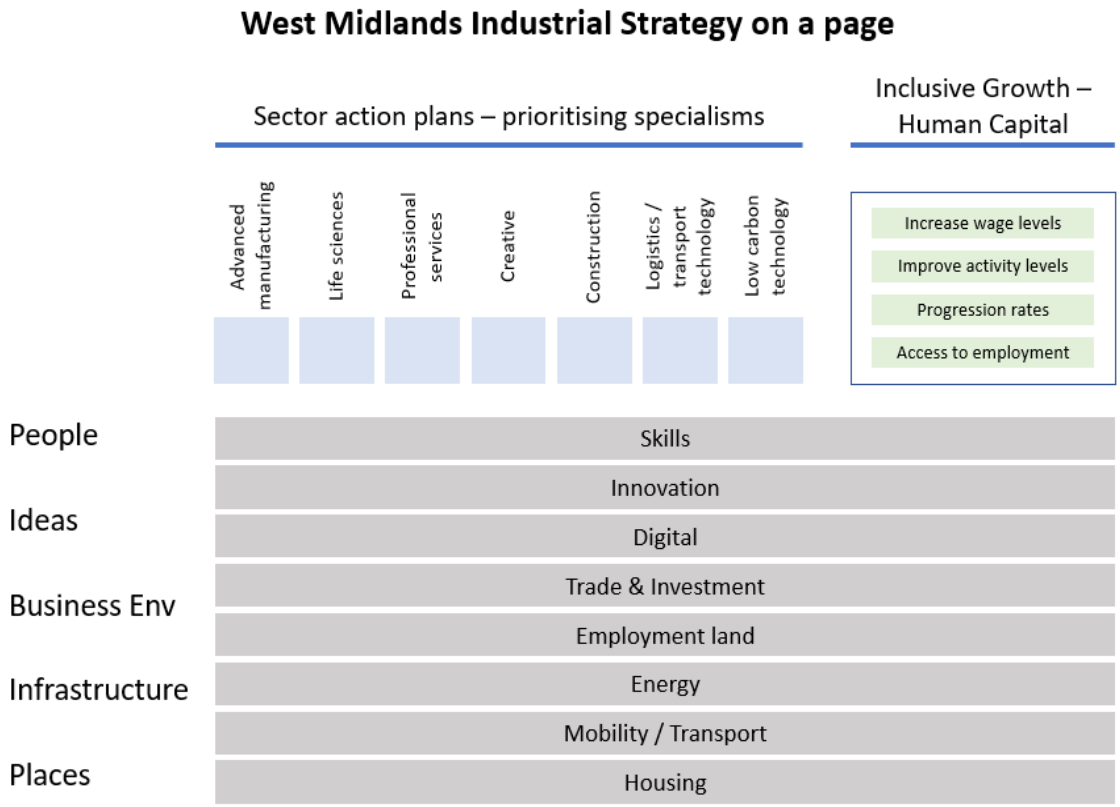

Figure 1 West Midlands Industrial Strategy

Characteristics of a competitive energy system

At first sight energy is simple, and it's easy to take it for granted, but actually it has multiple characteristics, and these make the way the energy system works more or less significant to different sectors of the economy.

The headline cost of energy clearly matters directly to industrial competitiveness: lower the costs of energy to a business, for example, and you immediately profit by the same amount[5].

But economic growth and productivity don't just depend on the headline cost of energy. They also require an energy system that delivers:

- Stable and predictable commercial terms
- Security of energy supply, including competitive costs to connect new capacity and energy demands (like new factories, commercial space or housing)
- Appropriate energy vectors for their processes and products[6] in the right places at the right times
- Competitive generation, transmission and distribution infrastructure[7]
- Acceptable levels of environmental impact, particularly on air quality, carbon emissions, waste streams and vehicle movements

Energy infrastructure is an important area for public policy and public bodies. This is not only because environmental impact is a public issue and economic growth matters to communities, but also because an economically-optimal energy infrastructure needs to reflect local spatial and development plans. Energy infrastructure needs to make best use of local resources (e.g., waste streams, other utility networks) and deliver to the sometimes rapidly-changing needs of local communities. Vulnerable citizens and strategic industries need to be protected from the potentially destructive consequences of either public policy or market forces in what is an essential utility for everyone.

Because it is a fundamental utility worldwide and can make the difference between an advanced or a backward economy and society, energy is also highly vulnerable to global geopolitics and periodic price shocks (where primary fuels are traded internationally.)

Sectoral sensitivities

The relationship between the characteristics of our energy system, productivity and economic growth is significantly stronger in some sectors than others. Four sectors where these interactions are particularly significant are in manufacturing, transport, construction and digital.[8] This is true worldwide, but is particularly relevant to the West Midlands because these are all either significant parts of our existing economy or core to our strategic economic plans.

Together, manufacturing and transport account for 58% of non-domestic energy use nationally[8]. In the West Midlands the proportion is higher because manufacturing and transport are relatively more dominant elements of our regional economy (see section 2). In the digital sector, energy is the critical input to datacentres and will be the highest input cost

[5] How this feeds through to productivity and GVA in the short- and longer term is discussed in detail in section 3.

[6] 'Vectors' is widely used in the energy sector to mean all the different forms in which energy can be delivered, for example: electricity, gas, hydrogen, heat, coal, oil, petrol (etc). You can't sell gas boilers if your customers have no access to gas mains; or electric cars if there is no electrical power for customers to charge them with.

[7] Infrastructure costs are between 50-75% of unit electricity costs for example (depending on definitions). Legacy energy infrastructure costs can thus potentially hold back economies significantly.

[8] Office for National Statistics, Energy Consumption in the United Kingdom, 1990-2015.

at between 25% and 60% of total costs[9] (twice the energy intensity of a typical manufacturing business and 10 times the energy intensity of an average office[10]). This is why bitcoin mining is largely based close to cheap power supplies in Iceland, for example.

The predictability and level of energy costs, security of supply and the ability to connect easily to energy networks is thus critical to business planning and continued investment in these sectors. Manufacturing and logistics businesses are likely to be more productive if managers are concentrating on manufacturing and logistics, and able to invest without worrying about uncertainty in energy costs.

Energy cost predictability is a function of energy market design. The UK energy markets are now so complex (largely because of the ways they have evolved) that few people understand how they work[11], and a medium-sized company doing its best to buy electricity simply and competitively (through a broker) finds itself receiving a monthly bill with over 25 line items on it, virtually all of which relate to the inner workings of the energy markets or government levies and only 3 or 4 actually relate to activities over which the business has any control[12]. The message that energy prices have very little to do with competition and everything to do with (highly unpredictable) political whims could not be made more clearly.

In the construction and automotive sectors, there is also a relationship with the energy system of a different kind but of at least equal significance.

In the UK, energy requirements of our buildings account for around 40-45% of total energy use[13], and buildings are generally around for many years, locking in a demand for heat, power and cooling that acts as a fundamental constraint (or customer requirement) on our energy infrastructure. Similarly, transport accounts for around 40-50% of regional energy use (see section 2) currently mostly in the form of petrol and diesel for private vehicles.

Two things are happening simultaneously in both the transport and construction sectors.

1. Their products are becoming significantly more energy efficient. The average UK house built to today's standards requires less than half of the energy to run compared to the same house built in 1960[14]. Similarly, in transport the average fuel efficiency of cars has more than doubled since 1975 and has been consistently improving by 1-2% per year since 2000.[15]
2. The dominant energy vectors are changing in both cases – from petrol and diesel to electricity (and possibly hydrogen) in transport; and from gas to electricity and district heating in buildings.

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[9] https://www.techuk.org/images/programmes/DataCentres/Data_Centres_and_Power.pdf
[10] https://www.energy.gov/eere/analysis/energy-intensity-indicators-indicators-major-sectors
[11] This point is also made by Helm, and few in the industry would argue with it.
[12] Items a business can control are its usage patterns (red/amber/green tariff rates). Other items, such as CfD and FIT levies, Elexon charges etc, simply serve to make the point that more effort is invested in worrying about the technicalities of market design than in delivering competitively-priced power to customers.
[13] https://www.gov.uk/government/statistics/energy-consumption-in-the-uk
[14]https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/345141/uk_housing_fact_file_2013.pdf
[15] https://www.gov.uk/government/statistical-data-sets/env01-fuel-consumption; https://www.eea.europa.eu/data-and-maps/daviz/developments-in-fuel-efficiency-of-1#tab-chart_1; http://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2011/04/20/driving-to-545-mpg-the-history-of-fuel-economy

The point is that energy infrastructure is not just delivered through pipes and wires and power stations, nor should we assume our economy will always simply want more or less of the same.

Energy infrastructure and energy strategy choices are also choices about the markets you will create in the region, and the industries you'll encourage and support. Making these choices strategically and openly avoids accidentally holding back economic growth, closing down economic opportunity and handicapping future productivity.

For example, the energy efficiency standards you choose to set and police in the construction industry are directly relevant to decisions you need to make about investment in energy infrastructure, and should be part of the same debate. Is it cheaper to require the next 100,000 houses built in the region to be 25% more energy efficient (costing little more than attention to detail on site or use of modern methods of construction) or to build a 2GW power station (costing between £2bn and £6bn)? The first option creates a market for innovative construction businesses in the region, although any costs will be incurred now by house purchasers; the second one supports a market for innovative (but probably global) engineering businesses, with the costs reflected in energy prices for the next 45 years.

Similarly, if we don't invest in sufficient electrical infrastructure (and in the right locations) to support the anticipated rapid transition to electric vehicles[16] we are making it harder to launch and commercialise new automotive products in this region. It's important that energy strategy is developed and managed as a core part of our industrial strategy.

Dealing with technical change

Historically, for most of the past century technology and economics have only supported a largely one-size-fits all approach to energy infrastructure in the UK. Attempts to do anything more than superficially adapt energy systems infrastructure to local needs would either have imposed excessive costs or resulted in inequities in access.

However, rapid reductions in the costs of communications, IT and energy storage and generation technologies have now changed this context fundamentally.[17] Figure 2 illustrates one example: a five fold reduction in the cost of solar PV, since 2009[18]. Digitisation and energy storage technologies in particular make it possible to optimise energy systems at much more local levels, and to manage them in a more distributed way[19]. This in turn means national energy infrastructure, including energy market and regulatory structures, can accommodate much more diversity and variety (at least in principle). The benefits of such local diversity in energy systems and responsiveness to local needs now outweigh the costs.

This means local energy strategies are once again viable and meaningful concepts, coinciding with industrial strategy once again becoming a valid area for local and national political debate.

[16] http://www.nextgreencar.com/electric-cars/statistics/; https://www.spenergynetworks.co.uk/userfiles/file/Electric_Vehicle_Uptake_Forecasts.pdf

[17] Dieter Helm, Cost of Energy Review, BEIS, 2017. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/654902/Cost_of_Energy_Review.pdf

[18] International Renewable Energy Agency, 2016

[19] Digitization and Energy, IEA, 2017. http://www.iea.org/digital/

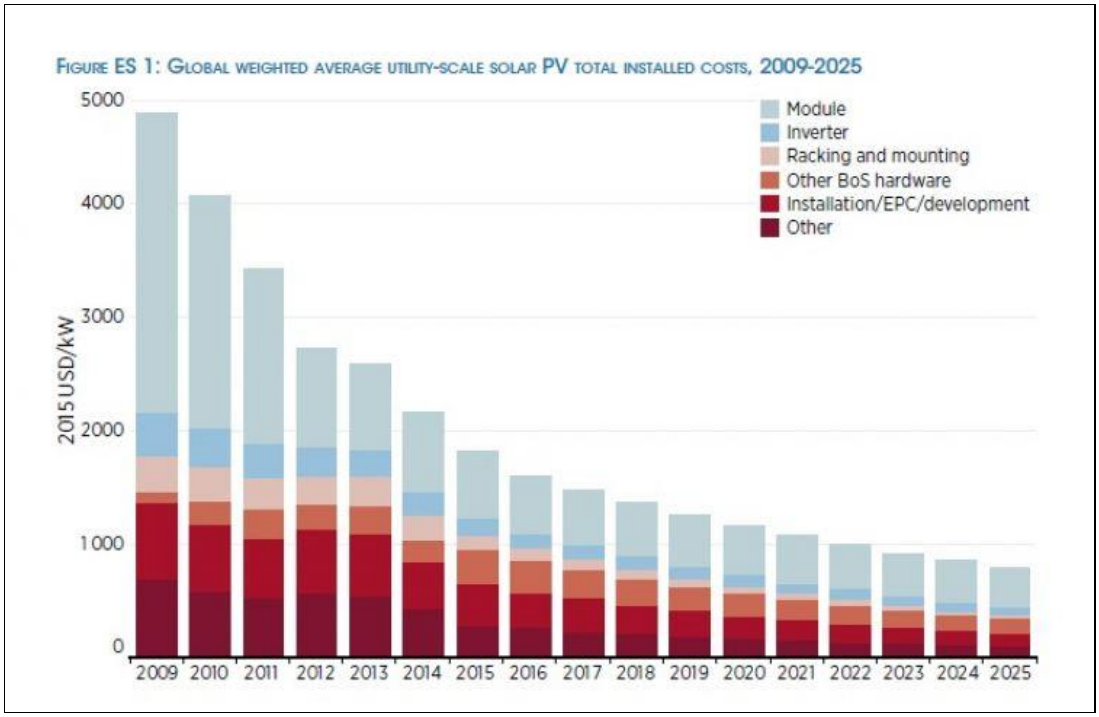

Figure 2 How costs of energy technologies can fall rapidly

Economic opportunity

These fundamental technical changes have been accompanied by significant global political shifts, particularly recognition of the need to address the challenges of climate change through reducing carbon emissions. The energy system is the largest emitter of carbon globally, and thus at the forefront of these political changes.

The economic opportunities of these shifts are potentially huge. The broad global political consensus around climate change is manifest in changing customer attitudes, varying national targets, regulatory nudges and incentives across the world, all of which create significant markets for clean energy technologies and systems.

The most recent estimates (e.g., from the World Bank, Oxford Economics, Mckinsey and IEA) of the global market opportunity for clean tech products and services suggest a market of well over $3trn a year, with energy infrastructure investment alone accounting for between $2,5trn and $3trn a year between now and 2040[20]. Low carbon technologies and services are an identified strategic sector in the West Midlands industrial strategy, but the region will also be a much more attractive location to grow these kinds of business if our own regional infrastructure is designed to support modern, smart and clean energy systems.

[20] Global Infrastructure Outlook, Oxford Economics, 2017. Also http://www.worldbank.org/en/news/feature/2014/09/24/new-report-identifies-major-clean-tech-market-opportunity-for-small-businesses-in-developing-countries; https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/energy-infrastructure-seizing-the-opportunity-in-growth-markets; https://www.businessgreen.com/bg/news/3021679/bnef-global-energy-storage-market-to-double-six-times-by-2030;

Building on existing strengths

The West Midlands has a strong history of leadership in energy, particularly building industrial strength on the back of a successful energy strategy and sector.

Cost effective energy infrastructure made the West Midlands what it is today. Low cost access to coal in the Black Country attracted the innovators and skilled workers who made the region the workshop of the world in the 18th and 19th centuries, and it is those same skills and industries which supply the modern automotive and aerospace manufacturing businesses that still dominate the region.

Recent surveys suggest the region hosts more than 50,000 people working in the energy sector across almost 10,000 companies[21], and we are home to the UK headquarters of some of the most significant energy businesses in the country (for example National Grid, Cadent and E.ON). We also host a significant portion of the UK's energy innovation and research and deployment capacity in the Energy Systems Catapult, our universities and various technology consultancies.

This is the basis of a very compelling narrative for the region in this sector: not only is energy a critical enabler for our industrial strategy; it is also a major strategic economic opportunity its own right.

Structure of this report

This report makes the case for a focused, region-wide approach to energy in the West Midlands as a core element of the local industrial strategy. In section 2, it summarises the annual financial flows associated with energy across the region. Section 3 discusses the broad kinds of opportunities and interventions available to the Combined Authority and its constituent members likely to impact productivity; and section 4 reviews approaches of other regional economies to the same topic.

The report complements other initiatives already underway across the region, including the Mayor's Regional Energy Policy Commission, and the current status of these are summarised in section 5. There is a moment of opportunity for the region to take the initiative in this sector nationally and internationally, and section 6 sets out how a local energy strategy could underpin the local industrial strategy and proposes specific next steps.

[21] West Midlands Science and Innovation Audit, 2017. https://www.wmca.org.uk/media/1682/west-midlands-sia-final-for-publication-21617.pdf. Also Warwick Institute for Employment Research, https://warwick.ac.uk/fac/soc/ier/ngrf/lmifuturetrends/sectorscovered/energy/regional/west-midlands/.

2. Energy in the WM Economy

This section considers the financial flows associated with energy across the West Midlands region.[22] The first part looks at revenue flows (i.e., what we spend on gas, electricity and fuel every year) and the second part looks at infrastructure investment (networks, generation assets and other capital spend).

Revenue flows

Figure 3 below shows the estimated split of annual energy spend in the West Midlands[23].

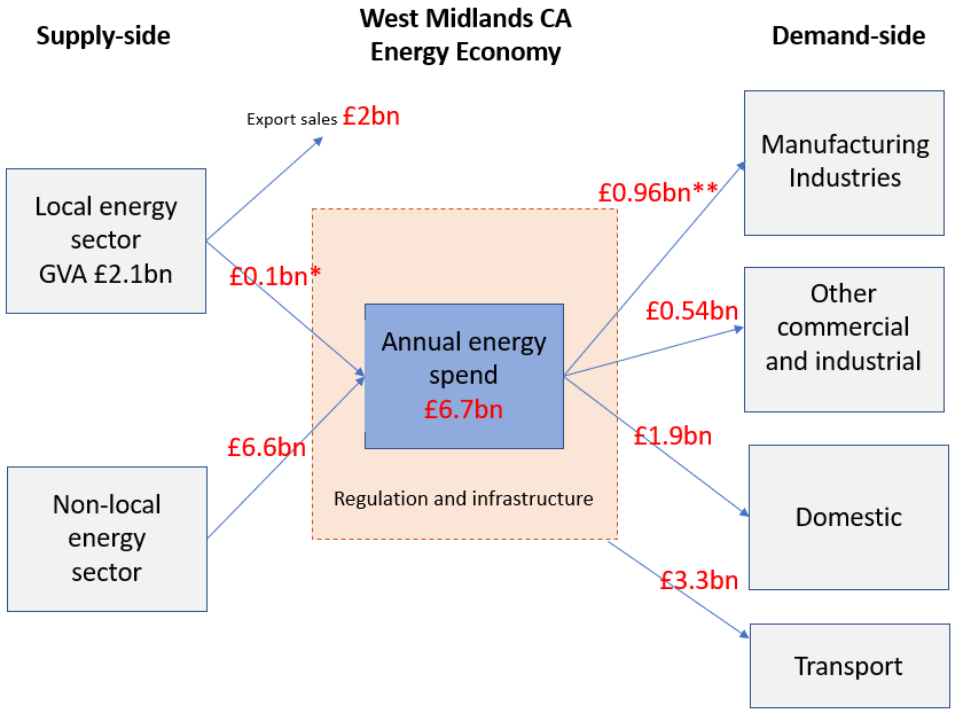

Figure 3 The West Midlands energy economy

Although the local energy sector contributes approximately £2.1bn of GVA to the regional economy, most of this is earned outside the region (it is dominated by companies like E.ON, who sell energy nationally). The more significant figure is the £6.7bn spent annually on energy by West Midlands businesses and households, and within this the £960m spent by the industrial and manufacturing sectors.

The combined manufacturing and commercial annual spend figure of £1.5bn has a direct impact on productivity[24]. If the figure were £500m lower our regional productivity and GVA

[22] Defined as the three LEP geography covered by the Black Country, GBS and Coventry and Warwickshire LEPs.
[23] This data is sourced from BEIS, DECC, the Digest of UK Energy Statistics, The Office of National Statistics and OFGEM. GVA figures are from a SIC code analysis by Charlie Hopkirk for BCLEP.
[24] Provided productivity is measured using output-based methods not total factor methods (see section 3) for a discussion of this.

would be £500m higher (for the same output)[25]. It is thus very relevant that UK energy costs in many sectors are up to 40% higher than those of competitor economies (see Figure 4).[26]

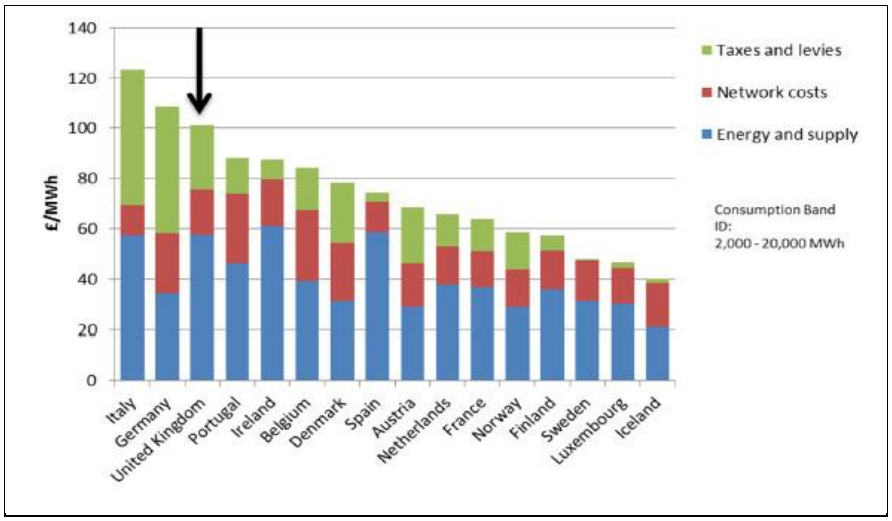

Figure 4 Commercial energy costs compared internationally[27]

It is also relevant that around half of electricity costs for typical regional manufacturing companies are the apportioned costs of regional and national infrastructure investments (Figure 5[28]). This is why Figure 3 has a shaded box labelled market regulation and infrastructure: there are considerable and increasing opportunities to influence energy costs and hence sectoral productivity simply through regulation and strategic choices.

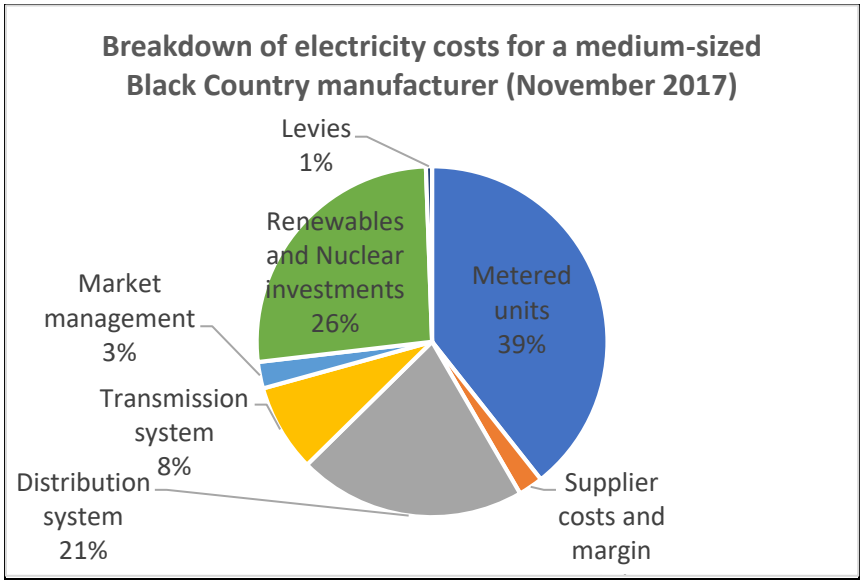

Figure 5 Split of electricity costs for a medium-sized West Midlands manufacturer

[25] But see section 3 for a more technical discussion of how these figures are likely to be related according to classical economic theory.
[26] Helm, Cost of Energy Review, BEIS 2017
[27] ibid
[28] Source: Actual bills of a metal processing business, November 2017, obtained for this project.

Because of their magnitude and impact, the way energy infrastructure costs are apportioned between sectors is treated as an industrial strategy decision in many other economies[29]. For example, in Germany there is quite a complex 'privilege' system which allocates network and renewables costs variably between industrial sectors, favouring some sectors (such as metal processing) and penalising others (such as paper mills). Thus, although average industrial energy costs in Germany appear on face value higher than the UK (Figure 6) in practice they are significantly lower in many manufacturing sectors and even higher in other sectors (including the domestic sector[30]) to ensure that the overall numbers balance (see Figure 6).

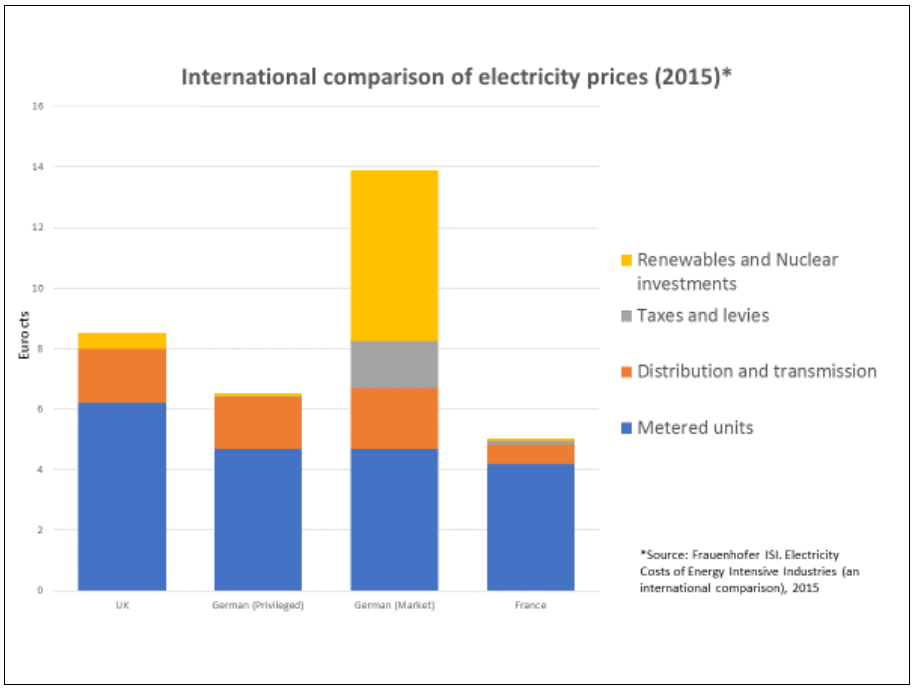

Figure 6 International comparison of electricity prices

In the UK, however, we currently operate a regulated national market system which does not generally differentiate between industrial sectors, other than on size (larger businesses pay a lower share of infrastructure costs). This will tend to differentially handicap our more energy intense sectors (in comparison to competitor economies with industrial strategies) although a number of ad hoc dispensations have been secured over the years to compensate to a degree for this.[31]

The UK approach to energy market regulation has recently been extensively criticised in a high-profile report commissioned by the Secretary of State for Business, Energy and Industrial Strategy (BEIS) and written by Professor Dieter Helm[32]. In it, he makes a number of relevant observations about the direction of travel of global energy systems, including the very powerful point that within a relatively few years almost all energy costs will be fixed

[29] Frauenhofer ISI and Ecofys, Electricity Costs of Energy Intensive Industries, An international comparison, 2015

[30] Headline energy prices in the domestic sector do not necessarily mean higher bills for households provided housing is well-built to high energy efficiency standards. Hence the German public is, up to a point, more tolerant of higher energy tariffs than the UK public, who live in lower quality housing (on average).

[31] See, for example, file:///C:/Users/User/Downloads/Reducing-Energy-Policy-Costs_UK-Steel-Guide-to-Compensation-and-Exemptions-for-the-Steel-Sector%20(2).pdf;

[32] Helm, Cost of Energy Review, BEIS 2017

and apportioned infrastructure costs, with virtually no variable costs as the cost of fuels essentially falls to zero[33].

This has profound implications for UK energy market regulation and how energy costs are managed, because it means that energy will become very like telecoms or road travel in that usage of the system once it's built will essentially be free for everyone up to local capacity limits, so you can't meaningfully base pricing on usage any more: you are instead entirely focused on ensuring you recover infrastructure investment costs, and you might choose to do this in a number of ways to meet industrial strategy or political objectives.

Investment flows

In the West Midlands, we invest around £1.25bn every year in our energy infrastructure (Figure 7): this is network investments such as gas pipes, heat mains, wires and substations; key energy conversion technologies such as domestic boilers; and local energy generation assets such as solar farms, district heating and waste to energy plants.[34]

We also spend around £3.5bn every year on our built environment[35], which as discussed in section 1 has a significant impact on our energy spend and long-term productivity in its own right, and should probably therefore also be considered as energy infrastructure.

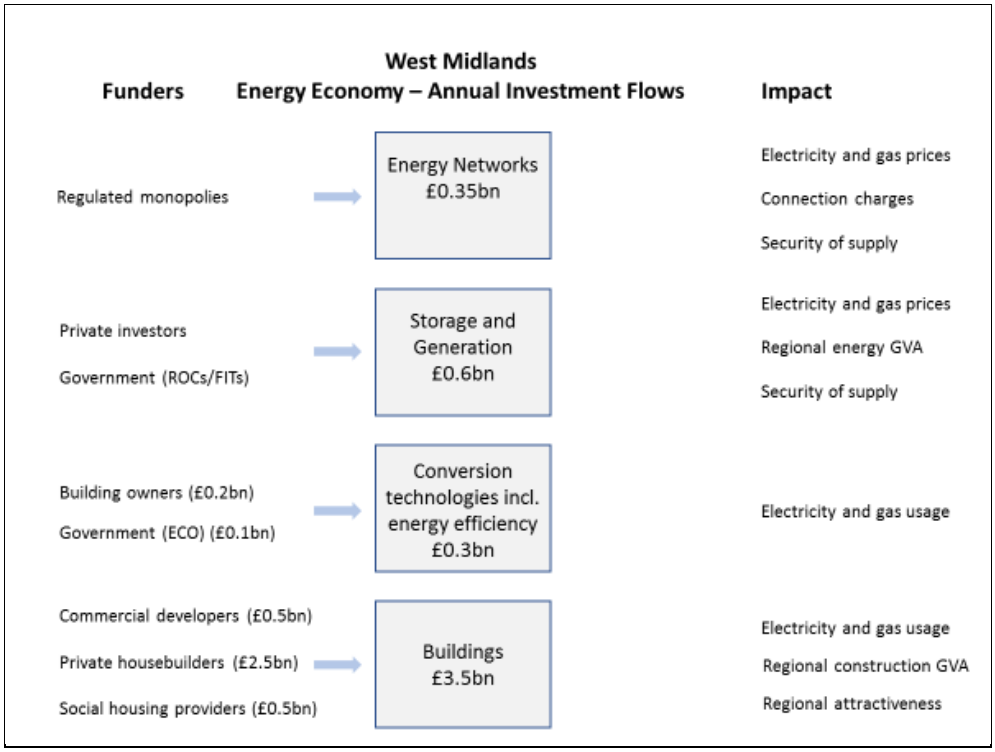

Figure 7 West Midlands annual investment flows - energy

[33] This is obvious if you consider that nuclear and renewable energy systems are essentially all asset investments with free or essentially sunk fuel costs. Helm also (slightly more controversially) argues that fossil fuel prices will fall towards zero as it becomes impossible to sell them given increasing global penalties for pollution and carbon emissions.

[34] This data is mostly from government sources, primarily UK Energy Investment, DECC, 2014.

[35] https://www.citb.co.uk/documents/research/csn_reports_2018-2022/2018csn_wm_summary_050218.pdf

Economic activity

Energy and Environmental technologies currently account for £2.1bn of annual GVA in the WMCA area[36], and is the most productive of all sectors by value. It is the only sector in which regional productivity is higher than the UK average. Coventry and Warwickshire and the Black Country are both in the top five LEPs nationally in terms of % of GVA attributable to energy and environmental technologies.

Employment estimates vary between 24,500 jobs and 60,000 jobs[37] depending on definitions of geography and sector boundaries, with between 5,000 and 10,000 companies operating in the sector. The GVA generated is concentrated in a small number of large firms (E.ON, National Grid, Cadent, Baxi, Calor) with a long tail of smaller firms. There are also significant employers just outside current regional boundaries (Worcester Bosch, nPower) and significant economic activity and employment within the region controlled by firms with headquarters elsewhere in the UK (Western Power Distribution, British Gas).

The statistics exclude closely-related jobs which depend on energy infrastructure, such as most manufacturing, transport and automotive jobs, and energy managers within larger organisations. Engineering and infrastructure companies such as Balfour Beatty, Arup and Costain all have significant energy infrastructure divisions and presence in the region which may not appear in sectoral figures, as does Severn Trent which as well as being primarily a water company is one of the largest renewable energy generators in the UK.

Skills are an issue in energy as in many other sectors, with 36% of all vacancies across the energy and utilities sector nationally attributed to skills shortages.[38] The sector skills council for Energy and Utilities, Energy and Utility Skills, is based in the region (Solihull) as are other key sector interest groups and trade associations (e.g., the Energy and Utilities Alliance, the Sustainable Energy Association). There are also a number of specialist training providers across the region (e.g., the Energy Training Hub in Dudley) suggesting skilled energy sector people are as easy (or easier) to recruit in the West Midlands as anywhere in the country.

Energy Storage and Systems was identified as one of the four key market strengths in the recent regional Science and Innovation Audit[39], picking up the major academic assets in this sector across our regional universities. There are significant and largely complementary national and world-class energy research capabilities in Aston, Warwick and Birmingham (working together through the Energy Research Accelerator) and in Coventry, BCU and Wolverhampton, who have expertise in energy in buildings and smart systems. The Energy Systems Catapult is also based in the region.

[36] WMCA Productivity and Skills Commission, Sector Outline (Charlie Hopkirk)
[37] Warwick Institute for Employment Research, https://warwick.ac.uk/fac/soc/ier/ngrf/lmifuturetrends/sectorscovered/energy/regional/west-midlands/
[38] Energy and Utility Skills, 2018. http://www.euskills.co.uk/2018/02/09/skills-strategy-impacts-energy-utilities-sector-ahead-first-anniversary/
[39] West Midlands Science and Innovation Audit, 2017. https://www.wmca.org.uk/media/1682/west-midlands-sia-final-for-publication-21617.pdf

3. Opportunities to impact productivity and economic growth

There are four broad ways that energy infrastructure impacts industrial strategy, competitiveness and productivity (Figure 8).

a. It controls and constrains the pace of commercial and industrial development
b. It dictates how fast new markets can develop for products and services which use energy, particularly when these products need specialist energy infrastructure; for example, vehicles and buildings.
c. Energy costs directly impact the competitiveness and productivity of industry in the region, including through the hidden costs associated with complexity and price volatility.
d. Energy costs matter to people, and make houses in the region more or less attractive and comfortable places in which skilled people will choose to live

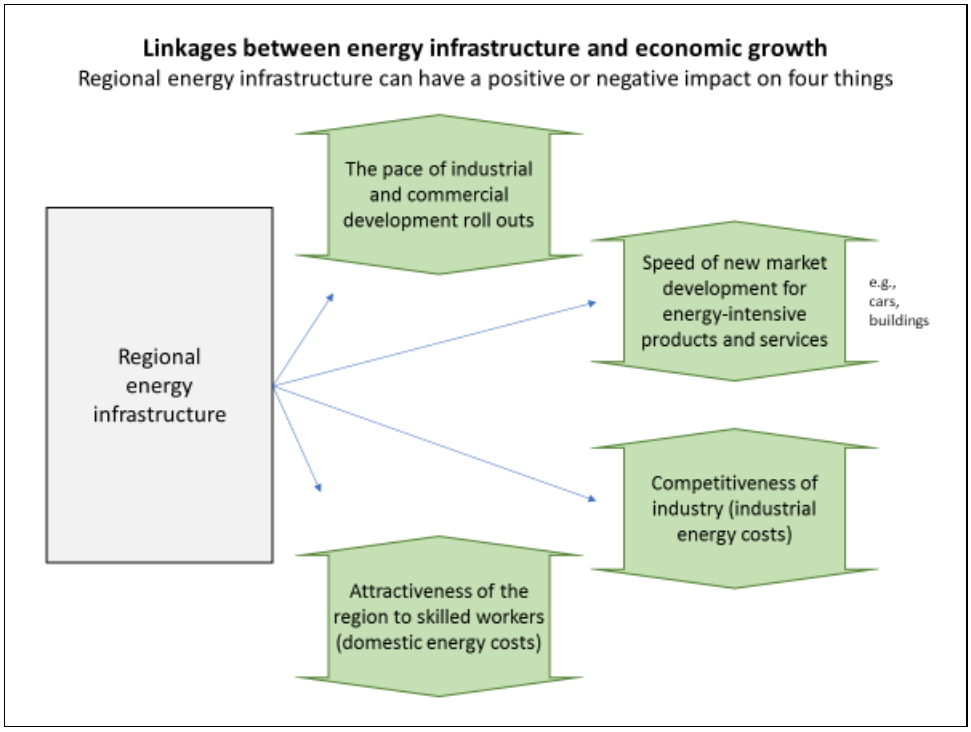

Figure 8 Linkages between energy and economic growth

The initial analysis of West Midlands' financial flows associated with energy in section 2 enables us to make some preliminary estimates of the orders of magnitudes of impact possible in each of these cases.

The pace of industrial and commercial roll out plans

Work conducted by Arup for the Greater London Authority in 2017[40] showed that for areas where significant development is planned (they considered planned developments around Vauxhall and Battersea) accelerated investment in energy infrastructure offered a positive

[40] GLA DevCo, High-Level Economic Case, September 2017.

net present value of £12.6M[41]. If social benefits are included (jobs and commercial and residential rents) the net present value became £293M. This was achieved for a required level of infrastructure investment of £26m, based on making the investment six years ahead of projected demand materialising, and is a NPV compared to a base case of the distribution network operator making the investment with a timing and magnitude agreed with OFGEM through RIIO-ED1[42] (the normal process used nationally).

This same report examined other areas where the scale and pace of development roll out was smaller (White City) and found that even where the existing RIIO-ED1 investment process offered a better net present value, the difference was relatively small (a negative NPV of between £0.5M and £2M).

The report concluded: "*In fast growing areas…where [energy] demand pockets can be assumed to keep forming in the future, the lack of a strategic anticipatory approach to network reinforcement can have a negative impact on long-term network costs and economic development*"[43]. In other words, by failing to plan and invest in energy networks in a way aligned local to commercial and residential development roll out plans, the local economy would suffer a loss of £293M (NPV) over 15 years.

The NPV in these cases is most sensitive to faster or slower materialisation of the energy demand, which is something that is otherwise entirely under the control of the local authority. It therefore makes sense for the local authority to take the risk, and the GLA/Arup report proposes a model, called a DevCo which does this and which OFGEM are minded to approve[44].

The West Midlands currently has the fastest growth rate in the UK outside London,[45] so there is a reasonable likelihood that there will be pockets of growing demand similar to those identified by the GLA where more targeted energy infrastructure investment has a positive NPV and the risk is low.[46]

The three WM LEPs have commissioned Arup to make some more detailed estimates of potential benefits, but based on there being at least 15 economic development zones in the region where anticipatory investment makes sense, and NPVs in each case of around half that of Vauxhall, it seems conservative and reasonable to estimate potential annual benefits of around £100M from accelerated energy infrastructure investment in targeted zones.

Speed of new market development for energy-intensive products and services

Mass market products like cars and houses need efficient, accessible energy infrastructure to deliver the services they promise to customers.

[41] Using Treasury Green Book methodology.
[42] This is the acronym used to describe the eight-year planning cycle for electricity infrastructure, managed by OFGEM as the costs of investment get added to customer bills.
[43] GLA/Arup 2017 (see note 40)
[44] Conversation with GLA Infrastructure and Growth Team, January 2018
[45] https://www.birminghammail.co.uk/news/midlands-news/west-midlands-fastest-growing-economy-14026835
[46] Indeed, major companies have already identified and negotiated one-off dispensations from RIIO-ED1 in several areas.

This means that when technologies change – for example, when electric cars become theoretically more economic and attractive than petrol or diesel cars – manufacturers face a conundrum. If they switch to producing electric vehicles but the charging infrastructure doesn't exist, then no one will buy the cars. However, they can't invest in the infrastructure (at least not very easily or efficiently) because they are car companies not utilities, and in any case, transport infrastructure and planning are controlled by local and regional authorities.

Globally, demand for electric vehicles is expected to increase by a factor of at least 10 by 2025[47], and by 2040 in the UK all new cars will be electric[48]. This will clearly also have a major impact on electricity networks, which will require substantive investment (of the order of £15-£20M each for the infrastructure to support major fast charging hubs, equivalent to current motorway services)[49]. However, there is significant potential to optimise such investments both to minimise the actual requirements (e.g., using smart control systems, batteries, and careful placement of charging stations) and to ensure extra capacity investments are also used efficiently to support domestic and commercial power requirements.

This means that there is significant potential economic benefit in joint planning of strategic infrastructure investment to support accelerated market development of new automotive (and other) technologies. Indeed, there is global evidence that this is the best way to encourage and support the transition to electric vehicles, and to ensure impact and costs to existing energy networks are minimised.[50]

The benefits to car producers are reduced risk for new product launches and faster take-up of new vehicle models; the benefits to the region are faster employment growth; potential to steal a march on other regions in the development of new business and service models; and more opportunities for local supply chains.

Regions which are investing sensibly and in a planned way in electric vehicle charging infrastructure include Norway, which has invested modest sums nationally in EV infrastructure – around EUR6million per year for 10 years[51]. Norway has a similar population to the West Midlands (5 million) and as a result of this very modest investment now has the highest market share for EVs in the world (30%) and is on track to have 100% of all new cars electric by 2025[52].

Around 2.5 million new cars are sold in the UK each year[53]. Assuming the 3 LEP/WMCA market is 5% of the UK economy (which is probably conservative for cars) this is 250,000 new cars a year sold in the West Midlands. 30% of this market is 75,000 electric vehicles or a market of around £1.5bn a year. Based on SMMT/KPMG figures for GVA per £ of sales, this level of market will create around £120M per year of GVA for the West Midlands economy[54].

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[47] https://www.theicct.org/sites/default/files/publications/EV-charging-best-practices_ICCT-white-paper_04102017_vF.pdf
[48] http://www.bbc.co.uk/news/uk-40723581
[49] Conversations with JLR.
[50] https://www.theicct.org/sites/default/files/publications/EV-charging-best-practices_ICCT-white-paper_04102017_vF.pdf
[51] https://www.greentechmedia.com/articles/read/norways-ev-charger-rollout-shifts-up-a-gear#gs.2a5Qp7c
[52] https://www.theicct.org/sites/default/files/publications/EV-charging-best-practices_ICCT-white-paper_04102017_vF.pdf.
[53] Society of Motor Manufacturers and Traders
[54] https://www.smmt.co.uk/wp-content/uploads/sites/2/SMMT-KPMG-EU-Report.pdf

Competitiveness of industry (industrial energy costs)

According to current methods used for measuring national productivity in the UK[55], industrial energy costs don't affect UK productivity. This is because they are (more or less) the same for everyone. Hence lowering or raising industrial energy costs (according to economic theory) must be passed on to customers as competition will force all competing manufacturers to adjust the intensity of using energy to match their varying capital or labour inputs. For this reason, current UK methods for estimating productivity do not reflect the impact of energy price changes on productivity (or GVA).

However, this approach is potentially very misleading where industries satisfy any of the following conditions:

- they compete predominantly internationally, exporting a significant part of their output (and energy costs vary by country, which they do, significantly)
- they are relatively mature, and have consolidated down to only one or two companies in the UK competing in the same sub-sector
- there is significant differentiation in their products (hence the actual market is narrowly defined)
- customers are 'sticky' or loyal or there are relatively high costs for customers to switch supplier

Many of the traditional manufacturing businesses remaining in the West Midlands probably come into one or more of these categories.

For such businesses, productivity is better measured using the 'gross-output' approach to estimate productivity. This is a more common-sense approach to productivity measurement, which takes the view that if industrial energy costs fall (due to either good management or the cost per kWh falling) and a company's output prices stay the same, profits and hence value added and productivity will rise. This is always likely to be true for many firms in the short-term.

For the purposes of this report, we are therefore taking the second, more intuitively common-sense approach.

If we discount variation in commodity fuel prices (which is clearly outside local control), the costs of energy to industry can be reduced by:

1. Reducing energy infrastructure costs.

[55] I am grateful to Professor Jun Du of Aston University for this insight into why UK national productivity figures may systematically underestimate the impact of energy price effects on mature, energy-intense industry, competing internationally. Her technical explanation is as follows:
"The most commonly-used approach in economics to determine firm level total factor productivity is the value-added production function approach. This is partially because it is it is consistent with the aggregated estimate of a region or a country's productivity which is the by far the most relied upon indicator.
However, the value-added approach assumes adjustment of all intermediate inputs in the production, such as energy and materials, and hence does not take into account the contribution of inputs other than capital and labour. Put simply, the value-added approach implicitly assumes the intensity of using intermediate inputs (i.e., energy) does not impact on productivity."

2. Improving energy efficiency (i.e., cutting demand per unit of production)

In addition, it's important that energy markets operate in an open, transparent and competitive way so that industrial customers can access the cheapest energy supplies as simply as possible. Like domestic customers, they should be able to change suppliers to encourage competition and efficient market outcomes (for example when technologies change and make cheaper energy supply possible).

We discuss each of these in turn.

Reducing energy infrastructure costs

As more than 50% of unit costs (for electricity) are infrastructure costs (see Figure 5) this means a more efficient energy system infrastructure can have a significant and direct impact on productivity, provided such cost savings are passed on the industrial customers.

There are several potential ways of doing this.

1. Constructing local energy infrastructure that is lower cost than the national system offers, coupled with legal and commercial entities which enable lower costs to be passed on to customers. This is possible in certain circumstances (for example 'private wire' networks, local combined heat and power stations and innovative smart energy management and local storage systems) but generally requires a scale which is beyond the means of most individual medium-scale manufacturers. Nevertheless, it is generally the case that dense urban areas with a good mix of energy demand present a greater opportunity for this kind of efficiency than other areas.
2. Separating out legacy infrastructure costs from current energy bills and paying for this through general taxation or other routes. Helm proposes creating a national 'legacy bank' for around 25% of industrial energy costs in his recent review, and then securitising this to pay for it.[56]
3. Adjusting the structure of (local) energy markets to apportion these costs differently, for example to encourage investment in energy efficiency in sectors where there may be particular benefits in doing so (like housing). This approach is used effectively in Germany and many other countries[57].

Our analysis in section 2 above suggests around £960M per year of regional energy spend is energy-intense industrial energy spend, so infrastructure costs will represent around £0.5bn of this.

If Helm's recommendations are taken up by government nationally, this would reduce energy bills for West Midlands businesses by around £250M, which would feed through directly to GVA using output-based measures of productivity.

Opportunities for cutting out distribution and transmission network costs as well as legacy costs are highly dependent on local geography and conditions (e.g., waste to energy or solar plants close to manufacturing facilities and able to do private wire deals). However, we know there are several opportunities for this around the Black Country (Wolverhampton, Walsall and Dudley) and there may be many more in Greater Birmingham, Solihull and Coventry. An

[56] Helm, Cost of Energy Review, BEIS 2017

[57] Frauenhofer ISI and Ecofys, Electricity Costs of Energy Intensive Industries, An international comparison, 2015

estimate of around £50M potential savings per year is a reasonable initial estimate from this type of opportunity.

Improving energy efficiency

A recent comprehensive study of industrial energy savings opportunities carried out by the EU[58] suggests that on average the potential economic energy saving opportunity in industrial sectors ranges from 4.3% to 10% (with technical potential closer to 30%).

For businesses with annual energy bills in excess of £1-£2 million, investing in an energy manager to optimise energy efficiency is thus an easy cost-benefit decision to make. Employment costs of £50-£75k per year are highly likely to be exceeded by savings delivered.

However, few companies in the region are of this scale. For businesses smaller than this such an investment doesn't make sense, and they will need to rely on consultants or brokers or both to reduce their costs. This may not always attract management attention, and it can be difficult to find specialist consultants able to optimise energy within specific businesses: on average for manufacturing companies around 67% of their energy is used in the actual manufacturing process, which can be unique and is obviously of critical importance to the success of the operation (hence not instantly accessible to a generalist energy consultant).

As a consequence, it is likely that the actual economic energy efficiency opportunities in the vast majority of smaller West Midlands manufacturers are higher than the figures provided in the EU report.

If we take a median figure of around 7%, therefore, based on the EU report, this is likely to be conservative. It would give us an annual saving and productivity improvement potential of around £67M from industrial energy efficiency.

Open, competitive markets

A survey of medium sized manufacturing businesses in the region indicates that they are paying between 4% and 13% per unit more than would be expected for electricity for businesses of their size compared to national average figures (see Figure 9)[59].

This suggests the energy market is not working particularly well for these businesses at the moment.

Further investigation of the actual bills of two of these companies in 2017 produced individual bills with no fewer than 26 separate levies and charges, each based on different proportions of the actual energy consumption of the site. Very few of these charge lines make clear what is actually being paid for[60]. This degree of complexity perhaps explains why the market is not easy for customers to navigate, let alone for market forces to drive competition and economic efficiency

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[58] https://ec.europa.eu/energy/sites/ener/files/documents/151201%20DG%20ENER%20Industrial%20EE%20study%20-%20final%20report_clean_stc.pdf

[59] Source: Energy bills submitted by LEP partners. 2017.

[60] For example, 'AAHEDC Charge'. An internet search reveals this to be a cross-subsidy to reduce distribution costs for the north of Scotland. https://www.nationalgrid.com/uk/electricity/charging-and-methodology/assistance-areas-high-electricity-distribution-costs-aahedc

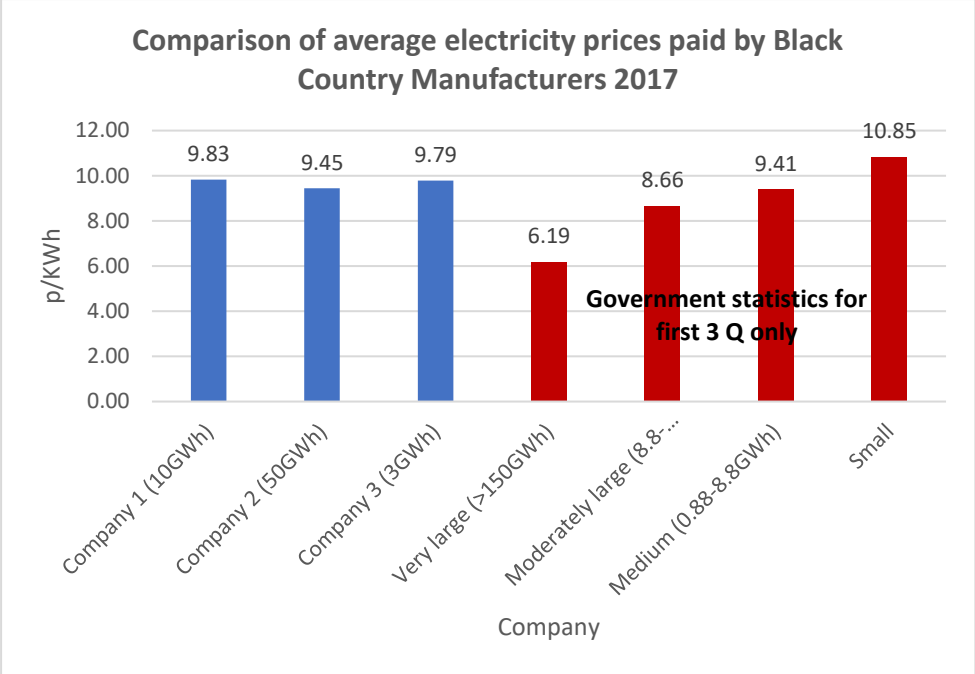

Figure 9 Comparison of actual 2017 bills locally to government statistics

If we assume creating greater transparency and competition in energy markets for business locally helped regional firms reduce their energy costs to national average prices for their scale of demand and take the lower figure of 4% potential for saving, then the potential impact on regional GVA is £38M per year.

Attractiveness of the region to skilled workers (domestic energy costs)

The West Midlands has some of the highest incidence of fuel poverty in the UK[61]. What this means in practice is that in terms of energy bills, and for a significant proportion of our labour force, it's more expensive to live here than competing regional economies.

This isn't to do with the unit price of electricity or gas (the headline 13p per unit for electricity or 5p per unit for gas, which is the same nationally and half the price of electricity in Germany, for example) - it's entirely to do with the quality of our housing. Poor quality houses are draughty, poorly insulated and inefficiently heated: they can easily use 3-10 times as much gas and electricity and thus cost 3-10 times as much to heat as a modern, well-built equivalent house of exactly the same dimensions (or an identical property in Germany, despite the higher costs per unit of energy).

The economic impact of this is very difficult to quantify, but it's clear that building high quality new housing with good energy efficiency standards and retrofitting existing housing to similar standards must benefit the local economy several times over:

- Better quality housing makes it easier to attract and retain skilled workers

[61] The rate of fuel poverty amongst households exceeds 12% on average and is as high as 14% in parts of Birmingham and the Black Country. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/533056/Fuel_poverty_Sub-regional_report_2016.pdf

- Lower energy bills mean more disposable income for people to spend in the local economy (and as the analysis in section 2 shows, this is likely to be a net transfer of GVA into the local economy from the rest of the world)
- Constructing higher quality housing creates market opportunities for modern methods of construction and advanced building technologies. Refurbishment projects are typically delivered by local installation and building contractors.

As with industrial costs, there are also opportunities for domestic customers to benefit from reduced infrastructure costs (for example from sensible sited and developed district heating schemes). Figure x below illustrates this potential.

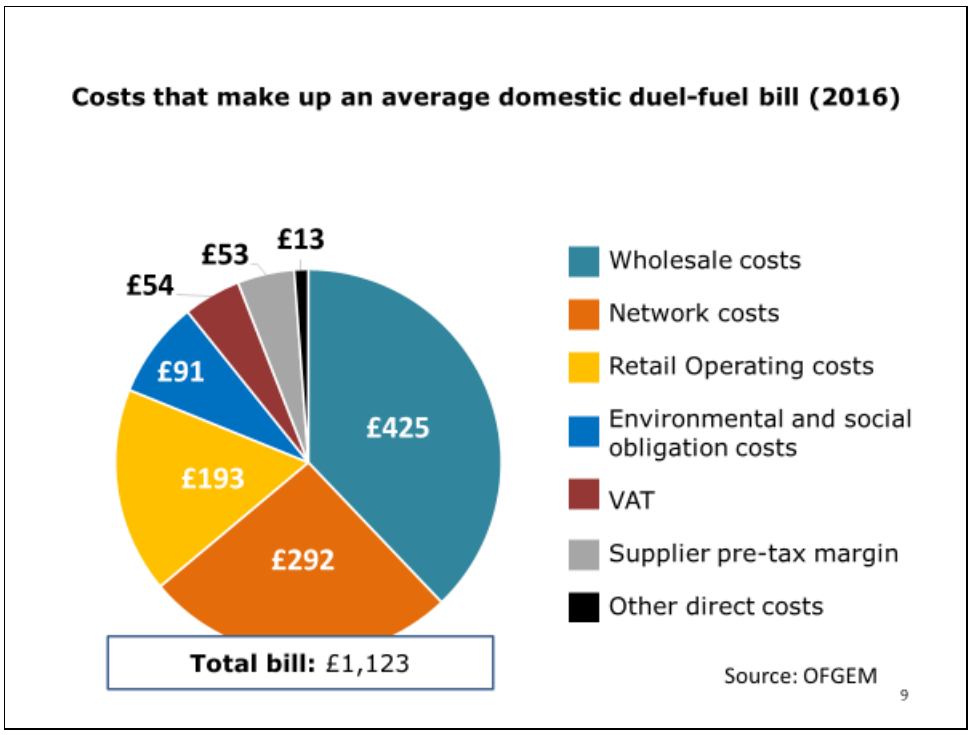

Figure 10 Breakdown of average domestic fuel bill

As an initial and conservative estimate of the potential value of reduced domestic energy costs to the regional economy, if we were able to reduce costs by 10% through installed energy efficiency measures and higher build standards on new housing this would redirect around £190M per year into the local economy (using the figures for domestic spend summarised in section 2). In practice, savings will reflect take up of measures, so a wide range estimate of £25M-£200M is used in this report.

Achieving this would require investment of the order of 5-10 times this value over a period of several years, but this will already largely be accounted for in the investment figures (Figure 7). The broad evidence from the construction sector[62] is that delivering greater energy efficiency in housing is not a matter of how much you spend, but rather what you spend the same money on and the skill and attention to detail with which you build things. This is an area where are virtuous circle of skills training, ambitious targets and effectively policed standards can deliver significant economic benefits for the region at minimal cost.

[62] http://www.lsiarchitects.co.uk/a-comparative-study-into-the-cost-of-passivhaus-in-the-uk/?cookie=ok; http://elrondburrell.com/blog/5-excuses-for-not-doing-passivhaus/

Summary

Adding together the potential annual economic benefits delivered through all four mechanisms identified in this report and summarised above, an optimised regional energy strategy could deliver between £400M and £820M of annual GVA improvement for the region. This figure is broken down as follows:

Potential Benefits of a Focused Regional Approach to Energy as an Enabler of Industrial Strategy	Provisional GVA impact estimate (p.a.)
Accelerated roll-out of commercial developments	£100M
Speed of new market development	£120M
Competitiveness of industry	£155M-£400M[63]
Attractiveness of the region to skilled people	£25M-200M
Total	**£400M - £820M**

Table 2 Summary of potential GVA benefits delivered by a West Midlands Regional Energy Strategy

This is before the unquantifiable benefits of leadership in innovation in a $2trn plus[64] global market that is developing rapidly, and in which the West Midlands has a strong core base of expertise and skills evenly distributed across all three LEPs, including highly complementary capabilities across our academic institutions.

[63] The higher figure assumes Helm's national recommendation to establish legacy bank for historic energy infrastructure investment costs is adopted in the West Midlands.
[64] Global Infrastructure Outlook, Oxford Economics, 2017

4. Approaches of other regional economies

Before discussing progress in UK cities and regions on energy (and making international comparisons) it's important to have a high-level appreciation of how the UK energy market is structured, as this is relevant to any comparisons.

The UK energy market is structured in a way that makes it challenging to take an integrated, market-based approach to energy infrastructure planning at regional level. This is because energy markets and energy infrastructure are primarily regulated, planned and managed nationally, whereas transport, waste and spatial plans are primarily planned and regulated regionally and locally.

The diagram below summarises the way the current UK energy market is structured and regulated by the national regulator, OFGEM.

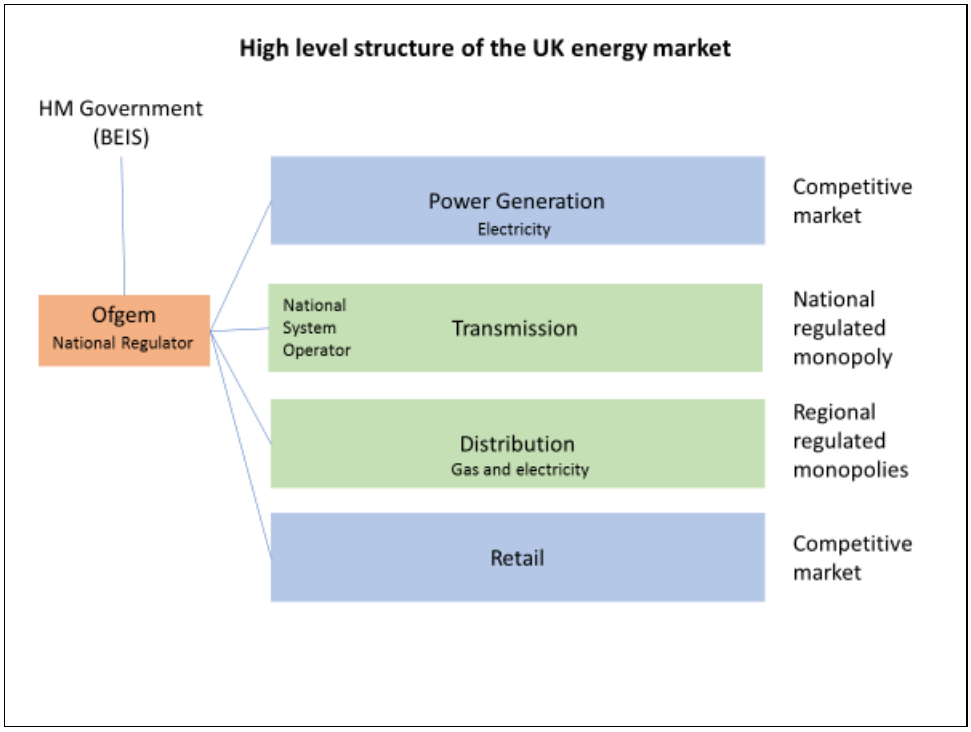

Figure 11 How the UK energy market is structured

The essential argument in this report is that the greatest economic and industrial benefit can be secured by optimising this system as a whole, and particularly distribution and generation infrastructure at a regional level (integrated with other regional infrastructure and industrial needs). Unfortunately, the system is currently designed on the assumption that distribution and transmission infrastructure is essentially fixed, changes only slowly, and has little or no impact on competitiveness. It also assumes that the only economically-viable generation assets are national in scale. The present UK system therefore assumes that the only economic benefit and industrial advantage that the energy system can offer is through

competition in retailing energy and in generating energy to supply a national system. In the 21st century, these assumptions are simply wrong[65].

Despite this, a number of cities and regions have made limited progress, reviewed in this section. We also provide some international examples for comparison, although these should be read bearing in mind that their regulatory contexts are typically very different from those of the UK.

Progress of UK regions and cities

Cities in the UK which have made significant progress on energy include Bristol, Nottingham, Glasgow and London.

Bristol and Nottingham have both set up retail energy companies. Bristol's now has over 100,000 customers and Nottingham 50,000, and Nottingham has recently expanded its offer to Leeds under a white label scheme[66]. Both have also invested in energy project teams (numbering in 10s of staff) and have a reasonable pipeline of projects supported by funding from the EU and Innovate UK.

Neither have yet managed to achieve the theoretical ideal of linking substantive funding streams from a successful retail energy company into local energy infrastructure investment. This has limited the scale of their achievements to modest savings on customer bills (of the order of 10%, or £130-£190 per household) and modest capital investment projects, of the order of £1-£10M[67].

Such achievements are substantial in the context of austerity and the wider challenges facing the public sector, but nevertheless fall significantly short both of what Bristol and Nottingham themselves set as targets (Bristol estimates £1 billion of investment is needed in its energy system to meet its 2050 targets) and what the West Midlands is seeking to achieve through its industrial strategy.

Glasgow has also made similar progress with a retail energy company, led by the social housing sector (which is helpful in providing access to a semi-captive customer base, thus reducing risk) and London has made useful progress in constructively challenging OFGEM around regulations which inhibit local authorities supporting infrastructure investment ahead of demand (see section 3).

In late 2017, BEIS also provided funding to help every LEP in the country develop an energy strategy and is following up with two years of funding for the equivalent of one energy officer in every LEP. This will be helpful in supporting higher quality discussions and transfer of best practice nationally.

However, the West Midlands is the only region which sees energy strategy as core to its regional industrial strategy and is thus pursuing this agenda with a degree of ambition and focus significantly ahead of other UK cities and regions.

[65] In saying this, I am agreeing with Dieter Helm, who develops all these points at some length in his cost of energy review.
[66] Much of the evidence in this section is drawn from the work of David Strahan and the West Midlands Regional Energy Policy Commission, whose report will be published in March 2018.
[67] Ibid.

International examples

International examples of progress and innovation in regional energy systems were recently comprehensively reviewed by the West Midlands Regional Energy Policy Commission[68]. Copenhagen, Munich, New York and South Australia are all mentioned as regions which have benefitted substantially from locally-controlled energy investment, but the point is made that in all these cases the municipalities have far greater statutory powers and responsibilities than their UK equivalents.

Copenhagen has a history of local investment in integrated energy infrastructure suited to its needs going back for at least a century. A city region with a population of just under 2 million, Copenhagen's local authority recently issued a bond of EUR500 million solely to finance regional energy projects.

Munich is comparable to the West Midlands in terms of population with an urban core home to 1.5 million people and a wider regional population of 2.65 million people. Interestingly, Munich operates its transport and energy systems through a single integrated municipal utility, Stadtwerke Munchen, running a liberalised local energy (and transport) system and market on an entirely commercial basis and securing revenues of EUR6.5 billion in 2016[69]. Munich has already secured and invested over EUR3 billion on its local energy system and plans to raise a further EUR3-4 billion shortly.

As the Regional Energy Policy Commission report notes, what all these examples show is the power of local action to accelerate clean energy deployment and innovation, and to outstrip national targets. Munich in particular is a good example (with its similar industrial heritage to the West Midlands) and is currently one of the fastest growing city regions in Germany.

[68] Powering West Midlands Growth: A Regional Approach to Clean Energy Innovation, March 2018
[69] https://www.swm.de/dam/swm/dokumente/english/swm-annual-report-2016.pdf

5. Current regional and national activities and initiatives in this space

There is considerable evidence that the West Midlands is pushing at an open door in its desire to support an ambitious local industrial strategy with an equally ambitious local energy strategy.

The government merged the Department for Energy and Climate Change (DECC) into the department for Business, Energy and Industrial Strategy (BEIS) in 2016, reflecting national recognition of the linkage between energy and industrial strategy. Indeed, the national industrial strategy[70], published in 2017, identifies clean growth as a 'grand challenge' and Infrastructure as one of five foundations ('Place' is another).

The importance of infrastructure and place to energy costs and energy strategy were further emphasised in the BEIS-sponsored but independent Helm Review[71] of the Cost of Energy in the UK. Helm (probably the leading energy expert in the UK) recommends establishing publicly-owned Regional Energy System Operators to procure energy infrastructure competitively locally. His findings are currently being considered by BEIS.

They are, however, consistent with industry trends and expectations. For example, in September 2017 (in Birmingham) Western Power Distribution launched an ambitious £125M strategy[72] to transform themselves into a Distribution System Operator, mirroring and anticipating Helm's recommendations the following month. Separately, National Grid announced it was restructuring to align itself with the more distributed market structure it sees emerging globally[73] and established a separate subsidiary in early 2017 specifically to compete in emerging competitive markets.[74]

The government has also been providing significant support to development of local heat networks for several years[75] backed by over £300M of investment funds. The Chief Executive of Ofgem warned the whole energy industry in December 2017 that 'change is coming'[76] and specifically identified the challenge of electric vehicle infrastructure as an area where regulation needs to change.

So the context is right, and there is also likely to be both private and public money to support leading regions, LEPs and local authorities.

In addition to the government's heat network funding, they are expected shortly to announce a £108M innovation fund 'Prospering from the Energy Revolution'[77] as part of the Industrial Strategy Challenge Fund. The West Midlands can also access current ERDF and

[70] https://www.gov.uk/government/topical-events/the-uks-industrial-strategy
[71] https://www.gov.uk/government/publications/cost-of-energy-independent-review
[72] https://www.westernpower.co.uk/About-us/Our-Business/Our-network/Strategic-network-investment/DSO-Strategy.aspx
[73] https://www.nationalgrid.com/uk/about-grid/our-role-industry/future-electricity-system-operator
[74] https://www.nationalgrid.com/group/about-us/what-we-do/national-grid-ventures
[75] https://www.gov.uk/guidance/heat-networks-delivery-unit
[76] https://www.ofgem.gov.uk/publications-and-updates/dermot-nolan-s-speech-energy-uk-annual-conference
[77] Conversation with Phil New, CEO of Energy Systems Catapult.

Horizon2020 funds to support energy projects (to the scale of £5-£10M per round, typically) and it is likely similar funds will be made available nationally post-Brexit.[78] Around £500M has also been allocated towards electric vehicle infrastructure as part of the national industrial strategy[79].

There are also national energy levy schemes, such as the Energy Company Obligation (ECO) which amounts to some £650M per year, Networks Innovation Competition (NIC) and Contracts for Difference (CfD) which make substantial investment funding available (sometimes through quite tortuous routes) for local energy projects.

Fundamentally, most sensible energy investment projects are commercially viable, so funding is largely required to support establishing efficient and appropriate institutions and capacity to manage risk; to support or underwrite innovation risk; and to help small businesses acquire skills, engage and enter markets fairly.

In particular, considerable progress should be possible by ensuring local authorities can work to investment horizons appropriate to energy infrastructure (for example electricity distribution asset investments are depreciated over 45 years as part of regulated price controls); take decisions on investment ahead of demand in energy infrastructure based on wider local strategic infrastructure and development plans (see section 3) and by making it easier to capture returns on energy investments. These are regulatory adjustments, not major investment or subsidy requirements.

West Midlands' positioning

The West Midlands has successfully positioned itself as a leading region in developing this agenda (see also section 1) putting us in a prime position to secure significant investment provided we maintain momentum.

The concept of Energy Innovation Zones (EIZs) was invented in the Black Country, in response to an early consultation around potential devolution asks in 2015. This idea has now been recognised by BEIS in the way it has structured the industrial strategy challenge funding for energy[80].

EIZs are a powerful concept because they enable energy infrastructure planning and investment to be managed locally coupled with regulatory simplifications appropriate to local needs. They are also designed to encourage commercial-scale deployment of systemic innovation. This will allow local industrial strategy to be supported by meaningful local energy strategies in a way that is simply not possible as long as energy is regulated nationally while all other infrastructure and economic development planning is managed regionally.

EIZs create publicly-managed contexts in which industrial partners and private investors can deploy new technologies (such as electric vehicles) at a scale sufficient to give them a platform on which to develop a global market position. This will in turn create new markets

[78] https://hansard.parliament.uk/lords/2017-12-12/debates/02B00000-02E4-49B8-BE0D-93CD46515DD8/EuropeanStructuralAndInvestmentFunds

[79] https://www.gov.uk/government/publications/industrial-strategy-the-foundations/industrial-strategy-the-5-foundations#infrastructure

[80] Patrick Allcorn, Head of Local Energy at BEIS, identified the region as the source of the EIZ idea in December 2017 in evidence to the Regional Energy Policy Commission.

for local supply chains and deliver significant GVA and productivity benefits to the region (see section 3).

We have followed up as a region by asking Sir David King to chair an independent commission reporting to the Mayor on regional energy policy (March 2018) and have framed our regional energy strategy around the concept of EIZs. Arup are currently developing high level business cases to support a clear set of investment 'asks'.

There is a strong partnership supporting this in the form of Energy Capital, which brings energy infrastructure providers together with customers including major industries, local authorities and LEPs and reports into the Regional Industrial Strategy (SEP) Board.

6. Recommended next steps

The West Midlands has an extremely strong regional history built on energy, and a set of well-evidenced industrial and academic strengths in automotive, manufacturing, construction and energy systems which are strongly aligned with equally well-evidenced emerging global market opportunities in clean growth[81].

National government and global industry and investors recognise that future energy systems will be distributed and built around 'Places' and everyone understands the importance of energy to industrial strategy as well as climate and social policy.

The West Midlands has already positioned itself within the UK as the leading region developing a local industrial strategy as well as leading in developing a local energy strategy.

The next step is to link these two initiatives together fully by:

1. Developing a place-based clean growth sector deal with industrial partners to present to government by June 2018, with a view to securing funding and any required powers by November 2018.
2. Consolidating this deal and the energy strategy around a single compelling vision (such as creation of the energy infrastructure for the manufacturing and creative city region of the future)
3. This deal should convert the linkages between energy strategy and industrial strategy outlined in this report into specific projects and partnership initiatives across the region, using locally-governed EIZs in each LEP area as a framework.
4. Working with partners to ensure that sufficient resourcing is in place, with appropriate reporting lines, within the WMCA to facilitate development and delivery of this deal.
5. Re-affirming Energy Capital's role in supervising these resources reporting into the Industrial Strategy (SEP) Board.

In particular, it's clear from the analysis in section 3 that a number of specific interventions could have disproportionate impact.

- Implementation of the proposed Energy Innovation Zone (EIZ) model being developed through the Regional Energy Policy Commission, particularly to support local authority-owned 'DevCos' or similar risk vehicles for infrastructure investment ahead of demand. This will help accelerate the economic benefits of commercial development roll out plans and build commercial markets for new technologies and systems.
- A strategic focus on encouraging investment in modern and smart energy infrastructure for supporting the large-scale deployment of future mobility technologies (such as electric vehicles) and clean growth technologies (such as low carbon and energy efficient housing). This will support accelerated development of new markets across the region.
- Differential energy pricing for strategic industries following international patterns and using the 'Legacy Bank' model proposed by Dieter Helm in his recent review of

[81] Global Infrastructure Outlook, Oxford Economics, 2017

the Cost of Energy in the UK for the government[82]. This will directly impact the competitiveness of existing industries and could potentially have the most significant short-term impact on regional GVA.

- A focus on promoting energy efficiency in industry; open and transparent, competitive local markets for energy; and local private wire and district energy systems where appropriate. These are obvious wins which largely simply require focused resourcing to deliver up to £100M of potential GVA improvements.
- Imposition and effective policing of energy efficiency standards on new housing developments representing a 10-25% improvement on current national standards, coupled with well-designed incentives for energy efficient improvement of existing stock. This is economically, technically and environmentally very difficult to argue with, but challenging politically due to the high profile of the topic; vested interests of incumbent housebuilders; and diversity and complexity of the existing building stock (and its owners).

This report supports the recommendation of the recent government-commissioned Helm review that the UK should establish publicly-owned Regional System Operators (RSO) to procure energy infrastructure. Both RSOs and local energy companies[83] will make all the above recommendations simpler and easier to implement. The West Midlands could offer itself as a pilot for this approach, working in partnership with the existing energy system operators and Ofgem.

A moment of opportunity

There is a moment of opportunity for the West Midlands to make a unique and substantial contribution to national economic growth in this sector. Companies like Western Power and National Grid are investing significantly in change and looking for well-organised and ambitious public-sector partners ***at regional level***; the energy regulator and government recognise the need for change; leading experts have identified regional public sector leadership as the key; but no one has yet developed the detail or created the practical reality.

In the West Midlands, we can do this (partly because we started down this road several years ago). The timing of our devolution deal; our positioning leading on both local industrial strategy and local energy strategy; our unique combination of local industrial partners, innovation assets and diverse concentration of markets; and the flexible governance structures we've developed and honed through our LEPs, WMCA, local authorities and Energy Capital make this possible.

We should seize the moment.

[82] The Cost of Energy Review, Dieter Helm for BEIS, October 2017.

[83] Several local authorities in the region are already working on local retail energy companies, which would be entirely complementary to and supportive of everything discussed in this report.

Table of Figures

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