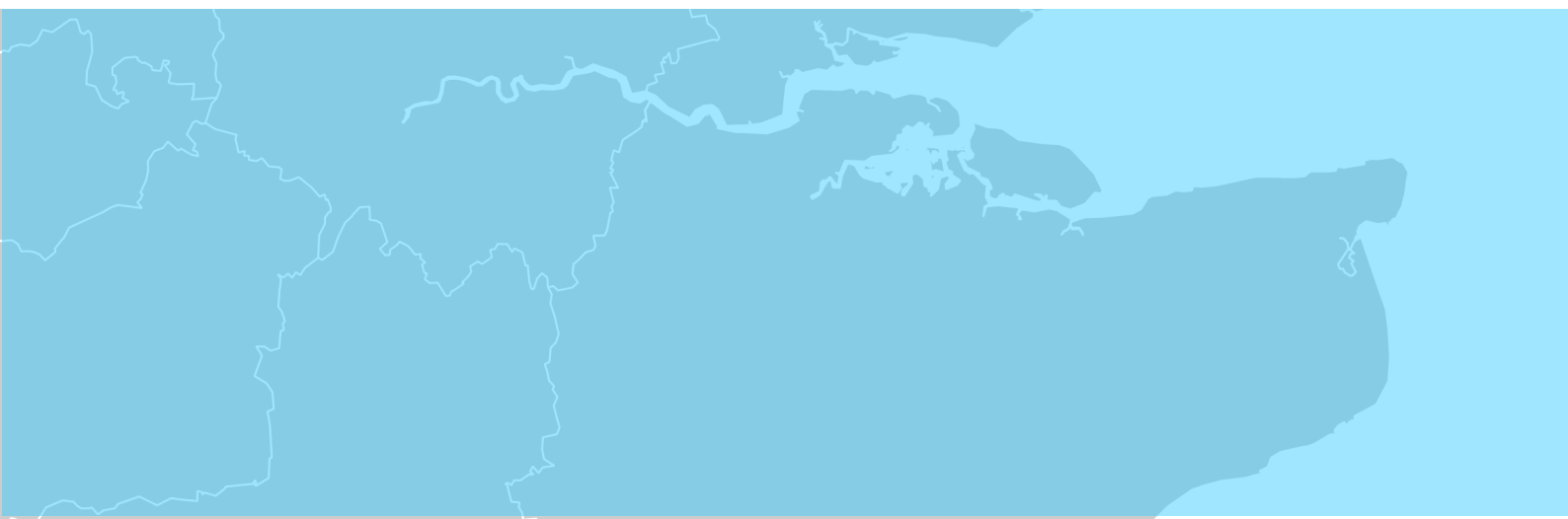
Local Energy East Strategy:

An Energy Strategy for the Tri-LEP Area

May 2018: Endorsement copy for stakeholders



Local Energy East Network

The Local Energy East Network was established in response to the Department of Business, Energy and Industrial Strategy (BEIS) offering each Local Enterprise Partnership (LEP) funding to develop a Local Energy Strategy. The three LEP areas of Cambridgeshire and Peterborough (formerly Greater Cambridge and Greater Peterborough), Hertfordshire and New Anglia joined together and working with their constituent local authorities, the Distribution Network Operator (DNO), universities, third sector and energy sector businesses were able to create a tri-LEP area project. Those involved in the Steering Group and Project Delivery Group, other than the LEPs, included:

- Allia;
- Anglia Ruskin University;
- Cambridge City Council;
- Cambridgeshire County Council;
- East Herts District Council;
- Hertfordshire County Council;
- Nautilus Associates;
- Norfolk County Council;
- Peterborough City Council;
- Peterborough Environment City Trust;
- Suffolk County Council;
- UK Power Networks;
- University of East Anglia;
- West Suffolk Councils.

The Extended Stakeholder Group included over 400 people from all 38 constituent local authority areas and related organisations who had been engaged and involved in the project.

This wide group of local and sub-national organisations represents a huge potential to collaboratively take the findings and ambitions of this strategy and deliver future work using a mix of public sector leadership and business knowledge.

Contents

Executive Summary

The Local Energy East (LEE) area is one of the most important energy producing areas in the UK, and a leading area for renewable energy. We are well-positioned to benefit from the global energy revolution that is now underway, and to make a significant contribution to the UK's energy economy. The Government's Industrial Strategy and Clean Growth Strategy both present significant opportunities at a local level to capitalise on local energy growth initiatives.

This strategy sets out our collective ambitions to 2030 underpinned by a range of activities that the LEE Network and the Greater South East Energy Hub will take forward to ensure that we remain at the forefront of Clean Growth in the UK and grasp the opportunities ahead. We have agreed the following themes that are the basis for this strategy:

- **Clean Economic Growth (over-arching)** – we will support growth in our local energy sector, ensure local people benefit from the employment opportunities this creates, and we will support the transfer of the benefits of new energy technologies across sectors as part of our wider drive to boost productivity;

- **Housing growth and commercial site infrastructure** – we will work with UKPN and partners to ensure that the grid enables our housing and commercial development ambitions. We will support new smart grid systems;

- **Secure, local, affordable, low-carbon consumption** – we will work to increase energy efficiency and improve energy affordability; reducing fuel poverty. And we will work to reduce carbon emissions and improve air quality;

- **Clean transport networks** – we will work with local partners and businesses to support the transition to electric vehicles (EVs). We will continue to support behavioural change and modal shift that improves transport sustainability.

Success will only be achieved if all partners play their role in delivering the strategy. It will be delivered through actions taken by a wide range of local partners, through new delivery models to enable distributed energy generation and supply; and be supported by innovative funding models to enable the investment our infrastructure needs.

1 Introduction

1.1 Local Energy East (LEE) is a partnership covering three Local Enterprise Partnership (LEP) areas of Cambridgeshire and Peterborough, Hertfordshire, and New Anglia (Norfolk and Suffolk) collectively known as the 'LEE area'.

1.2 In early 2017, the department for Business, Energy and Industrial Strategy (BEIS) invited LEPs to produce a Local Energy Strategy, building on the work that we had begun locally in our Strategic Economic Plans (SEPs) and other local strategies and initiatives. Over the past year we have worked with a range of stakeholders and experts to develop this strategy. We have engaged with over 400 people representing over 50 organisations locally to ensure that our objectives and actions have been developed and co-designed with the wide range of partners.

1.3 Our combined LEP area is an important part of the UK economy. Home to 3.9m people, 1.8m jobs, and with a total economic output of £98bn (6.2% of the UK total) we are home to an extremely broad range of businesses, universities, research centres and other major UK economic assets.

1.4 We are a significant producer and distributor of energy – the Bacton gas terminal is one of the main points for receiving gas from the North Sea whilst the Sizewell nuclear reactor supplies over a thousand megawatts to the national grid. The offshore wind farms at Sheringham Shoal, Scroby Sands and Greater Gabbard contribute a third of the UK's offshore wind power. Future planned offshore wind projects in our region will more than double UK generating capacity in this sector. We are the only part of the UK with expertise and operations in all areas of energy generation. New techniques and technologies offer major opportunities across different parts of the sector.

1.5 Business and political leaders in our area have high ambitions for growth, both in the energy sector and wider economy. Having the right energy infrastructure is essential for this growth, able to meet the needs of our businesses and support the development of well-functioning, attractive places to live and work. Already, there are areas where further development and growth locations are significantly constrained due to lack of electricity capacity. The expected shift towards electric vehicles (EVs) will add further pressure to the network as well as creating new opportunities. We also want to ensure that improvements in energy infrastructure benefit our residents, increasing the affordability of supply and contributing to addressing fuel poverty.

1.6 We are a clean growth region. We have superb natural assets and a high quality of life in our cities, towns and rural areas. Our Local Energy Strategy shows our commitment to the need to reduce carbon emissions and pollution, to improve air quality and ensure a healthy environment.

1.7 This strategy has been developed at a time of huge change in the way that energy is being generated, stored and distributed. New technology provides significant opportunities but also requires careful navigation and investment to maximise the potential for the LEE area.

1.8 To inform this strategy an online energy data-mapping portal was created using multiple layers of energy related data. The portal is able to display energy data at a granular level. Feedback from local authorities and other stakeholders so far has been very positive. The portal is a solid base to take delivery activities forward. It enables planners, developers, land owners and other strategic decision makers to better understand where the challenges and opportunities exist.

1.9 To accompany this strategy there is a companion Mapping Analysis Report which provides greater detail on the online energy data-mapping portal used and evidence derived from it.

1.10 The rest of this document is structured as follows:

- Section 2 sets out our **objectives** for this strategy;
- Section 3 explains the broader **context** – in terms of policy, economics and wider trends;
- Section 4 sets out our plan to achieve **clean economic growth**;
- Section 5 describes how we will support **housing growth and commercial site infrastructure**;
- Section 6 explains how we will support **secure, affordable, low-carbon consumption**;
- Section 7 sets out our plans to support **clean transport networks**;
- Section 8 explains our **future work** and how we will progress our objectives;
- Section 9 is a **glossary of terms**.

1.11 Throughout this strategy there are brief case studies to highlight where a noteworthy activity in the LEE area supports a particular priority or endeavour. Case studies from outside the LEE area are also referenced where learning and delivery in another area is worth considering for replication to support a particular ambition or priority in the strategy.

2 Our objectives

2.1 This strategy looks forward to 2030. There will be a period of uncertainty in terms of technology, regulation and policy and climate change impacts. Our actions focus on driving clean economic growth over the next three years alongside setting the overall direction for the next decade. Doing both at once will enable us to reap the economic, social and environmental benefits of the energy revolution.

2.2 The principal objectives of this strategy are as follows:

- To put the region at the forefront of the UK's drive towards clean economic growth reflecting the Government's Clean Growth and Industrial Strategies;
- To create high-value jobs in the energy sector and broader supply chain that support our wider economic growth objectives;
- To ensure that our economy is underpinned by a world class energy system;
- To enable local people to benefit from the many new energy opportunities that will be created over the next decade;
- To foster innovation, both within the energy sector and across other sectors;
- To create a dynamic, flexible energy system comprised of smart energy grids and a new distribution network that leads development;
- To create a local energy market, where buying and selling energy locally brings improved economic resilience for residents and businesses and greater affordability of energy supply;
- To reduce carbon emissions, in line with national targets;
- To improve air quality in the LEE area, benefiting the health of all residents;
- To play an active role with the new energy hub for South East England and ensure that our area attracts and benefits from available investment in energy infrastructure.

2.3 Following publication of the strategy, partners will develop robust targets and a supporting methodology which will enable us to monitor progress and test interventions that align with our ambitions and objectives. Our actions will comprise Direct, Indirect and Related initiatives:

- **Direct** - Endeavours such as increased renewable energy generation, storage, distribution and supply to put the LEE area in a leading position in England. This would enhance grid resilience and capacity enabling the move toward the electrification of both heating and transportation in the LEE area. By supporting this local energy infrastructure, we will work to enable new business and community energy schemes. We will also be enabling smart grid connected homes that take advantage of these new energy systems with our ambition to create leading whole energy systems region in England;

- **Indirect** - By actively leading on the direct actions we plan to reduce greenhouse gas emissions and the number of householders in fuel poverty measured against agreed targets. Air quality would also be improved. Existing and new demand reduction and energy efficiency schemes and initiatives would be promoted and supported to contribute to lower energy consumption and increase the Energy Performance Certificate (EPC) rating of homes in the region;

- **Related** - Increasing the GVA from energy sector and new jobs in the energy sector would both underpin and support our Clean Growth Ambition.

Themes

2.4 Working with partners we have identified four themes which will be central to delivering our objectives and targets. We set out the challenges and opportunities ahead and the actions we are going to take for each of these themes:

- Clean economic growth;
- Housing growth and commercial site infrastructure;
- Secure, local, affordable, low-carbon consumption;
- Clean transport networks.

2.5 Sections 4 to 7 explore each of these themes in more detail and sets out the challenges and opportunities ahead and the collective actions we are going to take.

3 Context

3.1 This section sets out:

- The global energy and wider policy context within which this Energy Strategy sits;
- Key relevant trends in local energy networks;
- The broader technological trends that will influence delivery of the strategy.

Global Energy Context

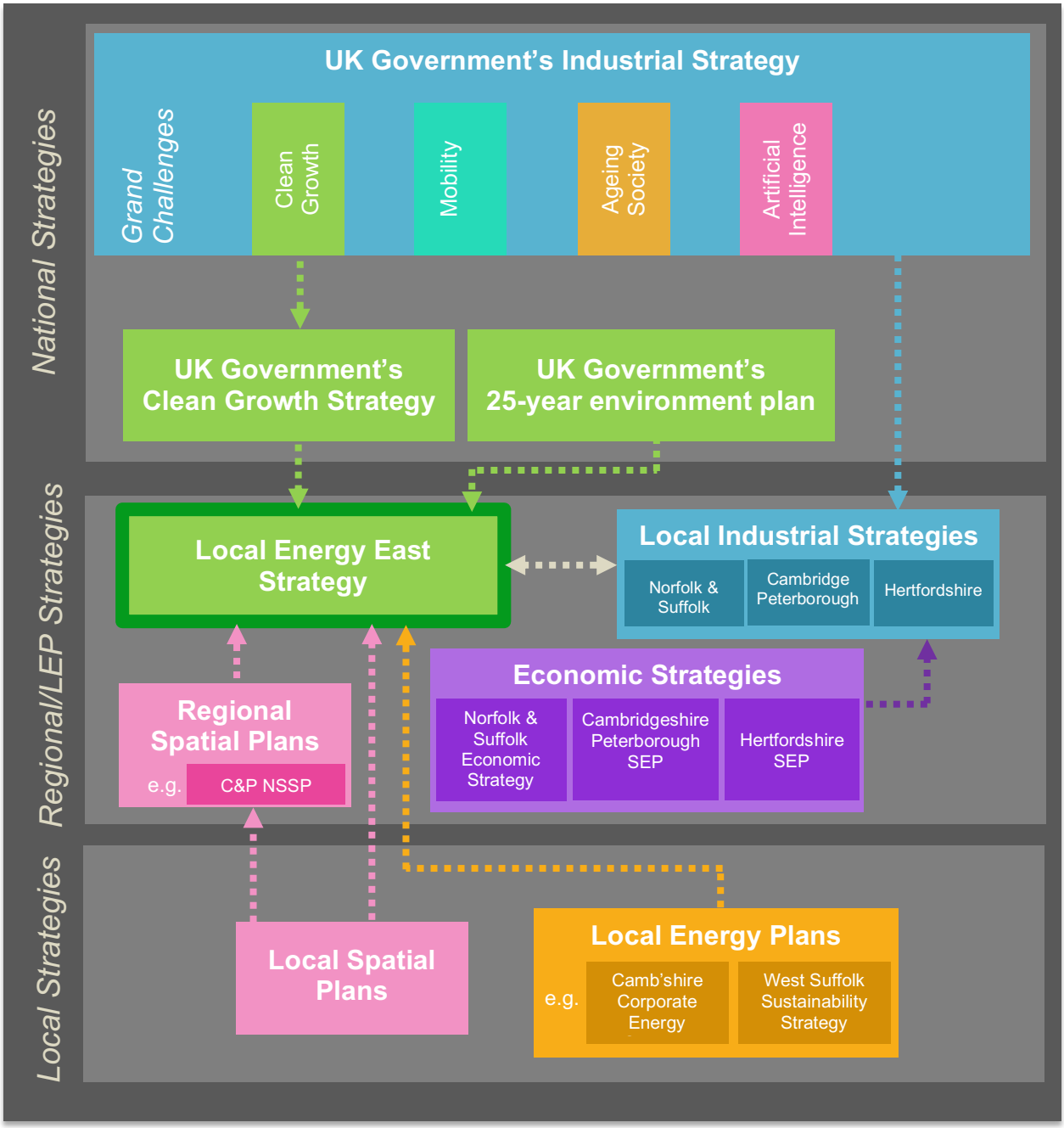
3.2 There are a few key factors which define current trends and shape future projections as the energy revolution gather pace. These include:

- Global energy demand is soaring due to the rapid growth and urbanisation in many parts of the world, particularly Asia;
- Renewable energy generation and capacity is increasing dramatically as the unit costs of generation for renewables falls with improvements in technology and scale of deployment, alongside state subsidies and support for the renewables sector;
- Improved battery technology offers the potential for increasingly distributed storage and generation, as well as better management of peak demand;
- The combination of small-scale renewable generation and improved battery technology offers the potential for distributed smart grids. This would improve the resilience of the network but would radically change the existing utility business model which is based on centralised generation and distribution;
- Perhaps the biggest change in the energy mix over the next few decades will come from the transition from petrol and diesel vehicles to electric vehicles (EVs). Significant growth in this sector is expected due to improvements in the underlying technology, the supporting infrastructure and due to government policy increasingly favouring EVs.

Policy Context

3.3 Our Energy Strategy complements and is consistent with wider policy. The diagram overleaf illustrates how our Energy Strategy sits alongside national and local strategies.

Figure 1. Policy context



The Industrial Strategy

3.4 The Government's Industrial Strategy, published in November 2017, sets out a national approach to growing and rebalancing the UK economy. The Industrial Strategy sets out five 'foundations' for growth:

- Ideas;
- People;
- Infrastructure;
- Business environment;
- Places.

3.5 The Industrial Strategy also sets out a series of 'Grand Challenges' for the UK economy which will enable and require it to 'plan for a rapidly changing future, look to shape new markets and industries, and build the UK's competitive advantage'. The Industrial Strategy includes several ways in which Government is seeking to support clean energy development, and its future role in our economy, including:

- Launching a new programme 'Prospering from the energy revolution' to develop world-leading local smart energy systems that deliver cheaper and cleaner energy across power, heating and transport, while creating high value jobs and export capabilities;
- Working with the energy sector to support rapid adoption of Artificial Intelligence technologies at scale to support and lead the fourth industrial revolution;
- Developing UK leadership in low carbon transport and investing in innovation to develop clean technologies across road, rail, aviation and maritime transport;
- Delivering affordable energy and keeping energy costs down for businesses through energy efficiency.

3.6 The clean growth grand challenge aims to 'maximise the advantages to UK industry of the global shift to clean growth'. The Industrial Strategy envisions that 'whole new industries will be created and existing industries transformed as we move towards a low carbon, more resource-efficient economy'. It sets out five initial priorities:

- Developing smart systems for cheap and clean energy across power, heating and transport;
- Transforming construction techniques to dramatically improve efficiency;
- Making our energy intensive industries competitive in the clean economy;
- Putting the UK at the forefront of the global move to high efficiency agriculture;
- Making the UK the global standard better for finance that supports clean growth.

The UK Clean Growth Strategy

3.7 Alongside the Industrial Strategy, BEIS have published a Clean Growth Strategy which commits to growing our national income while cutting greenhouse gas emissions and tackling air quality with two overarching objectives to:

- Meet domestic commitments (on Carbon dioxide (CO_2) emissions) at the lowest possible net cost to UK taxpayers, consumers and businesses;
- Maximise the social and economic benefits for the UK from this transition to a low carbon economy It will achieve this through driving the uptake of ultra-low emission vehicles including a rollout of electric vehicle (EV) charge points through a £1bn investment fund. A further £900m of public funds will be invested in smart systems for energy storage, demand response technologies, new nuclear and for reducing the cost of renewables.

3.8 The UK has demonstrated over the last thirty years that it is possible to drive growth while also significantly cutting the amount of Carbon dioxide (CO_2) emitted, in part by capitalising on the

growth of new energy industries. Hence the premise of the Clean Growth Strategy is that economic growth and cutting Carbon dioxide (CO_2) emissions are complementary objectives.

3.9 The key proposals of the Clean Growth Strategy are organised under the following headings:

- (1) Accelerating Clean Growth – becoming a world leading low carbon economy;
- (2) Improving Business and Industry Efficiency – reducing energy waste and improving efficiency through technological change;
- (3) Improving Our Homes – becoming our own mini power systems where we generate energy from micro-renewables, store energy via batteries, charge our electric cars and most importantly stop energy waste;
- (4) Accelerating the Shift to Low Carbon Transport – getting the EV infrastructure in place to support the electrification of transport;
- (5) Delivering Clean, Smart, Flexible Power – using technology to get energy where it is needed at any one time quickly and efficiently whilst minimising pollution;
- (6) Enhancing the Benefits and Value of Our Natural Resources – reducing air pollution and carbon emissions mitigates climate change;
- (7) Leading in the Public Sector;
- (8) Government Leadership in Driving Clean Growth.

The Local Energy East Strategy

3.10 The first two Clean Growth Strategy key proposals in 3.9 feed into our over-arching theme – Clean Economic Growth. The third relates to our theme of housing growth and commercial site infrastructure. The fourth directly maps onto our theme of transport electrification and hydrogen, while the fifth and sixth contribute towards our theme of secure, affordable, low-carbon consumption. The last two, on public sector leadership in the LEE area, define our approach. The creation of this strategy and its follow through, will be our way of leading in pursuing the clean growth agenda.

3.11 Our Local Energy Strategy is therefore very strongly aligned with the economic and emissions reductions aims and methods of both the Industrial Strategy and the Clean Growth Strategy.

3.12 As well as national level strategies, this strategy also supports the aims of the existing Strategic Economic Plans (SEPs) and Economic Strategies of the three LEPs and the future development of local industrial strategies in the year ahead. It also dovetails with local plans and the non-statutory spatial plan being developed by the Cambridgeshire and Peterborough Combined Authority.

Energy Networks: Challenges and Opportunities

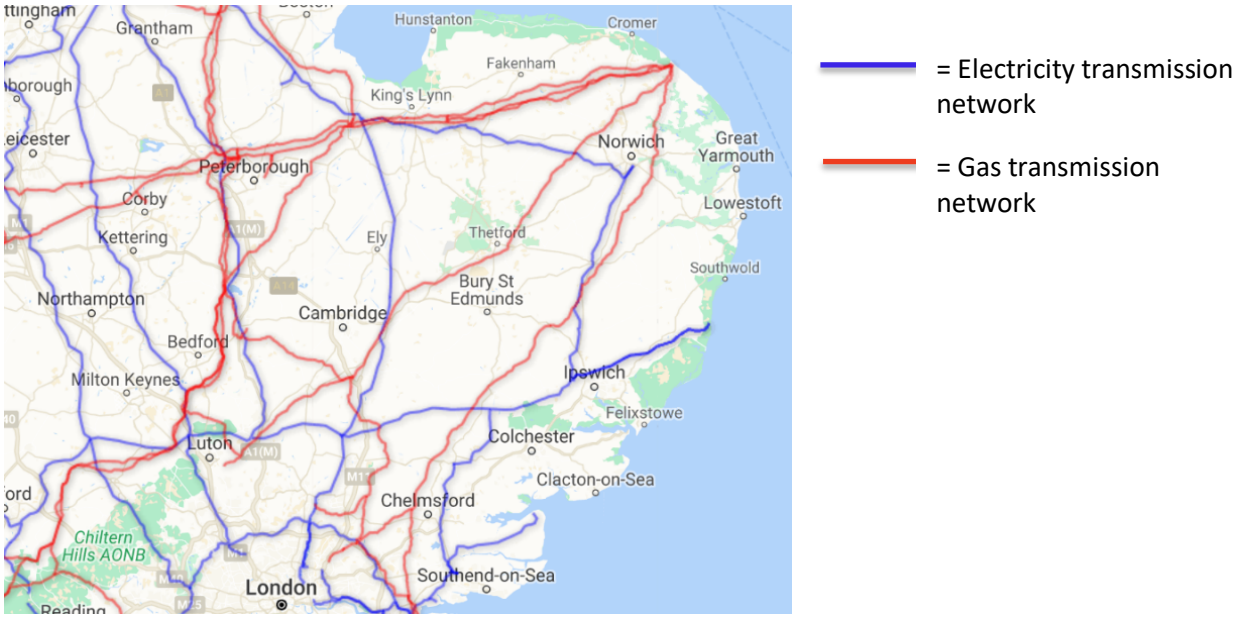
Regional Energy Networks position

3.13 The energy sector plays an important role in our economy. The East of England Energy Group (EEEGR) has estimated that 7,700 people are employed in the energy sector across the East of

England generating gross value added (GVA) of nearly £1bn. The sector is also one of the LEE area's most productive, with GVA per job of £129,000.

3.14 Figure 2 sets out the key electricity and gas transmission networks in our region. UK Power Networks (UKPN) are the DNO (Distribution Network Operator) for the Eastern Power Network (EPN) Region. The role of DNO is to take the energy from the ***transmission network*** (the network operated by the National Grid which receives energy from power stations operated by Utility companies) and distribute it (via the ***distribution network***) to homes, offices and retail premises. This is done via substations, which 'step down' the voltage of the power being transmitted.

Figure 2. Electricity and gas transmission networks in our region



Source: Energy data-mapping portal.

Energy challenges to accommodate

3.15 Peak demand for electricity nationally is expected to increase from 60GW currently to 85GW in 2050. Current peak demand in the LEE area is 6.4GW. If our area sees similar increases to those projected nationally this would imply energy demand of approximately 9.1GW by 2050. Emerging challenges flagged by UKPN in its Long Term Development Statement for the Eastern Power Networks (EPN) region (which covers our area and beyond into Essex, Bedford, Buckinghamshire, and North London) include the loss of night-time electrical load from the increasing penetration of gas heating systems (though this may change due to the anticipated electrification of heat) increasing summer load from air conditioning and cooling equipment and the growth in demand from electric vehicle (EV) charging.

3.16 A need for increased efficiency of electricity usage is driving an increase in 'flexibility services' whereby electricity supply becomes more responsive to local demand. Therefore, the responsibility is changing from one of overseeing the local distribution to one of managing an intelligent, multi-input, local energy system. This means much closer matching of supply and demand will take place locally independent of the transmission network.

3.17 The long-term plan set out by the government is to transform DNOs into DSOs (Distribution System Operators) by 2030. This will reflect the changing nature of energy distribution driven by decentralised energy policy and more local businesses, communities and individuals becoming

'prosumers' – both producers and consumers of electricity. There is evidence of this change already taking place as the market share of smaller suppliers grows and the dominance of larger ones diminishes.

3.18 Nonetheless, there are currently some significant bottlenecks in connecting new electricity generation and demands onto the distribution network in parts of the LEE area. Section 5 sets out how these are currently constraining some of our biggest residential and commercial sites. Without further intervention, sustainable growth will be curtailed which could impact on the ambition of our growing economy.

3.19 Cadent are the gas distributor for the region. The National Grid has produced projections which suggest that gas demand will fall significantly over the coming decade as it becomes more expensive and more environmentally-friendly means of heating become available. However, there is a lot of legacy infrastructure for gas, from the distribution network through to individual homes and commercial premises, which means that there are reasons to doubt whether gas demand will drop off as quickly as currently envisaged by some projections. The speed of this transition will depend on movement towards a decentralised energy system where people may be able to subsidise the cost of their electric heating by generating their own energy (see point 3.14).

The clean energy opportunity

3.20 The UK is one of the leading countries in the world in the field of clean energy. The UK has the largest installed capacity of offshore wind. Across the UK as a whole, the use of solar energy is increasing. Solar generation capacity in the UK increased from less than 1 MW in 2010 to 12.3 GW in 2017, equivalent to ten Sizewell B nuclear power stations.

3.21 The East of England is one of the leading areas of the UK in the generation of renewable energy. Figure 3 below, shows that the East of England is in the top three leading regions for installed capacity, electricity generated and the number of renewable energy sites.

Figure 3. Renewable energy generation, leading regions in England 2016

Rank	Number of sites		Installed capacity MWe		Generation GWh all sources	
1	South West	113,166	Yorkshire & Humber	3,880.6	Yorkshire & Humber	19,315.3
2	South East	102,369	**East of England**	**3,743.8**	**East of England**	**8,156.9**
3	**East of England**	**97,258**	South East	3,536.7	South East	7,450.2

Source: Department of Business, Energy and Industrial Strategy.

3.22 Offshore wind along the coast is a particular strength, where there are already three large windfarms and planned development of at least another ten. E.On, Statoil and SSE operate existing windfarms with new wind farms being developed by companies such as Scottish Power and Vattenfall. There will be large increases in energy generation in the LEE area as multiple offshore wind power developments come online.

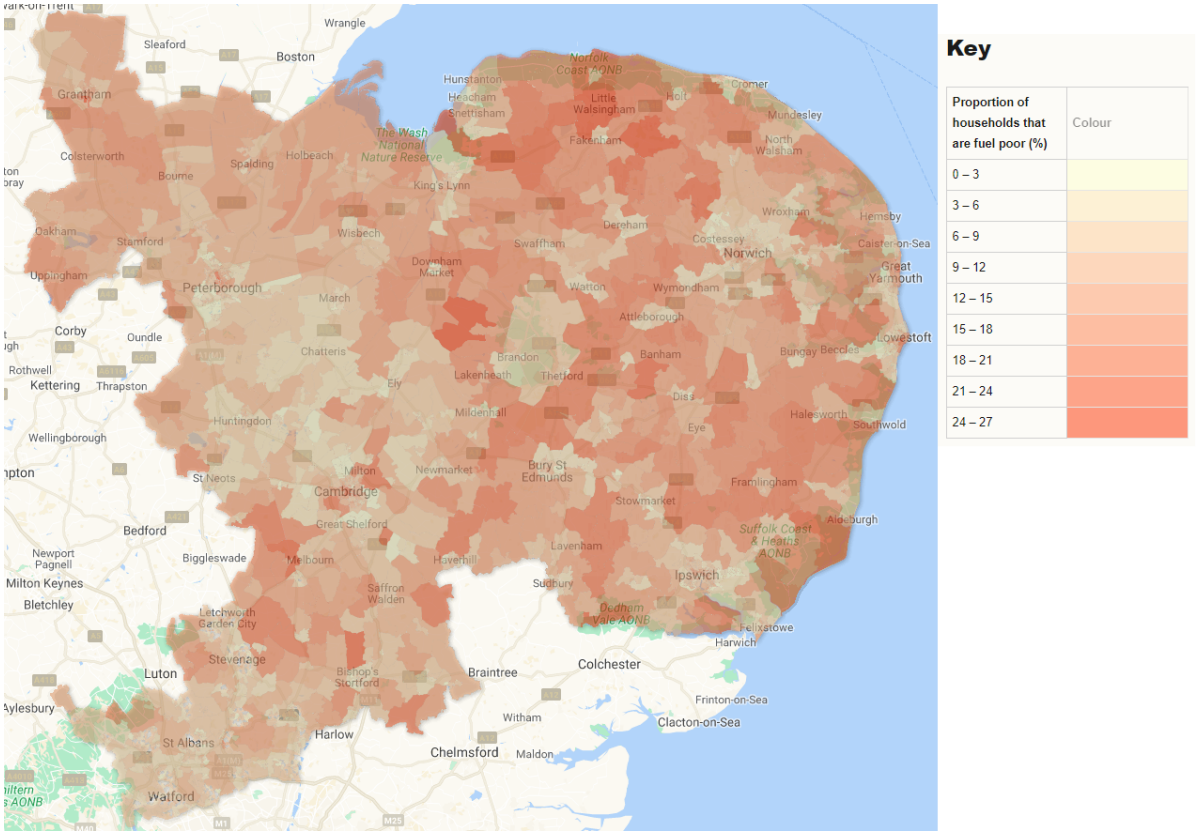
3.23 Alongside the strength in renewables, the proposed development of Sizewell C nuclear power station is expected to create 25,000 jobs and further opportunities in the decommissioning of existing nuclear power facilities (as well as offshore installations).

3.24 As well as the clean energy opportunity, the Southern North Sea is one of the first regions to undertake large scale oil and gas rig decommissioning and there is real potential to create specialist skills (e.g. well-plugging and abandonment) which could be exported globally.

Fuel poverty

3.25 Fuel poverty is below the national average across the East of England. This is defined as the percentage of households with required fuel for heating costs above national average and who would be left with an income that puts them below the official poverty line were they to spend that amount on heating.

Figure 4. Fuel poverty (% of households that are fuel poor)



3.26 The fuel poverty average for the East of England region is 7.8% compared to a UK figure of 11.4%. However, the total average obscures the fact that in some areas fuel poverty is much higher, reaching a quarter of households in some parts of North and West Norfolk. To an extent, this is correlated with provision of gas, those areas where fewer people have access to the gas network end up paying more for oil or existing electricity-based heating systems. Across the LEE area, 12% of households have no access to the gas network.

3.27 Another challenge is that the East of England has higher Carbon dioxide (CO_2) emissions than the UK average. This is due in part to higher levels of energy use in transportation which is 20% more per person than the national average.

3.28 The current network and existing non-renewable sources of energy will remain an important part of the energy mix for some time. Nonetheless, the energy sector is undergoing extensive change. This

creates a range of economic opportunities to improve our resilience and energy affordability whilst reducing Carbon dioxide (CO_2) emissions. The next sections describe how we intend to address these challenges and opportunities.

4 Clean economic growth

4.1 The UK Clean Growth Strategy provides a framework for growing our economy and productivity whilst at the same time cutting Carbon dioxide (CO_2) emissions. The Government estimates that the UK low carbon economy could grow by an estimated 11 per cent per year between 2015 and 2030 – four times faster than the rest of the economy - and could deliver between £60 billion and £170 billion of export sales of goods and services by 2030.

4.2 Given the ambitious nature of our Strategic Economic Plans and Economic Strategies, as well as our existing strengths in the energy sector, we propose to build on our existing strengths through the following:

- Generating clean growth and innovation;
- Building local energy skills;
- Supporting diffusion of innovation into other sectors.

Generating clean growth and innovation

4.3 To ensure the sustainability of jobs and business in the energy sector and to continue to support reduced emissions, the LEE area needs to continue to invest in renewable energy and storage technologies, their development and installation. Renewable energy production has increased significantly over the past decade and a number of important projects will come online over the period to 2030. However, the LEE area needs to build on its strengths, to create jobs and new businesses locally and build a vibrant local energy economy/market.

4.4 Our area is recognised as a leader in this sector. For example, the New Anglia LEP area was selected by government as their Green Economy Pathfinder in 2012 to further develop its low carbon sector economy and develop local energy networks.

4.5 Two of the biggest energy business networks are based locally: EEEGr (the East of England Energy Group) is headquartered in Great Yarmouth and Orbis Energy (a hub for offshore wind energy businesses) is in Lowestoft. In Cambridgeshire the Future Business Centre (FBC), an innovation hub for low carbon business start-ups, builds on the strong clean tech and IT clusters and is networked closely with spin outs from the University of Cambridge and Anglia Ruskin University. The FBC is home to Cambridge Cleantech, the Low Carbon and Environmental Goods and Services (LCEGS) membership organisation for the East of England and internationally. The new Enterprise Zone for Enviro-Tech in Hertfordshire aims to provide infrastructure linking green research, science, engineering and technology enterprises and assists the growth of new businesses associated with green enterprise. Furthermore, the region's universities, including the University of Cambridge, Anglia Ruskin and the UEA, are leading centres for research and innovation.

4.6 Capital investment in clean energy worth £50 billion is planned for the region by 2020 including: The world's largest windfarm in development off the coast; the proposed development of Sizewell C nuclear power station creating 25,000 jobs and opportunities in the decommissioning of existing nuclear power facilities and offshore installations. The East Coast College Energy Skills & Engineering Centre, The Engineering & Innovation Centre at West Suffolk College and a graduate

energy engineering school at the University of East Anglia, will provide local people with routes to be involved and benefit as this cluster expands. The ambitious proposal to develop an Eastern Institute of Technology (EIoT) builds on these strong foundations and will assist in creating a skills pipeline for technical careers through the offer of attractive and aspirational career pathways. It is led by a very close collaboration of education organisations and employers from across the East and is an innovative solution to ensure our businesses have the highly skilled technical workforce they need for growth in the future.

4.7 Hertfordshire is home to the world's largest independent renewable energy company with a project portfolio exceeding 13 Gigawatts and the expertise to develop, engineer, construct, finance and operate projects around the globe. RES (Renewable Energy Systems) is active in a range of technologies including onshore and offshore, solar, energy storage and transmission and distribution. Connecting these international players with emerging skills delivery and new business is mission critical.

4.8 Similarly, the Cambridge Norwich Tech Corridor growth opportunity offers potential for the growth of clean tech enterprises. The aims of this initiative are to: "support regional supply chains and technology convergence, drive up productivity and support clean growth across a range of sectors"[1]

4.9 Despite these strengths, our energy economy also faces important challenges. Currently our coastal areas are not well served by rail or road links. This has an impact on commuting accessibility and supply chains. There are significant skills barriers that impact the ability of local people to access employment opportunities in the sector, particularly in rural and coastal regions (see below).

4.10 To meet these challenges and opportunities we will:

- Build on our existing centres of excellence and develop new ones that support sectoral growth. We will work with BEIS to develop a renewable energy office based in the LEE area;
- Build on existing supply chain initiatives such as SCORE (Supply Chain Innovation for Offshore Renewable Energy) in order to promote opportunities for SMEs in the renewables sector;
- Support sector funding through initiatives like the University of East Anglia's Low Carbon Innovation Fund (LCIF);
- Support networking across the sector through initiatives like Cambridge Cleantech and existing networks like Orbis Energy and EEEGr;
- Invest in infrastructure needed to support the energy sector. This includes working with Highways England and local planning authorities to develop key transport links. For example, dualling of the A47 and A12 (already being developed via the Suffolk Energy Gateway project) to bring coastal energy centres into closer proximity with other major towns in the region.

[1] Cambridge-Norwich Tech Corridor Draft Strategy

Case Study: Energy storage at Hemsby

When it comes to innovation in the energy sector, we are a leading region of the UK. The first trial of renewable energy storage for distribution in the UK took place at Hemsby, near Great Yarmouth, starting in 2010. This explored how electricity could be stored to overcome the challenge of intermittent power production from renewable sources. It was designed to show the extent to which, when power generation exceeded demand, the energy could be stored. This trial demonstrated that energy storage is a technically viable smart solution that can operate autonomously.

Case Study: Renewable energy investment in West Suffolk

Toggam Solar farm near Lakenheath in West Suffolk is an example of how the public sector can invest in energy generation to create income to help fund essential council services and become a leader in carbon reduction.

As part of its renewable energy investment programme, Forest Heath District Council acquired the 12.4 MWp site in July 2016, at the time the largest district council-owned solar installation in the country. The purchase was made using capital in line with the council's capital programme.

Under local government finance rules, councils are not allowed to use capital to plug annual funding gaps as eventually the money will recede. Instead, councils can use the money to create a revenue stream which is invested straight back into local service delivery. Renewable energy generation gives the council a stable, long term investment return as well as making a significant contribution to the organisation's environmental commitments.

The site generates around 12,000 MWh of electricity annually bringing in £1.2 million of income. After taking into account the capital outlay, this delivers a net income of £308,000 to fund local services.

Along with its other assets, Forest Heath are able to offset around 4,900 tonnes of Carbon dioxide (CO_2) and providing enough power to run 3,500 homes. As a result, and with work to improve its own energy efficiency, Forest Heath District Council is now a carbon neutral organisation.

Creating jobs in the energy sector

4.11 The energy sector employs thousands of people in the region. As well as the renewables sector, the LEE area benefits from the nuclear industry at Sizewell C and potential for new gas extraction, together with long term decommissioning opportunities that create significant employment opportunities. The Building Research Establishment (BRE) is located in Hertfordshire and is a world

leading, multi-disciplinary, building science centre with a mission to improve buildings and infrastructure through research and knowledge generation.

4.12 It is essential that jobs growth in the future benefits our residents and our local places. In particular, many of our coastal towns have relatively high levels of deprivation and low skills. There is a disconnect between the high-quality jobs in engineering and manufacturing offered by the energy sector and the low-quality, often seasonal, employment that characterises many coastal areas.

4.13 Skills are a significant limitation for more people getting into the energy industry. For example, in 2015, 16.9% of Great Yarmouth residents had an NVQ Level 4 or higher, this compares with 33.3% for the East of England, and 36.8% for England. So, we will act to further link skills provision to business needs and to help local people better understand the opportunities that exist and access the skills needed.

4.14 The Hertfordshire Green Triangle is a green growth partnership between the Building Research Establishment, Rothamsted Research, The University of Hertfordshire, St Albans City and District Council and Oaklands College. The Hertfordshire Green Triangle presents a collaborative approach to raising the profile of green and environmental sectors within the county. Now in its third year the organisation strives to attract and retain skills and talent in this sector, assist the growth of green enterprise and provide infrastructure linking green research, science, engineering and technology enterprises.

4.15 The New Anglia Energy Sector Skills Strategy has identified a number of skills challenges in the existing energy economy:

- Across the sector, employers highlighted the growing importance of aligning advanced manufacturing and engineering with energy in the context of Industry 4.0[2], particularly on the back of the increasing use of digital and cloud-based technologies;

- The workforce demands for the offshore wind industry are project cycle based from the planning, consultation stages through to new build, operations and maintenance. Key skills needs include project management skills linked to heavily oriented project-based work methods. The civil infrastructure investment stages require a mixture of key roles and trade-based skills from across construction and civil engineering, including digging, cabling/piping and onshore new build for power transmission;

- Biomass installation usually requires a combination of gas accredited qualifications, combined with working within a 'wet' environment. HETAS (Heating Equipment Testing and Approval Scheme) provide a direct entry (with NVQ L2/3 pre-requisites) programme for biomass installation, with training available from its approved training centre in Sudbury, Suffolk;

- NICEIC (National Inspection Council for Electrical Installation Contracting) approved short courses are the standard training route way for solar PV installation and maintenance, solar thermal and heat pump installation/maintenance activity. The training is delivered nationwide and there is a need for greater training opportunities in the LEE area;

[2] Industry 4.0 is a name for the current trend of automation and data exchange in manufacturing technologies. It includes cyber-physical systems, the Internet of things, cloud computing and cognitive computing. Industry 4.0 is commonly referred to as the fourth industrial revolution.

- Our area is home for large numbers of domestic renewable energy consulting businesses such as for air and ground source heating and solar installations. The workforce operating is locally sourced and is often sourced from a customer service background, up to a graduate level. There are however no specific courses available linked to the domestic energy market.
- The nuclear industry has highlighted challenges in terms of skills supply including:
    - Control and instrument engineers;
    - Specialist safety engineers;
    - Commissioning engineers;
    - Electrical engineers;
    - Project and planning control.

Strategic leadership

4.16 The Local Energy East Strategy organisations will:

- Work with education providers and industry to mobilise industry leadership to advocate for more apprenticeships in the energy sector, particularly higher-level apprenticeships. Work with local training centres to ensure local provision of relevant skills;
- Work with schools, colleges, university and businesses to ensure that a clear pathway into the offshore energy sector is defined as the government rolls out the new T-levels. We will work to address the 'fragility' of skills supply;
- Develop in partnership with industry and education providers a higher technical engineering offer;
- Support 'intra-industry' and 'inter-sector' workforce transferability;
- Ensure that this agenda is reflected in the priorities of the new Skills Advisory Panels.

Case Study: SmartLIFE Construction Centres

Cambridge Regional College is home to the UK's two leading SmartLIFE Construction Centres, used to teach the latest sustainable construction methods and renewable energy techniques.

Students learn the expertise needed for building low carbon homes and installing renewable energy systems, opening up jobs in the renewable energy and sustainable construction sectors.

Cambridgeshire Regional College also supports existing businesses looking to adapt to a low carbon economy and teach the workforce skills needed for building low carbon homes and installing renewable energy solutions. Specialist classrooms are used to teach the installation of photo-voltaic, advanced gas and solar energy systems.

Diffusion of energy innovation into other sectors

4.17 As innovation continues apace, we will examine how these benefits can be felt across other sectors. This reflects the aims of the Clean Growth Strategy. Particular areas where we will support further activity include:

- *Construction and Energy:* The design, materials and construction methods employed for domestic and office buildings has a significant impact on their energy efficiency. BRE, one of the constituent members of Hertfordshire's Green Triangle are looking into how building design can lead to better environmental outcomes. New construction methods, including off-site manufacturing, can increase productivity as well as reduce environmental / energy impact;

- *Agriculture and Energy:* AgriTech is a particular area of expertise for the East of England and a very high quantity of land is given over to agriculture. Rothamsted Research, Hertfordshire-based agricultural experts are already exploring how farming can be made environmentally friendly. We will engage farmers to trial new technologies as they develop including through our Food Enterprise Zones. We will explore the potential for agri-fuel sources that complement our AgriTech and agricultural strengths;

- *Data Science and Energy:* Data science, a speciality of the region and in particular Cambridge University, is extremely data consumptive. For this growth industry to flourish, we will need to find solutions that ensure both sufficient energy capacity and limit environmental impact;

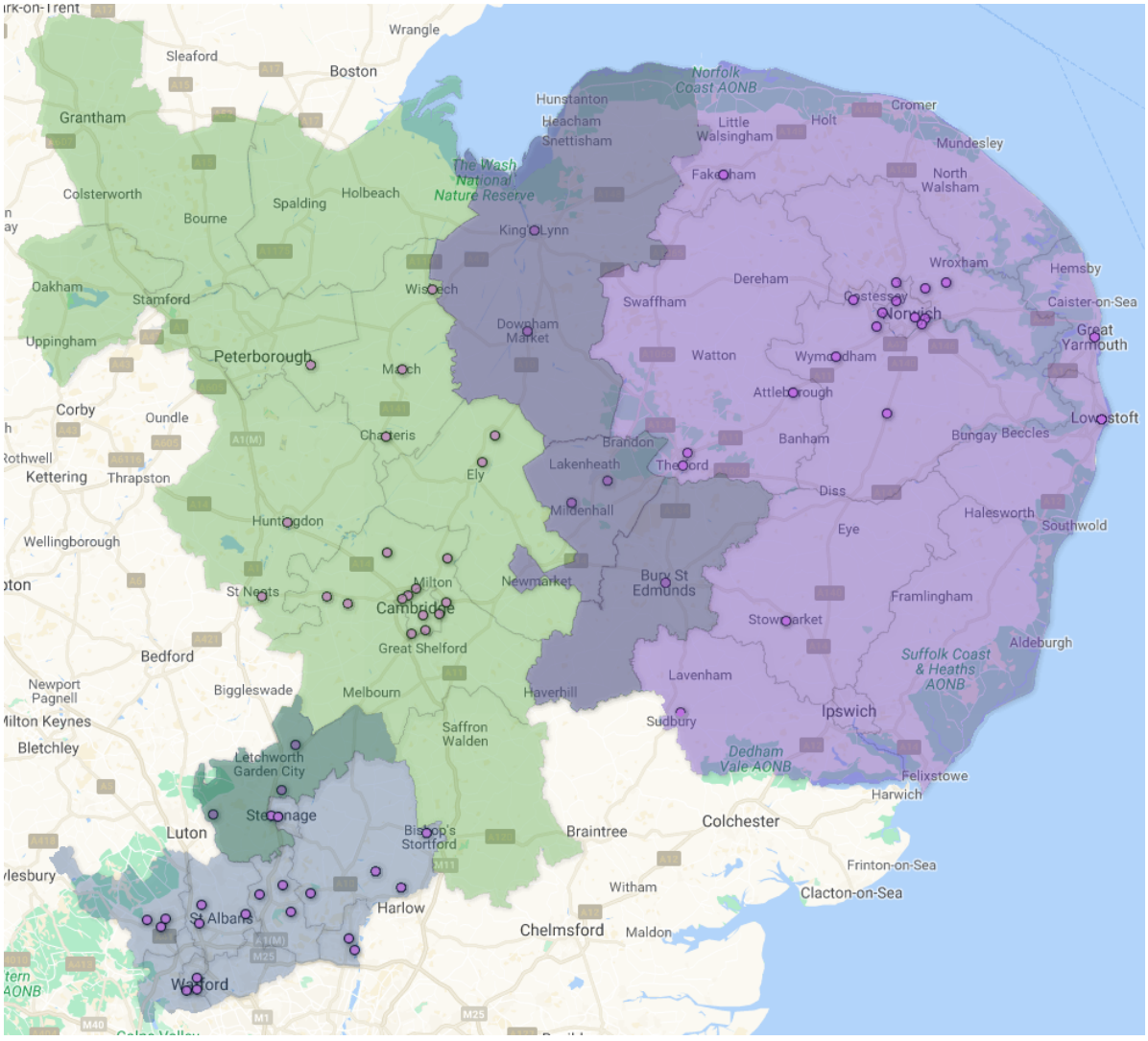
- *Advanced Manufacturing and Energy:* Our advanced manufacturing industries, including the high-level engineering at Peterborough, comprising manufacturing in Huntingdon and TMI in Cambridge, are second to none. This industry can contribute to the development of new energy generation technology as well as transforming other products (e.g. vehicles) to become more efficient. This includes Blue Economy and Marine subsector;

- *Developing Linkages Between Regional Centres of Excellence*: Cambridge University, University of East Anglia and the Building Research Establishment work to develop the region's reputation as a centre for research, innovation and commercial development.

5 Housing growth and commercial site infrastructure

5.1 Our population is projected to grow from 3.9 million to 4.3 million by 2030. Our industries require high quality, cost-effective commercial sites to be internationally competitive. Providing an effective energy system is vital to enable housing growth and commercial land supply in our region. This section explains how we will ensure that our energy system can support our growth ambitions.

Figure 5. Major housing sites



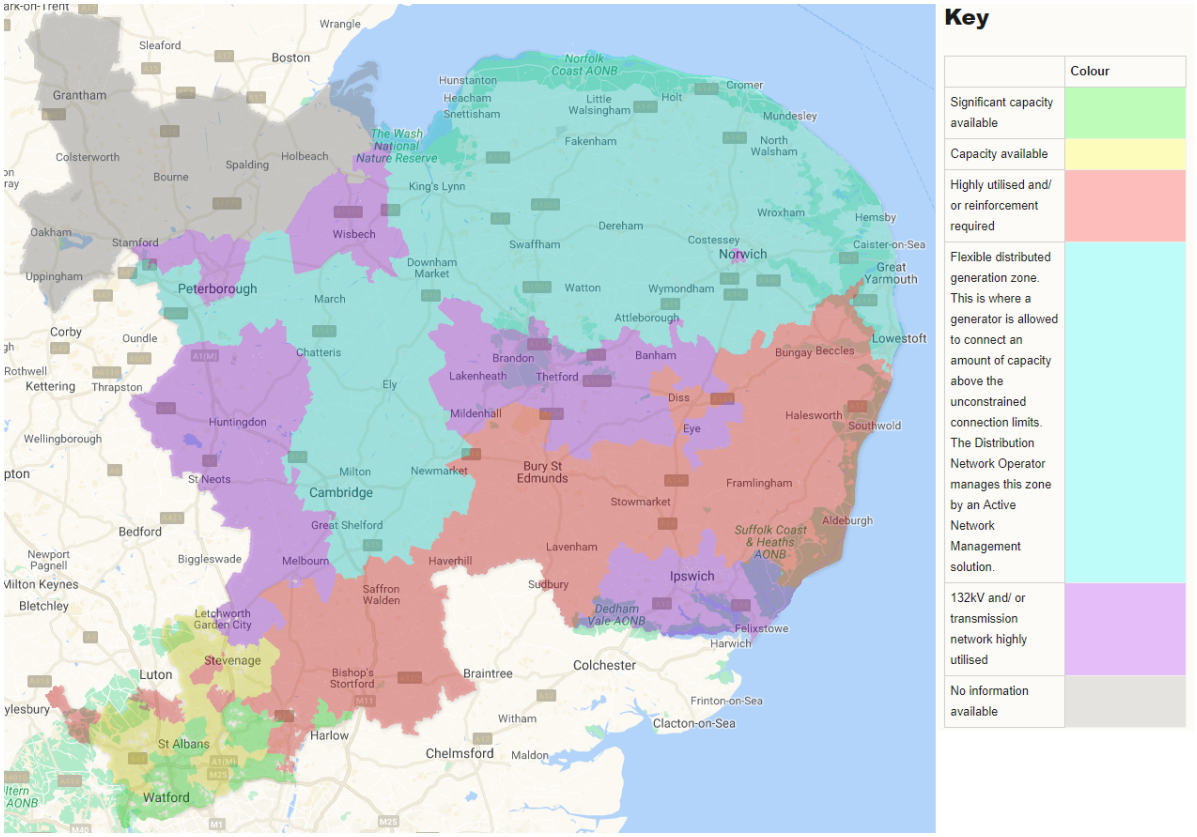
KEY

Purple dots denote major housing developments in the planning system.

The shaded colour areas denote Local Enterprise Partnership (LEP) areas and areas shared by LEPs.

- Light Purple – New Anglia LEP only.
- Dark Purple – New Anglia LEP, and Cambridgeshire and Peterborough LEP shared area.
- Green – Cambridgeshire and Peterborough LEP area only.
- Dark Green – Cambridgeshire and Peterborough LEP and Hertfordshire LEP shared area.
- Light Grey – Hertfordshire LEP only.

Figure 6. Capacity availability and constraints



5.2 Specific examples of projects that are being put at risk as a result of energy infrastructure challenges include the following:

North West Cambridge and West Cambridge developments

5.3 The North West Cambridge project is the University of Cambridge's flagship mixed-use development comprising housing, academic and commercial research space. In response to planning requirements the scheme will be an exemplar of sustainable living. However, as a result of lack of grid capacity, the University has faced some restrictions on the use of photovoltaic panels and may not be able to switch on its Combined Heat and Power unit until additional capacity within the grid can be supplied.

The Southern Cluster, Cambridge employment site

5.4 The Southern Fringe is the focus for growth in biomedical and high technology research, and includes development at Addenbrooke's Hospital, the Cambridge Biomedical Campus and other research parks in South Cambridgeshire (e.g. Spicers, Babraham Research Institute, Granta Park and the Genome Centre) and development at Marshalls (residential development).

5.5 To support the expansion plans within the Cluster over the period up to 2027 requires an additional 89 MVA (Mega Volt Amps) against 2 MVA of spare capacity available currently at the substation serving the Southern Cluster area. Work is underway to bring forward the grid infrastructure reinforcement needed to the Fulbourn grid to increase supply capacity. This supply capacity is not guaranteed for individual organisations but available on a first come, first served basis.

5.6 It is anticipated that the upgrade of the Fulbourn Grid will take three years to design and deliver. There will still be a need to carry out additional works to link new developments to the Fulbourn

Grid, and the design of these works will only take place once applications to connect have been submitted by individual developments. All of this adds additional time, costs and risk to this strategically important development and harms the competitiveness of our region.

The Greater Norwich Partnership

5.7 The Greater Norwich Partnership of Broadland, Norwich City, and South Norfolk Councils, representing 400,000 residents, plans, plan to build over 30,000 new homes in the next 13 years and is implementing a network of electric vehicle charging points. Commercial growth is already limited by a lack of energy capacity at key employment sites (including Norwich Research Park, Broadland Northway and Hethel Technology Park) whilst . the existing power distribution network does not align well with areas of growth within the partnership area. There is clearly a need to map anticipated power requirements and develop a plan to ensure capacity is available. This plan needs to both integrate and balance the power requirements of each member of the partnership. It's an opportunity to base a future on innovative solutions and sustainably sourced renewable energy generated locally and to minimise overall energy requirements.

Capacity mapping of sites not deemed to be under stress

5.8 Some areas, such as parts of Hertfordshire, have been assessed as having sufficient grid capacity. This however doesn't necessarily mean that multi-thousand new development sites such as those in Gilston, Brookfield Farm in Broxbourne, Welwyn Garden City and Bishops Stortford will necessarily be unrestricted when connecting to the grid when they are developed. One key priority of this strategy is to not only deal with current issues but strategically understand and plan for emerging and known future grid constraints. By taking this approach, new domestic and commercial developments should not be hindered by the grid status at the time they wish to connect.

Decommissioned military bases

5.9 There are now many disused military bases across the LEE area, particularly old air bases. These are ideal locations for development as they do not require construction on greenfield sites and already have much of the existing infrastructure required. Local authorities are developing these in some areas, such as at Coltishall, where Norfolk County Council has set up the Scottow Enterprise Park, which contains one of the largest solar farms in the UK. The solar farm is providing rental income to Norfolk County Council.

5.10 However, the energy capacity requirements of new housing and commercial developments tend to exceed what was needed previously and therefore to achieve their potential extra capacity must be installed. As the case studies demonstrate, this has often proven to be a time consuming and difficult affair.

5.11 Allowing long periods of time to elapse before sufficient capacity can be provided at these sites is not an acceptable outcome as they provide much needed rural jobs and business locations. Jobs and businesses tailored specifically to rural areas are essential in ensuring that rural areas retain and attract young business people. This will help to address a typical migratory pattern of young people moving to urban areas and big cities. The common challenge with all sites discussed is the provision of adequate energy capacity in order to fuel the potential economic development of the site. The. The opportunity presented is to develop increased grid capacity and/or renewable-based solutions.

5.12 We will discuss with UK Power Networks what a 'standard approach' to decommissioned military base redeployment would look like, creating a framework that will allow issues to be navigated quickly. By rolling out a similar approach across sites, we will bring benefits of infrastructure scale, procurement and connectivity. In doing this we will draw upon the expertise of those involved in the negotiations around the current sites and investigate to what extent onsite generation could meet capacity shortfalls.

Case Study: Bentwaters

Bentwaters is an ex-RAF/USAF base located just to the east of Woodbridge in Suffolk. The base was closed by the MoD in 1993. It was then purchased primarily by two landowners with the intention of developing the site as a diverse business location. The site went through many years of challenging planning scenarios to develop its current diverse business basis.

Central to this development was the development of a source of renewable energy on site. Given the agricultural nature of the surrounding area, the use of anaerobic digestion was chosen and after a protracted period of feasibility and planning a plant was established.

The location has also become attractive to companies that are active in the low carbon sector such as a local energy company specialising in the provision of renewables, plus many other companies in a diverse range of sectors. Current plans for the further development of 'Bentwaters Parks' are ambitious and consistent with local growth plans but will require further energy capacity.

Improving collection and dissemination of information by UKPN

5.13 We have a strong partnership with UKPN and stakeholders have been at pains to recognise that UKPN is responsive to information requests. Nonetheless, there are fundamental challenges associated with getting information that supports our development ambitions and those of private sector developers.

5.14 Currently, UKPN often either lacks information about energy capacity or is only able to share the information it has with local authorities and developers on a reactive or piecemeal basis. This is partly because UKPN itself is restricted in its ability to reinforce grid connections until planning permission is agreed.

5.15 Without the information on energy infrastructure, planners and developers cannot be certain if the development plans are feasible. This can cause delays, cost increases, and ultimately creates excessive risk which in some instances cause developments not to proceed. Even when information is provided, it is often late on in the planning process and often only covers the site in question and not surrounding areas, which might also be affected if development goes forward.

5.16 As noted in the case study below, some DNOs in other parts of the country have established stronger data-gathering infrastructure and more proactive measures of information sharing.

Ultimately though, it is important to remember that DNOs are regulated entities and that national regulations must support the local planning system.

Strategic leadership

5.17 Three actions are proposed:

- We will work with UKPN to consider how best to increase available information and ensure that this is available in real time as much as possible;
- We will work with UKPN and National Grid to consider how the current regulatory system can be improved in order that necessary information is available on-demand;
- Further to the above, we will look to integrate an improved information source with our on-line energy data-mapping portal to ensure that our partners have access to this information to support growth.

Case Study: Differences of approach between UK DNOs

Different Distribution Network Operators (DNOs) around the country provide differing levels of information. Some examples of this include:

- UK Power Networks (UKPN) provide an interactive map and RAG rating for substations (not sites) and focus on the potential for connecting distributed generation;
- Western Power Distribution (WPD) have invested in deploying large numbers of sensors around the network and thereby have a better idea of what kind of headroom is available on individual substations for both demand and generation. They offer an interactive map which has a figure for headroom as well as a RAG rating for different areas;
- Northern Powergrid (NP), Scottish and Southern Electricity Power Distribution (SSEPD) and Scottish Power Energy Networks (SPEN) provide an interactive map showing details on the current performance of substations and a RAG rating for potential future connections;
- All of the above provide details for what the technical reason for any constraint is e.g. fault level or thermal;
- Electricity Northwest offer downloadable PDFs giving RAG ratings for connecting generators of 10 MW or above at 33 kV and High Voltage (HV).

These are good examples of investment and more proactive provision of information by DNOs. We will encourage this in our region and work with government to build upon this through supportive regulation.

Investing in upstream reinforcements in the grid

5.18 Where the grid is insufficient to support proposed levels of development, this can create major problems. Sites are not always adjacent to the distribution network, and DNOs are not allowed to invest in network upgrades (i.e. super-grid transformers) without an outline planning permission or

the costs of the upgrades picked up by an external funder. This is to prevent costs of stranded assets being picked up by bill payers.

5.19 The result is that unless developers are prepared to take the cost and risk in paying for the whole upgrade up-front (including those elements which don't directly benefit their site), development projects will stall. Whilst local government and LEPs can choose to foot the bill (and seek to recoup the costs over ten years from developers), this simply transfers risk and cost to the public sector and is often simply not practical.

5.20 In some areas covered by the strategy, such as Norfolk, on the one hand housing and employment growth is constrained by limited grid capacity, while on the other, nationally significant offshore energy projects are being developed to supply renewable and low carbon energy direct to the national grid. At present local communities do not directly benefit from the energy generated by these schemes, or indeed benefit from connecting to these enhanced grid connections via local energy schemes. Therefore, opportunities should be explored with relevant public and private sector partners to facilitate secondary interconnection between the Offshore Transmission Operator (OFTO) and local distribution networks as an innovative means of overcoming capacity constraints and enabling growth. In addition, opportunities should be explored for local economic benefits to be maximised from these nationally significant projects through provision of high quality jobs, supply chain opportunities, longer term jobs related to operations and maintenance and the creation of apprenticeships and training opportunities working with local schools and colleges.

Strategic leadership

5.21 To address the aforementioned challenges, we will do the following:

- Work with UKPN and the National Grid to consider how the current regulatory system can be improved in order that DNOs are able to provide necessary infrastructure investment up-front and make representations on this to Government;
- Make use of national funds to address site-based infrastructure issues. In particular, we will support and lead on Housing Infrastructure Fund (HIF) bids that deliver energy infrastructure to support site development;
- Work across the LEPs and local planning authorities to consider how a dedicated revolving fund can be used to address these and other site-based issues that prevent or slow development.

Case Study: Ebbsfleet Development Corporation

The Ebbsfleet Development Corporation (EDC) has worked with UKPN to purchase the design and build of two substations and associated cabling that will provide network capacity to support the development of Ebbsfleet Garden City, a new settlement of 15,000 homes and up to 30,000 new jobs.

Ebbsfleet Development Corporation will become owners of the energy infrastructure when it is built. This allows UKPN to charge for the grid connections and repay Ebbsfleet Development Corporation. Over time, the investment and a small profit to pay for administration will be paid

back. As the EDC is able to take a long view on financial returns, they have been able to get the infrastructure in place for new development without delay.

Whilst the development corporation model may not be suitable for the LEE area (though it may be for some sites), the ability to take a long view on investment and returns is essential to addressing the infrastructure barriers to development.

Case Studies: Achieving an increase in energy capacity

Thetford Northern Sustainable Urban Extension

A planned new development north of Thetford, to include 5,000 new homes, three new primary schools and developments of local transport systems, has required the upfront reinforcement of power supplies to progress. A bid for funding from the Housing Infrastructure Fund (HIF) has secured £9.9 million to provide this and bring a supply of potable water to the development.

Given the Government's enthusiasm for homebuilding at present, bids such as these, which show a credible ambition to develop large areas of housing, may be able to attract funding in further HIF funding rounds, particularly if they include smarter means for generating and distributing energy.

Snetterton Heath

Snetterton is a partly developed ex wartime air base situated close to the A11 on the Norwich to Cambridge Corridor. Businesses located on the site, landowners, the district council and UKPN have been engaged in years of negotiation to fully develop the site and to overcome the main obstacle to development – a lack of energy capacity.

Despite the location of a biomass energy plant on the site the energy capacity has not been provided to fully develop the business potential of the location. Protracted negotiation has been hampered by multiple land ownership issues, the need for a strategic lead body, lack of finance and a lack of strategic agreement on the sites development across the main partners. Current actions, including £2.65 million of Growth Deal funding from New Anglia LEP, lend weight to optimism that the site will now be fully developed but there are clearly lessons to be learnt from years of protracted negotiation at this site.

Decentralising the energy network

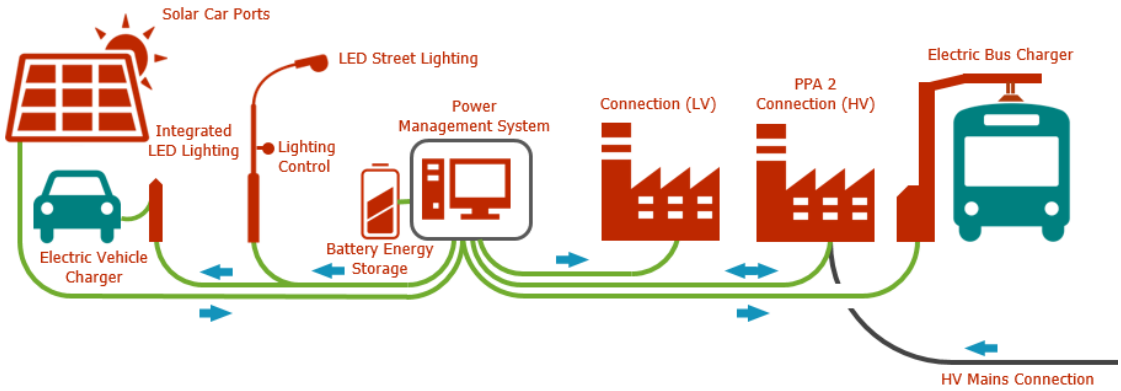
5.22 As well as seeking to make the current energy provision mechanism work as best we can, we should be seeking to take advantage of new decentralised methods of distributing energy. Not only will this enhance the sustainability and resilience of the network, it will also incentivise the development of small-scale renewable projects in the knowledge that these will have a ready market for surplus energy.

5.23 Large parts of Norfolk and Cambridgeshire and Peterborough are part of 'flexible distributed generation zones' in which UKPN offers Active Network Management services. These allow the connection of additional generation to the distribution grid where ordinarily this would not be

possible. This is backed by an innovative commercial arrangement wherein UKPN can require generators to curtail their output on the few days a year it would cause network issues and considerably reduces the cost and time to set up a new connection. UKPN has indicated that it will roll this practice out to the rest of its region over time which will create opportunities for further connecting in small-scale generation.

5.24 The diagram below illustrates how decentralised energy networks can operate.

Figure 7. Illustrative example of local decentralised energy network



Source: Bouygues Energies and Services, St Ives Park and Ride, Smart Energy Grid, MLEI Cambridgeshire.

5.25 These transformations apply to heat as well as power. The development of 'heat networks', linked into Combined Heat and Power (CHP) will allow for retention and transfer heat without its being wasted, making it possible to balance heat demands on the electricity network as heat is electrified. With take-up in heat pumps increasing there will be a higher incidence of people generating their own heat. Our energy data-mapping work has shown a number of major heat loads throughout the LEE area meaning there is a real opportunity.

Strategic leadership

5.26 In order to advance the roll-out and adoption of decentralised energy networks we will:

- Support localised pilots of decentralised energy generation and distribution. We will monitor and evaluate these to understand the long-term options for support and roll-out;
- Work with planning authorities and developers to encourage the development of smart energy grids as islands with the longer aim to connect these smart energy islands together, thus growing the energy system with smart technologies. For example, new major/strategic developments could have their own smart energy grids to balance supply and demand across a community and extend to other smart energy islands if required;
- Develop smart grid programmes within existing business and residential communities located in highly constrained areas of the power network;
- Work with local partners, including local authorities and businesses, to develop bids for funding to help produce innovative solutions to grid capacity constraints in order to unlock growth. For example, Innovate UK funding linked to the Industrial Strategy Challenge Fund and future rounds of the Housing Infrastructure Fund;

- Explore local peer-to-peer trading of generation and consumption capacity to reduce network imbalances, the need for re-enforcement and to retain local value;
- Work with planning authorities and others to bring forward heat networks.

Case Studies: Smart energy in the Scilly Isles

The Smart Energy Islands project aims to enable the transition to a low-carbon, sustainable and resilient community on the Isles of Scilly. The project is led by Hitachi Europe Ltd. and supported by the European Regional Development Fund (ERDF). The Council of the Isles of Scilly, the Duchy of Cornwall and the Tresco Estate.

By implementing a set of interconnected projects, the Smart Energy Islands programme aims to cut electricity bills by 40%, meet 40% of energy demand through renewables and see electric and low-carbon cars make up 40% of vehicles. Investments include rooftop solar PV for 10% of households and two 50 kWp solar 'gardens'.

This is underpinned by an Internet of Things platform (a network connecting appliances, lighting, and local power generation, such that they can "talk to each other") that will monitor electricity loads in houses and businesses, as well as electric vehicles, home batteries, smart heating technologies and other infrastructure, to optimise local energy use.

Free support provided to businesses includes: an energy audit, an energy monitor and tablet, analysis of a firm's energy use and a training community to help businesses implement the recommendations.

This project provides an example of what can be achieved on a small community scale for homes and businesses. We will follow the results closely to learn how some of these ideas could be applied to new developments and existing communities.

6 Secure, affordable, low-carbon consumption

6.1 While the LEE area is incredibly energy-rich, many of the financial benefits of producing so much energy are not experienced by local communities. In particular, fuel poverty is very high in some parts, especially those that are not connected to the gas grid, as residents are forced to rely on more expensive sources, e.g. oil and electricity, for their heating.

6.2 This divergence between the area's energy strengths and the day-to-day experience of energy costs for our residents and businesses, requires a joined-up approach. The development of an Energy Hub for the South East will provide a locus for some of this activity, which has already been occurring through multiple initiatives and uses of government funding. We will also look at developing a dedicated vehicle for this activity in the form of a Multi-Utility Service Company (MUSCo), see Section 8.

6.3 To address fuel poverty, we will support a further wave of Energy Company Obligation (ECO) type measures. These measures oblige energy companies to spend a fixed proportion of profits improving the energy efficiency of customers' homes, by installing insulation, replacing inefficient boilers, etc. and are targeted in particular at lower income consumers, thereby tackling fuel poverty and reducing emissions. They have a long history under various names (e.g. the CERT, CESP, EEC and EESoP schemes)[3].

6.4 The government has already signalled that some sort of ECO equivalent obligation will continue up to 2022. We are keen that future ECO measures are universal, to encourage wider roll-out, rather than means-tested which has historically reduced uptake. It is important that future initiatives are stable, predictable and accessible to improve their impact.

Strategic leadership

6.5 Therefore, to address fuel poverty the following activities could be considered by the LEE Network of organisations:

- Support further universally available ECO-type measures;
- Bid for available Government funding that addresses fuel poverty;
- Support improved energy efficiency measures (see below);
- Support community scale energy schemes as part of new developments where these are commercially viable;

[3] Details of these schemes can be found at: https://www.ofgem.gov.uk/environmental-programmes/eco/overview-previous-schemeshttps://www.ofgem.gov.uk/environmental-programmes/eco/overview-previous-schemes

- Develop local time of use tariffs and feasible smart metering to allow consumers benefit from changing their consumption behaviours;
- Support more equitable tariffs for vulnerable householders on pre-payment meters;
- Develop off-gas grid low carbon heating projects in rural areas.

6.6 We also want to support communities to benefit from local renewable energy generation. We want to consider a range of actions to do this, potentially including:

- Supporting the development of new community owned schemes, which cut bills for people and gives them ownership over their local energy production. This could either be done by creating energy "clubs" (see Bethesda Case Study) or by local government owning schemes and where necessary, procuring the finance to deliver them (see Soham Solar Park case study);
- Supporting the development of local smart grids, see Section 5;
- Developing a dedicated vehicle for generating local energy in a way which benefits communities. Specifically, we will review the potential for a MUSCo, either on a site-by-site basis or on a broader basis;
- Working with our local authority partners to explore the potential for pooling energy related business rates retained at a local level and using this funding to reinvest in building efficiency and renewable energy.

6.7 We will consider where targeted pilots could help us explore these kinds of initiatives and will look to learn from other leading areas / schemes.

Case Study: Schemes guarantee benefit to local populations

Bethesda Hydroelectric Power

In Bethesda, a small village in North Wales, 100 households have joined together to create an 'energy club' to ensure residents benefit from their location, close to Snowdonia and the fast-flowing River Berthen. By partnering with Co-op Energy and Energy Local, residents have had smart metres installed to show them when the energy being produced by the HEP station is most abundant, meaning they can get lower prices for their energy at these times. When energy supply is lower, and more is consumed than produced, it gets sold to them at the normal rate. By reducing the distance the energy has to travel the cost is reduced, with consumers paying 7p/kWh for their energy, about half of the national average.

Soham Solar Park, Cambridgeshire

Cambridgeshire County Council was the first Local Authority in England to receive Contracts for Difference (CfD) for its solar park. Contracts for difference is a finance incentive run by Government where projects compete to deliver renewable energy based on price. The Soham Solar Park will create £1 million of revenue a year from an initial investment of £9 million and will provide an income for the council offsetting the need to make cuts.

Project	Soham Solar Park, Cambridgeshire	
Savings	• £1 million annual gross revenue benefit per annum • Total net cash flow of more than £10 million	• 135,170 tonnes of Carbon dioxide (CO_2) cumulative over 25 years • Simple payback of 11.1 years • 12,000 MWh generated per annum
Timescales	• The build took 16 weeks and the solar farm began feeding electricity to the grid in Spring 2017	
Statistics	• 206 rows of solar panels across 70 acres • More than 45,000 panels connected by over 430,000 metres of cabling • Eight nationalities on the installation team	

Improving energy efficiency

6.13 The LEE area contributes a higher level of Carbon dioxide (CO_2) emissions per capita than the national average, largely as a result of high levels of transport emissions reflecting the rural nature of many parts of our area. Reducing Carbon dioxide (CO_2) emissions can be expected to happen as a result of increasing investment in renewable energy sources (see Section 4) and the shift towards electric vehicles, see Section 7. However, further to this, there is more that we can do to invest in improving energy efficiency, in homes, commercial premises and public-sector buildings.

6.14 The importance of this is reflected in the 'energy hierarchy', a conceptual method of thinking about the most environmental approach to power. Before considering how to improve energy *supply* (through renewable energy generation), we should think of how to reduce energy *demand*, through improving the efficiency of our houses. This reduces the need for alternative methods of energy generation, though of course, these go hand in hand.

6.15 To do this, we will improve the skills of those with professions in the built environment, including plumbers, builders, and electricians, to ensure they have employ the most environmentally friendly approaches when constructing or altering housing.

Strategic leadership

6.16 The Local Energy East organisations will:

- Work with planning authority partners to review mechanisms to either ensure high levels of energy efficiency/carbon reduction as standard in new development and/or to raise money for retrofitting activities. These could include the development of a Carbon Offset Fund, similar to the approach in Milton Keynes, see the case study over leaf;
- Work with planning authorities to develop robust planning policies targeting energy performance across all sectors of development (housing, commercial development, transportation and other infrastructure) to achieve carbon emissions reductions targets;
- Consider a pilot programme to invest in energy efficiency that also supports our fuel poverty aims;
- Work with sustainable transport-related action not about EVs – change the tenure model for ownership to point of use hire, e.g. car clubs, logistics sharing;

- Develop financial instruments to promote commercial energy efficiency – not grants but loans & energy performance contracts;
- Develop and simplify the supply chain to make it easier for business to invest in energy efficiency facilitated by public sector buying power.

Case Study – Milton Keynes Carbon Offset Fund

Milton Keynes is a pioneering local authority, which has managed to improve energy efficiency in existing housing stock and incentivise the creation of energy efficient new housing stock. It has done this through the Carbon Offset Fund, launched in 2008, which required developers to contribute £200 per tonne of carbon expected to be emitted by the home in the first year of its usage. This goes into a fund, which has been used for replacement of boilers and support of the older population in using energy more efficiently. This has proved very successful – for example, approximately 15% to 20% of the boilers replaced in the period since the scheme was launched have benefitted from the funding.

7 Clean transport networks

7.1 To achieve our environmental objectives and growth ambitions, a focus on transforming our methods of transportation is essential. The Government's policy limiting fossil fuel-based vehicles in favour of electric vehicles coupled with vehicle manufacturers' pledges to shift to EVs by as early as 2019 means significant infrastructure change to support is essential.

7.2 The LEE area has major ports, such as Ipswich, Great Yarmouth and Felixstowe, meaning lots of freight passes through it. The agricultural industry is transport intensive and there are major logistics hubs at Peterborough due to its location on major national transport corridors. Finally, the rural nature of much of the area necessitates travel for many residents to access essential goods and services.

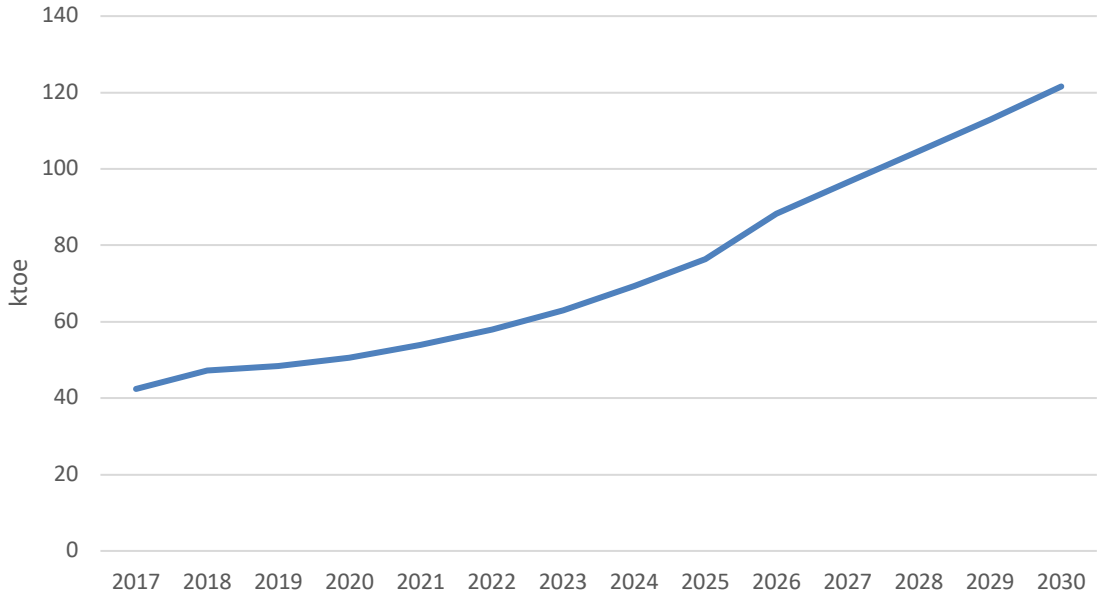
7.3 There will be significant changes in how transport networks consume energy over the next decade. In the longer-term, it is possible that hydrogen technology will become the norm but over the next decade, it is likely that EVs will be the most widespread form of renewable transport energy in use. This section considers the implications of this and sets out how we and partners will work to take best advantage of this technological shift.

Enabling the large-scale roll-out of electric vehicles

7.4 Today, there are already at least 30,000 electric vehicles in the region. This is forecast to increase to between 1.2 million and 1.9 million by 2030, according to UKPN, mirroring similarly large increases across the rest of the country. At present, transport in the East of England[4] accounts for roughly 10% of transport energy consumption in the UK, or approximately 42 ktoe (kilo-tonne oil equivalent) of electricity consumption. The graph below shows that this figure is expected to triple by 2030, reflecting the expected high uptake of electric vehicles.

[4] Figures are not available for the Local Energy East area.

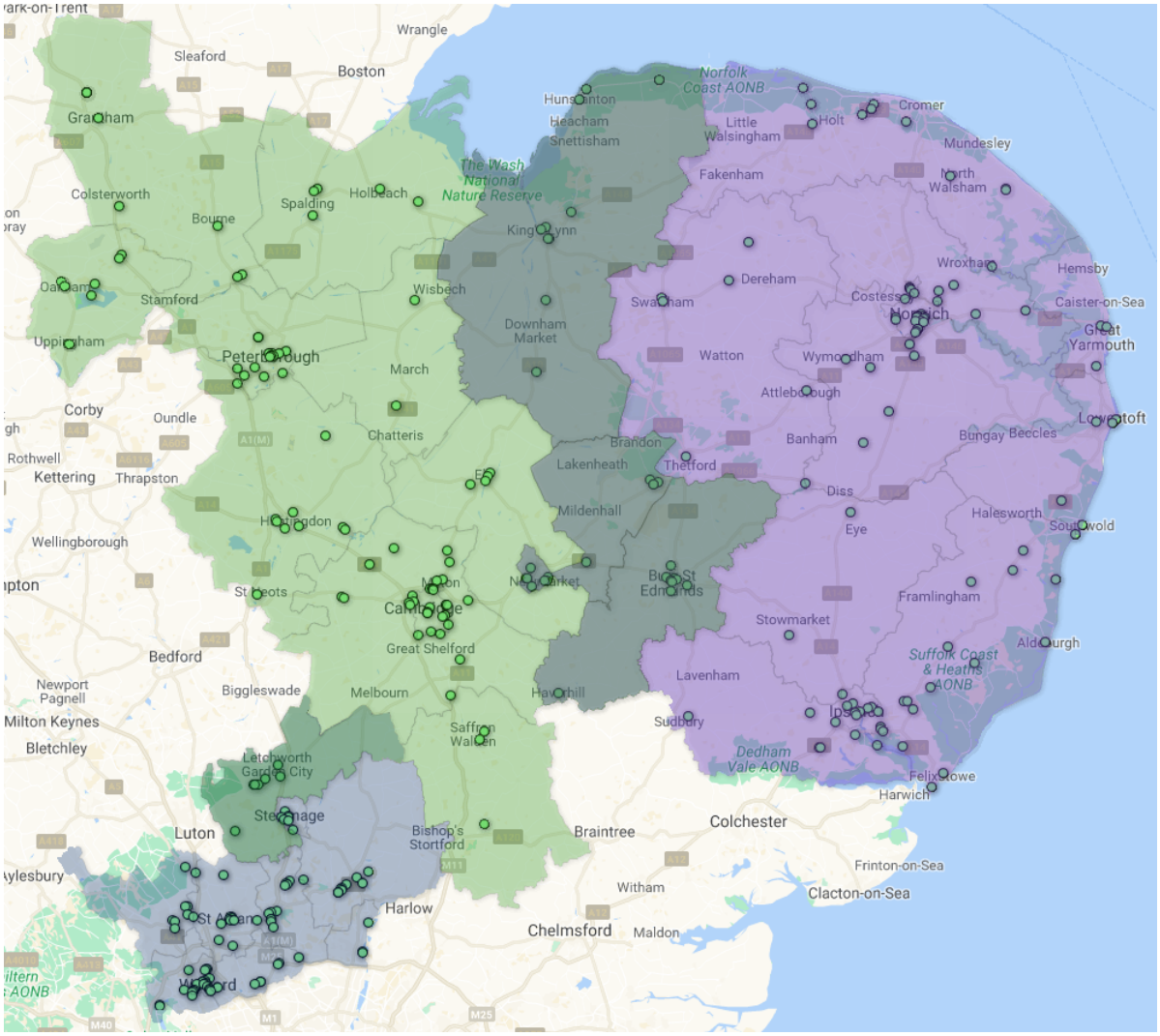
Figure 8. East of England projected electricity consumption in the transport sector



7.5 This increase in electricity demand will place strain on our energy system if planning for this change isn't developed at a pace that matches the predated change. This is particularly true of domestic charging points but also applies to commercial chargers as well. Therefore, to prepare the LEE area for the impacts of increased EV activity we will:

- Work with UKPN and others to undertake a review of the implications of EV charging roll-out for our network, to identify any bottlenecks in the infrastructure;
- Continue to follow developments in automated vehicle technology and the surrounding legal context, to understand how these will affect spatial deployment of charging points and any technical changes that may need to be made to them.

Figure 9. EV charging point distribution at present



KEY

Green dots denote EV charging points.

The shaded colour areas denote Local Enterprise Partnership (LEP) areas and areas shared by LEPs.

Light Purple – New Anglia LEP only.

Dark Purple – New Anglia LEP, and Cambridgeshire and Peterborough LEP shared area.

Green – Cambridgeshire and Peterborough LEP area only.

Dark Green – Cambridgeshire and Peterborough LEP and Hertfordshire LEP shared area.

Light Grey – Hertfordshire LEP only.

7.6 Supporting the scale of increased demand requires a different kind of distribution network (see Section 5, above) and specific investments in the charging point infrastructure that will enable uptake. Distribution of existing petrol stations suggests that, left to the market, the allocation of rapid charging points may end up being socially suboptimal – clustering in cities and along major highways, but poorly serving rural areas.

7.7 The shift from internal combustion engine to electric motor vehicles will have a positive impact on urban air quality but it may mean that the overall impact on vehicle emissions will be muted as rural dwellers may choose not to switch to electric transport and continue to make longer journeys (to work, amenities, cultural sites, etc.) using petrol or diesel vehicles. Conversely, if we are able to

ensure EV charging provision in rural areas is strong, a lack of petrol stations in these areas will make the switch to EVs more appealing as will increased vehicle range.

Strategic leadership

7.8 Therefore, the Local Energy East organisations will:

- Work with partners to support and finance the installation of EV charging points at strategic locations, where people visit regularly and for a sufficient amount of time to charge, such as supermarkets, places of employment and town centres as well as ensuring independent Smart Energy grids can support EVs;
- Work with planning authorities to encourage the installation of charging points in new homes where feasible (and associated grid reinforcement activities) and collaborate with employers to install EV charging points in staff car parks. We will also encourage car clubs with shared electric vehicles and charging bays;
- Support the work of Highways England to install EV charging points on the strategic road network, building on local partners' existing work in this area;
- Develop a long-term investment-financial return model that facilitates early expansion of the EV charging network based on likely spatial and temporal demand;
- Support a programme of engagement and promotion of EV to stimulate the passenger and commercial fleet markets.

Introducing electricity and hydrogen power into public and freight transport

7.9 Much of the road network in the East of England is being upgraded currently or is in the pipeline to be upgraded. This includes the multiple lane and intersection improvements on the A14 between Huntingdon and Cambridge, future ambitions for the A47, A10 and potential extension of the M11. These roads, particularly the A14, are very important for heavy goods transport. Therefore, we will:

- Work with Highways England and local highways authorities to ensure these roads have capability to support rapid EV charging for larger vehicles;
- Work with local logistics businesses to understand the longer-term potential for hydrogen refuelling facilities.

7.10 Local government can directly influence the energy usage of public transport. The Park and Ride station at St Ives (see Case Study, below) is an example of a local authority delivering a UK leading renewable-based smart energy system. The Greater Cambridge Partnership and the Energy Investment Unit at Cambridgeshire County Council have been researching ideas to electrify buses across the Greater Cambridge area. A concept for a network of smart energy grids, similar to St Ives Smart Energy Grid is set to be developed around the City and along the public transport corridor to St. Ives.

7.11 More broadly, we will:

- Work with local authorities and public transport concession holders to consider opportunities for supporting electric and hydrogen-based charging systems. We will develop business cases and pilot projects, building on the success of the St. Ives case;
- Assess how electrification of transport projects can improve air quality, building on work done by Transport for London on the electrification of buses.

Case Study: St Ives Park and Ride

The Smart Energy Grid comprises a 950kW solar PV carport with integrated LED lighting, 10x electric vehicle chargers and an electric bus charger, smart street lighting, a battery energy storage system and private wire connections to local customers. This enables the generation, storage and distribution of renewable energy to the various end users, namely the electric vehicles, the site's electrical infrastructure and local customers to buy the electricity directly from the scheme. This helps build local resilience to energy cuts and keeps the energy economy local.

Changing behaviours to promote other low-carbon forms of transport

7.12 While there are many promising and innovative solutions to be pursued in moving towards a lower carbon transport system, encouraging walking and cycling in the place of driving is also important to reduce Carbon dioxide (CO_2) emissions, improve air quality, enhance public health and contribute to well-being. We will continue to support local behavioural change programmes and systems which encourage walking and cycling.

Case Study: Liftshare - Matching drivers and passengers

This innovative car sharing service was founded in 1998 and is headquartered in Norwich. Liftshare locally helps over 8,000 members – including employees in the two County Councils, West Suffolk NHS, University of East Anglia and EDF Energy – to get around the East by sharing journeys. The service is free and is available to all who live, work and travel in and around the county and matches potential drivers and passenger partners to share car journeys as little or as often as they like.

Liftshare currently provides services to almost 700 clients in the public and private sectors including some of the UK's biggest businesses. The platform has achieved impressive success with one of the most notable being its work with Jaguar Land Rover. Ten thousand staff members have registered on the platform and five thousand of these have confirmed as sharing their journeys on a daily basis.

8 Future work

8.1 This strategy sets out our ambitions and actions that collectively the LEPs and local authorities in the Local Energy East area wish to pursue, in partnership with UK Power Networks and with the support of BEIS, to ensure that the we remain at the forefront of Clean Growth in the UK and grasp the opportunities ahead.

8.2 Collaboration is our key to success and will ensure that our economy grows cleanly, promising developments have the energy required to prosper, consumers can enjoy an affordable low-carbon supply and that our transport will be electrified effectively.

8.3 This strategy will not be delivered by one partner alone or by one strand of investment or action. Our ambition and direction is set, the next step is to make it happen. We are fortunate to have a new human and financial resource with which to support our endeavours, the Greater South East Energy Hub.

The Greater South East Energy Hub

8.4 In the Autumn of 2017 BEIS offered LEPs the opportunity to develop five new 'Local Energy Hubs', which will support local energy projects across England. Acknowledging that Local Energy Strategies created by LEPs would need to be supported by human and financial resources in order to identify need, overcome barriers and create investment ready projects, BEIS offered funding for two years to kick start activity.

8.5 The East of England, Greater London, the South East and the Oxford to Cambridge Growth Corridor including Milton Keynes and parts of Northamptonshire were identified as a connected area that a Hub could support. The 11 LEPs with some of their constituent local authorities formed a partnership to respond to BEIS' offer and quickly develop a basis which to collaborate and work together for the Greater South East, the Hub area.

8.6 Within the Hub area there will be six new Local Energy Strategies. Two multi-LEP projects of three LEP areas and utilisation of the Greater London Authority's existing energy plans to inform the work of the new Hub. The Hub is being set up managed by the Cambridgeshire and Peterborough Combined Authority on behalf of all 11 LEP areas which includes 16 counties and London. The dedicated Hub team will seek to identify need from these strategies and deliver local energy projects that unlock sustainable economic growth whilst piloting innovative financial, technical and operational methods of delivery.

8.7 The Hub will optimise funding options such as green bonds and crowd funding to respond to a highly dynamic, fast growing sector which maximises potential to scale up pilot and test projects across the substantial geography of the Hub.

8.8 The Hub's activities are likely to include:

- Supporting those with aligned project aims;
- Bringing forward a pipeline of projects aligned to the strategic aims and objectives;
- Helping to identify and remove barriers to opportunities;

- Spotting opportunities and synergies across administrative geographies and sectors;
- Measuring progress against key KPIs;
- Helping to provide strategic direction to a wide range of stakeholders, delivery agents and new project proposers seeking in invest in the LEE area.

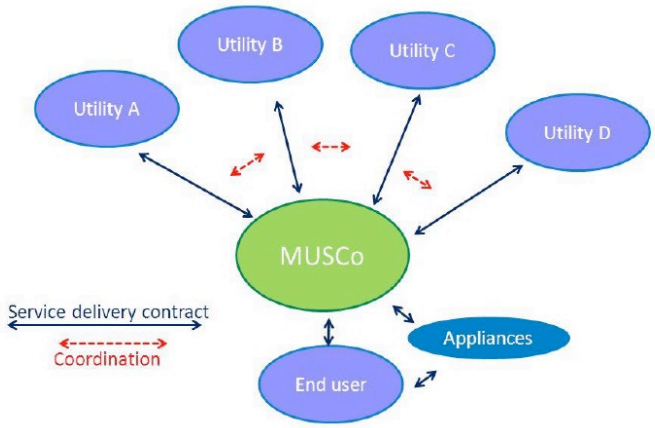
Developing delivery vehicles and funding mechanisms

8.9 We will carry out an assessment of possible delivery vehicles to understand what model can best take forward our ambitions. In particular we will look at the option of establishing a MUSCo, a Multi-Service Company.

8.10 A MUSCo is essentially a Special Purpose Vehicle created to manage one or more of the utilities at a given site or sites. This is usually delivered in conjunction with a private sector partner, de-risking the process, but enabling the development. With local authorities being an active participant, it is also has the potential to generate a financial return alongside supporting local authority concerns around low carbon development, energy security and fuel poverty. As far as local authorities are concerned this is a relatively untapped area to date, with East Hampshire District Council the only authority to create its own MUSCo called RegenCo.

8.11 The diagram overleaf shows the possibilities around managing a number of interconnected sites/utility services.

Figure 10. Example of MUSCo structure



8.12 We will also explore the potential for revolving fund mechanisms that address the challenge of forward-funding infrastructure.

Developing energy systems to support public transport Systems

8.13 We will support the development of a network of smart energy grids based at transport hubs/interchanges around Cambridge and other urban centres across the LEE area which can generate renewable energy, store energy and charge EVs, buses, metros and light freight.

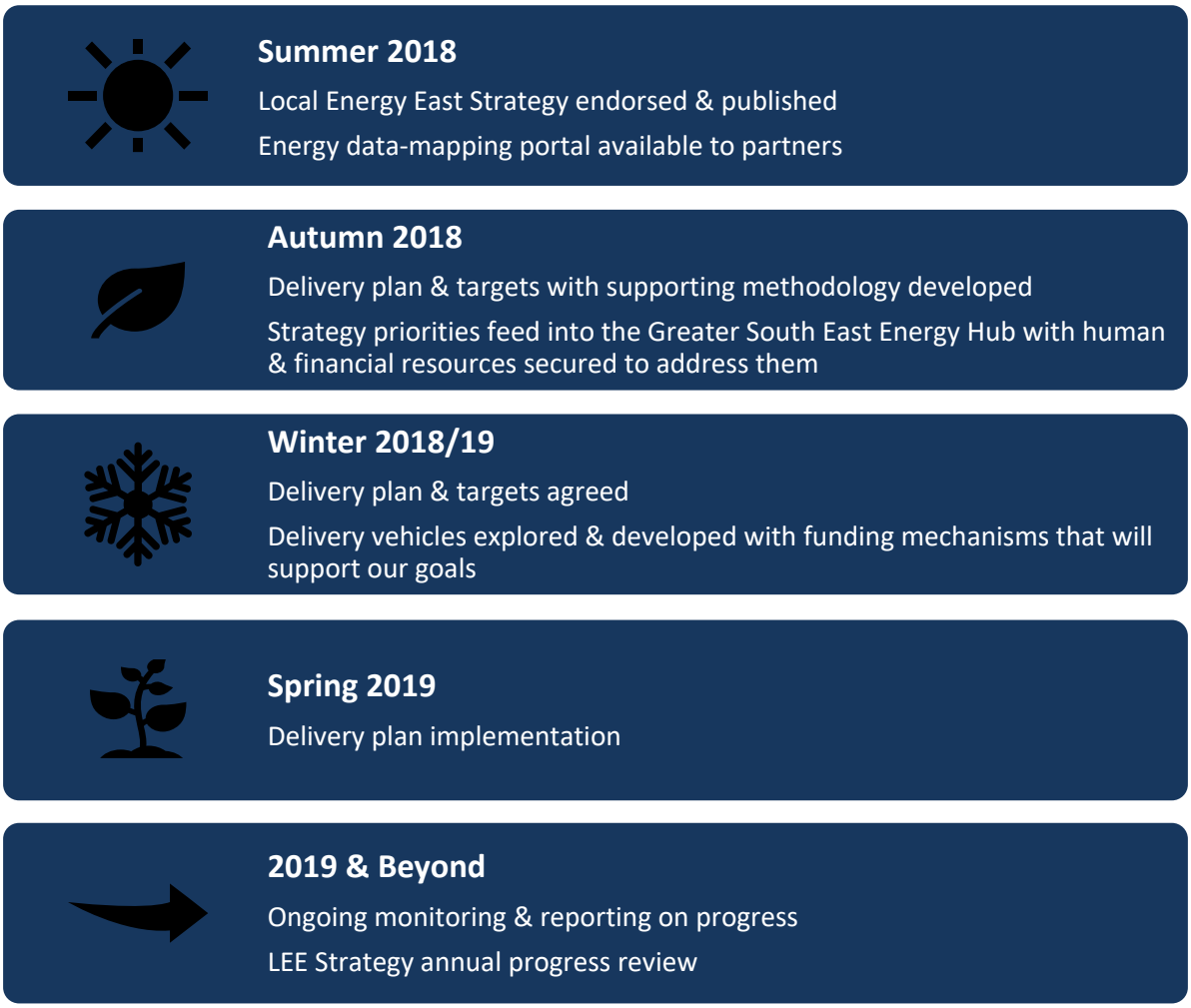
Housing and Commercial Developments

8.14 We will support demonstrator projects for the delivery of larger smart energy grids for major new developments to help build new energy system infrastructure fit for the future and that can be linked to other smart energy grids or the distribution network if required. These may include MUSCos, serving as trials for a possible expansion of the MUSCo model.

8.15 We will submit bids to Innovate UK and other sources for match funding and build consortiums of businesses to help make this happen. For example, in the Southern Cluster Cambridge we will look to develop a demonstrator smart energy grid to facilitate commercial development.

8.16 All our ambitions and priority areas of work are summarised in the Future Plan below.

Figure 11. The Local Energy East Strategy Future Plan



9 Glossary of terms

- **CERT** – Carbon Emissions Reduction Target – Government funding scheme that expired at the end of 2012.
- **CESP** – Community Energy Saving Programme – Government funding scheme that expired at the end of 2012.
- **Clean Growth Strategy** – A document published by the UK Government, building upon the Industrial Strategy. It sets out policies to deliver Clean Growth for the UK, including setting up a Green Finance Taskforce, improving business efficiency, and investing over £1bn to make cycling and walking the natural choice for shorter journeys.
- **Decentralised Energy** – Electricity generation and storage performed by a variety of small, grid-connected devices. These may instead be directly connected to local sources of power generation, particularly renewables.
- **Distribution Network** – The network which takes power from the transmission network, and distributes it to homes, offices, and other premises.
- **DNO – Distribution Network Operator** – These companies oversee the distribution network and are responsible for upgrades to it.
- **EEC** – Energy Efficiency Commitment – Government energy efficiency programme in operation between 2005 and 2008.
- **EESoP** – Energy Efficiency Standards of Performance – Government domestic energy efficiency programme in operation between 1994 and 2002.
- **ECO -** Energy Company Obligation – Measures which oblige energy companies to spend a certain amount on improving the energy efficiency of homes. These measures are particularly targeted at individuals on lower incomes.
- **Energy Data-Mapping Portal** – A system developed by the Local Energy East (LEE) team to map key data relating to the strategy's aims. This includes data on sites of constrained energy.
- **Energy Storage** –Technologies that store energy (energy must otherwise be used as it is produced). Storing of energy enables more balancing between the demand for energy and supply of energy, as supply can be 'released' to respond to demand. Battery storage stores electricity specifically using battery technology.
- **Flexible Distribution** – Distribution which balances supply and demand, using energy storage to regulate supply, and better consumer information to regulate demand.
- **Fuel Poverty** – A household is in fuel poverty if it has required fuel for heating costs above national average and who would be left with an income that puts it below the official poverty line were they to spend that amount on heating. (A previous definition stated that households were fuel poor if they spent more than 10% of their post-tax income on fuel for heating).

- **GVA –** Gross Value Added – A measure of the value produced by the local economy.
- **HEP Station –** Hydro Electric Power Station – used to generate energy from the natural flowing of water.
- **HIF -** Housing Infrastructure Fund **(HIF)** – A government capital grant programme of up to £2.3 billion, which Local Authorities can apply to for funds to deliver the infrastructure needed for new housing developments.
- **Hydrogen Fuel Cell** – Hydrogen fuel cells convert hydrogen into energy and could in future be used to power cars. There are some of these vehicles in development, but there are challenges around economic viability at present.
- **Industrial Strategy** – A document published by the UK Government in November 2017. It outlines four 'grand challenges' for UK industry – Ageing, Artificial Intelligence, Clean Growth, and Mobility.
- **MUSCo -** Multi-Utility Service Company – A company that is created to deliver and manage many utilities a given site, or sites. This is usually delivered in conjunction with a private sector partner, de-risking the process, but enabling the development.
- **MWp –** Mega Watt peak – a unit for measuring the maximum output of power for a given power plant or system.
- **MWh –** Mega Watt hour – a unit for measuring power over time.
- **National Grid** – The transmission network for electricity in the United Kingdom, and the name of the company which operates it.
- **Peer-to-Peer Trading** – When householders in a locality can trade energy between themselves, particularly if many of them are generating their own energy.
- **Prosumers** – A conceptual notion of how people will consume and produce energy in future, being both givers to and takers from the energy network.
- **Renewable Energy** – Energy that doesn't deplete its source when it is generated, e.g. solar energy, which does not 'use up' the sun's energy.
- **Smart Grids** – Newer energy networks which can intelligently manage consumption to reduce peak demand when required, and effectively inform consumers of their energy costs. These grids may also receive energy from small-scale generation.
- **Smart Meters** – Appliances which inform consumers of their energy consumption in a way which is easy to understand.
- **Substation** – A set of equipment 'stepping down' the high voltage of electrical power transmission to that suitable for supply to consumers.
- **Transmission Network** – The network which takes energy from large-scale energy generation, such as coal and gas power plants, and transfers it to substations, where its voltage can be reduced before being transferred to the distribution network.