



Environmental Technology,
Low Carbon, and
Environmental Goods and
Services
Sector Report: Final

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EXECUTIVE SUMMARY

BUSINESSES, EMPLOYMENT, AND PRODUCTIVITY

1. Estimates by BIS suggest that there were 1,300 businesses, employing 23,900 people, and generating £3 billion in turnover in the Coast to Capital region in 2011/12 in the Low Carbon and Environmental goods and services (LCEGS). By these estimates businesses make up 1.8% of the regional total and employees make up 3.1% of total employees in the region. Sales are the 10th highest out of 39 LEPs and has had 4.7% growth from 2010/2011, whilst it is the 10th highest LEP by businesses and 9th highest LEP by employees.
2. As the 6th biggest LEP economy the lower rankings of employment, businesses and sales in the sector is disappointing, however numbers do not tell the whole story and there are a number of strengths the region possesses. The existing networks, business support organisations, and the expertise they provide will deliver a cutting edge to local LCEGS businesses and communities that engage with them. The universities in the region offer additional expertise through their research capabilities in areas such as automotive and fuel efficiency, alternative fuels, water efficiency and management, and environmental regulation. Furthermore, the political and social strengths in the region should not be overlooked, in Brighton and Hove and Lewes in particular the Green party's electoral success suggests an area keen to support the low carbon agenda.
3. The natural capital within the Coast to Capital region is a key resource, there is a lot of sunshine to make use of solar photovoltaics, the coast provides opportunities for growth in wind and tidal energy, the large wooded areas have potential as a local fuel or building materials source, and the strong agricultural sector will play a key part in the circular economy. There are a number of high quality and innovative businesses in the region exploiting these advantages and bringing new technologies to market. The energy efficiency market is also seen as a key market for businesses in the region as it is not restricted to any one sector and there is growing demand for retrofit and built in energy efficiency of commercial and domestic buildings.

SECTOR DRIVERS AND BARRIERS TO GROWTH

4. The sector is expected to grow in the future as the move towards a low carbon economy continues, however there are a number of opportunities and challenges for the sector to deal with that will determine the level of growth that occurs.
5. The national government is seen as the main driver and constraint to growth in the LCEGS sector both nationally and locally. Support, subsidies, and policies such as feed in tariffs, contracts for difference, the capacity market, and the green investment bank are all examples of the government stimulating demand in the market, the issue however, is that sudden changes to funding and policies make it difficult for businesses in the sector to plan their operations, hire, train, and retain staff, and make investments. Long term, stable, well planned policy and funding is a key foundation for growing the sector, however the scope for action

is limited locally as many of the key policy levers for supporting the sector are held nationally.

6. A lack of investment and finance is the second most mentioned barrier to growth in the sector locally, despite half of investment (£7.4bn) in energy in 2013 going towards renewables and significant investment funding available from the green investment bank. One of the reasons for this is the government's recent changes to policy, reducing investor's confidence in the sector. A lack of lead investors in the sector with the right mix of management and technical experience also hamper investor confidence. These finance issues span the whole business cycle and different business needs, from high start-up costs, to funding for innovative products. Some of the finance issues also stem from an inability to raise finance internally, suggesting a lack of internal management skills required to manage finances internally, but also to raise external finance.
7. The lack of business management skills has a negative effect on such operations as finding investment, creating high quality business proposals, finding alternative markets for products and services, effective collaboration between businesses that are working on low carbon solutions and new ways of working, creating and implementing new business models, and implementing robust and ambitious sustainability plans. Although there are high quality business support organisations locally there may be gaps that are not being met that local government can help fill as there is some suggestion local business support is lacking cohesion.
8. In the future an increasingly distributed energy generation system will open up opportunities for smaller investments in local energy production, particularly in renewables such as solar farms. The move away from carbon intensive energy production will change the energy mix, more renewables, use of natural gas, and nuclear power, which will also create new investment and employment opportunities. Renewables are expected to make up a significant part of this mix, in 2012 expectations were that by 2015 there would be 1.5GW installed capacity, by 2015 there was actually 8GW installed and future renewable energy generation is expected to grow by at least 380% from 2010 to 2030.
9. Growing acceptance of climate change and the need to move towards a low carbon economy coupled with the desire to reduce energy costs is increasing demand for renewable energy and energy efficiency products such as smart thermometers and smart metering. Although societal pressure is growing for a shift to a lower carbon economy those driving it are still in the minority and a number of hurdles need to be overcome. In particular the lack of personal responsibility towards reducing carbon foot prints, waste, and energy efficiency represents a significant problem that will require greater leadership from government, institutions, and communities to overcome.

LABOUR MARKET CHARACTERISTICS

10. Not much is known about the estimated 23,900 people employed in the LCEGS sector in the Coast to Capital region. The employment profile is likely to be similar

to the wider energy sector and the Advanced Manufacturing and Engineering (AME) sector. These sectors have predominantly male employees who are older than the wider workforce as a whole, although they do have higher levels of education. In both the energy and manufacturing sectors employment is declining, however within manufacturing there is a shift towards growth in AME employment and there is a similar trend in energy as renewable employment grows whilst oil, coal, and gas employment declines. The shift into AME and renewable jobs is also increasing demand for higher level qualifications, in the AME sector demand for those with degree level qualifications is expected to rise 7% by 2022 as demand for those with less than degree level qualifications falls by 25%.

11. There are a number of skills issues that may constrain growth in the LCEGS sector, although skills issues are less prominent than other factors, such as government policy or access to finance, and many of the skills issues are not sector specific. However, there are some skills shortages, particularly in energy efficiency literacy, STEM skills, and strategic management skills, which creates difficulties in finding the required skills in developing new business models in the sector, and in soft skills such as interpersonal and communication skills. In addressing these issues some businesses have found a lack of sector specific courses to create a supply of new entrants and to re-train or up-skill current workers, particularly electrical engineering courses. There are also issues beyond the LCEGS sector, where there are gaps in knowledge in other sectors around energy use and efficiency and the payback of various energy saving initiatives.
12. Due to the relatively young nature of the sector many of the future skills demands are the same as the current skills demands, environmental engineering skills, leadership and management skills, IT and data analysis skills, efficiency skills, and change management skills will continue to be required. The key issue for future skills demand is the supply of skills from education, along with the sector specific training courses, and improved succession planning. An older workforce and a low number of new entrants has led to a potential gap in skills opening up within the sector. Some employers are moving to counter this, improving internal training and mentoring schemes to facilitate knowledge transfer between older and younger workers, however an increasingly mobile workforce makes this a challenge. The increased mobility is driven by self-employment of experienced workers whose skills allow them to demand a wage premium, however this pushes the initiative for training onto the individual and makes it harder for companies to retain and transfer skills and knowledge within the workforce.

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INTRODUCTION

13. Electricity is the life blood of the economy, running through almost every facet of modern life, and a major economic contributor in its own right. However, the damage caused by its production has long been an issue for society, from air pollution from burning fossil fuels, to pollution of land and sea from oil, coal, and gas extraction, environmental damage caused by oil spills and other industrial accidents, and the cumulative adverse effect using fossil fuels has on the climate.
14. Increasingly attention has been turned to the issue of how to shift away from generating electricity from fossil fuels and towards renewable sources of energy and energy efficiency, one of the key questions to be answered is how to decouple economic growth from energy consumption. The tide is beginning to turn, just recently Portugal met all of its energy needs from renewables for four days¹, the UK had a historic week where coal fired generation fell to 0% several times², overtaken by renewable sources, and Denmark's wind farms generated 140% of its electricity demand³, selling the excess to Germany, Sweden, and Norway. 2015 was a record year for renewable energy, globally 147 Gigawatts of renewable electricity came online in 2015, the largest annual increase ever, clean energy investment increased to £198bn, and more than twice as much money was spent on renewables than on coal and gas-fired power generation⁴.
15. There is a global race to innovate the next leap in technology in renewable energy and the winner will benefit from increased economic output, energy security, and high value jobs. The Coast to Capital region can be at the forefront of this, there are a number of highly innovative companies working towards a low carbon future, there is an abundance of natural capital that can be harnessed for renewable energy, and the existing support networks. However there are hurdles to overcome, constant changes to government policy and cuts to subsidies have destabilised the market, denting business confidence in the sector, a lack of available finance hampering investments, and a poor mix of sector specific skills, experience, and strategic leadership and management skills required to take businesses in the sector forwards.
16. Despite these issues, the opportunities and benefits arising from a low carbon economy far outweigh the difficulties. The sector is diverse and cross cutting, expanding beyond those directly operating in the sector, opening up opportunities for other industries to reduce energy consumption, increase efficiency, and create new jobs.

¹ Portugal runs for four days straight on renewable energy alone – The Guardian:

<http://www.theguardian.com/environment/2016/may/18/portugal-runs-for-four-days-straight-on-renewable-energy-alone>

² UK energy from coal hits zero for first time in over 100 years – The Guardian:

<http://www.theguardian.com/environment/2016/may/13/uk-energy-from-coal-hits-zero-for-first-time-in-over-100-years>

³ Wind power generates 140% of Denmark's electricity demand – The Guardian:

<http://www.theguardian.com/environment/2015/jul/10/denmark-wind-windfarm-power-exceed-electricity-demand>

⁴ Renewable energy smashes global records in 2015, report shows – The Guardian:

<http://www.theguardian.com/environment/2016/jun/01/renewable-energy-smashes-global-records-in-2015-report-shows>

The sector has been defined using 24 sub sectors (Level 2 markets). These are sub-divided into three broad categories - Environmental, Renewable Energy and Low Carbon - the addition of each broadly mapping the evolution of the current LCEGS sector definition from its Environmental roots:

Environmental	Renewable Energy	Low Carbon
<ul style="list-style-type: none"> • Air Pollution • Contaminated Land • Environmental Consultancy • Environmental Monitoring • Marine Pollution Control • Noise & Vibration Control • Recovery and Recycling • Waste Management • Water Supply and Waste Water Treatment 	<ul style="list-style-type: none"> • Biomass • Geothermal • Hydro • Photovoltaic • Wave & Tidal • Wind • Renewable Consulting 	<ul style="list-style-type: none"> • Additional Energy Sources • Alternative Fuel/ Vehicle • Alternative Fuels • Building Technologies • Energy Management • Carbon Capture & Storage • Carbon Finance • Nuclear Power

COAST TO CAPITAL BACKGROUND

17. The Coast to Capital Local Enterprise Partnership (LEP) spans the UK’s two most successful and important economic regions; it extends from South London to the coast, from Chichester in the west along to the city of Brighton and Hove and on to Lewes in the east. The LEP comprises the whole of West Sussex, the London Borough of Croydon, the City of Brighton and Hove, East Surrey, and the Local Authority district of Lewes which is part of East Sussex. It has a resident population of nearly two million and an estimated 120,000 businesses. The Coast to Capital LEP has always had one clear aim; to foster exceptional growth and productivity gains in the local economy.
18. This report is part of a suite of papers looking into the priority sectors within the Coast to Capital region; the others being Financial and Business Services, Health and Life Sciences, Creative, Digital and IT, and Advanced Manufacturing and Engineering. They will make up part of the evidence base when looking at sector specific strengths, advantages, issues, and needs in the Coast to Capital region, providing a reference point for partners, potential bids for funding by local organisations, or foreign direct investment inquiries.

Coast to Capital Area Local Partnerships

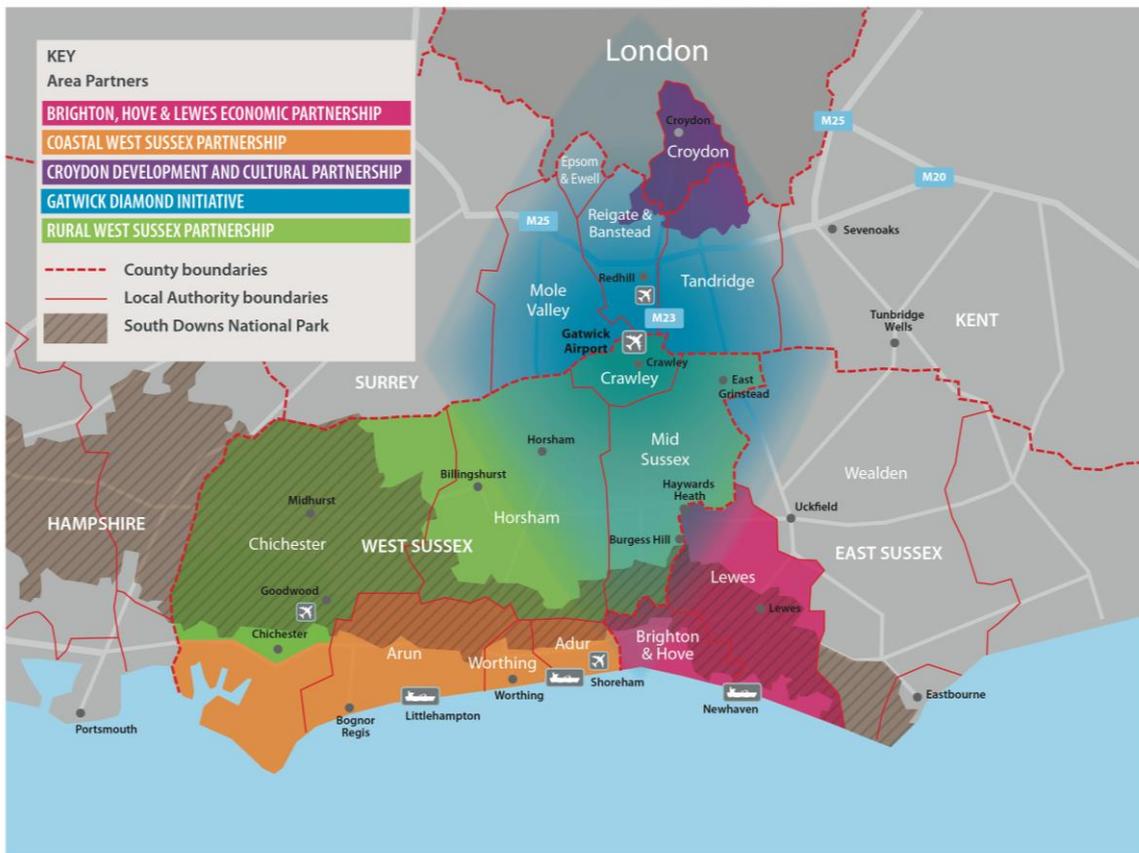


Figure 1 – Coast to Capital Region

19. The paper makes reference to the local Area Partnerships and Local Authorities, which are set out in figure 1. It should be noted that some of these Area Partnerships overlap in places such as Chichester and Arun which are in both the Rural and Coastal West Sussex partnerships. The Gatwick Diamond comprises of Epsom and Ewell, Mole Valley, Reigate and Banstead, Tandridge, Crawley, Horsham, and Mid Sussex; the last two are also in the Rural West Sussex Partnership.

BUSINESSES, EMPLOYMENT, AND PRODUCTIVITY

20. There is little data available for this sector, particularly at sub-regional geographies such as Local Enterprise Partnerships or Local Authority areas. Where there is data it is not available in the same format and detail as is available for other sectors. The main issue is that there are no official SIC codes⁵ set out for the sector. The research by BIS, from which data for the Coast to Capital region has been taken, has collected the data using “market intelligence and involves the creation, qualification and examination of new data values using techniques that include data mining, data triangulation, deduction, induction, pattern recognition and trend analysis”.

THE COAST TO CAPITAL LOW CARBON AND ENVIRONMENTAL GOOD AND SERVICES ECONOMY

21. The research by BIS⁶ estimates that in 2011/2012 there were 1,300 companies, 23,900 employees, and £3.06 billion worth of sales in the Low Carbon and Environmental Good and Services (LCEGS) sector in the Coast to Capital region. By these estimates businesses make up 1.8% of the regional total and employees make up 3.1% of total employees in the region. Sales are the 10th highest out of 39 LEPS and has had 4.7% growth from 2010/2011, whilst it is the 10th highest LEP by businesses and 9th highest LEP by employees.
22. The location quotient (LQ)⁷ for jobs in the sector is 0.9 and the LQ for businesses in the sector is 0.7, suggesting no particular strengths currently in the Coast to Capital region. However, this is based on estimated data and only for one year. This can be seen when comparing 2011/12 data against other LEPS.
23. The Green Growth Platform at the University of Brighton commissioned kMatrix to study the LCEGS industry in Sussex⁸. They estimated that the sector supported 1,550 businesses, 21,000 employees, and £2.7 billion in sales in 2013/14. The breakdown of sales between sub-sectors was 52% for Low Carbon, 30% for Renewable Energy, and 18% for Environmental Industries. Each sector is expected to grow between 2013/14 and 2018/19, albeit at different rates; the Renewable Energy sector is predicted to grow between 7.2% and 8.2%, the Low Carbon sector is to grow between 5.2% and 6.1%, and the Environmental Industries by 2.9% to 3.8%.
24. In figure 2 the LCEGS sectors in each LEP are mapped by size and growth (excluding London), as can be seen the Coast to Capital region is in the middle

SeaRoc

Profile: SeaRoc, who have their head office in Chichester, specialises in offshore renewable energy projects. They offer marine and engineering services for offshore projects, consultancy advice, and their own planning and data analysis products.

⁵ Standard Industrial Classification Codes

⁶ The Department for Business, Innovation & Skills - Low Carbon Environmental Goods and Services Report for 2011/12

⁷ More information on Location Quotients is available in the Annex

⁸ Including East Sussex, of which only Lewes is in the Coast to Capital region

cluster of LEPs, although this is higher than a majority of LEPs. Compared to other LEPs it has similar employment and sales size and slightly lower than average growth.

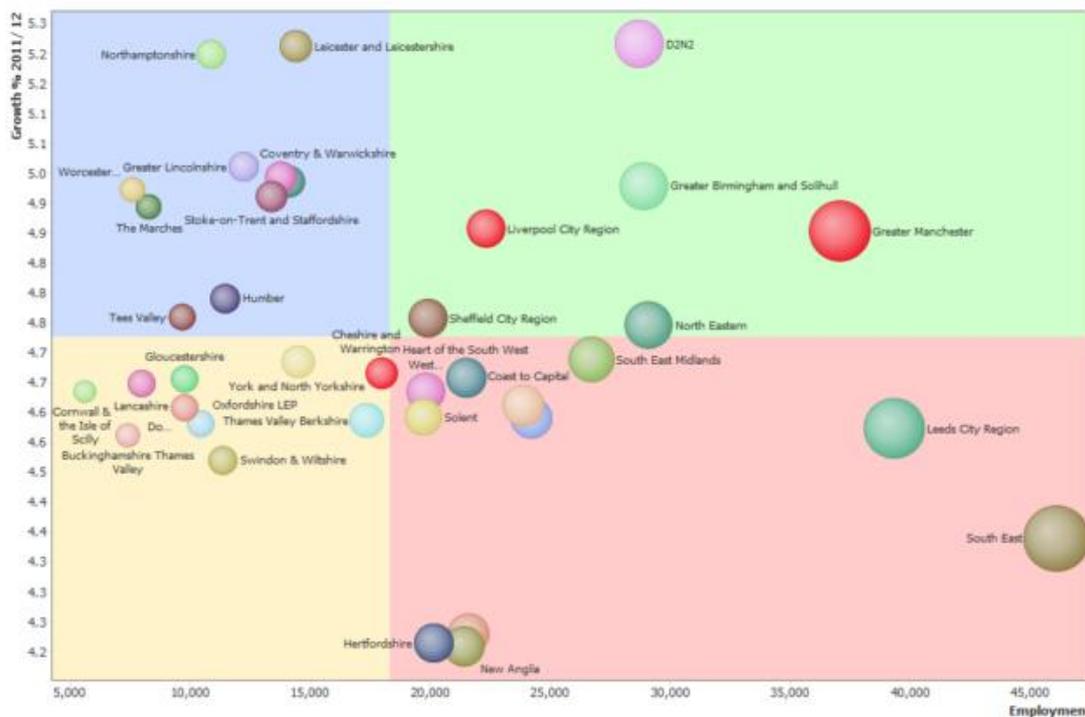


Figure 2 – LEPs (excluding London) Compare by Growth, Employment and Sales: The Department for Business, Innovation & Skills - Low Carbon Environmental Goods and Services Report for 2011/12

LOCAL STRENGTHS AND OPPORTUNITIES

- 25. As the 6th biggest LEP economy the lower rankings of employment, businesses and sales in the sector is disappointing, however numbers do not tell the whole story and there are a number of strengths the region possesses.
- 26. One of the key areas of strength in the region’s natural capital, Sussex and Surrey make up some of the most wooded areas in the country, potentially providing renewable resources for fuel and materials in construction, if properly managed. Along the coastal strip there is a strong agricultural sector that could provide biofuels or contribute to a circular economy, local food sold to local people and businesses, particularly linked to the hospitality sector. The south in general is relatively sunnier than other parts of the UK, making it an attractive place for solar photovoltaics, and there is opportunity for developing further offshore wind farms and tidal energy along the coast.
- 27. The existing networks that have built up around the sector locally are also an asset, the Green Growth Platform offer expertise to businesses in the sector who wish to grow, innovate, undertake R&D,

CTEC Energy

Profile: Based in Lewes CTEC is a clean tech company which designs and builds Heat Recovery systems that generate electrical power from wasted engine exhaust gas, with applications in landfill gas, anaerobic digestion, biomass operations, and furnace exhausts.

train staff, or find financing, and helps other businesses who wish to lower their carbon footprint as well as providing networking opportunities. The Sustainable Business Partnership offers support to organisations to help them reduce costs and environmental impact through improving resource efficiency, as well as those in the environmental and low carbon sectors to help them develop their businesses and create a local, low-carbon economy and also providing local networking opportunities. There are also community energy groups such as Community Energy South, Brighton & Hove Energy Services Co-Op, and Ouse Valley Energy Services Company that provide support for local communities to control their energy supply and reducing emissions by promoting the use of renewables.

28. The political and social strengths the region has should not be overlooked, particularly in Brighton and Hove where the UK's first, and currently only, Green party MP has been elected, and led the Council for four years. In Lewes the mayor and deputy mayor are both Green party members, and the Green party is the largest in the council. This suggests there is significant support for the Low Carbon agenda, at least in these places, which will provide local opportunity and support for the sector.

Veolia

Profile: *Veolia are a waste, water, and energy management company. Their strategy is focused on manufacturing green products and energy, helping customers and suppliers reduce their carbon impact by investing more than £1 billion on new infrastructure between 2012 and 2018. This includes an energy recovery facility in Newhaven which processes half the household waste of the South Downs area, converting non-recyclable materials into electricity.*

29. A survey undertaken by Coast to Capital looking into the local LCEGS sector found that respondents felt there are strengths around specific technologies and innovation, in particular renewables, LED lighting, and recycling technologies. When asked what opportunities for growth there were in the region renewable energy and technologies was the main answer. Most mentioned was solar photovoltaics, with some support for community ownership of solar energy, offshore wind farms, waste and biomass energy, and tidal energy. This can be seen in some of the leading edge companies and projects in the region, such as Firefly Solar, the Rampion Wind Farm, the Newhaven Energy Recovery Facility, and Saunders Energy.
30. The next biggest opportunity for growth identified by respondents was energy efficiency, in particular in both domestic and commercial buildings. This will come through new building and construction practices and techniques but also through retrofit of energy efficiency technologies in pre-existing buildings. This will provide opportunities for building and construction companies and the companies that supply them, but also dedicated energy efficiency companies such as BlackBox Energy and environmental consultancies that will work with businesses outside of the low carbon sector who wish to reduce their carbon footprint and save on energy costs. Energy efficiency is not just limited to buildings however, electrical goods, manufacturing processes, and engines will also drive energy efficiencies in

their own way. Engine efficiency is one area where the Coast to Capital region has an advantage, as the University of Brighton and Ricardo collaborate on research into this issue.

31. Another area of potential growth noted was the emergence of new business models such as the 'sharing economy' and the 'circular economy'. The circular economy attracted a number of comments as a way of reducing the carbon emissions of the local economy, more specifically the advantage of local agricultural production for food and bio fuels, new materials being made from waste, and energy recovery from waste products are mentioned as key areas of opportunity. However, to unlock the circular economy there will need to be a shift in how businesses operate, increasing skills in circular design and production, new business models, skills in building cascades and reverse cycles, and cross-cycle/cross-sector collaboration⁹. The cross sector/cycle collaboration will be key in moving towards a circular economy, better integration across businesses and sectors will be required to effectively match the waste outputs of one industry with the inputs of another industry.

Firefly

Profile: *Firefly are a company based in Lewes that produces hybrid generators that run on both non-renewable and renewable energy sources, portable battery power packs, and solar panels. The hybrid generators can be hired or bought to provide low carbon energy to construction and development projects and large events and festivals.*

LOCAL RESEARCH SPECIALISATIONS

32. In an attempt to identify the local specialisations of this nascent sector the research centres and research groups of the local universities¹⁰ were mapped to the LCEGS sector. This exercise suggested research focus in four areas linked to the LCEGS sector, automotive and fuel efficiency, alternative fuels, water efficiency and management, and environmental regulation.
33. In automotive and fuel efficiency the University of Brighton has the Advanced Engineering Centre and Sir Harry Ricardo Laboratories that focus on engine efficiency, emission reduction, heat recovery and energy, and the advanced propulsion centre is a spoke of the ICE¹¹ thermal efficiency programme. The University of Sussex has a dynamics, control and vehicle research group that has a focus on CO2 reduction in vehicles. The University of Surrey has an Automotive Engineering centre that has research strands in electric and hybrid vehicles and vehicle aerodynamics.
34. In alternative fuels the University of Brighton's advanced engineering centre has a focus on this subject. The University of Sussex has the Sussex Energy Group where a part of their work is around sustainability and innovation in biofuels and their Energy and Materials Chemistry department works in clean energy. The

⁹ Towards the Circular Economy: an economic and business rationale for an accelerated transition. Ellen MacArthur Foundation. 2012

¹⁰ Including the University of Surrey

¹¹ Internal Combustion Engine

University of Surrey has a Department of Chemical & Process Engineering where part of their work is based on low carbon energy generation and biofuels.

- 35. In water efficiency and management the University of Brighton has the aquatic research centre which focuses on water efficiency and use, water waste, quality and treatment, and nanotechnology and biomaterials used to clean water and remove contaminates. The University of Surrey’s Department of Chemical & Process Engineering has a focus on water processing technologies, including the disposal of waste water.
- 36. In environmental regulation the University of Brighton has the environment & public health group has a focus on air quality management and waste management, including recycling and energy recovery. The University of Sussex has the Sussex Climate Change Network that aims to improve understanding of how climate change is developing, the impacts on people and the implications for policy and action. The University of Surrey has the environmental regulator research group which researches climate change, water resources, environmental and public health, and natural resources.
- 37. Below are the Coast to Capital rankings for Innovate UK Funding per FTE related to the 8 Great Technologies. In areas that may be linked to the LCEGS sector, such as Energy, companies in the Coast to Capital are doing well, however in Electronics and Robotics, Biosciences, and Advanced Materials companies have not accessed as much funding suggesting a lack of innovation and specialism in these areas.

OST Energy

Profile: OST Energy are a technical consultancy specialising in advising upon commercial and technical risk for Solar, Wind, Biomass and Renewable Heat projects, and providing Environmental services. Since their founding in Brighton in 2008 they have opened offices in France, Italy, America, India, and South Africa.

Healthcare	Energy	Digital	Sustainable agri-food	Electronics and Robotics	Biosciences	Advanced Materials	Space Programmes
18 th	10 th	8 th	29 th	29 th	17 th	29 th	23 rd

Table 1

THE NATIONAL LOW CARBON ECONOMY

- 38. In another report by BIS and TBR¹² a more focused approach was used, narrowing the types of businesses to those specifically in Low Carbon activities¹³ on the basis that they will directly contribute to the government’s targets for reducing carbon emissions. This report estimates that there are 11,550 firms, 269,800 employees, £70.8 billion turnover, and £26.2 billion in Gross Value Added (GVA) in the Low Carbon economy. Including those firms in the supply chain this increases to 460,600 employees, £121.7 billion turnover, and £44.9 billion Gross Value Added

¹² The Department for Business, Innovation & Skills, 2015. The Size and Performance of the UK Low Carbon Economy: Report for 2010 to 2013

¹³ These are grouped as: Low Carbon Electricity, Low Carbon Heat, Waste Processing and Energy from Waste and Biomass, Energy Efficiency Products, Low Carbon Services, and Other Low Carbon

in the Low Carbon economy. Including the supply chain, Low Carbon economy employment accounts for 1.6% of the UK's total employment.

- 39. From 2010 to 2013 the average annual growth rate for employment in the sector was 3.8%, in terms of turnover it has risen by 7.6% on average per year, and GVA has risen by 8.7% on average per year.
- 40. In figure 4 the contribution of the sub-sectors to the overall Low Carbon economy is set out across firms, employment, turnover, and GVA. Two sub-sectors stand out as the main contributors to the economy, Low Carbon Electricity and Waste Processing, with Energy Efficiency Products also contributing strongly to the overall sector.

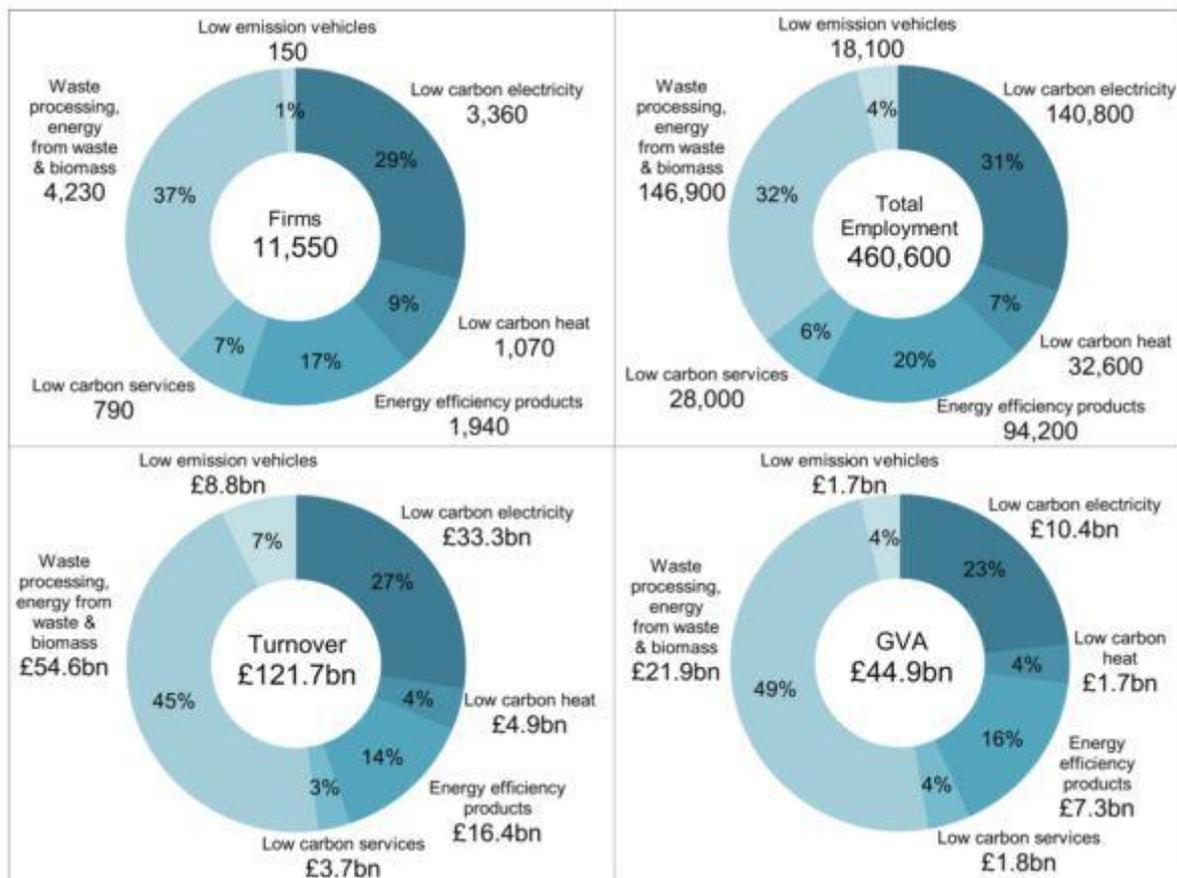


Figure 3 – Total firms, employment, turnover, and GVA in the Low Carbon economy and supply chain – 2013; Source: The Department for Business, Innovation & Skills, 2015. The Size and Performance of the UK Low Carbon Economy: Report for 2010 to 2013

- 41. The Low Carbon economy is experiencing strong growth across employment, turnover, and GVA, as well as in the majority of the sub-sectors. In particular there has been strong growth in the Low Carbon Electricity and the Waste Processing sub-sectors. Growth has not been as strong in the Energy Efficiency Products and Low Carbon Services sub-sectors. Drilling down further finds that growth in the Low Carbon Electricity sub-sector has been driven by Solar Photovoltaics and in the Waste Processing sub-sector Alternative Fuels have driven growth.

Compound Annual Growth Rate 2010-2013	Employment CAGR	Turnover CAGR	GVA CAGR
Low Carbon Electricity	7.8%	6.5%	5.8%
Low Carbon Heat	3.6%	5.4%	3.7%
Energy Efficiency Products	0.6%	0.9%	1.5%
Low Carbon Services	-0.1%	3.1%	0.9%
Waste Processing	3.3%	11.9%	14.7%
Low Emission Vehicles	3.9%	5.3%	8.7%
Total Low Carbon Economy	3.8%	7.6%	8.7%

Table 2 – Compound annual growth rate 2010 to 2013 for Low Carbon Economy: The Department for Business, Innovation & Skills, 2015. The Size and Performance of the UK Low Carbon Economy: Report for 2010 to 2013

42. At the national level the UK imports for the LCEGS sector in 2011/12 were £7 billion, a 2.8% increase from 2010/11. The main countries the UK imports from are China (£474 million) and Hong Kong (£415 million), whilst Spain (£318 million) is the only EU country to be in the top five countries the UK imports from. South Korea (£297 million) and Pakistan (£294 million) round out the top five.
43. Exports of LCEGS amounted to £12.2 billion in 2011/12, a 3.7% increase on the year before, and higher than the level of imports, making the UK a net exporter and suggesting that value added is being captured in the UK supply chain. Exports account for around 9.5% of total sales in the sector. At a sub-sector level highest levels of exports to sales for 2011/12 are Photovoltaic (24%), Air Pollution Control (17%), Noise & Vibration Control (15%), Water/Waste Water Treatment (15%) and Additional Energy Sources, Biomass, Carbon Capture & Storage, Hydro and Renewable Consulting (13%).
44. The main market for exports by a large margin is China, where £812 million worth of goods was sold in 2011/12, followed by Hong Kong (£614 million), Spain (£517 million), South Korea (£503 million), and Taiwan (£433 million), who make up the top five. India and Pakistan are close behind on £426 million and £424 million respectively.
45. Of the top thirteen (by value) countries that the UK exports to, the UK is in the top five suppliers for eleven¹⁴ of those countries. In India and Spain, the UK is the top supplier of LCEGS and the second top suppliers in Poland, UAE, and Romania. In those eleven countries the UK is the leading EU supplier, highlighting the UK's strong position in the LCEGS sector.
46. The London and South East regions make up a large part of the national LCEGS sector, London accounts for 18% (£1.2 billion) of all imports, followed by the

Circuitree

Profile: *Circuitree is a clean energy, capture and storage specialist. It enables users to capture energy using mainly solar panels. The energy is stored in a specialist battery, enabling complete independence from the grid. These systems can be controlled remotely with an internet connection.*

¹⁴ Those countries are: China, Hong Kong, Spain, South Korea, India, Pakistan, Taiwan, UAE, Poland, Romania, and Malaysia

South East which accounts for 15% (£1 billion) of all UK imports. The next closest region is the North West which accounts for 10% (£700 million) of all imports. Exports from London were worth £2.2 billion (18%) in 2011/12 and in the South East they were worth £1.8 billion (15%), proportionally the same as imports. The North West accounted for £1.2 billion (10%) of exports, highlighting the gap between London and the South East and the rest of the country.



Figure 4 – Regional Share of Total Sales by Sub-sector: The Department for Business, Innovations & Skills, 2015. The Size and Performance of the UK Low Carbon Economy: Report for 2010 to 2013

- 47. London and the South East, mostly London, are generally the areas with the largest share of sales across the sub-sectors in the industry. In particular London has a virtual monopoly on the Carbon Finance sub-sector due to its position as a global finance hub. The sub-sectors where the South East has the largest share of sales are Environmental Monitoring, Marine Pollution Control, and Building Technologies. It is worth noting that the South East has almost no presence in the Carbon Capture and Storage sub-sector.

SECTOR DRIVERS AND BARRIERS TO GROWTH

- 48. The sector is expected to grow in the future as the move towards a low carbon economy continues, however there are a number of opportunities and challenges for the sector to deal with that will determine the level of growth that occurs.

GOVERNMENT POLICIES AND REGULATIONS

- 49. There are a number of policies and legislations that will drive change in the sector. The Electricity Market Reform (EMR) policy is aimed at maintaining capacity in electricity generation to meet demand and to support decarbonisation in the Energy industry through support for Feed-in-Tariffs, Contracts for Difference, and the Capacity Market. The Department for Energy and Climate Change has estimated that the EMR will generate £110 billion, creating new jobs and upskilling

the workforce and that £200 billion investment in various projects is planned from 2014 onwards.

- 50. The Energy Savings Opportunity Scheme (ESOS) is legislation from the EU that requires member countries to set up mandatory programmes for energy audits of large organisations to calculate the amount of energy used per employer and identify potential measure to reduce their energy consumption.
- 51. A key initiative that is driving the LCEGS sector is the energy efficiency targets from both the EU and UK governments. UK targets for 2020 include a 20% reduction in greenhouse gas emissions compared to 1990, 20% of energy to be sourced from renewable sources, and a 20% increase in energy efficiency. In the longer term the UK government has set out a target of reducing carbon emissions by 80% of 1990 levels by 2050 and has set out legally binding 'carbon budgets' which set out how much carbon the UK can produce over a five year period.

Feed-in-Tariffs	Contracts for Difference	Capacity Market
<ul style="list-style-type: none"> • Feed-in-Tariffs are designed to boost uptake of low carbon technologies by subsidising adopters based on electricity generation and how much is sold to the national grid • However changes in December 2015 have led to a reduction in tariff values and are planned to decrease until at least 2019 	<ul style="list-style-type: none"> • Contracts for Difference are designed to protect low carbon energy producers from volatile market prices • The contracts set a strike price, a generator is paid the difference between this and the average market price, if the market price is higher than the strike price then the generator has to pay back the difference 	<ul style="list-style-type: none"> • The Capacity Market is a set of auctions to sell future electricity generation contracts at as low a price as possible • The Capacity Market aims to secure capacity in electricity by boosting new investment in generation projects and maintaining and maximising current generation capacity • Winners of contracts will have to be able to deliver energy when needed and will face penalties if they do not

- 52. Whilst these policies and legislations are aimed at helping the Low Carbon Energy sub-sector, and generally do, changes to them (particularly the recent changes to Feed-in-Tariffs and the Green Deal) create uncertainty for the industry. Both locally¹⁵ ¹⁶ and nationally the lack of government support is one of the main barriers to growth identified by businesses, in particular the governments sudden changes to subsidies and the inconsistent approach to policy in the sector. This uncertainty affects business planning and investment, project viability, and training and development planning, which is exacerbated by the fact many technologies in the LCEGS sector are new and present a greater risk to investors. Reduced investment may have a knock on effect for skills, if low investment reduces employment growth and retention there is a possibility skills and knowledge in the sector will be lost, in turn further hampering growth.

¹⁵ Coast to Capital Call for Evidence: Low Carbon & Environmental Goods & Services 2016

¹⁶ Greater Brighton & West Sussex Business Survey 2014

53. More locally there are issues around the lack of business support for the sector and the cohesiveness of that support. Although there are high quality business support organisations in the sector there may be gaps that are not being met that local government can help fill. Issues also mentioned include procurement rules that dissuade SMEs from tendering bids¹⁷, although this is a problem across all sectors, and a lack of requirements in local procurement and planning policies for environmental, resource efficiency, and sustainability measures which would help build the market for the local LCEGS sector where consumer demand alone cannot fully drive growth in the sector¹⁸. Some of these issues stem from the fact that many of the relevant policy levers that would directly affect the sector are held at national level and local governments are limited in what they can provide.

54. The signals sent by international organisations such as the UN and OECD are important drivers of the low carbon agenda. In 2015 countries from around the world met under the United Nations Framework Convention on Climate Change to agree on action to tackle climate change. The resulting agreement aims to stop global temperatures rising by 2 °C above pre-industrial levels, increase the ability to adapt to the impacts of climate change, and make finance flows consistent with the need to lower greenhouse gas emission and climate resilience development. This will be achieved through nationally determined contributions, which means each country will decide how best to meet these aims. The agreement will only be enforced when at least 55 countries that produce 55% of emissions ratify the agreement, however there are no binding enforcement mechanisms. These signals need to be reinforced by concrete actions to continue leading the direction of the low carbon agenda however, or such agreements will be seen as hollow.

Saunders Energy

Profile: Saunders Energy are manufacturers of innovative and cost effective tidal and in-stream turbines. These are designed so that they do not have any effect on marine life, and also to be discrete in the water yet visible to the water users. They are based in Littlehampton and were founded in 2011.

ECONOMIC DRIVERS AND BARRIERS

55. Investment in renewables (£7.4 billion) in 2013 made up half of all investment in the Energy sector and is expected to stay at this level for years to come, particularly into new technologies that increase renewable energy capacity¹⁹. The Offshore Wind sub-sector is expected to see an increase in investment, in part due to the resistance to onshore wind, which is predicted to create around 35,000 jobs by 2023. However much of this is uncertain because of a wide range of factors that can influence or even delay investments and development of the sector.

56. Despite the high level of investment it appears it is still an issues for LCEGS businesses in the Coast to Capital region as it is one of the most mentioned

¹⁷ Ibid

¹⁸ Ibid

¹⁹ UK Commission for Employment and Skills: Skills and Performance Challenges in the Energy Sector – 2015

barriers to growth alongside government policy²⁰. The specific strands of issues span the business life cycle and differing business needs, from high start-up costs, to difficulty obtaining finance for innovative products, finance focused on products rather than on services, a lack of internal funds available for investment, and a lack of sector knowledgeable investors who can lead funding rounds. Some of these issues may stem from a lack of external funding and the sector may be boosted by access to local, sector specific funding, but it may also hint at issues within businesses. The inability to raise finance to start a business or to build new products may arise from a lack of management skills or sector knowledge within the business, in which case access to business mentoring and support may be more effective.

57. Business management is another issue that was identified from the call for evidence as being an issue for the sector. It was suggested there was a lack of management experience in the sector, which has a negative effect on such operations as finding investment, creating high quality business proposals, finding alternative markets for products and services, effective collaboration between businesses that are working on low carbon solutions and new ways of working, creating and implementing new business models, and implementing robust and ambitious sustainability plans²¹. The last of these is identified as a barrier for both businesses and local government. These management issues will need to be dealt with as the landscape of the energy market changes in the UK.
58. The UK's energy system is becoming increasingly distributed, opening up opportunities for electricity generation from a greater number of smaller plants. This will lead to increased investment in interconnection projects aimed at improving transmission and distribution across the national grid. Energy producers that rely on wind, rain, and sun may not always be sure when or how much capacity they can provide so interconnection will need to be improved, as will power storage capabilities, e.g. batteries, that can be used to save excess energy in times of low demand.
59. Nuclear power is unlikely to be a big part of the Coast to Capital region, however the government anticipates it making up almost 50% of the UK's energy mix by 2050, which may increase jobs in the region through the supply chain. This presents opportunities for new jobs and businesses, in addition to upskilling and training for existing roles.
60. Oil prices can have a positive or negative effect on the LCEGS sector, high oil prices can spur interest in renewables as a lower cost alternative. Conversely the

Lightfoot LED

***Profile:** Lightfoot LED are an LED manufacturing company who manufacture a wide array of lighting, ranging from 12V household lights to industrial scale floodlights. They were founded in Hove in 2011, and currently employ 5 people.*

²⁰ Coast to Capital Call for Evidence: Low Carbon & Environmental Goods & Services 2016

²¹ 'Coast to Capital Call for Evidence: Low Carbon & Environmental Goods & Services 2016' & 'The Greater Brighton & West Sussex Business Survey 2014'

current low oil prices reduce the impetus for investment in renewables. It seems unlikely that oil will regain its previous high prices, but it will rise in the medium term, whilst as the same time demand for energy grows and constraints on the supply of fossil fuels increase, in part due to fossil fuels being increasingly hard to reach and thus uneconomical, attention will again turn to renewable sources of power. This links to the need to properly price externalities to reflect their effect on the environment and society, which would increase the price of carbon intensive activities and in turn make the cost of low carbon activities more attractive.

61. The National Grid has produced a report looking into future energy scenarios²² and how they might affect the transition to a low carbon economy. The scenarios are based on a framework of prosperity and green ambition, i.e. how driven society is to decarbonise versus its ability to pay for it. The four broad scenarios the report envisages are set out below. It is worth noting that under the 'Gone Green' scenario electricity demand is higher than in any other scenario due to the reduced reliance on oil and gas for various power needs.



Figure 5 – Future Energy Scenarios – The National Grid 2015

62. Based on this framework Your Energy Sussex mapped these variables across the West Sussex County to identify which scenario was currently taking place at a local level (figure 6). The most frequent scenario currently is 'No progression',

²² The National Grid 2015 - Future Energy Scenarios <http://fes.nationalgrid.com/fes-document/>

particularly along the coast, where there is also a majority of the 'Slow Progression' scenarios, and around Crawly and Burgess Hill²³. This is because many of these places are the most deprived in the county. 'Gone Green' is mostly in rural areas where affluence is relatively high highlighting a split between rural and urban areas. Even more affluent urban areas such as Horsham and Chichester seem less likely to be engaged in the green agenda, allowing consumer power to dominate. If this framework was applied across the rest of the Coast to Capital region there is likely to be similar patterns in urban and rural areas, particularly moving from east Surrey into Corydon, although there may be more cultural weight applied to Brighton and Hove as a 'Green City' despite the pockets of deprivation there.

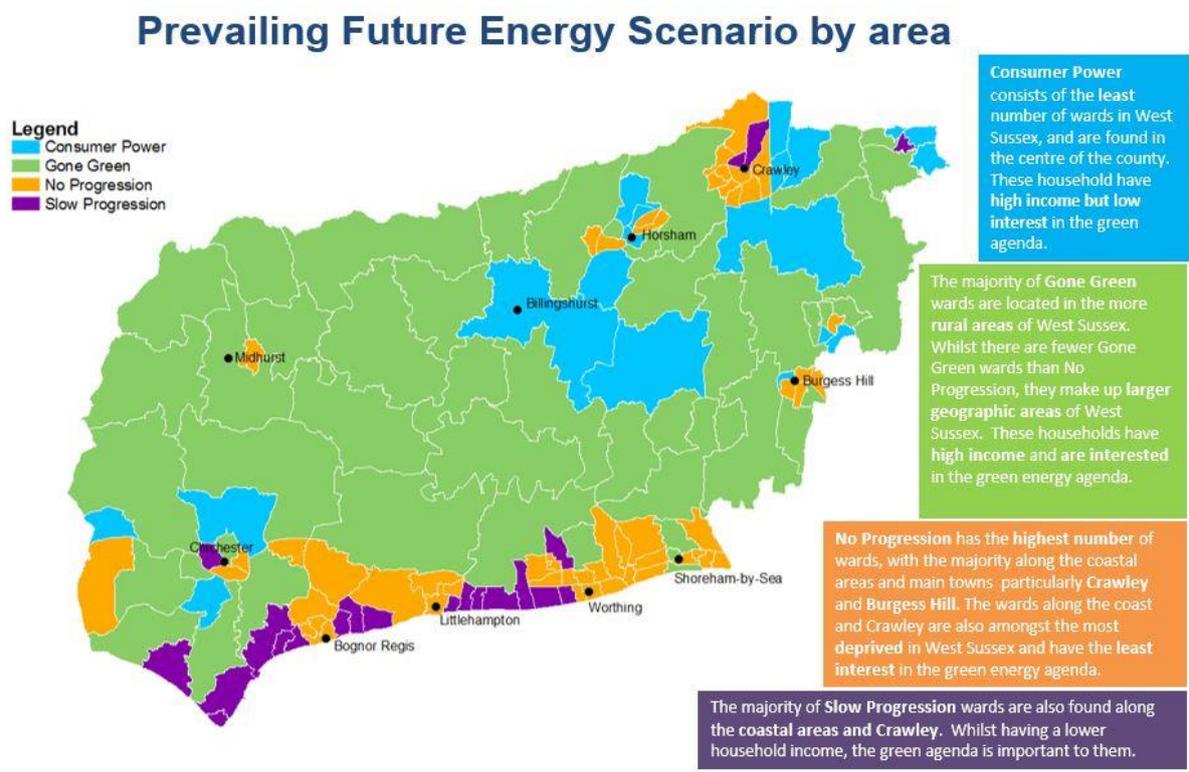


Figure 6 – Future Energy Scenarios in West Sussex County – Your Energy Sussex 2016

SOCIAL DRIVERS

63. Consumer interest in renewables and climate change, coupled with the desire to reduce their energy costs, is increasing uptake of smart energy management technologies, such as smart thermometers and smart metering. £320 million is expected to be invested in smart energy technologies in 2015, along with an additional £230 million invested in smart metering infrastructure. The Department for Energy and Climate Change (DECC) has estimated smart grid technologies will generate up to £13 billion on GVA and support 8,000 jobs by 2020 nationally.
64. There appears to be an ambivalence towards smart metering however, at least for SMEs. A study by Ipsos MORI and DECC found that whilst there was no active

²³ Note: these are based on Ward boundaries that are set by population, roughly 5,000 people in each, so whilst 'Gone Green' covers a large area it covers less population overall.

resistance to smart metering among SMEs, there was no active interest either. Many SMEs felt there were benefits to their business, but that there were not enough to make an active approach worth their time. Further attitudes towards energy management included that the majority of businesses thought they were managing their energy as much as they could and were mostly driven by cost considerations. Similar findings were presented in another DECC paper²⁴.

65. The barriers to energy management included the idea that any cost reductions would be minimal, staff had little incentive to reduce energy use, capital outlay would not be recouped in a reasonable time, and that neither landlords nor tenants were willing to make capital outlays because neither could guarantee they would receive the benefits or recoup the costs. The incentive for landlords and tenants is also a big factor in the domestic market, landlords do not wish to make a capital outlay to reduce energy costs for tenants, and tenants do not wish to make capital outlays on homes they do not own.
66. Although societal pressure is growing for a shift to a lower carbon economy those driving it are still in the minority and a number of hurdles need to be overcome. In particular the lack of personal responsibility towards reducing their carbon footprint, waste, and energy efficiency represents a significant problem that will require greater leadership from government, institutions, and communities to overcome. For businesses there is also difficulty incentivising staff to reduce their energy use and recycle waste in the workplace, especially considering many take steps to reduce their use at home²⁵. Some of this also comes from a lack of understanding about what measures are available to both domestic and commercial consumers to reduce their carbon footprint and waste outputs.

BlackBox Energy

***Profile:** BlackBox Energy are a team of installers who install energy saving products, such as external insulation and double glazed doors. They have some government backed schemes providing affordable insulation to homes. They were founded in May 2013.*

FUTURE CAPACITY

67. The government's commitment to renewable sources of energy is reflected in the growth in capacity in recent years and the projected growth up to 2020. In 2005 renewables accounted for 1.3% of energy demand, by 2014 this has risen to 7% and within electricity generation renewable sources accounted for 20% of total generation²⁶. This has been driven in part by the rapid growth of solar power, in 2012 expectations were that 1.5GW of capacity would be installed by 2015, capacity is currently 8GW.

²⁴ Department of Energy and Climate Change: Research to Assess the Barriers and Drivers to Energy Efficiency in Small and Medium Sized Enterprises – 2014

²⁵ 'I just can't be bothered': why people are greener at home than in the office -

<http://www.theguardian.com/sustainable-business/2016/may/20/green-home-office-environmental-leadership>

²⁶ Department of Energy and Climate Change: Progress Report on the Promotion and Use of Energy from Renewable Sources for the United Kingdom – 2016

68. In figure 7 below the DECC looked at the potential generation capacity of renewable energy under various scenarios²⁷. It is clear they expect growth in capacity at least until 2030, under even the lowest scenario capacity is expected to grow by over 380%. The report highlights off-shore wind and solar to be the main areas of potential generation capacity with smaller contributions made from biofuels and biomass, hydro and marine technologies, and energy and gas from waste, landfill and sewage.

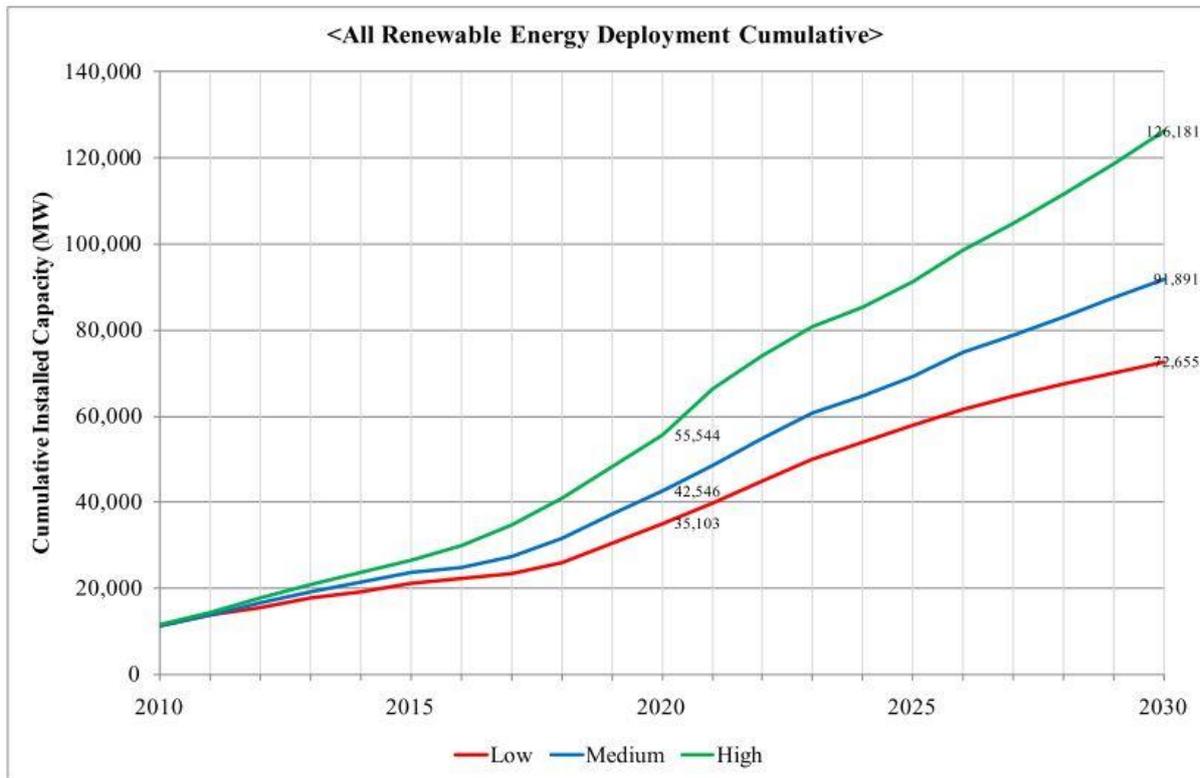


Figure 7 – Predicted Total UK Generation Capacity: Department of Energy and Climate Change: Review of the generation costs and deployment potential of renewable electricity technologies in the UK – 2011

69. In order to contribute to this added capacity the Coast to Capital region will require infrastructure upgrades to the electrical grid. As energy generation becomes more distributed increased connections to the national grid will be required for excess energy to be sold onto the market, also capacity will need to be carefully managed, as will demand and storage. Improvements to storage will be required as renewable energy is cannot be created in line with peak demand, storing energy at times of low demand and releasing it at peak times will smooth this mismatch. Similarly the increased use of smart grids and meters will be required to efficiently manage electricity demand.
70. At a higher strategic level the Coast to Capital region is losing out on access to the London electricity market, there is only one interconnector in the area that runs along the coast into Hampshire and Kent. Additionally should there be issues

²⁷ Department of Energy and Climate Change: Review of the generation costs and deployment potential of renewable electricity technologies in the UK - 2011

at either end of this connection there may be disruption to the power supply without a more flexible solution.

LABOUR MARKET CHARACTERISTICS

71. Due to the lack of methodological frameworks for defining the Environmental Technology, Low Carbon, and Environmental Goods and Services sector there is no direct way to measure the labour market characteristics of the sector. There have been studies on the energy sector as a whole that touch on the Environmental sector and there is a strong overlap with the Advanced Manufacturing and Engineering sector that can be used to piece together a picture of the sector.

EMPLOYMENT

72. In the Energy sector as a whole employment has been rising since 2005, driven by growth in the electricity sector, and in 2013 it accounted for 6.2% of total employment, around 170,000 people. When comparing GVA per employee it is one of the most productive sectors in the economy, however this has been in decline due to falling production in the oil and gas sub-sector²⁸. The UKCES paper²⁹ notes that the Energy sector is made up of varying sub-sectors, coal, oil, and gas production is falling whereas renewable technologies are experiencing rapid growth.
73. The Energy sector as a whole is predominantly male, 79% compared to an average of 53% in the wider economy, and generally older than the wider workforce. This may become a problem when the current workforce retires, Working Futures data suggests a quarter of retirees in the sector will be in science, research, engineering, and technology professionals, and skilled metal, electrical, and electronic tradespeople.
74. There is significant cross over between the LCEGS sector and the Advanced Manufacturing and Engineering sector so some of the future changes in employment will be relevant. The number of people expected to be employed in manufacturing in 2022 will be lower than in 2012, but is predicted to be a shift to higher level occupations who have higher levels of education, leading the sector to be more reliant on higher level skills. Occupations linked with the Advanced Manufacturing sector are expected to grow by 10% nationally, compared to a 9% drop in the Manufacturing sector as a whole³⁰.

Ceres Power

***Profile:** Ceres, based in Horsham, Japan, and Korea, is an energy company focused on creating the next generation of fuel cell technologies using low cost steel and ceramics and operating on natural gas to create flexible and lower carbon power solutions for homes and businesses.*

²⁸ UK Commission for Employment and Skills: Skills and Performance Challenges in the Energy Sector – 2015

²⁹ Ibid

³⁰ UK Commission for Employment and Skills – Skills and performance challenges in the advanced manufacturing sector – 2015

75. This move towards higher level occupations means that there will be more demand for higher levels of education; demand for employees with qualifications of QCF level 4 or higher is predicted to rise by 7% whilst demand for employees with qualification levels 1 to 3 is expected to fall by 25% and demand for employees with no qualifications is expected to fall by 50%. This will change the composition of the workforce so that those with level 4+ qualifications will go from making up 40% of employees to making up 50%.

SKILLS ISSUES

76. There are a number of skills issues that may constrain growth in the LCEGS sector, although skills issues are less prominent than other factors, such as government policy or access to finance. The sector suffers from some skills shortages, particularly in STEM skills, as well as a lack of sector specific courses to create a supply of new entrants and to re-train or up-skill current workers. There are also some difficulties in finding the required skills in developing new business models in the sector. Beyond the LCEGS sector there are gaps in knowledge in other sectors around energy use and efficiency and the payback of various energy saving initiatives.
77. Future skills demands may also exacerbate the constraints on the sector which will require the workforce to have increased engineering skills, in particular electrical engineering, IT, software development, and analytics skills, people management and communications skills, project management skills and related cost management skills, and specific technical skills to match the increasingly specific nature of technologies. These are similar skills issues as those seen in the Advanced Manufacturing and Engineering sector.
78. Strategic management skills are one of the most in-demand as competition increases, advances and innovations in technology open up potential new market opportunities, and the number of jobs in managerial positions is expected to grow faster than in other occupations in the Advanced Manufacturing and Engineering sector. Strategic management skills have been identified as one of the key challenges for the sector³¹. These skills are important as managers need to be able to identify long term trends, their impact upon their business, and to be able to respond with cost effective measures or with a strategy to exploit a market opportunity. There is a particular problem for small and medium enterprises (SMEs) in attaining these skills as they have less resource to develop them. At management level there will also be increasing demand for skills in supply chain management, purchasing, contract negotiation, and large scale project

Mott MacDonald

Profile: Mott MacDonald are a global engineering management and development consultancy with expertise in a wide range of areas, including the environmental sector. This includes engineering of low carbon and renewable power generation, environmental management, conservation and restoration, and sustainable development.

³¹ UK Commission for Employment and Skills – Sector Skills Insights: Advanced Manufacturing – 2012

management³². There is potential for the business and technical management roles to be split into two separate roles.

79. Also crossing across the LCEGS and Advanced Manufacturing and Engineering sectors is the need for improved soft skills, such as interpersonal skills, as supply chains become supply networks there will be more interaction between companies at all levels. This will lead to less regulation of workers who will have to be more responsible for their own work and training and managers will have to improve their delegation skills and increasingly manage and monitor the process rather than the production to achieve 100 percent quality. The use of diverse and complex design packages and bespoke software is requiring production managers to widen their skill sets. IT literacy is becoming more important across all levels of the production chain as computer controlled machines become more commonly used.
80. The Sussex Learning Network conducted research into skills gaps in the sector and found that some previously identified skills gaps were no longer relevant to the current energy efficiency market due to changes to government policy³³. There is one area that has proven to be a significant gap in the market however, energy efficiency literacy is found to be lacking, and increasingly required, across all sectors and levels of employment. This is due to the gaining importance of energy efficiency in all types of businesses and represents an opportunity for local LCEGS sector growth and wider efficiency savings.
81. Looking at available evidence on the whole energy sector there may be skills shortages affecting the LCEGS sector, 36% of energy sector employers had a vacancy that was hard to fill and 31% had skills shortage vacancies, which were most prevalent at skilled and professional levels³⁴. Of those companies with hard to fill vacancies 50% said this was due to a low number of applicants with the required skills, although this may affect the oil, gas, and coal sub-sectors more than the renewables sub-sector.
82. The low number of applicants with the required skills may be a result of the combination of an ageing workforce and a lack of interest from young entrants into the sector³⁵. The workforce is generally older than in the wider economy and the number of workers retiring is expected to increase year on year until 2025,

Ricardo

***Profile:** Ricardo is an engineering and consultancy company, they have expertise in engine efficiencies and hybrid automotive engines. They also undertake collaborative R&D with the University of Brighton. Their environmental consultancy has specialisms in air quality, energy and climate change, resource efficiency and waste management, and sustainable transport.*

³² UK Commission for Employment and Skills – Skills and performance challenges in the advanced manufacturing sector – 2015

³³ Building Sustainable Skills: Sussex Learning Network – 2015

³⁴ UK Commission for Employment and Skills: Employers Skills Survey 2013

³⁵ UK Commission for Employment and Skills: Skills and Performance Challenges in the Energy Sector – 2015

requiring at least 1,000 new recruits per year to meet power generation demand up to 2025 and beyond. One issue that has been identified by the sector is whether it is well promoted to young people who may have a negative view of the sector, but again this may be more of an issue for the oil, coal, and gas sub-sector.

83. One of the main skills shortages identified by employers is in STEM³⁶ skills. Employers suggest this may be due to perceptions young people have of STEM subjects, including: costs of studying a STEM subject and potential Masters Degree are too high, there are potentially cheaper degree options, entry requirements for STEM subjects are too high, and that STEM subjects are too difficult. Research³⁷ has suggested that there is an overall balance in STEM qualifications and STEM occupations in the workforce, but that those young people with STEM qualifications are not necessarily attracted to the Energy sector³⁸.
84. However, in the Coast to Capital region there is evidence of increasing graduates in STEM³⁹ subjects. There were 3,300 STEM graduates in 2012/2013, which has risen by 16% from 2011/2012⁴⁰. In 2012/2013 the number of STEM graduates from Universities in the Coast to Capital region who went on to find work in the Coast to Capital region was 51.6%, higher than the rate for graduates as a whole. They are also slightly more likely to be in graduate level employment; 59% of STEM graduates were in a graduate level job six months after graduation compared to 54% of total graduates.
85. The number of people achieving qualifications in engineering or manufacturing apprenticeships has been steady between 2008/2009 and 2012/2013 in the Coast to Capital region, whereas apprenticeship achievements as whole have been increasing. This may be a reflection of the fact that the level of employment in the Manufacturing and Engineering sectors is decreasing and as such there is no demand for an increase in apprentices; the demand is being met by current output. There is evidence to suggest that those businesses that offer three to four year apprenticeships have a strong supply of applicants, suggesting any constraint on increase supply is not due to a lack of applicants, but because there are not enough opportunities being offered.

Dearman

Profile: Dearman are pioneering cold energy systems, using liquid nitrogen in gas form to drive engines and power units, whilst also providing cooling solutions for refrigeration units and buildings, the emissions from which are clean. Founded in the 1960's they are based in Croydon and employ around 30 people.

³⁶ Ibid

³⁷ UK Commission for Employment and Skills: Supply and Demand for High Level STEM Skills – 2013

³⁸ Energy and Utility Skills: Sector Skills Assessment 2010

³⁹ Higher Education in Science, Technology, Engineering and Mathematics (STEM) subjects - Science and Technology Committee – House of Lords:

<http://www.publications.parliament.uk/pa/ld201213/ldselect/ldsctech/37/3705.htm>

⁴⁰ Higher Education Statistics Authority 2012/13

FUTURE SKILLS NEEDS

86. In response to the expected changes in the sector the skills needs are also predicted to change. Across all occupations there will be a greater need for people management and communication skills, as well as a need to understand and adopt green energy policies. Another emerging trend will be the need for increased technical specialisation within roles as the technology used becomes more specialised.
87. IT skills and data analytics are also increasingly required across occupations, in particular for engineers and technicians, as well as knowledge of smart metering and smart grid technologies. Project managers will be expected to have interdisciplinary skills on top of people and project management skills and the understanding of, and ability to deliver, budgeting and cost effectiveness for projects. Cost management skills will be increasingly needed across all occupations, in particular for engineers.
88. In the Renewables sector there is an issue around the number of renewables focused training courses available. The sector is pushing to increase the number, which in turn may boost the awareness of opportunities in the sector to potential new entrants. There has already been some success with the introduction of apprenticeships for on and off shore wind turbine technicians. Other potential solutions include moving offices to where there is already a supply of the required skills and by targeting students through engagement with universities and teaching seminars.
89. Policy will play an important role in shaping future skills availability, positively or negatively. In the Renewables sector around two thirds of employers are holding back on investment in training, skills, and development of employees, as well as the recruitment of trainees and apprentices due to the perceived lack of stability in renewables policy from the government⁴¹.

Globe Energy

***Profile:** Based in Burgess Hill Globe Energy provide innovative solutions to energy and heat efficiency in industrial buildings, particularly focussing on saving energy costs. They have patents on a wide range of energy saving technologies and this has enabled them to sell their products across Europe and North America.*

TRAINING

90. There are strong levels of training in the sector, 75% of employers have offered on and off the job training to employees, compared to 66% in the wider economy. The percentage of employers (86%) who offer continuous development to employees is in line with the wider economy average⁴². There also appears to be a reliance on in house training, with many employers adding to existing qualifications with training that is more attuned to their sector or company specific needs.

⁴¹ UK Commission for Employment and Skills: Skills and Performance Challenges in the Energy Sector – 2015

⁴² UK Commission for Employment and Skills: Working Futures 2012 – 2022

91. Some of the issues highlighted in the report include the perception of employers that there are not enough courses available to train people in the required technical skills, particularly in electrical engineering courses. For project managers and sales and marketing managers there is an increased need for a mix of commercial and softer skills alongside the technical skills required in the sector.

COMPETITION AND SUCCESSION PLANNING

92. A lack of interest in the Energy sector is exacerbated by intense competition for STEM and similar required skills from other sectors in the economy, sub-sectors within the Energy sector, and from other nations. There are similar issues affecting Energy sectors around the world increasing competition for skilled workers and in many cases these countries can have lower costs of living and perceived better quality of life that tempts workers. This works both ways however, research has suggested the UK is heavily reliant on inward migration for skilled workers⁴³.
93. Another issue to contend with is the increasingly mobile workforce, driven by a rise in self-employment, particularly in experienced roles where daily rates can be charged at a premium. This in turn makes it harder to train the workforce, increasing self-employment places the burden of training on the individual rather than the organisation. Other barriers to training include the fast pace of change in the sector and policy changes, particularly in the Renewables sub-sector.
94. In the UKCES report⁴⁴ the issues in the renewable energies technician occupation are studied. The main issue is that there is not enough knowledge or experience in the sector, in part due to the relative newness of the sector. The small pool of experienced employees' means there is much competition for workers and there is a risk of skilled technicians moving jobs. The uncertain state of environmental policies also makes recruitment planning difficult and reduces investment in apprenticeships and training. Linked to this is the lack of training courses available for the Renewables sector, having a negative effect on the supply of renewables technicians and the ability for current technicians to refresh, up skill, or retrain in the sector.
95. These issues put pressure on those tasked with succession planning within the industry and at a company level. It has been suggested that historically employers in the sector have not spent enough time on this, in part because of rapid change in the sector and peaks and troughs in supply and demand. Larger companies have an advantage in resources and ability to attract labour that dampen the effects of poor succession planning, but smaller companies may struggle to plan ahead effectively and recruit new entrants.

EMPLOYERS RESPONSE

96. In response to these issues the sector is taking a number of approaches, the main avenue employers appear to be taking is increased training. Employers are increasing the number of apprentices they take on and providing the training and

⁴³ UK Commission for Employment and Skills: Sector Skills Insights: Energy 2012

⁴⁴ Ibid

experience they require in house, as well as developing mentoring schemes to foster skills transfers from older to younger workers. More immediately around three quarters of employers are having to increase salaries to attract the people they require, however not everyone can do this.

97. Partly in response to this demand the new University Technical College in Newhaven (UTC@Harbourside) will be offering courses in STEM subjects but with a focus on Marine and Environmental applications. This will link to Newhaven's new enterprise zone and its overall strategic aim of becoming a place for clean, green, and marine business. This focus will benefit the entire region as the businesses and talent devolved there will disperse throughout the surrounding area over time.

ANNEX

Both locally and nationally there is a crossover between Low Carbon and Manufacturing support organisations, below is a list that captures a mixture of both.

LOCAL SUPPORT ORGANISATIONS

University of Brighton

- The Sustainable Construction and Environmental Planning group examines the environmental performance and impact of buildings throughout their life cycles: from the choice of raw materials, through the design, construction and operation of buildings, to demolition, re-use and recycling of materials and components.
- The Sir Harry Ricardo Laboratories are one of the largest UK research teams dedicated to internal combustion engines, the development of laser-based measurement techniques, fundamental modelling and computational simulation. It is regarded as one of the foremost centres for automotive engine research in Europe. The group's international esteem is demonstrated by its breadth of collaboration with over 40 academic institutions and industrial partners across the world.
- This research is set to be expanded when the Advanced Engineering Centre opens on the university's Moulscombe campus. It will generate 30-35 additional research posts, 15 academic/technical engineering posts, 60 engineering graduates per year, and 3,600sqm employment space that will be made available to local companies that will have access to state of the art Manufacturing facilities and expertise as well as training and support.
- In addition there will be a Central Research Laboratory in the re-developed Preston Barracks in Brighton that will focus on supporting new hi-tech and design-led Manufacturing start-up companies and entrepreneurs.

University of Sussex

- The Sussex Sustainability Research Programme aims to support and build upon existing disciplines at Sussex to address complex socio-economic, technical and environmental challenges and develop problem-focused research across disciplines in the natural and social sciences. It will enhance both the understanding of complex sustainability challenges and the approaches through which more sustainable development pathways can be negotiated.
- The Dynamics, Control and Vehicle Research Group is internationally known for its work in automotive research in dynamics and control, along with work on vehicle efficiency through drag reduction, weight minimisation, and improved energy conversion.
- The Thermo-fluid Mechanics Research Centre is a dedicated research laboratory specialising in both fundamental and applied research in

thermofluids. Our expertise in the areas of aerodynamics and heat transfer is generally applied to research in gas turbine technology. There is a particular emphasis on gas turbine internal air systems, gas-path aerodynamics & component heat transfer and modelling of flow and combustion.

- The university also actively researches in the areas of informatics and data systems, management of data systems and biomedical diagnostics, development of video analytic software and robotics. SPRU – the Science Policy Research Unit examines issues raised by scientific and technological change. They pursue ways to achieve excellence, efficiency and competitiveness in the use of science and technology by firms engaged in knowledge exchange and innovation management; by industries and regional authorities seeking to understand technological trajectories and the clustering of companies; and governments seeking to nurture competences and capabilities.
- **The Green Growth Platform** - is part of the University of Brighton. They provide support to businesses in the low carbon and environmental technology sectors across Sussex as well as to those businesses in other sectors wishing to lower their emissions. They offer package of business support, events, innovation and training delivered by a team of industry experts, business advisors and leading academics. It has 1,000 businesses in its network, has placed 50 interns and apprentices in local companies, and supported 250 jobs.
- **The Sustainable Business Partnership** - is a not-for-profit Community Interest Company that specialises in working with businesses, social enterprises and the public sector to reduce costs through improving resource efficiency. They run a number of networking and training events throughout the area, promoting best practice and knowledge sharing.
- **Marine South East** – is a local support organisation that aims to support the strategic growth of the marine sector through consultancy projects, collaborations, European partnerships and strategic projects. They offer support on issues such as; Offshore and Marine Energy; Maritime Resource Efficiency; Ports and Marine Operations; Skills and Workforce Development; Maritime Cluster Collaborations; Marine Business Collaborations.
- **The Big Bang Fair South East** – is an annual fair that is aimed at school children as a way of encouraging them into engineering and science careers. 7,000 students from across the region attend and visit interactive displays and workshops run by local and international science and engineering companies.
- **STEMfest** – is linked to the Big Bang Fair and similarly aims to inspire young people to take up careers in STEM roles. It offers a series of interactive shows, workshops and demonstrations that take place in schools and colleges, in STEM Clubs and at a major public events. There are STEMfests in Crawley, and along the Coast.

- **University Technical College Newhaven** – is a new education provider with a focus on marine and environmental engineering for 14-18 year olds. Education will focus on STEM and computing subjects at GCSE and A-level.
- **Community Energy South** – is a collection of community energy groups across the south that aims to support and grow community owned renewable energy through facilitation of skills and knowledge sharing, promoting the activities of members, and providing advice on reducing energy consumption.
- **The Brighton & Hove Energy Services Co-operative** – is a not for profit social enterprise aimed at bringing together Brighton and Hove to develop local renewable energy projects and offer advice on improving efficiency and reducing fuel poverty and fuel bills.
- **Your Energy Sussex** – is a partnership between the Sussex councils working with householders, communities, and businesses to create an energy strategy for the region, including the effective use of renewable energy. They also offer advice and support on how to increase energy efficiency and where to access funding to do so.
- **The Sussex Innovation Centre** – is based in Brighton and Croydon, offering business support, office space, and mentoring to companies bringing new and innovative products to market. They have previously worked on a number of low carbon projects and offer sustainability consultancy and sustainable architecture services.
- **Chambers of Commerce and Sussex Manufacturing Forum** – the Sussex Surrey, Brighton and Hove, and Croydon Chambers of Commerce provide local businesses with advice and support and networking events. The Sussex Manufacturing Forum runs quarterly for local businesses to attend events and network with other local businesses.
- **Coast to Capital Business Navigators** – the Coast to Capital Business Navigator Growth Hub is a free sign posting service that helps businesses in the Coast to Capital region identify the type of support they require and where to find it. It is open to any type of business in the region.

NATIONAL SUPPORT ORGANISATIONS

- **The Green Investment Bank** – is owned by the government and operates with the sole aim of investing in green projects on commercial terms. It has initial capitalisation of £3.8 billion and has already invested in a number of large and small projects across different types of low carbon projects. One of those projects includes £306 million invested in the Rampion Wind Farm off the coast of Brighton.
- **The Centre for Sustainable Design** – has led and participated in a range of high quality research projects and has organised more than a hundred conferences, workshops and training courses focused on sustainable innovation and product sustainability. CfSD is recognised worldwide for its

knowledge and expertise, having worked closely with business, policy making and research communities for two decades.

- **The Carbon Trust** – is an independent organisation that helps businesses benefit from a more sustainable future through carbon reduction, resource efficiency strategies and commercialising low carbon technologies.
- **Cenex** – was set up as the UK's first Centre of Excellence for Low Carbon and Fuel Cell technologies. The organisation delivers a range of innovation support activities focused on assisting UK companies to take forward Research, Development and Demonstration projects for low carbon vehicle technologies. The organisation also helps develop projects and leverage Government funding available as part of the broader framework of innovation policy aimed at ensuring UK leadership in low carbon vehicle technologies.
- **The National Energy Foundation** – is an independent charity that aims to help organisations understand and improve the use of energy in buildings via delivering projects, supporting collaboration for knowledge sharing, and identifying market failures.
- **The UK Energy Research Centre** – carries out research into sustainable future energy systems. It is also committed to promoting cohesion in UK energy research; fostering and nurturing new talent; and up-skilling energy professionals.
- **The Low Carbon Vehicle Partnership** – The LowCVP is a public-private partnership working to accelerate a sustainable shift to lower carbon vehicles and fuels and create opportunities for UK business.
- **The Knowledge Transfer Network** – brings together businesses, entrepreneurs, academics and funders to develop new products, processes and services. They have three areas of work that particularly relate to the Low Carbon economy, Sustainability and Resource Efficiency, the Built Environment, and Energy
- **Semta** – The Science, Engineering, Manufacturing and Technologies Alliance - is a not-for-profit organisation responsible for engineering skills for the future of the UK's most advanced sectors. Led by employers, their job is to transform the skills and productivity of the people in the engineering and advanced Manufacturing technologies sectors.
- **Innovate UK** – is part of the Department for Business, Innovation, and Skills, and is aimed at providing funding and support for businesses engaged in innovative activity such as; carrying out a feasibility studies; creating a new product or service, through research and development; work with other businesses or research organisations on collaborative projects. It has some focus on specific industries that link to the Advanced Manufacturing and Engineering sector; Emerging and Enabling Technologies; Energy; High Value Manufacturing; Resource Efficiency; Transport.

- **UKTI** – provides tailored support and advice packages to all type of businesses who are interested in exporting their products and growing their business overseas.
- **The Enterprise Europe Network** – helps small and medium sized businesses in all industries exploit business opportunities in the European Union and further afield. Member organisations providing support include including chambers of commerce and industry, technology centres, universities and development agencies.
- **Patent Box and R&D Tax Credits** – are two schemes aimed at incentivising innovative activity. The Patent Box enables companies to apply a lower rate of Corporation Tax to profits earned from its patented inventions. R&D tax credits provide relief on corporation tax on qualifying research and development costs.
- **Engineering UK** – works in partnership with the engineering sector to improve the perception of the sector within society, and particularly young people, and to build career programmes around engineering. They run the Big Bang event that attracts almost 70,000 students to experience the types of activities are available in the engineering sector.

LOCATION QUOTIENTS

98. Location quotient is a method of measuring the relative concentration of an industry in one location compared to another. A LQ score of over 1.0 suggests there are sector strengths in that region. For example the Coast to Capital LQ would be compared to the national concentrations and an Area Partnership LQ would be compared to the Coast to Capital concentration.
99. For this paper the Coast to Capital regional level formula looks like this:

$$\frac{(\text{Coast to Capital Total Employees} / \text{Coast to Capital AME Employees})}{(\text{UK Total Employees} / \text{UK AME Employees})} = LQ$$

SKILLS AND PERFORMANCE CHALLENGES IN THE ENERGY SECTOR

100. Below is a summary of the key drivers of change in the wider Energy sector, from 'UKCES Sector Insights: skills and performance challenges in the energy sector':

Policy & Legislation	Economy
<p>Electricity Market Reform (EMR)</p> <p>Transition to Contracts for Difference (CfD)</p> <p>Energy Savings Opportunity Scheme (ESOS)</p> <p>Uncertainties due to changes in policy over the years</p> <p>General Election: uncertain political position beyond 2015</p> <p>Impacts for Scotland following the referendum not yet fully known</p> <p>EU energy efficiency targets (2020 and 2030)</p> <p>UK and devolved nation energy efficiency targets</p> <p>Potential of nuclear power to significantly contribute to reduction in carbon emissions and thus meet policy targets</p> <p>The need for energy security</p>	<p>Investment:</p> <ul style="list-style-type: none"> - £110 billion investment necessary to upgrade the grid by 2020 - Interconnection project investment - Ageing assets in oil & gas prompting greater investment into safety - New build nuclear sites investment - CfD intended to reduce volatility in electricity prices and thus reduce risk for investors into renewable technologies <p>Energy sector a high generator of tax revenue</p> <p>Decommissioning work to increase, offering commercial opportunities for businesses</p> <p>Fiscal regime e.g. tax relief offered for decommissioning projects</p> <p>Oil price reduction and inflation of wages; reduced investment into new sales and exploration due to the low price of oil</p> <p>Concerns of risks of investment into unproven technologies affecting renewables in particular</p> <p>Potential for job creation, but scale unknown</p>
Society & Environment	Technology
<p>Rising energy prices coupled with the issue of fuel poverty and a need to improve energy efficiency of the existing housing stock</p> <p>Increasing demand for energy yet constraints on fossil fuels</p> <p>More competitive market: new entrants in both energy supply and generation</p> <p>Closure of existing nuclear plants may result in a gap in generation capacity</p> <p>Reduction in oil & gas production of around 50 per cent since 1999: a need to improve recovery techniques but production efficiency falling</p> <p>Natural resources to be harnessed, especially in Wales and Scotland</p> <p>Concern about environmental impacts resulting in behavioural change e.g. switch to electric vehicles (although not expected to be mainstream for many years)</p> <p>Risk of natural disaster e.g. Fukushima nuclear collapse of 2011</p>	<p>On-going growth in renewables capacity with high levels of activity planned for offshore wind</p> <p>Expansion of smart grid and smart metering</p> <p>Rapid technological developments e.g. fuel cells, cheap and accessible energy storage solutions, lithium-ion batteries and sodium batteries etc.</p> <p>Technology such as smartphones a potential catalyst for increasing energy consumption</p> <p>Growing interest in potential of other key areas such as shale gas and carbon capture and storage</p> <p>Focus on developing technology to enhance recovery techniques in oil and gas</p>

Figure 8 – Summary of Key Drivers in the Energy Sector: UK Commission for Employment and Skills: Skills and Performance Challenges in the Energy Sector – 2015

101. Below is a SWOT analysis of the current skills situation in the Energy sector taken from the 'UKCES Sector Insights: skills and performance challenges in the energy sector' paper.

Strengths	Weaknesses
<p>Employers widely recognise the urgent need to tackle skills shortages particularly for engineers and technicians (but not necessarily working collectively to tackle this)</p> <p>Sector offers a high degree of job stability and security</p> <p>Good supply of career development and progression opportunities (within and cross sectors)</p> <p>Cross-fertilisation opportunities widely available (e.g. Scotland's supply of renewable energy skills picking up surplus where there is a decline in oil and gas)</p> <p>Well-established and flexible training provision, predominantly in house, with a culture promoting internal training</p> <p>Skills and talent recruitment from outside of the sector is a viable option, although in some cases needs to be from a similarly regulated sector e.g. sales roles</p>	<p>Limited pool of experienced talent</p> <p>Competition for talent resulting in a certain amount of reliance upon workers from overseas</p> <p>Time and cost to gain vital qualifications within a heavily regulated sector</p> <p>Difficulties in securing the right mix of technical and commercial skills for sales roles</p> <p>Some sub-sectors, working environments and occupations not deemed attractive among young people or experienced workers in other sectors</p> <p>Succession planning has been ineffective or too late in some cases</p> <p>Training can be delayed by regulations preventing under-18 apprentices from working on site</p> <p>Energy specific knowledge and experience can take some years to accumulate, leaving a gap at middle management level in particular</p> <p>Challenging to attract skilled workers to remote locations</p>
Opportunities	Threats
<p>Employers are demonstrating innovation in recruiting and attracting talent</p> <p>More apprenticeships being used to overcome skills shortages</p> <p>In-house training opportunities and support towards chartered status are widely available</p> <p>Skills shortages offer opportunities to train young people to industry specific requirements for these job roles</p> <p>More CPD opportunities demonstrate available progression routes and assist talent retention</p> <p>Improving sector specific careers information</p> <p>Peaks and troughs in demand in one sub-sector could increase supply of skills into another</p>	<p>Ageing workforce exacerbating gap in the middle layer of the workforce</p> <p>Lack of and limited future take up of STEM skills</p> <p>Cost saving exercises within businesses pulling funds from investment into skills and training</p> <p>Career progression into managerial roles diminishes expertise among high-demand engineering/technician job roles</p> <p>Negative perception or lack of visibility of the sector among young people</p> <p>Global demand for skills and cheaper degree courses a catalyst for UK talent migration abroad</p> <p>Increasingly mobile workforce working as contractors: employers reluctant to invest in up-skilling expensive and potentially unstable resource</p>

Figure 9 – SWOT analysis of skills issues in the Energy Sector: UK Commission for Employment and Skills: Skills and Performance Challenges in the Energy Sector – 2015