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SOUTH EAST
LOCAL ENTERPRISE
PARTNERSHIP

EnergySouth2East

Local Energy Strategy

Version 8.0

Contents

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Foreword

This local energy strategy has been developed to enable the Coast to Capital, Enterprise M3 and South East Local Enterprise Partnerships (LEPs) of England to achieve clean growth from now until 2050 in energy across the power, heat and transport sectors. Clean growth is about growing our local economy - creating jobs and building sustainable income streams - while cutting greenhouse gases. Delivering clean growth is at the heart of the UK's Industrial Strategy, whilst continuing to provide an affordable, sustainable and secure energy supply for businesses and consumers, which is key to what we want to achieve.

Our group of three LEPs cover a large part of the south east of England, an area that is ideally placed to harness the benefits that will come from the transition to a low carbon economy. We are situated in one of the most productive regions of the UK: we have significant capacity for renewable energy generation; extensive transport and utility infrastructure; a highly-skilled and diverse work force; and are supported by a network of capable public, private and research sector partners keen to pursue bolder and more sophisticated energy opportunities. However, there are significant challenges to contend with. Within our region exist areas of deprivation, inequality and fuel poverty; and the cost of energy that our businesses pay is significantly higher than their equivalents in countries like the Netherlands and Sweden[1].

Through this document we will show how we can play a key role in addressing the Government's Industrial Strategy Grand Challenge[2] of achieving clean growth. We will also set out how the area can capitalise on the opportunities presented by the emerging low carbon economy, a sector which is set to grow at 11% per year, that's four times faster than the rest of the economy from now until 2030[3]. This is our opportunity to deliver something really impactful for our region, building an energy and transport system that delivers what we need, at the right price, whilst protecting our environment.

By working together on this Strategy, the three LEPs have been able to look at the common challenges and opportunities across the whole geography, whilst also developing a local evidence base. It has enabled us to identify Project Models that are scalable and provide the platform to work together in the future to overcome the energy challenges identified in this document.

As next steps, we will endorse and commend the Strategy and Action Plan to the UK Government's Department for Business, Energy and Industrial Strategy (BEIS) to be at the forefront of the detailed scheduling of projects by the Greater South East Local Energy Hub, which we will then support. We will also widely publicise and propagate this document across the South East and into London in order to flush-out interest and investment from both our public sector colleagues and also large-scale private-sector finance, which might include pension funds and international financing institutions such as EIB and Green Investment funds / banks. A final key activity will be to rally energy advocates from the councils in the region to bring together collective action for the facilitation of large-scale projects and negotiations with developers and private-sector investors, in accordance with the Action Plan and non-technical activities identified.

[1] Department for Business, Energy and Industrial Strategy, "Collection: Quarterly energy prices", 28 June 2018 [online]
[2] Department for Business, Energy and Industrial Strategy, "Industrial Strategy: the Grand Challenges", 21 May 2018 [online]
[3] C. Perry, "Written statement to Parliament: The Clean Growth Strategy", 12 October 2017 [online]

We look forward to working with you and our public, private and research sector partners to realise the shared vision presented within this document to achieve our clean growth aspirations, and helping to secure our future competitiveness as a region.

LEP Chairs

Acknowledgement

We would like to thank Siemens for assisting us in producing this Energy Strategy and Action Plan. Headquartered at Frimley in Surrey (within the tri-LEP region), they have brought an international and innovation perspective to the work that, as with all our stakeholders in this Energy Strategy, will significantly affect them directly in years to come. Employing over 15,000 people in the UK, Siemens has repeatedly worked at the heart of innovative multi-partner collaborative energy projects underpinned with environmental aims.

Executive Summary

This local energy strategy was developed by three LEPs - Coast to Capital (C2C), Enterprise M3 (EM3) and South East LEP (SELEP) – and covers a geographic area from Essex to Hampshire, representing a large swathe of the south east of England.

Our shared vision for energy in the tri-LEP region is:

"To become a leader for sustainable energy production within the UK, powering innovative, decarbonised and clean economic growth"

This local energy strategy has two main goals: the first is that the tri-LEP region will play a leading role in the United Kingdom's **decarbonisation** efforts by making targeted interventions to reduce emissions in the electricity, heat and transport sectors. The second is that we will foster **'clean growth'** by supporting public and private sector investments in novel low carbon technologies to take advantage of the opportunities presented by the emerging low carbon economy.

Our research finds that we (the three LEPs forming the tri-LEP) have significantly reduced carbon emissions over the last two decades and we are on our way to meet the 2020 targets for the region. The power sector has significantly contributed to achieving this target. However, we will not be able to meet the upcoming fourth and fifth Carbon Budgets from the contribution of the power sector alone: we will require contribution from all sectors, in particular from the heat and transport sectors, to achieve the targets for reduced emissions and the decarbonisation of the supply of energy. Our strategy has identified five Priority Themes and a number of project models to tackle the twin goals of decarbonisation and clean growth. These Priority Themes and associated Project Models are listed in Table 1 below.

Five Priority Themes	Project Models
Low carbon heating	• #1 District Heat Networks rollout • #2 Off-gas grid homes • #3 Hydrogen injection into the Natural Gas grid • #16 New-build homes on hydrogen grid
Energy saving and efficiency	• #2 Off-gas grid homes • #9 Energy Efficiency in homes • #10 SME Support Programme
Renewable generation	• #4 Offshore wind development • #5 Solar and microgrid on landfill sites • #6 Biomass fuel supply chain development • #7 Solar energy for Network Rail • #8 Car parks - solar potential • #17 Biofuel evolution

Five Priority Themes	Project Models
Smart energy system	• #5 Solar and microgrid on landfill sites • #11 Housing and community microgrids • #12 EV charging & hydrogen-fuelling infrastructure • #15 Setup of ESCO / MUSCO infrastructure • #18 Support developments in CO2 capture
Transport revolution	• #12 EV charging & hydrogen-fuelling infrastructure • #13 CNG fleet fuelling • #14 Ports - modernisation of energy infrastructures

Table 1: Five priority themes and Project Models from the Action Plan

The eighteen Project Models are intended to act as beacon projects that demonstrate the commercial and technical viability of the concept, attract significant inward investment and enable greater scale up and adoption, where necessary extending out from the initiating LEP for delivery across the tri-LEP territories. They provide a practical and impactful way of delivering the twin goals of decarbonisation and clean growth for energy in our region. Our estimate indicates that the total investment required will be in excess of £14.755 billion which will help us to meet the required emission reduction target for 2032. The benefit to the local low carbon economy will be significant, with over 75,000 direct jobs secured and created.

It is clear that the scale and ambition embodied in this local energy strategy and accompanying Action Plan is massive, requiring strong leadership, the deployment of significant resources and investment, a lot of which is perhaps not in place today. We intend that this call for action will facilitate a clear, collective effort across our region from multiple stakeholders, the potential for inspiring and meaningful change being self-evident. But it must be remembered that many of the simpler and more impactful interventions have been delivered already, so there is significant risk that the aspirations will not be realised in the absence of the commitment of each and every one of us.

The comprehensive package of Project Models set out in this local energy strategy provides a practical and evolutionary framework that will deliver benefits not only over the coming decades, but also in the immediate future. The 5 priority themes drive key actions which we will take forward in the immediate future, including:

- Heat is responsible for a substantial proportion of emissions in the tri-LEP region. All efforts will be made to move households and businesses towards low carbon forms of heat, such as district heat networks (DHNs).
- We will roll out greater numbers of renewables, including quick-wins through the deployment of solar PV at disused landfill sites, for example. Not only would this displace fossil fuel generation but it would also provide a reliable revenue stream for Local Authorities and local people.
- Energy efficiency programmes will be rolled out to reduce energy consumption across Industrial / Commercial and Domestic subsectors.
- Utilisation of smart technologies such as microgrids in communities to address network constraint issues; and identify new supply models for the benefit of business and domestic consumers.
- Facilitate the transport revolution, for instance by building EV charging and Hydrogen refuelling infrastructure in our region, not only to support decarbonisation and clean growth but also to provide a modern and reliable transport system for our next generation.

- Finally, longer term interventions like the establishment of hydrogen gas grids not only to slash emissions but also to play a leading role in the global transition to a low carbon economy.

However, technology does not hold all the answers. Therefore, we will further support these five priority themes with a whole range of non-technological measures that will help to address problems in the energy system and drive forward the low carbon economy, such as policy interventions and investments in behavioural change programmes.

Ultimately, this strategy contends that we can and must do more to improve the way our energy system works so that it protects our greatest assets - our community, businesses and environment - and it supports our economic growth plans long into the future so that we may capitalise on the many opportunities offered by the low carbon economy.

1. Introduction

Energy matters. The way it is generated, distributed and consumed affects our economy and environment, as well as the health and wellbeing of our communities; and it is crucial to our national and international climate change ambitions.

But the energy system that has served us for more than 120 years is in the midst of great change, driven by the emergence of new technologies and a growing social consensus around climate change and sustainability. Analysts from across industry, government and academia agree there is a global trend away from high-carbon economies and towards a low-carbon alternative. This transition presents a significant opportunity and an enormous challenge for both the public and private sector. Success hinges on us developing a coordinated approach to the way we deploy policy, technology and capital spending so that we use our resources effectively and support our businesses to exploit new opportunities from around the world.

We will be at the forefront of this transition, along with other Local Enterprise Partnerships (LEPs) around the country, working in partnership with the public, private and research sectors to drive economic growth. The Department for Business, Energy and Industrial Strategy (BEIS) has empowered LEPs to take a more active role in the energy eco-system of their area and provided funding to establish local energy strategies like this one. The five new Local Energy Hubs that have been set up across England will work under the direction of LEPs to deliver impactful energy projects that support the national trajectory for decarbonisation, and stimulate and develop the low carbon economy[4].

This local energy strategy was developed by three LEPs - Coast to Capital (C2C), Enterprise M3 (EM3) and South East LEP (SELEP) – and covers a geographic area from Essex to Hampshire, representing a large swathe of south east of England. Driven by our Strategic Objectives, we firstly analyse the whole energy system - electricity, heat and transport - and articulate the opportunities and challenges facing the region. From this, we determine five priority themes which help us to focus and conceive an Action Plan of Project Models to attract investment, help to fuel the growth of our low carbon economy and, in the process, to reduce greenhouse gas emissions.

1.1 Background

This Energy Strategy is, in part, a response to the Government's Industrial Strategy Grand Challenge of achieving clean growth. Our objective is to explain how the tri-LEP region will reduce its emissions and stimulate the low carbon economy. The whole energy system has been assessed over a timeline from now until 2032, and includes electricity, heat and transport. The scope of the strategy is to:

- Provide a clear analysis of the energy opportunities and challenges for the region
- Estimate energy demand and carbon emissions, and the changes required
- Determine the energy and low carbon priorities for the tri-LEP area
- Develop a pipeline of potential energy and low carbon investment projects
- Develop an Action Plan with appropriate responsibilities identified
- Identify potential funding options to deliver low carbon energy projects
- Recommend arrangements for governance and delivery of the strategy
- Provide conclusions and recommendations

[4] Department of Business, Energy and Industrial Strategy, "Association for Public Service Excellence", January 2018 [online]

1.1.1 Growth and Productivity

This Local Energy Strategy is central to local, regional and national plans for economic development. It will be used by the three LEPs to help deliver their Strategic Economic Plans. It will shape the development of emerging Local Industrial Strategies and therefore support economic growth in the region. It will be used by the Department for Business, Energy and Industrial Strategy (BEIS) to inform policy decisions and to understand the range of energy opportunities and challenges across England, and how they relate to the Industrial Strategy and clean growth. It will also form the basic planning for the Greater South East Local Energy Hub to develop and prioritise a pipeline of local energy projects to be taken from concept through to business cases that attract investment and are then taken forwards to implementation.

The Government's focus on increased productivity through the Industrial Strategy and the ability of SMEs to scale-up across the tri-LEP region in order to contribute to UK growth and export, is key to all three LEP Strategic Economic Plans. However, this local energy strategy has not sought to replicate broader thinking and activity to support business scale-up across sectors. Instead, the aim has been to examine the potential of local energy consumption, production and associated project models to stimulate innovation, supply chains and higher skilled employment across businesses, thereby helping to tackle the productivity gap.

1.1.2 Strategic Objectives

It is very important that the purpose of our Local Energy Strategy is understood when read, integrated and implemented in the context of the actors and structures outlined above. Therefore, we have identified the following strategic objectives to realise our vision, which will underpin the delivery of the Strategy and Action Plan. This energy strategy will:

1. Enable the tri-LEP region to decarbonise in line with the national trajectory as set down in the Climate Change Act

2. Position the tri-LEP region as a centre for innovation in the low carbon sector; where new concepts and technologies are demonstrated and commercialised to drive clean growth

3. Foster clean growth across the region, supporting fledgling low carbon businesses to evolve and prosper

4. Ensure that all energy produced, distributed and consumed across the region is clean and low-carbon

5. Ensure that local people and society are beneficiaries of the energy strategy and its delivery, both directly and indirectly

The Project Models that form the basis of the Action Plan are the tangible means of meeting these Strategic Objectives.

2. The position today

The tri-LEP region as shown in Figure 1 is a dynamic and industrious area, an economic powerhouse with a growing population, situated within an ancient and beautiful natural environment. The community and stakeholders have a real ambition to support the transition to a low carbon economy. The area is rich in natural resources such as high levels of sunshine, accessible wind resources, significant woodland assets and, outside of the major conurbations, a great deal of land space to expedite the harvesting of renewables. Importantly, the key regional players – the public sector, utility companies, industry, universities and land owners – are all keen to engage and support investment in new technology. What's more, the large amount of development that is taking place offers significant opportunities to pioneer new ways of generating, distributing and consuming energy.

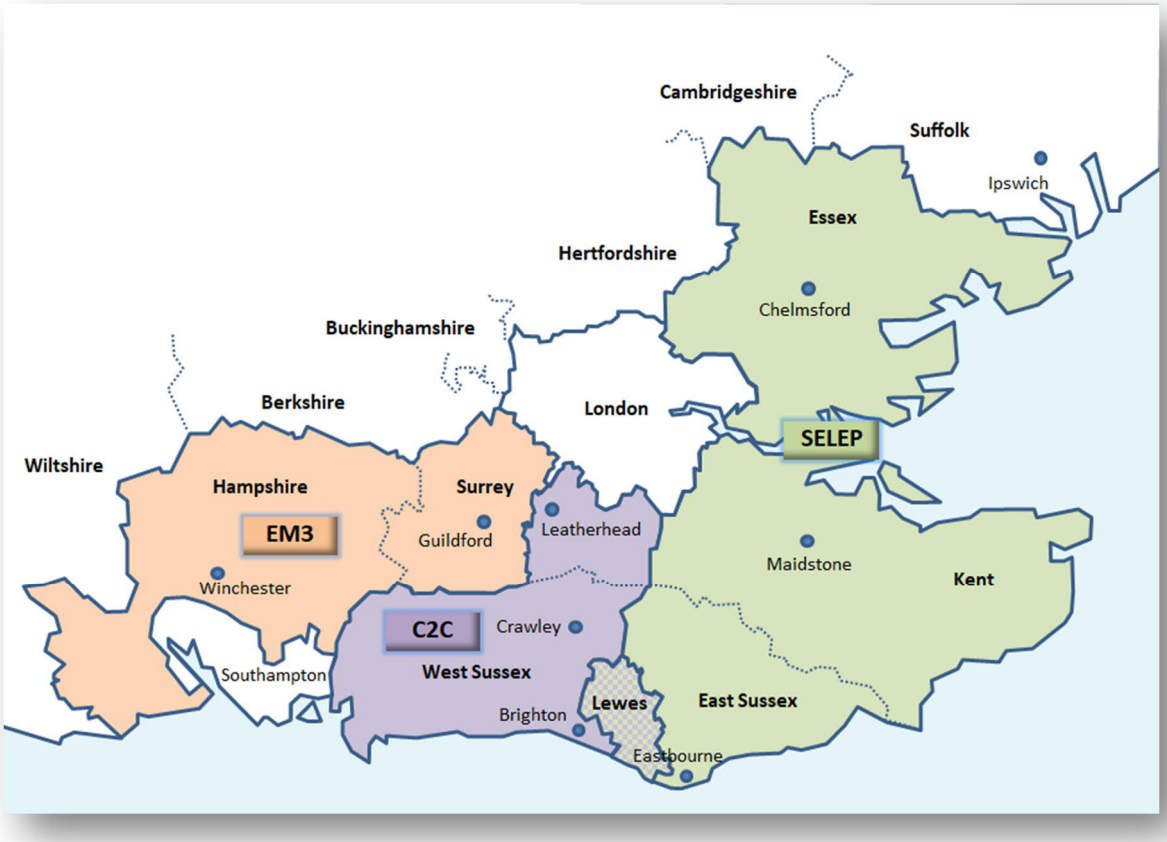


Figure 1: Geographic responsibility of the tri-LEP

On the other hand there are several challenges that we need to overcome. There is quantitative and qualitative evidence to show the region is affected by heavily constrained electricity networks. And there are other factors such as energy-inefficient housing stock, which risk undermining economic growth and slowing the pace of decarbonisation. It is clear that the local community has enjoyed only limited benefits from the emerging low carbon economy, and so reform is needed to reverse some of the ineffective outcomes of current arrangements.

2.1.1 Emissions and energy data

The UK has achieved tremendous progress through the last two decades in reducing energy-related greenhouse gas emissions, dominated by the power sector. The tri-LEP region currently stands at 37% reduction in emissions from the 1990 level as illustrated in Table 2.

Year	Carbon budget level (ktCO2e)	Reduction below 1990 levels
1990 level	64,312	-
2015 level	40,517	37%
2032 target	27,654	57%
2050 target	12,862	80%

Table 2: tri-LEP emission levels and targets from power, heat and transport sectors

The UK's commitment through the current UK Carbon Budget requires an achievement of an overall 57% reduction in CO2 emissions from 1990 to 2032. As we represent a significant region of the UK, the tri-LEP urgently needs plans to cut the CO2 emissions in line with this commitment, particularly as there is a legal duty underpinning this.

2.1.2 Emissions trajectory

The emissions in all three LEP geographies have fallen substantially since 2005, showing a downward trend that is in-line with the national trajectory, as per Figure 2. The combined emissions in the tri-LEP geography reduced by 28% over the period 2005 to 2015, which can be attributed to a number of factors including the increasing efficiency of motor vehicles and the near elimination of coal fired generation from our power system. Although the trend is positive, it must be remembered that many of the simpler and more impactful decarbonisation interventions have been delivered already.

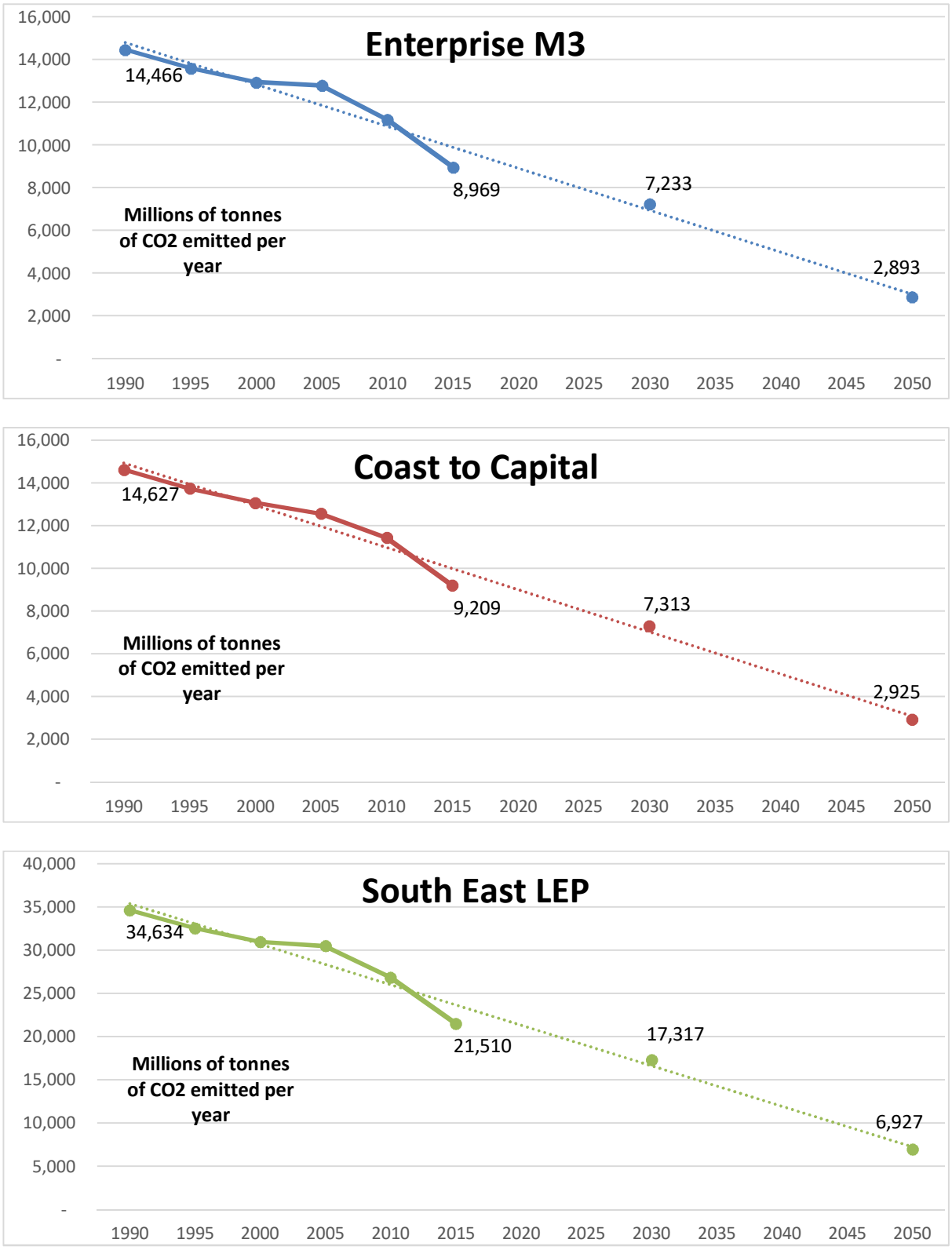


Figure 2: Decarbonisation performance and projection for the three LEPs

Using regional population statistics, we have plotted the per capita emissions factor for each LEP area (Figure 3). The national average is 5.9 tonnes of CO2e per capita, and so both the SELEP and

C2C regions are performing well, however the EM3 region produces slightly more emissions per person than the UK average.

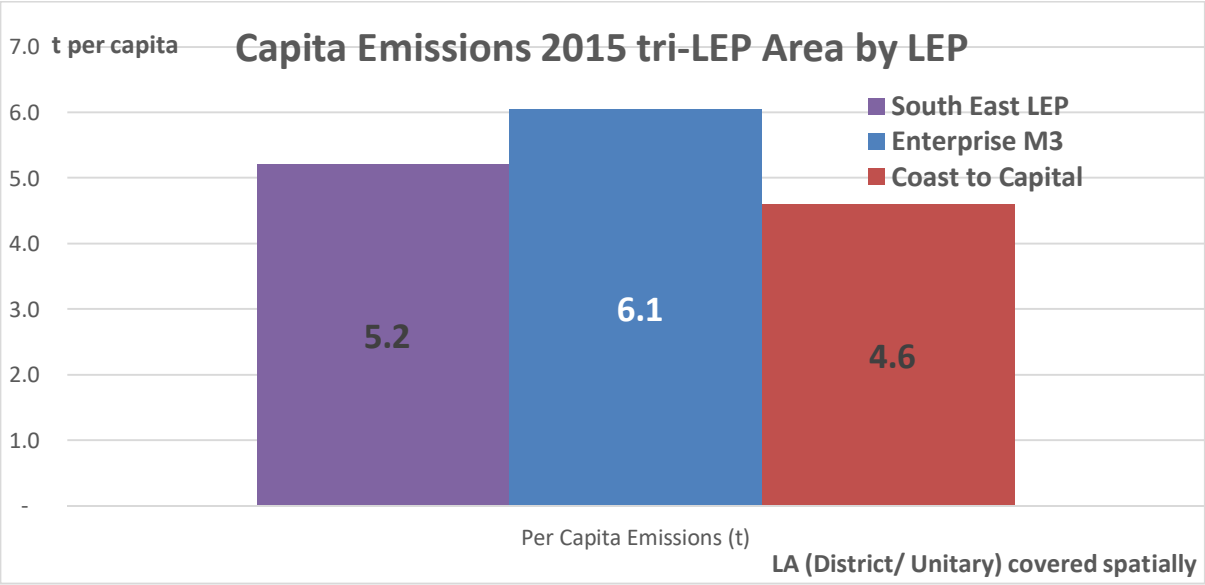


Figure 3: Per-capita emissions performance for tri-LEP area (2015)

Within each LEP area, transport represented the biggest cause of emissions, as shown in Figure 4. Road transport is responsible for 40% of the emissions in the tri-LEP region and is one of the biggest contributors to air quality issues in the area's towns and cities.

Over a third of the energy used in the tri-LEP region is to produce heat and it accounted for over 10 million tonnes of CO_2e in 2015, around a quarter of total emissions. Not only does heat have a big impact on the environment, it also affects the economy - as a country we spend £32 billion a year on heating and about 75% of industrial energy use is for the production of heat. One of the reasons for the high consumption of heat is that the UK's housing stock is amongst the least energy efficient in the world.

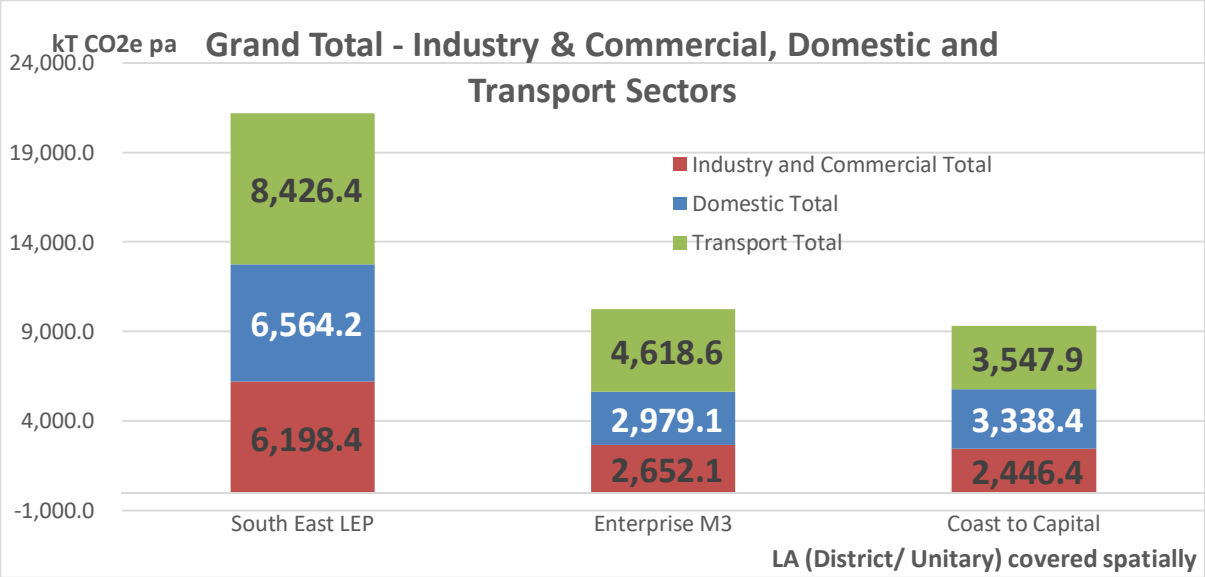


Figure 4: Emissions performance by Sector for tri-LEP area (2015)

Some areas of the tri-LEP region have been able to reduce their emissions more quickly than others since 2005, as per Figure 5. It must be stressed the reductions are not all down to energy efficiency measures, for instance Thurrock was able to achieve a 50% reduction due to the closure of Tilbury Power Station. However in general the data shows that every district is reducing emissions with a spread of some 25%, broadly in line with each other to 2015.

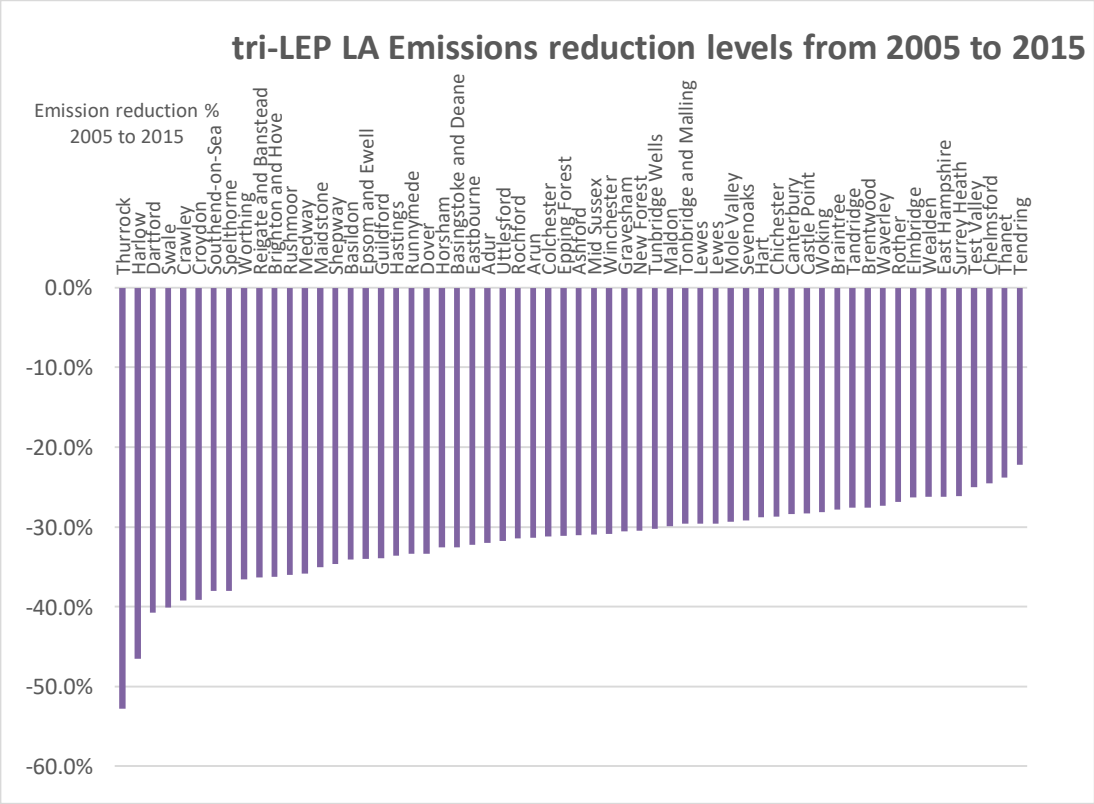


Figure 5: Emissions reduction by District/Borough in the tri-LEP region
(*N.B. full district data which does not necessarily reflect the split of districts by LEP)*

2.2 Energy Demand driving Clean Growth Opportunities

The demand for energy by society, along with generation and supply, is directly tied to greenhouse gas emissions. Therefore, it is essential to understand the progression of the use of energy in terms of its sectorial split and how it is distributed across the tri-LEP region. As the life blood supporting commercial growth, domestic life and transport, the consumption of energy in 2032 (the end of the fifth UK Carbon budget period) is projected to be substantially the same as present, with UK energy demand changing less than 3% when compared between 2018 and 2032[5]. This is in part because reductions from efficiency gains such as industrial process efficiency, the implementation of smart networks, domestic white goods being more efficient, (etc.) will be balanced by increases from the growth in population and the associated developments in business and society in general.

Figure 6 shows the energy demand for 2015 and 2032 by each tri-LEP region that will be allowed under emission targets – for the overall tri-LEP region this being to the order of 146.27 TWh in 2015 down to 98.82 TWh by 2032.

[5] Department for Business, Energy and Industrial Strategy, "BEIS 2017 Updated Energy & Emissions Projections - Annex E Primary energy demand" and "BEIS 2017 Updated Energy & Emissions Projections - Annex F Final energy demand", 2 January 2018 [online]

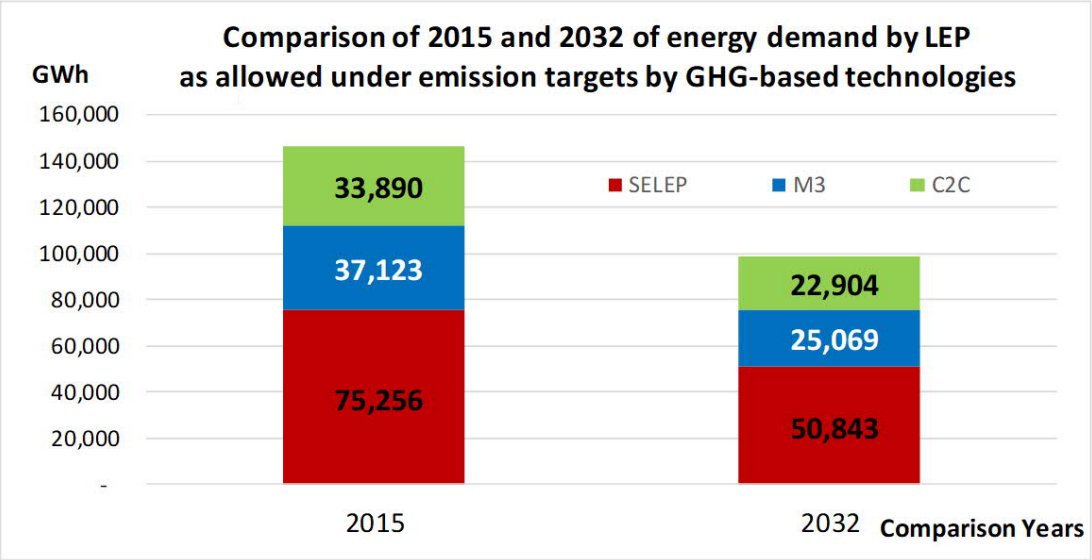


Figure 6: Comparison of energy generation from GHG-based technologies for 2015 to 2032

The required reduction in GHG emission between 2015 and 2032 is not going to be met by a reduction in energy demand by society in general. So this "gap" must be met by transitioning from fossil-fuel based generation sources to low carbon and zero carbon power generation sources. There are four methods to this:

- firstly, decarbonisation of the large-scale, national energy generation sources - examples being the removal of oil and coal-fired power stations from the UK's generation mix;
- secondly, developing low-carbon generation sources at (or near) the point of consumption, such as having wind farms and solar photo-voltaic installations near consumers in the tri-LEP region;
- thirdly, reducing consumption from GHG-intensive sources, for instance by switching to electric vehicles for transport or undertaking energy-efficiency measures in properties heated by oil or coal; and
- fourthly, improving energy efficiency in the industrial and built environment, both domestic and business, to stop waste.

This is considered in Figure 7, which shows the sectors making the greatest demands for energy within the scope of our local energy strategy and the energy demand "gap" to be met by "clean" power generation in 2032.

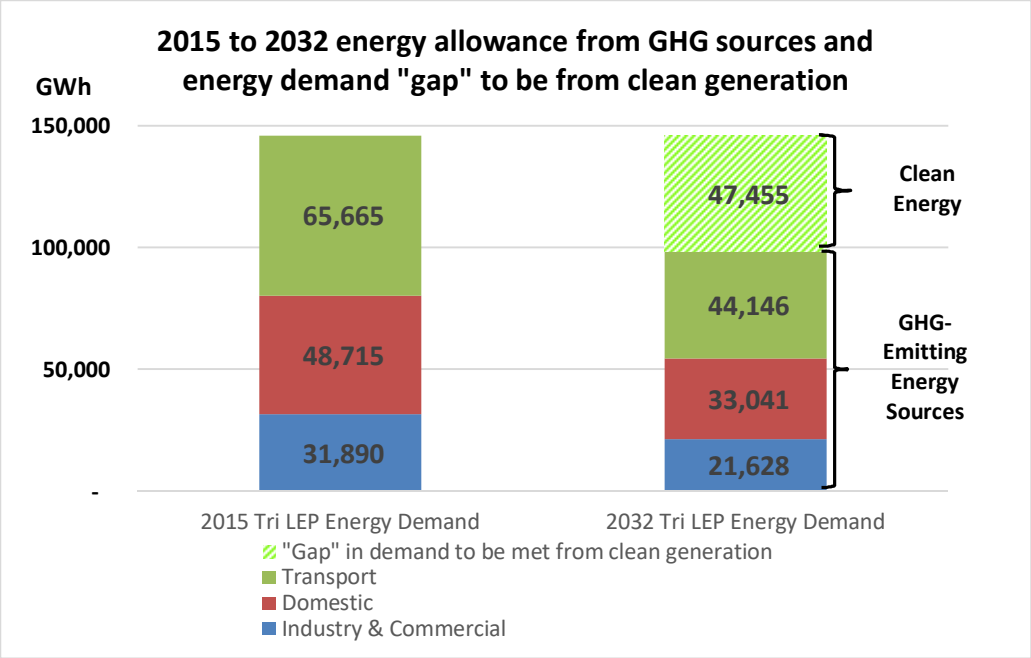


Figure 7: Comparison of 2015 to 2032 energy demand by Sector, highlighting energy "gap" to be met by clean energy

By focussing our individual LEP attention as in Figure 8 on applying the four methods outlined to the Industrial & Commercial, Domestic and Transport sectors, we can hope to be most effective in attempting to meet the targets through prioritisation of the resources we have available.

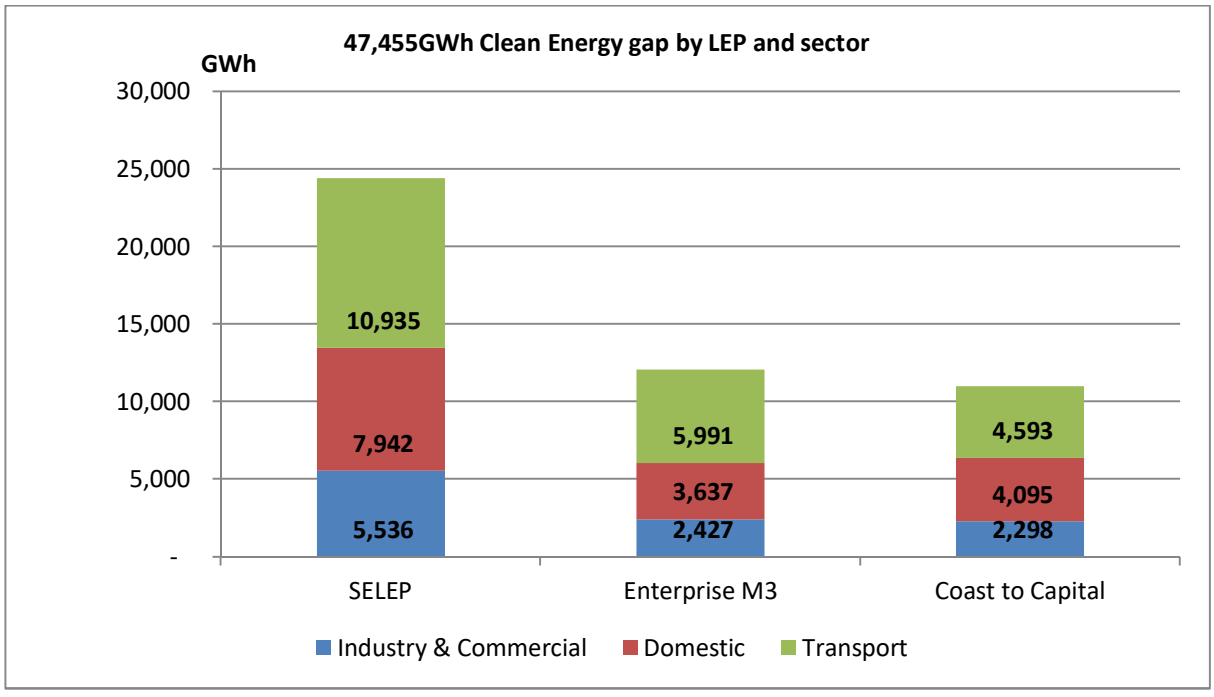


Figure 8: The energy gap mapped to LEP and sector

By 2032, the tri-LEP region needs to have in place clean power generation capability to supply approximately 47,455 GWh, otherwise the region will not meet its 2032 Carbon Budget levels or potentially, the energy demand requirements of the region.

To put this into context, the total domestic demand in 2015 for electricity, gas and other fuels across the tri-LEP region was 48GWh. So, one way to meet the target would be to deliver the energy, heat and cooking needs of all 3.4 million homes within the tri-LEP region from low- or zero-carbon sources by 2032.

The aim of the Energy Strategy is to demonstrate how this clean energy will be developed, aligned with the national policy that will drive local action on energy.

We have considered the opportunities and challenges facing the tri-LEP region and, by targeting generation, supply and efficiency interventions, this leads us to 5 priority themes that are detailed in the following sections. These have direct additional benefits including meeting the power generation requirements, but also securing inward investment, stimulating business and creating jobs that will help us develop clean growth.

The means by which we can meet the required clean power "gap" is provided by our Action Plan and the associated Project Models. These concurrent, aligned and interlinked activities show scaling and timelines for development that will ultimately win investment and develop the supply chain supporting Local Economic Growth in accordance with our individual Strategic Economic Plans. As can be seen in Figure 9, the themes, Action Plan and Project Models actually meet the clean power gap with an additional 2.4% headroom.

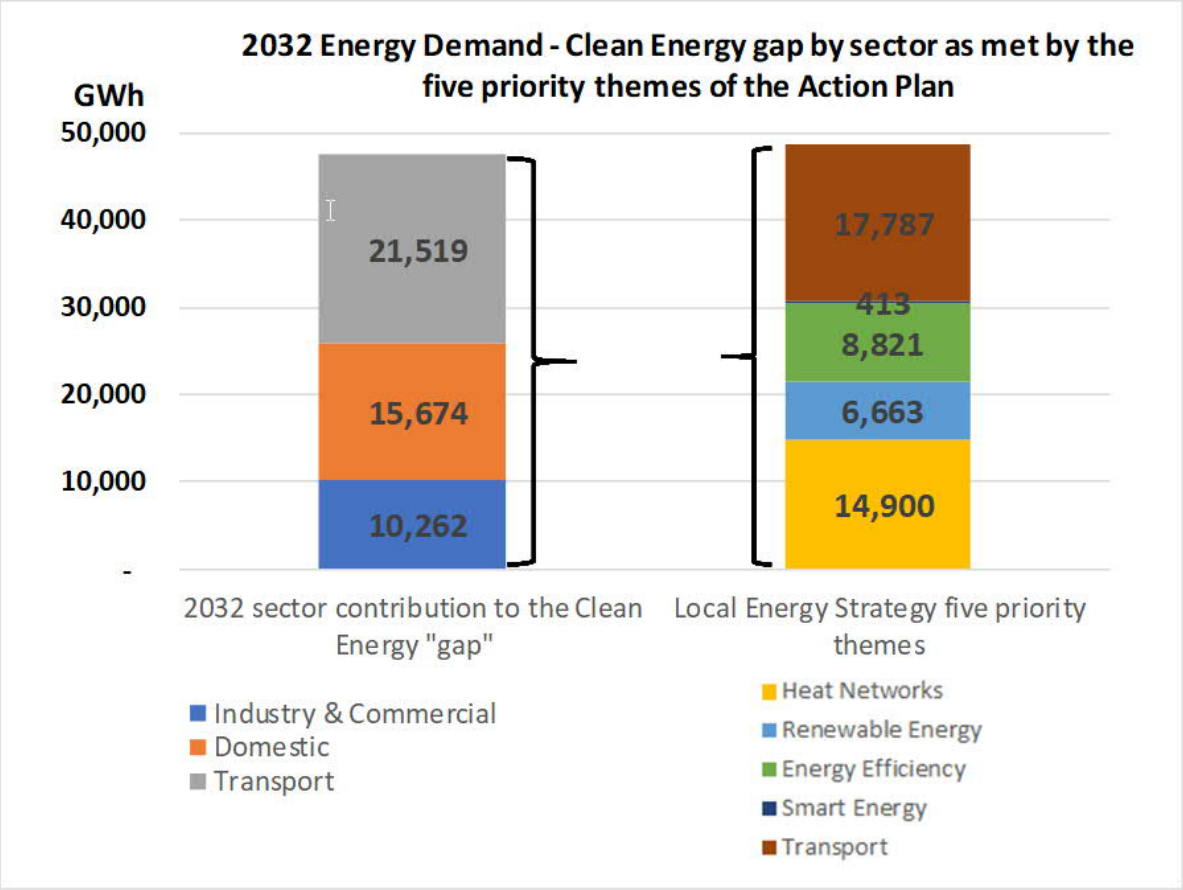


Figure 9: 2032 Clean Energy Demand met by Clean Power Themes

Based on our research, we have engaged stakeholders, researched the available data and built the project finance case using our Intelligence Tool, while keeping an eye to innovation. Underpinning this is an alignment with national policy so that we can aim to deliver the Project Models for each of our LEP areas in accordance with our local context. Evaluation of the emissions and the power demand showing the necessary split into the areas of Electricity, Heat and Transport is key, as it has enabled this process of collaboratively identifying a wayforward utilising both technical and non-technical means as the basis of this Local Energy Strategy.

2.2.2 The key opportunities for the tri-LEP region

Evidence from data analysis and stakeholder engagement highlighted significant opportunities that the tri-LEP will develop as part of a coherent strategy. These include:

- **Significant renewable potential:** The South East ranks third in England for the amount of electricity generated from renewable sources[6], calculations show that solar PV schemes can produce up-to 36% more electricity than elsewhere in the UK[7]. As Figure 10 shows, with the country's highest levels of solar irradiation, the majority of the South East's renewable generation comes from solar. The solar levels in the South East are comparable with that of central European countries, including

[6] RegenSW, "Renewable energy: A local progress report for England", 2016 [online]
[7] National Renewable Energy Laboratory, "NREL's PVWatts Calculator", [online]

Germany, which generates about 7% of its electricity from solar power[7]. Additionally, where deployed, onshore wind energy projects in the South East rank third in the UK for the capability with which they utilise the wind, with a load factor of 25.3%[8]. This shows there is further opportunity for both on and offshore wind. Significant contributions from both Energy-from-Waste and Landfill Gas are then the foundation for the South East's high electricity generation capability from renewables.

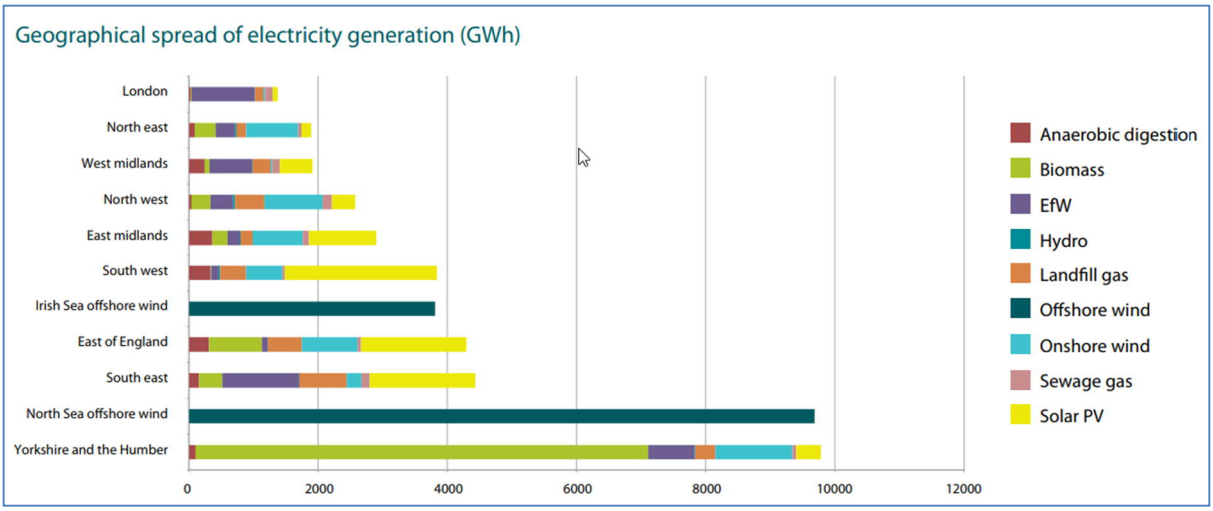


Figure 10: South East and London rank third for renewable electricity generation by region, 2016[6]

- **Rich in natural assets:** Woodland covers 15.6% of the South East, making it the most wooded area in England compared to a national average lower than 10%. In some areas like Surrey, woodland cover is as high as 25%, which makes it England's most wooded county[9]. This natural asset could be utilised to generate clean economic growth and displace fossil fuels from our energy system. The Forestry Commission estimates that if 75% of woodland cover was sustainably managed, this could provide 1,000,000m^3 per year of wood-based products and biomass into the South East economy[10].

- **Large amount of development taking place:** The population of the south east of England is expected to grow by 8.1% between 2014 and 2024, equating to more than 700,000 additional people[11]. The National Housing and Planning Advice Unit states that up-to 53,800 new dwellings need to be built in the region every year until 2031[12]. Consequently there is a significant amount of new development taking place across the area, with thousands of new homes and commercial properties planned in places like Manydown (3,200 new homes near Basingstoke), Burgess Hill (5,000 new homes in Mid Sussex), Otterpool (10,000 new homes near Folkestone) and the three new North Essex Garden Communities (43,000 new homes). With this comes a great

[8] Statista, "Onshore wind energy load factors in England in 2016, by region," 2016 [online]
[9] Surrey Tree Warden volunteers, "Surrey Tree Wardens", http://www.surreytreewardens.org.uk/englandsmostwoodedregioninventory.pdf
[10] Forestry Commission England, "South East & London wood market update," London, 2017
[11] Office for National Statistics, "Subnational population projections for England," 2014 [online]
[12] National Housing and Planning Advice Unit, "More homes for more people: advice to Ministers on housing levels to be considered in regional plans," London, 2009

opportunity to deploy new energy system models that enable greater integration of renewable energy sources with overall infrastructure such as transport, heat, water, waste water, waste management, etc. to achieve a self-sufficient and sustainable eco-system for these new developments.

- **Key sectors are already engaging:** The tri-LEP region is home to 18 universities, 929 thousand enterprises and 1.06 million SMEs[13], many of which will be keen to develop specialisms that allow them to prosper in the emerging low carbon economy. A good example of this can be seen at the University of Chichester, which has plans in place to develop a hydrogen production facility in the region that could help to decarbonise the transport sector and support thousands of new jobs. Another example is Southern Gas Networks (SGN), the gas distribution network operator, which has a workforce perfectly equipped to build, operate and maintain new district heating networks.

2.2.3 The key challenges facing the tri-LEP region

In addition, several challenges for the region have been highlighted which the strategy needs to address. These include:

- **Electrical grid constraint prevents growth and development:** At every engagement workshop, attendees pointed out that limitations on the congested electricity distribution grids operated by Scottish and Southern Electricity (SSE) and UK Power Networks (UKPN) significantly limit new connections, particularly for generation projects. Progress is being made: UKPN and National Grid for instance have launched a new active network management scheme to boost grid capacity and simplify the connections process for generators[14]. However, much more innovation is needed to ensure new housing developments can go ahead without significant grid connection charges that often render such projects uneconomic.

- **Waste heat is not utilised efficiently:** Nearly half the energy we use is for heating of one sort or another. UK Government figures in 2013 shows that almost three-quarters of industrial energy use is to provide heat, often at very high temperatures[15]. Much of the 'waste' heat is discharged into the atmosphere, despite the fact it could be reused in a number of ways within the same facility for heating or cooling, by another end-user (e.g. via a heat network), or by converting the waste heat to power. One recent study has shown that it is commercially viable to recover 5 TWh/year of industrial heat in the UK each year[16]. Not only would this help to reduce emissions it would also make our businesses more competitive and help to stimulate the low carbon economy.

- **20% of homes are not connected to the gas grid:** Whilst natural gas is a fossil fuel, it produces significantly lower emissions than fuels like heating oil, which are often

[13] C. Rhodes, "Business Statistics: Briefing Paper Number 06152," House of Commons Library, London, 2017
[14] UK Power Networks, "Power network reveals next steps toward a smart future," 28 March 2018 [online]
[15] D. S. Vicky Goodright, "Estimates of heat use in the United Kingdom in 2013," DECC, London, 2013
[16] Element Energy et al, "The potential recovering and using surplus heat from industry," Element Energy, London, 2014

used as an alternative. Heating oil produces approximately 25% higher CO_2 emissions than natural gas and 95% higher emissions than biofuels like wood pellets[17]. As a consequence the emissions that these houses produce are disproportionately and unnecessarily high. Fixing this isn't easy though: around 90% of these homes are EPC (Energy Performance Certificate) Level D or below and therefore are not currently capable of integrating low grade (and low emission) heating systems such as heat pumps and heat networks[18]. That means that the low-carbon emission heating technologies would be insufficient to provide the heating requirements of the residents, due to heat leaking out of the property arising from poor insulation and aged structural design.

- **There are real concerns around air quality and emissions:** Pollution across the tri-LEP region is higher than other parts of the country and this has a real impact on the communities that live there. In terms of mortality rates across the UK, the worst 5 performing local authority areas for air quality were Kent, Essex, Hampshire, Birmingham and Surrey respectively[19]. Emissions from transport have been identified as a key contributing factor especially older diesel cars, heavy goods vehicles and buses.

- **The economic value of the energy produced in the tri-LEP region is not retained:** For example, although Kent produces 12% of its own electricity demand, including from renewable wind and solar, local people see relatively little economic benefit from this[20]. This is partly due to the fact the community has little to no equity in the energy generation infrastructure in their area.

[17] Forest Research, "Tools & Resources: Carbon emissions of different fuels," 2018 [online]
[18] Heating Ventilating & Plumbing, "CCC heat pump ambition for off-grid homes is flawed, says Worcester Bosch," 3 July 2018 [online]
[19] Daily Telegraph, "Mapped: Where is air pollution killing the most people?," 13 November 2015 [online]
[20] AECOM, "Renewable Energy for Kent - Part II: Underpinning the Vision," Kent County Council, Maidstone, 2012

3. The route to 2050

3.1 Our five priority themes

In the context of the opportunities and challenges confronting the tri-LEP region, this strategy has identified five priority themes against which Project Models have been developed.

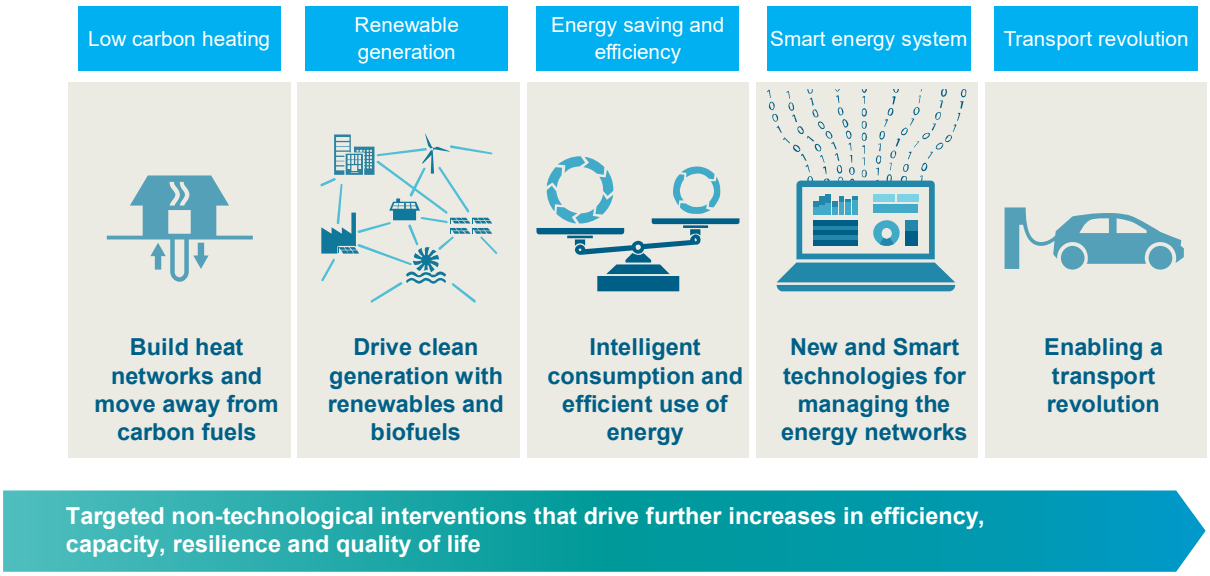
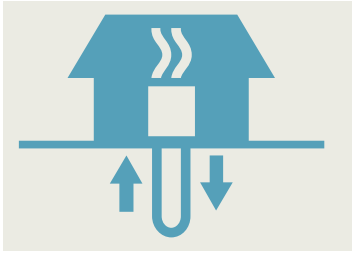


Figure 11: The five priority themes for categorising energy interventions

Further, the five priority themes can be considered as interlinked because they will bring greater benefits when developed as a whole, rather than as stand-alone interventions. Non-technical activities such as support programmes, funding and lobbying into relevant parties for the facilitation and resource support to drive activity forward are also presented. We acknowledge that there are significant criticisms of the non-technical dimensions of energy such as policy, regulation and market design[21], so we will work to adapt such non-technical interventions over time, in response to developments such as Brexit or under new energy legislation.

Low carbon heating: Heat networks and a move away from oil



Over a third of the energy used in the tri-LEP region is to produce heat and it accounted for over 10 million tonnes of CO_2e in 2015, around a quarter of total emissions. Not only does heat have a big impact on the environment it also affects the economy; as a country, consumers spend £32 billion a year on heating[22] and about 70% of industrial energy use is for the production of heat[23].

The provision of heat networks, particularly in urban areas, allows the delivery of low carbon heat to be undertaken in the most efficient manner, whilst improving the overall efficiency, resilience and capacity of the energy system through the connection of Combined Heat &

[21] Dieter Helm's "Cost of Energy Review" of October 2017
[22] DECC, "The future of heating: meeting the challenge," 26 March 2013 [online]
[23] DECC, ECUK: Table 4.7 "Industrial energy consumption by end use (different processes)," London, 2008

Power (CHP) plants, waste heat, geothermal and other zero carbon heat generation technologies to heat networks.

Heat networks, though firmly established in other countries across Europe, provide 12.8TWh per year or only 2% of the UK's non-industrial heat demand, an estimated 14,000 networks serving approximately 492,000 connections across the UK and with a turnover of £300 million per annum. The Climate Change Committee has said that around 18% of UK heat will need to come from heat networks by 2050 if the UK is to meet its carbon targets cost effectively[24]. There are plenty of good case studies that demonstrate the benefits of heat networks. Enfield's award-winning Exeter Road Project[25] combined energy efficiency measures with the installation of a ground source heat pump system to provide a new heating and hot water system to 185 flats. The new heating system is estimated to reduce fuel costs by 80 per cent per flat, saving residents as much as £500 a year.

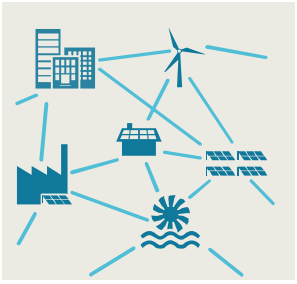
This strategy proposes that the tri-LEP should facilitate the building and extension of heat networks, particularly in new build developments. Through the UK Government's Heat Network Development Unit (HNDU)[26], a number of potential heat networks have been identified already and have received initial funding. Taking these schemes from concept to commissioning should be a priority for the region since they deliver substantial reductions in emissions and provide good rates of return for investors. The Greater South East Local Energy Hub should ensure the public and private sectors work in partnership by sharing information, identifying opportunities to establish heat networks and working together to overcome any technical or commercial obstacles. Local authorities should work closely with developers to ensure these opportunities are not missed and, where necessary, ensure planning consent includes clauses around district heat.

Off-gas grid homes are quite common in the tri-LEP region and evidence suggests 1 in 5 homes are not connected to the gas network. The majority of these homes consequently burn heating oil, which significantly increases the area's emissions. It is the Government's ambition to phase out the installation of high carbon fossil fuel heating in new and existing off gas grid residential buildings (which are mostly in rural areas) during the 2020s, starting with new homes as these lend themselves more readily to other forms of low carbon heating[27]. One of the hurdles for achieving this will be insulation – 1 in 10 homes off the gas grid are so poorly insulated that they cannot currently be converted to district heat or electrical heating like a heat pump. Whilst this should be addressed in its own right, the region should attempt to convert as many of these properties to biofuels such as locally produced wood chip (capitalising on the abundance of woodland cover in the region), therefore stimulating the low carbon economy as well as significantly reducing emissions.

In the future, we should work with key private sector partners to investigate more radical changes such as the introduction of synthetic natural gas and even hydrogen networks. In both cases the gas is produced through electrical power, and in an area like the tri-LEP region with a high renewable potential, this could mean that the gas is produced at near zero operational cost. Hydrogen produces no emissions and can be blended into the existing gas grid (as being piloted in Keele University's HyDeploy project[28]) or even used in a pure form as Southern Gas Network's H100 project has shown.[29]

[24] Competition & Markets Authority, "Heat networks market study - Final report", 23 July 2018 [online]
[25] See https://new.enfield.gov.uk/news-and-events/council-pumps-up-the-heat-on-estate/
[26] See https://www.gov.uk/guidance/heat-networks-delivery-unit
[27] See https://www.gov.uk/government/groups/heat-in-buildings
[28] See hydeploy.co.uk
[29] See www.sgn.co.uk/Hydrogen-100/

Renewable generation: Generating more renewable energy and using biofuels



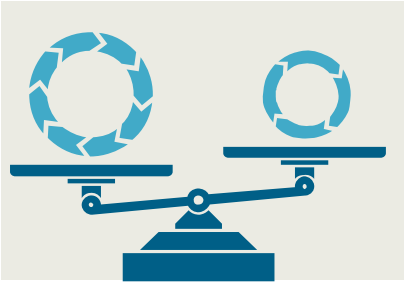
Modelling by the Committee on Climate Change shows that the power sector must be near zero carbon in 2050 if we are to meet our legislated emission reduction targets. This means that we need ultimately to generate more of our power from low or zero carbon sources of electricity, and whilst fossil fuels may still play a role, their emissions will have to be dealt with through carbon capture and storage.

The tri-LEP region is blessed with ample renewable resources such as solar, on shore and offshore wind and coastal and estuarine tides. Due to current planning restrictions on-shore wind and tidal power schemes are difficult to deliver, but solar is commercially viable even without Feed In Tariff subsidies. By utilising space on buildings and land more effectively the region could produce a significant proportion of its own electricity needs. Also, by making it easier for public bodies and communities to invest, it's possible to ensure that the economic value of the energy produced is retained in the local area. With new technology like battery storage becoming cheaper it is possible to circumvent the technical constraints on the distribution networks that have held the region back. A good example of this is the County of Cornwall, which now contributes more than 768 MW of sustainable energy generation to the UK energy mix[30]. Approximately a quarter of this is in local ownership, including the local council owns over 8MW of solar PV and more than 1MW is owned by various community groups. This has been supported by England's first community energy revolving fund with £2.5 million council funds invested by Cornwall County Council to support community energy schemes in the county[31].

There is a huge potential to grow the low carbon economy in the tri-LEP region through investments in renewables. In 2015, the low carbon electricity sector generated over £12 billion in turnover and directly supported 47,000 jobs, with more in supply chains[32]. This local energy strategy shows how the region can capitalise on these opportunities, supporting the growth of businesses but it is imperative that the tri-LEP region understands how the area can utilise and protect its environment in new and innovative ways. We must look at how to drive resource productivity and better manage land use in the coming years. Forestry is identified as a clean growth sector that holds much opportunity. Forestry and wood processing currently provides 43,000 jobs in the UK and contributes £2 billion to the economy. It also provides an important carbon sink – the doubling of woodland cover over the past century means UK forests currently absorb 20 million tonnes of carbon dioxide a year[33]. Recently published natural capital accounts by the Office for National Statistics show that Britain's woodlands provide services of £2.3 billion per year to the economy in terms of recreation, carbon sequestration, timber and air pollutant removal. The government's plans are ambitious: "We will develop a new network of English forests with the right incentives and rules to establish and support new regional and national community woodlands to help reach 12 per cent woodland cover in England by 2060. We have allocated funding to woodland planting to support our commitment to plant 11 million trees."[34] The tri-LEP region is in prime position to take the lead in this sector given it has the highest woodland cover in the country. Working with the Forestry Commission we should look to establish projects that enable greater utilisation of the region's natural assets and help ensure that rural communities are able to take their stake in the emerging low carbon economy.

[30] RegenSW, "Renewable Energy Progress 2016" [online]
[31] Business Cornwall, "Pioneering local energy", 22nd December 2016 [online]
[32] Parliament, "Electricity and Renewables Sector Report", 21st December 2017 [online]
[33] Forestry Commission, "Forestry Statistics 2016" [online]
[34] Forestry Commission England, "Corporate Plan Performance 2018" [online]

Energy saving and efficiency: Domestic and industrial energy efficiency



Improving domestic and industrial energy efficiency is a 'win-win' for households, businesses and the region as a whole. It increases energy security, reduces carbon emissions, and lowers energy bills.

Energy efficient homes are warmer in winter, cooler in summer, and help to protect vulnerable people from fuel poverty. Currently the UK's housing stock is amongst the least energy efficient in the world. This is something that is felt across our whole society - the Building Research Establishment (BRE) has estimated that the cost of cold and damp homes to the NHS is approximately £760 million per year[35].

Almost 79 per cent of homes in England in 2015 had an Energy Performance Certificate (EPC) rating of Band D or better compared to 39 per cent in 2005. Upgrading energy efficiency from an EPC Band E to an EPC Band D reduces energy costs by £380 per year on average. For example, the annual running cost of a Band C rated home are £270 lower than the average Band D rated home and £650 less than the average Band E rated home.

We will consider how to deliver Project Models that address domestic energy efficiency such as insulation schemes, particularly those in fuel poverty, as part of our relevant Project Models. Affordability will be a key consideration, as the recommended changes will need funding that will hit low income households the hardest; and combined with likely escalating energy prices, creates a double whammy for those typically living in poorer insulated homes. We should also lobby to see the reintroduction of policies such as the Code for Sustainable Homes, which was abandoned in 2015. Local authorities should ensure all new developments are delivered in line with the Building Research Establishment's Home Quality Mark (HQM), which is part of the successful BREEAM family of quality and sustainability standards.

Energy efficiency measures should be targeted at the non-domestic sector also, including business, industry and the public bodies like local authorities. The Industrial Strategy contains a commitment to minimising energy costs for businesses, to ensure the UK's economy remains strong and competitive. It recognises that our industrial electricity costs are currently higher than other countries, and addressing energy efficiency is a major step to reduce costs both now and in the future. To do this the government wants to enable business and industry to improve energy efficiency by at least 20 per cent by 2030[36].

We will look to set out and encourage programmes to support organisations to become more energy efficient. One way of doing this could be through industrial heat recovery, a process by which heat generated in or for an industrial process, that otherwise would be wasted, is recovered and reused. This waste heat can be reused in a number of ways, including within the same industrial facility for heat or cooling, by another end user (e.g. via a heat network), or by converting the waste heat to power. Other ways include supporting local authorities to rollout energy efficient technology such as LED street lights wherever possible.

[35] Building Research Establishment, "The cost of poor housing to the NHS", 2011 [online]
[36] Department for Business, Energy & Industrial Strategy, "Helping businesses to improve the way they use energy: call for evidence," 18th July 2018 [online]

The UK energy efficiency sector already turns over £20.3 billion, employs 144,000 people and sells exports worth over £1 billion; and British businesses could save more than £6 billion by 2030 through investment in cost-effective energy efficiency technologies in buildings and industrial processes[37]. But more can be done through modular factory-based construction techniques that deliver new homes and buildings that are less energy intensive to build and more energy efficient to run.

Smart energy systems

The country's energy system is undergoing a transformation as it moves from a rigid, centralised structure to a much more flexible, decentralised model.

The integration of large amounts of solar and wind generation has changed the way our electrical system operates and placed it under considerable strain, primarily because the modernisation required has not kept pace with the rate of change and type of demand in society. Generation availability maps show that large swathes of the tri-LEP region are under severe constraint[38]. To add to this, over the next ten years we will see a revolution in transport where millions of electric vehicles become connected to our grid[39]; and at the same time we expect to see the electrification of heat as well as power hungry technologies such as heat pumps become more common. This could threaten the stability of our energy system and make it more vulnerable to faults and outages. It could also significantly increase the cost of our supply because of the need to pay for expensive reinforcement measures. Finally, it may also harm our decarbonisation efforts and our economy as grid constraint holds back the rollout of renewable generation and the development of new construction projects such as garden communities and towns.

Smart energy systems can improve network stability by helping to establish a balance between generation and demand. In conjunction with energy storage devices, they enable distributed energy producers to be integrated into the grid on a larger scale. In addition, demand management processes can be used to minimise peaks and balance energy supply. For example, cooling systems can be shut off for short periods, elevators can travel more slowly, and industrial power demand can be scheduled to take place when energy supplies are at their highest level.

Energy storage presents one opportunity to reduce system constraints and improve flexibility on the national grid. It could be built in isolation, co-located with renewable generation or even on an industrial estate to smooth peaks in demand. Integrating smart technologies like this can address capacity constraints and also provide valuable revenue streams to investors.

Another form of smart system could be a micro-grid, which is essentially a locally owned/operated utility grid that provides energy to homes and businesses. Systems like this have been in operation around the world for many years. For instance in the municipality of Wildpoldsried in southern Germany a portion of the low-voltage grid has successfully been decoupled from the public power grid to enable greater penetration of renewables. This network, a so-called intelligent microgrid, has been operated with a high level of stability and without interruptions. Additional decentralised, electricity-generating capacity, such as photovoltaic or biogas facilities, can also be easily added to the

[37] House of Commons Library, "Debate Pack - Energy Efficiency and the Clean Growth Strategy", 7th March 2018 [online]
[38] UK Power Networks "Distributed Energy Resources (DER)" at https://www.ukpowernetworks.co.uk/electricity/distribution-energy-resources [online] and Scottish & Southern Electricity Networks "Generation Availability Map" at https://www.ssen.co.uk/generationavailability/ [online]
[39] National Grid, "Future Energy Scenarios" [online]

community's energy mix whenever required[40]. Such local, independent networks could make an important contribution to maintaining energy supply security in the future by helping to fill demand gaps created by storms, flooding or blackouts.

Another area that could be potentially important for future energy systems is demand side response, where measures are taken by consumers to reduce or reschedule their energy usage at times of peak demand. According to the National Infrastructure Commission (NIC), if 5% of current peak demand was met by demand side solutions the system would be £200 million a year cheaper to run, and consumers could benefit by £790 million. This presents a big opportunity to both industry and the public sector, and so is something that we will consider within the tri-LEP region. The NIC's Smart Power report states, "As demand response technology and energy storage become easier to implement and aggregate into the domestic market, large portfolio owners (such as Housing Associations) will be able to be offer demand aggregation at scale to the National Grid, providing a new set of partners the National Grid can work with to shave peak demand." There are significant benefits for consumers and network operators if we are able to create a more flexible system, mainly driven by the avoided investment in expensive new generation. The benefit to consumers in the UK could be anything from £2.9bn to £8.1bn per year in 2030.

Enabling a transport revolution

Road transport is responsible for 40% of the emissions in the tri-LEP region and is one of the biggest contributors to air quality issues in the area's towns and cities. Public transport is the source of over 7% of all transport carbon emissions associated with English households.[41]

While new cars in the UK are up to 16 per cent more efficient than they were in 2000, to meet the Climate Change Act target almost every car and van on the road will need to be zero emission by 2050. The government has now said it wants to see at least 50% of new car sales and up to 40% of new van sales to be ultra-low emission by 2030 and by 2040 it will end the sale of new conventional petrol and diesel cars and vans.

Over the coming decades it is expected that the number of electric vehicles on our roads will increase dramatically. Bloomberg has predicted 530 million or 33% of the world's vehicles will be EVs by 2040. Figure 12 below shows the rapid pace of progress in the UK, where there are now 160,000 EVs on the road.

[40] See www.iren2.de/en
[41] Joseph Rowntree Foundation, "Distribution of Carbon Emissions in the UK: Implications for Domestic Energy Policy", March 2013 [online]

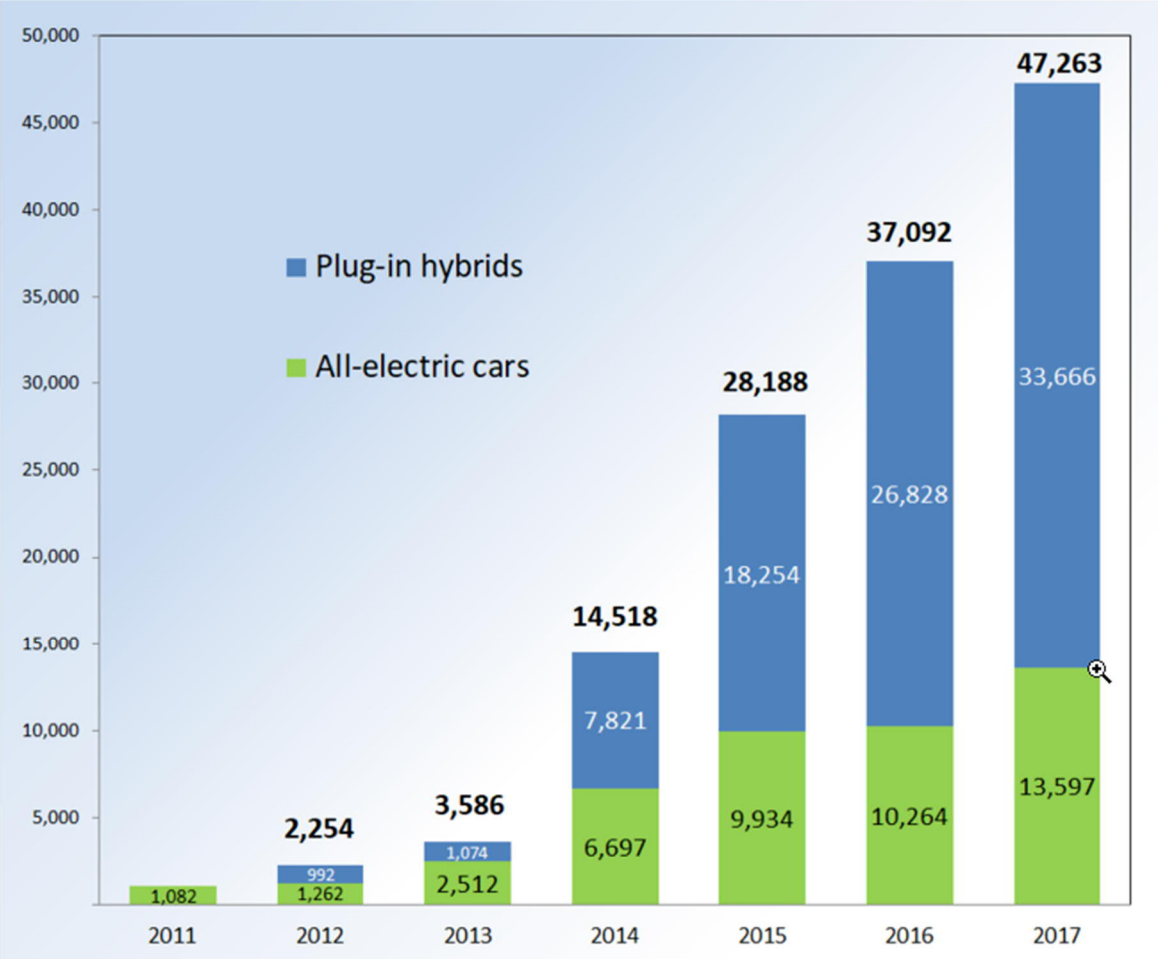


Figure 12: Registrations of plug-in electric cars in the UK by year[42]

Whilst the onset of low carbon forms of transport will alleviate many of the emissions and air quality problems in the tri-LEP region, it will also radically alter the structure of our transport sector such as our fuelling infrastructure. The anticipated growth of the EV market represents a very significant shift in energy usage from petroleum fuels to electricity. This will have a profound impact in terms of the overall demand for electricity, and the peak demand for power that must be delivered to vehicle charging points throughout the country. The challenge for the local network is how to support multiple electric vehicle charging at a low voltage substation level which would typically serve 20 to 100 households. A home EV charging station delivering 7 kW would require a similar level of power as an electric shower. The difference is diversity; householders are not expected to shower for several hours, and not all households are expected to shower at the same time. Therefore network operators, government and local authorities will need to work together to ensure the EV revolution is not held back by issues such as charging infrastructure.

To help this, the Government has allocated an additional £80 million to support charging infrastructure deployment, alongside £15 million from Highways England to ensure rapid charge points every 20 miles across 95 per cent of England's Strategic Road Network. In addition to utilising government funding the region needs to implement a programme to support local authorities, businesses and communities to analyse demand for charging infrastructure and help with the capital cost of installing

[42] Wikipedia, statistics from the Society of Motor Manufacturers and Traders (SMMT)

it. Progress has been made, the region has the second highest number of public charging points in the UK with 1,730. However, much more will be needed to cope with the millions of expected EVs that are set to be bought by UK consumers in the coming years.

This is not to say that EVs are the only solution though. Biofuel, Compressed Natural Gas (CNG) and hydrogen technologies could well play an important part in the wider transportation sector including buses, trains, HGVs and shipping. Heavy goods vehicles play a major role in our economy, 89% of all goods transported by land in the UK and 98% of all food, agricultural products, consumer products and machinery in the UK are transported by road freight[43]. Other types of heavy vehicles such as refuse collection trucks are also in constant transit through our communities.

The Clean Growth Strategy suggests that we need a cleaner public transport system. Low emission buses now represent 13 per cent of all buses in the UK, but the government wants to go well beyond this to achieve significant uptake of ultra-low and zero emission buses. It will seek more use of electric, bi-mode (electric and diesel hybrid) and alternative fuel traction on the railway, and will continue to invest in route electrification where it benefits passengers. Also, road infrastructure needs to be improved. Research by Transport for the South East has suggested that cutting journey times by just a minute on one of the busiest transport routes in the region could add as much as £4.5 million a year to the national economy.[44]

3.2 Intelligence Tool

To identify viable opportunities arising from consideration of the five priority themes in conjunction with LEP stakeholders, we have utilised an Intelligence Tool to conduct high-level technical and economic assessment. Projects were selected and modelled in the tool, with those demonstrating positive business cases being taken forward for more involved investigation with the developers and appropriate parties. New projects or existing opportunities were considered so that we moved towards a shortlist of Project Models for the Action Plan, based on the output of the tool and assessment against a number of criteria formed from our Strategic Objectives.

The Intelligence Tool will be available to review and refine the projects forming or extending from the Project Models as they are delivered. Further, as parties within the tri-LEP region become involved and perhaps broaden the Project Models or even develop new energy projects, the Intelligence Tool will again be used to help model business cases as part of the search for sources of funding and investment.

3.3 The Project Models

The accompanying Action Plan to this local energy strategy is based on 18 Project Models. The Project Models presented have been developed in detail with our Stakeholders and analysis of multiple public data sources, testing of financial models using our Intelligence Tool and ultimately building out from the five Priority Themes identified. These Project Models will act as exemplars, unlocking multiple related projects that can be aggregated into large portfolios to attract major investment; the detail for both the initial stage and associated funding (typically in £millions) and the scale-up opportunities (with estimated portfolio values more typically in £billions) are presented in the Action Plan. The cumulative environmental and economic benefits for the tri-LEP region are covered in the Conclusions and Recommendations for this local energy strategy and highlight what we will

[43] Road Haulage Association, "Road Haulage Facts and Stats" [online]
[44] "Saving a minute on the South East's busiest journeys adds millions to the economy, study shows", 8th May 2018 [online]

achieve for the South East and the UK as a whole. Ultimately, these Project Models create the bedrock for ambitious, large scale undertakings within the tri-LEP area to fulfil our Strategic Vision.

Alignment through the five Priority Themes with national Government policy ensures that LEP and Local Authority discussions with BEIS through the Greater South East Local Energy Hub have a firm base for a constructive dialogue when considering policy lobbying and support funding. This alignment also gives private investors' confidence of Government support rather than conflict. The Project Models are based on developments that give a scale-up opportunity in the south east of England – across the whole tri-LEP region and the Local Authority base. This is not an exhaustive and closed list; further opportunities will exist but are viewed, for instance, as lying under a national government jurisdiction (such as the future nuclear build at Bradwell) that will require a LEP strategic response on a case-by-case basis. Additionally, there are projects that are not specific to the tri-LEPs or relevant to our local energy strategy. An example of this latter case is the development of offshore renewable tidal generation, where there are significant development activities already underway elsewhere, such as the Perpetuus programme on the Isle of Wight under Solent LEP. Such projects that lie outside of the current scope of the Action Plan for whatever reason, may be found in Section 3.4.

The Project Models are split, in the Action Plan, into Short Term (considered "spade ready" for deployment) and Medium term, where more technological development or market preparation and understanding is required.

Five priority themes	Project Models
Low carbon heating	**Project Model #1**: District Heat Networks (DHN) rollout: *What: Support construction of DHN projects across the south east of England* *Why?* England has a target to get 18% of all heat generation and distribution into network infrastructure by 2050. For the Local Energy Strategy, the Local Authorities will aim to deliver projects to achieve 9% for heat within the tri-LEP region by 2032. This shall feed through into the relevant LEP Strategic Economic Plans.
	Project Model #2: Off gas grid homes: *What: Connect off-grid homes to the gas grid* *Why?* Around 30% of homes in the tri-LEP area are not connected to the gas grid and so it is important to find alternative forms of heat for these properties in the coming years. Houses that are less than 50m away from the gas network should be connected and schemes are in place to enable homeowners to do this at minimal cost. A range of interventions to update the heating technology and improve insulation are developed within this Project Model to reduce energy consumption and move all off-gas homes in the tri-LEP region towards sustainable, low carbon sources.
	Project Model #3: Hydrogen injection into the natural gas grid: *What: Create the pathway for hydrogen to be injected into the natural gas grid* *Why?* The UK has a world class gas grid delivering heat conveniently and safely to over 83% of homes. Emissions could be reduced by lowering the carbon content of the natural gas through blending with hydrogen. Compared with solutions such as heat pumps, this means that customers would not need disruptive and expensive changes in their homes to pursue an environmental agenda. This route has the potential to deliver 29TWh per annum of decarbonised heat in Great Britain, saving £8.1 billion and 119 million tonnes of carbon by 2050.

Five priority themes	Project Models
Renewable generation	**Project Model #4**: Offshore wind development: *What: Encourage further inward investment and economic development of the south east of England in offshore wind* *Why?* The UK Offshore Wind Industry has seen a period of significant growth in the past decade, growing from 1.3GW in 2010 to 5.1GW as of 2016, an almost 400% increase in just 6 years, and is on trajectory to reach the 10GW mark as early as 2020. By 2032, installed capacity will have reached 20 GW. Offshore wind opportunities for the tri-LEP area exist with Crown Estate block release in coming years – the LEPS will be a key facilitator in commercialising and supporting supply chain infrastructure developments.
	Project Model #5: Solar and microgrid on landfill site(s): *What: Build solar arrays on council-owned landfill sites to generate an income and reduce emissions* *Why?* Former landfill sites are ideal for solar developments as they have little productive value and require years of remediation before they can be used in a normal productive development sense. The tri-LEP region has a large number of landfill sites – ones now closed and ones that will be closed in coming years. Many former landfill sites had a connection to the electricity grid in order to export electricity from landfill gas engines and, as landfill gas generation diminishes, grid capacity potentially becomes available
	Project Model #6: Biomass fuel supply chain development: *What: Support the development of a biomass supply chain to utilise natural resources of the south east of England* *Why?* The Tri-LEP area has large areas of woodland both in public and private ownership. The yield from the woodland can be taken through a sustainable and localised supply chain to support community biomass heating projects; such projects can be considered both for "on gas grid" situations in the form of urban heating network schemes, but also as potentially being a key provider of an off-grid community heating system.
	Project Model #7: Solar energy for Network Rail: *What: Support the development of renewables to power a significant regional energy consumer* *Why?* In the Tri LEP region the Kent, Sussex and Wessex rail routes together consumed 1.38TWh of traction electricity in 2015/16, at a total cost to train operators of £ 114M. Analysis indicates that each traction substation in the Southern Region should on average be able to comfortably accommodate intermittent supply from a connected ~1MWp solar array. Community Energy South's (CES) members have conducted a high-level audit of land use constraints around the 540 traction substations on the Southern Region. Their findings suggest that around three quarters of these have suitable lineside opportunities for solar development.
	Project Model #8: Car parks - solar potential: *What: Invest in solar car ports to increase utilisation of car park land* *Why?* Through the innovative integration of three technologies, solar PV (in the form of solar carports), battery storage and electric vehicle charge-points, it is now possible to turn carparks into power stations, addressing the challenges of decentralised energy generation while supporting the electric mobility transition.

Five priority themes	Project Models
Energy saving and efficiency	**Project Model #9**: Energy Efficiency Insulation Improvements in Homes: *What: Increase energy efficiency of domestic properties to EPC C or above* *Why?* Central Government's 2032 Pathway programme for homes will see that existing buildings waste even less energy. The Pathway will see a further six to nine million properties insulated with a particular focus on those in fuel poverty, with up to 2.5 million fuel poor homes in England improved to an EPC rating of C or better by 2032 Therefore, we are pulling together a programme of home energy efficiency measures enabling improved levels of loft and cavity wall insulation to assist in homes achieving an EPC rating of C to align with the 2032 Pathway.
	Project Model #10: SME Support Programme: *What: Expand LOCASE programme to whole of south east to develop the supply chain ready for clean growth and low carbon opportunities, by targetting grant funding into small businesses* *Why?* This Project Model is to facilitate SMEs to develop and refocus to be ready to exploit the significant sector changes detailed in this Action Plan. It is proposed to utilise the successful LoCASE grant funding programme model, which originally focussed on gaining energy efficiency improvements from improving process activity in Industry and the commercial arena. The delivery method and processes are applicable to supply chain development, so SMEs will be able to fund new applications of technology and / or reduce none value-added activity (NVA) and / or concentrate energy and people resource on only Value Add (VA) activities. Particularly, this Project Model advocates that the LoCASE programme approach is greatly expanded and becomes a tri-LEP region activity. Under such a scheme, an SME could develop their direct operations, either by investing in process equipment or by undertaking an operational process review, or consider to seize efficiency gains from their indirect operations, such as a move to low energy lighting or improving building fabric insulation.
Smart energy system	**Project Model #11**: Housing and community micro grids: *What: Locally built and owned microgrids on new housing and community developments to increase retention of energy value locally* *Why?* Community microgrids are a way for neighbourhoods, villages, towns and cities to meet their energy needs locally. Increasingly, community microgrids are being explored as an option, even in areas where a larger grid already exists, mainly as a way to increase local energy independence and resilience. With the thousands of new homes that will be built each year in the south east, microgrids offer an excellent opportunity to retain more of the economic value of the energy that is generated locally and enable developers to circumvent constraint issues on the public distribution grid.

Five priority themes	Project Models
Transport revolution	**Project Model #12**: EV Charging and Hydrogen fuelling Infrastructure Scale up: *What: Support ultra-low emissions vehicle charging infrastructure scale up across region* *Why?* The electric vehicle (EV) revolution is imminent, and it will dramatically affect how we use and fuel vehicles, both in the private and public transport sectors. An estimated 38,000 on-street charging points will be necessary to enable members of the public to charge their vehicles conveniently. This level of charging infrastructure will be critical to enable the EV rollout and the wider transition to a low carbon economy. It is understood that Pivot Power, National Grid and other potential providers are already looking for opportunities to invest in these schemes. We will look to work with these solution providers / developers to ensure fully-fledged EV charging or Hydrogen filling stations are established by 2032.
	Project Model #13: Compressed Natural Gas (CNG) Fleet Fuelling: *What: Support roll out of CNG for HGV and refuse vehicles, supporting a shift away from diesel* *Why?* Opportunities exist for vehicle fleet operators to move to CNG as their prime fuel, because it is both lower priced and produces lower CO_2e emissions. To facilitate this change, there needs to infrastructure created for fuelling station capability and also for engine conversion. This Project Model supports the change to CNG and Biomethane by an initial infrastructure deployment.
	Project Model #14: Ports - Move to on-site Renewable Power: *What: Generate more renewable power at ports* *Why?* Our major ports manage most of our export and import of goods required for the country supported by around 2,500 to 3,000 directly employed staff and 30,000 indirect employments at each of the major ports. However, the activities of these ports generate a high level of pollution mainly due to diesel generators powering the ships while at the docks, diesel trailers, large cranes and container trucks. A green energy smart energy infrastructure programme supported by energy storage scheme and EV infrastructure can help us to reduce the emission levels at our ports.
Non-technical intervention	**Project Model #15**: Setup of ESCO / MUSCO infrastructure: *What: Establish local energy companies to offer consumers affordable, clean energy* *Why?* A number of different delivery models exist that could be deployed alongside the Project Models. Examples of this include ESCo (Energy Services Company) and MUSCo (Multi-Utility Services Company). ESCo's and MUSCo's are alternative models of delivering energy and other services to consumers. The tri-LEP will look to setup the ESCo / MUSCo infrastructure (customer services, meter reading, billing management, Regulatory compliance, etc.), likely using an arms-length organisation. This will facilitate multiple Local Authorities to run multiple front-end ESCo / MUSCo's based on their own local priorities.

Five priority themes	Project Models
Low carbon heating (medium term)	**Project Model #16**: New build homes on Hydrogen grid: *What: Build housing development fuelled by hydrogen for heat and cooking, as a demonstrator to convert the entire natural gas grid to hydrogen* *Why?* Gaseous hydrogen can be transported through pipelines much the way natural gas is today. This can be burned for cooking and heating and the only thing that is 'emitted' is water – no carbon or other pollutants. Working with Southern Gas Networks, we will build a new housing development, ideally affordable homes built by a local authority, along with a new polyethylene pipe network to provide hydrogen for heating and cooling.
Renewable generation (medium term)	**Project Model #17**: Biofuel evolution: *What: Build a new economy in the south east of England around biofuels* *Why?* According to the Food and Agriculture Organisation (FAO) of the United Nations, 1.3 billion tonnes of food produced globally for human consumption is lost or wasted every year. The Waste and Resources Action Programme (WRAP) estimate that in the UK this food waste generated more than 20million tonnes of CO_2e per year and if this was eliminated it would be the same impact as removing 1 in 4 cars off our roads. This Project Model would enable investment to drive innovative new business to locate operations in south east and commercialise their ground-breaking bio-fuel technology. Biofuels like bioethanol are widely used across Europe; in the UK for instance most transport fuel is blended with bioethanol to make it 'greener'.
Smart energy system (medium term)	**Project Model #18**: Support developments in CO_2 capture, usage and storage (CCUS) *What: Build a new economy in the south east of England around CCUS* *Why?* Biogas has been considered as the cleanest renewable fuel for transportation by the United States and the European Union. However, since raw biogas mainly consists of methane (CH_4 ~ 65vol%) and carbon dioxide (CO2 ~ 35vol%), an upgrading process is normally needed to remove CO_2 and other unwanted impurities before it can be used. However, the CO2 could potentially be removed from the raw biogas and captured, used and stored instead of being released into the atmosphere. A tri-LEP supported demonstrator facility would the first in the UK and help to establish the south east as a centre for CCUS technology with significant potential job creation and GVA growth prospects.

3.4 Future Project Models

A number of energy technologies, opportunities and projects sit outside the Project Models developed under this Local Energy Strategy. As innovations come to market, or political and social factors change around particular interventions (e.g. a level of social consensus is reached around an energy technology), we will develop our thinking, strategy and associated actions in the following areas.

3.4.1 New Nuclear

The UK has clear set out an expectation that nuclear will be essential to delivering a secure, sustainable and low carbon energy future and that the domestic new build and wider nuclear market will be a key platform to further enhance the UK nuclear commercial base and grow its supply chain capabilities[45]. Around £930 billion investment is planned globally to build new reactors[46] and £250

[45] HM Government, "The UK's Nuclear Future", 2013 [online]

billion decommissioning those that are coming off-line[47]. Added to this is a significant potential market of extending the life of existing nuclear reactors and enhancing their efficiency. In the UK alone, industry has set out plans for several new reactors to follow the on-going development of Hinckley Point C in Somerset which alone with create 25,000 employment opportunities including up to 1,000 apprenticeships and providing 3.2GW of low carbon power.

New nuclear plants can form a major part of an affordable low carbon transition with potential roles for both large nuclear and Small Modular Reactors (SMRs). Large reactors are best suited to baseload electricity production, whereas SMR power plants may in the future be able to fulfil a local operational role to deliver Combined Heat and Power (CHP), depending on the techno-economic viability and safety aspects of such plants.

Notwithstanding the international and national market, there is huge potential to grow the nuclear sector locally in the tri-LEP area through the planned investment in nuclear new build at Bradwell in Essex and Sizewell in Suffolk just outside the tri-LEP boundary and decommissioning (a UK market worth around £3bn a year) at Dungeness. The skills, capabilities and capacity needed for this decommissioning work and new build work locally, nationally and globally are significant.

Going forward, we will consider seriously the requirements for new nuclear power plants for the region to provide base load generation, as it is unlikely that the UK will continue commissioning any more fossil fuel based power plants. These projects, together with providing the long term infrastructure needed to support these activities, and building an important UK nuclear export sector, presents a significant strategic opportunity for the tri-LEP across the nuclear sector, including:

- Capturing opportunities in the home market; both in the tri-LEP area but also nationally
- Enhancing the tri-LEP's innovation and R&D landscape;
- Public sector engagement to attract domestic and inward investment in nuclear projects and assistance to help firms penetrate overseas markets; and
- Ensuring the tri-LEP area has the necessary skills for the future.

3.4.2 Airports

The tri-LEP region is home to two of the UK's main airports, Gatwick (the second busiest in the UK) and Stansted (the fourth), as well as a number of smaller airfields. Airports are vital to local economies, directly and indirectly employing high numbers of people, driving supply chains, connecting International markets and fostering innovation. Aviation emissions have been judged to be outside of the scope of the Strategy given that emissions from International aviation are not directly included in the UK Carbon budget, and thus this Local Energy Strategy cannot implement relevant actions. However, airports are very high consumers of energy and, as with ports, contribute significantly to emissions - the Civil Aviation Authority estimates that the direct emissions from major airports are less than 1% of the total emissions emitted by aircraft using the airports, which would

[46] The World Nuclear Supply Chain: Outlook 2030, WNA, Sep 2012, ISBN: 978-0-9550784-6-0
[47] A Review of the UK's Nuclear R&D Capability, commissioned by the TSB, 2008

indicate some 330 kT CO2e pa[48]. In delivering the strategy at a local level, therefore, links will be made to important airports, their own sustainability and energy strategies and the wider impacts.

3.4.3 Onshore Wind

Despite both numerous existing onshore windfarms and the right mix of resources creating the potential for many more across the tri-LEP region, further development of onshore wind in the short- and medium-term is too problematic to form part of a coherent Strategy and Action Plan. The decision by the UK Government in 2015 to change Local Planning considerations for wind energy developments "so that local people have the final say on wind farm applications"[49] makes development very uncertain to go ahead and effectively uninvestible, so that planning for new onshore wind developments have plummeted by 94%[50]. Further, financing barriers also remain, for instance with onshore wind developers unable to take part in the UK Government's Contracts for Different (CfD) auctions, despite being the lowest cost form of new generating capacity in the UK[51]. The current position is that only national Government action will unlock these issue, which requires both political will and time to implement, and is effectively out of the control or influence of the tri-LEP.

3.4.4 Renewable Generation in the built environment

There are many opportunities to develop the existing public and private sector built environment with the addition of solar and wind technologies underpinned by revenues unlocked with small-scale storage. Across the UK, the latest figures show that over 840,000 homes in the UK have solar panels, and already up-to 10,000 combine this with battery storage[52]. Given the objectives and opportunities of the tri-LEP Local Energy Strategy, this initial good work should be considered for encouragement by Local Authorities, though co-ordinated action may be difficult and will not easily lead to large scale change. Such public-sector led initiative can provide large wins, with Portsmouth (on the edge of the tri-LEP region) having over 5MW generating capacity from solar photovoltaic systems across 300 office and school rooftops, rollout commencing in 2014[53]

Local Authorities can play roles through direct investment, encouraging development indirectly, but also providing the platform for such developments to take place, such as a programme of solar and storage supplier accreditation being implemented in Southend. However, to make significant scale-up to meet the aspirations of this Local Energy Strategy and create a large, investible package attracting significant grants or finance can be more readily achieved over large, uniform, connectible assets under Local Authority control with readily repeatable development process, such as Project Models #5 'Solar and microgrid on landfill sites' and #8 'Car parks - solar potential'. Novel applications such as Combined Heat-and-Power (CHP) developed with storage should also be considered as this Local Energy Strategy is revised and updated.

[48] Civil Aviation Authority, "Information on aviation's environmental impact - CAP 1524", available at https://publicapps.caa.co.uk/docs/33/cap1524environmentalinformation29032017.pdf
[49] House of Commons: Written Statement (HCWS42) by Secretary of State for Communities and Local Government (Greg Clark) on 18 June 2015
[50] Independent, "Environmental impact of policies that led to collapse of onshore wind was not considered by government", 6 May 2018
[51] BusinessGreen.com, "Planning tweak delivers 'glimmer of hope' for onshore wind repowering projects", 26 July 2018
[52] The Guardian, "UK home solar power faces cloudy outlook as subsidies are axed", 27 June 2018
[53] The Portsmouth News, "Portsmouth City Council's solar panel work wins warm praise for a sunny outlook", 25 April 2018

3.4.5 Storage

Growth in the application of storage to energy networks is massive, with the equivalent of two power stations (3,033 MW) being deployed in the UK between 2012 and 2025[54]. Currently, the sector is hampered by revenue uncertainty (e.g. regular changes in the ancillary market underpinned by short-term contracts) and significant fluctuation in technology costs. The sector is forging ahead with projects where storage is a viable component when integrated with other technologies of generation and demand, providing an effective means of supporting both.

For the purposes of this Local Energy Strategy, Storage is viewed it as an enabler, helping to improve the business model and achieve environmental objectives for the Project Models under which it is implicitly applied. Further, the gamut of storage technologies is not limited to the 'hot topic' of lithium-ion battery cells, also novel electrical technologies (including CASF and flow batteries) are being deployed. Also, stakeholders identified pumped hydro schemes (e.g. Winchester and the upper Test Valley) and the use of heat systems such as boilers and CHP under demand response activities.

3.4.6 Wave & Tidal

The Government estimates that wave & tidal stream energy combined has the potential to deliver around 20 per cent of the UK's current electricity needs which equates to an installed capacity of around 30 – 50GW.

The Tri LEP area has a long coastline and several waterways. There is potential to capture renewable energy from some of these water sources. Some of the projects already happening in the area include:

- Pioneering research on wave and tidal power is being conducted at the University of Southampton. The Sustainable Energy Research Group at the School of Civil Engineering and the Environment has collaborated with several industrial partners and the National Oceanography Centre to focus of a wide range of research areas. Scale trials are in progress for the new Anaconda device to design power take off systems and quantify energy yield performance.
- Checkmate Seaenergy based in Sheerness in Kent has worked with Wave Energy Scotland on the Ananconda wave machine which is in development.
- The Port of Dover within the Pro-tide project is investigating the feasibility of a tidal energy power station, testing smaller scale devices in a commercial location. Pro-Tide is an Interreg IVB funded European project that aims to further develop the use of tidal energy systems in North West Europe, focusing on innovative systems operating at sites with small differences in tide levels and/or low flow rates. It is different from other tidal energy projects because of its focus on systems which may be suitable for near-shore locations, estuaries, tidal rivers and coastal defence infrastructure.
- Thames Tidal School in London will be entirely powered by tidal energy from the Thames and will be built to Passivhaus standards.
- Metrotidal Project - Metrotidal is an independent private sector initiative to develop a multi-modal Lower Thames Tunnel with a tidal power plant and new flood defences for London.

We will consider tidal and wave energy schemes in the future revisions of the energy strategy when these projects are technically and commercially viable. Until such time, we will support the relevant research group and scientific communities to undertake the necessary research, development and demonstration.

[54] IHS Markit , "Grid-Connected Energy Storage Market Tracker - H1 2018"

3.4.7 The Circular Economy and Waste Management

The management of the huge quantities of waste produced every day in the UK and south east of England is a significant environmental problem in itself. The opportunities of treating waste or handling it as part of a circular economy afford benefits including as a supply of energy as well as climate-change mitigation in the process. As a significant sector and infrastructure underpinning the functioning of our society, the significant benefits that might be afforded across the environment through sustainability will be addressed outside of this Local Energy Strategy.

4. Funding

Financing the implementation of this Strategy and Action Plan will require significant capital investment from both the public and private sector. Low carbon technology is generally more capital-intensive than the traditional fossil fuel alternative. Therefore rolling-out the Project Models at scale will require access to public funds as well as competitive rates of financing. Thus in Table 3 below, we set out the various funding options available and that we will be seeking to support the Project Models with, as identified in the Action Plan.

Project Model	Project Model title	Investment Envelope £ Million	Grant funded	Public funded	Private investment fund	Finance institution (Pension fund / EIB)	Govt supported scheme (FiT/CFD etc)
#1	District Heat Network rollout	£ 1,440	X	X	X	X	
#2	Off-gas grid homes	£ 334	X	X			
#3	Hydrogen injection into the Natural Gas Grid	£ 1,253	X		X	X	
#4	Offshore wind development	£ 3,000			X	X	X
#5	Solar and microgrid on landfill sites	£ 1,450		X	X		X
#6	Biomass fuel supply chain development	£ 225	X		X		
#7	Solar energy for Network Rail	£ 200		X	X	X	X
#8	Car parks - solar potential	£ 52		X	X		X
#9	Energy Efficiency in Homes	£ 2,154	X	X			
#10	SME Support Programme	£ 50	X	X			X
#11	Housing and community micro grids	£ 713		X	X	X	X
#12	EV charging & Hydrogen fuelling infrastructure	£ 1,744		X	X	X	
#13	Compressed Natural Gas (CNG) Fleet Fuelling	£ 640		X	X	X	
#14	Ports – Modernisation of Port Energy Infrastructures	£ 1,500			X		
#15	Setup of ESCO or MUSCO infrastructure	R&D	X	X	X	X	
#16	New build homes on Hydrogen grid	R&D		X	X		
#17	Biofuel evolution	R&D	X		X		
#18	Support developments in CO2 capture	R&D	X	X	X		
	Total Indicative Investment Requirement	**£ 14.755 billion**					

Table 3: Investment required for the Project Models and recommended sources of funding

5. Governance and the mechanisms for delivery

5.1 Governance

The successful implementation of this strategy requires a regional governance model that utilises the individual governance arrangements of each participating LEP, and facilitates the operation of the Greater South East Local Energy Hub. It also needs full political commitment, leadership and democratic accountability from our partner local authorities, the commercial expertise of the private sector and the innovation and skills of the education sector.

The following governance model has been formulated to ensure that technical expertise and decision making is consolidated at a local level, whilst maintaining the opportunities and benefits associated with regional cooperation. It is simple and flexible, so that it can respond to emerging opportunities and can support the scale-up of the Project Models from within the tri-LEP region and potentially beyond.

5.1.1 *Local Enterprise Partnership Strategic Boards*

The Strategic Boards of Coast to Capital, Enterprise M3 and South East LEPs will provide the overarching governance for the realisation of the Energy Strategy and Action Plan. In the South East LEP, this will recognise the federated area structure and associated federated area Boards.

The three LEP Strategic Boards will provide strategic direction, investment scrutiny (where appropriate) and advocacy for the energy ambitions set out in this Strategy and those of the Industrial Strategy.

5.1.2 *Strategic Energy Delivery Group*

A Strategic Energy Delivery Group will be established that is composed of LEP staff and Local Authority officers who have some background in energy and a good understanding of the tri-LEP Energy Strategy and Action Plan. The role of the group will be to coordinate delivery of the Action Plan, to pursue and coordinate opportunities to deliver the Project Models and to ensure that opportunities for cooperation and upscaling are identified and actioned. The group will have the autonomy to make decisions and provide tactical direction for each LEP and for the tri-LEP region, and will report to the Strategic Boards and LEP sub-boards as necessary.

The Group will draw upon the expertise of LEP-level and local working groups and organisations, who will be best placed to scope out and develop local energy projects that form components of the project models. This will also facilitate the sharing of information and strategic input between the LEPs and the Greater South East Local Energy Hub.

As each LEP takes a greater role in its energy ecosystem, strategic partners such as Southern Gas Networks, UK Power Networks, Scottish and Southern Energy, OFGEM and BEIS will be consulted and engaged with on a range of issues so that their knowledge and experience is utilised. The ever-increasing criticality of the energy system to our economy and way of life mean that it is vital that the tri-LEP region develops a strong and interactive collaboration with all key partners, which will be facilitated by the Strategic Energy Delivery Group.

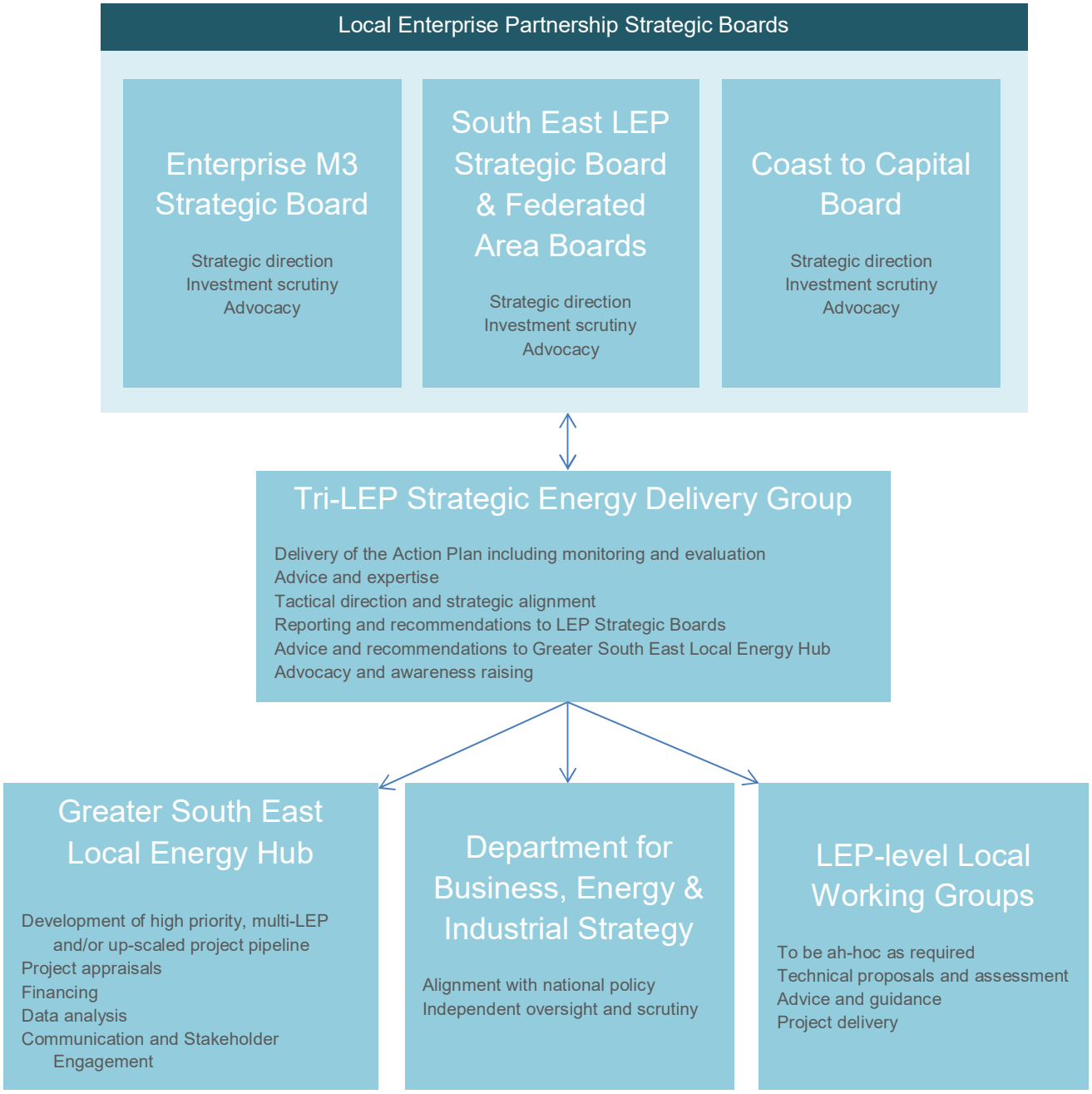


Figure 13: Governance structure for delivery of Local Energy Strategy and Action Plan

5.2 Mechanisms for delivery

5.2.1 Greater South East Local Energy Hub

As part of Government's Local Energy Programme, BEIS has allocated £4.8m to create five Local Energy Hubs that will provide additional capacity for LEPs to take a more active role in the area's energy ecosystem. This is implicitly underpinned by the Industrial Strategy Grand Challenge[2] of achieving clean growth.

The Energy Hubs are collaborations of LEPs across England and are tasked with addressing the challenges and commercialising the opportunities related to energy generation, storage, distribution and supply (including heat networks).

Coast to Capital, Enterprise M3 and the South East LEPs are part of the Greater South East (GSE) Local Energy Hub, which comprises ten LEPs and the Greater London Authority (GLA). It covers the East of England, the South East and the Oxford to Cambridge Growth Corridor including Milton Keynes, surrounding areas and Greater London.

The Hub consists of an operational team of eight technical specialists, which is overseen by a Board representing all constituent LEPs in the hub. The GSE Local Energy Hub is expected to become self-sustaining by late 2020 and will be:

- Developing and prioritising a pipeline of local energy projects identified through LEP energy strategies, and undertaking the initial stages of development for nominated priority projects and programmes (e.g. feasibility studies and business cases), up to a point where investment can be secured
- Helping drive a collaborative and coordinated approach across multiple LEP areas
- Providing a good practice link between local LEP activity, other local LEP areas, and national Government

5.2.2 Local Authorities

Local Authorities play a key role in the energy system both directly (as a large energy user) and indirectly (through the development of Local Planning Policy, etc.). More than 60 local authorities are represented within the tri-LEP region and during the development of this Energy Strategy, a wide range of strategic documents, reports and feasibility studies were reviewed. Each document has been considered for its relevance to the Local Energy Strategy and the full details of this can be found in the Companion Document. Any critical insight or data was identified through this process and has been fed into the Energy Strategy for the baseline emissions assessment and the Action Plan Project Models.

5.2.3 Communities and Neighbourhoods

Communities and Neighbourhoods within the tri-LEP region are forming a groundswell that can make significant contributions in carbon savings and positive changes for the energy sector. For instance, over 202GWh of energy was generated across England in 2017 by 168MW of community schemes, which is the equivalent of 71,000 tCO2e emission reductions and enough to power 67,000 homes. There are 228 organisations in this field that employ 166 full-time staff and over 1,800 volunteers, and were able to access over £14.3M of investment[55].

A number of publicly available documents share the processes and successes (and failures) of such projects, with the engaged members of the public behind them keen to disseminate best practice. During our stakeholder engagement, we spoke with many such groups who ensured that the strategy broadly covered their activities and opportunities, as well as those of the public sector structures in place. Such schemes can be very ambitious in outlook, if you consider the opportunity of community

[55] Community Energy England and Community Energy Wales, “Community Energy State of the Sector 2018,” Community Energy England, Sheffield, 2018.

schemes providing the significant energy demands of Network Rail, as per Project Model #7 ("Solar energy for Network Rail").

This groundswell, literally from the 'bottom-up', particularly has the opportunity to leverage public funding to build Neighbourhood Plans that can be the tinderbox for projects and interventions delivery across a wide geographical area. The process is equally applicable from rural villages and coastal communities (or parts thereof) through to streets, zones, quarters and districts in the most built-up of urban areas. Developing the Neighbourhood Plan or Development can be supported by up-to £9,000 in a basic grant, with a mechanism in place to additional Grant Funding of £8,000. Further, the UK Government provides free Technical Support (e.g. to develop detailed feasibility, masterplanning, Impact Assessments, etc.) with a private-sector partner AECOM.

6. Conclusion and Recommendations

The south east has decarbonised significantly since 2005 and put in place the foundations for a low carbon economy. However, much work is necessary to realise the vision set out in this strategy and the objectives outlined. The area's natural strengths like its high levels of solar irradiation and wood biomass fuel assets mean it is well placed to play a leading role in the energy transition. Countering this, the area still faces a number of challenges that are holding back progress such as the high degree of constraint in the electricity grid which throttles back growth and decarbonisation efforts.

Five priority areas have been identified which respond to the opportunities and challenges facing the region. They provide a clear framework for the Project Models and will enable the south east 'To become a leader for sustainable energy production within the UK, powering innovative, decarbonised and clean economic growth.' These eighteen Project Models comprise a package which collectively address the great challenge of decarbonisation and clean growth. Not only do they enable the LEP partners to make an immediate impact, they act as building blocks for future revolutionary interventions beyond 2032 which can be realised once the Project Models are bedded-in and the required technology reaches maturity.

Modelling shows that once completed, the Project Models will deliver the emissions reductions and decarbonisation of demand necessary to keep the tri-LEP region in line with the national trajectory until 2050. They will also position the region as a centre for innovation; providing opportunities for companies to trial new concepts like hydrogen gas networks which promise to radically change the way our society produces, manages and consumes energy. With dedicated implementation, our territory can be an exemplar out into the south East of England and beyond.

A key objective for this strategy was to foster clean growth across the region. This has been achieved in two ways; firstly, through the stimulation of the low carbon sector through targeted investments in new technology; secondly, by supporting fledgling low-carbon businesses to evolve and prosper. Two such companies have been identified and LEPs should use their funding and influence to ensure these and similar SMEs are able to grow and prosper.

The work in developing the strategy has also identified a number of key non-technical opportunities which require further work. Overarching this is the need to secure funding from both public and private sector sources, facilitated by the evidence in the Action Plan of the benefits and returns available that make the portfolios of the projects bankable. Opportunities for blending Project Models and non-technical actions can unlock post-subsidy delivery mechanisms to address market challenges such as the rapidly evolving mix of energy demand, combining interventions such as housing retrofits for energy efficiency (Project Model #9) with the promotion of new methods of housing construction to deliver meaningful change for local people.

If this strategy is delivered in line with recommendations, by 2032 the tri-LEP region will deliver impact in the short / medium term, and prepare the foundation for meeting targets for the long-term through:

- Secured investment in the region of £14.755 billion in commercially and technically viable projects that deliver healthy returns to stakeholders
- Delivered a reduction in emissions across the electricity, heat and transport sectors of 13,615 kT CO2e, which is the equivalent of removing all 5 million cars in the south east from the road

- Transition of 47,455 GWh from polluting, high-carbon generation to clean energy sources, the equivalent of providing all 3.4 million homes in the tri-LEP region with a low-carbon supply of both electricity and heating
- And created or secure 75,652 jobs across the tri-LEP area

The 'What' and 'Why' elements of the Project Models have been discussed in detail within this strategy. The crucial next step, the 'How', is presented in the accompanying Action Plan. The final recommendation from this local energy strategy is that it should be regularly reviewed and refreshed to ensure it realises its objectives, and responds to changes in technology, society and Government Policy that cannot be foreseen currently.

7. Glossary

BEIS; Department for Business, Energy and Industrial Strategy (see www.beis.gov.uk)

CBM; compressed biomethane

CCUS; Carbon Capture Use and Storage

clean growth; the Government's Clean Growth Strategy is an ambitious blueprint for lowering carbon emissions, protecting the environment and meeting our climate change obligations while stimulating growth and prosperity, increasing earning power and creating and supporting thousands of jobs[4]

CNG; compressed natural gas

CO_2; carbon dioxide

DHN; District Heat Network

ESCO; Energy Services Company

EV; electric vehicles, whether fully electric powered (instead of diesel, petrol or gas) or a hybrid combination

Greenhouse gases; a gas that is detrimental to the Earth's environment in contributing to the greenhouse effect by absorbing infrared radiation, e.g. carbon dioxide and chlorofluorocarbons

GVA; Gross Value Add, an economic metric

HGV; heavy goods vehicle

HNDU; Heat Network Delivery Unit

LED lighting; light-emitting diodes, a lighting technology now widely adopted due to its significant energy saving capabilities compared to traditional incandescent bulbs

LEP; Local Enterprise Partnership

Micro-grid; a collection of different types of generation technologies and consumers, all connected together across a small geographical area (typically community)

Mtoe; million tonnes of oil equivalent, a measure of consumption of energy on a national scale

MUSCO; Multi-Utility Services Company

PV; photovoltaic generation or more typically known as solar panels

SME; Small or Medium Enterprise