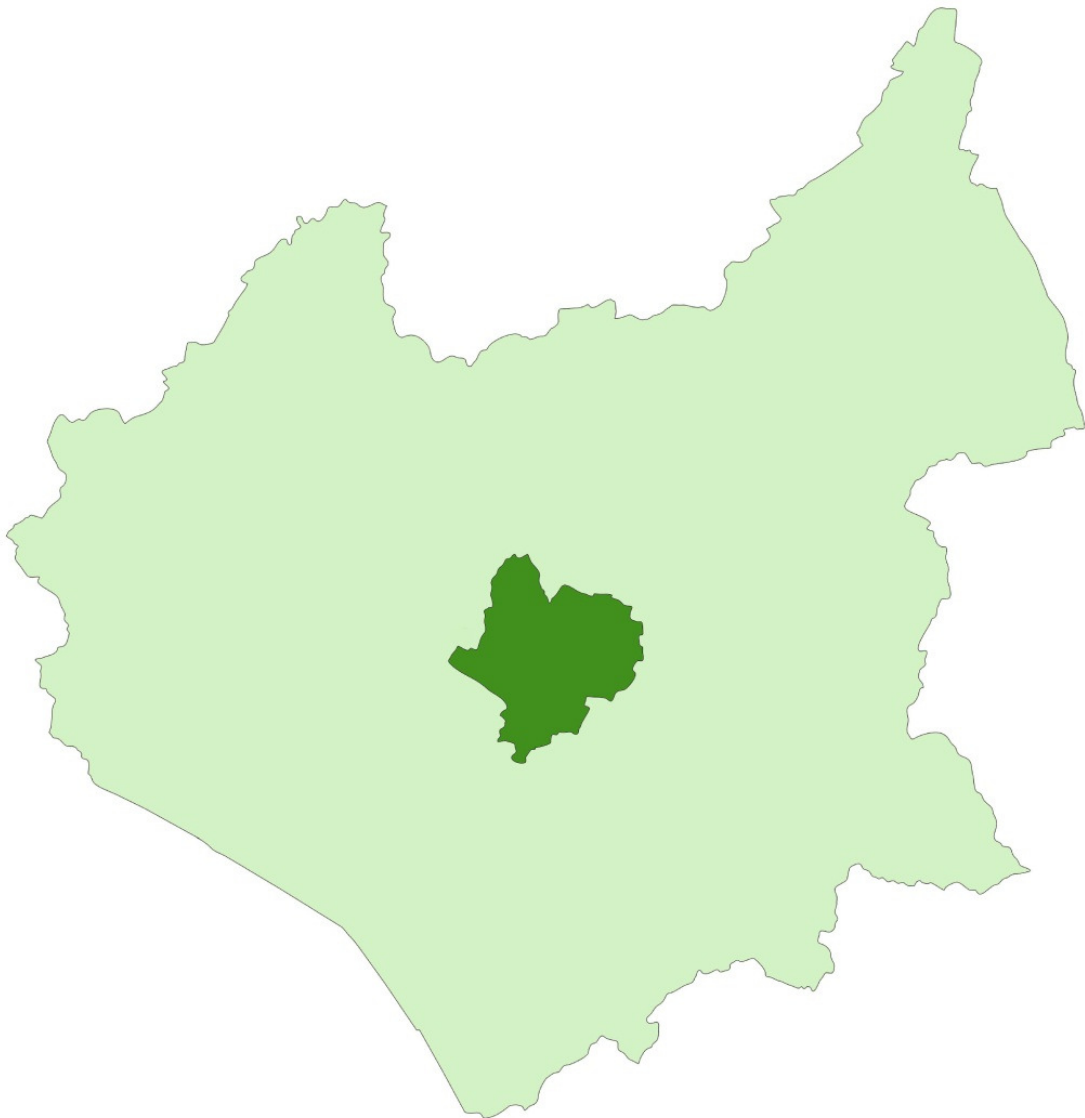




Low Carbon Leicester and Leicestershire research study



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Executive Summary

This study was commissioned by Leicester County Council and Leicester City Council on behalf of the Leicester and Leicestershire Enterprise Partnership (LLEP), with two distinct sets of objectives:

1. To develop a clear outline of the size, composition and growth of the low carbon and environmental goods and services (LCEGS) sector in Leicester and Leicestershire; and identifying opportunities for future growth.
2. To explore Small and Medium Enterprise (SME) attitudes to resource efficiency and support to improve resource efficiency.

Two strands of research were then undertaken: secondary data analysis, documentary review and qualitative stakeholder interviews to meet the first objective; and a survey of SMEs supplemented with qualitative interviews.

The LCEGS sector in Leicester and Leicestershire

There is a vibrant, growing LCEGS sector in Leicester and Leicestershire, with firms engaged in a wide range of activities and at different points within the supply chain. **There are an estimated 780 companies active in the sector, employing 14,400 people and accounting for nearly £2 billion in sales. The sector as a whole is set to grow by 24 per cent between 2011 and 2016.**

The dataset is disaggregated into 'levels' within the sector, providing different levels of detail. Level 2 data breaks the sector into 24 activity areas (see Section 2 for more detail). Of these, **three activity areas emerge as key sectors for Leicester and Leicestershire: alternative fuels, building technologies and wind energy.** Between them, these three industries account for over half of the overall sales value of the LCEGS sector in Leicester and Leicestershire.

Combining the secondary data with documentary review and stakeholder consultation, **a number of other important areas of activity are revealed, most notably Alternative Fuel Vehicles,** which will receive a large boost from the development of the Formula E headquarters at Donington Park.

The LCEGS sector is bolstered by a **strong presence in research on low carbon and renewable energies across the three universities** within the LLEP area. The proximity of the universities to local LCEGS business was seen by stakeholders as an important part of the Leicester and Leicestershire 'offer'.

Stakeholders felt that the area was a competitive, central location for business, although LCEGS businesses faced some barriers around finding appropriately skilled staff, capital investment, and the development of supply chains. Businesses would welcome greater opportunities to engage with LLEP and other LCEGS businesses.

SME attitudes to resource efficiency

Research with SMEs revealed that SMEs are taking action on resource efficiency. Four out of five SMEs have taken some action to reduce their ecological footprint. For the majority (two-thirds) of those that had taken action, this amounted to small-scale operational changes rather than undertaking capital renewal or strategic change to business operations.

Cost and legislation are the key drivers of action, but they also act as important barriers. Ultimately cost is the final consideration in deciding whether or not to take action on resource efficiency. But, SMEs are motivated to act by other concerns, most notably environmental values and 'buying local'.

A quarter of firms have previously accessed energy-related business support, although only a third of these then took action based on the advice and support they received. Nonetheless, there is an appetite for advice and support on resource efficiency among SMEs.

SMEs are interested in a range of potential services. Grant funding or 'hands-off' advice such as online tools or provision of information and evidence on resource efficiency are important. However, in order to achieve long-term transformative change in businesses it is likely that more in-depth forms of support will be necessary.

It is important to acknowledge that SMEs are not a homogenous group: there is huge variety among firms, particularly across different sectors and size of businesses. The survey revealed that firms with more than ten employees, and non-service sector SMEs are more likely to:

- have taken action on resource efficiency
- be increasing their investment in resource efficiency in the next year
- face a wider range of barriers to action
- be open to a wider range of types of support
- be open to a wider range of support providers – in particular business networks such as the FSB and Chamber of Commerce.

A suite of recommendations were developed from these findings, which are detailed in Section 4. These focus on:

1. Stimulating key areas of activity within the LCEGS sector in Leicester and Leicestershire (including focusing public sector procurement and investment on key areas); developing the visibility and profile of the sector; and engaging LCEGS firms within the policy process.
2. Developing a targeted SME support service with a focus on supporting SMEs to make systemic changes to business, as well as engaging with those that have not yet taken action on resource efficiency; and to explicitly link SME support to generated demand for the area's LCEGS firms' goods and services.

Introduction

1.1. Background to the study

In recent years the transition to a low carbon economy has become a mainstream policy goal for all levels of government. This is based around meeting a series of interlinking agendas, including:

- carbon reduction
- energy security
- economic growth.

This study was commissioned by Leicester County Council and Leicester City Council on behalf of the Leicester and Leicestershire Enterprise Partnership (LLEP) with each of these concerns in mind. In particular, LLEP are interested in (a) understanding the current and potential value of the Low Carbon and Environmental Goods and Services (LCEGS) sector to the LLEP area, and (b) developing a better understanding of Small and Medium Enterprise (SME) behaviours and attitudes towards resource efficiency.

LLEP recognises the potential benefits of the low carbon economy to the area in both its Strategic Economic Plan and its European Structural and Investment Funds strategy. This is borne out through LLEP's plan to invest 28 per cent of ERDF monies to support the transition to a low carbon economy (higher than the 20 per cent minimum threshold).

SMEs account for around 60 per cent of the UK's carbon emissions from business¹ and as a result represent an important target group for carbon reduction policy. The challenge for those seeking to address issues within the SME population is that SMEs as a whole tend to have little engagement with support providers, with research for BIS showing that only 40 per cent of SMEs utilised any form of external assistance and just 20 per cent utilised public sector support.² Furthermore, in a context of tight constraints on local authority expenditure and service provision it is important that councils and Local Enterprise Partnerships (LEPs) are able to act strategically and accurately pinpoint the areas in which they can have greatest impact.

This challenge is recognised by LLEP in its EU Structural and Investment Fund (EU-SIF), which details plans for a co-ordinated programme of support to SMEs and micro-businesses, and this research will seek to feed directly into this.

¹ Revell, A. and Rutherford, R. (2003) UK environmental policy and the small firm: broadening the focus. *Business Strategy and the Environment*, 12, pp. 26-35.

² BIS (2011) *Small Business Survey 2010*. London: HMSO.

1.2. The Leicester and Leicestershire economy

The Leicester and Leicestershire economy is worth £19.4 billion per year and the LEP network's data on LEP performance shows Leicester and Leicestershire to be emerging from the recessionary period of 2008-2010. However, **Leicester and Leicestershire fares less well compared to the rest England in terms of high value services and technology sectors. It is interesting to note therefore that many elements of the LCEGS sector are well placed to provide stimulus in the latter of these two sectors.** The manufacturing and construction sectors remain important to the LLEP economy, and achieve stronger growth than most other LEPs. This is borne out in the data on LCEGS below, with key sub-sectors based around building technologies and renewable energy components and installation.

1.3. Study aims and methods

The study focused on two distinct tasks:

1. Developing a clear outline of the size, composition and growth of the low carbon economy in Leicester and Leicestershire; and identifying opportunities for future growth.
2. Exploring SME attitudes to resource efficiency.

Meeting these aims involved two strands of research, with differing methodologies, as follows.

Outlining the size, composition and growth of the low carbon economy

This strand involved three key tasks:

- review of BIS data on the size and composition of LCEGS across the 39 LEPs
- review of additional literature on UK and international LCEGS markets
- consultation with stakeholders and LCEGS businesses in the LLEP area.

These elements are drawn together in Section 2 below.

Exploring SME attitudes to resource efficiency

This strand involved two key tasks:

- a quantitative survey of SMEs in Leicester and Leicestershire
- in-depth qualitative interviews with ten SMEs.

These elements are drawn together in Section 3 below. In Section 4 both sets of findings are integrated in an action plan for future policy development by LLEP and local partners. This short summary report is accompanied by technical and data annexes, which give the full datasets for the study.

The low carbon economy in Leicester and Leicestershire

2.1. Overview

This section analyses BIS data on the low carbon economy, supplemented with further data provided by K-Matrix.³ It gives estimates of the size, composition and potential growth of the low carbon and environmental goods and services (LCEGS) sector. This data is available at the LEP, regional and national level with the exception of sector growth. Here, regional and national data has been used to estimate likely LEP trends. Because the LCEGS sector does not easily map onto traditional Standard Industrial Classification (SIC) codes, it is not directly comparable to other data on economic sectors. Instead, the analysis below focuses on extrapolating the performance of key sub-sectors within the LCEGS sector and benchmarking against other LEPs, the East Midlands region as a whole and the rest of the UK.



The headline points from this section are as follows:

- **The LCEGS sector is an increasingly important sector for Leicester and Leicestershire.** There are an estimated 780 companies active in the sector, employing 14,400 people and accounting for nearly £2 billion in sales.⁴ The sector as a whole is set to grow by 24 per cent between 2011 and 2016.
- **The LLEP area is performing better in the LCEGS sector than in the economy as a whole.** While Leicester and Leicestershire ranks 20th for overall Gross Value Added (GVA) per capita among LEPs, the area is 15th for sales per capita in the LCEGS sector. This is significantly higher in some areas of activity: in particular, Alternative Fuels and Wind Energy.

³ K-Matrix also generated the data for BIS. For more information on the methodology used to generate this data, please see the BIS [Low Carbon and Environmental Goods and Services report](#) for 2011/12

⁴ It is important to note here that this figure is for gross sales – that is, turnover – rather than GVA

- **Alternative Fuels, Wind Energy and Building Technologies are the three most valuable sectors for the area** in terms of sales and size relative to other LEP areas.
- There is also some evidence of **clustering of research and development (R&D) and supply chains in Alternative Fuel vehicles and Building Technologies**, as well as more broadly in terms of renewable energy technologies.
- Two ‘cross-cutting’ sectors were also found to be important to the area, with potential for growth: **Smart Grid Development and implementation and the Woodland Economy**.
- This is bolstered by a **strong presence in research on low carbon and renewable energies across the three universities** within the LLEP area. The proximity of the universities to local LCEGS businesses was seen by stakeholders as an important part of the Leicester and Leicestershire ‘offer’.
- **Stakeholders felt that the area was a competitive, central location for business**, although LCEGS businesses faced some barriers around finding appropriately skilled staff, capital investment, and the development of supply chains. Businesses would welcome greater opportunities to engage with LLEP and other LCEGS businesses.

2.2. Key low carbon sectors

The LCEGS data is disaggregated into Level 1 and Level 2 sub-sectors. The Level 1 data refers to three broad classifications: ‘environmental’; ‘low carbon’; and ‘renewable energy’. These are useful as high level categories – for instance, the LLEP area comes out well in terms of the size of the renewable energy sub-sector – but they do not tell us much of practical use about the composition of the LCEGS sector. Level 2 analysis is more useful in this regard, which breaks down the Level 1 sub-sectors into a total of 24 Level 2 sectors. These are summarised in Figure 1, below. This report also refers to Level 3 sectors, of which there are 126: a list of these can be found in the technical annex.

Figure 1, below shows how the data is organised in three Level 1 activity areas and 24 Level 2 areas. Level 3 activities are also referred to at times in this report, of which there are 126: a full list of these is included in the technical annex.

Figure 1: LCEGS typology of activities

Level 1	Level 2
Environmental	Air Pollution
	Contaminated Land Reclamation & Remediation
	Environmental Consultancy and Related Services
	Environmental Monitoring, Instrumentation and Analysis
	Marine Pollution Control
	Noise & Vibration Control
	Recovery and Recycling
	Waste Management
	Water Supply and Waste Water Treatment
Low Carbon	Additional Energy Sources
	Alternative Fuel Vehicle
	Alternative Fuels
	Nuclear Power
	Building Technologies
	Carbon Capture & Storage
	Carbon Finance
	Energy Management
Renewable Energy	Biomass
	Geothermal
	Hydro
	Photovoltaic
	Renewable consulting
	Wave & Tidal
	Wind

Source: data provided by K-Matrix

Using this data, supplemented with wider documentary analysis and consultation with key stakeholders and low carbon businesses, a small number of key low carbon sectors for Leicester and Leicestershire emerge. These are:

- Alternative Fuels
- Building Technologies
- Wind Energy.

These also comprise the three largest LCEGS markets globally as well as in the UK, with Wind Energy also the fastest growing UK low carbon industry (7.5 per cent growth in 2011/12).

Alternative Fuels

The dataset shows Alternative Fuels as both the largest LCEGS Level 2 sector in Leicester and Leicestershire by sales, employment and number of companies and the largest Level 2 sector in the area relative to the UK as a whole. In 2011/12 it was estimated to account for **£436 million in sales**



across 170 companies, employing just over 3,000 people. This made LLEP the 4th largest per capita (working age population) economy for Alternative Fuels. It will remain an important industry for the foreseeable future, with sales increasing in value by around 23 per cent by 2015-16.⁵ The dataset shows that three-quarters of the sector is made up from 'Other Biofuels' activity. This includes production, distribution and supply of biomass and woodfuel - which are discussed below (Section 2.2) as industries of potential importance - as well methane and vegetable oil.

Alternative Fuels: Intelligent Energy

Intelligent Energy develops efficient and clean energy technology for the global consumer electronics, automotive and distributed power and generation markets – from compact energy packs for mobile devices to powertrains for zero-emission vehicles, and distributed power and generation units for the always-on infrastructure.

Wind

Wind energy-related industries form the second largest Level 2 sector in Leicester and Leicestershire. The sector is also ranked 2nd for per capita (working age population) sales across the LEPs. **The wind sector is forecast to grow by 37 per cent in the LLEP area between 2011 and 2016.** This makes it the fastest growing Level 2 sector for the area. In all, Wind-related industries are estimated as providing around 2,000 jobs to the LLEP area, amounting to £340 million in sales. The Level 3 data for Wind is less revealing than for Biofuels. The data is disaggregated into 'large' and 'small' wind turbines, and 'wind farm systems', with a fairly even sales split between the three, although 'wind farm systems' is set for slightly faster growth (47 per cent, 2011-16).



⁵ See the technical annex for detail on how these figures were calculated

Building Technologies

In line with the rest of the UK, Building Technologies is estimated to be an important Level 2 sector for Leicester and Leicestershire, comprising 13 per cent of the LCEGS sector in Leicester and Leicestershire.



In 2011/12, the building technologies sector employed 1,890 people, accounting for £270 million in sales. This was set to grow by 23 per cent between 2011 and 2016. The Building Technologies sector is separated into four Level 3 sectors: doors; insulation and heat retention materials; monitoring and control systems; and windows. Of these, insulation and heat retention materials is the largest activity area, accounting for over a third (£98 million) of overall sales, with windows also accounting for just under a third of sales (£92 million). Further detailed LCEGS analysis appears in the data annex.

Building Technologies: The Mark Group

The Mark Group pioneered cavity wall and loft insulation in Leicestershire and is a leading UK domestic insulation specialist. With over 2,500 employees worldwide (over 1,500 in the UK), Mark Group is now a global installer of renewable energy technologies such as solar hot water panels, heat pumps and solar electricity.

Other important sectors

The data clearly shows Alternative Fuels, Wind and Building Technologies as the key Level 2 sectors in Leicester and Leicestershire in terms of overall size, or in relation to the rest of the UK. It is worth also noting three other sub-sectors:

- Photovoltaics
- Alternative Fuel Vehicles
- Geothermal.

Photovoltaics is a relatively small Level 2 sector in terms of absolute size (7th largest sub-sector in Leicester and Leicestershire by sales); but it is larger relative to the overall sector in relation to the rest of the UK, especially in terms of number of companies. **This suggests that the sector is made up largely of SMEs** in the LLEP area, and more so than in other LEP areas. It is also forecast to be the second fastest growing area in Leicester and Leicestershire, with sales estimated to increase by 31 per cent between 2011 and 2016.

Alternative Fuel Vehicles is the 5th largest Level 2 sector within Leicester and Leicestershire but it does not figure highly relative to the rest of the UK, especially compared to LEP areas that have received significant stimulus to develop low carbon vehicles (for instance, those in the North East and West Midlands). However, the

establishment of the **Formula E⁶ headquarters at Donington Park presents an opportunity** to develop a niche specialism within the area. At present, three quarters of these sales are accounted for by ‘mainstream alternative fuels for vehicles’, which includes liquid natural gas, LPG, synthetic fuels and hydrogen fuel vehicles, but Formula E and associated developments will potentially provide growth in more high-tech industries, around – for instance – plug-in electric vehicles.

One perhaps surprising element within the data is the relatively high figures for Geothermal energy-related technology: predicted at around £160 million in sales within LLEP, amounting to 69 companies with some involvement in geothermal technologies. The Level 3 data shows that four-fifths of activity is captured under system manufacture, supply and installation, with component/system design and specialist consultancy accounting for the remaining 20 per cent. Further investigation did unearth a number of ground source heat pump manufacturers and installers in the LLEP area, including plumbers, which may in part account for this. Consulted businesses were also unable to explain this figure. However, the dataset includes all supply chain activities, which means a large number of plumbing businesses will be counted under this sub-sector. An important point to make here is that the BIS data, while helpful as an indicator of activity the data needs also to be tested against consultation with businesses and actually existing companies.

Solar and Biomass: Prescient Power

Prescient Power are renewable energy consultants and installers for all major renewable energy technologies, with a particular focus on solar and biomass.

www.prescientpower.co.uk

2.3. Looking beyond the data – other sectors

The BIS data gives a useful overview of the LCEGS sector, and – combined with stakeholder consultation – provides a good sense of the key sub-sectors. However, there are limitations to this dataset, and it does exclude some ‘cross-cutting’ industries that are worthy of attention. The growth in importance of **Smart Grids** and allied technologies is particularly significant.

Smart Grids have been identified by the government’s Low Carbon Innovation Co-ordination Group as a priority area for investment, and the roll-out of smart meters across the UK by 2020 is acting as a stimulus for supplier investment. Key companies in the LLEP area are engaged in this agenda, most notably British Gas/Centrica, which is investing heavily in Smart Grid development and roll-out. De Montfort University’s SMART places partnership with Leicester City Council also aims to catalyse further development of smart environmental technologies. The UK government estimates that Smart Grid rollout could be worth up to £8 billion pounds in GVA to the UK economy by 2050. Ernst and Young take this further in estimating a total value of £13 billion in direct benefits; and facilitation of growth in secondary sectors of between £75 and £329 billion.⁷

⁶ Formula E is the FIA’s new fully-electric single-seater championship designed to appeal to a new generation of motorsport fans, whilst accelerating the interest in electric vehicles and promoting sustainability. Racing entirely on temporary city-centre race tracks, it uses cars capable of speeds in excess of 150mph (225kph). Its ten teams feature some of the leading international names in motorsport including Alain Prost and Michael Andretti, along with high-profile environmental supporters including Sir Richard Branson and Leonardo DiCaprio.

⁷ Ernst and Young (2012) Smart Grid: a race worth winning? Ernst and Young, <http://www.ey.com/UK/en/Industries/Power---Utilities/Smart-Grid---1--Overview>

The presence of the National Forest across Leicester and Leicestershire provides opportunities for the development of the **Woodland Economy**. This provides prospects across a number of economic activities within the supply chain, including: biomass, woodfuel (including development of wider supply chain through to energy production), building materials, wood craft/manufacture, carbon offsetting/land sponsorship, and the visitor economy. It also supports woodland services such as woodland maintenance and Genecon⁸ estimate that the National Forest is worth around £1.7 billion in GVA to the LLEP area. This includes the value of the Forest as a natural asset with valuable but less tangible impacts on inward investment, land value, attracting high-value workers to the sub-region, and its 'locked-in' value as a carbon sink. Nonetheless, this represents a considerable figure.

Smart Grids: British Gas

British Gas has a strong presence in Leicester and Leicestershire, and is one of the area's largest employers. A priority area for British Gas is creating 'connected buildings', through the development and roll-out of smart meters and Smart Grids, including investment in an initial £54m programme of technology and customer engagement.

2.4. Emerging clusters and local supply chains

One finding from the stakeholder and business consultation was that local supply chains are not particularly well developed in that most of those businesses consulted do not use local suppliers. However, the study has found three principal clusters of activity, where there is some evidence of different elements of the supply chain working together within Leicester and Leicestershire. These broadly map onto the areas of strength outlined in analysis of the K-Matrix/BIS dataset above, but also cut across different Level 2 sectors, so are outlined separately here. These areas are low emission transport technologies (including the Level 2 sector Alternative Fuel Vehicles), renewable and low carbon energy (including wind and photovoltaic cells) and building technologies and retrofit (in line with the Building Technologies sector outlined above).

Low Emission Transport Technologies

Enhancing the picture of alternative fuel vehicles as an important sub-sector for the LLEP area, more broadly across Leicester and Leicestershire there are strong capabilities in low emission transport technology covering motorsport, R&D, testing and fleet management:

- MIRA Technology Park near Hinckley provides an ideal location with Enterprise Zone status for those involved in R&D in the transport sector. MIRA brings a strong track record in low carbon vehicle design and implementation.
- At Donington Park some 150 racing engineers are involved in the preparation and testing of new Formula E electric cars following an LLEP £3.7m loan from the Growing Places Fund.
- Genex in Loughborough supports the early market development of low carbon vehicle technologies including electric, hybrid, bio-methane and hydrogen powered vehicles.

⁸ Genecon (2014 The National Forest – Economic Impact and future economic potential *Leeds, Genecon.*

- Smart Go Solutions is a Leicester based social enterprise offering low carbon travel networks. Cenex is also involved in fleet carbon reduction. The company organises the UK's largest low carbon vehicle event and facilitates networks from Plugged-in Midlands to the Transport KTN.
- Transport research [groups](#) at Loughborough are looking at modal shift and [internal combustion engines](#) and the transport i-net is also based at Loughborough.

Alternative Fuel Vehicles: Formula E, Donington Park

Donington Park is now home to the new operational HQ for Formula E following support from the LLEP from its Growing Places Fund. Its 150 racing engineers will showcase and develop electric vehicle technology preparing and testing the new Formula E electric cars.

Renewable and Low Carbon Energy

There is a cluster of activity in Loughborough around the development and commercialisation of clean energy, largely based around the Low Carbon Alternative Fuels and Renewable Energy sectors outlined in the LCEGS data:

- Loughborough-based Intelligent Energy develops efficient and clean energy technology for the global consumer electronics, automotive and distributed power and generation markets.
- The Energy Technology Institute (ETI) in Loughborough brings together engineering projects that develop affordable, secure and sustainable energy technologies across heat, power, transport and the infrastructure that links them, with a focus on their commercialisation.
- The Centre for Renewable Energy Systems Technology (CREST) undertakes research and education in renewable energy technology and the Midlands Energy Consortium combines the energy research capabilities of the universities of Birmingham, Loughborough and Nottingham.
- Niche company Air Fuel Synthesis Ltd (AFS) is working to produce synthetic air based alternatives to petrol and diesel.
- The study also identified Loughborough-based BRUSH - the largest independent manufacturer of turbogenerators (for all forms of energy), and also in Loughborough, Evance Limited manufactures and supplies small wind turbines (we understand it has just been subject to a takeover).

Further afield the Environmental Technology Centre at the University of Nottingham's Innovation Park helps SMEs make improvements through the adoption of environmentally friendly working practices and the use of cleaner, renewable and sustainable technologies. Also in Nottingham is the niche clean tech networking organisation and low carbon skills body, Employer First.

Building Technologies and Retrofit

Also building on the LCEGS data presented above, the study has identified several academic and commercial strengths around Building Technologies and sustainable construction:

- Loughborough University has expertise around energy efficiency in buildings and retrofit (comprising [training](#) in energy demand reduction, domestic refurbishment and carbon footprint projects such as [calebre](#) and [4 M](#) and research [groups](#) and [units](#)).
- The Mark Group is a company that pioneered cavity wall and loft insulation in Leicestershire and is a leading UK domestic insulation specialist. With over 2,500 employees worldwide (over 1,500 in the UK), Mark Group is now a global installer of renewable energy technologies such as solar hot water panels, heat pumps and solar electricity.
- Local consulting firms able to advise on energy efficiency, carbon foot printing and resource efficiency.
- Leicester College, Stephenson College and Hinckley Colleges are all delivering programmes to develop workforce skills in this sub-sector. Leicester College has been awarded £2 million through the Local Growth Fund for a programme of activity and capital works to significantly develop the area's ability to meet the skills needs in Low Carbon Construction and Retrofit.

2.5. Research and Development and University capabilities

An important factor in stimulating the area's LCEGS sector is its capabilities in Research and Development. This a necessary feature of promoting and catalysing innovation, a key element in the generation of competitive advantage for the LLEP area. The area contains three universities with strong track records in a number of LCEGS-related activities. Some of these activities are detailed above, but to summarise, these include:

- **De Montfort University's Institute of Energy and Sustainable Development (IESD)** has a strong track record in the development of applied approaches to understanding energy and carbon flows in cities and their built environment. Much of this work involves drawing inward investment in the guise of EU and UK research council funding to work with local organisations on carbon reduction. Current projects include work with Leicester City Council to develop 'smart' energy management systems through the SMART SPACES project, and various other projects around the broad theme of cities and low carbon transitions. It is also important to note the value of the Institute's long history of engaging with the area's 'anchor' institutions (key employers and public sector bodies), and plays an important role in providing expert input to local strategy and policy delivery.
- As noted above, **Loughborough University** has research strengths in a number of areas relating to the LCEGS sector. These include the Energy Technology Institute (ETI) and the Centre for Renewable Energy Systems Technology (CREST), the Sustainable Design Research Group and membership of the London-Loughborough Energy Demand doctoral research partnership. The University has been working with De Montfort University as part of the 4M partnership looking at urban carbon footprints; and – through CREST – is involved in a wide range of research on energy distribution, demand management and renewable energy technologies.

- Academics across a number of departments at the **University of Leicester** are working in the fields of renewable and low carbon energy technologies. An example of this work is the development of new 'spray on' [photovoltaic technologies](#).

2.6. Stakeholder perceptions of the LCEGS sector in Leicester and Leicestershire

As part of the study, key stakeholders in the area were consulted regarding their views on the LCEGS sector in Leicester and Leicestershire, with particular focus on the ways in which policy could be shaped to: tackle existing barriers to growth; promote the sector; and take advantage of opportunities for growth. Stakeholders included local LCEGS companies, policy-makers, local academics and training providers.⁹

Barriers to Growth

Companies and organisations were asked about both barriers to growth and key challenges. They were quite diverse.

- Some companies talked about the failure of organisations to take low carbon products and services seriously and of companies to invest in, and commit to, low carbon activities.
- Finding the right staff was a challenge for one firm consulted and another mentioned the importance of inspiring and engaging young people in STEM subjects.
- The quality and reliability of the supply chain is critical for those involved in the motorsport sector. Access to expansion finance was perceived as important for advanced engineering firms given the significant capital investment required for plant and machinery etc.
- One organisation talked about the challenge of getting training providers to work with developers of low carbon technologies in response to their current skill needs.
- Other areas cited as barriers to growth included the development of supply chains, the presence of effective low carbon networks and events, and the availability of an effective business support offer aimed at local carbon businesses.

Perceptions of Low Carbon Sector in Leicester and Leicestershire

The study participants were asked about their perceptions of the LLEP area as a place to do business and their awareness of low carbon capabilities.

- The LLEP area was perceived as a competitive and central location to do business with easy access to customers and suppliers.
- Proximity to the universities was important and some low carbon businesses/organisations have spun out of HEIs.
- The local authorities were considered to be proactive in the area of low carbon.

That said, many respondents suggested awareness of Low Carbon capabilities in the local area could be enhanced.

⁹ See the Technical Annex for more detail on the approach taken to stakeholder interviews.

- One respondent would like to see more pro-active marketing of the LLEP area's capabilities.
- Promoting the benefits of low carbon (cost saving through low carbon travel networks or transport led carbon reduction for instance) or championing climate change adaptation (through sustainable sourcing and procurement or social housing retrofit for instance) was perceived as worthwhile.
- Another respondent said they would like greater visibility of local sector strengths and low carbon service providers.
- It seems for several respondents quite a fragmented sector at the moment with no real identity. There could perhaps be better referral mechanisms between projects too.
- Big players such as MIRA and Intelligent Energy could be used to help attract local carbon transport technologies/inward investment (clearly the Enterprise Zone has this objective within its remit and actively marketing its offer).

Growth and Future Opportunities

Several companies and organisations mentioned expansion plans. For instance:

- Formula E has started its electric racing season and hopes to expand its activities into street racing
- Air Fuel Synthesis is undergoing an intensive phase of pre-commercialisation R&D involving the manufacture Carbon Neutral synthetic fuels
- other respondents claimed they would like to do 'more of the same' – deepening local networks or service provision
- one firm is looking to expand its activities in carbon off-setting
- several were expanding or planning to expand their premises.

Several respondents felt that improvements in the economic climate means firms will be thinking more about the future and potentially investing in low carbon activities.

The organisations and firms consulted generally showed an appetite to continue to engage on projects/activities in Leicester and Leicestershire:

- the majority of respondents expressed a desire to work more closely with LLEP
- there was a recognition that the LLEP geography could provide new opportunities but many organisations have been working within an East Midlands footprint or across wide geographical markets (motorsport for instance)
- connections with neighbouring areas (notably D2N2) were recognised as important.

People would welcome greater coherence in terms of the low carbon business support offer and there appears to be a general appetite for informal networking (judging by interest shown in recent events). Building on an earlier observation it was suggested that low carbon and STEM skills would be required to support the growth of the sector.

It was claimed there could be a smarter fit with the LEPs priority sectors and several respondents were able to highlight where they could work with the LLEP priorities:

- sustainable fleet management in distribution and logistics

- developing low carbon high-technology manufacturing solutions e.g. turbine blade or retrofit technologies
- using heat and waste to energy opportunities in food and drink manufacturing
- developing new business models for community, business and energy suppliers via the business and financial services sector
- promoting green tourism and hospitality
- using creative design to promote behavioural change and making buildings work better
- environmental/low carbon technologies
- low carbon space and aerospace technologies.

Participants were also asked about future opportunities. They highlighted a broad range of low carbon activities:

- The universities would like to work locally with SMEs and organisations on for instance:
 - domestic and energy efficiency e.g. demand reduction and management in buildings, data measurement and diagnostics and practical technology projects
 - technology development projects and renewable energy development and installation
 - energy demonstration projects using smart systems to showcase what can be achieved or promoting the smart cities agenda.
- There is an appetite to work on the commercialisation and innovation of low carbon technologies and work with the universities in major societal challenges such as radioactive waste disposal, sustainable societies or clean fossil fuels and carbon abatement technologies.
- It was suggested that opportunities like Green Deal could act as a catalyst to promote local supply chain development and for instance the engagement of trusted local delivery partners and installers.
- There was a desire to engage more with local business, for example on fleet management, carbon foot printing, or demonstration projects or Smart Grid pilots.

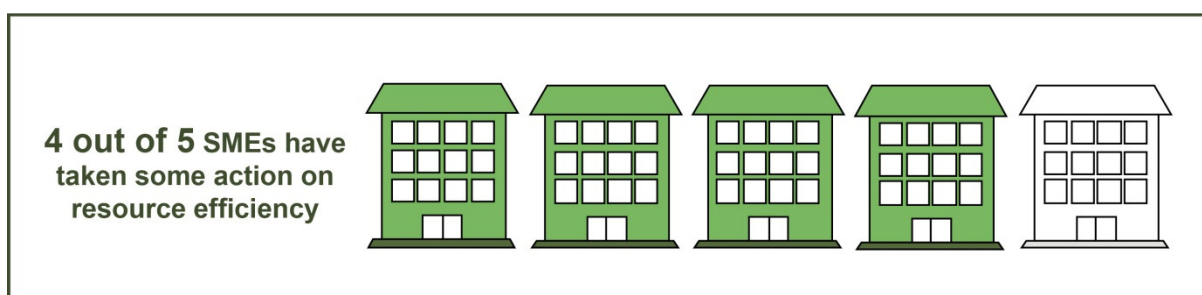
SMEs and Resource Efficiency in Leicester and Leicestershire

3.1. Overview

The second element of the research focused on a key demand side issue in relation to the low carbon economy: resource efficiency in SMEs. Although reports vary, SMEs are estimated to account for around 60 per cent of all carbon emissions, yet receive surprisingly little policy attention from national or local government.

This research component entailed an online survey of SMEs in Leicester and Leicestershire. This survey achieved 285 valid responses, which allows reporting of the headline figures with a reasonable level of confidence, but making statistically robust points about the characteristics of responses from different firm size, sectors or other variable is more difficult.¹⁰ We have sought to partially overcome this by minimizing the number of sub-groups for analysis, opting for two categories of firm size, and of sector. Nonetheless, sub-group analysis should be seen as indicative rather than statistically robust. Respondents were asked a series of questions relating to their concerns, actions and attitudes towards business support in relation to resource efficiency.

The survey data was supplemented with a small number (ten) of follow-up interviews with SME owner-managers. These explored some of the reasons behind survey responses in order to give greater depth to the findings.



¹⁰ 285 valid responses gives a confidence interval of 5.8 per cent at the 95 per cent confidence level (that is, if 50 per cent of respondents select a particular response to a question, we can be 95 per cent confident that the 'true' value across all SMEs in the LLEP area is somewhere between 44 and 56 per cent). Breaking this down to, say, the 68 firms that responded who had more than 10 employees gives a confidence interval of around 12 percentage points – in other words there is a greater margin of 'error' in the data.

The headline points are as follows:

- Four out of five SMEs have taken some action on resource efficiency.
- Energy and transport fuel costs are a concern for the majority of businesses.
- Cost and legislation are both the key drivers and the key barriers to action, and ultimately cost is the 'bottom line' in deciding whether or not to take action on resource efficiency. But, SMEs are motivated to act by other concerns, most notably environmental values and 'buying local'.
- A quarter of firms have previously accessed energy-related business support, although only a third of these then took action based on the advice and support they received.
- There is an appetite for advice and support on resource efficiency among SMEs.
- SMEs are interested in a range of potential services, with a preference for grant funding or 'hands-off' advice such as online tools or provision of information and evidence on resource efficiency.

Firms with more than ten employees and non-service sector firms are more likely to:

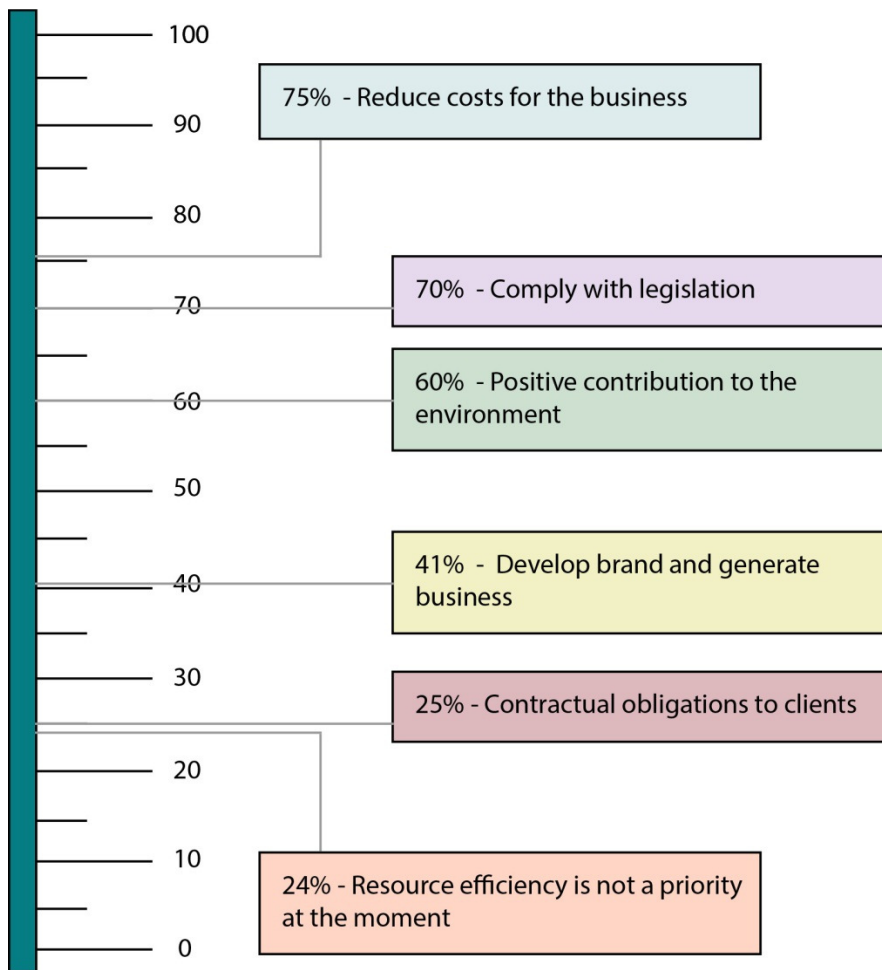
- have taken action on resource efficiency
- be increasing their investment in resource efficiency in the next year
- face a wider range of barriers to action
- be open to a wider range of types of support
- be open to a wider range of support providers – in particular business networks such as the Federation for Small Business (FSB) and Chamber of Commerce.

3.2. SME concerns and values

Energy and fuel use is a concern for businesses and relatively high on the agenda. 62 per cent of respondents saw either energy or petrol and diesel costs as a concern for their business.

Perhaps unsurprisingly, **cost/profit is the key issue in considering improvements to resource efficiency.** 75 per cent of respondents saw this as a reason for engaging with resource efficiency. The second highest motivation for action was to comply with legislation, as also might be expected. It is, however, worth noting that rationales did go beyond these 'core business' concerns: the majority of businesses saw concern for the environment in itself as an important reason to act, and 41 per cent thought that it was a useful means of developing their brand. Only 24 per cent of firms did not see resource efficiency as a priority for their business at the moment.

Reasons to engage with resource efficiency activities

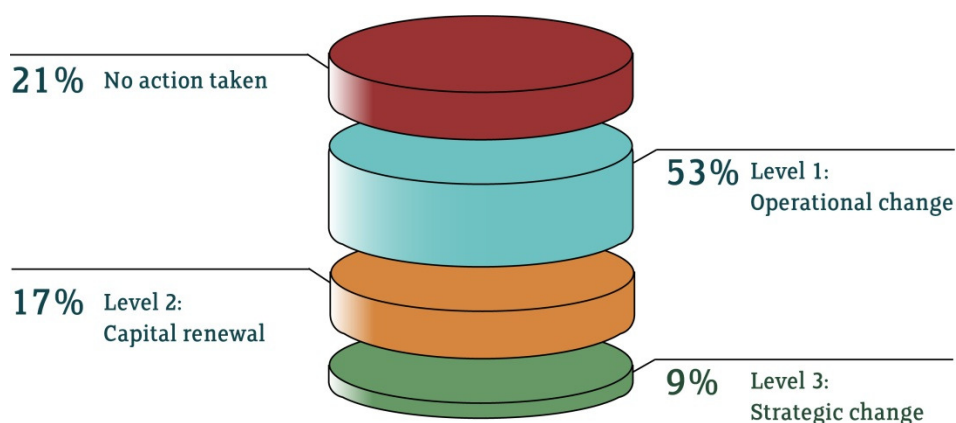


Base: 266 - 268

3.3. SME action

Most companies had taken small steps to improve resource efficiency: 80 per cent of firms reported having taken some level of action. The majority of those that had taken action had made small changes to buildings, machinery and ways of working as opposed to more ‘disruptive’ changes to operations such as making capital investments or changing their business model. There is a challenge therefore to encourage SMEs to move beyond the ‘low hanging fruit’ – which most firms were starting to make progress on – to effecting deeper changes to the way in which businesses operate.

Level of action taken



Base = 253

A challenge in this regard is that **only half of those that made changes thought that it was worth the time/money**. This is an important finding, and suggests that there are barriers to realising the potential of resource efficiency measures, which may in turn impact on attitudes to further action.

The most common measures taken or planned by respondents were:

- improvements to recycling or waste management procedures (63 per cent)
- encouraging behaviour change within the organisation (61 per cent)
- changing ways of heating premises / using electricity (50 per cent).

On the whole, action focused on internal operations. Companies were not actively targeting their supply chains (only 13 per cent planned or had taken action on this); and only 25 per cent of respondents sometimes or always sought low carbon suppliers. However, **82 per cent reported actively seeking local suppliers**. This is borne out in wider literature on SME support and resource efficiency,¹¹ and suggests that there might be a case for branding low carbon/resource efficiency projects around a localist agenda. Clearly localisation and carbon reduction are not necessarily linked, but it might be worthwhile seeking out points at which the two agendas interlink.

3.4. Attitudes towards business support

Only a quarter of businesses had ever sought advice or support on resource efficiency, and just over a third (37 per cent) of those had acted on that advice: in other words **nine per cent of business had taken advice and then acted upon it**.

However, there was appetite for support across the board, especially in terms of financial assistance, but also softer measures such as online tools and general provision of information and evidence around resource efficiency.

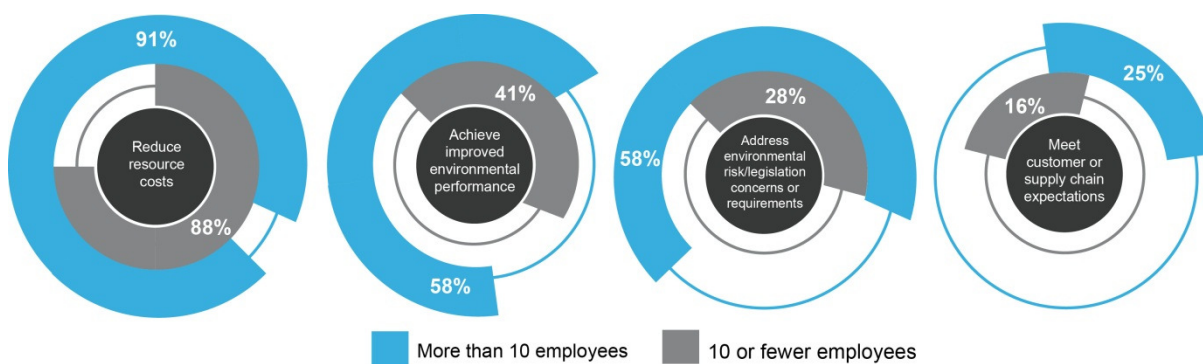
¹¹ See Eadson, W (2011) Sub-national interventions on carbon reduction in SMEs: a review of the evidence. Sheffield Hallam University, Sheffield.

No one organisation came out as a preferred source of advice or support for a majority of firms. Local government, national government and other businesses received the greatest number of responses, with each being a preferred source of advice or support for just over a third of respondents. The preference for national government-funded support – when viewed alongside the qualitative findings (below) – suggests that SMEs valued the ‘one-stop’ service previously offered by business link. The survey reveals that few SMEs (11 per cent) would consider the LEP as a likely source of advice or support, most likely because this is not something that LLEP has delivered in the past.

3.5. Differences by size and sector

The data was analysed for differences by type of firm in two ways: according to size (whether a firm had either 0-10 or 11-250 employees) and according to sector type (service sector or non-service sector).¹²

Motivations for action on resource efficiency

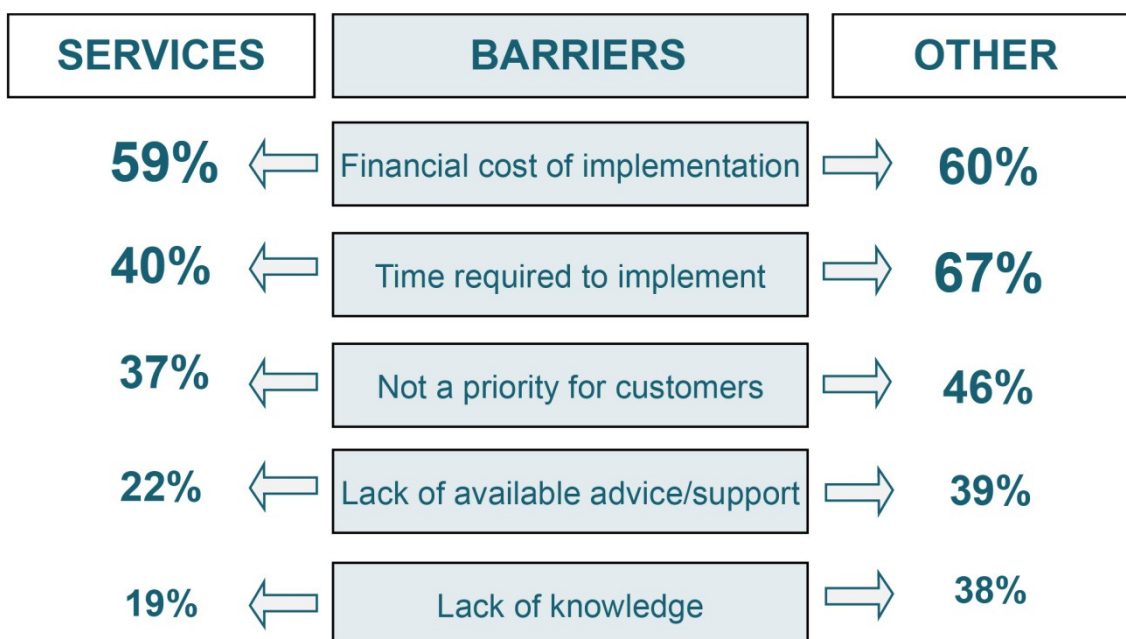


Many of the findings produced similar responses across both size and sector. However, it is worth highlighting some key differences. In terms of motivations and actions taken, these include:

- larger SMEs and non-service sector firms cited a wider range of rationales for action than smaller firms and were more likely to view environmental performance, legislation and customer or supply chain expectations as motivations to take action (see figure 4, below)
- ...but non-service sector SMEs also cited a wider range of barriers to action, and were significantly more likely to be concerned about the time required to implement resource efficiency measures (see figure 5, below)
- smaller firms (22 per cent) and service sector firms (25 per cent) were more likely to have not taken any action on resource efficiency than larger (11 per cent) or non-service sector (15 per cent) firms
- as might be expected, non-service sector firms were much more likely to have taken steps to deal with non-energy related matters, such as hazardous waste, use of raw materials, and waste to landfill
- larger SMEs (46 per cent) were much more likely to be increasing the level of investment in resource efficiency than those with 10 or fewer employees (14 per cent).

¹² These divisions were used to ensure that there were sufficient numbers in each category to generate indicative results with at least some degree of statistical accuracy.

Barriers to action on resource efficiency



In terms of business support, the survey found the following key differences:

- non-service sector firms (30 per cent) and larger SMEs (46 per cent) were more likely to have sought advice or support on resource efficiency in the past than service sector (23 per cent) or smaller firms (18 per cent). The same groups were more likely to have acted on the advice they received
- non-service sector firms and larger SMEs were more likely to consider a wider range of sources of advice, and had greater awareness of LEPs
- non-service sector firms and larger SMEs were more interested than service sector firms and smaller firms across all forms of support. Differences between non-service sector and service sector firms were particularly marked on appetite for energy audits/site reviews; information and evidence; and grant funding.

3.6. Insights from qualitative interviews with SME owner/managers

Following completion of the survey a small number of SMEs were identified for qualitative interviews to add depth to the quantitative data. In particular, it sought to unpick 'why', 'how' and 'in what circumstances' SMEs might take action on resource efficiency, and their attitudes towards different forms of business support.¹³ The responses from this research strand are summarised below under the following headings: making decisions on resource efficiency; barriers to further action; and attitudes towards business support.

Making decisions on resource efficiency

The first point to make on SME decision-making is that they tend to be based around a key individual – most likely the owner-manager. This means that, more so than larger firms, their behaviour is less likely to be 'calculated' and follow a clear economic rationale. Their knowledge/access to information is likely to be imperfect;

¹³ See the Technical Annex for further detail on the approach taken to SME interviews.

they are less likely to have long-term strategies in place; and are unlikely to have staff dedicated to 'non-core' business, such as resource efficiency or facilities management. This is elaborated in the following key points to arise from the interviews with SMEs:

- Reinforcing the survey findings, cost tends to be the deciding factor on investing in resource efficiency...
- ...but moral values (e.g. environmental concerns, or an aversion to 'waste' in general) are important and often a driving force in taking action: *"It never boils down completely to cost. For instance if anyone asks us if it's less for cash we're very strict, it's the same whatever and it will go through the books. It boils down to integrity"* (Retailer). At the other end of the spectrum regulatory measures are also important drivers.
- Even where SMEs profess to be driven purely by profit, cost alone is not a sufficient condition for action because:
 - those making the decisions do not often have a strong grasp of the costs/benefits of actions
 - they do not necessarily trust the modelling of 'likely savings' from taking different measures; and
 - there can be a perception (not necessarily based on evidence) that changes are either too small to make a real difference to running costs, or too large, and therefore represent too great a risk. One SME, who had engaged in resource efficiency to meet various ISO standards summed this up: *"An example where it [action on resource efficiency] has cost us...I can't think of something off the top of my head, I can't think of a single thing, but it feels like it's true"* (Agricultural chemicals firm).
- Because of the above, those that have taken action do not always seek the cheapest option, as long as it does not impact on profits and is 'affordable' (however this might be defined): *"it's about my personal values to the point that we can afford to do it and it doesn't impinge on the business...but it still has to be competitive"* (Fitness firm).
- Another important element of decision-making was the 'use value' of products aimed at energy efficiency/waste reduction: that is, their ability to 'do the job' for which they were designed first and foremost (for instance, light/heat the premises; carry out a manufacturing process etc.), before considering savings on energy/waste.
- Decision-making is bound to the values and history of the owner-manager (especially for micro firms): for instance, one SME owner-manager talked about their deep-held concern for frugality and aversion to waste as a driver for their behaviour in business. This was not foremost about cost, although that was a *"helpful bonus"* (Tree surgeons).
- Decision-making tends to take place at key points within the firm lifecycle – in particular, setting up new premises, or when making capital investments. This is important to consider in designing support programmes. One SME owner-manager suggested that business support on resource efficiency would be best placed in the following situations:
 - at the point of applying for planning/building regulations approval (they could put the SME in contact with the support provider, for example)
 - as part of business start-up support
- Although some SMEs mentioned that it was helpful for their brand to be able to point to action on carbon emissions and waste, it was clear that customers were

not active drivers of action. So, while action on resource efficiency was perceived as potentially increasing custom, inaction was not considered a risk to business

- There was a strong appetite for finding ways of re-using waste: *“Anytime you can turn a waste into a raw material, the level of efficiency goes down by an order of magnitude” (Agricultural chemicals firm).*

Barriers to further action

Survey respondents raised a range of barriers to further action on resource efficiency and these were explored further in the interviews. As highlighted in the survey results, cost, access to finance, and time were discussed as key barriers to action. But other issues were also raised, including the following:

- Difficulty of accessing up-front finance for capital measures or improvement to existing stock: one SME had been trying to get finance to fund capital measures to improve efficiency, but was finding it very difficult to access bank loans for this purpose; they were ineligible for publicly-funded loans; and they felt that ‘private’ funding had too many conditions attached to be worth considering.
- Time to research and implement resource efficiency measures was also a big issue. This could be partly overcome by business support, but there was a feeling that in many instances the solutions needed to be highly bespoke to suit the business’ needs and that a generic SME consultant would not be able to assist with this. One example of this was the Fitness firm:

“the biggest challenge was trying to set it up in an efficient way... there wasn’t enough resources out there. I spent weeks trying to find out about different things - the main thing was the boiler, people said you need to share enough water for six showers. But then I managed to find a combi boiler that can give out 46 litres per minute. But who would know that unless they were in my position with this business’s specific needs? It’s not something I’d expect a general consultant to be able to tell me about”.

- The difficulty of finding people with the expertise to maintain and repair ‘eco’ infrastructure. For instance one SME had installed grey water recycling and a heat exchange system. After fruitlessly trying to find someone within the LLEP area to carry out repairs and maintenance they had resorted to dealing directly with the manufacturer and attempting to carry out maintenance themselves.
- The importance of landlords as barriers to action. Many SMEs do not own their premises, and this can be a major barrier to action. **This is an important issue, and requires further research (it is not well covered by existing literature)**, but broadly speaking this caused problems for three intersecting reasons:
 1. landlords might be unwilling to invest their own money in improving the energy efficiency of premises
 2. landlords might be unwilling to allow tenants to make changes to the premises
 3. tenants might be unwilling to invest their own money in premises that they do not own, and therefore will not be an asset of the business
- Those operating in markets outside the UK discussed a lack of level playing field on both regulation and voluntary standards. For instance, standards on labelling products as organic differed between the UK and Spain, where there was a more *laissez faire* attitude.

Support preferences

SMEs discussed the following in relation to different types of support:

- In line with the survey and the points above, 'money up-front' was seen as the most important support that LLEP or another provider could offer. There was a clear preference for grants, but loans were not entirely discounted. There was a feeling that loans would work where SMEs were already strongly motivated to act on resource efficiency but otherwise they may lack demand. One SME pointed to the Green Deal as a product that had failed because of a lack of motivation for households to act (which also raised the point of ensuring interest rates that were lower than available through other means).
- Feelings were mixed about one-to-one advice. One SME said they tended to turn down any in-person advice or help because they do not have time during operating hours: *"we'll just look on the internet at night"* (Tree surgeon).
- Respondents were interested in online support, but rightly pointed out that there is already a wide range of materials available through the internet: any additional support would only really be useful in signposting to existing material.

On the provider of support, SMEs came up with a range of ideas:

- A number of SMEs highlighted Business Link as the ideal host of resource efficiency advice, as a 'one stop shop' for SME advice. The obvious point being, Business Link no longer operates. However, the wider point here is that any resource efficiency support should be part of a broader offer to businesses, ideally accessed through a central hub/provider
- The majority of respondents saw local authorities as the natural host for support provision – as a trusted organisation - but those that did not were quite vocal in their opposition, seeing local authorities as bureaucratic and unlikely to understand the needs of businesses. For these respondents, the Chamber of Commerce was cited as a potential provider, or possibly a private consultancy. As noted in the summary report, this highlights the need for the service to be endorsed by a range of stakeholders in order to reduce any potential concerns businesses might have about individual organisations.

Recommendations

Drawing from the research, we have developed a set of recommendations for growing the LCEGS sector in the LLEP area, and for developing a support service for SMEs on resource efficiency.

4.1. LCEGS sector action plan

Our research points towards prioritising the following actions, working towards the development of a proactive policy environment on the Low Carbon and Environmental Goods and Services (LCEGS) sector in the LLEP area:

1. **Further stimulate the growth of the Building Technologies, Alternative Fuels and Wind sectors**, for instance through supply chain development, understanding the capacity of Loughborough to accommodate more growth (and providing stimulus to increase this capacity); inward investment around Enterprise Zones and the possible development of mini sector action plans.
2. **Focus EU-SIF investment on initiatives that seek to promote** the commercialisation and innovation of low carbon technologies and encourage R&D and low carbon demonstration projects with universities and others.
3. Use **public sector procurement and LLEP and partners' investment** to stimulate markets for new or experimental approaches. One example of this is the work between De Montfort University and Leicester City Council to develop online real-time energy monitoring tools for buildings. This can also be achieved through capital investment, for instance in renewable energy and retrofit for social housing.
4. **Raise the LCEGS sector profile and its capabilities** to investors, companies and stakeholders through appropriate marketing (the research found a desire to understand more about the area's strengths). This includes expanding/encouraging **existing activities and projects** with a good track record in the area for instance around business energy efficiency.
5. **Encourage a smarter fit between low carbon activities and the LLEP's priority sectors**, and nurture links between LLEP and low carbon businesses through **convening a low carbon economy sub-group**, with two key purposes: development of a growth strategy for the sector; and engagement with and between business operating in the LCEGS sector.
6. Ensuring a **comprehensive, tailored businesses support** offer is available within the proposed Business Growth Hub and consider how low carbon and STEM skills will be developed (through EU funds, for instance).
7. Carry out further work to **establish a deeper understanding of LCEGS sector business needs, the skills and capabilities of the existing labour force and the capacity of local training providers to address any gaps.**

4.2. SME action plan

We make the following recommendations for any future work by LLEP and partners towards developing SME support on resource efficiency:

1. **Ensure that SME support is developed with an explicit objective to generate demand for the products and services of local LCEGS businesses**
2. **Develop a partnership approach to any business support programme.** This might sound like a fairly anodyne statement but the research showed that, although local authorities are the most popular option for advice on carbon reduction, there is no source that is popular among the majority of SMEs. As a result a partnership approach between a range of agencies will be necessary. Business champions will play an important role within this.
3. When developing any business support tools, **cost/savings should be the principle focus, but marketing should also reference a wider set of values** (environmental concerns, branding, customer desires). Also consider linking relevant aspects of the low carbon agenda to a localist approach given the importance placed by SMEs on local sourcing.
4. **Link any new resource efficiency support programme to mainstream business support**, including embedding some elements of non-specialist resource efficiency advice and support within mainstream services, for instance through the nascent Business Growth Hub (a number of SME respondents mourned the loss of Business Link as a 'one stop shop' for advice and support).
5. **Support should be specifically tailored for three distinct groups:**
 - those that have not engaged with resource efficiency
 - those that have made some small improvements and need support to take the 'next step'
 - those that have begun to make systemic change and need support to achieve this
6. **Business support should also be tailored to sector and size to reflect their distinctive requirements.** SMEs are interested in a range of potential services, and 'hands-off' advice such as online tools or provision of information and evidence on resource efficiency are important ways of engaging with businesses.
7. **Develop tools that assist SMEs to take the leap beyond small scale behavioural change:** the big challenge for SME support in this area is to move from low-level action to more systemic change within businesses. This will also result in higher resultant impact activity. Face-to-face support is a central part of this.
8. **On-going support is required, beyond the initial intervention.** The research highlighted two important challenges in this regard: turning advice into action; and ensuring that action is continued over time to ensure that the full benefits are realised.

Annex 1: List of LCEGS Level 3 Sub-sectors

Level 2

Air Pollution
 Air Pollution
 Air Pollution
 Air Pollution
 Air Pollution
 Air Pollution
 Contaminated Land Reclamation & Remediation
 Contaminated Land Reclamation & Remediation
 Environmental Consultancy and Related Services
 Environmental Consultancy and Related Services
 Environmental Consultancy and Related Services
 Environmental Consultancy and Related Services
 Environmental Monitoring, Instrumentation and Analysis
 Environmental Monitoring, Instrumentation and Analysis
 Environmental Monitoring, Instrumentation and Analysis
 Marine Pollution Control
 Marine Pollution Control
 Marine Pollution Control
 Noise & Vibration Control
 Noise & Vibration Control
 Noise & Vibration Control
 Recovery and Recycling
 Recovery and Recycling
 Recovery and Recycling
 Recovery and Recycling
 Recovery and Recycling
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 Recovery and Recycling
 Recovery and Recycling
 Recovery and Recycling
 Recovery and Recycling
 Waste Management
 Waste Management
 Waste Management
 Waste Management
 Water Supply and Waste Water Treatment
 Water Supply and Waste Water Treatment
 Water Supply and Waste Water Treatment
 Water Supply and Waste Water Treatment

Level 3

Dust & Particulate Control
 Indoor Air Quality
 Industrial Ambient (Workplace) Air Control
 Industrial Emission Control
 Industrial/Mobile Source Emission Control
 Process Engineering Air Pollution
 Decommissioning of Nuclear Sites
 Remediation & Land Reclamation
 Management Services in the Environmental Sector
 Manpower and Executive Recruitment
 Specialist Consultancy to the Environmental Sector
 Training & Education
 Environmental Analysis
 Environmental Monitoring
 Instrumentation Equipment & Software
 Marine Pollution Abatement
 Marine Pollution Specialist Consulting & Training
 Technologies, Research & Development
 Noise & Vibration Consultancy, Training & Education Services
 Noise Abatement
 Technologies, Research & Development
 Automobile Recycling
 Coal Combustion Products Stock Processing
 Composting Feed Stock Processing
 Construction and Demolition Debris Stock Processing
 Consultancy, Training and Education
 Electronics & Related Stock Processing
 Engineering & Equipment
 Glass Stock Processing
 Household Electrical Goods Stock Processing
 Metals Recycling Stock Processing
 Oil Stock Processing
 Paper Feed Stock Processing
 Plastics Stock Processing
 Rubber Products Stock Processing
 Technologies, Research & Development
 Textiles Feed Stock Processing
 Waste Collection
 Wood Stock Processing
 Construction & Operation of Waste Treatment Facilities
 Consultancy, Training and Education
 Equipment For Waste Treatment
 Technologies, Research & Development
 Consulting, Education & Training
 Engineering
 Technology, Research & Development
 Water Treatment and Distribution

Additional Energy Sources	Compressed Air in Cylinders and in Caverns
Additional Energy Sources	Energy Storage Research
Additional Energy Sources	Flywheel Energy Storage
Additional Energy Sources	Fuel Cells
Additional Energy Sources	Hydraulic Accumulator
Additional Energy Sources	Hydrogen Produced by Electrolysis
Additional Energy Sources	Molten Salt
Additional Energy Sources	Superconducting Magnetic Energy Storages
Additional Energy Sources	Thermal Mass
Alternative Fuel Vehicle	Alternative Fuels (main Stream) for Vehicles Only
Alternative Fuel Vehicle	Other Fuels and Vehicles
Alternative Fuels	Batteries
Alternative Fuels	Bio Fuels Alternative for Vehicles Only
Alternative Fuels	Main Stream Bio Fuels
Alternative Fuels	Other Bio Fuels
Alternative Fuels	Other Fuels
Building Technologies	Doors
Building Technologies	Insulation and Heat Retention Materials
Building Technologies	Monitoring and Control Systems
Building Technologies	Windows
Carbon Capture & Storage	Consultancy
Carbon Capture & Storage	Engineering
Carbon Capture & Storage	Geological Storage
Carbon Capture & Storage	Mineral Storage
Carbon Capture & Storage	Ocean Storage
Carbon Capture & Storage	OxyFuel Combustion
Carbon Capture & Storage	Pipeline
Carbon Capture & Storage	Post-Combustion Capture
Carbon Capture & Storage	Pre-combustion Capture
Carbon Capture & Storage	Project Management
Carbon Capture & Storage	Ship
Carbon Finance	Carbon Credits Finance & Fund Management
Carbon Finance	Carbon Credits Journals and Press Periodicals
Carbon Finance	Carbon Credits Trading
Carbon Finance	Carbon Market Intelligence & Forecasting
Carbon Finance	Projects and Verification
Energy Management	Consulting, Education & Training
Energy Management	Energy Saving Electrical Equipment
Energy Management	Energy Saving Heating & Ventilation Equipment
Energy Management	Energy Saving Lighting Equipment
Energy Management	Gas Supply
Energy Management	Technologies, Research & Development
Nuclear Power	Commissioning Engineering Services
Nuclear Power	Construction of Plant & Equipment
Nuclear Power	Manufacture of Cooling Equipment for the Nuclear Power Industry
Nuclear Power	Nuclear Power Plant Operations
Nuclear Power	Nuclear Safety Engineering Services
Nuclear Power	Nuclear Science Services
Nuclear Power	Sampling & Testing Services
Biomass	Biomass Energy Systems
Biomass	Biomass Furnace Systems
Biomass	Boilers and related Systems
Biomass	Education and Technical Consulting
Biomass	Manufacturing Of Boilers and Related Systems
Geothermal	Component Design & Research
Geothermal	Consulting & Related Services
Geothermal	Manufacture and Supply of Specialist Equipment
Geothermal	Suppliers of Systems
Geothermal	Whole Systems Manufacture
Hydro	Dams & Structures
Hydro	Electricity Supply

Hydro
Hydro
Photovoltaic
Photovoltaic
Photovoltaic
Photovoltaic
Photovoltaic
Renewable Energy General Consultancy
Renewable Energy General Consultancy
Wave & Tidal
Wave & Tidal
Wave & Tidal
Wave & Tidal
Wave & Tidal
Wave & Tidal
Wind
Wind
Wind

Pumping & Lubrication
Turbines
Chemicals
Other Related Equipment and Chemicals
Photovoltaic Cells
Research & Development
Systems & Equipment
Consultancy Services
Legal Services
Assessment and Measurement
Ebb & Flood
Other General Services
Pumps & Equipment
Turbine and Generation
Two Basin Schemes
Large Wind Turbine
Small Wind Turbine
Wind Farm Systems

Annex 2: List of acronyms



4M	Measurement, Modelling, Mapping and Management research partnership
BIS	Department for Business Innovation and Skills
CREST	Centre for Renewable Energy Systems Technology, Loughborough University
ERDF	European Regional Development Fund
EU-SIF	European Union Strategic Investment Fund
ETI	Energy Technology Institute, Loughborough University
GVA	Gross Value Added
IESD	Institute of Energy and Sustainable Development, De Montfort University
LCEGS	Low Carbon and Environmental Goods Sector
R&D	Research and Development
SIC	Standard Industrial Classification code
SME	Small and Medium Enterprise
STEM	Science, Technology, Engineering and Maths

Sheffield Hallam University

Low carbon Leicester and Leicestershire research study

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