Energy Security Select Committee Report

March 2016

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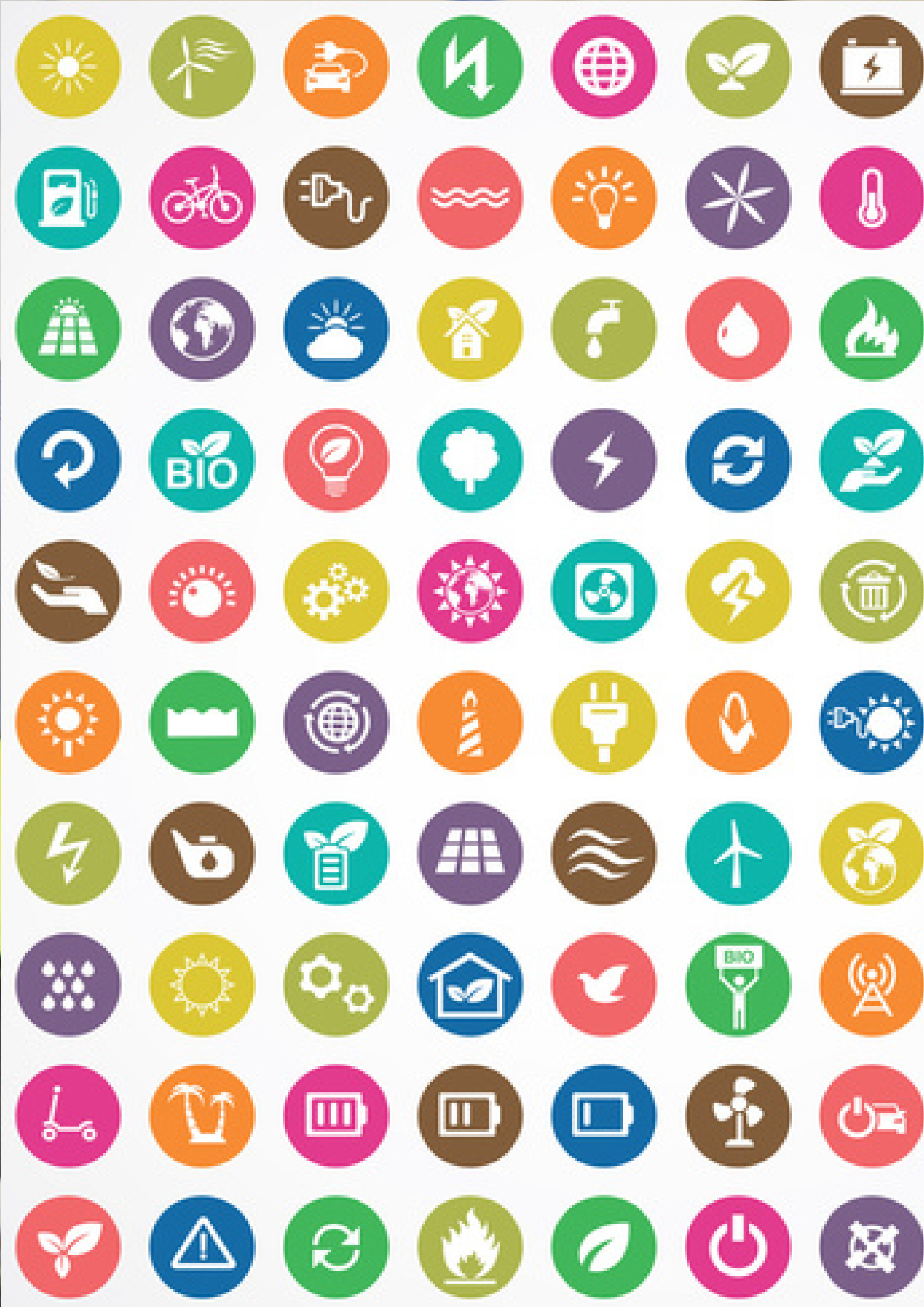
BIO

Foreword

Energy is crucial to our quality of life: we use energy to generate electricity and heat for our homes, public places and businesses. Our prosperity depends on energy security.

The UK benefits from a strong energy system, but we need to be prepared for a future characterised by smaller domestic reserves of fossil fuels, increasing reliance on imports to meet our demand for energy, the replacement of much of our existing plant with lower carbon technologies, and the need to update and improve our infrastructure.

Energy security is very much a national issue, but local communities can play a key role by generating their own low-carbon energy, taking control over the energy they use and helping to tackle climate change.

We cannot afford to take our energy supply and system for granted. We are faced with a range of short-term and long-term challenges that must be addressed in order to ensure that the UK continues to benefit from one the of the most secure energy systems in the world. With the right investment, innovation and partnership working, this goal can be achieved.

This report provides an outline of our current local and national position, the challenges we face, the actions we are already taking and a number of recommendations that will contribute to promoting energy security in a sustainable, reliable and affordable manner, both at national and county-wide level. We believe that greater long-term coherence in energy policy, greater public awareness and behavioural change towards our energy use, ensuring a balanced energy mix, and sustained support for low-carbon technologies and a low carbon economy are all crucial components in ensuring energy security for the UK, both at a local and national level.

Jim Wedgbury

Chairman of the Energy Security Select Committee

Executive Summary

1.1. Committee Membership

1.1.1. The Committee consists of ten Members of Kent County Council (KCC): five members of the Conservative Party, two members of the UK Independence Party (UKIP), one member of the Labour Party, one member of the Liberal Democrat Party and one (co-opted) member of the Green Party[1].

Mr David Brazier
Conservative
Sevenoaks North East

Mr Brian Clark
Liberal Democrat
Maidstone South

Mr Adrian Crowther
UKIP
Sheppey

Mr Christopher Hoare
UKIP
Tunbridge Wells East

Mr Peter Homewood
Conservative
Malling Rural North East

Mrs Eileen Rowbotham
Labour
Deal

Mr Chris Smith
Conservative
Tonbridge

Mrs Carole Waters
Conservative
Romney Marsh

Mr Jim Wedgbury
Conservative (Chair)
Ashford Central

[1] Mr Martin Whybrow (Green Party) participated fully in the evidence gathering meetings, but took no part in the approval of the final report and recommendations.

1.2. Scene Setting

1.2.1. Kent County Council has significant existing commitments to energy generation and security, as exemplified in the work of the previous Renewable Energy Select Committee and outlined in the Kent Environment Strategy. Increasing energy prices, limited spare energy capacity and the ongoing effects of climate change make energy security a pressing issue.

1.2.2. The establishment of the Energy Security Select Committee demonstrates Kent County Council's ongoing commitment to furthering a balanced mix of low carbon energy generation measures; to fairly evaluating all applicable energy generation measures and to ensuring that Kent has as resilient and sustainable an energy supply as possible.

1.2.3. This review will aim to provide an informative and objective basis for the further development of a joint Kent and Medway energy security strategy and inform the updating of the Kent Environment Strategy, which is led by KCC's Sustainable Business and Communities team.

1.2.4. The supply and generation of energy for Kent, as well as the reduction of energy consumption, is of significant importance to citizens, businesses and local government alike, as are the related social, environmental, and economic impacts of such measures. This review reflects a commitment on the behalf of Kent County Council to securing the future energy needs of Kent, and ensuring that this is done in a sustainable, affordable and secure way.

1.3. Terms of Reference

1.3.1. To clarify the meaning of “Energy Security” and the responsibilities of KCC in ensuring this security.

1.3.2. To examine and assess a range of energy issues so as to best secure the future energy needs of Kent.

1.3.3. To identify existing best practice across the UK and abroad on how best to strengthen a sustainable, reliable energy infrastructure for Kent.

1.3.4. For the Energy Security Select Committee to make recommendations after having gathered evidence and information throughout the review.

1.4. Scope

1.4.1. The complexity of this topic and the tight timeframe of the review required a clear and focused approach. The key themes and aspects that were covered by the review are detailed below:

To clarify the meaning of "Energy Security" and the responsibilities of KCC in ensuring this security.

a. To explore the definition of "Energy Security".

b. To examine the responsibilities and roles that KCC holds in securing energy security.

To examine and assess a range of energy generation methods so as to best secure the future energy needs of Kent.

a. To investigate the various energy security measures available to KCC, Kent residents, and Kent businesses.

b. To assess these measures and their suitability in helping to secure the future energy needs of Kent.

To identify existing best practice across the UK and abroad of how best to strengthen a sustainable, reliable energy infrastructure for Kent.

a. To explore best practice examples, both across the UK and abroad, of how local authorities and other relevant organisations work to develop energy security and sustainability in their area.

b. To consider how this best practice can be replicated to improve energy security in Kent.

For the Energy Security Select Committee to make recommendations after having gathered evidence and information throughout the review.

a. To use the findings of the review and the resultant recommendations to inform the development of a joint Kent and Medway energy security strategy and to contribute to the updating of the Kent Environment Strategy.

1.5. Recommendations

NB: The recommendations below are arranged in priority order. Numbering reflects order of appearance within the report text.

Recommendations 1, 2, 3, 4, 5 and 6 (combined)

That the Cabinet Member for Environment and Transport writes to the Secretary of State for Energy and Climate Change, to highlight key issues of concern for national and local energy security, such as:

1. **The importance of further new nuclear both nationally and for Kent (see Section 5.1, p.81).**

2. **The need for the introduction of stronger national building standards, requiring both increased energy efficiency and generation measures in new developments (Section 5.1, p.84).**

3. **The need for additional financial support and incentives for community energy projects following the reduction of the FiT (Section 4.2, p.76).**

4. **The need for local authority control and management of any future energy efficiency schemes that replace ECO (Section 5.3, p.103).**

5. **The need for energy utilities to produce and implement 25 year management plans, akin to those held by water utilities (Section 6.1, p.120).**

6. **The need to ensure that the South-East CORE is adequately resourced and supported so as to facilitate the continued uptake of renewable (wind) energy within Kent (Section 4.2, p.74).**

Recommendation 7

That KCC, working in partnership with relevant organisations, builds on the work of the Select Committee in identifying key opportunities and risks to Kent's energy infrastructure, ensuring the evidence base underpinning our energy security is up-to-date and robust (Section 2.4, p.35).

Recommendation 8

That KCC leads by example through driving further energy saving and energy generation measures across its estate - in accordance with KCC's Carbon Management Plan - and in partnership with Kent social housing providers and districts (Section 4.1, p.67).

Recommendation 9

That KCC creates a communications strategy strengthening its engagement with businesses and local communities to help them understand the benefit of reducing energy use and generating their own energy (Section 4.2, p.76).

Recommendation 10

That KCC investigates the feasibility of creating investment measures to develop local, low-carbon energy generation and diversification projects (Section 5.2, p.101).

Recommendation 11

That KCC works with partners and local authorities to influence the design and planning process for developments from the start, so as to ensure that they are as energy efficient as possible (Section 5.3, p.106).

Recommendation 12

That KCC works with educational institutions within Kent to ensure that students and apprentices are given the necessary skillsets and expertise required for working across the energy sector (Section 5.4, p.111).

Recommendation 13

That KCC continues to strengthen its ability to work in partnership with local authorities, relevant agencies, businesses, community groups and the education and training sector to make sure that a comprehensive approach is taken in ensuring energy security for Kent (Section 6.1, p.116).

Recommendation 14

That LASER and Sustainable Business and Communities investigate the feasibility of KCC establishing itself as an energy supplier to the local community (Section 6.1, p.118).

Recommendation 15

That KCC works in partnership with UKPN and relevant energy generation companies within Kent to better understand the risks to Kent's energy systems and how these can be mitigated (Section 6.1, p.120).

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2. Background

Energy security is a complex and important issue that has many different aspects. Before beginning any investigation into energy security, it is first necessary to understand what it entails, and why it is emerging as an increasingly prominent subject.

This section outlines the main energy sources used in the UK's gas and electricity mix, as well as other important facts around the UK and Kent's energy situation.

Finally, when considering energy security, it is important to be aware of EU, national and local policies that will inform recommendations, as any recommendations must ensure that such laws and policies are taken into account when doing so.

2.1. What Is 'Energy Security'?

2.1.1. There is no single, universally agreed upon definition of energy security[23]. However, there are a number of overlapping definitions that can serve as a focal point for inquiry. The International Energy Agency (IEA) defines energy security as:

> The uninterrupted availability of energy sources at an affordable price.[4]

While the House of Commons' Energy and Climate change Committee provides a more detailed definition:

> A secure energy system is one that is able to meet the needs of people and organisations for energy services such as heating, lighting, powering appliances and transportation, in a reliable and affordable way both now and in the future.[5]

The Department for Energy and Climate Change (DECC) defines energy security as:

> …ensuring that we have access to the energy services we need (physical security) at prices that avoid excessive volatility (price security).[6]

2.1.2. The institute for Public Policy Research (IPPR) has noted that most definitions of energy security entail three main components that comprise this security:

- Ensuring security of supply of current fuels
- Finding alternative sources of energy
- Reducing demand for energy[7]

[2] KCC (2015), Energy Security Select Committee, Written Evidence, 27 Nov 2015.
[3] DECC (2012), Energy Security Strategy, London.
[4] International Energy Agency [online], available at: http://www.iea.org/topics/energysecurity/subtopics/whatisenergysecurity/
[5] House of Commons Energy and Climate Change Committee (2011), UK Energy Supply: Security or Independence? London.
[6] DECC (2012), Energy Security Strategy, London.
[7] IPPR (2007), Energy Security in the UK, London.

'A secure energy system is one that is able to meet the needs of people and organisations for energy services such as heating, lighting, powering appliances and transportation, in a reliable and affordable way both now and in the future.'

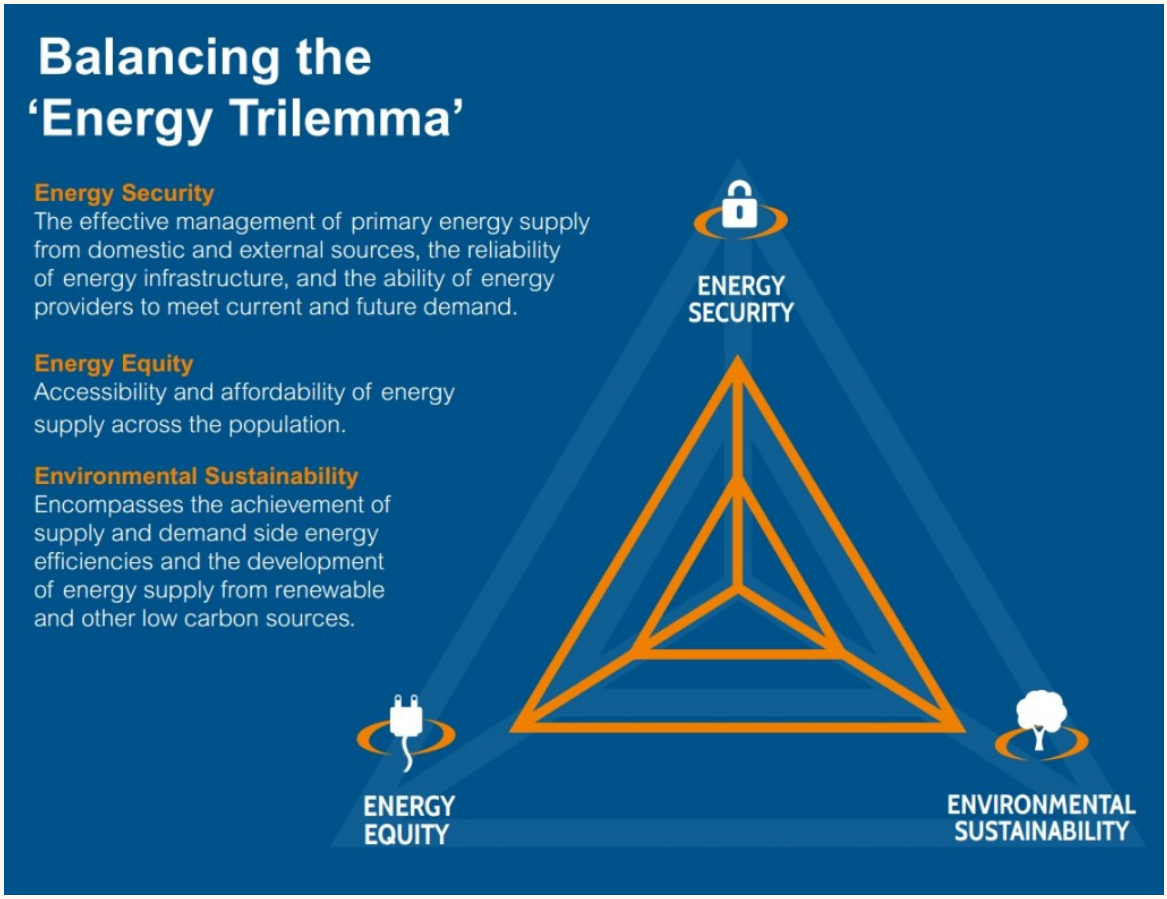
House of Commons' Energy and Climate Change Select Committee (2011)

The Energy Trilemma

2.1.3. This tri-partite definition of energy security is often referred to as the 'energy trilemma'.[8] The energy trilemma stands for the balance needed between the three goals of energy security, energy sustainability, and energy affordability.[9][10]

[8] World Energy Council (2016), *World Energy Trilemma,* [online] available at: https://www.worldenergy.org/work-programme/strategic-insight/assessment-of-energy-climate-change-policy/
[9] Ibid.
[10] DECC (2012) Energy Security Strategy, London.

Figure 1: The Energy Trilemma



Source: World Energy Council (2014)

2.1.4. Any attempt to address energy security will need to take account of the *'interwoven links between public and private actors, governments and regulators, economic and social factors, national resources, environmental concerns, and individual behaviours.'*[11]

2.1.5. In addressing energy security, it is important to distinguish between the short, medium and long term goals and threats to energy security.[12]

[11] World Energy Council (2016), *World Energy Trilemma*, [online].
[12] IPPR (2007), Energy Security in The UK, London.

2.1.6. For instance: in the short term, energy security may be about minimising disruption to fuel supplies, with the short term risks being disruption of current fuel sources (e.g. coal and gas).[13] In the medium term, energy security may mean focusing on replacing the generation capacity lost through the closure of old power plants[14] [15] [16] [17]. Finally, the long term focus may involve ensuring that supply can continue to meet demand[18], by creating an environmentally friendly and sustainable energy system that utilises emerging technologies.[19] [20] [21]

2.1.7. Based on these considerations, any definition of energy security would do well to take into account the myriad factors that make up the topic of energy security.

Key Points

- **There is no single, agreed upon definition of energy security.**
- **When considering energy security, the '*energy trilemma*' (ensuring reliability, sustainability & affordability) is a useful conceptual tool.**
- **Energy security can comprise short term, medium term and long term considerations.**

[13] Ibid.
[14] Ibid.
[15] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[16] DECC (2012), Energy Security Strategy, London.
[17] BBC (2015), *UK's Coal Plants to be Phased Out Within 10 Years,* [online] available at: http://www.bbc.co.uk/news/business-34851718
[18] IPPR (2007), Energy Security in the UK, London.
[19] DECC (2012), Energy Security Strategy, London.
[20] KCC (2015), Energy Security Select Committee, 26 November 2015.
[21] KCC (2015), Energy Security Select Committee, 4 December 2015.

2.2. Why Now?

2.2.1. The topic of energy security has been increasing in prominence in the public eye in recent years. Nearly 7 in 10 members of the public report feeling concerned about steep energy rises in the future. 42% report feeling concerned about power cuts becoming more frequent in future, whilst 58% report feeling concerned about the UK's supplies of fossil fuels being enough to meet ongoing demand.[22]

2.2.2. Energy security has also been receiving increasing attention in both the political and academic sphere[23] [24] [25] [26]. Indeed, the issue was considered prominent enough that, in 2012, DECC published the UK's first specific Energy Security Strategy.[27]

2.2.3. As has been established over the course of the Committee's review, there is no single reason for the increasing importance of energy security. Rather, there are a number of interlinked issues that enhance the need to address it.

Increasing Energy Dependence & Geopolitical Concerns

2.2.4. Since the late 90's, the UK has moved from a position of relative self-sufficiency for its energy needs - primarily supplied through North Sea oil and gas - to one dependence on imports for oil, gas and coal.[28] [29] [30] As of 2014, the UK imported 46% of its total fuel (oil, gas and coal).[31]

2.2.5. At a global level, the demand for energy is increasing, with rapidly developing countries such as India and China ensuring that this trend is likely to continue for the foreseeable future. Combined with an increasing global population and diminishing fossil fuel reserves, the question of whether existing energy supplies will be able to meet future demands is becoming increasingly salient.[32] [33]

[22] DECC (2015), Public Attitudes Tracker – Wave 15, London.
[23] KCC (2015), Energy Security Select Committee, 4 December 2015.
[24] Ibid.
[25] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[26] LGiU (2011), The 10 Pillars of Energy Security, London.
[27] DECC (2012), Energy Security Strategy, London.
[28] ONS (2015) Energy and Emissions in the UK [online], available at: http://visual.ons.gov.uk/uk-perspectives-energy-and-emissions/
[29] IPPR (2007), Energy Security in the UK, London.
[30] DECC (2015) Digest of UK Energy Statistics (DUKES), London.
[31] Ibid.
[32] IPPR (2007), Energy Security in the UK, London.
[33] DECC (2009), Energy Security: A National Challenge in a Changing World, London.

2.2.6. A reliance on imports serves to make the UK's energy security at least partially contingent on that of other nations that either export the energy the UK needs, or that host the infrastructure through which it is supplied (e.g. gas pipelines).[34] Such a reliance on other countries for fuel raises potential geopolitical concerns.[35] However, it is also possible that increasing interdependence and a better connected energy grid will make for a more responsive and efficient energy market.[36] It is also worth noting that exporters and importers of fuels are equally reliant on secure trade flows.[37]

> '***Successfully delivering safe, secure, low-carbon energy will be one of the main challenges facing public sector organisations in the next decade.'***
>
> **LGiU – The 10 Pillars of Local Energy Security (2011)**

Changing Energy Infrastructure

2.2.7. A significant proportion of the UK's existing plant is coming to the end of its life. For instance, the Government has recently announced that all coal-fired power stations will close by 2025.[38] There will also be regulated closures of the UK's nuclear power plants over the coming decade.[39] This has led to rising concerns that – unless additional plant and other measures are put in place - the 'lights will go out'.[40]

2.2.8. Additionally, the UK's energy infrastructure needs continuing investment to ensure it is fit for both current and future demand. DECC estimates that UK energy infrastructure needs £110bn of investment between 2012 and 2020.[41] In Kent, the investment needed in energy infrastructure to 2031 is estimated at £433m.[42] Securing these investments will require a 'stable and attractive investment climate'.[43]

[34] KCC (2015), Energy Security Select Committee, Presentation, 16 December 2015.
[35] Ibid.
[36] KCC (2015), Energy Security Select Committee, 4 December 2015.
[37] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[38] BBC (2015), *UK's Coal Plants to be Phased Out Within 10 Years*, [online].
[39] DECC (2012), Energy Security Strategy, London.
[40] KCC (2015), Energy Security Select Committee, 4 December 2015.
[41] DECC (2012), Energy Security Strategy, London.
[42] KCC (2015), Kent and Medway Growth and Infrastructure Framework (GIF).
[43] DECC (2012), Energy Security Strategy, London.

2.2.9. Advancements in new technologies entail new challenges for the UK's energy infrastructure. The UK's energy system has traditionally been highly centralised[44], with large power stations (e.g. coal, gas and nuclear) connected to the high voltage power network (National Grid). The electricity generated by these plants is then distributed through local distribution networks via the Distribution Network Operators (DNOs).[45] Distributed generation (e.g. small scale solar PV and wind installations) connects directly to the distribution network, and is therefore 'invisible' to National Grid, causing a challenge for grid balancing.[46] The Government is committed to increasing small scale and community energy developments[47] as a means of improving energy security. Ensuring that the UK's energy infrastructure is able to accommodate an increasing proportion of decentralised energy generation is therefore likely to present an ongoing need for innovation.

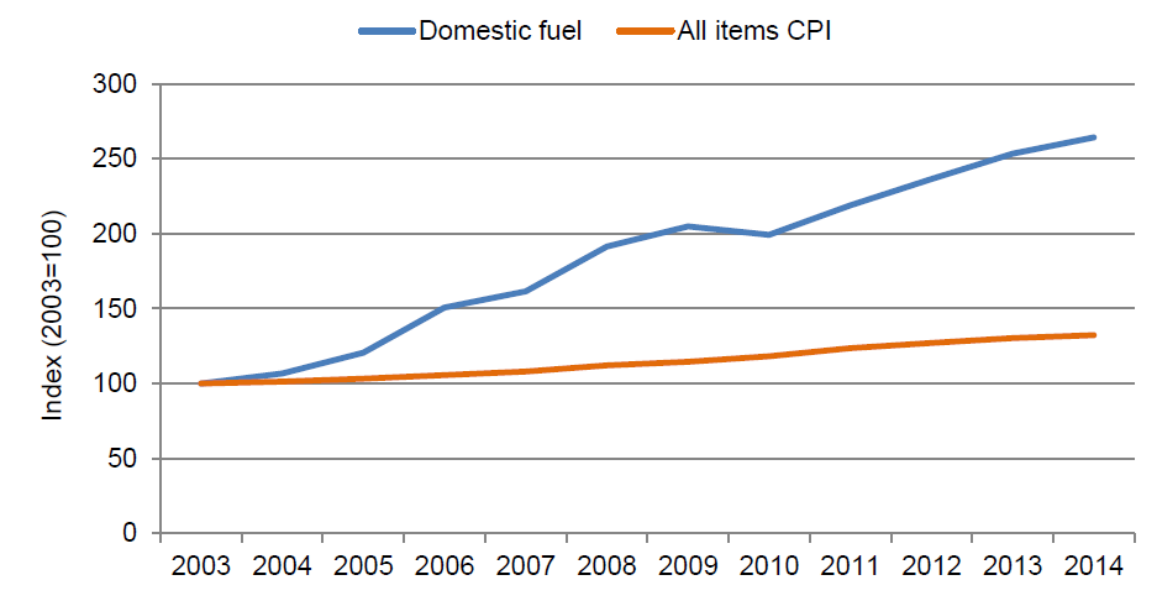
2.2.10. In spite of these challenges, the UK has one of the most reliable energy systems in the world[48] [49] [50] DECC reports that, between 2011-12, National Grid transmitted electricity at a reliability level of 99.99972%[51]. The Government has introduced a range of measures – such as a capacity market[52] [53] and new interconnectors with Europe[54] – to ensure supply can meet demand. Despite popular opinion often to the contrary, it is very unlikely that the UK will be in danger of power cuts in the foreseeable future. Energy security in this context will therefore focus primarily on ensuring that our energy system remains effective and resilient, ensuring that capacity will continue to meet demand in future, and utilising new technologies and initiatives to enhance energy security at both a local and national level.

[44] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[45] Ibid.
[46] Ibid.
[47] DECC (2014), Community Energy Strategy: Full Report, London.
[48] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[49] KCC (2015), Energy Security Select Committee, 26 November 2015.
[50] KCC (2015), Energy Security Select Committee, 4 December 2015.
[51] DECC (2012), Energy Security Strategy, London.
[52] Ibid.
[53] KCC (2015), Energy Security Select Committee, 22 October 2015.
[54] Ibid.

Increasing Energy Prices & Fuel Poverty

2.2.11. The subject of energy prices is one that is closely related to energy security. Since 2003, the price of energy has continued to rise above the Consumer Price Index (CPI) – the 'typical' basket of goods and services that make up the CPI (See Figure 2).

Figure 2: Domestic energy prices and the Consumer Price Index, 2003-2013



Source: DECC (2015), Annual Fuel Poverty Statistics Report 2015, London.

2.2.12. This rise in the cost of domestic energy prices above other goods and services means that consumers are having to spend a larger proportion of their income on heating and powering their homes.

2.2.13. There are currently 2.35m households in England estimated to be living in fuel poverty – 10.4% of all households in England.[55] Fuel poverty can have a range of negative impacts besides inefficient and excessive use of energy, such as increased chance of medical problems[56] and excess winter deaths[57]

2.2.14. Tackling fuel poverty as part of any strategy for energy security will therefore provide benefits over and above increased energy efficiency and reduced demand.

[55] DECC (2015), Annual Fuel Poverty Statistics Report 2015, London.
[56] KCC (2015), Energy Security Select Committee, 26 November 2015.
[57] ACE (2013), Fact-file: The Cold Man of Europe, London.

Climate Change & Environmental Targets

2.2.15. Climate change is an important and interlinked issue with energy security. As seen with the 'energy trilemma' (see Section 2.1), the need for affordable and reliable energy must be balanced by ensuring that that energy is ultimately environmentally sustainable. DECC recognises the importance of decarbonising the UK's fuel supply so as to 'avoid dangerous climate change.'[58]

2.2.16. There are a number of legally binding targets placed upon the UK by both UK and EU legislation. Most notably, the Climate Change Act (2008), the EU Renewable Energy Directive (2009) and the EU Energy Efficiency Directive (2012).

2.2.17. These acts commit the UK to a range of targets such as significant reductions in carbon emissions, an increase in energy generated from renewable sources, and efficiency and energy reduction targets. Climate change and decarbonisation is a central pillar of energy security[59], and must therefore be taken into account when considering the options.

Key Points

There are a number of interrelated concerns that contribute to the importance of energy security as a topic:

- **Increasing energy interdependence**
- **Changes to energy infrastructure**
- **Rising energy prices and fuel poverty**
- **Climate change targets**

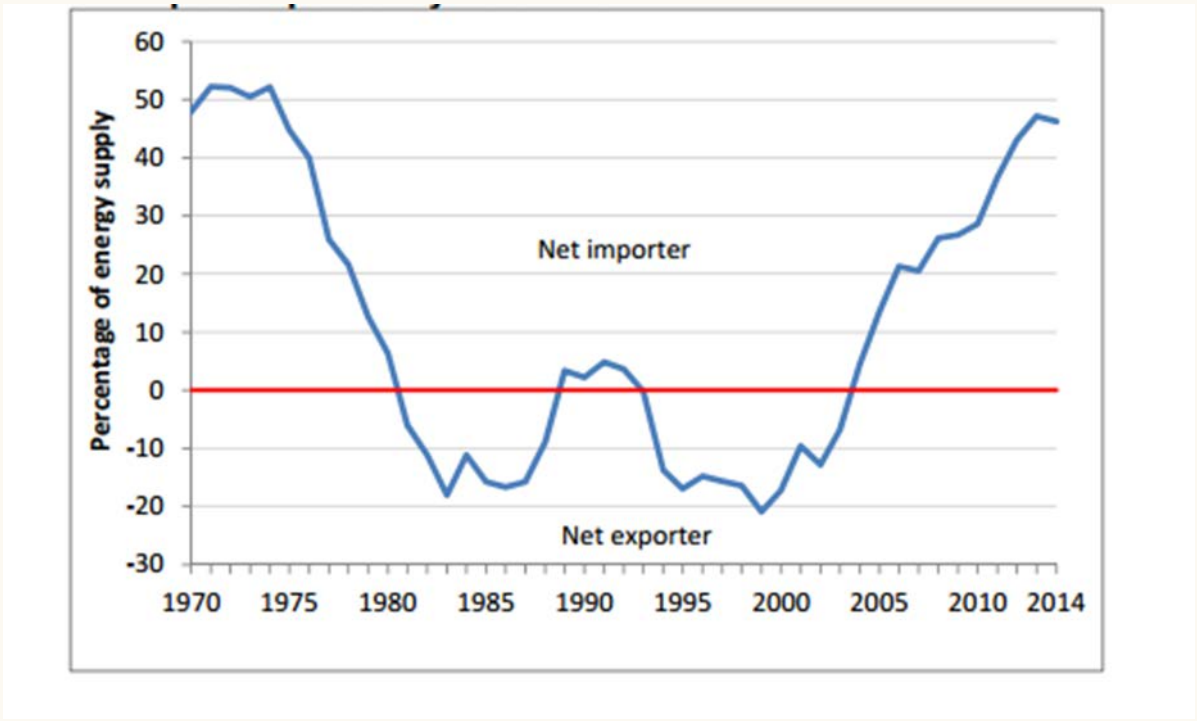
[58] DECC (2012), Energy Security Strategy, London.
[59] Ibid.

2.3. Outlining Energy in the UK

Energy Imports/Exports

2.3.1. As of 2004, the UK moved from being a net exporter of energy to a net importer. In 2013, 47% of the UK's net energy supply came from imports – the highest level since 1974[60]. As of 2014, imports have fallen to 45% of total energy supply (See Figure 3).[61] The UK became a net exporter of energy from the 1980's after the development of oil and gas reserves in the North Sea. However, North Sea production peaked in 1999 and has declined year on year since.[62]

Figure 3: UK Import Dependency, 1970-2014

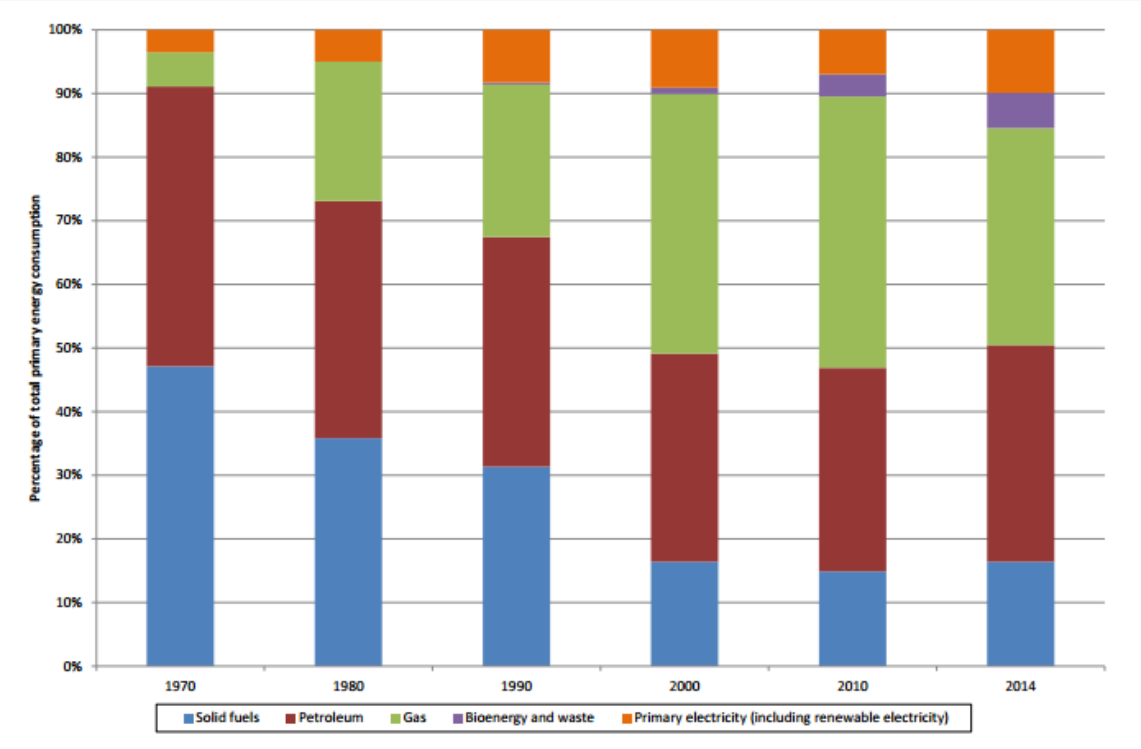


Source: DECC (2015) DUKES, Statistical Press Release

[60] ONS (2015) Energy and Emissions in the UK [online], available at: http://visual.ons.gov.uk/uk-perspectives-energy-and-emissions/
[61] DECC (2015) DUKES Infographics [online], available at: https://www.gov.uk/government/publications/digest-of-united-kingdom-energy-statistics-dukes-2015-infographics
[62] ONS (2015) Energy and Emissions in the UK [online]

2.3.2. In 1970, primary fuel consumption was dominated by solid fuel – primarily coal – (47% of all UK energy consumption) and petroleum (44%). By 1980, with the addition of North Sea gas, solid fuel consumption fell to 36%, petroleum to 37%, and natural gas' share increased to 22%. This level remained relatively unchanged into the 90s. By 2000, natural gas accounted for the majority of primary fuel consumption (at 41%), with solid fuels falling to 16%. By 2014, renewables had entered the mix as well (see Figure 4).[63]

Figure 4: UK Total Primary Energy Consumption by Fuel, 1970 – 2014



Source: DECC, ECUK Table 1.02

2.3.3. The UK is a net importer of all main fuel types (gas, coal, crude oil and petroleum products).[64] Fuel imports come from the following countries:

- **Crude Oil:** 46% from Norway.
- **Petroleum products:** the UK sources diesel from a range of European countries, and aviation fuel from OPEC countries such as Kuwait and Saudi Arabia.
- **Gas:** 57% from Norway and 15% from the Netherlands. 92% of Liquid Natural Gas (LNG) imports (accounting for 27% of all gas imports) come from Qatar.

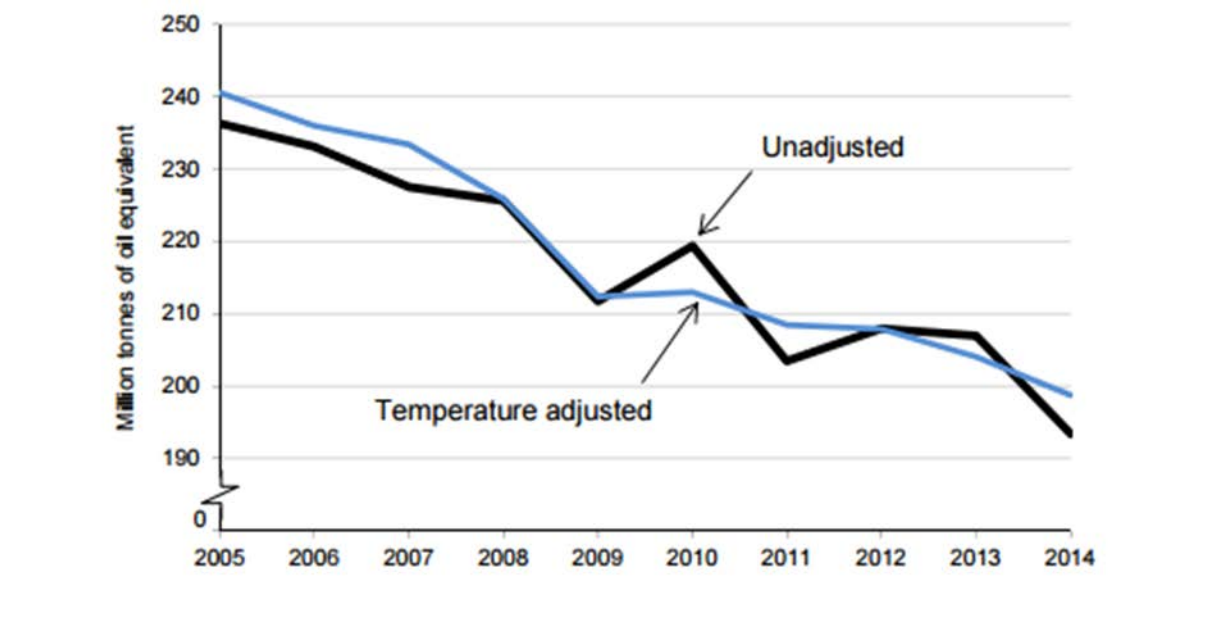
[63] DECC (2015), Energy Consumption in the UK, London.
[64] DECC (2015), DUKES Statistical Press Release [online], available at: https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes#2015

- **Coal:** 42% from Russia, 26% from the USA and 23% from Colombia.[65]

UK Energy Consumption

2.3.4. In 2014, UK primary energy consumption[66] decreased by 2.6% on a temperature adjusted basis (whereby the unadjusted yearly use is mitigated through reference to yearly variations in temperature. E.g. a particularly cold winter one year may over-inflate energy usage figures) against 2013 consumption levels. This continues the downward trend in primary energy consumption of the last ten years (See Figure 5).[67]

Figure 5: Primary Energy Consumption, UK, 2000-2014



Source: DECC (2015) DUKES, Statistical Press Release

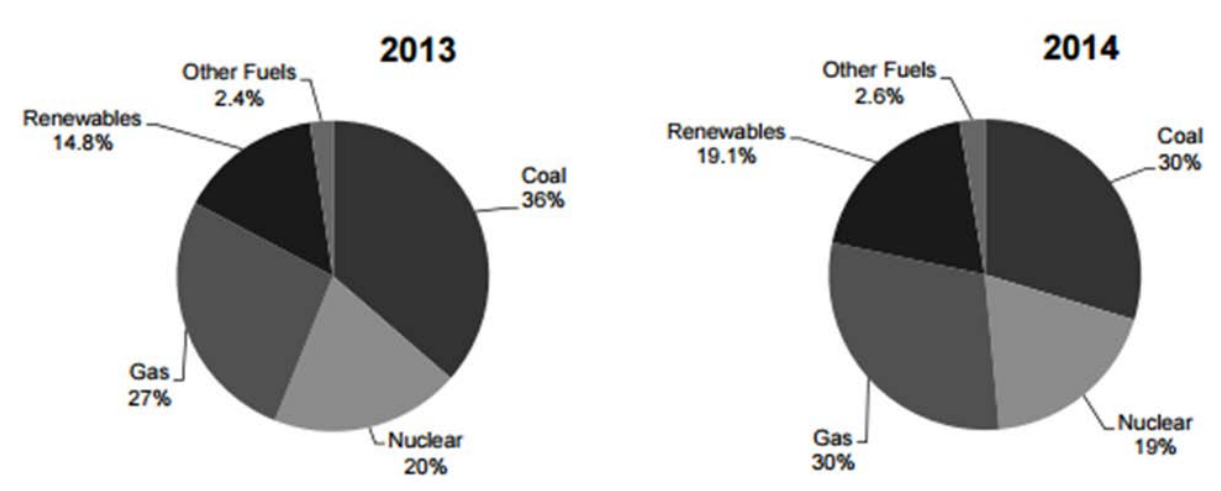
Electricity

2.3.5. Electricity currently accounts for 18% of the UK's energy (gas accounts for 28% and petroleum products 48%)[68] However, the Government foresees electricity providing between 30-100% of the UK's energy by 2050[69]. This is predicated upon the electrification of heat and transport (currently fuelled primarily by gas and oil respectively[70] [71]).[72]

[65] Ibid.
[66] Primary energy consumption refers to the direct use at the source, or supply to users without transformation, of crude energy, e.g. coal, gas or oil as a raw resource.
[67] DECC (2015) DUKES Statistical Press Release [online]
[68] DECC (2015), DUKES Infographics [online].
[69] DECC (2012), Energy Security Strategy, London.
[70] HoP: Parliamentary Office of Science & Technology (2015), Future of Natural Gas in the UK.
[71] DECC (2015), DUKES Infographics [online].
[72] DECC (2012), Energy Security Strategy, London.

2.3.6. The UK utilises a range of energy sources to generate its electricity, drawing on coal, gas, nuclear, renewables and other fuels. As of 2014, renewables now generate more of the UK's electricity than nuclear (a growth in renewables of 21% on the year before[73]). Gas has now become the main fuel used in electricity generation, matching coal at 30% each (See Figure 6).

Figure 6: Shares of Electricity Generation by Fuel, UK, 2013-2014



Source: DECC (2015), DUKES, London.

2.3.7. The domestic sector is the largest consumer of electricity for 2014 (108.9 TWh), with the service sector coming second (96.9 TWh) and the industrial sector third (93.4 TWh).[74]

2.3.8. The Government rates the overall security of the UK's electricity system as robust.[75] However, electricity capacity will need to expand to meet increasing demand. The challenge of a more intermittent (renewables) and less flexible (nuclear) energy supply will also need addressing. In addition to new generation, non-generation technologies such as storage, interconnection and demand side response can all contribute to increased energy security.[76]

[73] DECC (2015), DUKES Statistical Press Release [online].
[74] Ibid.
[75] DECC (2012), Energy Security Strategy, London.
[76] Ibid.

'Electricity generation is spread across a range of infrastructure, such that a breakdown in one piece of important physical infrastructure would normally be insufficient to disrupt overall supply if it occurs in isolation.'

DECC (2012) Energy Security Strategy

Gas

2.3.9. In 2014, gas supplied 30% of the UK's electricity and 70% of its heat.[77] The UK is the third largest producer of gas in Europe, producing 37 billion cubic metres in 2014, which enabled it to meet 55% of national demand. Total UK gas usage in 2014 was 70bcm.[78]

2.3.10. Indigenous natural gas production peaked in 2000, and has since declined. DECC predicts that, by 2030, production will have fallen to 16bcm per year.[79] National Grid forecasts that, by 2035, imports will supply 40-90% of gas demand.[80]

2.3.11. Alongside natural gas, in 2014 the UK also produced 2.6bcm of biogas (a form of renewable energy). Growth in advanced technologies and anaerobic digestion could see production reach 7bcm by 2025[81] - equivalent to supplying 10% of UK gas demand at current levels.

2.3.12. Unconventional gas (shale gas and gas extracted from coal beds), released by a process referred to as 'fracking', may in future help to reduce UK reliance on imports. However, it is unlikely that significant quantities of unconventional gas will be produced before the early 2020s.[82][83]

2.3.13. The Government has judged the current UK gas market to be 'resilient to all but the most extreme supply disruptions.'[84]

[77] HoP: POST (2015), Future of Natural Gas in the UK.
[78] Ibid.
[79] Ibid.
[80] Ibid.
[81] Ibid.
[82] Ibid.
[83] KCC - Fusion (2014), Unconventional Gas: Shale Gas and Coalbed Methane, Maidstone.
[84] DECC (2012), Energy Security Strategy, London.

'For 2014-16 the UK gas market is set to remain resilient to all but the most extreme combination of severe infrastructure failure or supply shocks. This is because of the UK's significant and diverse sources of gas supply.'

HoP: POST (2015) Future of Natural Gas in the UK

Key Points

Outlining energy in the UK:

- **The UK has moved from being a net exporter of energy during the 1970s to being a net importer today.**
- **Total primary energy consumption has been decreasing for the past decade.**
- **The UK generates its electricity from a balanced range of sources including coal, gas, nuclear and renewables.**
- **Electricity from renewables and gas has increased, whilst coal and nuclear has decreased.**
- **The Government rates the resilience and security of both the gas and electricity networks as strong.**

2.4. Energy Needs of Kent

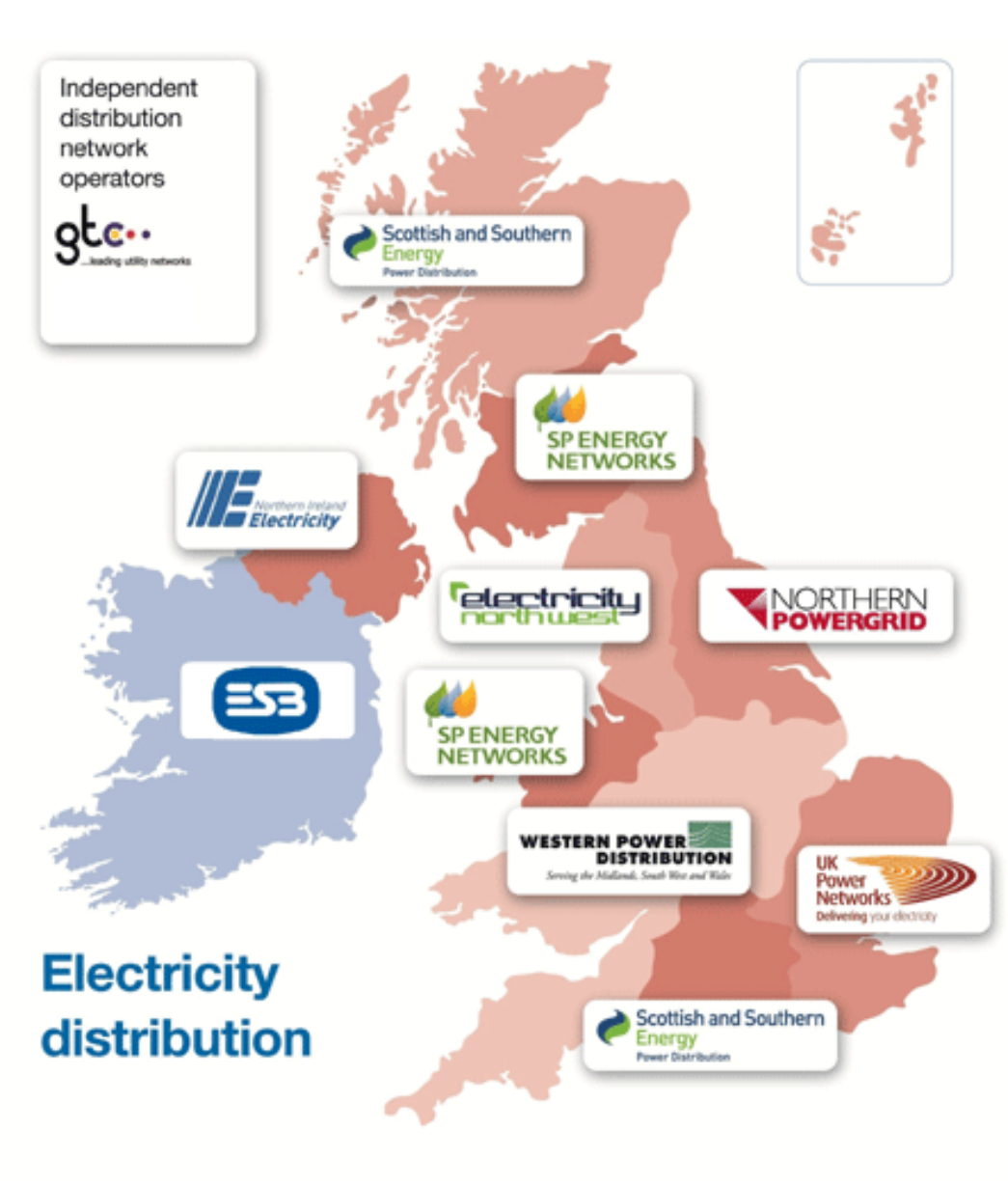
2.4.1. As a county, Kent is predicted to experience significant growth over the coming years. The Kent and Medway Growth and Infrastructure Framework (GIF) estimates that Kent's population will grow by 293,300 (17% growth on current population) by 2031, with an additional 158,500 new homes by the same date (21% growth on current housing).[85]

2.4.2. These new households will increase the amount of energy that Kent needs in order to adequately facilitate the day-to-day life of its inhabitants (i.e. heating, lighting, cooking, etc.). The increased energy needs of these homes will also place an additional demand upon the infrastructure that supplies and carries this energy to homes and businesses.

2.4.3. Electricity is transmitted through the National Grid before being dispersed through the distribution networks, from whence it is supplied to businesses and households. The Distribution Network Operator (DNO) for Kent is UK Power Networks (UKPN) (See Figure 7). UKPN is planning to spend £155m on maintaining Kent's energy infrastructure by 2023.[86] As DNO's cannot fund new infrastructure through revenue from existing customers, additional funding for new energy infrastructure will be contributed by developers. An additional £276m in funding is required by 2031. It should be noted that the GIF does not predict a funding gap for this required investment in new infrastructure.[87]

[85] KCC (2015), Kent & Medway Growth and Infrastructure Framework, Maidstone.
[86] Ibid.
[87] Ibid.

Figure 7: UK Distribution Network Operators



Source: nationalgrid.com, Distribution Network Operator (DNO) Companies.

2.4.4. Total energy consumption for Kent and Medway (industrial/commercial, domestic and transport) in 2012 was 35,149,700MWh, of which 7,111,500MWh (20%) was electricity.[88]

2.4.5. Total domestic energy consumption within Kent for 2013 had decreased by 1.8% on 2012 figures, and by 15% on 2008 levels. This trend is in line with the national reduction in domestic energy use.[89]

[88] KCC (2015), Kent State of the Environment 2015, Maidstone.
[89] KCC (2015), Domestic Energy Consumption 2013 – Statistical Bulletin, Maidstone.

2.4.6. Kent's installed renewable electricity generation exceeds 1GW (1GW=1000MW).[90] This is roughly equivalent to the output of Dungeness B nuclear power plant.[91] Electricity generated through FiT and ROC installations was 4,193,412MWh in 2014.[92] Taken together, renewable energy in Kent currently generates the equivalent of 12% of the County's total energy consumption, and 59% of its electricity consumption.[93]

2.4.7. However, as the UK's electricity system is largely centralised, energy security for Kent is largely synonymous with energy security for the UK as a whole.[94] Energy generated in Kent by power plants (i.e. coal, gas and nuclear) and by large scale renewable installations (i.e. wind farms and large scale solar farms) is exported into the National Grid, and is then transferred elsewhere within the UK to where it is needed.[95]

2.4.8. As a result of this, it is not possible to calculate how much of Kent's energy needs are being met by a certain plant (e.g. Dungeness B) or a specific type of energy that comes from within Kent, as these plants are producing electricity for the UK as a whole, not for Kent specifically.

2.4.9. Whilst the information presented here helps to give a picture of Kent's overall energy need and usage, there are certain areas that are not currently clearly understood. Besides the difficulty of calculating where energy is finally used, systemic risks to Kent's energy infrastructure (e.g. adverse weather, terrorism, industrial action) are not easily identifiable. Section 6.1 of this report examines the need for closer partnership working between KCC and energy network and utilities companies to help address this situation. In light of the current gaps in knowledge around energy security, the Committee recommends that KCC, by working with other relevant organisations, undertakes further work to identify key opportunities and risks to Kent's energy systems, ensuring that the evidence base for energy security is robust and contemporary.

Recommendation 7

That KCC, working in partnership with relevant organisations, builds on the work of the Select Committee in identifying key opportunities and risks to Kent's energy infrastructure, ensuring the evidence base underpinning our energy security is up-to-date and robust.

[90] KCC (2015), Kent State of the Environment 2015, Maidstone.
[91] EDF (2015), Nuclear Generation in the UK.
[92] KCC (2015), Kent State of the Environment 2015, Maidstone.
[93] Ibid.
[94] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[95] Ibid.

Key Points

Energy Needs of Kent:

- **Kent's population will grow by just under 300,000 (17% increase on 2015) by 2031.**
- **158,000 new homes will be needed by 2031.**
- **£276m of additional investment in electricity infrastructure will be needed by 2031.**
- **Renewable generation in Kent supplies the equivalent of 59% of Kent's electricity demand.**
- **Most of the electricity generated in Kent is exported through the National Grid for use across the UK.**

2.4.10. Throughout the evidence gathering process, the Committee determined that there were three general ways to improve energy security for Kent.

2.4.11. Given the interconnectedness of the UK's energy systems and supply (both nationally and internationally), any approach to securing energy security will have to address issues – such as the building of new plant and Government funding of energy initiatives - at a national level. The Committee can therefore lobby Central Government on a number of important issues.[96] [97] [98] [99] [100]

2.4.12. Arguably the most important method that can be adopted on a local level to ensure both local and national energy security is demand reduction – reducing the amount of energy needed by individuals, businesses and government in the first place. The Committee heard that there were a number of ways by which demand reduction can be promoted in Kent.[101] [102] [103] [104] [105] [106]

2.4.13. Additionally, a range of new technologies, schemes, and community organisations offer the possibility of increasing energy security at a local level, by empowering communities and local authorities to generate and supply their own electricity, gas or heat, and to build spare capacity in at a local level, potentially reducing demand on the national energy system.[107] [108] [109] [110] [111] [112] [113] [114]

[96] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[97] KCC (2015), Energy Security Select Committee, 22 October 2015.
[98] KCC (2015), Energy Security Select Committee, 26 November 2015.
[99] KCC (2015), Energy Security Select Committee, 4 December 2015.
[100] KCC (2015), Energy Security Select Committee, 16 December 2015.
[101] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[102] KCC (2015), Energy Security Select Committee, 22 October 2015.
[103] KCC (2015), Energy Security Select Committee, 17 November 2015.
[104] KCC (2015), Energy Security Select Committee, 26 November 2015.
[105] KCC (2015), Energy Security Select Committee, 4 December 2015.
[106] Ibid.
[107] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[108] KCC (2015), Energy Security Select Committee, 13 November 2015.
[109] KCC (2015), Energy Security Select Committee, 17 November 2015.
[110] KCC (2015), Energy Security Select Committee, 4 December 2015.
[111] Ibid.
[112] KCC (2015), Energy Security Select Committee, 15 December 2015.
[113] Ibid.
[114] Ibid.

Ensuring Energy Security

There are three main ways in which KCC can ensure energy security for Kent (and the UK as a whole):

- Lobby National Government and other key actors on national energy issues (e.g. building new plant).
- Reduce energy demand within Kent.
- Create additional local generation that either feeds into the grid (thus increasing the UK's total electricity supply), or that feeds directly into Kent communities (thus reducing their demand on the National Grid).

2.5. National and EU Policies and Strategies

2.5.1. The UK has a number of binding laws and targets that must be taken into account when considering how best to address the issue of energy security. KCC also has a number of Kent specific strategies and policies that further supplement and guide any potential recommendation.

EU Directives

2.5.2. Directive 2012/27/EU of the European Parliament and Council (Energy Efficiency Directive) states that:

'*Member states should be required to set indicative national energy efficiency targets, schemes, and programmes… member states should be able to take into account national circumstances… changes in energy imports and exports, development of all sources of renewable energies, nuclear energy, carbon capture and storage, and early action.*'[115]

2.5.3. Directive 2009/28/EC (Renewable Energy Directive) sets a legally binding target for all EU member states to ensure that 20% of all energy consumption (heat, transport and power) within the EU by 2020 is from renewable sources, with a 10% renewable energy commitment for transport related energy use. In the case of the UK, it has a target of generating 15% of all energy consumed from renewable sources by 2020.[116]

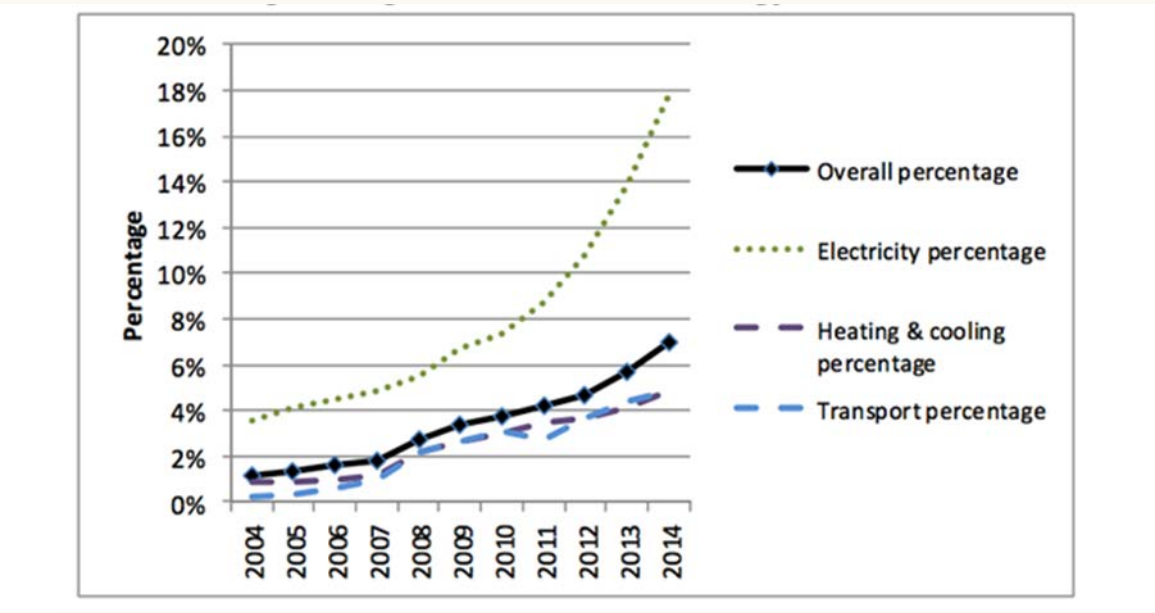
2.5.4. As of 2014, 7% of total UK energy consumption came from renewable sources, an increase on previous years from 3.8% (2011), 4.2% (2012) and 5.6% (2013)[117] (see Figure 8).

[115] European Parliament and Council (2012) Directive 2012/27/EU, [online] available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012L0027&from=EN

[116] European Parliament and Council (2009) Directive 2009/28/EC [online] available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0028&from=EN

[117] European Parliament and Council (2013) Second Progress Report on the Promotion and Use of Energy from Renewable Sources for the United Kingdom.

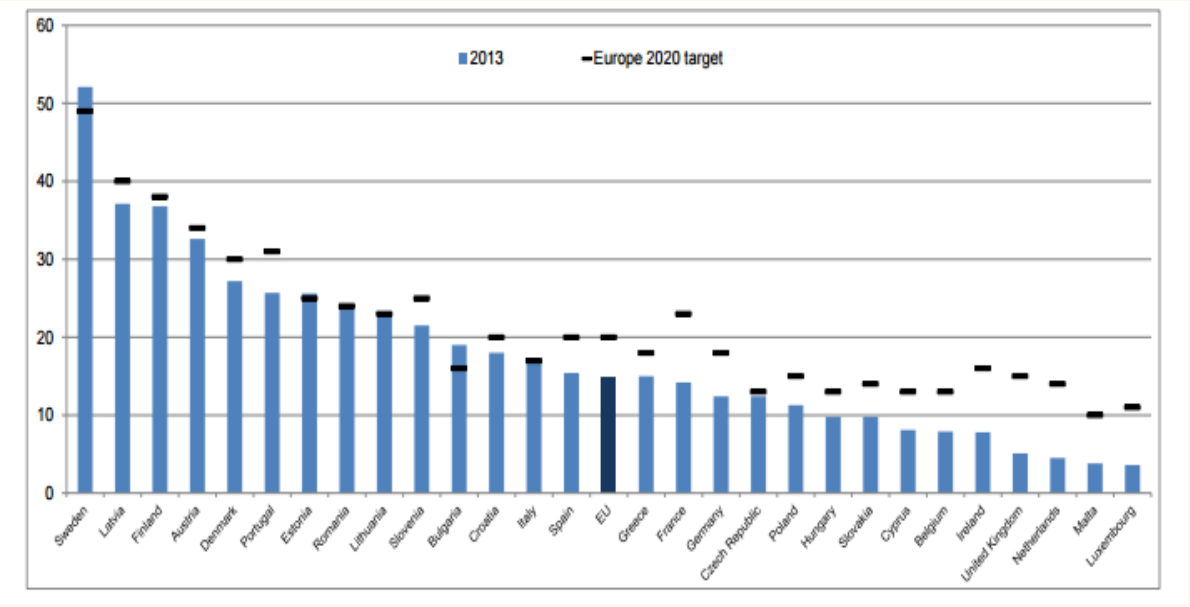
Figure 8: Progress Against Renewable Energy Directive



Source: Share of UK energy for heat, transport and power supplied by renewables, DECC.

2.5.5. Although the percentage of energy supplied by renewables in the UK's energy mix has been steadily increasing over the past few years, the UK still remains behind the other 27 EU member states in achieving this target (9.9% away from achieving its 2020 target).[118] (See Figure 9)

Figure 9: Share of energy from renewable sources in the EU Member States, 2013 (in % of gross final energy consumption)



Source: Eurostat (2015), Renewable Energy in the EU, news release.

[118] Eurostat (2015), Renewable Energy in the EU.

National Policy

2.5.6. The Climate Change Act (2008) commits the UK to reducing Greenhouse Gas (GHG) emissions by 50% on 1990 levels by 2025, and by 80% on 1990 levels by 2050. It does so by legislating a series of five-yearly carbon budgets – a maximum cap on the amount of CO2 that the UK may emit during this five year period. The first four carbon budgets, leading to 2027, have been set in law. (See Figure 10)

Figure 10: The First Four Carbon Budgets for the UK, 2008-2027

Budget	Carbon budget level	% reduction below base year
1st Carbon budget (2008-12)	3,018 MtCO2e	23%
2nd Carbon budget (2013-17)	2,782 MtCO2e	29%
3rd Carbon budget (2018-22)	2,544 MtCO2e	35% by 2020
4th Carbon budget (2023-27)	1,950 MtCO2e	50% by 2025

Source: The Committee on Climate Change (CCC) - Carbon Budgets and Targets

2.5.7. Although the UK met the required reduction in emissions set out in the first carbon budget (2008 – 2012), the Committee on Climate Change (CCC) has noted that the speed with which emissions are currently being reduced will need to increase if the UK is to meet future carbon budgets.[119]

'The underlying pace of emissions reduction – allowing for the impacts of the recession – through the first carbon budget period and in 2013 was insufficient to meet future carbon budgets.'

CCC (2014), Progress Report to Parliament

[119] CCC (2014), Meeting Carbon Budgets – 2014 Progress Report to Parliament, London.

2.5.8. Meeting the UK's carbon reduction targets will require savings in final energy consumption per capita of between 31% and 54% between 2007 and 2050.[120] As the Government notes, meeting these targets will have a major impact on the UK's future energy needs.[121]

2.5.9. The Department for Energy and Climate Change has a number of key strategies relating to energy security. These include the Energy Security Strategy (2012), the Community Energy Strategy (2014) and the Energy Efficiency Strategy (2012).

2.5.10. The Government's **Energy Security Strategy** (2012) – the UK's first dedicated energy security strategy – outlines six key responses on the behalf of Central Government to Energy Security:

- **Resilience measures** to prevent possible disruptions ranging from flooding through to industrial action, and to reduce the impact of incidents if they do occur.

- **Energy efficiency** measures lower our exposure to domestic and international energy market risks.

- **Maximising economic production** of our oil and gas reserves to provide reliable energy supplies which are not exposed to international energy supply risks.

- **Working to improve the reliability of global energy markets** to help ensure that, where the UK does require the supply of energy from overseas, it is dependable and affordable.

- **Reliable networks** ensure that the energy we need is delivered, and where we need it.

- **Decarbonising our supplies** to help reduce our dependence on international fossil fuel markets in the longer term.[122]

[120] DECC (2012), Energy Security Strategy, London.
[121] Ibid.
[122] Ibid.

2.5.11. The **Community Energy Strategy** (2014) makes further specific provisions around local communities and energy under a number of themes:

- **Supporting strong partnerships:**
    - Increasing shared ownership of onshore renewable developments (between the business and the community).
    - Publishing a Community Benefits Register making public the benefits received by communities in such situations.
    - Creation of a new Community Energy unit within DECC.
- **Community capability and capacity:**
    - The establishment of a 'One Stop Shop' information resource for community energy.
    - A £500,000 peer mentoring scheme between experienced community groups and newer entrants.
- **Generating electricity and heat:**
    - Creation of a £1.5m Rural Community Energy Fund (RCEF) for rural community heat and electricity projects.
    - Creation of a £10m Urban Community Energy Fund (UCEF).
    - Creation of the Renewable Heat Incentive (RHI) – a financial incentive for both domestic and non-domestic renewable heat projects.
    - Creation of the Heat Networks Delivery Unit (HNDU) within DECC – aiming to transform district heating in the UK by providing finance, guidance and expertise for local authorities wishing to develop heat networks.
    - Investigating (with Ofgem) ways for communities to supply electricity (i.e. 'Licence Lite').
- **Collective purchasing and switching:**
    - Creation of the Big Energy Saving Network (BESN) – a £900,000 programme to support communities and third sector to reach vulnerable consumers, focusing on helping them reduce energy costs.
    - Updated best practice for organisers of collective switching schemes.[123]

[123] DECC (2014), Community Energy Strategy, London.

2.5.12. The **Energy Efficiency Strategy** (updated 2013) identifies a number of barriers to the uptake of energy efficiency:

- **Embryonic markets:** The current energy efficiency market in the UK is small in comparison to the size of the opportunity at hand.

- **Information:** Accessing trusted and appropriate energy efficiency has proven to be difficult thus far. Information is usually too generic for the task at hand, making it hard to estimate the potential benefits of energy efficiency measures.

- **Misaligned financial incentives:** Those who invest in energy efficiency are not always those benefitting from it (e.g. landlords retrofitting rental properties). Improved security of supply and decarbonisation are not immediately tangible to investors.

- **Undervaluing energy efficiency:** Lack of trusted information in the market leads to scepticism about the long term benefits of improved energy efficiency. Energy efficiency is therefore undervalued relative to other investment options.[124]

2.5.13. To attempt to rectify these issues, the government has introduced a number of measures around energy efficiency:

- Expanded choice and support for households through the Energy Company Obligation (ECO). Government recently extended ECO to 2017.

- Simplified support for businesses and the public sector by removing overlaps between various EU and national energy legislation and systems.

- Introducing the mandatory Greenhouse Gas Reporting Scheme for companies.

- Introducing the Energy Savings Opportunity Scheme (ESOS) – helping companies to reduce energy bills through investing in energy efficiency measures.

- Increased funding for public sector financing schemes such as Salix.[125]

[124] DECC (2013), Energy Efficiency Strategy, London.
[125] Ibid.

2.6. Local Policies and Strategies

2.6.1. In addition to international legislation and national legislation and strategies, there are a number of Kent specific strategies and targets around energy security that must be considered when looking at improving energy security for the County.

2.6.2. The **Kent Environment Strategy (KES, 2015)** sets out three guiding outcomes for Kent:

- **Building the foundations for delivery:** Our policies, actions and decisions are based on a clear evidence base and resources are in place for delivery.

- **Making best use of existing resources and minimising negative impacts:** All sectors are aware of their impact on the environment and how to minimise it through reducing resource usage and wasting less.

- **Towards a sustainable future:** Kent is actively addressing the risks and opportunities from environmental and climate change, whilst delivering wider economic and health opportunities.[126]

2.6.3. The KES commits Kent to reducing greenhouse gas (GHG) emissions from a 2005 baseline by 34% by 2020, and 60% by 2030. At present, Kent has reduced GHG emissions by 21% on 2005 levels.

2.6.4. 80% of Kent's future required housing stock over the next few decades is already built. This therefore means that retrofitting of energy efficiency and energy generation measures will be a key way of achieving a low carbon life for Kent residents, whilst supporting them to reduce energy costs and improve energy security.[127]

[126] KCC (2015), Kent Environment Strategy, Maidstone.
[127] Ibid.

'…growth of our population and housing development [means that] additional low carbon and appropriate renewable energy infrastructure, as well as an increase in uptake of energy efficiency initiatives will be needed…'

KCC (2015), Kent Environment Strategy

2.6.5. The **Kent Environment Strategy Implementation Plan** sets out in greater detail how the outcomes of the KES will be achieved.[128]

2.6.6. In 2012, Kent partners agreed to deliver **Climate Local Kent**, a public commitment to set locally owned and determined commitments and actions to reduce carbon emissions and to manage climate impacts.[129] These measures include:

- **The Kent and Medway Green Deal Partnership**: working with KCC's ECO pilot areas to retrofit 1,200 homes by December 2014.
- Securing £12m funding into Kent through the ECO by 2015.
- Raising awareness of retrofitting via an annual perception survey for Kent residents.
- Delivering consistent messages for Kent residents around retrofitting through Warm Homes.
- Developing a network of accredited small and medium enterprises (SME's) to install measures and assess properties.
- Undertaking public sector energy efficiency improvements.
- Sharing learning and undertaking quarterly reviews into energy efficiency in the public estate. [130]

[128] KCC (2013), KES Implementation Plan 2013 – 2015, Maidstone.
[129] Ibid.
[130] Ibid.

2.6.7. In addition to the KES, the **Kent Renewable Energy Action Plan (REAP, 2013)** outlines a number of specific priorities for the development of a range of renewable energies across Kent[131]:

- **Skills and Training:** Building the levels of skills, training and education needed amongst the Kent workforce, increasing capacity and ensuring Kent is well placed to provide sector investors with access to a skilled workforce.

- **Public Sector Leading by Example:** Increasing deployment of energy measures across the public sector and sharing best practice to improve knowledge.

- **Planning and Development:** Considering the contribution that communities can make to energy generation from renewable sources as part of sustainable development.

- **Business and Innovation:** Increasing renewable energy deployment and researching new technologies, materials and energy storage to provide significant business opportunities for the Kent economy.

- **Community Energy:** Utilising opportunities for communities to generate their own energy and income through a range of renewable, low-carbon technologies.

- **Focus on Wind Energy:** Supporting the continued growth of both onshore and offshore wind farms, making the most of Kent's competitive advantage nationally for wind energy.

- **Focus on Bioenergy:** Increasing uptake of biomass fuel from sources such as Kent woodlands, agricultural waste, and other green waste.[132]

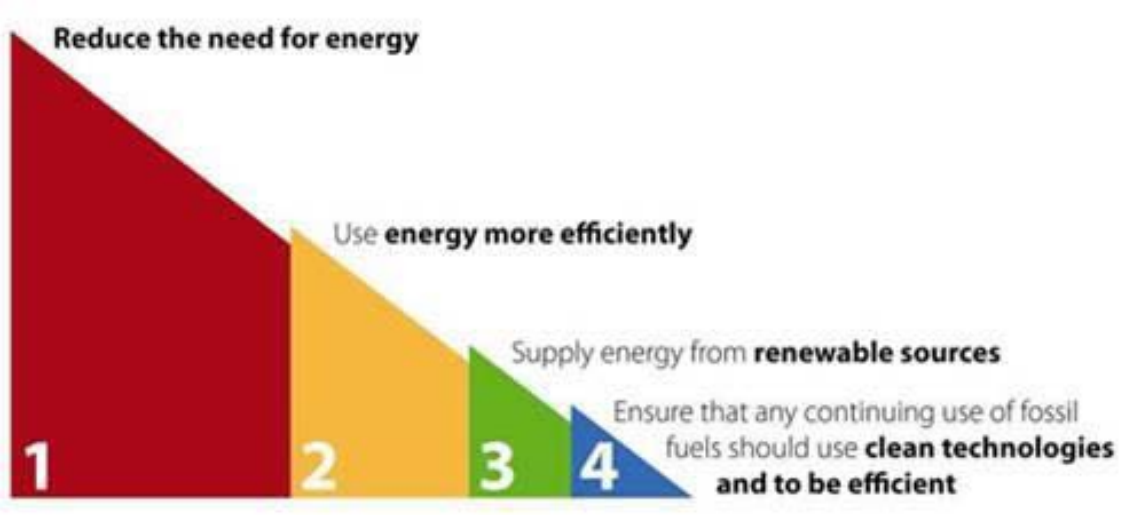
2.6.8. The REAP outlines the energy hierarchy used to determine the relative priority of various energy security measures (See Figure 11).[133] Reducing energy demand is the most important measure, followed by greater energy efficiency, then increasing the amount of energy supplied from renewable sources, and – finally – ensuring that fossil fuels take advantage of clean technologies wherever possible.

2.6.9. Finally, A 2014 KCC Position Statement on Development of Large Scale Solar Arrays provides additional guidance to planning authorities on the siting of large-scale solar farms. Such installations should be

[131] KCC (2013), Renewable Energy for Kent – An Action Plan for Delivering Opportunities, Maidstone.
[132] Ibid.
[133] Ibid.

sited so as to avoid adverse environmental, aesthetic, economic and social impacts.[134]

Figure 11: The Energy Hierarchy



Source: KCC (2013), Kent Renewable Energy Action Plan, Maidstone.

Key KCC Policies

- The Kent Environment Strategy (KES, 2015)
- The KES Implementation Plan (2013)
- The Renewable Energy Action Plan (REAP, 2013)
- The Growth and Infrastructure Framework (GIF, 2015)

[134] KCC (2014), 14/00076 – Position Statement on Development of Large Scale Solar Arrays.

2.7. Methodology

2.7.1. The Members of the Energy Security Select Committee held multiple hearing sessions with a range of witnesses. The Committee gathered a wealth of information and evidence from a variety of sources, including representatives of energy providers and of community energy groups, academics as well as KCC officers and officers from other local authorities.

2.7.2. The Committee also received written evidence and attended four official visits: a visit to Islington London Borough Council's district heating network, a tour of Dungeness B nuclear power station, a visit to the Sustainable Sheppey Community Energy Project and a visit to the anaerobic digestion plant and solar farm at St Nicholas at Wade Farm. During visits, Members were informed of the key aspects of the initiatives/technology, and had the opportunity to ask a variety of questions. More details about the evidence gathering process can be found in Appendix 1.

2.7.3. Transport and its relationship to energy security has not been investigated within this report. This is due to the fact that the great majority of the literature on energy security identified by the Select Committee, as well as the evidence given by witnesses during hearings, primarily concerned the electricity, gas systems and their transmission within the UK. The Committee heard that transport was an important, complex, area of concern, with its own specific challenges.[135] [136] [137]

[135] KCC (2015), Energy Security Select Committee, 22 October 2015.
[136] KCC (2015), Energy Security Select Committee, 4 December 2015.
[137] KCC (2015), Energy Security Select Committee, 16 December 2015.

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3. Best Practice in Energy Security

One of the major challenges facing the UK over the coming decades is how to ensure a sustainable supply of reliable and affordable energy, as the UK decarbonises it's energy system – in line with environmental and emissions targets – to avoid dangerous climate change.

Such a goal requires a shift in the way in which we produce and use energy, both nationally and locally. This chapter outlines a range of good practice initiatives that are promoting sustainable, secure and affordable energy security. Whilst by no means exhaustive or comprehensive, this chapter includes extensive local programmes both in the UK and in continental Europe.

3.1. Best Practice in the UK

3.1.1. This section outlines a range of initiatives that promote energy security and sustainability in the UK. In 2008 a systematic assessment by DECC found no less than 5,000 community energy groups in the country. The majority of these initiatives focus on renewable energy generation, with the most prevalent technologies being solar PV and onshore wind. At least 60MW of community-owned renewable electricity generation is currently in operation.[138]

East Sussex – Harvey's Brewery (Lewes) Solar Plant

3.1.2. The array consists of 544 Sharp 180w solar panels, installed on the roof of the Harvey's Brewery in the heart of Lewes. The panels have a capacity of 98kWp[139] and will generate an estimated 92,000kWhs of electricity per year, to be used by the brewery. Any surplus energy generated will be fed back into the local grid.[140]

3.1.3. The solar array is owned by members of the local community, through shares in the project. As well as any excess energy being used by the community, investors will receive a 3-4% return over 25 years. The rate of return is somewhat lower than that of a typical domestic or commercial installation as it allows a portion of the FiT to be reinvested in further community owned schemes in the areas.[141]

3.1.4. Since completing the Harvey's Brewery project in 2011, the Ouse Valley Energy Services Company (OVESCO) has completed a number of additional PV projects across Lewes. In 2012, it installed 143 PV panels on the state-owned Priory School. Again run on a community investment model, the panels will generate 35,000kWhs of electricity per year, saving the school £3000 on energy bills and providing a return of 4% to investors for the next 25 years.[142]

[138] DECC (2014) Community Energy Strategy; Full Report, London.
[139] A typical domestic PV system is between 1.5 to 3 kWp. Under ideal conditions, each kWp should generate between 800 and 850 kW per year. Source: Solarae [online] available at: http://www.solarae.co.uk/ask-rae/what-does-kwp-and-kwh-mean
[140] Southern Solar (2012) OVESCo: Harveys Brewery Community-Owned Solar [online].
[141] Ibid.
[142] OVESCOips, Projects [online] available at: http://www.ovesco-ips.co.uk/harveys_priory_projects.html

Harvey's Brewery - Lewes
Community Owned Power Station

- **92kW solar PV array installed**
- **544 Sharp 180W solar panels**
- **Installation time: 4 weeks**
- **100% owned by members of the local community**
- **3-4% return on investment, plus reinvestment funds**
- **92,000kWhs a year to be used for free by local business Harvey's Brewery or to flow back into the local grid.**

Source: www.southernsolar.co.uk

London Borough of Islington – Community Heat Network

3.1.5. Faced with rising energy bills and energy poverty for residents, and environmental concerns, in June 2011 Islington Council approved plans for the new Bunhill energy centre. Funded by grants from the London Development Agency and the Homes and Community Agency, the Centre was completed in September 2012, in time to begin supplying heat for the winter period.[143]

3.1.6. A district heat network is a series of underground pipes carrying hot water between the local energy centre (where the heat is generated) and the buildings connected to the network. The heat is transported through these pipes to the boiler houses in each building, from which it is dispersed through already existing central heating systems.[144]

3.1.7. Up to two thirds of the energy generated by conventional power stations (i.e. coal, gas, oil) is lost through wasted heat emissions when burning fuels to produce electricity. Combined Heat and Power (CHP) plants such as Bunhill capture and disperse this heat energy for use, as well as the electricity generated from the process.[145] CHP plants therefore have a number of benefits:

- Greater energy efficiency and savings on energy bills for residents
- Greater energy reliability and security
- Reduced carbon dioxide emissions (up to 30% less than traditional sources)[146]

3.1.8. The Bunhill energy centre connects three estates and two leisure centres in the borough, bringing cheap energy to over 700 homes[147] The Council - working with Bunhill Ward and the EU Celsius research project – is now set to expand the network further to take in a further 454 homes, with the potential to supply an additional 1000 at a later date. The network will now also capture additional heat waste from the London tube network, and a second CHP plant will be built to facilitate the expansion.[148]

[143] Islington Council, FAQs: Bunhill Energy Centre and Heat Network [online] available at: http://www.islington.gov.uk/publicrecords/library/Environmental-protection/Information/Factsheets/2011-2012/(2011-11-28)-Bunhill-Heat-and-Power.pdf
[144] Ibid.
[145] Ibid.
[146] Ibid.
[147] Islington Council, Cheaper, Greener Energy in Islington [online] available at: http://www.islington.gov.uk/services/parks-environment/sustainability/energy-services/Pages/bunhill-heat-power.aspx
[148] Ibid.

Lambeth Community Energy Programme

3.1.9. In 2011, Lambeth Borough Council adopted an energy programme to promote viable, community-led renewable energy schemes that would address fuel poverty, harness local skills and resources, create jobs and work experience and increase the Borough's energy resilience and security.[149]

3.1.10. The programme has been a successful collaborative partnership with Repowering London, a community-based organisation that supports community groups in creating their own energy projects across London. Together Lambeth Council and Repowering London have produced three community-owned solar projects on social housing estates in Brixton.[150]

3.1.11. These projects have installed a total solar PV capacity of 132kW through community share offers, raising £180,000 from largely local investors. The projects not only offer training and work experience for local young people, but also generate funds for the installation of energy efficiency measures.[151]

Bath and North East Somerset Council

3.1.12. In October 2011 Bath & North East Somerset Council signed a Cooperation Agreement with the social enterprise Bath & West Community Energy (BWCE). The council provided a grant to support project development. This facilitated the installation of solar PV panels on six schools via roof-rental agreements and is laying the foundation for a range of further community solar, wind and hydro projects in the future.[152]

3.1.13. To promote retrofitting of energy efficiency measures, the council set up the Bath Green Homes project in 2012 in partnership with Transition Bath and Bath Preservation Trust. In 2014, 19 Green Homes were opened to the public, receiving over 900 visitors.[153]

3.1.14. The council has also developed the Energy@Home Partnership to lead a community approach to retrofitting and ensure the best use of government incentives. The partnership includes BWCE and a local social housing provider, Curo Group. It has cross-departmental council participation so that frontline services can help with the community-based marketing of retrofitting, and is underpinned by a Community Energy Forum.[154]

[149] DECC (2014) Community Energy Strategy; Full Report, London.
[150] Ibid
[151] Ibid
[152] Ibid
[153] Ibid
[154] Ibid

Green Cornwall Programme

3.1.15. Established in 2009, the Green Cornwall Programme has a £35m capital budget that projects can bid for. The programme is reducing bills and fuel poverty, generating clean, local energy and creating local jobs through initiatives such as:

- £1.3m community renewable energy fund. This agreed its first four loans to community energy groups. They will generate enough electricity to power 145 homes.

- Glow Cornwall, which aims to reach 20,000 households and has already completed the installation of measures in over 100 households. It also aims to employ around 120 people.

- Cornwall Together, a collective switching programme part-funded by DECC's Cheaper Energy Together scheme, which has so far switched 3,500 households and delivered a total saving of nearly £300,000.

- 7MW of installed renewable electricity capacity on the council's land, including the first local authority owned solar farm.[155]

[155] Ibid

Green Cornwall Programme

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- **Cornwall Together is a collective switching programme part-funded by DECC's Cheaper Energy Together scheme. So far it has switched suppliers of 3,500 households and delivered a total saving of nearly £300,000 for consumers.**

- **7MW of installed renewable electricity capacity on the council's land, including the first local authority owned solar farm.**

Source: DECC (2014) Community Energy Strategy

3.2. Best Practice Abroad

3.2.1. Energy security initiatives have a strong track record in some countries in continental Europe. They play a particularly prominent role in countries such as Germany, Denmark, Austria and Sweden.

Germany

3.2.2. In Germany, Energiewende builds on a tradition of local energy activism. Municipal energy companies and citizens' energy cooperatives are providing a sizeable contribution to this change in Germany's energy system.[156]

3.2.3. By the end of 2010, 'community' energy made up 40% of Germany's total renewable energy capacity, largely through private citizens investing in energy cooperatives. A further 11% was owned by farmers and 14% by project developers with the 'Big Four' utility companies – E.ON, RWE, EnBW and Vattenfall - only controlling a 13.5% share of the market. Community and shared ownership of wind turbines and increasingly solar PV installations are the most common forms.[157]

3.2.4. There has also been a move towards community ownership and management of local electricity grids. Municipal energy companies already control more than half of the low voltage distribution system in the country and some energy cooperatives are now running their own local grids too. Over the five years to 2012, approximately 150 distribution grids have been taken over in this way with some 450 new energy cooperatives formed to generate and manage energy across the country.[158]

3.2.5. An example of this in action is in Feldheim, a small village south of Berlin. The village set up a cooperative to provide heat and electricity from a local biogas plant running on pig waste. They also have wind turbines and a solar PV array all connected to their own independent regional grid. The village is carbon neutral, self-sufficient in energy and any excess electricity they generate is sold back to the national grid for a profit. They also benefit from significantly cheaper energy prices than the national average and about a third of the inhabitants are employed directly by the local wind farm or solar PV factory.[159]

[156] DECC (2014) Community Energy Strategy; Full Report, London.
[157] Ibid.
[158] Ibid.
[159] Ibid.

3.2.6. The success of community energy in Germany can be attributed to a number of factors. These include: a well-established environmental and alternative energy movement and a general tradition of forming cooperatives and other associations to achieve change at a local level; a high level of leadership and support from municipalities; and macro-level institutional factors such as the feed-in tariff system, first introduced in 1991, and the state owned bank, the KfW, that has been running for over 60 years and is able to provide capital loans at preferential rates.[160]

Germany

- **By the end of 2010 'community' energy made up 40% of Germany's total renewable energy capacity, largely through private citizens investing in energy cooperatives.**
- **A further 11% was owned by farmers and 14% by project developers, with the 'Big Four' utility companies only controlling a 13.5% share of the market.**
- **Community and shared ownership of wind turbines and increasingly solar PV installations are the most common forms.**
- **Municipal energy companies already control more than half of the low voltage distribution system operators in the country and some energy cooperatives are now running their own local grids too.**

Source: DECC (2014) Community Energy Strategy

[160] Ibid.

Denmark

3.2.7. In Denmark, the majority of wind turbines are wholly or jointly owned by citizens, communities, landowners and farmers. 150,000 households in Denmark owned or held shares in wind farm projects as far back as 2001. In 2010 29% of Denmark's total electricity generation capacity was generated by wind turbines; this high proportion can be partly attributed to the involvement of Danish people.[161]

3.2.8. In recent years the industry has become more 'professionalised' with the development of larger, more expensive turbines. This has meant that partnership models are increasingly common. For example, the Middelgrunden 40MW offshore wind farm outside the Harbour of Copenhagen is a shared ownership partnership between a cooperative and the municipal-owned utility company, DONG Energy.[162]

3.2.9. Factors that led to Denmark's success include: a strong domestic market underpinned by incentives provided through feed-in regulation; capital support for early-stage projects; standardised rules for grid-connection; and tax advantages.[163]

Sweden

3.2.10. HammarbySjöstad is an area of Stockholm that is currently undergoing a large urban developmental restructuring programme. The objective has revolved around the need to address environment and sustainability issues in a more focused way. As well as transforming a former brownfield site, a particular aim has been to reduce CO2 emissions by 50% from the corresponding level of the early 1990s. In order to obtain these goals, integrated planning and innovative solutions were incorporated into architectural plans first drawn up in 1990.[164]

3.2.11. This new 200 hectare city district will comprise 9,000 apartments, housing a population of 20,000 people, and 200,000 sqm of commercial floor space attracting a further 10,000 people to work in the area. Objectives for HammarbySjöstad include:

• Transport & mobility: public transport use to increase by 80% and a 25% proportionate use of electric biogas vehicles.

• Energy: The target for energy consumption of buildings is set at 50 kWh/m2, out of which 15 kWh/m2 is used for electricity. Further, all waste and wastewater coming from the inhabitants will be recycled and returned to the area in the form of renewable energy

[161] Ibid.
[162] Ibid.
[163] Ibid.
[164] Fudge, S. et al (2012) *Locating the Agency and Influence of Local Authorities in UK Energy Governance*, University of Surrey, Guilford.

• Water: 60% reduction of water consumption per person

• Waste: 90% reduction of landfill waste and 40% reduction of all waste produced.

• Cleaner Sewage: Fewer contaminants to be dispersed into the Stockholm archipelago via the treated wastewater, and a cleaner residual product, bio-solids, to be reused on agricultural land.

• Social objectives: citizen involvement, creating an attractive and sustainable place to live and work.[165]

[165] Ibid.


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4. Raising Awareness and Championing Energy Security

Although energy security is very much a national issue, there is much that can be done at a local and community level. Community-based initiatives can help generate energy, reduce energy consumption and manage energy demand. Localised energy production can help build stronger communities by bringing people together around community projects that create local jobs and boost the local economy.

There are several local initiatives and projects in Kent that promote energy security, but more can be done to unlock the potential of community energy. KCC can help ensure this by continuing to lead by example, increasing awareness amongst Kent residents and businesses of community energy initiatives, and by providing support and guidance on these matters.

4.1. Leading by Example

4.1.1. In light of Central Government policies to decentralise energy, local government is likely to play an increasingly prominent role in energy matters in the future.[166] As trusted and visible local actors, councils can play a key role in promoting energy security to the public.[167] [168] [169] [170]

4.1.2. Perhaps the most immediate way that local authorities can promote energy security is by carrying out measures across their own estate.[171] This has a number of benefits such as: reduced energy costs for councils[172], an additional source of income through energy generation[173], and an opportunity to direct the market and provide civic leadership.[174]

4.1.3. KCC has been active in installing both energy efficiency and energy generation measures across its own estate through a variety of methods, such as:

- **Energy efficiency investment fund (including schools):** £3.9m invested to date, with £12.9m in lifetime savings from reduced energy use as a result.[175]

- **School energy efficiency projects:** 22 school LED lighting projects to date. £683,000 invested with £2.8m in lifetime savings.[176]

- **Solar PV panels:** Three arrays installed in 2012 on Invicta House, Maidstone; Highways Depot, Ashford and Broadmeadow Care Home, Folkestone. £128,000 invested with expected lifetime profit of £250,000.[177]

- **LED lighting (KCC buildings):** Replacement of County Hall lighting with low-energy LED has reduced on-site energy consumption by 18% and will generate £690,000 in lifetime savings.[178]

[166] LGiU (2011), The 10 Pillars of Local Energy Security, London.
[167] KCC (2015), Energy Security Select Committee, 15 December 2015.
[168] KCC (2015), Energy Security Select Committee, 17 November 2015.
[169] KCC (2015), Energy Security Select Committee, 26 November 2015.
[170] Ibid.
[171] LGiU (2011), The 10 Pillars of Local Energy Security, London.
[172] Ibid.
[173] KCC (2015), Energy Security Select Committee, Presentation, 13 November 2015.
[174] Fudge, Peters & Wade (2012), *Locating the agency and influence of local authorities in UK energy governance,* University of Surrey.
[175] KCC (2015), Energy Security Select Committee, Presentation, 13 November 2015.
[176] Ibid.
[177] KCC (2013), Climate Local Kent – One Year on, Maidstone.
[178] Ibid.

- **LED lighting (streetlights):** First wave of replacements at an investment of £240,000 are expected to save over £1m in total. The current annual bill for street lighting is £5.8m. £14m (plus £22m from a Government loan) has been invested to replace all remaining lights.[179] [180]

- **District Heating Network:** A HNDU feasibility study is currently assessing the possibility of constructing a district heating network for Maidstone which will incorporate both KCC estate and other civic buildings.[181]

- **LASER:** Created by KCC in 1989 to procure energy for KCC and other public organisations. LASER now buys £450m of energy per annum which it supplies to public sector organisations across the UK, with total savings to all customers of £28m pa. LASER offers additional services around energy such as site surveying, certification and installation of LED lighting.[182]

- **Kent and Medway Sustainable Energy Partnership (KMSEP):** KCC has procured a framework agreement with suppliers, on behalf of KMSEP, that allows KCC, districts and social housing providers to access Energy Company Obligation (ECO) and other funding for retrofitting of housing within Kent, thus helping to reduce energy use through increased domestic energy efficiency.

'...local government's ability to change behaviour and consumption needs to be central to [central governments] deliberations.'

Richard Vize (2013) – Former Editor of the Local Government Chronicle

[179] Ibid.
[180] KCC (2015), Energy Security Select Committee, 16 December 2015.
[181] Ibid.
[182] KCC (2015), Energy Security Select Committee, Presentation, 16 December 2015.

4.1.4. Being aware of the work currently being undertaken across KCC's estate to reduce energy usage and carbon emissions - and of the significant benefits gained from undertaking such measures - the Committee recommends that KCC continue to lead through example by carrying out further energy saving and energy generation measures across its estate. Through carrying out such measures, KCC will not only reduce Kent's overall energy demand, but will also contribute to the impetus and knowledge needed for encouraging further improvements across Kent.

Recommendation 8

That KCC leads by example through driving further energy saving and energy generation measures across its estate - in accordance with KCC's Carbon Management Plan - and in partnership with Kent social housing providers and districts.

4.2. Raising Awareness, Providing Local Support

4.2.1. Research conducted by the UK Energy Research Centre (UKERC) suggests that widespread public awareness of energy security as a concept is likely to be low, with personal behaviours not yet consciously identified and linked with it. However, once concrete problems and scenarios are explained to people, respondents are concerned that it is not higher on the political agenda[183]

4.2.2. DECC's Public Attitudes Tracker suggests that energy security has also fallen in prominence to its lowest level since the survey began.[184] However, in spite of this:

- 68% of respondents report feeling concerned about steep energy rises in the future.
- 42% report feeling more concerned about power cuts becoming more frequent in future.
- 58% report feeling concerned about UK fossil fuel supplies being sufficient to meet UK demand for them.
- 64% report feeling concerned about the UK being too reliant on energy from other countries.
- 63% report feeling concerned that the UK is not investing fast enough in alternative sources of energy.[185]

'Energy security suffers from low understanding and awareness, reflecting the lack of focused coverage in the media, which concentrates on aspects of different supplies rather than longer term availability or affordability.'

UKERC (2012), Climate change and energy security

[183] UKERC (2012), Climate change and energy security: Assessing the impact of information and its delivery on attitudes and behaviour.
[184] DECC (2015), Public Attitudes Tracker – Wave 15, London.
[185] Ibid.

4.2.3. Perhaps the most immediately understood manifestation of energy security amongst the general public concerns energy prices and fuel poverty, with 48% of the population giving a fair amount of thought to saving energy, and 23% giving it a lot of thought.[186] Since 2004, the cost of domestic energy prices has been rising over and above the cost of other items in the Consumer Price Index (see Figure 2, Section 2.2).[187] The rising cost of heating and powering one's home is linked to an increased risk of fuel poverty.[188]

4.2.4. On the current definition, a household is determined to be in fuel poverty if:

- They have required fuel costs that are above average;
- Were they to spend this amount, they would be left with a residual income below the official poverty line.[189]

4.2.5. As of 2013, 2.35m households were estimated to be living in fuel poverty (approximately 10.4% of all English households).[190] £3bn is wasted in energy every year across UK homes[191], despite the UK having some of the lowest gas and electricity prices in Europe, suggesting that the key driver of energy poverty is the poor energy efficiency of the UK's housing stock[192].

4.2.6. In Kent, 308,000 homes are inadequately insulated, with an estimated 11.4% of Kent's residents living in fuel poverty (80,000 households).[193]

4.2.7. The issue of the energy efficiency of the UK's housing stock (and the connected problem of energy poverty) is of key concern for energy security. As of 2014, the domestic sector accounted for 27% of all energy consumption in the UK, and was the biggest consumer of gas of any sector at 36% of total supply.[194] In addition, the domestic/residential sector accounted for 25% of GHG emissions in 2013.[195]

[186] Ibid.
[187] DECC (2015), Annual Fuel Poverty Statistics Report, London.
[188] Ibid.
[189] Ibid.
[190] Ibid.
[191] KCC (2013), Climate Local Kent – One Year on, Maidstone.
[192] ACE (2013), Fact-file: The Cold Man of Europe, London.
[193] KCC (2013), Climate Local Kent – One Year on, Maidstone.
[194] DECC (2015), DUKES Infographics [online]
[195] DECC (2015), 2014 UK Greenhouse Gas Emissions, Provisional Figures [online], available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416810/2014_stats_release.pdf

Key Facts

Housing and Energy Poverty:

- **Housing accounts for 27% of all energy consumption in the UK, and 25% of all GHG emissions.**
- **£3bn is wasted every year by UK households on their energy usage.**
- **10.4% of UK households (2.35m) are estimated to be living in fuel poverty.**
- **11.4% of Kent households (80k) are estimated to be living in fuel poverty.**
- **308,000 Kent households are judged to be inadequately insulated.**

4.2.8. Raising awareness around energy efficiency and fuel poverty, and supporting communities and organisations to improve the efficiency of housing stock and generate their own energy, offers local authorities a range of options that address the energy trilemma:

- **Reliability:** Reduced energy demand through greater domestic energy efficiency and localised generation ensures maximum efficient usage of current energy supplies.

- **Sustainability:** Reduced energy demand will lead to less GHG emissions, and localised generation will increase the contribution of renewables to the UK's energy needs.

- **Affordability:** Improved domestic energy efficiency will reduce consumer's energy bills, and community generation schemes offer potential investment opportunities for residents.

Raising Awareness in Communities

4.2.9. A number of communities and organisations across Kent are already working to raise awareness to encourage residents to both save and use energy more efficiently:

4.2.10. Kent's first Collective Switching Scheme, 'Energy Deal' – encouraging customers to switch their energy tariff or supplier for a better one – was launched in 2013 as a partnership between Tunbridge Wells, Dover, Dartford and Gravesham councils. The scheme engaged with 2,500 residents in six weeks, with average savings per resident of £102 pa.[196]

4.2.11. In Sheppey, community volunteers have been trained to become Green Doctors, visiting vulnerable people and advising them on how to make their homes more energy efficient. The scheme is expected to help 1,900 households reduce their carbon emissions and save on their utility bills.[197]

4.2.12. The village of Elham has established 'Elham Going Green'. The group undertakes a range of activities around energy issues such as a community energy saving initiative, a number of eco fairs showcasing various technologies, and two feasibility studies that have investigated the possibility of installing renewable energy generation measures in the village.[198]

[196] KCC (2013), Climate Local Kent – One Year on, Maidstone.
[197] Ibid.
[198] KCC (2015), Energy Security Select Committee, 17 November 2015.

4.2.13. Community Energy South (CES) is an umbrella organisation of community energy groups covering the Southeast of England which seeks to support the transition to a distributed, renewable energy network.[199] [200] As a member of CES, Sustainability Connections is a social enterprise specialising in, amongst other things, community energy training – training local Energy Champions to raise awareness amongst the public of energy usage, reducing personal consumption and costs, and encouraging the retrofitting of existing housing stock to improve efficiency.[201] [202] OVO Energy has supported similar projects, partnering with Citizens Advice Bureau (CAB) to train volunteers to advise the public on issues such as energy tariff/provider switching.[203]

4.2.14. The Committee heard that KCC's support for groups such as Elham Going Green had been very helpful, and had the potential to improve the outcomes of community energy groups and their projects.[204] [205] In the case of Elham Going Green, KCC had conducted a low-carbon pilot scheme with the village at the beginning of the group's life, and had donated £500 towards the proceedings. KCC subsequently sponsored a competition between four communities for the best project. It was from winning this competition that Elham Going Green was able to finance its energy saving project.

4.2.15. KCC also helped to establish a Low Carbon Community Network to share expertise and facilitated several workshops for the community on energy issues.[206] The Committee were informed that the workshops had been very helpful, and that further roadshows organised by KCC to showcase energy technologies, funding schemes, and energy reduction techniques would be greatly appreciated by community groups looking to undertake similar work.[207] More generally, the Committee heard that KCC's knowledge of demographics made it well-placed for supporting and promoting schemes across Kent, ensuring a balanced take-up of similar schemes across the county.[208]

[199] KCC (2015), Energy Security Select Committee, 4 December, 2015.
[200] CES (2016), About CES, [online], available at: http://www.communityenergysouth.org.uk/about/
[201] KCC (2015), Energy Security Select Committee, 4 December, 2015.
[202] Sustainability Connections (2016), Homepage [online], available at: http://www.sustainabilityconnections.co.uk/
[203] KCC (2015), Energy Security Select Committee, 17 November 2015.
[204] KCC (2015), Energy Security Select Committee, 17 November 2015.
[205] KCC (2015), Energy Security Select Committee, 4 December, 2015.
[206] KCC (2015), Energy Security Select Committee, Written Evidence, 17 November.
[207] KCC (2015), Energy Security Select Committee, 17 November 2015.
[208] KCC (2015), Energy Security Select Committee, 4 December, 2015.

Raising Awareness Amongst Businesses

4.2.16. The low carbon sector includes businesses that are either operating in a sustainable manner or delivering green products or services.[209] In Kent the sector is currently growing by around 4-5% annually, employs up to 25,000 people, and adds £1bn in value to the Kent economy.[210] [211]

4.2.17. KCC is involved in supporting businesses to reduce their energy usage, to encourage renewable energy businesses to work within Kent, and to assist businesses that seek to supply and support the low carbon sector within Kent.

4.2.18. With European funding, KCC established the Low Carbon Kent business network in 2013 to support businesses in growing the Kent economy in a sustainable way. 222 businesses have been supported so far, with annual savings on their energy, waste and water bills of £2,065 each.[212]

4.2.19. KCC provides a £2.3m project – part funded by the EU – that offers grants to businesses seeking to provide low carbon products and services. So far 20 grants totalling £225,000 have been awarded, unlocking further private sector funding of £380,000.[213]

4.2.20. KCC currently facilitates a number of promotional and networking events on the behalf of businesses. The Low Carbon Zone at Kent 2020 – the largest regional business to business exhibition - showcased a variety of businesses and their products. The Kent Excellence in Business Awards (KEiBA) now has an award for Commitment to the Environment, jointly awarded by UKPN and KCC. The annual Green Business Conference brings together over 100 delegates – members, politicians and experts – to discuss the benefits to businesses of minimising their environmental (and thus energy) impacts.[214]

4.2.21. The Southeast Centre for Offshore Renewable Engineering (CORE) is one of six areas in England identified by Government as a key location for the development of the offshore windfarm industry and its supply chain. Planning consent is in place for a turbine manufacturing and assembly facility at Sheerness, with marketing being undertaken by Locate in Kent. Skills and training provision in CORE is also being strengthened, and the continued development of an industry supply chain to support both existing and future growth remains a key priority.[215]

[209] KCC (2013), Climate Local Kent – One Year on, Maidstone.
[210] KCC (2014), Climate Local Kent 2014 Progress Report, Maidstone.
[211] KCC (2013), Climate Local Kent – One Year on, Maidstone.
[212] KCC (2014), Climate Local Kent 2014 Progress Report, Maidstone.
[213] Ibid.
[214] Ibid.
[215] KCC (2013), Climate Local Kent – One Year on, Maidstone.

4.2.22. Given that wind power is the most viable of all available renewable energy sources for Kent[216], the Committee feel that it is crucial that CORE be adequately resourced and supported so as to ensure the continued uptake of renewable energy within Kent.

Recommendation 6

The Cabinet Member for Environment and Transport should write to the Secretary of State for Energy and Climate Change, asking them to ensure that the South-East CORE is adequately resourced and supported so as to facilitate the continued uptake of renewable (wind) energy within Kent.

4.2.23. The Committee heard that KCC's work with small and medium enterprises (SMEs) around renewables and energy efficiency, and its work raising awareness amongst Kent businesses of opportunities to supply and work with the growing renewables sector had been very beneficial thus far.[217] [218] It was recommended that KCC continue to actively promote the various opportunities for Kent businesses arising from energy efficiency and energy generation measures.[219] [220]

Community Generation Schemes

4.2.24. Community energy generation refers to communities who install energy generation measures (such as solar PV and wind turbines) that allow them to create their own electricity and heat. Community generation schemes offer a number of potential benefits:

- Communities are often more effective in reaching vulnerable residents, and – in the case of providing electricity – may be more trusted by sceptical consumers than other electricity suppliers.[221] [222]

- They can offer the opportunity for local people to become stakeholders in energy projects by investing in the project and receiving a return on investment and a portion of the energy generated.[223]

[216] KCC (2013), Renewable Energy Action Plan, Maidstone.
[217] KCC (2015), Energy Security Select Committee, 4 December 2015.
[218] KCC (2015), Energy Security Select Committee, 26 November 2015.
[219] KCC (2015), Energy Security Select Committee, 4 December 2015.
[220] KCC (2015), Energy Security Select Committee, 26 November 2015.
[221] DECC (2014), Community Energy Strategy, London.
[222] KCC, (2015), Energy Security Select Committee, 4 December 2015.
[223] Ibid.

- They can create local jobs and help support local economic growth.[224]

- They can help to raise awareness around wider issues of energy security and energy use amongst participants, encouraging additional reductions in energy use and increased public awareness.[225]

- They can help to build local energy capacity, potentially reducing reliance on the electricity and gas grids.[226] [227]

4.2.25. Central Government estimates that there are more than 5,000 groups in the UK working on community energy. By 2020, local communities could be generating enough electricity to power 1 million homes.[228] According to a survey conducted by DECC, 42% of people would be interested in taking part in community energy projects if it helped them save money on their energy bills.[229]

4.2.26. To promote community energy projects, Central Government has created a £10m Urban Community Energy Fund, a £15m Rural Community Energy Fund. In addition, a new Community Energy Unit within DECC has been created to provide leadership for DECC's role in the strategy.[230]

4.2.27. However, the Committee heard that Central Government's decision to reduce the FiT for small-scale renewable energy installations[231] had made it difficult for community-scale energy generation projects to afford the costs of the technology.[232] Unlike larger commercial organisations, community groups often have neither assets to borrow against nor a portfolio of projects over which to spread the risk. Community energy projects are usually looking for project finance between £100,000 to £2,000,000, and traditional private sector investors are rarely interested in providing such finance.[233] Community groups therefore need to raise funding for their projects through other means, such as community share offers.[234] [235] Such projects may also seek funding for feasibility and pre planning work from the UCEF or RCEF.[236]

[224] DECC (2014), Community Energy Strategy, London.
[225] KCC (2015), Energy Security Select Committee, Written Evidence, 22 October 2015.
[226] KCC (2015), Energy Security Select Committee, Written Evidence, 22 October 2015.
[227] KCC (2015), Energy Security Select Committee, 4 December 2015.
[228] DECC (2014), Community Energy Strategy, London.
[229] Ibid.
[230] Ibid.
[231] DECC (2015), Press Release – Changes to Renewable Subsidies, 17 December 2015.
[232] KCC (2015), Energy Security Select Committee, 4 December 2015.
[233] DECC (2014), Community Energy Strategy, London.
[234] Ibid.
[235] KCC (2015), Energy Security Select Committee, 4 December 2015.
[236] DECC (2014), Community Energy Strategy, London.

4.2.28. To ensure that community groups are able to continue to implement energy generation schemes that benefit both the local community and the UK's overall energy supply, the Committee recommends that Central Government introduce additional financial support for community energy projects following the reduction of the FiT.

Recommendation 3

The Cabinet Member for Environment and Transport should write to the Secretary of State for Energy and Climate Change, asking them to provide additional financial support for community energy projects following the reduction of the FiT.

4.2.29. Throughout the evidence gathering process the Committee heard of the work that KCC was already doing with communities around energy generation projects.[237] [238] In light of the evidence gathered the Committee wishes to commend the crucial role that KCC plays in supporting and advising communities that wish to generate their own energy.

4.2.30. In light of the importance for energy security of raising awareness and supporting businesses and communities to both reduce their energy use and generate their own energy, the Committee recommends that a communications strategy be put together by the relevant teams within KCC, outlining methods of communicating with businesses and communities on these matters to further their uptake.

Recommendation 9

That KCC creates a communications strategy strengthening its engagement with businesses and local communities to help them understand the benefit of reducing energy use and generating their own energy.

[237] KCC (2015), Energy Security Select Committee, 13 November 2015.
[238] KCC (2015), Energy Security Select Committee, 16 December 2015.

5. Promoting Technologies

The energy sector is undergoing a profound shift. Both on an international and national level, new technologies and innovations are serving to change the face of our energy systems, responding to the need to ensure that our energy remains secure, sustainable and affordable into the future.

Emerging and existing technologies bring with them both new opportunities and challenges. Ensuring that the UK can continue to meet its energy needs in a sustainable and secure manner will require ongoing innovation, and a commitment to using a range of different technologies in a balanced fashion.

Increasingly, new technologies offer the opportunity for more energy generation and supply at a local level, in some cases with the possibility for communities and local authorities to generate energy directly. The Committee has had a number of site visits to energy generation sites, and heard evidence from a variety of experts, community groups, voluntary sector organisations, academics and companies on these issues.

5.1. Central Government Policy

Nuclear Energy

5.1.1. The UK's electricity generation mix is currently undergoing a change driven by two main factors. Firstly, much of the UK's existing plant is approaching the end of its operating life (see Section 2.2). Secondly, national and internationally binding agreements on climate change and environmental sustainability necessitate a move to low-carbon forms of energy generation (see Section 2.5).

5.1.2. Nuclear power offers a potential option for a low-carbon energy that is capable of providing a steady baseload of electricity. Most nuclear reactors run on uranium pellets, with one uranium fuel pellet providing as much energy as 800kg of coal. Nuclear produces significantly less emissions than conventional fossil fuels such as coal, oil and gas.[239]

5.1.3. EDF is the UK's main operator of nuclear power plants, running eight nuclear power plants across the country. EDF estimates that its nuclear plants avoid around 33 million tonnes of CO2 emissions every year (compared to providing the same energy using fossil fuel plants). Each site contributes around £50m to the UK economy in a year, with almost £33m in income to the local economy through the 1,200 jobs supported (directly and indirectly) by the sites.[240]

5.1.4. Over 7GW of EDF's Advanced Gas Cooled Reactor (AGR) plant is expected to close as it reaches the end of its scheduled life by 2030.[241] Central Government has encouraged the creation of new nuclear, with EDF and China General Nuclear Corporation (CGN) jointly investing in the first new reactors in the UK for a generation at Hinkley Point C in Somerset. When completed, Hinkley Point C will provide 7% of the UK's electricity demand, whilst avoiding 9 million tonnes of CO2 emissions per year.[242] Additional nuclear power stations are also planned for Sizewell in Suffolk and Bradwell in Essex.[243]

5.1.5. Hinkley Point C was originally due to begin generating electricity by 2017. However, due to increased costs and delays to the building timetable, this date has now been revised to 2025.[244] Further delays to the completion of new nuclear could carry a potential risk to the sustainability, affordability, and security of the UK's electricity supply.

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[239] EDF (2016), Nuclear Generation in the UK.
[240] Ibid.
[241] KCC (2016), Energy Security Select Committee, Written Evidence, 25 January 2016.
[242] Ibid.
[243] BBC (2015), *What does the nuclear deal with China mean?* [online], available at: http://www.bbc.co.uk/news/business-34585219
[244] BCC (2016), *Decision on new nuclear power plant 'delayed',* [online], available at: http://www.bbc.co.uk/news/business-35415187

5.1.6. Dungeness B in Kent is one of EDF's eight nuclear power plants. Dungeness B began generating in 1983, and has an output of over 1GW.[245] The plant employs 550 staff, with an additional 200 contract staff and 6 apprentices per year, and contributes £40m a year to the local economy per year.[246] Dungeness B was originally scheduled for closure in 2018 but - following from Central Government's decision to extend the plant's operating life – the plant will now be operational until 2028.[247] EDF will deliver a £150m investment programme to extend the life of the reactor to 2028, allowing Dungeness to continue supplying the equivalent of 1.5m homes with power.[248] EDF will also deliver investment programmes to extend the lives of its seven other UK nuclear power stations.[249]

Key Facts

Nuclear Energy:

- **7GW worth of existing nuclear plant expected to close by 2030.**
- **New nuclear reactors being built at Hinkley Point in Somerset; Sizewell in Suffolk and Bradwell in Essex.**
- **EDF's 8 UK nuclear power stations avoid 33m tonnes of CO2 emissions.**
- **Dungeness B in Kent generates 1GW of electricity: enough to power 1.5m homes.**
- **Dungeness B employs 550 staff, with a further 200 contract staff and 6 apprentices.**
- **Dungeness B contributes £40m to the local Kent economy.**

[245] EDF (2016), Nuclear Generation in the UK.
[246] BBC (2015), *Dungeness B nuclear power station given 10-year reprieve,* [online], available at: http://www.bbc.co.uk/news/uk-england-kent-30898444
[247] Ibid.
[248] KCC (2016), Energy Security Select Committee, Written Evidence, 25 January 2016.
[249] Ibid.

5.1.7. It had originally been hoped that Dungeness B would eventually be replaced by Dungeness C, allowing Kent to continue to host new nuclear for many more years after Dungeness B reached the end of its operating life. In 2009, Dungeness was put forward by the then government, along with ten other sites in the UK, as a site for potential new nuclear build.[250] However, Dungeness was in the end discounted due to concerns around the environmental impact of a new plant, coastal erosion, and associated flood risks at the site.[251] [252] [253]

5.1.8. During a site visit to Dungeness B, the Committee learned that, following the disaster at Fukushima nuclear power plant in Japan, EDF had invested £70m in improved flood defences and emergency response equipment for Dungeness B.[254] These defences are intended to survive a 1 in 10,000 year event.[255]

5.1.9. Any new nuclear reactor being built in the UK requires a spent fuel store to be built on site, capable of storing nuclear waste safely for 100 years.[256] Shepway council had previously contemplated the possibility of constructing an underground nuclear waste storage facility in Romney Marsh, but this was abandoned due to local and county opposition.[257] [258]

5.1.10. In light of the ongoing closure of existing nuclear plant, the need to decarbonise the UK's energy supply, and the wider economic and social benefits provided to Kent through hosting Dungeness B, the Committee wishes Central Government to reconsider the viability of Dungeness for new nuclear or other low-carbon generation.

Recommendation 1

The Cabinet Member for Environment and Transport should write to the Secretary of State for Energy and Climate Change, asking them to reconsider the viability of Dungeness for siting future nuclear power or other low-carbon generation.

[250] Kent & Sussex Courier (2009), *Dungeness among 11 sites for new nuclear power station,* [online], available at: http://www.courier.co.uk/Dungeness-11-sites-new-nuclear-power-station/story-11985330-detail/story.html
[251] WiredGov (DECC, 2009), *Miliband sets strategic direction for overhaul of UK energy system,* [online], available at: http://www.wired-gov.net/wg/wg-news-1.nsf/0/D65A29FCBB70A6D880257669005A368C?OpenDocument
[252] KCC (2015), Energy Security Select Committee, Site Visit, 14 December 2015.
[253] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[254] KCC (2015), Energy Security Select Committee, Site Visit, 14 December 2015.
[255] Ibid.
[256] Ibid.
[257] Ibid.
[258] BBC (2012), *Romney Marsh nuclear waste storage plant plan rejected,* [online], available at: http://www.bbc.co.uk/news/uk-england-kent-19656382

Policy Setting

5.1.11. The importance of the energy trilemma when considering energy security has already been discussed (see Section 2.1). The need to ensure – both in the short-term and long-term – that the UK's energy generation and supply remains secure, sustainable and affordable is crucial. Accordingly, national energy policy should seek, as much as is possible, to harmonise these concerns and to provide a stable, forward thinking environment in which to realise them.

5.1.12. During the evidence gathering process, the Committee heard from a number of community groups undertaking both energy generation and energy saving measures in their local area. These initiatives can help to improve energy security (see Section 4.1.12), as well as having other wider benefits (e.g. economic, social) as well.

5.1.13. In the case of Elham Going Green, the Committee heard that the group had been active in considering and then promoting a range of potential energy generation measures for the village of Elham.[259] Amongst the energy generation measures that proved most popular with locals were small-scale domestic solar PV panels. The potentially high upfront cost of installing solar panels and other small scale renewable technologies can often be prohibitive to people who would otherwise wish to do so, particularly in the case of the elderly - who may not consider themselves to be able to recoup the benefits of the technology over its lifetime.[260] However, the Government's introduction of Feed-in-Tariffs (FiT) has helped increase consumer confidence in, and uptake of, the technology.[261]

5.1.14. Introduced in 2010, FiTs replaced Government grants as the main financial incentive to encourage uptake of renewable electricity generating technologies such as solar PV, wind turbines, hydroelectricity, anaerobic digesters, and micro combined heat and power (CHP) systems.[262] In addition to making savings on their energy bills (through generating and using their own electricity), individuals who install a renewable energy system are also paid a generation tariff for each unit (KWh) that they generate, and an export tariff unit exported back to the electricity grid.[263]

[259] KCC (2015), Energy Security Select Committee, 17 November 2015.
[260] Ibid.
[261] KCC (2015), Energy Security Select Committee, 17 November 2015.
[262] The Energy Saving Trust (2016), Feed-in-Tariff scheme, [online], available at: http://www.energysavingtrust.org.uk/domestic/feed-tariff-scheme
[263] Ibid.

5.1.15. As of October 2014, small-scale FiT renewable installations in Kent generated 44,439MWh (See Figure 12) of electricity – roughly enough to meet the electricity demands of 11,000 homes for one year,[264] with solar PV installations alone generating 98.8% of this total figure.[265]

Figure 12: Total generating capacity for small scale renewable energy devices as recorded through FiTs, Kent, 2015

Renewable energy type	Estimated generation per annum (MWh[4])
Hydroelectric	12.30
Micro combined heat and power (CHP)	22.34
Solar photovoltaics	43,900.43
Wind	503.80
Total	**44,438.86**

Source: KCC (2015), Kent State of the Environment 2015, Maidstone.

5.1.16. However, the Committee heard that Central Government's decision to reduce the FiTs and Renewables Obligation Certificates (ROCs – for larger renewable installations)[266] had potentially reduced the ability of communities and residents to generate their own low-carbon energy, due to the still significant costs of the technology without financial assistance.[267] More broadly, the Committee heard evidence that sudden policy changes regarding energy policy carried the risk of deterring investment in necessary measures, due to a lack of investor confidence in Government's long-term support for the industry.[268] At a community and individual level, this runs the risk of causing 'burnout' – a waning of enthusiasm and uptake for local energy generation due to the difficulty of keeping up with and applying for the various, changing funding mechanisms.[269]

5.1.17. Alongside energy generation, the Committee heard that energy efficiency and reducing the demand for energy was the single most important measure that could be adopted to increase energy security.[270] [271] One of the key ways in which to do this is to ensure that houses and civic buildings are energy efficient (see Section 4.1).

[264] DECC (2015), Energy Consumption in the UK, London.
[265] KCC (2015), Kent State of the Environment 2015, Maidstone.
[266] DECC (2015), Press Release – Changes to Renewable Subsidies, 17 December 2015.
[267] KCC (2015), Energy Security Select Committee, 4 December 2015.
[268] KCC (2015), Energy Security Select Committee, 4 December 2015.
[269] DECC (2014), Community Energy Strategy, London.
[270] KCC (2015), Energy Security Select Committee, 16 December 2015.
[271] KCC (2015), Energy Security Select Committee, 26 November 2015.

5.1.18. The Committee heard that, as of July 2015, Central Government had chosen to end the Zero Carbon Buildings policy (ZCB).[272] The ZCB policy formed part of the Government's wider strategy for meeting the reductions in CO2 required by the Climate Change Act (2008 – see Section 2.5). Under the ZCB policy, all new homes would had to have been carbon neutral by 2016. The Government removed the policy to streamline the planning process and increase the rate at which new housing is built.[273] However, the Committee heard that higher building standards help to drive innovation and mainstreaming of technologies, which in turn brings down the costs for developers and consumers (e.g. through lower energy bills due to energy efficient housing).[274] It was put to the Committee that the construction industry is legislation driven, and that the removal of the policy is therefore likely to lead to less energy efficient housing.[275]

5.1.19. Coupled with the need for 158,000 new homes (and supporting infrastructure) to be built in Kent by 2031 (see Section 2.4), the removal of the ZCB policy will likely lead to increased energy demand and CO2 emissions above previously predicted levels. The Committee therefore recommends that KCC lobby Central Government for the urgent reintroduction of the policy.

5.1.20. The Committee recognises the importance of a stable national energy policy position for ensuring long-term investment in, and development of, low carbon energy generation, increased energy efficiency and reduced demand for energy; as such measures are crucial for ensuring energy security. The Committee therefore recommends Central Government be lobbied to ensure greater long-term coherence in national energy policy, including the reintroduction of the Zero Carbon Buildings policy, and the provision of additional, clear and accessible financial support for community energy projects.

Recommendation 2

The Cabinet Member for Environment and Transport should write to the Secretary of State for Energy and Climate Change, asking them to introduce stronger national building standards, requiring both increased energy efficiency and generation measures in new developments.

[272] KCC (2015), Energy Security Select Committee, 22 October 2015.
[273] HM Treasury (2015), Fixing the foundations: Creating a more prosperous nation, London.
[274] KCC (2015), Energy Security Select Committee, 22 October 2015.
[275] KCC (2015), Energy Security Select Committee, 26 November 2015.

5.2. Technologies

5.2.1. Throughout the evidence gathering process, the Committee heard about a range of technologies and innovations that could potentially contribute towards energy security for both the UK and Kent.

5.2.2. Gas currently supplies 28% of the UK's total energy needs, being used primarily for electricity generation and domestic heating and cooking.[276] The UK currently meets 55% of national demand through natural gas production – primarily in the North Sea.[277] The remaining 45% of the UK's gas demands are met by imports, with 57% of all imported gas coming from Norway, 15% from the Netherlands, and the remainder being imported as LNG from Qatar.[278]

5.2.3. UK gas production has declined since 2000 as the UK has extracted much of its economically viable gas reserves. DECC predicts that, by 2030, production will fall to 16bcm a year (the UK currently uses 70bcm a year).[279] National Grid forecasts that, by 2035, imports of gas will supply between 40-90% of gas demand (See Section 2.3 for further information on gas).[280]

5.2.4. Though at present the UK's gas imports are secure[281]; if it is decided that energy security entails sourcing a greater proportion of the UK's energy needs directly, rather than through imports, then a number of options are available for increasing indigenous production.

[276] DECC (2015), DUKES Infographics [online].
[277] HoP: POST (2015), Future of Natural Gas in the UK.
[278] DECC (2015) DUKES Statistical Press Release [online].
[279] HoP: POST (2015), Future of Natural Gas in the UK.
[280] Ibid.
[281] KCC (2015), Energy Security Select Committee, 4 December 2015.

Unconventional Gas

5.2.5. Unconventional gas refers to gas that is not 'free-flowing', that is; gas that is trapped or locked in impermeable rocks that are technically difficult to access and extract the gas from.[282] Hydraulic fracturing – more commonly referred to as 'fracking' – refers to the method used for extracting this gas from shale and coal bed deposits. A mixture of water, sand and chemicals is pumped at great pressure into the bore-hole. This fractures the rock, allowing the gas to be siphoned off. Between 20-40% of the water used returns to the surface as waste water and cannot be reused in the process. Once the shale (or coalbed) has been fracked, gas can flow continuously for 5 years. However, formations may have to be re-fractured every four to five years to maintain gas production.[283]

5.2.6. Onshore exploration for unconventional gas is at an early stage. This therefore makes it difficult to estimate the potential levels required for production to be economically viable.[284] The British Geological Survey (BGS) identified two potential locations for unconventional gas within Kent.[285] The Weald Basin, running from Salisbury in Wiltshire to Ashford in Kent was identified as a potential source of shale gas, whilst the Kent Coalfield (in the east of the County) was identified as a potential source of methane.[286] The BGS has concluded that, whilst there is a potentially significant volume of unconventional shale oil within the Weald Basin, there is no significant shale gas potential. There is currently no information available on the potential coal bed methane resources in Kent.[287]

5.2.7. Over half of the public (56%) report knowing a lot or a little about hydraulic fracturing. Just over four in ten (43%) of the public neither support nor oppose the extraction of shale gas. Of those who do have a stance, 30% oppose it, whilst 23% are in favour of it. Support for fracking is higher amongst men and the over 65s. Opposition to fracking is highest amongst those aged between 45-64, and those who live in rural areas.[288]

[282] KCC - Fusion (2014), Unconventional Gas: Shale Gas and Coalbed Methane, Maidstone.
[283] Ibid.
[284] HoP: POST (2015), Future of Natural Gas in the UK.
[285] KCC - Fusion (2014), Unconventional Gas: Shale Gas and Coalbed Methane, Maidstone.
[286] Ibid.
[287] Ibid.
[288] DECC (2015), Public Attitudes Tracker – Wave 15, London.

5.2.8. A number of initiatives and incentives have been put forward by Central Government and the oil and gas industry to support the development of unconventional gas and oil.

- The Environment Agency has announced that it will streamline and simplify the regulation of exploratory activity.
- DECC has produced a Regulatory Roadmap Publication for developers to follow when drilling for onshore oil and gas.
- The 2013 Autumn Statement encouraged investment by halving the tax rate on early profits.
- In January 2014 the Prime Minister announced plans for councils to keep up to 100% of business rates from shale has sites.
- The Department of Communities and Local Government has published planning guidance that clarifies the interaction between the planning process and the environmental and safety consenting regimes.
- The Community Engagement Charter requires representatives from the UK Onshore Operators Group to engage communities in advance of any application for planning permissions. It includes £100,000 in community benefits, at exploration stage, per well-site, and 1% of revenues at production to be paid to communities.[289]

5.2.9. As the onshore unconventional gas industry is at a very early stage of development, it is difficult to estimate what the impact of the industry would be on future gas prices.[290] The factors that contributed to the boom in the unconventional gas industry in the United States are not as prevalent elsewhere, suggesting that the extraction of shale gas across Europe will be more costly. It is also unlikely that shale gas will lower UK energy costs in the same way as it did in the US.[291] Given the development needs of the industry, it is unlikely that significant quantities of gas will be produced before the early 2020s.[292]

[289] KCC - Fusion (2014), Unconventional Gas: Shale Gas and Coalbed Methane, Maidstone.
[290] Ibid.
[291] Ibid.
[292] HoP: POST (2015), Future of Natural Gas in the UK.

5.2.10. The GHG emissions of natural gas are the lowest of all the fossil fuels, with GHG emissions from shale gas and coalbed methane being 0-25% higher than conventional gas emissions. Gas is therefore a potential 'bridging fuel' that could be used whilst renewable energy sources are developed to achieve grid parity.[293] Switching to gas could help meet short-term emission targets (see Section 2.5). However, there is concern that the installation of additional gas-using units may create barriers to reducing GHG emissions in the long run, and detract from developing cleaner sources of energy more quickly.[294] [295]

Key Facts

Unconventional Gas:

- **Refers to gas trapped in impermeable rocks. Released by a process of hydraulic fracturing – 'fracking'.**
- **Unconventional gas' GHG emissions are 0-25% higher than conventional gas.**
- **Of those with an opinion, 30% of the public oppose fracking, whilst 23% are in favour of it.**
- **There is no shale gas potential within the Weald Basin.**
- **No estimates are available for coalbed methane reserves in Kent.**

[293] KCC - Fusion (2014), Unconventional Gas: Shale Gas and Coalbed Methane, Maidstone.
[294] Ibid.
[295] HoP: POST (2015), Future of Natural Gas in the UK.

5.2.11. The Committee heard from witnesses that there were opposing views amongst community groups on the issue of fracking, with concerns around the regulatory system.[296] Others maintained that, whilst the potential energy resource looked promising, the ecological and environmental impact was too great and therefore not worth pursuing.[297]

5.2.12. As the minerals planning authority for Kent, KCC is one of the key organisations that are capable of permitting hydraulic fracturing. Concurrently, KCC is required to treat each planning application impartially, and on a case-by-case basis.[298] At present, Central Government is considering stripping councils of their planning role in approving or denying approval to developers seeking to create onshore unconventional gas bore-holes.[299]

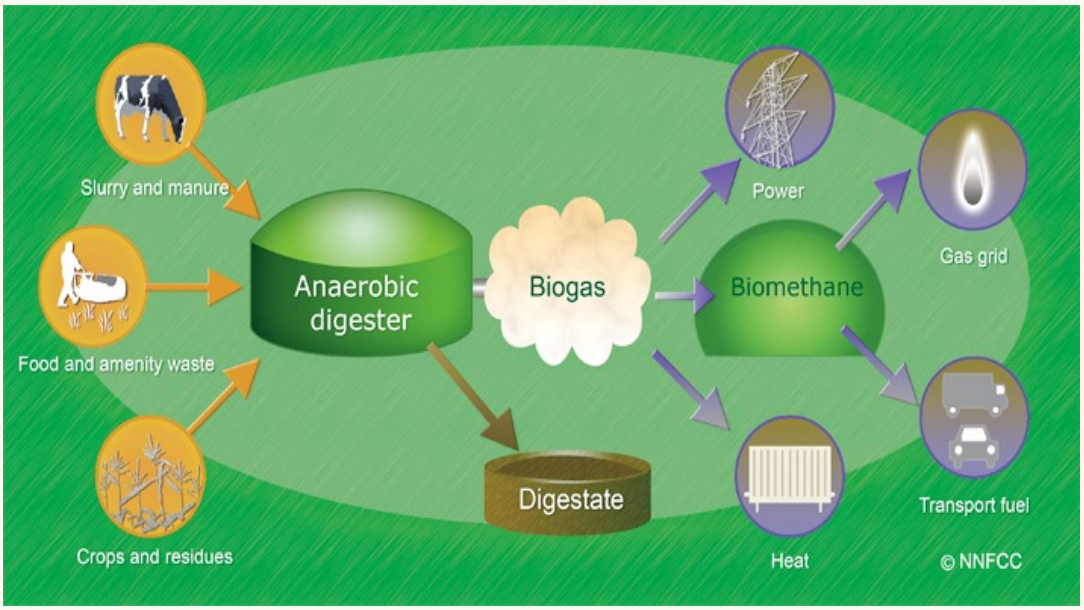
5.2.13. Given the potential reserves of unconventional gas that may be within Kent, and in light of possible future changes in energy markets, the Committee wishes to note the importance of keeping unconventional gas reserves in mind when considering energy security.

[296] KCC (2015), Energy Security Select Committee, 17 November 2015.
[297] KCC (2015), Energy Security Select Committee, 4 December 2015.
[298] KCC (2015), Energy Security Select Committee, 17 November 2015.
[299] The Times (2016), *Ministers set to strip councils of the power to ban fracking,* [online], available at: http://www.thetimes.co.uk/tto/business/industries/naturalresources/article4679138.ece?shareToken=6afea05b192daec41c782327b8e79ecd

Anaerobic Digestion and Biogas

5.2.14. Another method of producing gas is through anaerobic digestion (AD). Anaerobic digestion refers to a process whereby organic waste (such as animal slurry, food waste, sewage and crops[300]) is placed into a digester. Bacteria within the digester then break down the organic matter, producing gas (see Figure 13). This gas can then be burned to produce electricity, or used directly in cooking and heating. Electricity can either be transferred back to the grid, or used directly onsite or in the local area. Heat can also be distributed to the local area if a district heating network is established alongside the anaerobic digestion plant.

Figure 13: The process and outputs of anaerobic digestion



Source: Hallmark Power (2016), Anaerobic Digesters [online].

5.2.15. Alongside natural gas, in 2014 the UK also produced 2.6bcm of biogas (a form of renewable energy). Growth in advanced technologies and anaerobic digestion could see production reach 7bcm by 2025: equivalent to 10% of UK gas use at current levels.[301]

5.2.16. GHG emissions from biogas are around 90% less than for other fossil sources, making biogas the gas with the lowest GHG emissions.[302] This makes biogas a potentially useful aspect of the UK's energy mix in achieving the UK's carbon reduction targets (see Section 2.5).

[300] HoP: POST (2015), Future of Natural Gas in the UK.
[301] Ibid.
[302] Ibid.

5.2.17. At present, there are 150 AD plants across the UK, of which around half are waste fed. Waste fed AD plants have a current capacity of 100MW - enough to power over 130,000 homes.[303]

5.2.18. There are currently two operational anaerobic digestion plants in Kent, with a further two currently in planning:

- Ebbsfleet Farm in Ramsgate is a 500KW plant, commissioned in March 2013.
- St Nicholas Court Farm in St-Nicholas-at-Wade is a 250KW plant commissioned in December 2014.
- Blaise Farm (operated by New Earth Solutions) in West Malling has received planning permission for a 3MW plant.
- Knoxbridge Farm in Cranbrook has received planning permission for a plant that will meet the gas needs of the farm and around 2000 homes.[304]

5.2.19. Anaerobic digestion remains a relatively new energy technology within Kent. One of the main barriers to its uptake is the high start-up costs associated with establishing a plant.[305] To this end the Waste and Resources Action Programme (WRAP), on the behalf of Central Government, has established the On-Farm Anaerobic Digestion Fund to help farmers build small scale AD plants on their farms. The fund offers:

- A business grant of up to £10,000 to investigate the environmental and economic potential of building an AD plant on the farm.
- A capital loan of up to £400,000 (or a maximum of 50% of the project cost) for AD plants producing up to 250KW of power.[306]

[303] Green Investment Bank (2015), Smarter, greener cities: Ten ways to modernise and improve UK urban infrastructure.
[304] KCC (2016), Energy Security Select Committee, Written Evidence, 10 February 2016.
[305] Ibid.
[306] WRAP (2016), On-Farm AD Fund, [online], available at: http://www.wrap.org.uk/node/16778

Key Facts

Anaerobic Digestion (Biogas):

- **Biogas is made by bacteria eating waste organic matter and giving off biogas (methane and CO2)**
- **Biogas can be used for heating, electricity, gas and biofuels.**
- **10% of the UK's gas demand (at current levels) could be met by biogas by 2025.**
- **Biogas's GHG emissions are 90% lower than other fossil fuels (including natural and unconventional gas).**
- **There are 150 AD plants in the UK, producing enough energy to power 130,000 homes.**

5.2.20. The Committee visited an anaerobic digestion plant installed on farmland at St-Nicholas-at-Wade in Kent. The AD plant at St-Nicholas-at-Wade takes 75 tonnes of feed a day (primarily maize and other farm crops with 15% waste products) and produces 500 cubic metres of biogas per hour for export to the gas and electricity grids. 80% of the gas produced is used for heating and cooking, with the remaining 20% being burned to produce electricity.[307]

5.2.21. The St-Nicholas-at-Wade AD plant provides a number of additional benefits besides generating gas and electricity from waste products. The plant currently produces enough heat to heat around 1,000 homes. However, due to the location of the plant, only 20% of this figure is actually utilised, with the farm being heated by the plant. The waste material left over at the end of the process can be used instead of artificial fertilisers. This leads to significant improvements in soil viability, and saves the farm around £250,000 a year in artificial fertiliser. Nothing is wasted in the process, leading to 'low impact farming'.[308] The AD plant at St-Nicholas-at-Wade qualifies for both the Renewable Heat Incentive (RHI) and FiT, and has an annual turnover of £3.5m a year. By comparison, the farm itself has an annual turnover of £1.5m.[309]

5.2.22. At present, the plant currently vents CO2 produced through the process into the atmosphere. However, the plant is undergoing a refit that will allow it to capture the CO2 and convert it to dry ice, for use in the catering industry, adding another income stream to the process and further reducing emissions.[310]

5.2.23. The Committee heard that small scale energy generation (such as that at St Nicholas) could improve energy security by providing local communities with a buffer against potential energy shortages. Multiple small scale measures could also provide a greater failsafe than relatively fewer large-scale centralised power stations, as one measure malfunctioning is less significant in its effect in a more decentralised system. Mr Pace, the owner of St-Nicholas-at-Wade farm, expressed a desire for lots of farms to implement small scale AD, as this was better for a varied market as well as environmental diversity.[311]

[307] KCC (2015), Energy Security Select Committee, Site Visit, 30 November 2015.
[308] Ibid.
[309] Ibid.
[310] Ibid.
[311] Ibid.

5.2.24. AD plants need good road networks, and may therefore not be viable in some rural areas.[312] Furthermore, AD plants need to be constructed in sensible locations that match up to household and commercial waste food collection schemes.[313]

5.2.25. The Committee heard that biogas might be a preferable alternative to unconventional gas (see Section 5.3 – Unconventional Gas)[314], with a significant potential for producing electricity and heat.[315] Biogas is low carbon and flexible – meaning it can be turned on and off as needed. However, it was also expensive and required significant coordination between various industries and actors.[316] Furthermore, long term waste contracts across Kent would need to be revisited to ensure that AD uptake was being fully realised.[317] It was suggested that KCC should do more to encourage this technology, and that joint commissioning with an industry provider might be one way to increase the uptake of AD plants across the County.[318]

[312] Ibid.
[313] KCC (2015), Energy Security Select Committee, 15 December 2015.
[314] KCC (2015), Energy Security Select Committee, 4 December 2015.
[315] KCC (2015), Energy Security Select Committee, 15 December 2015.
[316] KCC (2015), Energy Security Select Committee, 4 December 2015.
[317] KCC (2015), Energy Security Select Committee, 15 December 2015.
[318] KCC (2015), Energy Security Select Committee, 15 December 2015.

Biomass

5.2.26. Biomass refers to the harvesting and processing of organic matter (such as wood, wood by-products and crops – all renewable resources) for use in modern, efficient boilers to provide heat. As 70% of all gas in the UK is used for heating (with the remaining 30% being burned to generate electricity)[319], biomass offers the potential to reduce the UK's reliance on gas for heating in favour of a locally produced, renewable resource.

5.2.27. Central Government estimates that by 2050 the UK could meet 12% of its primary energy demand from biomass alone.[320] DECC estimates there to be 170,000 hectares of unmanaged woodland in the UK that is not currently realising its potential for timber production, recreation or conservation purposes, suggesting that there is significant room for increasing the uptake of biomass. These sites could potentially become hubs for local communities wishing to develop biomass projects.[321]

5.2.28. The Forestry Commission notes that an increase in wood fuel supply on current levels of two million tonnes by 2020 – representing 50% of the estimated unharvested available material from English woodlands – would have substantial environmental benefits and (once mitigation measures have been pursued) modest adverse impacts.[322] Provided that wood fuel is sourced from well managed woodlands, where harvested trees are regularly replaced, wood fuel biomass represents a sustainable source of energy.[323]

5.2.29. Within Kent, only half of all existing woodland is currently managed. The Committee heard that there was significant scope for expansion as a result.[324] The Forestry Commission estimates that, with proper management, woodland in Kent could provide an annual harvest of 125,000 tonnes of wood for fuel.[325] This is roughly equivalent to 246,000MWh of energy, or 25m litres of oil.[326]

[319] HoP: POST (2015), Future of Natural Gas in the UK.
[320] DfT, DECC & DEFRA (2012), UK Bioenergy Strategy, London.
[321] DECC (2014), Community Energy Strategy, London.
[322] Forestry Commission (2007), A Woodfuel Strategy for England.
[323] Biomass Energy Centre (2016), Biomass Sustainability, [online], available at: http://www.biomassenergycentre.org.uk/portal/page?_pageid=76,535178&_dad=portal&_schema=PORTAL
[324] KCC (2015), Energy Security Select Committee, 15 December 2015.
[325] KCC (2015), Energy Security Select Committee, Written Evidence, 18 December 2015.
[326] KCC (2015), Energy Security Select Committee, 15 December 2015.

5.2.30. Woodchip is the most local of possible wood fuels for use in biomass boilers and heaters. It often travels less than 10 miles from source to end user[327], potentially reducing the carbon footprint associated with transporting and supplying fuel. Wood pellets are a more refined variant of wood fuel. At present, there are several wood pellet manufacturers in the UK, with manufacturers such as Leigh-Pemberton operating within Kent. It was recommended to the Committee that indigenous softwood pellets be used instead of imports.[328]

5.2.31. It is at present difficult to assess the potential GHG emissions of biomass, as the emissions released will largely depend on the type of fuel being burned. If whole trees are used, then emissions may be higher than coal. If residues such as sawdust, bark and thinnings are used, then emissions are likely to be lower than those produced by fossil fuels.[329]

5.2.32. Half of the public (49%) are aware of biomass boilers, but only 5% feel that they know a lot about renewable heating systems. The public are also four times as likely to be positive (45%) about the idea of having a renewable energy system in their home than negative (10%). Awareness of the Domestic Renewable Heat Incentive (RHI) is low, with just over one in ten people claiming to have heard of it (12%).[330]

[327] Ibid.
[328] Ibid.
[329] Carbon Brief (2013), New government research adds to biomass emissions controversy, [online] available at: http://www.carbonbrief.org/new-government-research-adds-to-biomass-emissions-controversy
[330] DECC (2015), Public Attitudes Tracker – Wave 15, London.

Key Facts

Biomass (wood fuels):

- **Biomass refers to organic fuel sources such as wood, wood by-products and crops.**
- **Biomass can be burned in a boiler to provide heating and hot water.**
- **GHG emissions from biomass vary depending on the type of biomass used.**
- **By 2050, 12% of the UK's total energy demand could be met by biomass and other biofuels.**
- **Only 50% of Kent woodlands are currently managed.**
- **With proper management, Kent woodlands could supply the equivalent of 25m litres of oil a year.**

5.2.33. The Kent Downs AONB Woodfuel Unit has undertaken extensive work with schools in Kent that are located in rural areas (and are thus off of the gas network) to explore options for biomass heating. The Committee were advised that any new build schools, or those undergoing refurbishment, should prioritise renewable energy systems such as biomass boilers to help ensure local energy security.[331]

5.2.34. Uptake of biomass boilers in local schools and other sites was hindered primarily by a smaller evidence base than traditional oil or LPG systems, a handful of bad case studies, and the currently low price of fossil fuels.[332] [333]

5.2.35. The Committee heard that there was not enough rural policy in Kent, and that there needed to be stronger links between energy security and its support by local organisations such as the Kent Association of Parish Councils and the Council for the Protection of Rural England. It was also suggested that KCC could establish an investment vehicle that would allow it to buy into community projects such as biomass and woodland management to help encourage uptake and support for it.[334]

[331] KCC (2015), Energy Security Select Committee, 15 December 2015.
[332] Ibid.
[333] KCC (2015), Energy Security Select Committee, Presentation, 16 December 2015.
[334] KCC (2015), Energy Security Select Committee, 15 December 2015.

Battery Storage

5.2.36. A key issue with certain renewable energy sources (e.g. wind and solar) is the problem of intermittency. This refers to the fact that solar panels primarily generate electricity during the day, whilst wind turbines generate less electricity in low winds, or need to be shut down in exceptionally high winds. This therefore leads to intermittent electricity generation: peaks and troughs in the amount of electricity being sent into the grid. This situation is currently managed by using other energy sources - such as nuclear - as a 'baseload' form of generation – providing a constant and steady rate of power to supplement intermittent sources.[335]

5.2.37. A fast developing technology that provides another way to address intermittency is battery storage. Battery storage refers to the development of efficient, scalable batteries that are capable (much like any other small scale battery currently in existence) of storing electricity over long periods of time, to be released when needed. Such storage systems can be either personal (e.g. a battery unit for and in one household), or at grid scale. Battery storage would allow the electricity generated by renewables such as solar and wind to be stored and released when needed.[336] [337] By offering an additional method by which to manage demand and reduce peaks on the national grid, they also offer the opportunity to reduce the need for costly upgrades and maintenance on the energy grid.[338]

5.2.38. The Committee heard that battery storage had recently reduced significantly in cost, and that prototypes such as domestic units (for connecting to domestic renewable installations) were increasing in number, and would likely be fully viable within 5 – 10 years.[339] [340]

5.2.39. As of January 2016, the UK's largest battery energy storage array has been completed and come online in Northern Ireland. Located in northern Belfast, the 10MW Kilroot Power Station is the first step in a planned 100MW storage array, which would when complete make it the largest in the world. When completed, the installation is expected to provide £8.5m in system savings per year, and reduce CO2 emissions by 123,000 tonnes annually. [341] Western Power Distribution are planning a £1m, 640KW battery plant to be connected to a 1.5MW solar farm and the electricity network in Somerset.[342]

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[335] KCC (2015), Energy Security Select Committee, 4 December 2015.
[336] KCC (2015), Energy Security Select Committee, 22 October 2015.
[337] KCC (2015), Energy Security Select Committee, 4 December 2015.
[338] DECC (2014), Community Energy Strategy, London.
[339] KCC (2015), Energy Security Select Committee, 26 November 2015.
[340] KCC (2015), Energy Security Select Committee, 16 December 2015.
[341] Energy Live News (2016), UK's largest battery energy storage completed, [online], available at: http://www.energylivenews.com/2016/01/08/uks-largest-battery-energy-storage-completed/
[342] Energy Live News (2016), £1m solar energy storage project unveiled, [online], available at: http://www.energylivenews.com/2016/01/07/1m-solar-energy-storage-project-unveiled/

'Finding an economical way to store renewable energy will provide security of energy supply from renewable sources. It will ensure renewables aren't wasted as in this case it will allow solar energy to be stored and accessed when required.'

Jenny Woodruff (2016), Innovation and Low Carbon Networks Engineer - Western Power Distribution

5.2.40. Additionally, the Committee heard from witnesses that, when coupled with council owned energy generation measures, energy storage systems offered the opportunity for councils to buy electricity when it was cheap, and then sell it back to the grid whilst in demand, thus providing a potential revenue stream.[343]

[343] KCC (2015), Energy Security Select Committee, 17 November 2015.

Investment Fund

5.2.41. Many of the technologies that the Committee heard about were low-carbon, renewable and could be undertaken at a local level. Besides diversifying the UK's (and Kent's) energy mix, in almost all cases they offer a low-carbon, environmentally sustainable way of doing so. They also offer the additional possibility of growing the Kent economy through contributing to local industries (such as woodland management and fuel processing), and to potential additional revenue streams for the Council, should it decide to invest in technologies that would allow it to generate and sell its own energy.

5.2.42. At present, KCC currently holds a fund for energy efficiency measures, but not for energy generation measures.[344] In light of the various emerging (and already established) technologies that are capable of improving energy security – either through reducing demand for imports and reliance on the national grid, or through building in local, low-carbon generation systems - the Committee heard that KCC may wish to investigate the feasibility of setting up an investment fund for emerging local renewable and low carbon energy measures[345] [346] [347], so as to drive uptake of such measures and to ensure greater energy security through a diverse range of energy sources.

Recommendation 10

That KCC investigates the feasibility of creating investment measures to develop local, low-carbon energy generation and diversification projects.

[344] KCC (2016), Energy Security Select Committee, Written Evidence, 12 January 2016.
[345] KCC (2015), Energy Security Select Committee, 4 December 2015.
[346] KCC (2015), Energy Security Select Committee, 15 December 2015.
[347] KCC (2015), Energy Security Select Committee, 4 December 2015.

5.3. Building Standards

Retrofitting and ECO

5.3.1. Buildings account for a significant proportion of the total energy used within the UK, both for heating and cooking, and for cooling and lighting (see Sections 2.4 and 4.2 for further information on housing figures for Kent and energy poverty). Ensuring that existing stock is updated and retrofitted, and that all new stock is built to high standards will help significantly to reduce demand for energy, enhancing energy security by making the energy that we use go further.

5.3.2. To address the issue of energy efficiency in the UK's existing housing stock, Central Government introduced two schemes:

- Green Deal
- Energy Company Obligation (ECO)

5.3.3. The Green Deal allowed homes and businesses to pay for energy efficiency improvements through savings on their energy bills. The scheme was withdrawn in July 2015 due to lack of uptake.[348] ECO requires the larger energy suppliers (e.g. EDF, Npower, etc.) to provide energy efficiency measures for those most in need, and for properties that are difficult to improve.[349] [350]

5.3.4. The Warm Homes scheme is a partnership project between Kent County Council, district councils and landlords (delivered through the Kent and Medway Sustainable Energy Partnership – KMSEP) to support residents in Kent and Medway to save energy in their home. The Warm Homes scheme offers subsidised heating and insulation through ECO funding. During Phase 1 of the scheme (2013 – 2014), £1.5m of ECO (and other) funding was utilised to install 1,447 measures across 1,387 homes. These measures will generate a lifetime saving of £5.5m to Kent residents, and save 25,000 tonnes of CO2. Warm Homes Phase 2 is now underway and has had over 1600 referrals so far, with over 100 completed installations.[351]

5.3.5. However, the Committee heard that the original intention of Central Government was that ECO would spend £1.3bn on housing improvements annually. The amount of funding made available when the scheme launched was significantly less than this intended sum.[352]

[348] DECC (2016), Changes to green home improvement policies announced today, [online], available at: https://decc.blog.gov.uk/2015/07/23/changes-to-green-home-improvement-policies-announced-today/
[349] DECC (2014), Community Energy Strategy, London.
[350] DECC (2013), Energy Efficiency Strategy, London.
[351] KCC (2015), Energy Security Select Committee, 13 November 2015.
[352] KCC (2015), Energy Security Select Committee, 26 November 2015.

5.3.6. Furthermore, both the private sector and homeowners found it difficult to understand what was available under the scheme.[353] DECC itself also noted that there was a lack of understanding of such initiatives amongst communities, with some groups thinking that ECO was a government grant scheme.[354] Some groups were put off from engaging with the Green Deal and ECO due to concerns about consumer credit licensing requirements,[355] whilst the private sector lacked confidence in ECO due to uncertainty over how long the funding would last for.[356] It was also heard that some energy companies had used substandard materials when carrying out work on behalf of ECO, though the regulations had now been tightened to ensure appropriate materials were used.[357]

5.3.7. The costs of poorly insulated housing go beyond increased energy demand. The economic costs are high (see Section 4.2), as are related social and health costs. The Committee heard that a hospital stay due to conditions brought on by poor quality, cold housing can cost up to £25,000. By contrast, spending £7000 could make that home warm and healthy, thus avoiding social care and medical costs.[358] [359] Energy efficient homes also have the additional benefit of enabling people to continue heating their homes even in the face of high energy prices.[360]

5.3.8. It was suggested to the Committee that local government could deliver far greater rollout of ECO, and therefore deliver greater reductions in energy use (as well as savings for householders), if ECO funding was transferred from the control of utility companies to local authorities.[361] [362] The Committee therefore recommends that the Cabinet Member should write to the Secretary of State to request that any future energy efficiency schemes be placed under local authority management and control.

Recommendation 4

The Cabinet Member for Environment and Transport should write to the Secretary of State for Energy and Climate Change to ask for local authority control and management of future energy efficiency schemes replacing or updating ECO.

[353] Ibid.
[354] DECC (2014), Community Energy Strategy, London.
[355] Ibid.
[356] KCC (2015), Energy Security Select Committee, 26 November 2015.
[357] Ibid.
[358] Ibid.
[359] ACE (2013), Fact-file: The Cold Man of Europe, London.
[360] Ibid.
[361] KCC (2015), Energy Security Select Committee, 26 November 2015.
[362] KCC (2015), Energy Security Select Committee, 16 December 2015.

5.3.9. Whilst schemes such as ECO focus on improving the energy efficiency of existing housing stock, the Committee heard that it was important to consider the efficiency of future housing stock as well.[363] Ensuring that all new domestic and civic buildings are built to high standards of energy efficiency will help to reduce energy demand amidst a growing population and the need for more housing (see Section 2.4).

5.3.10. The Committee heard that, when considering energy security in the context of building design, it was important to focus on the overall desired outcome, rather than on specific measures. For example, it may be better to specify reducing the overall energy demand of the building by 25%, rather than necessitating it have certain specific energy measures such as solar panels or a ground source heat pump. This approach allows for a greater degree of flexibility at both the design and execution stage when considering how best to build energy reduction, efficiency or generation into a development, as not all sites may be suitable for a certain type of measure. For instance, some schools may not face the right direction to make solar PV viable, but may be able to deliver reductions in energy use through other means.[364]

5.3.11. A number of initiatives are underway in the UK currently that aim to build highly energy efficient, sustainable buildings. Wolverhampton Council have challenged their Capital Projects team to design a 'Passivhaus' school at no extra cost than a normal new build school.[365] Developed in Germany in the 1990's, to qualify for the Passivhaus standard a building must have excellent thermal performance, exceptional airtightness and mechanical ventilation. The heating demand of Passivhaus buildings can be so low that only a heated towel rail is needed for conventional heating.[366] The standard can be applied to residential, community, civic and industrial buildings. As of 2013, there are around 250 Passivhaus certified buildings in the UK.[367]

[363] KCC (2015), Energy Security Select Committee, 16 December 2015.
[364] Ibid.
[365] Ibid.
[366] Passivhaus (2016), The Passivhaus Standard, [online], available at: http://www.passivhaus.org.uk/standard.jsp?id=122
[367] Passivhaus (2016), Passivhaus UK Buildings Database, [online].

5.3.12. In Kent, Hadlow College has completed a Passivhaus certified teaching facility and visitor centre at Tonbridge (see Figure 14). The teaching centre was constructed in just three days[368], and cost significantly less to build than the average PFI financed school (£1,742 per metre squared compared to £2,650), and has reduced heating and electricity demand compared to an average school by 92% and 18% respectively. This reduction has been achieved purely through the design of the building - without the addition of any energy generation measures. The centre is rated as well-lit and comfortable to work in in all conditions by the overwhelming majority of its users.[369] These reductions in energy are significant from both an energy security perspective – energy reduction being the key means of ensuring energy security[370] [371] [372] - and from an economic perspective. A large school can spend up to £150,000 a year on energy costs.[373] Ensuring energy security can therefore also help to ensure economic and physical wellbeing.

Figure 14: The Passivhaus certified teaching centre for Hadlow College

Source: Passivhaus Trust (2016), Hadlow College.

[368] Ibid.
[369] KCC (2016), Energy Security Select Committee, Presentation, 12 February 2016.
[370] KCC (2015), Energy Security Select Committee, 26 November 2015.
[371] KCC (2015), Energy Security Select Committee, 16 December 2015.
[372] Institution of Mechanical Engineers (2016), Engineering the UK Electricity Gap, London.
[373] KCC (2015), Energy Security Select Committee, 16 December 2015.

5.3.13. The Committee heard that such projects – particularly in schools – can have the added benefit of serving an educational purpose: helping to raise awareness and interest amongst users on issues such as energy use and sustainability.[374]

5.3.14. The Committee heard that formal approval for buildings by the local authority Planning Committee was at the end of the planning process, making it difficult to conduct significant alterations to unsatisfactory designs at this stage.[375] It was therefore crucial that, where KCC was the client for the development, it should promote an outcome based low carbon and low energy usage design. This would be achieved by ensuring that the desired outcomes for the building were stated at the start of the process, with the architect demonstrating at an initial stage what could be achieved with the design based on the specified outcomes and budget.[376] The Committee wholeheartedly endorses this view, and recommends that KCC influence the design and planning process for schools and other developments from the start to ensure that they are as energy efficient as possible.

Recommendation 11

That KCC works with partners and local authorities to influence the design and planning process for developments from the start, so as to ensure that they are as energy efficient as possible.

[374] Ibid.
[375] Ibid.
[376] Ibid.

5.4. Education, Skills and Businesses

5.4.1. A key facet of energy security lies in ensuring that the UK has the necessary skills and workforce in place to make sure that the UK's energy system is in capable hands; able to adjust to fast changing global energy markets and technological advancements.

5.4.2. As of 2013, the energy sector contributed 3.3% of the UK's GDP, directly contributing £25bn to the economy. 6.2% of the industrial workforce is employed by the sector – 169,000 people. In terms of GVA it remains one of the most productive sectors.[377] The UK energy sector is forecast to grow by 15.5% by 2022.[378] However, 23,000 of the workforce in coal, oil, gas and mining, and 43,000 of the electricity and gas workforce are expected to retire by 2022.[379] SSE estimates that up to 50% of the current energy sector workforce may retire by 2023.[380]

5.4.3. This loss of existing knowledge and skill, combined with the ongoing fast-changing nature of the sector[381], necessitates the training of a new generation of energy sector workers who are skilled to respond to new technologies and competencies.

5.4.4. Research conducted by the UK Commission for Employment and Skills (UKCES) has found that there are, at present, skills shortages across a number of key occupations (engineers; technicians; project managers; sales and marketing managers and overhead lines workers).[382] An earlier report (2007) by the Energy Research Partnership reached similar findings.[383]

5.4.5. Key reasons for skills shortages within the UK energy sector, as identified by UKCES, include:

- Strong competition for skills between sub-sectors, other sectors, and countries.
- Uptake of the most sector-relevant STEM qualifications not meeting employer demand.
- Poor visibility of (and consequently interest in) the energy sector as a career prospect among young people and potential new entrants from other industries.
- An ageing workforce.[384]

[377] UKCES (2015), Sector insights: skills and performance challenges in the energy sector.
[378] Energy Live News (2015), *Skills crisis threatens energy sector,* [online], available at: http://www.energylivenews.com/2015/03/26/skills-crisis-threatens-energy-sector/
[379] Ibid.
[380] SSE (2015), *SSE Warns of Skill Shortage in the Energy Industry,* [online], available at: http://sse.com/newsandviews/allarticles/2015/03/sse-warns-of-skill-shortage-in-the-energy-industry/
[381] UKCES (2015), Sector insights: skills and performance challenges in the energy sector.
[382] Ibid.
[383] ERP (2007), Investigation into high-level skills shortages in the energy sector, London.
[384] UKCES (2015), Sector insights: skills and performance challenges in the energy sector.

Key Facts

Education, skills and businesses:

- **The energy sector contributes 3.3% of UK GDP - £25bn annually.**
- **The energy sector employs 6.2% of the UK's industrial workforce – 169,000 people.**
- **The sector is forecast to grow by 15.5% by 2022.**
- **66,000 energy sector workers are expected to retire by 2022 – 39% of the current workforce.**
- **The UK Commission for Employment and Skills has identified skills shortages across a number of key occupations within the energy sector.**

'The most critical challenge identified for the future energy workforce is the shortage of skills. The majority of employers interviewed perceive that unless urgent action is taken, an already limited pool of talent will continue to diminish.'

UKCES (2015) – Skills and Performance Challenges in the Energy Sector

5.4.6. Noting the importance of a skilled workforce for ensuring energy security, UKCES makes a number of recommendations to Central Government for improving the skills gap within the energy sector:

- Make funding available for schemes to train people in key occupations with major skills shortages.
- Support and fund a collaborative approach, enabling employers to work collectively in addressing sector challenges.
- Enable higher-level occupational standards to be quickly developed that reflect sub-sector needs and plug existing gaps in coverage.
- Encourage collaboration between academia and industry so that qualifications are tailored closely to meet employer needs and reflect context of different sub-sectors.
- Cascade skills and knowledge from members of the workforce on the verge of retirement via internal mentoring.
- Enable cross-fertilisation between sub-sectors to channel the flow of skills, rather than losing people from the energy sector to other industries as a result of peaks and troughs in workforce demand.
- Improve careers information, particularly to enhance sector visibility for young people and potential new entrants from other industries.[385]

[385] Ibid.

5.4.7. Within Kent, the Kent Renewable Energy Action Plan (REAP) notes the importance of having a skilled and educated workforce in delivering a low-carbon energy sector and, more broadly, creating a low-carbon economy.[386] Kent and Medway already has several universities and colleges offering state of the art training facilities. Additional actions contained in the REAP include:

- Developing and delivering a skills strategy for low carbon and environmental goods and services addressing both 14-24 year olds and higher education opportunities.

- Supporting and promoting the development of renewable energy skills locally through the consortium of engineering colleges including SusCon, Swale Skills Centre and East Kent College.

- Raising awareness of the availability of Kent based courses and organisations offering training in renewable energy skills, including courses linked to the transfer of skills.

- Developing a programme of placements and apprenticeships allied to the growth of renewable energy technologies and services, linking businesses and communities with students in Kent.

- Developing an expertise network for renewables that can provide guidance and support for project development and assessment, and access to training for elected members and planning officers.[387]

5.4.8. The Committee heard that organisations such as Thanet Technical College and Swale Skills Centre were doing good work in training the next generation of energy-sector workers.[388] In 2013, Thanet Technical College opened a new £6.5m Centre for Environmental Technologies. The Centre offers leading-edge education and training in environmental technologies, and higher-level apprenticeships in science and technology, with the aim of providing a skilled workforce for the growing, local low-carbon energy sector.[389] The Swale Skills Centre is a unique state-of-the-art Vocational Centre designed to deliver training in engineering and sustainable technologies to people aged 14 - 19. The Centre works closely with employers to ensure the courses meet industry requirements.[390]

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[386] KCC (2013), Renewable Energy Action Plan, Maidstone.
[387] Ibid.
[388] KCC (2015), Energy Security Select Committee, 13 November 2015.
[389] OffshoreWind.biz (2011), *Thanet College Plans to Open New Technology Centre,* [online], available at: http://www.offshorewind.biz/2011/12/27/thanet-college-plans-to-open-new-technology-centre-uk/
[390] Swale Skills Centre (2016), About Swale Skills Centre, [online], available at: http://www.swaleskillscentre.co.uk/about-us/about-swale-skills-centre/

5.4.9. The Committee heard of the benefits of having a skilled local energy sector workforce from Vattenfall – one of the world's leading wind power companies. When Vattenfall first established itself in Kent, due to the lack, locally, of the required skills, the building and repair work on its wind farms was carried out by Danish technicians. However, since then - thanks to the growth in the required skills market in Kent - these jobs are now mainly carried out by Kentish employees. UK nationals now make up 33% of Vattenfall's workforce, and this figure is predicted to rise to 50% by the mid 2020's.[391] This is in an industry (wind power) that currently provides around 10% of the UK's electricity demand, with the potential of supplying 25% in the near future.[392]

5.4.10. The UKCES notes that, whilst a number of energy sector employers are innovating to reduce skills shortages, the majority of this activity is taking place in silos, rather than through a consistent, cross-sector approach.[393] In light of initial successes in Kent around teaching and preparing the next generation of energy sector workers, the Committee wishes to recommend that KCC further investigate the current situation regarding training and courses provided for the energy sector as a whole within Kent, joining up educational institutions and energy businesses so as to ensure that students and apprentices are given the necessary skillsets and expertise required for working in emerging job roles and sub-sectors (e.g. oil, gas, wind, solar, nuclear, etc.) of the energy sector.

Recommendation 12

That KCC works with educational institutions within Kent to ensure that students and apprentices are given the necessary skillsets and expertise required for working across the energy sector.

[391] KCC (2015), Energy Security Select Committee, 26 November 2015.
[392] Ibid.
[393] UKCES (2015), Sector insights: skills and performance challenges in the energy sector.

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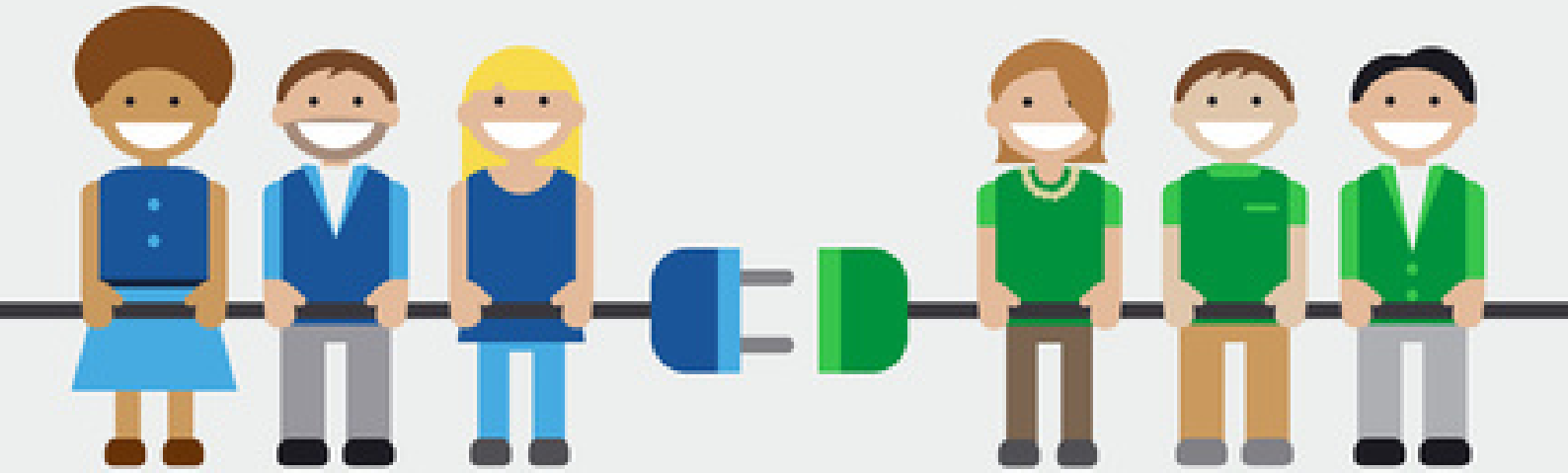

6. Collaboration and Working in Partnership

The UK's energy system is a complex and diverse field. Utility companies, network operators, energy regulators, local authorities and Central Government all have important roles to play in ensuring that our energy system is secure, affordable and sustainable; both now and in the future.

Due to the interconnected nature of our energy systems, many of these actors and agencies will work with one another in one or more respects, making partnership working a crucial aspect of ensuring energy security. In the case of KCC, a number of key strategies that cover energy security are Kent-wide documents: applying to a range of actors within and across Kent beyond KCC.

The Committee has heard evidence on a range of issues around partnership working and how its development and cementation can help ensure energy security for Kent; from local authorities acting as energy suppliers, to strengthened links between local authorities, to local authorities working with utilities companies.

6.1. Collaboration and Partnership Working

6.1.1. Energy security is an innately complex and multi-faceted issue, covering a diverse range of areas such as energy supply, energy generation, energy usage and infrastructure (all of which have further sub-divisions). It therefore involves a range of agents such as local authorities, Central Government departments, community groups, utility companies, academics and myriad businesses and other groups.

6.1.2. To ensure energy security means ensuring that all relevant agencies and organisations work together to strengthen and protect these various aspects of the UK's (and Kent's) energy system.

Partnership Working

6.1.3. It is important to note that the Growth and Infrastructure Framework (GIF), Kent Environment Strategy (KES) and Renewable Energy Action Plan (REAP) are Kent-wide strategies – held in common and acted upon by a range of agencies.

6.1.4. The GIF is held by Medway Council, Kent County Council and all twelve Kent districts, and helps to inform the Kent and Medway Economic Partnership (KMEP) – the partnership responsible for attracting investment in infrastructure for Kent.[394] Investment in energy infrastructure is directly referenced within the GIF. Given the importance of a secure energy infrastructure for ensuring energy security[395] and given that the GIF is a shared framework, continued partnership working will therefore be crucial for delivering a secure energy infrastructure.

6.1.5. The KES can be understood as assessing how the needs identified within the GIF should be delivered. The KES applies to the County of Kent as a whole, not just KCC.[396] Referencing the energy trilemma (see Section 2.1): the GIF aims to ensure that our energy supply is secure and protected for the future, whilst the KES seeks to ensure that this is done in a sustainable manner. The Kent Environment Strategy and its actions are delivered by the Kent Environment Strategy Steering Group (KESSG), which has representation from districts, statutory and third sector agencies (NHS, Environmental Agency, Kent Wildlife Trust and Natural England for example).[397]

[394] KCC (2015), Kent and Medway Growth and Infrastructure Framework, Maidstone.
[395] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[396] KCC (2015), Energy Security Select Committee, 22 October 2015.
[397] KCC (2015), Kent Environment Strategy, Maidstone.

6.1.6. The REAP makes further, more concrete recommendations about the energy sector in Kent, including increasing the uptake of low-carbon and renewable energy generation, supporting the skills, education and job supply for the energy sector, and supporting businesses and communities with energy research and community energy generation schemes.[398] A number of different agents have responsibility for these specific actions within the REAP, including KCC, Kent district councils and the Kent Downs AONB.[399]

6.1.7. Finally, the Kent and Medway Sustainable Energy Partnership (KMSEP) is an action group comprised of Kent County Council, districts and landlords. KMSEP is responsible for the delivery of the Kent Warm Homes initiative (see Section 5.3). One of the most crucial pillars of energy security – energy demand reduction – is therefore delivered within Kent by a partnership of organisations.

6.1.8. Given the multi-agency nature of all Kent policies that cover issues of energy security, and given that the energy sector and system itself is run by a diverse range of actors, the Committee wishes to note the importance of continued partnership working between local authorities, other agencies, businesses, community groups and the education and training sector in ensuring a comprehensive approach on energy security.

Recommendation 13

That KCC continues to strengthen its ability to work in partnership with local authorities, relevant agencies, businesses, community groups and the education and training sector to make sure that a comprehensive approach is taken in ensuring energy security for Kent.

[398] KCC (2013), Renewable Energy Action Plan, Maidstone.
[399] Ibid.

Council Energy Provision

6.1.9. Issues of energy security surrounding energy poverty and local energy generation have previously been highlighted within this report (see Section 4.2). Another potential way for councils to address these issues is through establishing themselves as energy providers.

6.1.10. DECC notes that, as of September 2015, just over half (56%) of the public trust energy suppliers to give customers a fair deal.[400] However, this suggests that there are a potentially significant number of people who, at present, do not feel that this is the case. Combined with a desire to alleviate fuel poverty, this presents an opportunity for councils to establish themselves as energy providers to the public, either directly, or by working in partnership with an energy supplier.

6.1.11. Throughout the evidence gathering process, the Committee heard of local authorities who had either partnered with energy suppliers, or who had chosen to generate/purchase and sell their own energy to local inhabitants.[401] [402] [403] [404]

6.1.12. Nottingham City Council has become the first Council in the UK to establish a local authority owned energy supply company – Robin Hood Energy. The aim is to provide customers with consistently low and clear energy prices, so as to tackle fuel poverty. Robin Hood Energy has no penalty fees for customers wishing to leave their energy tariff early. The company is wholly owned by Nottingham City Council as a not-for-profit company and has no shareholders.[405]

6.1.13. Southend-on-Sea Borough Council has established an energy supply company – Southend Energy – by partnering with OVO Energy. The Council manages the partnership, sets the energy tariffs, and generates customers using its local community outreach mechanisms. OVO Energy manages the operational aspects of the scheme through its energy licence and provides customer service, billing, debt management and energy supply.[406]

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[400] DECC (2015), Public Attitudes Tracker – Wave 15, London.
[401] KCC (2015), Energy Security Select Committee, 17 November 2015.
[402] KCC (2015), Energy Security Select Committee, 26 November 2015.
[403] KCC (2015), Energy Security Select Committee, 26 November 2015.
[404] KCC (2015), Energy Security Select Committee, 15 December 2015.
[405] RobinHoodenergy (2016), *About us,* [online], available at: https://www.robinhoodenergy.co.uk/about-us
[406] LGC (2015), *Our energy is under public control for the first time in a generation,* [online], available at: http://www.lgcplus.com/home/our-energy-is-under-public-control-for-the-first-time-in-a-generation/5086945.article

6.1.14. Southend's own research showed that only 1 in 10 customers shop around for the best energy prices, with 9 out of 10 being overcharged for their energy, at a national cost to consumers of £1bn a year. During focus groups, consumers (particularly the elderly) expressed fears of encountering additional problems if they switched supplier.[407] Interest in Southend's energy company was high amongst local residents, as the Council was well thought of and trusted to 'do what was right' for local residents.[408]

6.1.15. Within 6 months of launching Southend Energy, the scheme had 2,000 customers (3% of total market share in the district)[409]. Collectively, these customers are saving £375,000 a year (an average of £250 per customer) on their energy bills since switching to Southend Energy,[410] with 8 out of 10 customers saving money on their previous energy bills through switching.[411] These savings are similar to those made by customers of Fairerpower – Cheshire East's own energy supply partnership with OVO Energy – who have made average actual savings of £243 a year on their energy bills.[412]

6.1.16. As well as alleviating fuel poverty and ensuring that consumers get a fair deal, councils that establish themselves as energy suppliers are able to send market signals as to the type of energy that they wish to purchase. For example, suppliers such as OVO Energy purchase energy certificates from energy generators. These certificates are a way of monitoring what sources an energy supplier uses for its electricity (e.g. coal, oil, gas, renewables, etc.). OVO Energy are committed to purchasing a specified number of renewable energy certificates – thus helping to encourage further investment in the renewable and low-carbon energy market.[413]

6.1.17. In light of the various potential benefits of councils acting as energy suppliers – either directly or in partnership with an energy supplier – the Committee wish to recommend that KCC investigate the feasibility of establishing itself as an energy supplier to the local community.

Recommendation 14

That LASER and Sustainable Business and Communities investigate the feasibility of KCC establishing itself as an energy supplier to the local community.

[407] KCC (2015), Energy Security Select Committee, 15 December 2015.
[408] Ibid.
[409] Ibid.
[410] KCC (2015), Energy Security Select Committee, Written Evidence, 5 December 2015.
[411] KCC (2015), Energy Security Select Committee, 15 December 2015.
[412] KCC (2015), Energy Security Select Committee, Written Evidence, 17 November 2015.
[413] KCC (2015), Energy Security Select Committee, 17 November 2015.

Working with Energy Utilities and Distributors

6.1.18. Section 2 of this report addresses the need to ensure that the evidence base for energy security within Kent is expanded and updated to ensure risks to our energy system, supply and environment are mitigated. A key aspect of this will involve monitoring energy generation and transmission systems – the plant (e.g. power stations) and owners of plant that generate and supply our electricity, and the infrastructure (e.g. power pylons) that carries and supplies our energy.

6.1.19. UKPN is the electricity distribution company covering Kent that holds the responsibility for investing in and maintaining energy infrastructure within the County (see Section 2.4). There are a range of energy generation companies owning and operating varied energy plant within Kent, from windfarms to a nuclear power station.

6.1.20. As has already been noted, the Government rates the overall resilience of the UK's energy systems as strong (see Section 2.3). It is worth noting that, since the 1970s, all problems with the UK's energy systems have been concerning the transmission and distribution networks.[414] These problems have occurred primarily as a result of adverse weather (e.g. tress falling on power lines) and industrial action (e.g. strikes and fuel blockades).[415] The UK does not generally experience security of supply problems when it comes to ensuring there is enough energy/fuel.[416]

6.1.21. Kent's energy infrastructure requires significant investment and updating to ensure it continues to meet the needs of a growing population (see Section 2.4). In addition, inclement weather affecting the transmission system may become more pronounced depending on climate change.[417]

6.1.22. The Kent GIF notes that the current forecasting models used by electricity utility companies make it difficult to provide accurate estimates on investment needed, as electricity companies plan for the short to medium term only. UKPN's current Long Term Development Statement for the South East considers electricity requirements up to 2023, for instance.[418] By contrast, under water resource planning guidelines, water utilities are required to produce a plan detailing how they intend to balance supply and demand for water over a 25 year period.[419] The Committee believe that similar plans should be held by energy utilities, so as to ensure a long-term view on energy security is developed and implemented.

[414] KCC (2015), Energy Security Select Committee, Written Evidence, 27 November 2015.
[415] Ibid.
[416] Ibid.
[417] Ibid.
[418] KCC (2015), Kent and Medway Growth and Infrastructure Framework, Maidstone.
[419] EA, OFWAT, DEFRA, et al. (2012), Water resources planning guideline.

Recommendation 5

That the Cabinet Member for Environment and Transport write to the Secretary of State for Energy and Climate Change, highlighting the need for energy utilities to produce and implement 25 year management plans, akin to those held by water utilities.

6.1.23. The GIF notes the importance of local authorities working with the utilities sector to seek improved medium to long term planning that is aligned with the County's growth plans.[420] The Committee heard that Distribution Network Operators such as UKPN (as well as energy utility companies such as EDF and Npower) are at the forefront of ensuring energy security.[421] It is therefore crucial that KCC work with them and other relevant energy providers and generators to find out what the key risks to the energy system within Kent are, and how KCC can assist in mitigating them.[422] [423]

'A key role for the public sector will be to hold utilities companies to account to make the necessary capital investment [in energy infrastructure].'

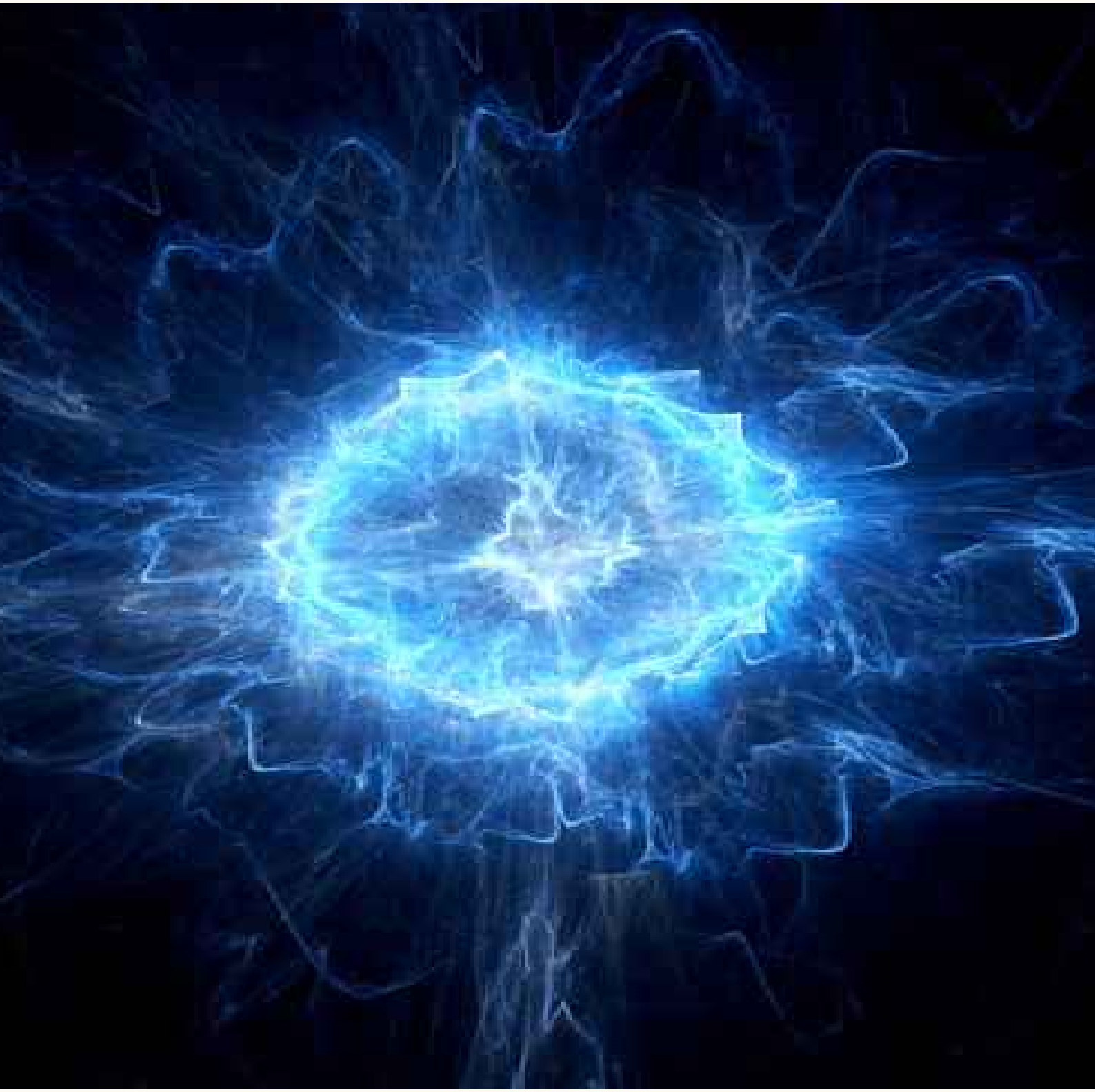
KCC (2015) – Kent and Medway GIF

6.1.24. In light of the need to ensure that Kent's energy infrastructure is secure, resilient to shocks, and capable of meeting forecasted population growth, the Committee recommends that KCC engage UKPN and relevant energy generation companies to better understand the risks to Kent's energy systems, and how these can be addressed.

Recommendation 15

That KCC works in partnership with UKPN and relevant energy generation companies within Kent to better understand the risks to Kent's energy systems and how these can be mitigated.

[420] Ibid.
[421] KCC (2015), Energy Security Select Committee, 4 December 2015.
[422] Ibid.
[423] KCC (2015), Energy Security Select Committee, 26 November 2015.



7. Conclusion

Energy is crucial to our quality of life: we use energy to generate electricity and heat our homes, public places and businesses. Energy security, therefore, underpins almost every aspect of our day to day lives.

In this report we have pointed out that energy security is very much a national issue, but that local communities and authorities can help address this national picture by generating their own low-carbon, sustainable energy.

These considerations are reflected in our recommendations. At national level, we believe that long term policies are needed to promote a stable climate for investment in infrastructure and technology, and to stimulate the development of further energy generation projects. We believe that policies that aim to reduce the demand for energy are crucial for increasing energy security; stronger building standards that promote energy efficiency and generation should therefore be reintroduced.

At a local level, we feel that it is necessary to develop a communications strategy that will encourage greater local awareness around energy issues, such as more efficient usage of energy and, as mentioned earlier, more sustainable energy generation amongst local communities. We also believe that creating an investment fund to develop local, low-carbon energy generation, and strengthening KCC's ability to work in partnership with other organisations, community groups and the education sector, we can help secure clean, sustainable and affordable energy.

We cannot afford to take our energy mix and supply for granted; we all need to work together to make sure that we keep the lights on.

The Energy Security Select Committee

Appendix 1

Evidence

Oral Evidence

A summary of the key topics discussed between witnesses and Members has been provided underneath each session.

Friday 13 November 2015

- **Carolyn McKenzie, Neil Hilkene, Steve Baggs,** Growth, Environment and Transport Directorate, KCC

    - Overview of the growth and energy needs of Kent
    - Overview of KCC and Kent-wide policy on energy security
    - Outline discussion on the key concerns of energy security
    - Building standards and energy efficiency and generation measures

Tuesday 17 November 2015

- **Robert Jeffery and Cian Fitzgerald**, OVO Energy

    - OVO's background and energy mix
    - Local government partnerships with OVO Energy
    - Energy advice and energy supplier switching schemes

- **Chris Jelly**, Elham Going Green

    - The origins of Elham Going Green
    - Energy events & measures provided by Elham Going Green
    - Uptake of energy measures within the village
    - Recommendations for KCC

Thursday 26 November 2015

- **Mary Thorogood and Mel Rogers**, Vattenfall

    - Vattenfall's background and energy mix
    - The benefits and potential levels of wind power in the UK's energy mix
    - Vattenfall and the local energy economy & workforce

- **Phillip Jackson**, Daedalus Environmental/E3

    - The role of Daedalus Environmental Ltd. and E3
    - Energy efficiency and building regulations
    - Problems with the ECO scheme
    - The importance of energy efficiency in ensuring energy security

- **Nick Swinford**, University of Kent

    - Energy efficiency and generation measures undertaken by the University of Kent

Friday 4 December 2015

- **Prof. Gordon MacKerron and Emily Cox**, Sussex Energy Group/University of Sussex

    - The future of Dungeness B nuclear power plant
    - The state of the nuclear industry in the UK
    - Overall energy security of the UK
    - How KCC can further promote energy security

- **Dr Wim Melis**, University of Greenwich

    - Energy storage technology
    - Different forms of emerging energy technologies
    - Key issues affecting the UK's energy security
    - Future predictions around energy developments

- **Stephanie Karpetas**, Sustainability Connections

    - The role of Community Energy South and Sustainability Connections
    - Community energy generation schemes
    - Community energy switching and energy saving schemes
    - The role of renewable energy in community schemes and the Kent economy

Tuesday 15 December 2015

- **Jeremy Martin**, Southend-on-Sea Borough Council

    - SBC's background and energy policy
    - Reasons for the creation of the energy supplier partnership with OVO Energy
    - Benefits of Southend Energy

- **Matthew Morris**, Kent Downs AONB

    - Kent Downs AONB's background in wood fuel management and promotion
    - Potential wood fuel yields within Kent
    - Biomass boilers for schools and other 'off grid' buildings

- **Joseph Grice**, London Borough of Islington

    - Reasons for Islington LB creating a heat distribution network
    - How the heat distribution network functions
    - Benefits of the heat distribution network
    - Future plans for the heat distribution network

Wednesday 16 December 2015

- **Andy Morgan**, LASER

    - Overview of the UK's energy imports and energy market
    - The role and origins of LASER

- **Carolyn McKenzie, Neil Hilkene, Steve Baggs,** Growth, Environment and Transport Directorate, KCC

    - Recap and summary of key issues throughout the review

Written Evidence

- **James Diggle**, External Communications Manager, EDF Energy

- **Chris Jelly**, Elham Going Green

- **Professor Gordon MacKerron and Miss Emily Cox,** Sussex Energy Group/University of Sussex

- **Dr Wim Melis**, University of Greenwich

Visits

Wednesday, 4 November 2015

- Islington LB District Heat Network

Monday, 30 November 2015

- St Nicholas-at-Wade Farm, St Nicholas-at-Wade

Tuesday 8 December 2015

- Sustainable Sheppey, Isle of Sheppey

Monday, 14 December 2015

- Dungeness B Nuclear Power Station, Dungeness

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Appendix 2

Glossary of Terms and Abbreviations

AD Anaerobic Digestion

Biomass Plant material and animal waste that can be used as fuel

Biofuels Synthetic fuels made from biomass commonly bio-ethanol and bio-diesel

CERT Carbon Emissions Reduction Target Funding

CHP Combined Heat and Power

CO2 Carbon Dioxide

DECC Department of Energy and Climate Change

DH District Heating

DHN District heating network

DNO Distribution Network Operator

ECO Energy Company Obligation

ESCO Energy Services Company

EU European Union

FIT Feed-in Tariff

Fossil Fuel Ancient biomass (e.g. petroleum, coal, natural gas) – non-renewable fuel

GHG Greenhouse gases – gases (including carbon dioxide) emitted through the burning of fossil fuels

Gigawatt (GW) Unit of power equivalent to 1 billion watts or 1,000 megawatts

Gigawatt hour (GWh) Unit of energy equivalent to 1 hour of electricity consumed at a rate of 1 GW

GVA Gross Value Added

HNDU Heat Networks Delivery Unit – Established by DECC to assist local authorities in setting up district heating networks

Kilowatt (kW) Unit of power equivalent to 1,000 watts

kWh Unit of energy equivalent to 1kW of power expended for one hour of time

LASER A company established by KCC responsible for energy procurement and energy management.

LED Light Emitting Diode

Megawatt (MW) Unit of power equal to 1,000,000 watts or 1,000 kilowatts

Ofgem The Office for Gas and Electricity Markets

OVESCO Ouse Valley Energy Services Company

PV Photovoltaic (e.g. solar panels)

RCEF Rural Community Energy Fund

REAP: Renewable Energy Action Plan

Retrofitting Installing or adding features/measures to a building which has already been constructed

RHI Renewable Heat Incentive

RO Renewables Obligation - the main support scheme for UK renewable electricity projects, whereby UK electricity suppliers must source an increasing proportion of electricity from renewable sources

SME Small and Medium Sized Enterprises are businesses which employ fewer than 250 people; with an annual turnover of up to 50 million euro, and/or an annual balance sheet of up to 43 million euro

Transmission (electricity) Transfer of very high voltage electrical energy from generating plants to local substations. In the UK this is mostly via overhead cables supported by towers (usually referred to as pylons) or insulated cables buried underground. National Grid is the main transmission company in the UK

UCEF Urban Community Energy Fund

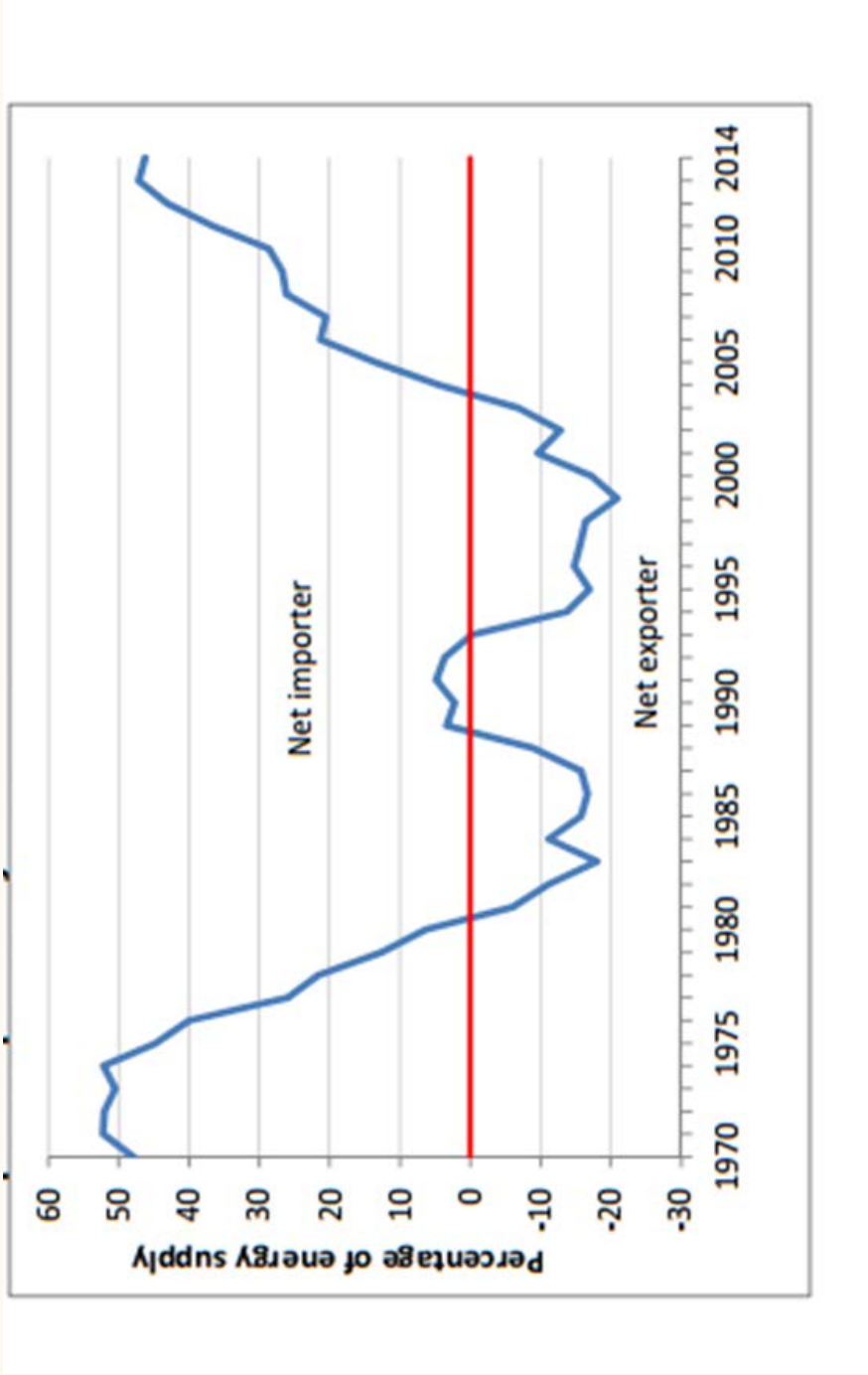
UKPN UK Power Networks – the Distribution Network Operator covering Kent and Essex.

ZCB Zero Carbon Buildings policy

Appendix 3

Pictures, Tables and Charts

Figure 3: UK Import Dependency, 1970-2014



Source: DECC (2015) DUKES, Statistical Press Release

Figure 4: UK Total Primary Energy Consumption by Fuel, 1970 – 2014

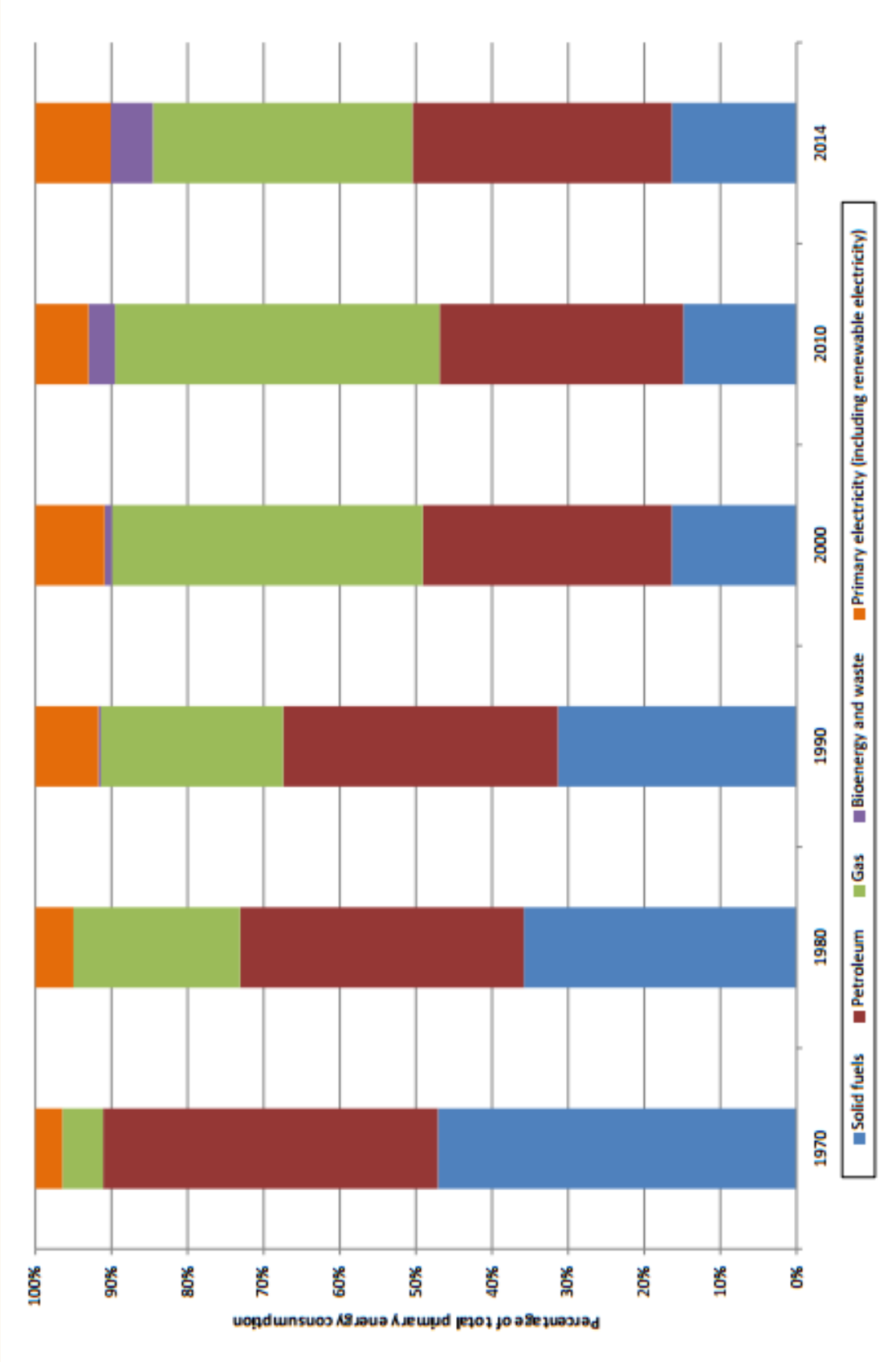
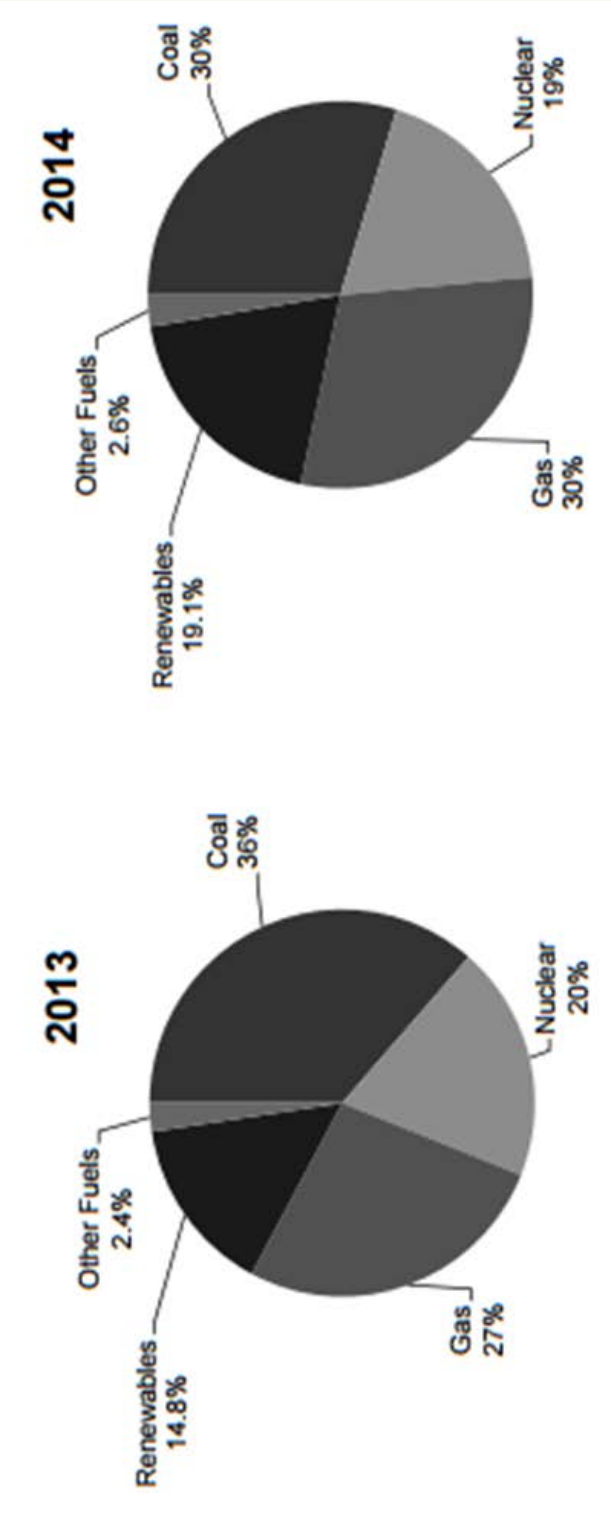
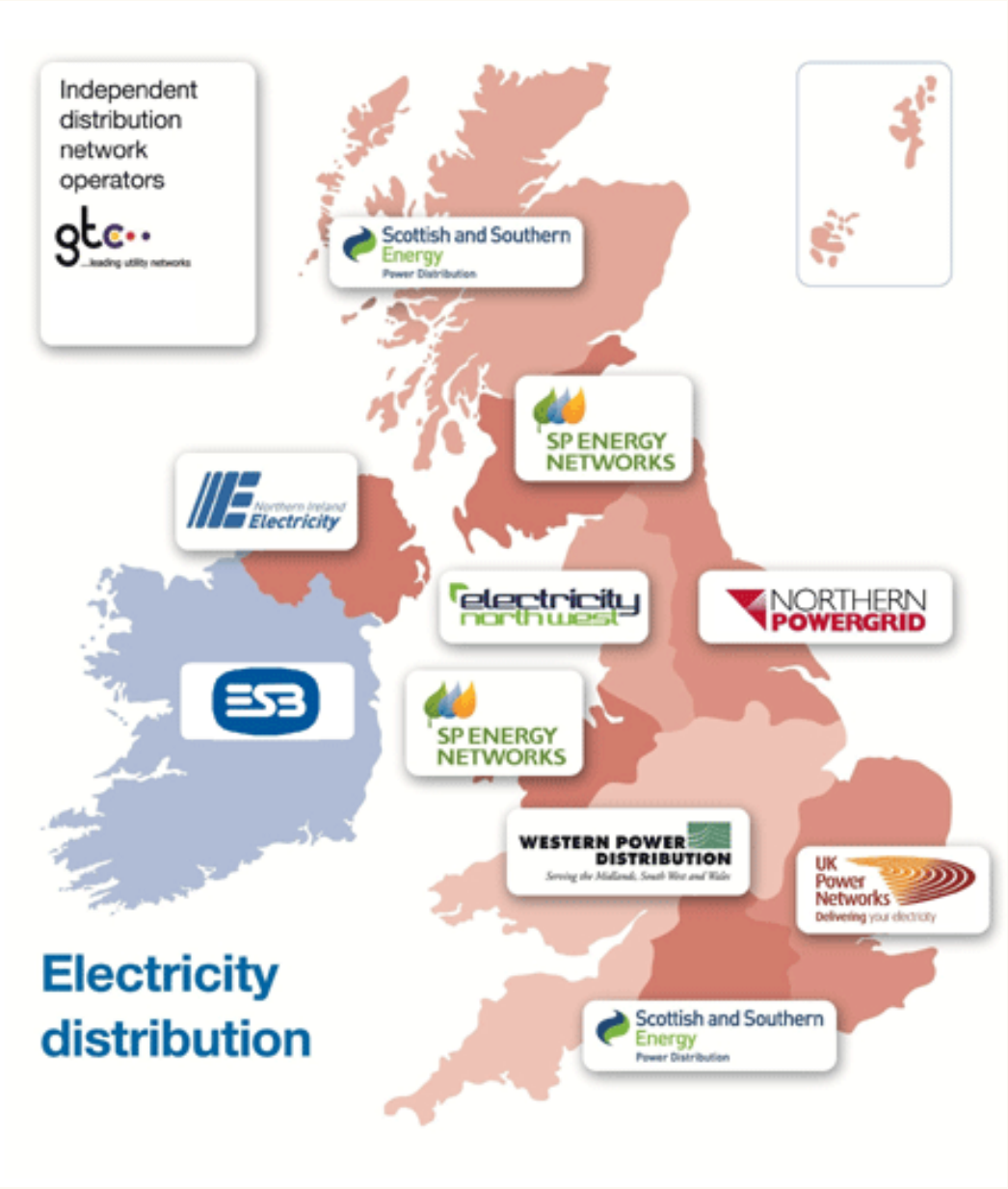


Figure 6: Shares of Electricity Generation by Fuel, UK, 2013-2014



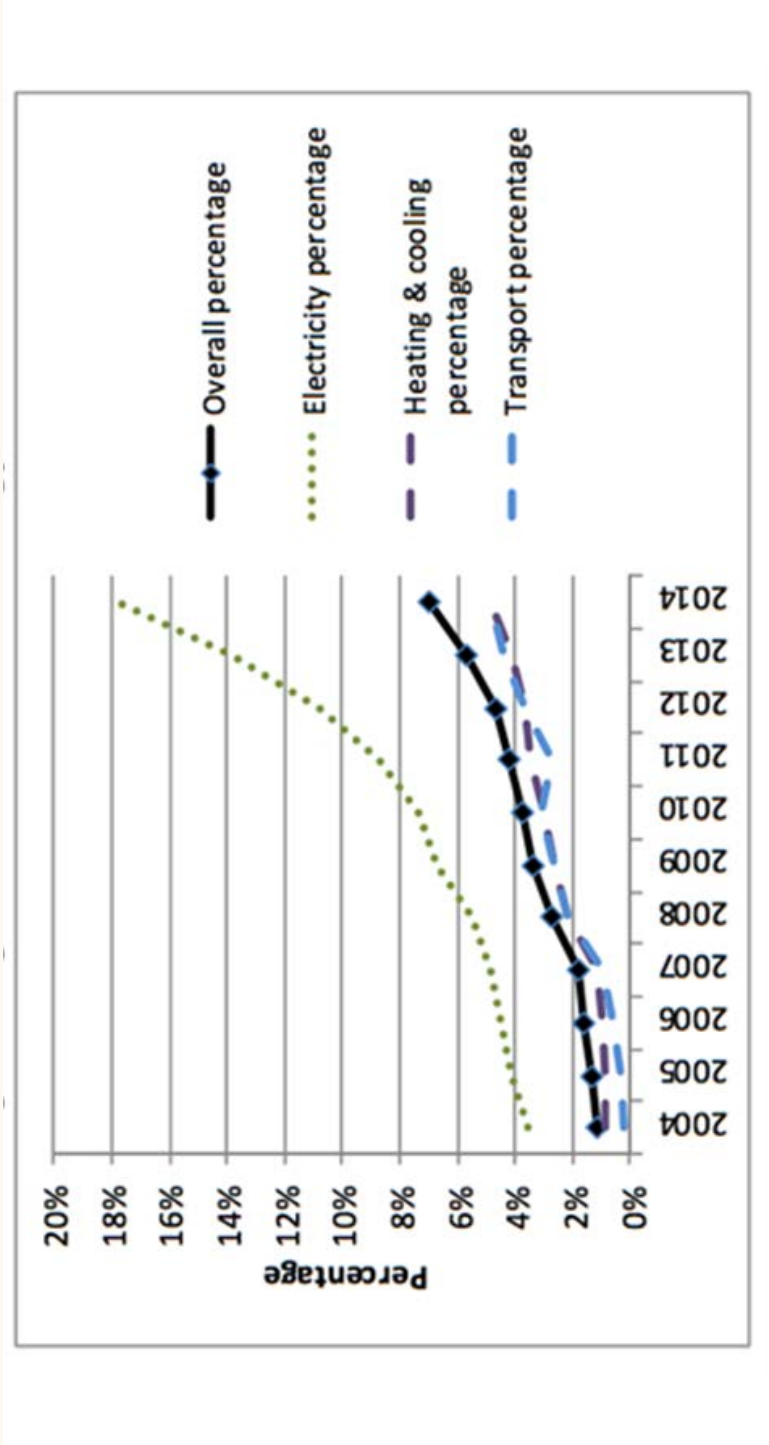
Source: DECC (2015), DUKES, London

Figure 7: UK Distribution Network Operators



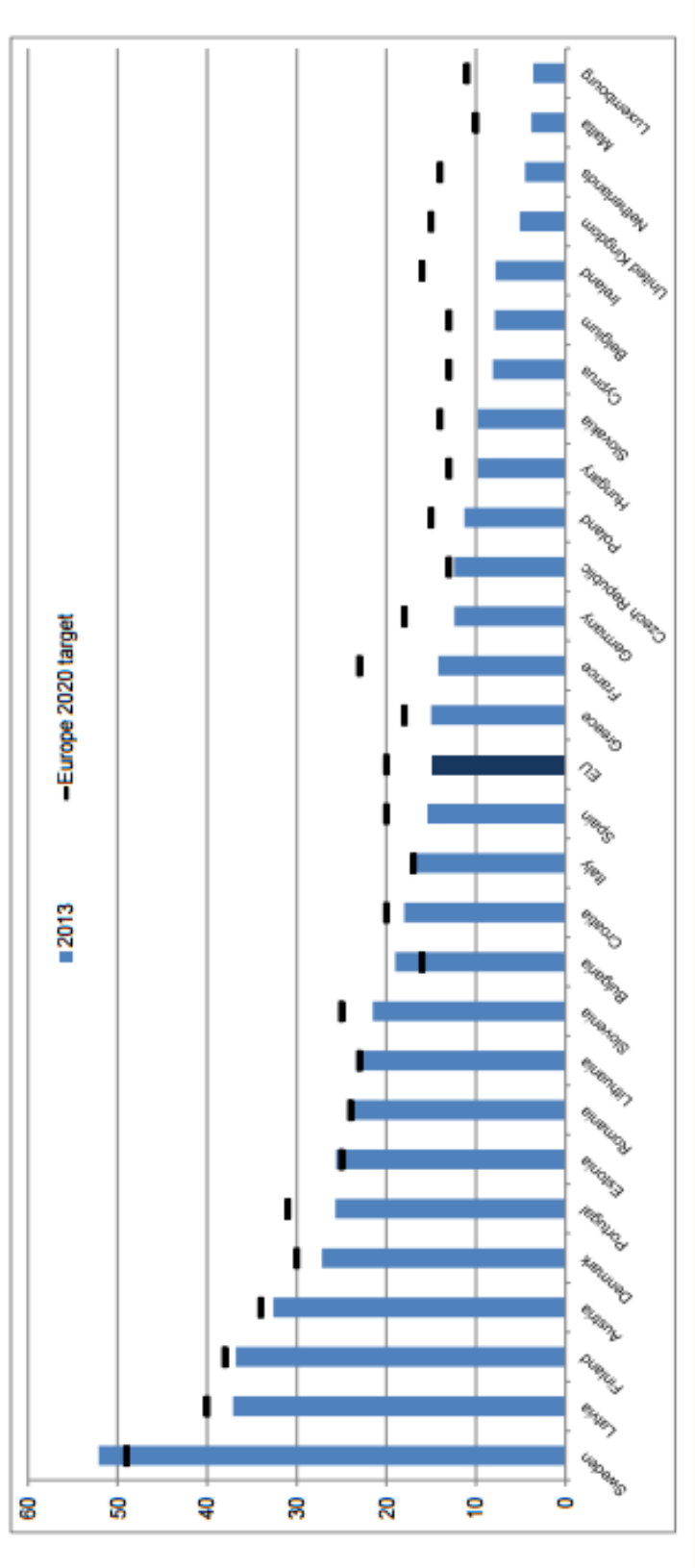
Source: nationalgrid.com, Distribution Network Operator (DNO) Companies

Figure 8: Progress Against Renewable Energy Directive, UK, 2004-2014



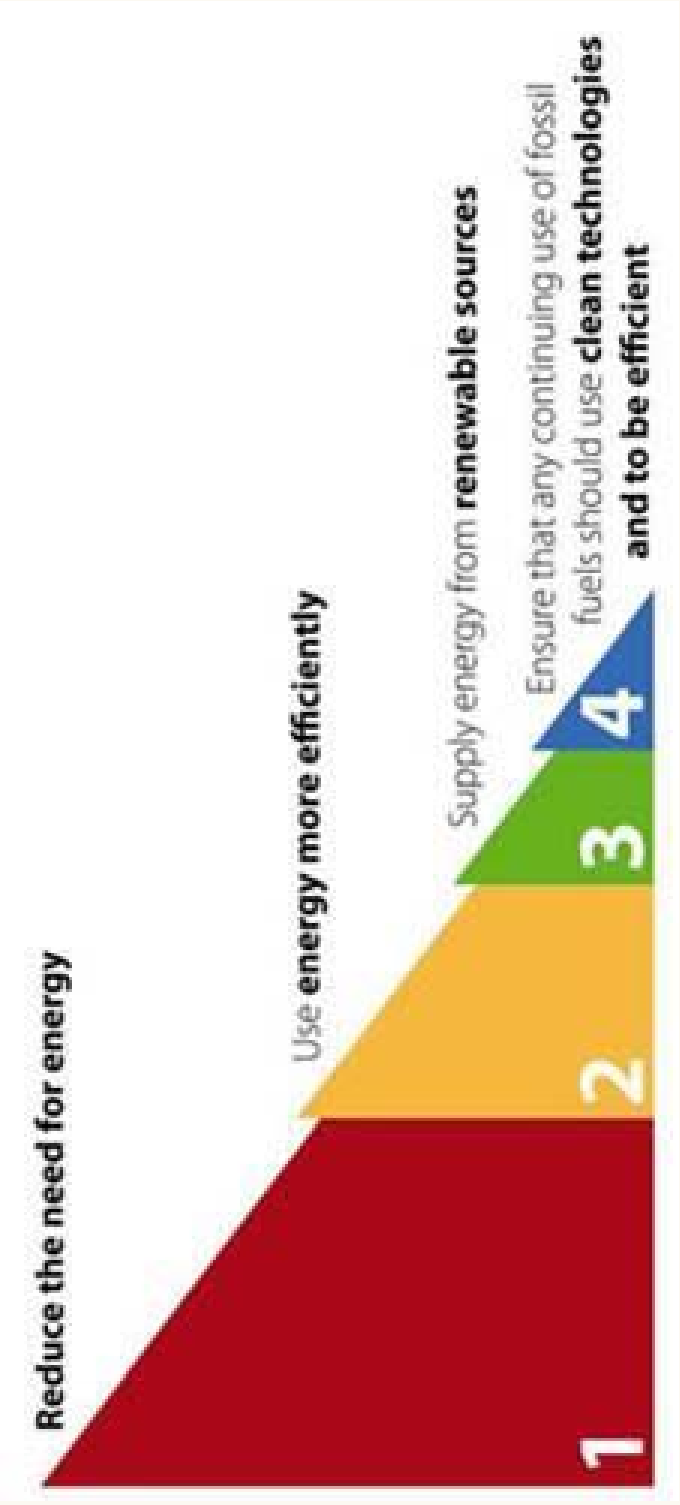
Source: Share of UK energy for heat, transport and power supplied by renewables, DECC.

Figure 9: Share of energy from renewable sources in the EU Member States, 2013



Source: Eurostat (2015), Renewable Energy in the EU, news release.

Figure 11: The Energy Hierarchy



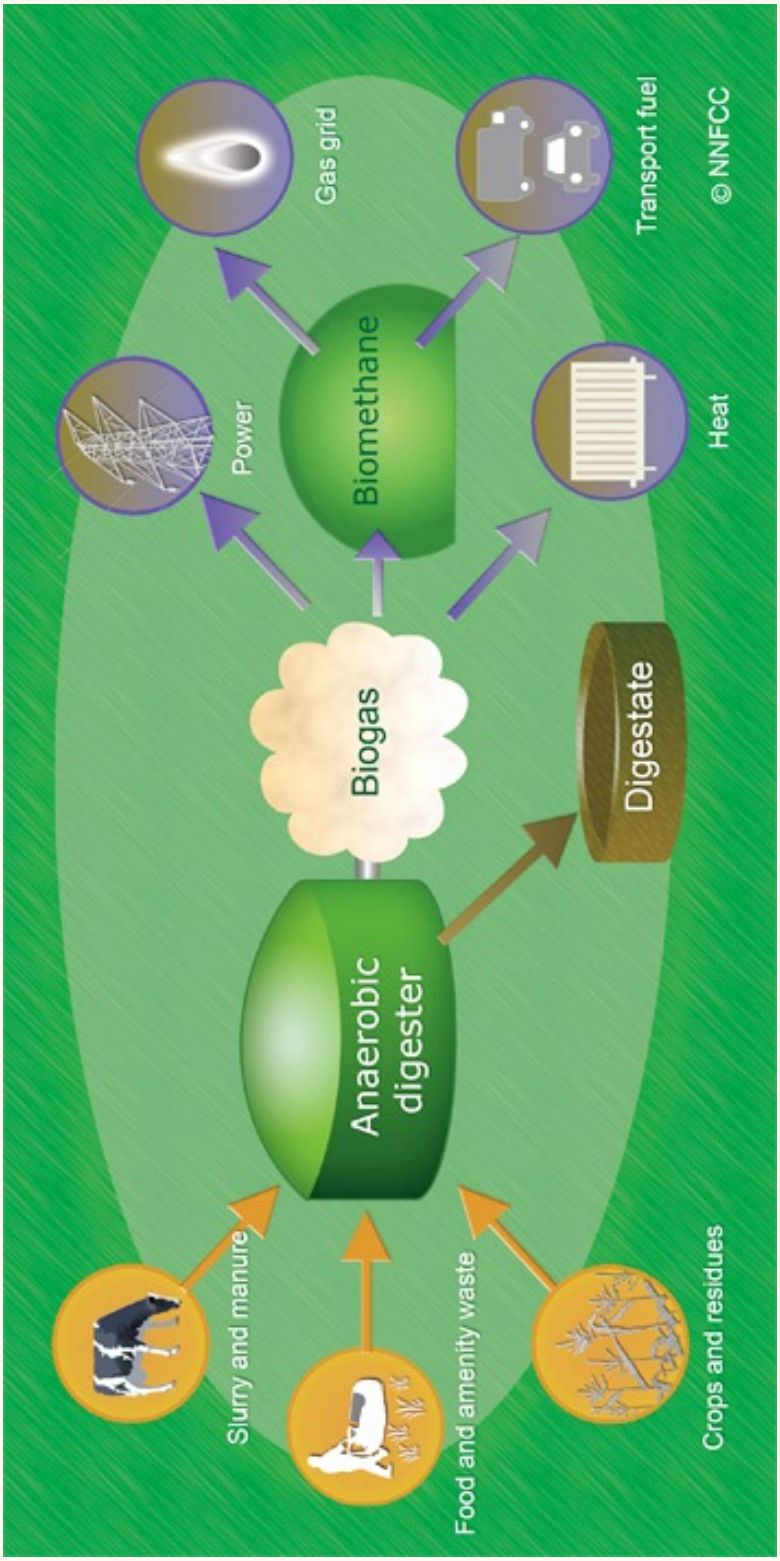
Source: KCC (2013), Kent Renewable Energy Action Plan, Maidstone.

Figure 12: Total generating capacity for small scale renewable energy devices as recorded through FiTs, Kent, 2015

Renewable energy type	Estimated generation per annum (MWh)
Hydroelectric	12.30
Micro combined heat and power (CHP)	22.34
Solar photovoltaics	43,900.43
Wind	503.80
Total	**44,438.86**

Source: KCC (2015), Kent State of the Environment 2015, Maidstone.

Figure 13: The process and outputs of anaerobic digestion



Source: Hallmark Power (2016), Anaerobic Digesters [online].

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Acknowledgements

We would like to thank all the professionals, academics, colleagues from other local authorities and KCC officers who have taken part in this review. We are indebted to the hosts of our site visits for their hospitality and support. Energy is central to our quality of life; we hope that this report will help ensure that national and local energy security is maintained in the context of the challenges that we face today and in the future.

The Energy Security Select Committee

March 2016

Written and produced by:

David Price – Kent Graduate Programme, Kent County Council

Gaetano Romagnuolo - Strategic and Corporate Services, Kent County Council

Sessions House
County Hall
Maidstone
Kent County Council
ME14 1XQ

Tel: 03000 416624
Website: www.kent.gov.uk


Kent
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