Ricardo
Energy & Environment

SWLEP Local Energy Strategy

Swindon and Wiltshire's Energy Future: Setting the Agenda

Report for Swindon & Wiltshire LEP

ED11276 | Issue Number 2 | Date 27/11/2018

Customer:

Swindon & Wiltshire LEP

Customer reference:

Quote URN ref CO0281

Contact:

Raphael Sibille
Ricardo Energy & Environment
21 Prince Street, Bristol BS1 4PH
United Kingdom

t: +44 (0) 1235 75 3296
e: raphael.sibillle@ricardo.com

Ricardo-AEA Ltd is certificated to ISO9001 and ISO14001

Author:

Raphael Sibille

Approved By:

Paul Maryan

Date:

27 November 2018

Ricardo Energy & Environment reference:

Ref: ED11276 Issue Number 2

Summary report

This energy strategy marks the beginning of a deeper engagement in the energy sector by the Swindon & Wiltshire Local Enterprise Partnership (SWLEP). It aims to overcome energy-related constraints to economic development and builds on the area's strengths to grow the low carbon economy.

The transition to a low carbon economy presents a huge opportunity. By actively engaging with it the SWLEP can improve productivity and boost exports, create higher value jobs and deliver new infrastructure. The energy strategy provides an overarching framework for delivering local energy priorities and sets a road map towards achieving them. The following objectives have shaped the preparation of the energy strategy:

- Taking steps to grow the low carbon economy and upgrading energy infrastructure in order to enable growth.
- Delivering the existing local priorities identified in SWLEP's Strategic Economic Plan to 2026 as well as those of Swindon Borough Council and Wiltshire Council.
- Aligning with the direction and intent of national policy, reflecting the Clean Growth Strategy and the clean growth elements of the Industrial Strategy.
- Making a contribution towards our national climate change commitments, ensuring Swindon & Wiltshire help meet the carbon budget.

Ricardo Energy & Environment with BVG Associates was commissioned by Swindon & Wiltshire LEP to produce the local energy strategy. Ricardo Energy & Environment is a leading environmental consultancy. BVG Associates is an independent renewable energy consultancy based in Swindon.

The LEP's role in delivering clean growth

The energy system is transforming and is becoming cleaner, more resilient and flexible. This transition is being accompanied by an intense burst of innovation and creativity. New technology, new business models and new ways of approaching old problems are creating huge opportunities for investment, growth and renewal. Decentralisation is a growing feature of the UK energy system as opportunities arise for consumers, communities and local areas to get involved in generating their own energy, in storage and supply.

The energy sector is fast moving. These technological developments are being enabled by a rapidly evolving policy and regulatory framework that is creating new drivers and opportunities to improve the performance of existing infrastructure and to make energy more affordable. Energy is closely aligned with SWLEP's Strategic Economic Plan and the Government's flagship Industrial Strategy, with the focus not only on clean energy but also autonomous vehicles, AI and big data, all of which have links to clean tech innovation.

The energy strategy is an important chance for Swindon and Wiltshire to take advantage of these new and emerging trends and to increase innovation in the local economy.

Local energy evidence

The local energy evidence base establishes a baseline for the energy strategy. It covers key aspects of power, heat and transport sectors, local infrastructure and the state of the low carbon economy.

The local energy evidence base has helped identify Swindon & Wiltshire's distinctive strengths and the opportunities as well as its challenges and constraints. The local context must of course be understood within the broader changes to the energy system underway nationally as well as global technological and political developments.

The big energy sector trends that the strategy needs to take into account include:

The continuing transformation of the electricity system

- Innovation & new products are reducing energy consumption.
- A continuing shift towards low & zero carbon electricity. Coal generation is heading towards zero.
- A move towards active management of power networks is making them more efficient & resilient.
- Decentralised generation, demand side response and energy storage are increasingly important providers of grid security & flexibility.

A low carbon transport revolution is beginning

- Pure electric vehicles are increasingly competitive on a whole life cost basis. Falling battery prices will soon make up-front costs comparable, driving uptake.
- An increasing range of EVs from the major marques and new producers mean they will become the mainstream choice for new vehicles in the 2020s.

Grasping the clean growth economic opportunity

- The low carbon economy is already a significant and growing part of the UK economy.
- Low carbon energy technology is expected to become a £1trillion a year global export opportunity.
- Hydrogen sector is already working together in order to realise the benefits of transformative products and processes by energy consumers.

Taking on the decarbonisation challenges

- Ensuring the energy supply is reliable, affordable and accessible.
- Decarbonising heating & identifying a viable route towards the widespread use of green gas and/or electrification.
- Delivering infrastructure & development that is consistent with the long term emissions trajectory.

SWLEP's strategic energy priorities

SWLEP is committing to concerted and sustained action to grow the local low carbon economy. Its priorities have been established through analysis of the evidence collected and through stakeholder consultation. They combine distinctive interventions that respond to the characteristics of the local economy, like hydrogen technology, with a recognition that SWLEP should also support clean growth across all sectors, contributing to a diverse, productive and clean local economy over the long term. It also recognises that there many opportunities to take advantage of new and cleaner energy technology that will be common to LEPs across the country where shared efforts can deliver infrastructure that secures the benefits of new energy technology.
SWLEP's strategic energy priorities are:

Smart grids and mitigating constraints

The lack of affordable access to electricity network capacity is a constraint to new development in Swindon and Wiltshire. Without access to grid capacity growing businesses might decide to expand elsewhere and new employment sites fail to come forward. Accelerating the development of a clean, flexible and resilient power system unlocks economic growth. Investing in strategic energy infrastructure will make Swindon & Wiltshire a more attractive place to establish and grow a business. This strategic priority can help enable a wide range of energy activities and aligns strongly with the SWLEP priorities and remit.

Hydrogen technology innovation and deployment

Swindon and Wiltshire can be a nationally significant leader in hydrogen technology. SWLEP will grow the existing cluster of hydrogen technology businesses, it will work with neighbouring LEPs and local authorities to increase hydrogen innovation and will support trials that deploy hydrogen to enable new commercial applications. SWLEP will support hydrogen fuel cell passenger cars as part of its comprehensive approach to new energy vehicles.

The transition to new energy vehicles

A low carbon transport revolution is underway and new energy vehicles –battery electric and hydrogen fuel cell vehicles - are becoming increasingly commonplace. A comprehensive network of charging infrastructure and fuelling stations will accelerate the transition and will make sure that new energy vehicles are a viable option in both urban and rural areas. SWLEP will also help add new energy vehicles into the public sector fleet and in public transport, starting where whole life benefits are greatest.

Low carbon growth

The aim of SWLEP is to stimulate local growth and increase productivity. Looking ahead, the low carbon economy will be increasingly integral to that. SWLEP will support clean growth in the business community and it will help Swindon and Wiltshire deliver a sustainable physical growth pattern, consistent with the long term decarbonisation pathway. This will include embedding low carbon growth in SWLEP's decision making and supporting low carbon construction and development.

A summary of the SWLEP energy strategy actions is presented in Appendix A.

Contents

Introduction

This energy strategy marks the beginning of a deeper engagement in the energy sector by the Swindon & Wiltshire Local Enterprise Partnership (SWLEP). It aims to overcome energy-related constraints to economic development and builds on the area's strengths to grow the low carbon economy.

The transition to a low carbon economy presents a huge opportunity. By actively engaging with it the SWLEP can improve productivity and boost exports, create higher value jobs and deliver new infrastructure. The energy strategy provides an overarching framework for delivering local energy priorities and sets a road map towards achieving them.

Ricardo Energy & Environment with BVG Associates was commissioned by Swindon & Wiltshire LEP to produce the local energy strategy. Ricardo Energy & Environment is a leading environmental consultancy. BVG Associates is an independent renewable energy consultancy based in Swindon.

The study has been undertaken by:

1. Gathering a local energy evidence base covering power, heat and transport
2. Consultation with local stakeholders and interviews with energy sector experts
3. Setting local energy priorities and goals based on local strengths, the energy opportunities and challenges
4. A delivery plan and actions as basis for implementing the strategy

The preparation of the energy strategy is supported by the Department for Business, Energy & Industrial Strategy's (BEIS) Local Energy Programme. Their goal is to increase local investment in the energy sector. Using the network of LEPs in England is central to this ambition. In support of LEPs BEIS intendeds to influence public sector funding streams and are providing tools to enhance capability. A South West Regional Energy Hub has been established in Bristol to provide funding and support across the South West, and governed by participating LEPs. It will be tasked with supporting LEPs to implement their strategies.

1 The LEP's role in delivering clean growth

The energy system is transforming and is becoming cleaner, more resilient and flexible. This transition is being accompanied by an intense burst of innovation and creativity. New technology, new business models and new ways of approaching old problems are creating huge opportunities for investment, growth and renewal. Decentralisation is a growing feature of the UK energy system as opportunities arise for consumers, communities and local areas to get involved in generating their own energy, in storage and supply.

The energy sector is fast moving. These technological developments are being enabled by a rapidly evolving policy and regulatory framework that is creating new drivers and opportunities to improve the performance of existing infrastructure and to make energy more affordable. Energy is closely aligned with SWLEP's Strategic Economic Plan and the Government's flagship Industrial Strategy, with the focus not only on clean energy but also autonomous vehicles, AI and big data, all of which have links to clean tech innovation.

The energy strategy is an important chance for Swindon and Wiltshire to take advantage of these new and emerging trends and to increase innovation in the local economy.

1.1 LEPs and local energy

Local Enterprise Partnerships were formed in 2010. Their creation marked the start of a decentralised shift in decision-making and public expenditure in order to make it more responsive to the needs of

local business and people. The overarching objective of the LEP is to stimulate local growth and increase productivity.

LEPs have been tasked with setting key investment priorities, distributing funding, enabling housing and infrastructure, supporting high-growth businesses and helping people into employment. Energy was also part of the LEP's founding remit[1].

> *LEPs should take on a diverse range of roles, such as exploring opportunities for developing financial and non-financial incentives on renewable energy projects.*

The role of LEPs has been enhanced further by the Ministerial Review of LEPs, Strengthening Local Enterprise Partnerships, published in July 2018. It confirmed their role in identifying strengths and challenges, future opportunities and the action needed to boost productivity, earning power and competitiveness across their area. There is strong case for more local decision-making in energy and LEPs are well placed to play a positive and strategic role and the LEP can support local energy activities in a number of ways.

Growing the low carbon economy requires a strong relationship with local industry and understanding of skills provision and need in order to maximise opportunities for growth. Likewise, LEPs can guide energy infrastructure investments at the regional and distribution level. LEPs are also well placed to advocate on behalf of their partnership areas while also providing support in the implementation of new policy and in accessing funding streams. Crucially, LEPs have a pivotal role in securing the key enabling infrastructure needed to bring the benefits of clean technology to the area and to catalyse innovation and growth.

1.2 The national decarbonisation mission

The Climate Change Act 2008 legally commits the UK to reducing carbon emissions by 80% by 2050 relative to a 1990 baseline. Carbon budgets act as interim targets and ensure we remain on a sound path towards 2050. The fifth carbon budget (for the period 2028 to 2032) was adopted in 2016 and requires emissions to fall 57% below 1990 levels[2].

The Committee on Climate Change (CCC) is an independent panel of climate change experts who advise the government. They suggest that meeting the fifth carbon budget will require continued progress in reducing emissions through energy efficiency and a shift to lower-carbon fuels in electricity generation. This however will need to be accompanied by new and strengthened efforts in other policy areas including transport, heating and tackling energy efficiency in hard to treat solid walled homes. They warn that the necessary changes will require bigger behavioural adjustments than required by efforts to date.

1.3 A modern Industrial Strategy

The Industrial Strategy[3] was published in January 2017 and sets out a long term plan to boost the productivity of the UK. It recognises that early investment is needed for the UK to gain a leading position in the new sectors and technologies in the coming decades. The government has committed funding and support for each of these Grand Challenges, as the Industrial Strategy calls them, with sectoral industrial strategies setting out the research, skills, infrastructure and business environment that will be required.

Clean Growth is one of the Grand Challenges within the Government's Industrial Strategy and the government has committed support it via the 'Prospering from the energy revolution' challenge fund. This will demonstrate how we can build local smart energy systems that deliver cheaper and cleaner

[1] BIS, 2010, Local Growth: Realising Every Place's Potential
[2] CCC, 2015, Advice on the fifth carbon budget
[3] BEIS, 2017, UK Industrial Strategy: a leading destination to invest and grow

energy across power, heating and transport while creating high value jobs and export capabilities. It will also comprise an innovation accelerator fund and a world-leading, inter-disciplinary research programme working alongside the Energy Systems Catapult.

The LEPs across England, except those in mayoral combined authorities, have been tasked with preparing local industrial strategies that identify and build on local strengths across the country. This puts LEPs at the heart of delivering the Industrial Strategy. It creates a window of opportunity to take stock of the local energy sector and to take advantage of the breadth of opportunities to enhance clean growth.

1.4 The Clean Growth Strategy

The Clean Growth Strategy[4] was published in October 2017 and sets out a comprehensive set of policies to meet our climate change commitments while also accelerating the pace of "clean" economic growth. This approach is defined by Government as growing our national income while cutting greenhouse gas emissions. Key to delivering these twin objectives are efforts to increase productivity and create jobs by taking advantage of the huge economic and industrial opportunities presented by the generational shift to a low carbon economic model.

> *The low carbon economy could grow 11 per cent per year between 2015 and 2030, four times faster than the projected growth of the economy as a whole.* The Clean Growth Strategy 2017

It is a cross-sectoral broad plan with proposals across a number of sectors from energy efficiency to transport, the power system, natural environment and public sector leadership among others.

The Clean Growth Strategy is closely linked to the Industrial Strategy and aims to create the best possible environment for the private sector to innovate and invest. It therefore provides an important basis for the development of the SWLEP energy strategy and can help guide towards where local strengths match national ambition. All LEPs are producing energy strategies and so our document does not sit in isolation.

1.5 SWLEP's Strategic Economic Plan 2016

The Swindon and Wiltshire LEP's Strategic Economic Plan 2016[5] sets out local economic goals and competitive advantages;

- the pivotal location in central southern England;
- a diverse economy providing a combination of vibrant SMEs alongside a strong presence of national and international large companies. based in both urban and rural locations;
- a highly attractive natural landscape; and
- a significant military presence.

It establishes SWLEPs priorities and investments to 2026 with strategic objectives that aim to accelerate economic growth across three growth zones, focussing on urban regeneration, improved infrastructure, building on the presence of the military, life sciences, advanced manufacturing and technology and addressing the skills deficit.

In terms of the SEP 2016's focus on energy, developing Swindon and Wiltshire as a nationally significant clean tech and hydrogen hub is already an objective. It highlights the advanced manufacturing and design cluster to be built upon. The rapid deployment of electric vehicles will be

[4] BEIS, 2017, The Clean Growth Strategy Leading the way to a low carbon future
[5] SWLEP, 2016, Swindon and Wiltshire Strategic Economic Plan

disruptive to the automotive industry but creates a unique window of opportunity for local companies with proper support and supply chain development.

The low carbon economy is on the "watch list" of important sectors where SWLEP can consider strategic interventions, an acknowledgement of its potential to strengthen the competitiveness of businesses and to attract inward investment to the area.

> *The transition to a low carbon economy is also identified as a key driver of change that will create new opportunities in many sectors, for example energy generation, innovation and sustainable construction.* SWLEP Strategic Economic Plan 2016

The strategic focus on *place shaping* puts emphasis on the need to deliver infrastructure to service the area and to facilitate growth. It acknowledges the need for increased energy infrastructure resilience as a key component of this.

SWLEP Strategic Economic Plan Objectives

1. **Skills and talent** - we need an appropriately skilled and competitive workforce to achieve our growth ambitions;
2. **Transport infrastructure improvements** - we need a well-connected, reliable and resilient transport system to support economic and planned development growth at key locations;
3. **Digital capability -** we need to deliver excellence in digital connectivity and cyber transformation to achieve business growth, innovative public services and influence societal change;
4. **Place-shaping -** we need to build the infrastructure required to deliver our planned growth and regenerate our city and town centres, and improve our visitor and cultural offer; and
5. **Business development -** we need to strengthen the competitiveness of small and medium sized businesses and attract a greater share of foreign and domestic investment into the area.

1.6 Energy strategy objectives

This Local Energy Strategy is an opportunity for SWLEP to develop a strategic approach to the energy sector and clean growth. It will enable Swindon & Wiltshire to take a more active role in energy, to gain from new and emerging technology trends and to increase innovation in the local economy.

The following objectives have shaped the preparation of the energy strategy:

- Taking steps to grow the low carbon economy and upgrading energy infrastructure in order to enable growth.
- Delivering the existing local priorities identified in SWLEP's Strategic Economic Plan to 2026 as well as those of Swindon Borough Council and Wiltshire Council.
- Aligning with the direction and intent of national policy, reflecting the Clean Growth Strategy and the clean growth elements of the Industrial Strategy.
- Making a contribution towards our national climate change commitments, ensuring Swindon & Wiltshire help meet the carbon budget.

2 Local energy evidence base

The local energy evidence base establishes a baseline for the energy strategy. It covers key aspects of power, heat and transport sectors, local infrastructure and the state of the low carbon economy and provides an assessment of the energy opportunities and challenges across SWLEP. A synthesis of the technical analysis and the views of stakeholders elicited from workshops and interviews provide the basis for the identification of energy priorities.

The evidence base section covers the following:

1. Recent energy consumption and emissions trends
2. Electricity generation
3. Renewable and low carbon heat
4. Low carbon transport
5. Energy infrastructure
6. Fuel poverty and energy efficiency
7. Low carbon economy
8. Hydrogen economy

2.1 Recent energy consumption and emissions trends

The UK's greenhouse gas emissions fell by 2.6% in 2017 continuing a long downward trajectory[6]. Emissions have fallen by 43% since 1990 – about halfway to the 2050 target - even while the economy has been growing and population rising. The decrease in emissions is primarily the product of two key trends. We are consuming less energy and the electricity supply is becoming cleaner.

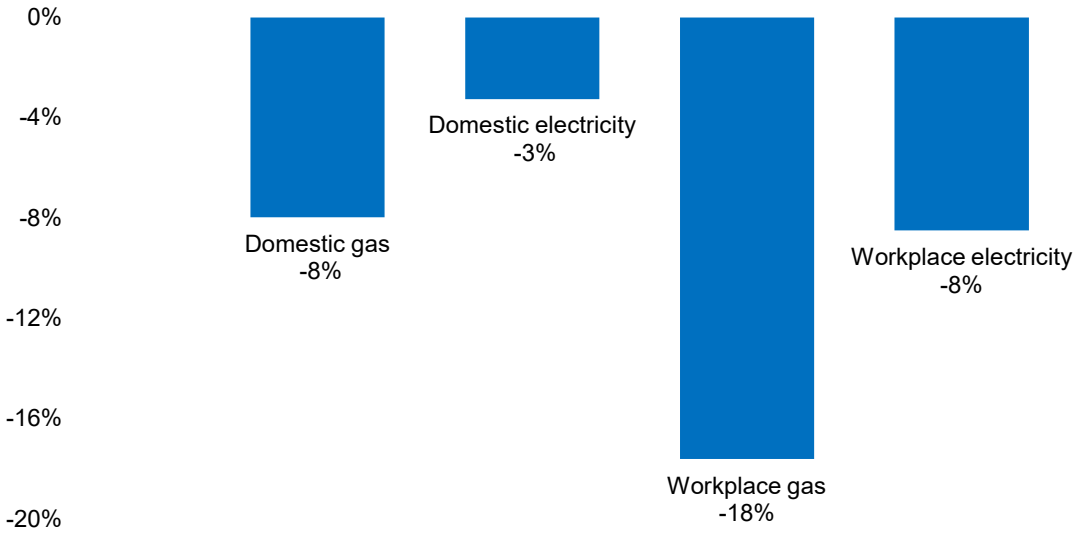
Total energy consumption is estimated to have fallen 11% since 1990 resulting from improvements in technology and a decline in the relative importance of energy intensive industries. The carbon intensity of the electricity supply fell 7.6% between 2016 and 2017 as renewable output increased and coal generation dropped 28%.

2.1.1 Energy consumption

In 2016, Swindon & Wiltshire's electricity consumption was estimated to be 4,374GWh with a further 3,312GWh demand for gas. 64% of gas demand and 41% of electricity demand is from domestic uses with the remainder for commercial & industrial uses.

Energy demand is falling in Swindon & Wiltshire[7]. Gas consumption is down 12% and electricity demand down 6% between 2010 and 2016, despite a 10% increase in the population over the same period. The downward trend is consistent across both homes and workplaces.

[6]2017, ONS, UK Greenhouse Gas Emissions, Provisional Figures Statistical Release
[7] https://www.gov.uk/government/publications/sub-national-electricity-and-gas-consumption-statistics-analysis-tool



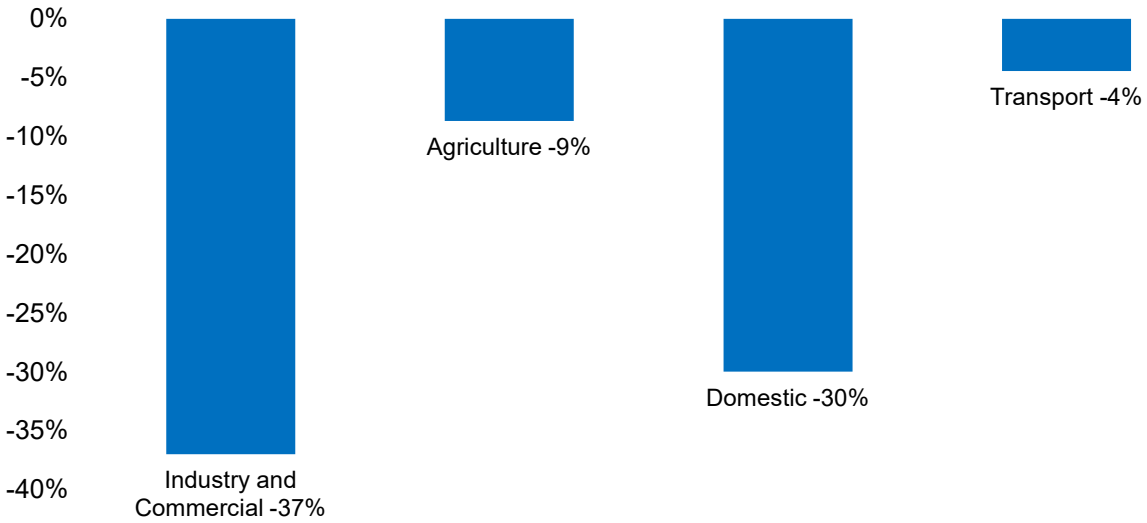
Change in total energy consumption between 2010 and 2016

Falling workplace energy consumption has occurred while the economic output of the local economy has grown. This is linked to improved efficiency and changes in the structure of the economy. The changes in home consumption can be attributed to energy efficiency improvements as well as improved appliance, lighting and boiler efficiency.

2.1.2 Carbon emissions

Swindon and Wiltshire's carbon emissions fell 25% between 2005 and 2015[8]. This can be attributed to the falling local energy consumption combined with the decarbonisation of the electricity supply and switching away from carbon intensive coal and oil heating systems. As a result of this sustained reduction emissions are now 3.7 $MtCO_2$ (million tonnes of carbon dioxide) per annum, with 2.7 $MtCO_2$ from Wiltshire and 1 $MtCO_2$ from Swindon.

Emissions have fallen fastest from industry and commercial uses. There have also been large reductions in home use with smaller falls in transport and agriculture

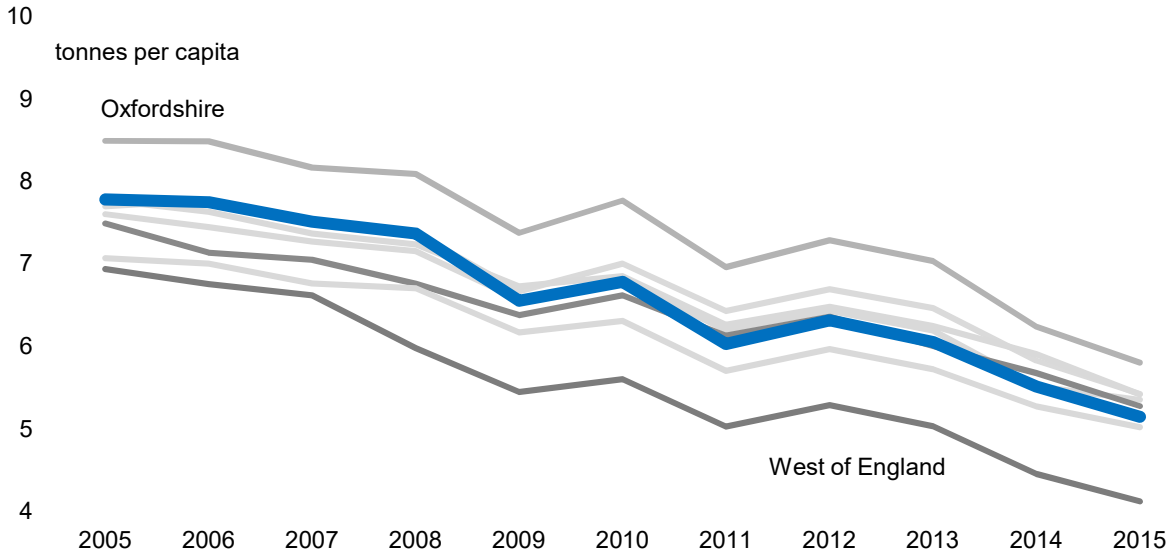


Change in carbon emissions in Swindon & Wiltshire by sector between 2005 and 2015

[8] Carbon dioxide (CO_2) is the main greenhouse gas, accounting for about 81 per cent of the UK greenhouse gas emissions in 2015.

Looking at emissions per person can help us to make comparisons between different areas. The local population increased by about 10% between 2005 and 2015 which means per capita emissions are down 34% at 5.2 tonnes per annum. These will vary according to each person's life style, income and where they live. Average per capita emissions in Swindon are 4.7 tonnes, lower than 5.6 tonnes in Wiltshire. This is likely due to urban living and the higher density of housing in Swindon which reduces heating and transport emissions.

Falling per capita emissions are also observed in comparable LEP areas, with SWLEP per capita emissions consistently lower than Oxfordshire but above Dorset and West of England.



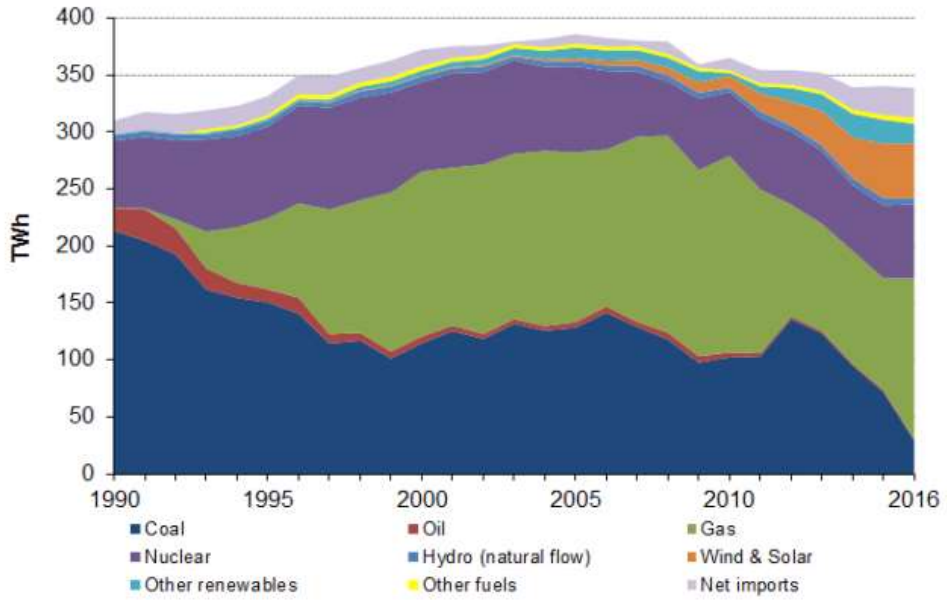
Per capita carbon emissions in Swindon & Wiltshire (blue) and other LEPs between 2010 and 2015

The evidence indicates that the changes in energy consumption patterns and emissions in Swindon and Wiltshire reflect the broader national trends. This can be attributed both to the impact of the changing nature of industry, the economy and the energy sector as well as local efforts to increase energy efficiency and to add renewable energy generation capacity, which is discussed below.

2.2 Electricity generation

UK renewable generation (hydro, wind, solar and bioenergy) leaped 19% in 2017, driven by increased renewable capacity and more favourable weather conditions[9]. Low carbon generation (nuclear and renewable) supplied more than half (50.4%) of all electricity for the first time. Planned renewable capacity additions over the coming years and the government's commitment to ending the use of unabated coal by 2025 will ensure that this trend continues[10].

[9] 2018, BEIS, Provisional 2017 electricity statistics
[10] 2018, BEIS, Implementing the end of unabated coal by 2025

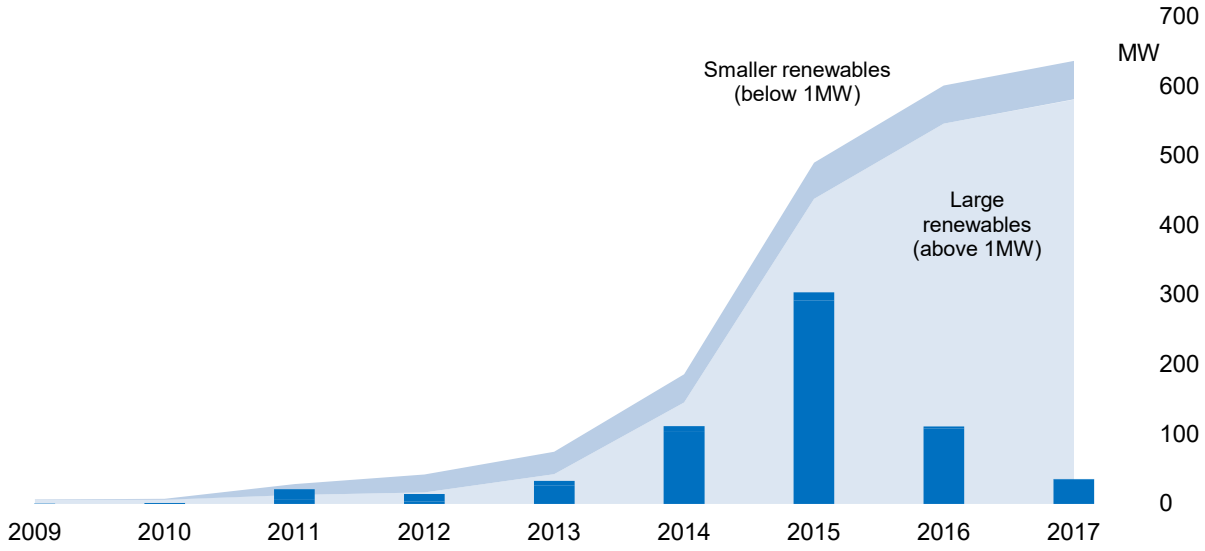


Electricity supplied by fuel type 1990-2016

The extent of the electricity system transformation was symbolically marked in April 2017, with the first 24-hour period without coal powered generation since the first coal power station opened in 1882.

2.2.1 Installed generating capacity

The capacity of renewable energy generators in Swindon and Wiltshire has increased rapidly over the last 8 years. 636MW of capacity was operational as of November 2017, with the majority of this installed between 2014 and 2016.



Growth in installed renewable electricity capacity in Swindon & Wiltshire and annual additions

The information has been collated using BEIS public datasets and local authority planning data. BEIS's Renewable Energy Planning Database which is used to track larger renewable energy projects as they move through the planning system and the Feed in Tariff scheme statistics. The Feed-in Tariff (FIT) offers a premium payment per unit of electricity generated from renewable energy technologies. It is the principal financial mechanism supporting smaller renewable energy generators like roof top solar PV. Since the incentive was introduced in April 2010 it has led to tremendous

growth in small and medium scale renewable energy capacity. Reductions in the tariffs have slowed the growth of installations since 2015. The government has signalled that the scheme will close to new applications in April 2019.

2.2.2 Solar power

Solar farms are ground-mounted installations of solar photovoltaic (PV) panels constructed on brownfield or agricultural land. 90% of the installed renewable energy capacity in Swindon and Wiltshire is provided by 43 solar farms with a combined in capacity of 568MW. These range in size from 1MW to 61MW at Wroughton Airfield and 70MW at RAF Lyneham, the largest solar farm in England covering 83 hectares. Many of them were commissioned between 2014 and 2016, after which the installation rate fell, and are situated primarily in the low lying areas between Trowbridge, Chippenham and Swindon where they can connect to the distribution grid and where landscape and visual impacts are easier to manage. 426MW is located in Wiltshire and 154MW in Swindon.

In addition, there are over 11,000 smaller solar installations with a combined installed capacity of around 50MW and accounting for 8.5% of installed capacity. The majority are home roof-top systems but there are also several hundred larger solar arrays on commercial roofs. These are located right across Swindon & Wiltshire with concentrations in larger towns and cities.

2.2.3 Energy from waste

There are five landfill gas sites (10.7MW) and one anaerobic digester (1.5MW) with a total installed capacity of 12.2MW. They represent around 2% of total installed capacity. The majority (9.2MW) are located in Wiltshire.

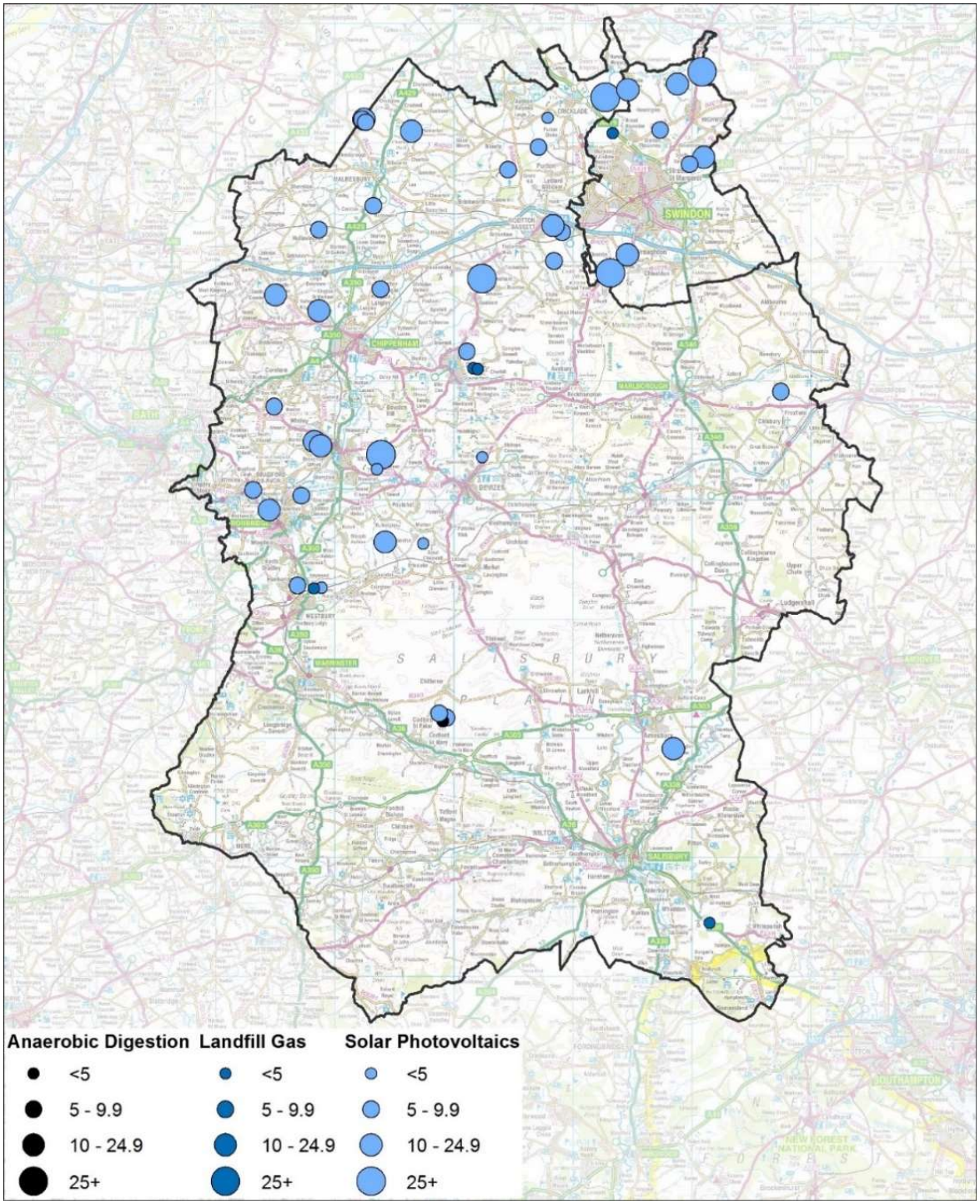
2.2.4 Wind power

There are no operational onshore wind farms in Swindon and Wilshire. This is likely to be as a result of several factors. Great value is placed on the historic landscape setting of Swindon & Wiltshire. With the North Wessex Downs and Cranborne Chase AONB, the Cotswolds to the North and the New Forest to the South, large swathes of the landscape are protected. The MOD's training area on Salisbury Plain also places additional restrictions across the wider area. Wind speeds are relatively low according to the NOABL Wind database. As a result of these unfavourable conditions only two planning applications for onshore wind turbines have been received and both were refused.

2.2.5 Run-of-river hydropower

Hydropower produces electricity from the energy stored in flowing and falling water. In run of river schemes the water is taken directly from the river, passed through a turbine which generates renewable electricity before being returned back to the watercourse. There are a number of small run-of-river micro-hydropower plants, for example three of them operating with a total capacity of 69 kW, the largest of which has been fitted to a former weir in Bradford-on-Avon.

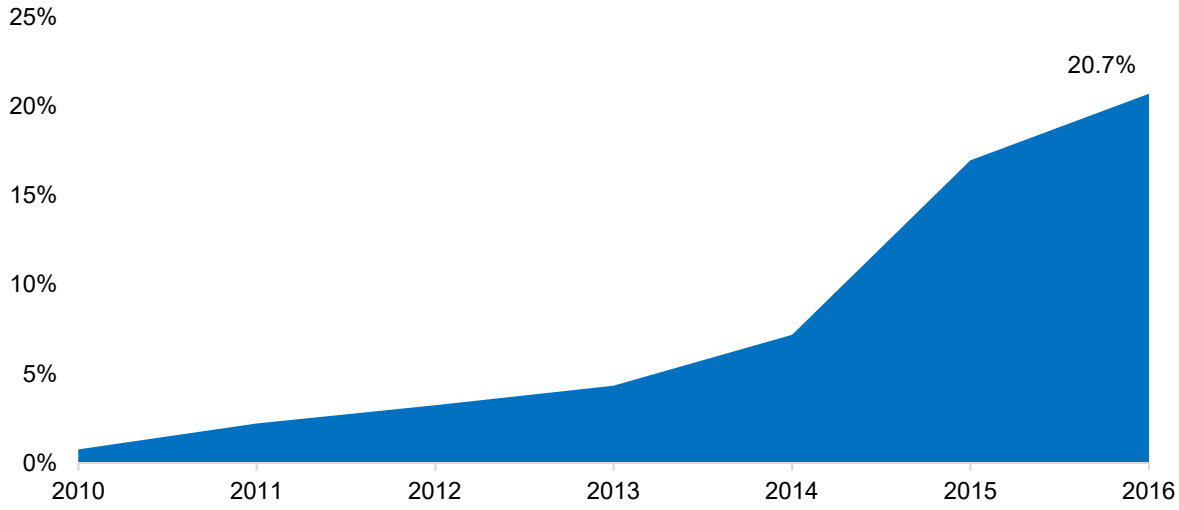
The map below shows the location of the larger renewable installations, with larger points indicative of the total installed capacity.



Map of renewable energy installations in Swindon & Wiltshire (with capacity in MW)

2.2.6 Renewable contribution to local energy demands

Electricity demand in Swindon & Wiltshire has been steadily decreasing over the past few years. At the same time the amount of electricity generated by renewables locally has increased significantly. The latest information available is for 2016 and indicates that approximately 20.7% of electricity demand was met by local renewable energy generation, up from around 1% in 2010. This has been supported by Swindon's target of installing 200MW of renewable capacity by 2020; equivalent to the city's residential demand.



Share of Swindon & Wiltshire's electricity demand met by local renewable generation

2.2.7 Summary

A combination of falling costs and government incentives schemes have led to a national boom in renewable energy installations, with a significant number of solar farms being installed locally and generating around a fifth of local needs. Changes to the government's approach to renewables and more recent planning restrictions has shrunk the pipeline of projects in development. Connecting new renewable generation to the distribution grid is also a key constraint to renewables expansion and is explored further in Section 2.5.

2.3 Renewable and low carbon heat

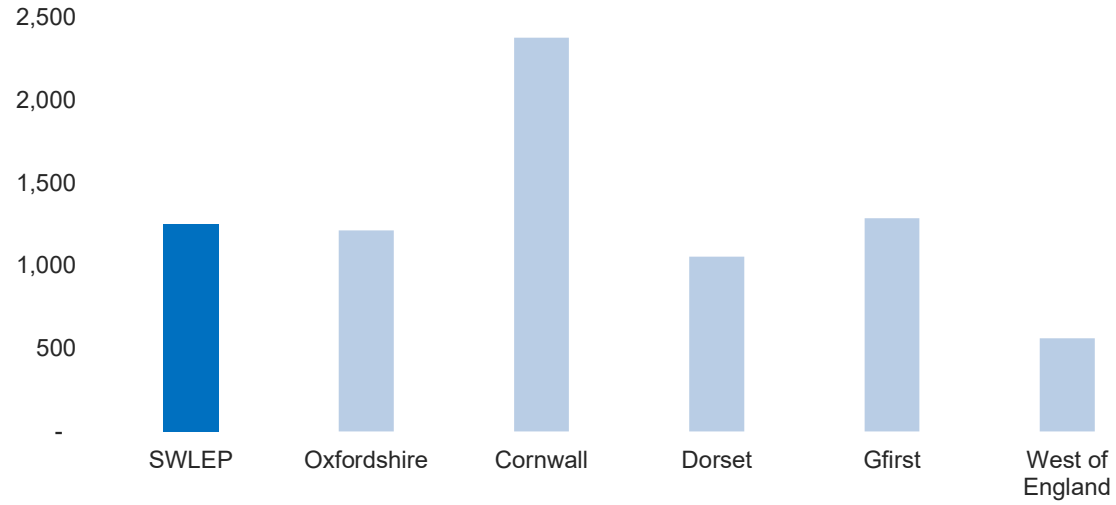
Renewable and low carbon heat can be generated by a range of technologies - including biomass boilers, heat pumps, solar thermal and gas-fired combined heat and power (CHP) - serving single homes or businesses through to communal heating systems providing heat to whole neighbourhoods.

2.3.1 Renewable heating installations

The Renewable Heat Incentive (RHI) is similar to the FiT and offers a premium payment per unit of heat generated in order to encourage a switch to renewable heating. A range of technologies including solid biomass, biogas, solar thermal and heat pumps serving both homes and workplaces are eligible.

BEIS's monthly statistics for the RHI from January 2018 provides information on uptake in Swindon & Wiltshire. 1,026 domestic renewable heating systems have been installed since April 2014, 97% of which are in Wiltshire. A further 239 non-domestic systems are operating with a combined installed capacity of 34.2MW. More than 90% are in Wiltshire. The difference in rates of uptake could be, in part, explained by the number of homes in Wiltshire not connected to the gas grid. Typical off-gas grid systems like oil and electric heaters are more expensive, increasing the attractiveness of the RHI.

Swindon & Wiltshire has experienced a similar rate of uptake to comparable LEP areas, with Cornwall having many more and the West of England having fewer.



Renewable Heat Incentive installations in Swindon & Wiltshire and other LEPs to January 2018

While more detailed information about the technology and size of these installations is not available at local authority level, nationally about half of domestic systems are air source heat pumps, 20% are biomass boilers, 15% ground source heat pumps and 15% are solar thermal panels. A similar mix can be expected in Swindon & Wiltshire.

2.3.2 District heating networks

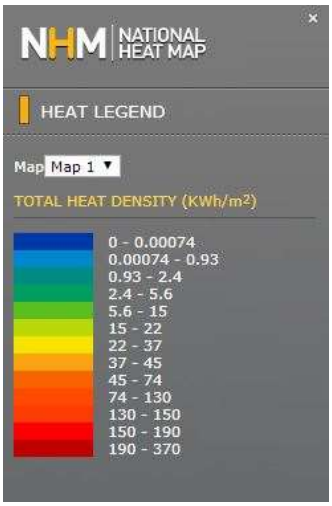
District heating is where the heat is distributed through a network of insulated pipes to homes and businesses from a central energy centre which contains the heating system. The larger and more diverse heating demand means that the plant can be more efficient, including the generation of combined heat and power (CHP). District heat networks can also make use of the waste heat from industrial processes or thermal power stations and can provide space heating, hot water and heat for use in industrial processes.

The most promising opportunities are where there is lots of demand for heat in a compact area. The National Heat Map[11] presents estimated heat demand density[12] from buildings across England and can be used to identify where district heating might be possible. The maps below show heat demand density in kWh/m^2 in Swindon, Salisbury and Chippenham (left to right).

[11] http://tools.decc.gov.uk/nationalheatmap/#
[12] Based on industry benchmarks head demand estimates combined with metered heat data from public buildings.

Total heat density of Swindon, Salisbury and Chippenham from the National Heat Map

Each colour band represents a range of heat demand density values, with areas in red indicate a high demand density and therefore greater potential for new district heating networks. They show how heat demand density is highest in the centre of town with central Swindon showing the greatest promise for a large heat network.



2.3.3 District heating feasibility studies

Both Wiltshire Council and Swindon BC have commissioned studies to investigate the feasibility of district heating in more detail, focusing on their most promising opportunities:

- A heat network linking the large heat loads in the town centre to North Star, a proposed regeneration area to the north which could include an indoor ski centre, arena and associated developments.
- The Wichelstowe urban extension of up to 4,500 homes to the south of Swindon.
- The proposed New Eastern Villages with up to 8,000 homes spread across a series of new centres to the east.
- The Langley Park area in Chippenham, site of a large business park and residential growth.
- Porton Down and the Porton science park.

The studies assessed the technical feasibility and financial viability of network options based on existing heat loads and the potential for serving new developments. The analysis indicates that a network supplying energy to the North Star area on its own or with an extension to the town centre could be viable and presented a strong business case. Delivering large urban networks is complex and can be reliant on upfront investment in infrastructure on the expectation that proposed developments come forward and are connected. The Porton Down study produced a strong technical basis and outline business case. Even with a strong business case in place, land and asset owner involvement is key to moving projects forward.

Reducing emissions from heating is the primary driver of new district heating schemes. However as the electricity supply continues to be decarbonised the gap between the carbon intensity of electric heating and gas heating is closing. If current trends continue, the case for gas-fired CHP district heating becomes weaker and individual electric heating systems will become increasingly preferable. The business case for investing in new networks must take this into account and should assess opportunities for using low carbon waste heat or biomass CHP.

Bristol's revised approach to heat planning policy

Bristol City Council has ambitious plans for three city centre district heating networks with an increasing number of connection to the growing Temple Quarter Enterprise Zone network. However the decarbonisation of the electricity supply has led to a revised approach, with a more balanced approach to heating systems in new developments. Bristol City Council's consultation on a Review of its Local Plan[13] suggests a scaling back of its 'heat priority area' in response.

2.3.4 Biomass supply

SWLEP has gathered evidence to promote the local timber and forestry sector. The Wiltshire Timber Study aimed to assess the potential for economic opportunities for forestry enterprise, woodland and timber and to identify the opportunities and barriers to developing the sector.

There are 34,311ha of woodland in Swindon and Wiltshire, representing 10.2% of the land area. This is predominantly broadleaved (55.5%) and is owned or managed by a mixture of private landowners, charitable institutions, local authorities and the Forestry Commission who manage 10%. The study indicates that a relatively high proportion (57%) of woodlands are already under management and much of it is in small blocks with poor access and infrastructure. This makes substantial increases in local biomass supply challenging. Combined with the relatively small woodland area and the price advantage of imported biomass supplies, this suggests that the local biomass industry does not have a strong strategic competitive advantage. Burning biomass also produces particulates which impact air quality.

Biomass heating for schools in Wiltshire

Schools across Wilshire have reduced their heating bill and carbon footprint by replacing old oil boilers with biomass heating systems as part of Wiltshire Council's Oil to Biomass Boiler Conversion Programme.

The Council invested in the installation of 12 biomass boiler replacements using an innovative arrangement that stream-lined the process for schools. The Council installs and owns the biomass boiler and charges each school for the heat they use. The school benefits from predictable low fuel bills and the Council receives the Renewable Heat Incentive (RHI) payments. Low cost Salix finance was used to deliver the programme which aimed to invest £2.73 million[14].

Stanton St. Quintin Community Primary[15] installed a biomass boiler which burns locally sourced wood pellets and reported annual fuel bill savings of £761 in one year, a 25% reduction. The upgrade cost £50,000 and was part funded through a DEFRA grant. The biomass boiler has helped to raise environmental awareness within the school. Overall, the public sector carbon footprint was reduced by 1,614 tCO_2, while stimulating demand for biomass fuels and woodland management.

Wiltshire Council continues to support schools installing renewable heating by facilitating the Salix finance application process.

[13] https://www.bristol.gov.uk/en_US/planning-and-building-regulations/local-plan-review
[14] https://cms.wiltshire.gov.uk/ieIssueDetails.aspx?IId=24105&Opt=3
[15] https://www.wiltshirehealthyschools.org/documents/site-manager-resources/Using_and_managing_your_energy_data/02_Biomass_Boiler_Case_Study.pdf

2.3.5 Decarbonising heating

In order to meet our climate commitments heating will need to be decarbonised. This will be a significant challenge and may require major changes to national infrastructure and our home and workplace heating systems.

The Committee on Climate Change[16] indicate that the lowest cost route towards heat decarbonisation over the next decade involves three important steps:

1. Installing heat pumps in all off gas-grid homes, requiring 2.5 million heat pumps in homes by 2030 up from around 150,000 today.
2. Expanding district heat networks in urban areas, up from 4 TWh today to 40 TWh.
3. Biomethane and hydrogen injection into the gas network up from 3 TWh to around 20 TWh.

The best approach to heat decarbonisation beyond 2030 is currently uncertain and could either proceed via full electrification using heat pumps or repurposing the gas networks for low carbon gases like biomethane and hydrogen.

This is a difficult strategic decision and the best route remains uncertain. The Energy Networks Association (ENA) is the industry body that represents the 'wires and pipes' transmission and distribution network operators for gas and electricity. They have looked at ways heat could be decarbonised by 2050[17]. Their four scenarios illustrate how divergent the future pathways are as well as the implications for electricity and gas infrastructure. The ENA concludes that the most cost effective long term solution continues to make use of the gas network, serving customers with alternative, low carbon gases like hydrogen and biogas. This makes good use of existing infrastructure and reduces disruption to consumers.

Evolution of the gas network

- Gas remains the main heating fuel
- The gas grid is decarbonised by converting to hydrogen gas, derived from natural gas. CO_2 is permanently stored.
- Existing gas distribution networks are mostly used for hydrogen gas across the country.

Diversified energy sources

- A mixture of technologies are used across the country
- Heat is partially decarbonised through a mixture of biomass sourced heat networks, gas and electric heating
- Gas distribution networks are only used in half of the country

Electric heating

- Switch to electric heating systems
- Heating is decarbonised by decarbonising power generation.
- Gas distribution networks are not used.

Onsite generation & electric heating

- Self-generated heating and energy solutions, but only for a minority.
- Electric heating systems for the majority
- Gas distribution networks aren't used

Summary of the four ENA 2050 energy scenarios for the decarbonisation of heating illustrating possible future pathways and the implications for electricity and gas infrastructure, ENA

While the long term route towards heat decarbonisation remains uncertain, the CCC's analysis makes clear what short-term measures are important. In SWLEP this involves continued efforts to reduce

[16] CCC, 2017 update to Parliament, Meeting Carbon Budgets: Closing the policy gap
[17] ENA, 2016, 2050 Energy Scenarios The UK Gas Networks role in a 2050 whole energy system

reliance on high cost, high carbon oil, electric resistance and solid fuel boilers and a switch to modern and efficient heating systems. It means delivering district heating networks where they are viable and contribute to reduced energy costs and long term emissions reductions. It also aligns with the cluster of local businesses in the hydrogen economy which could be expanded to include hydrogen heating pilots and innovation.

2.4 Low carbon transport

2.4.1 Electric vehicles

The UK already has around 150,000 plug-in electric vehicles (taking into account pure-electric, plug-in hybrid electric and hydrogen fuel cell vehicles) and figures from the first three months of 2018 show that they make up 2% of all new cars sold[18].

With an increase in the number of models coming available from major marques, increased range and falling prices, the electric vehicle market is expected to grow rapidly over the coming years. This demand has created a virtuous combination of increasing investment in technology and production at ever-larger scales. As a result, the cost of batteries is falling dramatically and is experiencing the same transformations as witnessed with flat screen TVs, solar panels and LED lighting.

This transition is an important component of the government's long term plan, not only to decarbonise road transport, but also to improve air quality with a commitment to end the sale of new conventional petrol and diesel cars and vans by 2040. National Grid's latest 2017 Future Energy Scenarios[19] present a set of credible futures that are used to illustrate how the country's energy system might develop in different directions. They suggest that up to 9 million EVs could be on the road by 2030 representing almost 30% of the vehicle fleet. With the ability to provide vehicle to grid (V2G) services, the EV fleet will help balance the electricity supply and enable increased deployment of variable renewables.

2.4.2 Electric vehicles charging points

The national network of EV charging points has grown quickly over recent years, with 5,500 charging locations available as of April 2018, 20% of which were added in the last year alone. These have been installed by the public and private sector to service early adopters and to meet anticipated demand. The type of chargers available must be taken into account in assessing the extent and depth of the charging network as well as the availability of connectors, which ensure compatibility with different vehicle manufacturers.

Slow	3kW	Most suited to long stay situations such as domestic properties and park and ride car parks with charge times of 6-8 hours.
Fast	7kW	These form the bulk of charging points and are well suited for situations such as offices and shopping centre car parks with a full charge achievable in 3-4 hours.
Fast	11kW	
Fast	22kW	
Rapid	43kW	Most suited to motorway service stations as they take the place of fossil fuel refuelling stations. These charge points can typically provide 80% Charge in around 30 minutes.
Rapid	50kW	
Super	120kW	

Types of EV charging point

[18] Society of Motor Manufacturers and Traders car registration data April 2018
[19] National Grid, 2017, Future Energy Scenarios

Zap Map statistics[20] indicate that a growing proportion of these are more powerful fast or rapid chargers that increase the convenience of charging dramatically.

2.4.3 Local electric vehicle infrastructure

Local car registration figures are not available so it is unclear how many EVs are already in use in Swindon & Wiltshire. However, it is clear that access to an extensive and reliable network of publicly accessible chargers will be a key factor in consumer choices.

Zap Map's publically available register of charging points aggregates data from multiple sources to provide the most comprehensive view of the network of publically available charging points in Swindon & Wiltshire. The table below shows the EV charge points categorised by type of location as well as capacity and connector options.

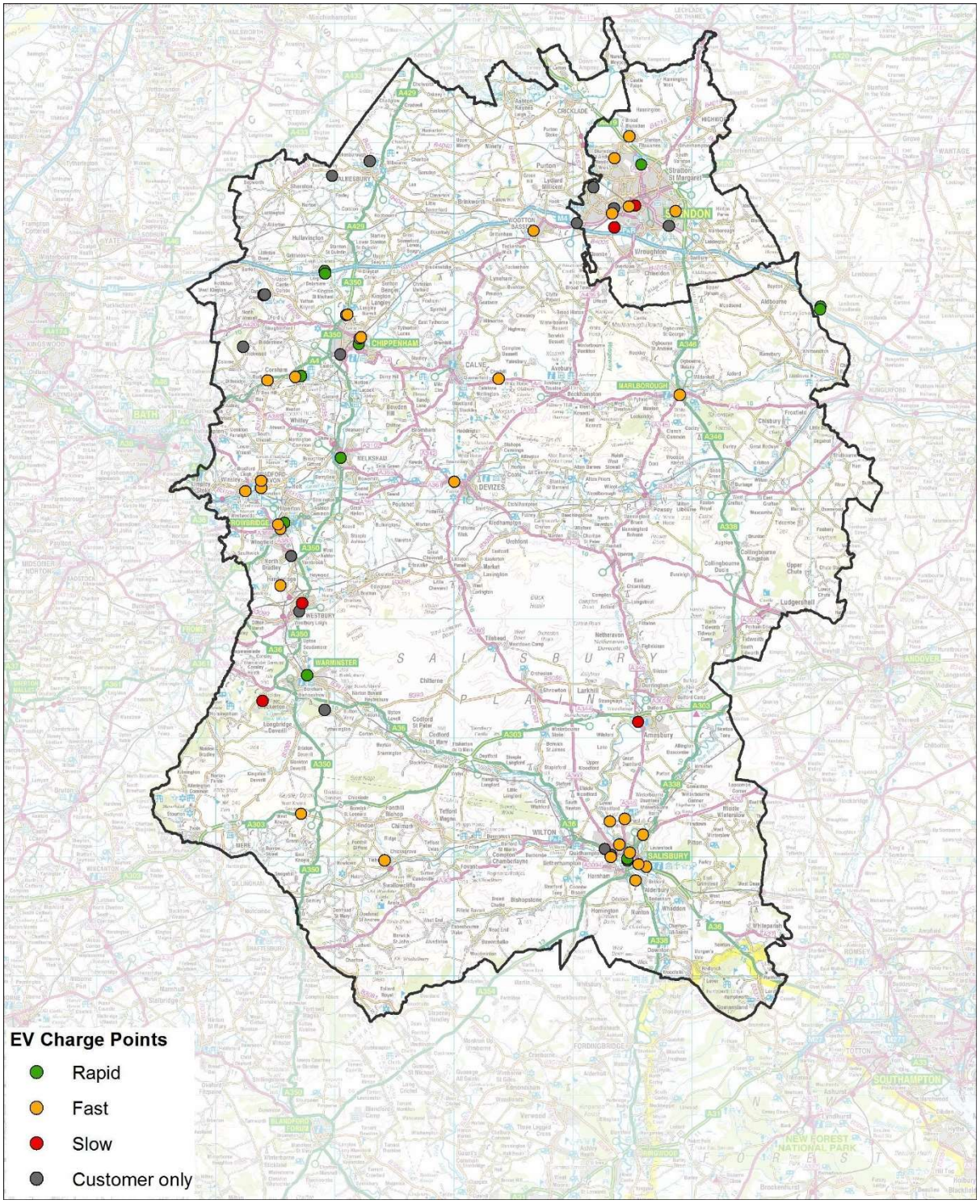
There are 64 charge points which together have 163 connectors. The majority are fully publically accessible (74%) and are located at convenient places to charge like service stations (6), transit node parking (8) or at town centre car parks (17). Many of these are fast and rapid chargers (77%). Other public locations like leisure centres, hotels and government offices and places of work are served by slow or fast chargers. A substantial proportion of publically accessible charge points are restricted to use by customers and staff only (26%) and therefore do not provide the same level of public amenity.

Charge point location	Number of sites	Number connectors	Slow	Fast	Rapid
Total	**64**	**163**	**37**	**90**	**36**
Service station	6	19	1	4	14
Train station / park & ride	8	17	0	14	3
Public / retail car park	17	40	10	15	15
Civic / leisure Centre	6	26	0	26	0
Hotel	5	14	9	5	0
Customers and staff only	17	39	16	19	4
Other	5	8	1	7	0

EV charge points in Swindon & Wiltshire by location and speed

The map below shows the locations of these charging points, with concentrations in towns, including Swindon (12), Salisbury (13), Chippenham (6) and Trowbridge (3).

[20] https://www.zap-map.com/statistics/



Map of EV charge points by charge capacity

2.4.4 Hydrogen vehicle infrastructure

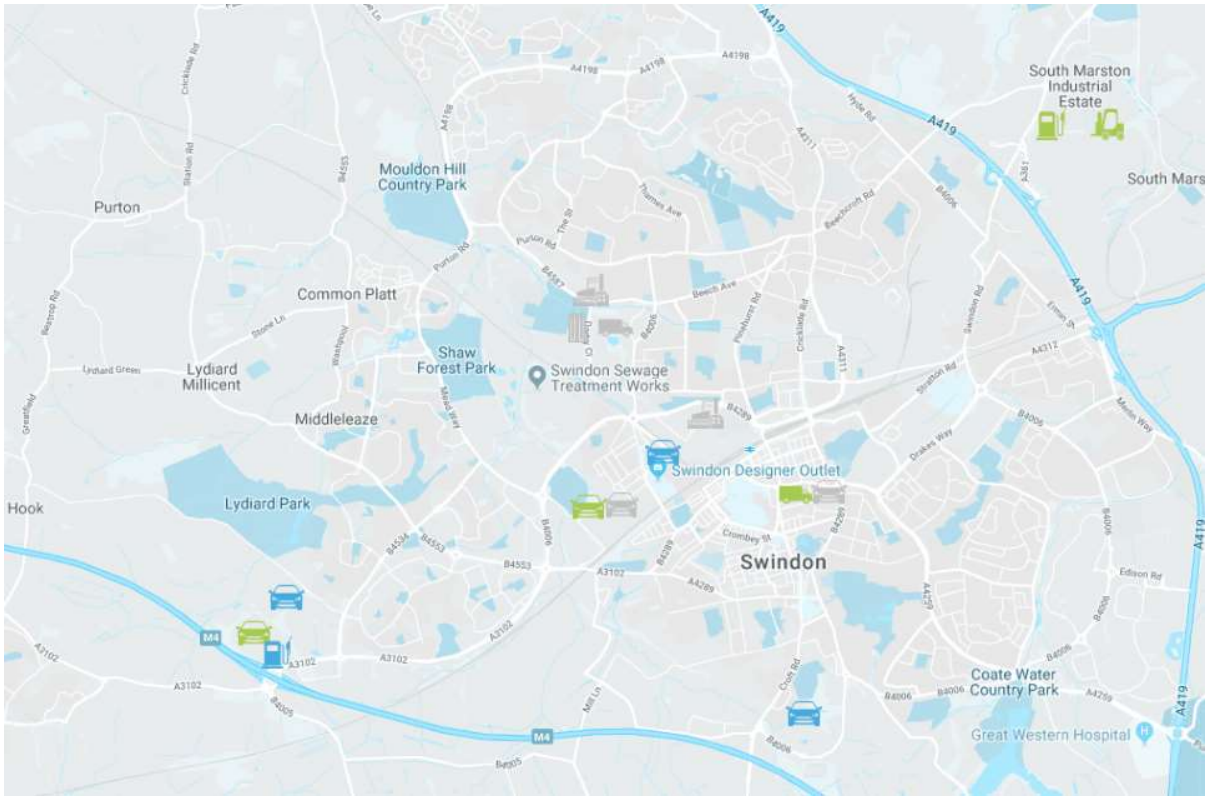
There are approximately 14 hydrogen refuelling stations in the UK with another 6 planned. Two of these are in Swindon[21], more than any other city outside London. One is located at the Honda manufacturing plant. Launched in 2014 by a consortium including BOC and Honda, it was the UK's

[21] SWLEP Growth Hub, The Swindon Investment Guide

first commercial scale solar-powered hydrogen production and refuelling facility[22]. The other station is at Johnson Matthey's fuel cell site next to the M4 will begin operating soon.

In addition to refuelling stations there are a number of hydrogen vehicle and demonstrators in use locally:

- Honda FLT – have 2 hydrogen fuel cell forklift trucks and 2 fuel cell tugs
- Swindon Borough Council run 5 hydrogen Ulemco vans
- Pebley Beach has a Hyundai fuel cell servicing centre and is considering two Hyundai ix35s as delivery vehicles
- The National Trust in Swindon has a Hyundai ix35 for use as a pool car
- JMFC has a Hyundai ix35 for use as a pool car
- Arval has a Toyota Mirai as a demonstrator
- The National Collections Centre at Wroughton airfield has a Toyota Mirai



Hydrogen Infrastructure and demonstration vehicles in Swindon, Hydrogen Hub

> *Arval has taken the leap into hydrogen and incorporated the cars into its fleet. Vehicles are now being leased to organisations such as the Science Museum Group and the National Trust, while Swindon Council has installed a second hydrogen station and may have more on the way, because Arval plans to have 170 hydrogen cars in the town by 2020[23].*
> Auto Express 2018

The hydrogen economy is discussed in more detail below in Section 2.6.3.

[22] Honda press release, 30 Oct 2014, UK's first commercial scale green hydrogen refuelling facility opens in Swindon
[23] http://www.autoexpress.co.uk/car-news/electric-cars/93180/hydrogen-fuel-cell-do-hydrogen-cars-have-a-future

2.5 Energy infrastructure

Power stations and renewable generators transfer the electricity they produce to customers via the grid, a national network of pylons, cables and transformers. It is made up of the transmission network and the distribution network. The transmission network is the backbone of the electricity network and moves large volumes of power at high voltage across the UK.

Each region is managed by a Distribution Network Operator (DNO) with responsibility for making new connections to generators ad to consumers while ensuring the supply is reliable. The DNOs are natural monopolies and are regulated by Ofgem. Their licences set the rules on what infrastructure they build and how it is maintained. It includes protections for consumers and limits on the amount they can charge.

2.5.1 Connecting to the distribution grid

Scottish and Southern Energy Power Distribution (SSEPD) is the DNO for Swindon & Wiltshire. While it is the duty of the DNO to always offer a new connection, this will include the cost of any necessary network upgrades which can be very high. These costs can be as a result of how the distribution grid is managed. At present it is a passive system. Electricity is generated and flows through it to consumers with little active operational management by the DNO.

DNOs are beginning a transformation to become Distribution Service Operators (DSO). This will introduce monitoring, control and automation to the network, creating a system operator role that is currently absent. This smart grid technology allows active management of supply & demand in real time making the network more flexible and able to offer more connections.

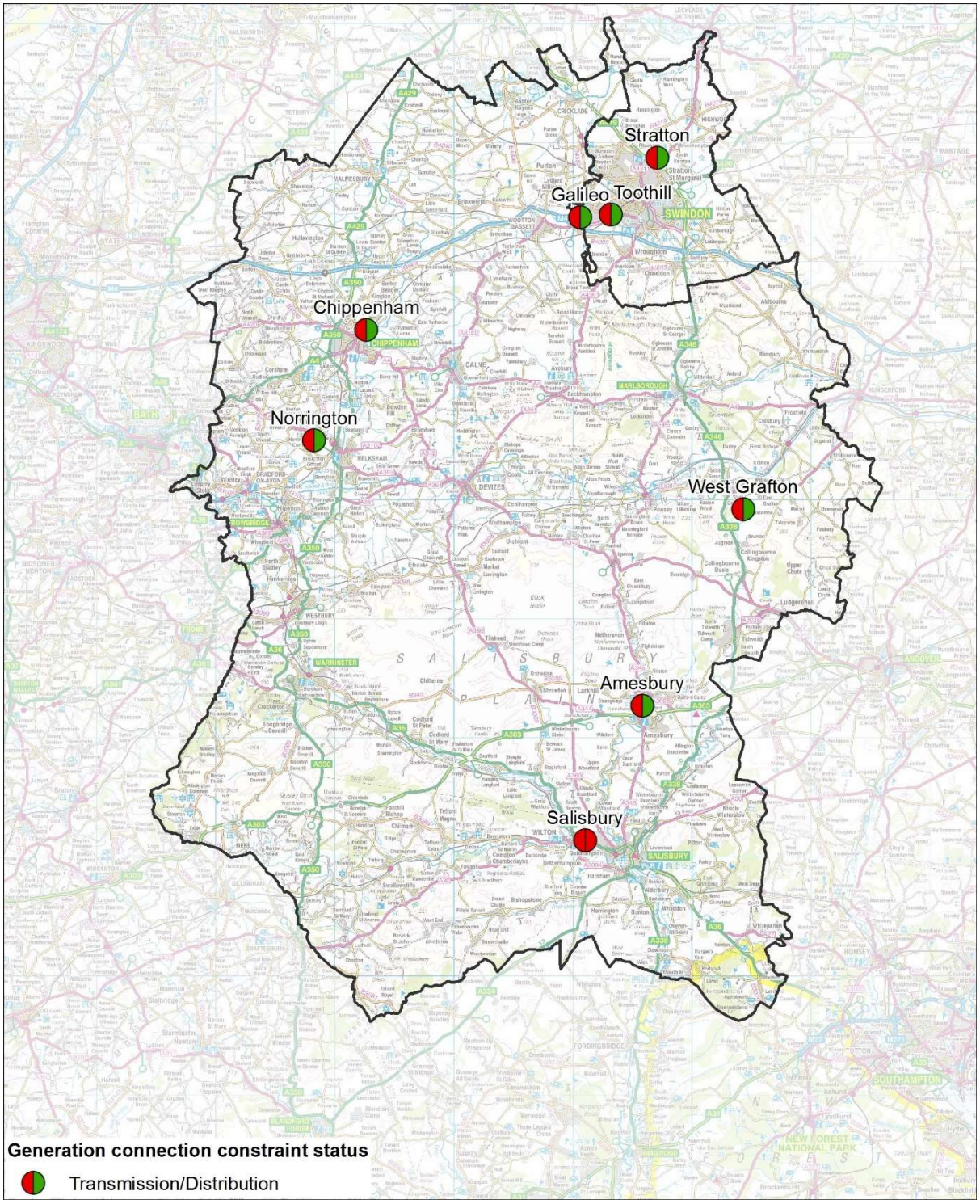
Three Grid Supply Points (GSP) serve Swindon and Wiltshire which are connected to nine Bulk Supply Points (BSPs) and then to 53 Primary Substations (PSSs). New connections for generation and for demand put different pressures on the network. For example, it would be possible to connect new strategic housing site, but not a new solar farm without significant upgrade to the BSP. We therefore look at generation and demand side connection capacity separately below.

2.5.2 Availability for generation connections

SSEPD's generation availability map[24] provides information on the availability of the distribution network for new large generation connections, above 5MVA. All nine BSPs (and their respective substations) are constrained at the transmission level. This means the electricity transmission system is unable to support additional generation on that part of the distribution grid due to congestion. This type of grid constraint is common across much of the country and is worse in some regions. Grid reinforcements would be needed before a large renewable generators, like a solar farm, could be connected. In addition, the Salisbury BSP is constrained at the distribution level. This means that distribution network capacity reinforcements would also be needed to connect new generators here[25].

[24] https://www.ssepd.co.uk/GenerationAvailabilityMap/?mapareaid=1

[25] Constraint indicators are based on the addition of at least 5 MVA synchronous generation. Smaller generators may still be able to connect subject to more detailed grid studies.



The generation connection constraint status of Bulk Supply Points (BSP) in Swindon & Wiltshire

The Power Potential Project

National Grid's Power Potential project[26] is encouraging renewable energy generators and energy storage systems to provide grid balancing services to help improve the performance of the local distribution grid.

National Grid has teamed up with UK Power Networks for this initiative which is piloting a Distributed Energy Management System that improves communication between National Grid and the regional DNO for the South East. It is creating new ways to manage grid constraints by coordinating local distributed energy providers through new commercial frameworks,.

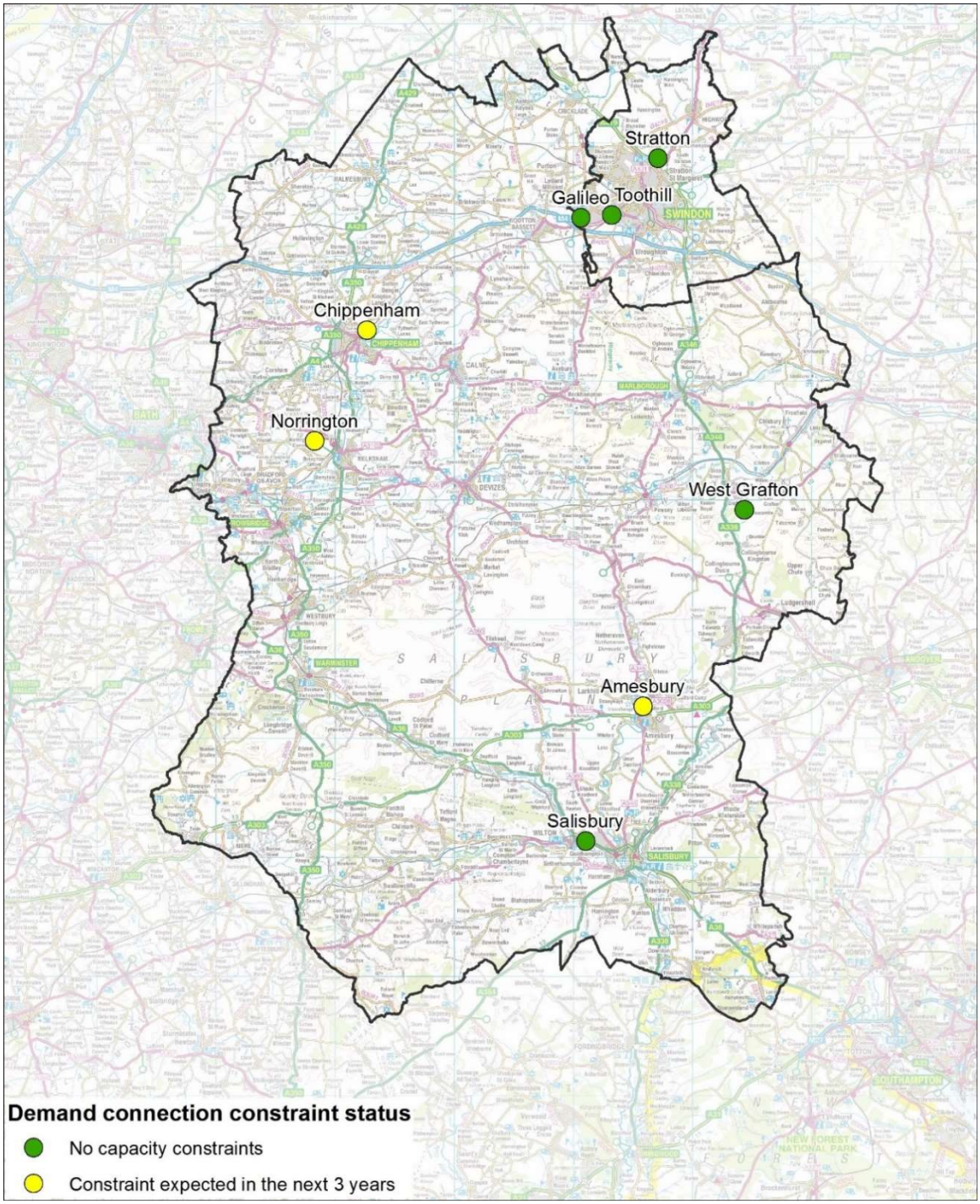
Power Potential could save energy consumers over £400m by 2050 while also increasing local generation.

2.5.3 Availability of demand connections

SSES also provide information on the availability of the distribution network for new demand connections based on firm capacity now and using forecasts for 2021/22. This gives an indication of the potential constraints to new development or significant increases in electricity demand from existing businesses now and in the near future. This is unlikely to impact businesses who are increasing power demand in small increments or within agreed capacity limits.

All nine BSPs in Swindon and Wiltshire are within their capacity limits today, with varying levels of remaining headroom. Amesbury, Chippenham and Norrington BSPs are not currently capacity constrained but could become so due to large load increases and are projected to become so within the next 4 years.

[26] https://www.nationalgrid.com/uk/investment-and-innovation/innovation/system-operator-innovation/power-potential



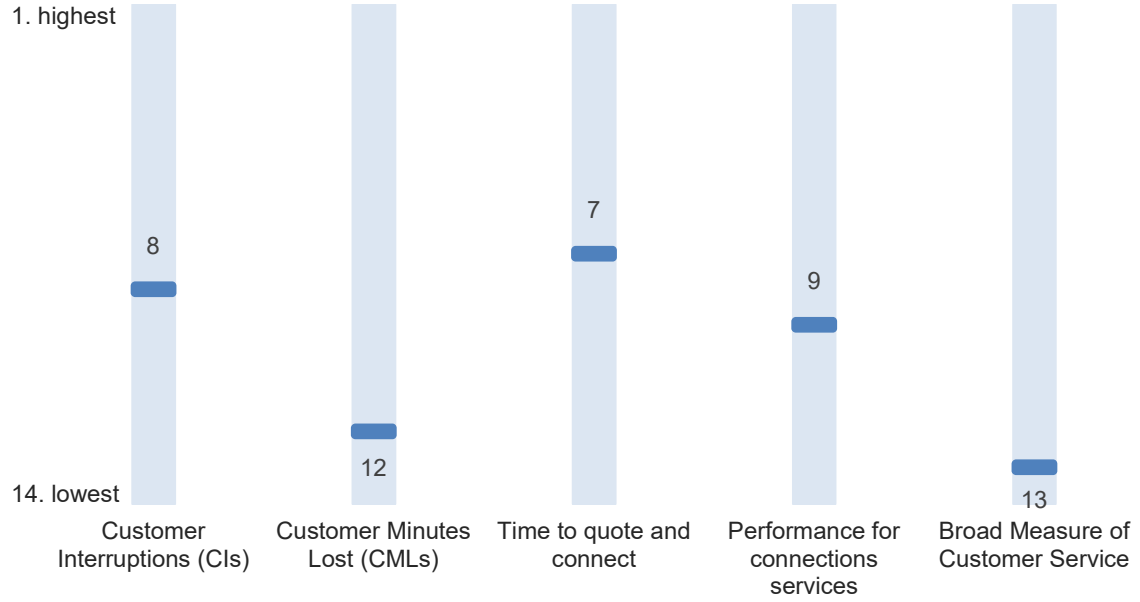
The demand-side connection constraint status of Bulk Supply Points (BSP) in Swindon & Wiltshire

This initial analysis is focussed on the BSP level. New connection requests may also be expected to contribute to reinforcement costs at primary and secondary substations level.

2.5.4 Power supply resilience

Distribution network operators are required to report their performance each year to the regulator as part of the RIIO network price controls[27]. These indicators provide an indication of the resilience of the power supply, through the number and duration of power disruptions, as well as broad measures of the connection process and customer service.

The figure below shows the performance of SSEPD compared to the 13 other DNOs in the UK. Of note is the below average performance in Customer Minutes Lost, the average length of time customers are without power per interruption. Customer service is also ranked below all but one other DNOs.



Ranking of SSEPD in the Energy Network Indicators against other DNOs

2.5.5 Summary

The electricity infrastructure in the Swindon and Wiltshire area is heavily constrained at the transmission level for generation. Large demand-side connections may also be constrained, depending on size and location that could act as a brake on private sector growth. In both cases more detailed strategic energy infrastructure evidence is required, and site-specific constraints can only be fully understood through SSEPD grid studies. The evidence could be used to inform revised Local Plan policies.

Smart grid technology is considered a fundamental pre-requisite to the deeper decarbonisation of the electricity supply. A government-backed report by the Carbon Trust[28] and Imperial College London presents detailed modelling of the potential value of energy storage as part of a smart grid in 2030. The cost of the UK's energy system could be reduced by up to £7 billion each year using smart grid technology, demand flexibility and energy storage. By making better use of existing infrastructure and enabling the emergence of new innovative business models. The development and deployment of smart grid technology is a key opportunity from the low carbon transition.

[27] Ofgem, 2016/17, Energy Network Indicators
[28] Carbon Trust (2016) Can storage help reduce the cost of a future UK electricity system? https://www.carbontrust.com/media/672486/energy-storage-report.pdf

2.6 Low carbon economy

Swindon and Wiltshire have a proud history of being at the forefront of industrial development, starting with the establishment of the GWR railway works in 1841. It has continued to make use of its natural advantages and strategic position, located within reach of other successful economic centres like Bath, Oxford, Southampton and London with good road and rail transport links.

Today Swindon & Wiltshire's economy has high levels of labour market participation and above average levels of productivity[29]. It has a vibrant base of SMEs, a large military presence and a cluster of automotive businesses. It has growing base of export-oriented businesses, bucking the national trend.

The SWLEP's Strategic Economic Plan highlights the low carbon economy as an important sector and acknowledges its potential to strengthen the competitiveness of businesses and to attract inward investment to the area. Low carbon technology is increasingly considered one part of more traditional sectors like manufacturing, construction and transport and creates opportunities to amplify existing economic strengths. Indeed, developing Swindon & Wiltshire as a nationally significant clean tech and hydrogen hub is already a stated objective. Improved energy efficiency and energy management also contributes to business resilience which is particularly important with on-going economic uncertainty, including as a result of Brexit.

2.6.1 The size of the local low carbon economy

In 2012 the government undertook a study of the economic value of the local carbon economy, with a broad definition of low carbon & environmental goods & services (LCEGS[30]). Total sales of LCEGS in Swindon and Wiltshire was estimated at £1.4 billion, around 1% of the £128 billion UK low carbon economy.

What data is available suggests that the local low carbon economy has been growing at a healthy 5-6% per year since then. In 2016 a different measure of the low carbon economy was adopted by the ONS based on the Low Carbon and Renewable Energy Economy Survey. It indicates that, nationally, the sector grew by 5% with employment up 3.3% to over 200,000. This trend suggests that LCEGS in Swindon & Wiltshire could be worth £2.1 billion in 2020 and £3.5 billion by 2030 compared to a GVA of £17 billion in 2016[31].

The low carbon sector is also an export opportunity and is also one of the fastest growing parts of the global economy. Research for the Committee on Climate change by Ricardo estimated that global trade in a low-carbon goods and services could increase to £1–1.8 trillion a year in 2030[32].

2.6.2 Local low carbon supply chain

BVG Associates have developed a snapshot of key aspects of the low carbon supply chain in the Swindon & Wiltshire area using published information, interviews with local business and their knowledge of the area.

Automotive sector

Swindon is already host to a significant number of automotive companies who employ over 9,000 local people. Around 10% of all the new cars made in the UK are produced in Swindon. Most are built for export to global markets, including elsewhere in Europe, the USA and Japan. SWLEP has examined this sector in their publication "Research, Design and Manufacture of New Energy Vehicles in Swindon and Wiltshire[33]. Information about the hydrogen fuel cell vehicle supply chain is presented below in Section 2.6.3.

[29] SWLEP, 2016, Swindon & Wiltshire Economic Assessment
[30] LCEGS is defined as 2,800 product and service from supply chain activities in the Environmental, Renewable Energy and Low Carbon activity sectors.
[31] Swindon and Wiltshire Economic Assessment 2018
[32] LSE, 2017, UK export opportunities in the low-carbon economy
[33] https://www.openaccessgovernment.org/wp-content/uploads/2017/12/Swindon-and-Wiltshire-ebook-web.pdf

BMW has a large pressing plant in Swindon. Panels are supplied to the Oxford Mini plant as well as others in Europe. It works with efficient press and sub-assembly technology to the high standards of the BMW Group. The plant and its 800 associates have gone through an extensive restructuring and modernisation programme. The focus for delivering environmental improvements is through understanding usage and improving the ways in which waste is removed from the process. Through understanding the supply requirements, the plant can actively choose sources that will be both environmentally, and economically effective. The main input to the Swindon plant is raw materials such as steel coil sourced from outside the region.

Honda UK Manufacturing has a fully integrated car manufacturing facility based in Swindon. HUM's first car plant was opened on 10th October 1992 and has a production capacity of 150,000 cars per year.

Having these two multinational car manufacturers in the region provides an economic and perception boost to the region. They bring agglomeration effects and are important to the economy and the local supply chain.

Dyson, based in Malmesbury, has announced a £2 billion electric vehicles development programme with a target to launch in 2020. Dyson has a 400-strong automotive team and is looking to recruit 300 more. It has acquired a US based battery company (Skati3) and is developing a 750 acre campus co-locating an Institute of Engineering and Technology at the Hullavington Airfield. The government has granted Dyson £16 million towards battery research here[34].

Johnson Matthey Fuel Cells manufacturing plant in Swindon is the world's first dedicated production facility for membrane electrode assemblies. They are a key component of the fuel cells that generate electricity from hydrogen and methanol. Johnson Matthey's fuel cells serve a number of sectors including vehicles, static power supplies and heat and power solutions for buildings.

Swindon and Wiltshire companies are already investing in the key innovations that will drive the future of the automotive sector. These range from reducing emissions, improved fuel consumption, electric vehicles, low carbon manufacturing and autonomous vehicles.

Swindon Silicon Systems, now owned by Sensata Technologies, is a global leader in complex custom mixed signal application specific integrated circuits (ASICs), sensor interfaces and micro-electro-mechanical systems (MEMS) pressure sensor solutions. Based in Royal Wootton Bassett, they provide the automotive sector with electronic systems and sensors to reduce fuel consumption and emissions. Their technology will also play a role in the evolution of autonomous vehicles in the coming years

AB Dynamics is based in Bradford upon Avon. It has a significant role to play in the development of autonomous vehicles. It is one of the world's leading specialists in automotive testing and clients include all the top global manufacturers.

Dymag based in Chippenham produce carbon hybrid wheels that are much lighter than standard wheels, improving fuel consumption and the range of EVs.

TE Connectivity is located in Swindon and is part of a global technology company. It develops EV charging solutions, battery-products and a line of connectors, relays, harnesses, contactors and disconnects to safely connect and protect the flow of data and power around hybrid and electric vehicles.

Other Swindon and Wiltshire companies in the automotive cluster do not explicitly provide a low carbon product themselves but may benefit from the low carbon supply chain. Examples are Arval, Cooper Tire & Rubber Co Europe, Dialog Semiconductor DTR VMS, Dynamatic, and Naim Audio. SWLEP should identify and support companies who are seeking to transition into the clean tech sector.

[34] https://about.bnef.com/blog/dyson-to-spend-1-billion-making-radical-electric-car

Low and zero carbon energy

The challenging regulatory climate for renewables, grid constraints and the reduction of subsidy schemes means that the volume of renewable energy installations has fallen in recent years. Tough market conditions mean that the local solar installer supply chain has shrunk considerably, with what remains consisting primarily of asset managers including operations and maintenance and some financial services organisations. Some installers have been able to diversify back into general electrical services, maintenance and scaffolding but many have ceased trading. Some of the diversification has been within the low carbon supply chain towards installing EV charging points.

Community energy

Community involvement in energy projects can yield important additional benefits. Community-led projects can retain more of the benefits locally and can bring investment in social and environmental infrastructure. Informed and engaged residents can influence energy projects, helping to address concerns about scale and sensitivity to the local context.

Swindon & Wiltshire has a strong network of community energy groups with many successful operational projects and more in the pipeline. The area is seen as a leader in community driven energy development and project financing. Organisations include:

- Public Power Solutions, wholly-owned by Swindon Borough Council, which has developed solar parks. They are a leader in developing new financial models, including working a financial service business to establish an ISA linked to the operation of one solar farm. With a Community Interest Company ownership model, PPS also runs municipal owned energy from waste facilities and has planning consent for a 50MW grid-scale energy storage system, which would be one of the largest in the country.
- Corsham based Mongoose Energy fosters community energy groups across the UK, helping them access funding and knowledge.
- Bath & West Community Energy in Trowbridge and Bradford upon Avon is one of the UKs leading energy cooperatives. It owns 12 solar projects and 3 small hydro projects.
- There are many other community energy groups including Nadder Community Energy and Salisbury Community Energy.

Electricity supply and distribution

Swindon & Wiltshire has two licensed electricity suppliers. Innogy is a subsidiary of RWE – owners of Npower – that is being refocused on renewable power generation following a recent acquisition, and Good Energy, a national company. Innogy with offices in Swindon owns larger scale renewables projects such as offshore wind farms and is developing new ones. Good Energy is based in Chippenham and supplies low carbon energy. It stands out for buying electricity from 143,000 customers who generate their own power[35].

Scottish and Southern is the distribution network operator for the region with offices in Dorcan, Melksham and Salisbury. They undertake all non-contestable new electrical utility connections and will operate, maintain and service the network including local teams that undertake trimming plants to avoid interference with overhead lines. Most electrical equipment will be sourced from outside the area.

There are a number of small consultancies active in low and zero carbon energy. These include BVGA Associates in Cricklade that works internationally in offshore wind and nationally in onshore wind and Swanbarton in Pinkney that works on the development and deployment of modern and smart technologies for electricity networks including storage. There are a range of niche providers of expertise and knowledge that link to the business needs and the type of resources of the area such as JMH Farming and Renewables which has expertise in the biomass market.

[35] https://group.goodenergy.co.uk/media/15426/2017-annual-report.pdf

Low carbon construction and energy efficiency

The construction industry employs around 7% of the Wiltshire workforce and 5.3% in Swindon. The use of low carbon construction techniques is expected to increase over the long term but the government's approach to low carbon construction remains unclear. As a result low carbon construction and energy efficiency schemes in the area are piecemeal and relatively small.

The energy efficiency supply chain of installers has been reduced and has become increasing fragile as publicly supported low energy retrofit schemes like the Green Deal have been reduced in scale since 2011. There is not a separate significant 'low carbon' supply chain for construction in Swindon and Wiltshire, though there are local leaders such as SMARTech-Energy. Increased ambition through smarter building standards and a reinvigorated approach to energy efficiency, at the local or national level, would provide a necessary basis for a growing low carbon construction and energy efficiency supply chain.

Energy from waste supply chain

Increasing concerns with the environmental impact of waste is leading legislation along with companies and consumers to improve waste management and to turn waste into a resource. Swindon & Wiltshire already has several successful energy from waste businesses and innovative start-ups.

Recycling Technologies is a start-up based in Swindon that is developing processes to turn end of life plastic into virgin plastic, wax and oils. The primary purpose is to provide raw materials for the petro-chemical industry but the oils can also be used as a fuel. At the pre-revenue stage, they have plans to develop a Swindon hub employing up to 400 people in the next four years.

Advanced Plasma Power Ltd (APP) based in Swindon is the world leader in waste to energy and advanced fuels technology. Its Gasplasma process provides an efficient, clean and scalable waste to energy and fuels technology. APP is also partners in the Gogreengas initiative developing bio-substitute natural gas.

Hills Waste Solutions' Northacre resource recovery centre near Westbury processes 60,000 tonnes of household waste per year and converts it into solid recovered fuel (SRF) using mechanical and biological treatment (MBT) for use in renewable energy plants. The centre is operated under a 25 year contract agreed with Wiltshire Council. The regions AD biogas installations are served by a number of Wiltshire based specialist consultancies including Malaby Biogas and Codford Biogas.

ARTIS, a division of Avon Rubber headquartered in Melksham, provides R&D in rubbers and polymers. Their innovative research into rubber recycling has increased the market for recycled products by increasing the understanding of how material perform during manufacture and in use.

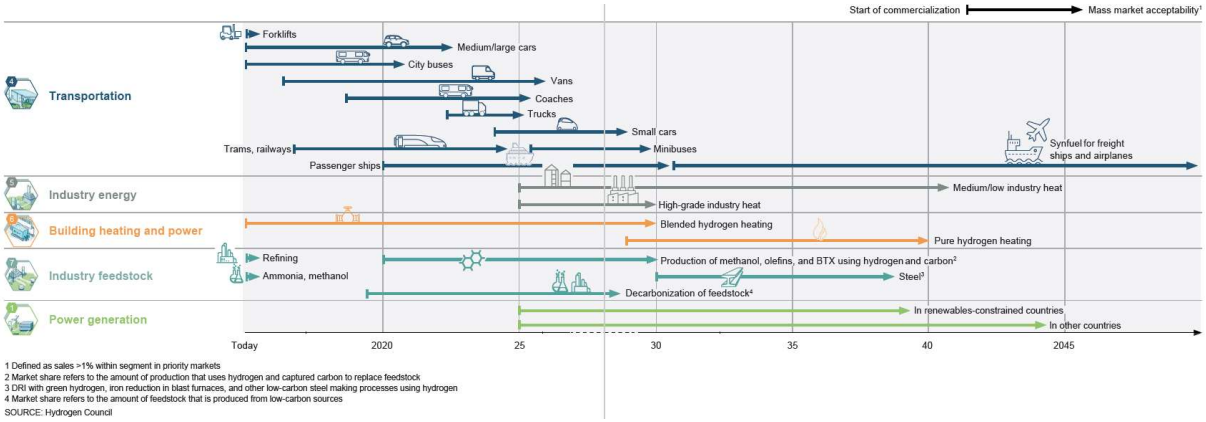
2.6.3 Hydrogen economy

Hydrogen has the potential to be an all-purpose clean energy source that can fuel our cars, homes and businesses without harmful emissions. If the hydrogen can be produced by electrolysing electricity generated by low carbon means the only by-product is water. It is flexible – it can be combusted for heating or fed into a fuel cell to produce electricity – which gives it the potential to become ubiquitous, earning the 'hydrogen economy' moniker. Pure hydrogen fuel needs to be manufactured – typically from natural gas or electrolysis – which helps make hydrogen a more expensive fuel. While the potential is near limitless, the cost of making the fuel has to date limited its uptake. Continued research and technology innovation have led to improvements which increasing the commercial opportunities for hydrogen.

The UK Hydrogen and Fuel Cell Industry estimates that the global fuel cell market could be worth $26bn in 2020 with a UK share of $1bn in 2020 rising to $19bn in 2050[36]. Momentum for hydrogen is building in early adopting countries, which includes Japan, Germany, California and China. These

[36] http://www.ukhfca.co.uk/the-industry/benefits/#fc

countries are pump priming hydrogen technology through deployment initiatives, targeted incentives and market scale-up mechanisms[37]. Some applications of hydrogen are more advanced than others and are being commercialised today. This includes transport applications and building heating and power. The mass market adoption depicted in the Hydrogen Council infographic below will need private and public efforts to be ramped up if they are to be realised.



Timeline showing how hydrogen technology could be deployed, Hydrogen Council

The hydrogen cluster

Swindon and Wiltshire have significant developments and investments in hydrogen technology and the area is emerging as a potential hydrogen economy cluster. The area is home to global brands with a stake in hydrogen technology including, Honda and Johnson Matthey which are part of the wider automotive cluster. SWLEP is the only LEP signatory to the Fuel Cell Hydrogen Joint Undertaking[38] a network of over 70 places in the EU actively working to open up their hydrogen economies.

The Hydrogen Hub was launched in Swindon and Wiltshire in January 2016 with the aim of supporting the commercialisation of hydrogen in order to capitalise on the global market opportunity. It is industry-led and has over 80 participating organisations from across the hydrogen and fuel cell supply chain. The Hydrogen Hub has led to over £1.5 million of investment into hydrogen and fuel cell projects in the region.

> *The Hydrogen Hub has been very successful in Swindon and Wiltshire, developing and deploying hydrogen and fuel cell projects which have established the region as a leader in these clean energy technologies.*
> Hydrogen Hub's Chairman, Kevin Fothergill

The Oxfordshire Hydrogen Hub was launched in March 2018[39]. It extends the Swindon and Wiltshire Hydrogen Hub to take advantage of the catalysts provided by the Oxford zero emission zone that has been announced. It provides an opportunity to look more widely to coordinate a critical mass for hydrogen infrastructure and deployment projects.

The hydrogen decarbonisation pathway

The Clean Growth Strategy illustrates different emissions reduction pathways that could be used to achieve the 2050 climate change targets. The 'Hydrogen Pathway' offers a vision of a hydrogen economy with widespread uptake of hydrogen fuel cell vehicles as well as injection of hydrogen into our existing gas infrastructure to deliver zero carbon gas heating to buildings.

The government is supporting research and innovation in hydrogen technology. This includes a £4.8 million Hydrogen for Transport Advancement Programme to create a network of 12 hydrogen refuelling stations. A £2million Fuel Cell Electric Vehicle Fleet Support Scheme aims to encourage public and

[37] Hydrogen Council, 2017, Hydrogen scaling up
[38] https://www.fch.europa.eu/
[39] https://www.hydrogenhub.org/2018/03/16/launch-oxfordshire-hydrogen-hub

private sector investment in hydrogen fuel cell cars and vans. Over £20 million has been awarded for Low Emission Freight and Logistics Trials with 20 demonstrations and trials of low and zero emission fleet vehicles, including hydrogen vehicles.

The Hydrogen for Transport Programme (HTP) was launched in August 2017 and is providing £23 million in grant funding[40] to accelerate the take up of hydrogen vehicles and fuel infrastructure. The new fund invites proposals from public organisations, businesses and hydrogen operators. The funding is supporting the construction of larger capacity Hydrogen Refuelling Stations.

The UK has a well-recognised and active research community focusing on hydrogen and fuel cell technologies, including:

- The H2FC Supergen network administered from a hub organisation at Imperial College London. It funds multidisciplinary research to impact energy policy.
- The Leeds City Gate project undertook a study which aims to determine the technical and economic feasibility of converting the UK gas network to hydrogen[41].
- National Grid Gas Distribution, together with Northern Gas Networks and the HyDeploy Consortium, has been awarded £6.8 million by Ofgem's Network Innovation Competition to pilot a hydrogen heating pilot scheme using Keele University's gas network in Staffordshire[42].

2.6.4 Energy research & innovation

The economy of Swindon & Wiltshire has above average levels of innovation with clusters of businesses in life sciences, advanced manufacturing and ICT sectors. This is as measured by rates of patents being filed, research and development expenditure per full-time employee and the percentage of staff employed in innovation-rich occupations.

This includes research into energy and clean technology. Records of publicly funded research provide an illustrative insight into the range and depth of energy innovation underway.

Research Councils UK and Innovate UK, the country's innovation agency publish information about their research grants and funding online[43,44]. Since 2004 local businesses have been involved in 295 projects with a total value of £82.2 million. Approximately a quarter of these projects (95) are energy related with combined value of £21.7 million (see table below).

Research themes	No of projects	Research value (£million)	% private funding
Emerging & enabling technology	3	0.6	58%
Built environment	8	0.7	11%
Energy	49	11.1	50%
Transport	22	5.9	48%
Sustainability	13	3.4	52%

The energy innovation projects cover a range of topics including emerging and enabling technology, transport and hydrogen. Selected examples are highlighted below.

[40] https://www.gov.uk/government/news/23-million-boost-for-hydrogen-powered-vehicles-and-infrastructure
[41] https://www.northerngasnetworks.co.uk/wp-content/uploads/2017/04/H21-Report-Interactive-PDF-July-2016.compressed.pdf
[42] http://media.nationalgrid.com/press-releases/uk-press-releases/east/boost-for-low-carbon-future-as-national-grid-scoops-11-million-for-ground-breaking-test-projects/
[43] http://gtr.rcuk.ac.uk/
[44] https://www.gov.uk/government/organisations/innovate-uk

All of the funded research is private sector-led due to the lack of local research-led universities. This is recognised by the SWLEP which is developing an ambitious plan for a new multi-campus university in the area. Issues relating to higher education provision may be linked to the large proportion of firms reporting skills gaps and low higher education participation in the local economy.

Commercialisation of plastic waste derived fuel for generating electricity

Recycling Technologies Limited (Swindon) have developed a technology (WarwickFBR™) to process end-of-life plastic waste and turn it into Plaxx™ an ultralow sulphur alternative to crude oil derived Heavy Fuel Oil. This technology can be used on sites where plastic is generated and then can be used in a generator set (on the same site) to generate electricity. The aim of this project is to conduct industrial trials and develop a partnership with an engine manufacturer to establish a pathway to market. Success of this project will reduce the plastic waste going to landfills and Energy from Waste plants and make plastics a more sustainable material.

Low emissions freight demonstration (Wincanton Holdings Limited)

This project will trial 81 dedicated gas HGVs which are new to the UK market. This project will create a wealth of valuable data on vehicle performance, fuel efficiency, reliability and cost. In addition five refrigeration units will use a prototype liquid nitrogen system, further reducing CO_2 and air quality emissions.

Green hydrogen for Swindon's public access refuelling and multi vehicle use

This 2.5 year project, at the Honda Swindon Manufacturing site, delivers solar energy generated hydrogen for the existing public access hydrogen refuelling station via a commercially available electrolyser into onsite storage. The hydrogen refuelling station is used to use material handling equipment and converted vans. The project will focus on the issues of integration of the whole system from the solar power source, to the implications of H_2 storage levels with varied use patterns. The project output will provide a detailed assessment of the value of the range of applications from an overall CO_2 saving, efficiency, duty cycles and commercial cost benefits.

2.7 Building energy efficiency and fuel poverty

The energy efficiency of our homes and workplaces will have to increase in order to meet our climate change commitments. 18% of UK carbon emissions come from buildings with a further 15% of from electricity consumed in buildings[45].

Swindon & Wiltshire includes areas of housing growth; this new development provides an important opportunity to reduce energy demand and emissions. It is far easier and cheaper to design and build energy efficient buildings than it is to undertake a deep energy efficiency retrofit in future. Retrofitting our existing homes involves cost and disruption but home energy efficiency is also strongly linked to the likelihood of being fuel poor. For example, you are 10 times less likely to be fuel poor if you live in a C rated rather than a G rated homes. In general people in old homes that are poorly insulated and not connected to the gas grid are mostly likely to suffer fuel poverty.

A household is considered to be fuel poor if it has higher than average energy costs which leaves them with a remaining income that is below the poverty line[46]. Being fuel poor often means living in cold and draughty homes that leads to poor health and wellbeing.

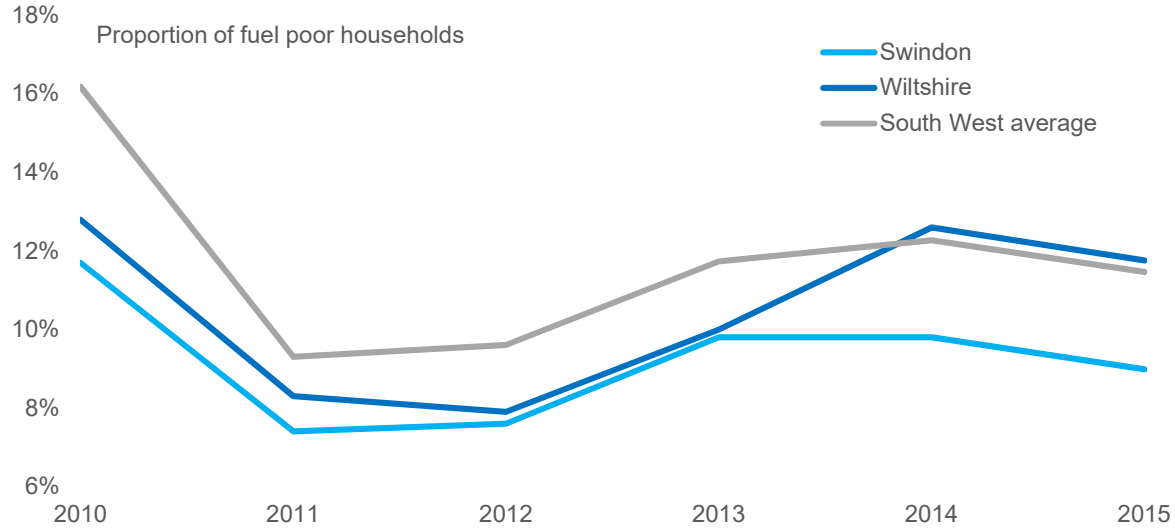
Approximately 2.5 million households were estimated to be in fuel poverty in England in 2015, around 11%. That was an increase of 0.4% over the year before. Fuel poverty is linked to household income, fuel prices and household energy requirements. Factors influencing household energy requirements include the type of house, its heating system and energy efficiency.

[45] https://www.theccc.org.uk/wpcontent/uploads/2016/06/2016-CCC-Progress-Report.pdf
[46] BEIS, 2015, Fuel Poverty Statistics

Energy efficiency in buildings is closely aligned with resource efficiency, with low water use fittings reducing energy demand associated with hot water while also reducing the impacts of new buildings on local energy and water supply infrastructure.

2.7.1 Local fuel poverty estimates

Sub-regional data for 2015 indicates that there were 32,300 fuel poor households in Swindon & Wiltshire in 2015, or 10.9% of all households. The rate of fuel poverty is above the national average in Wiltshire at 12% or 24,000 households. In Swindon it is below average at 9% or 8,300 households. The chart below shows how the percentage of fuel poor households has changed over time in Swindon & Wiltshire in comparison to the South West average.



Proportion of fuel poor households in comparison to the South West average

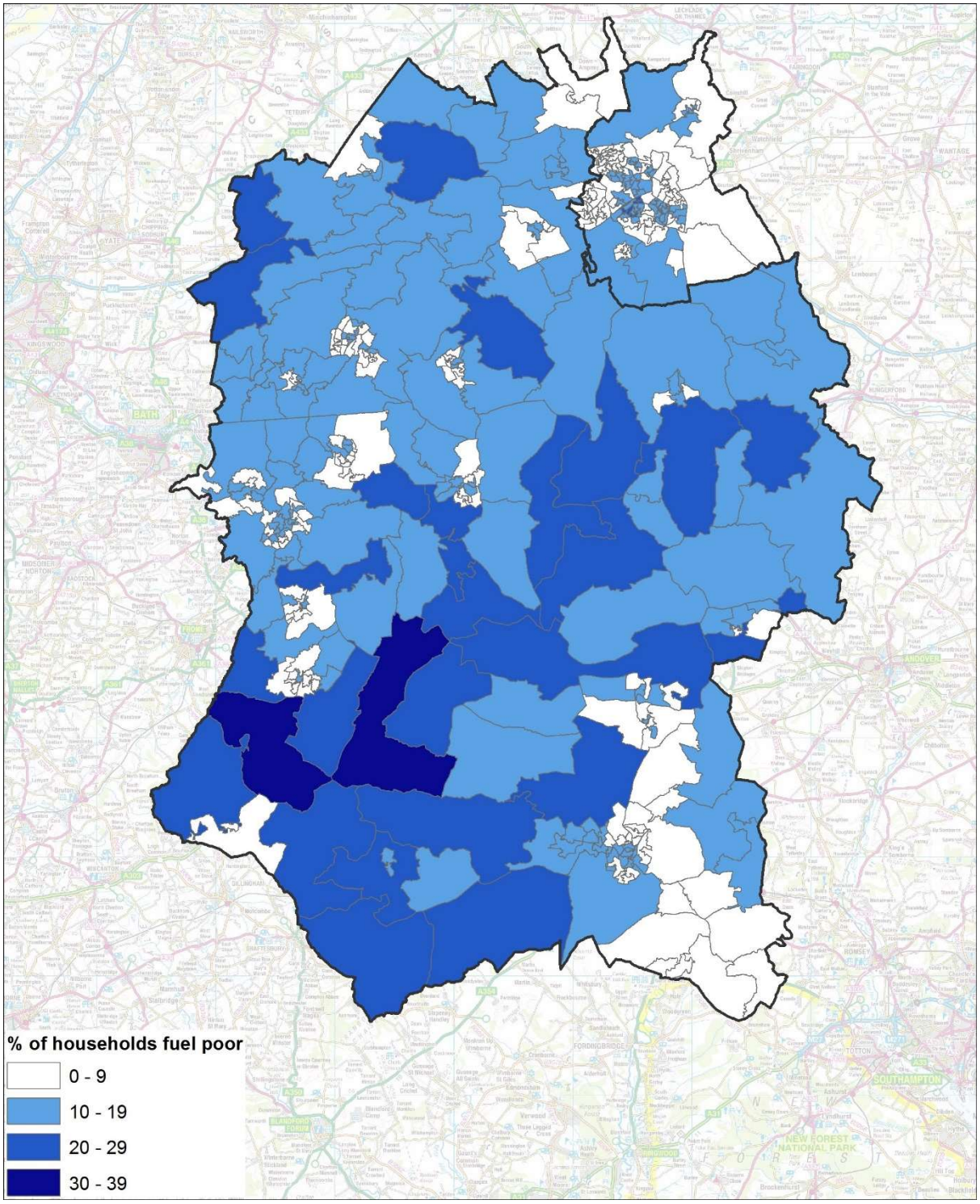
Swindon has one of the lowest rates of fuel poverty in the South West which may be attributable to the following factors:

- Its urban housing stock is relatively modern and includes few older housing that are hard to insulate.
- Almost 90% of homes are connected to the gas network which provides lower cost heating.
- Swindon BC have delivered energy efficiency programmes in the past, with most cavity walls now insulated.

Wiltshire's above average fuel poverty rate has been linked to:

- Many old solid wall properties which are hard to insulate.
- Large areas of the rural county are not served by the gas grid and rely on solid fuel, oil or electric heating.
- A number of mobile homes parks that are occupied all year round.

The map below shows where the highest concentrations of fuel poor homes are located.

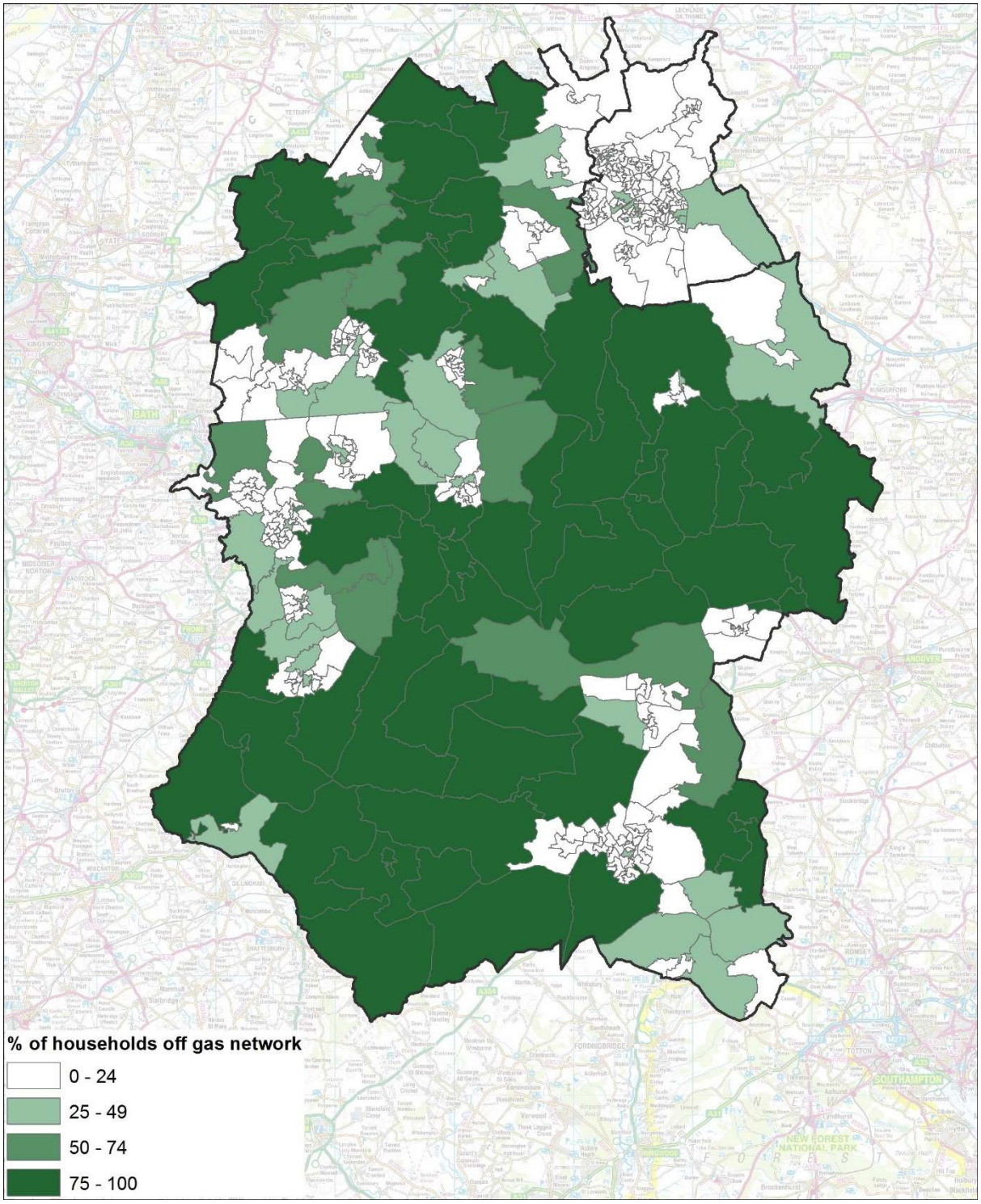


Map of areas with a high concentration of fuel poor households in 2015

2.7.2 Access to the gas network

Responsibility for the gas network in Swindon & Wiltshire is split between SGN, in the south and east, and Wales and West Utilities in the north and west. 15.5% of the 300,000 households are not connected to the gas network. The majority of these are in the more rural parts of Wiltshire,

particularly across Cranborne Chase and the North Wessex Downs. 17.7% of Wiltshire households are not connected in comparison to 10.7% in Swindon[47].



Percentage of households in SWLEP that are off the gas network

There is a clear correlation between areas that have a higher proportion of fuel poor households and those that are not served by the gas grid.

[47] https://www.gov.uk/government/statistics/lsoa-estimates-of-households-not-connected-to-the-gas-network

2.7.3 Tackling fuel poverty

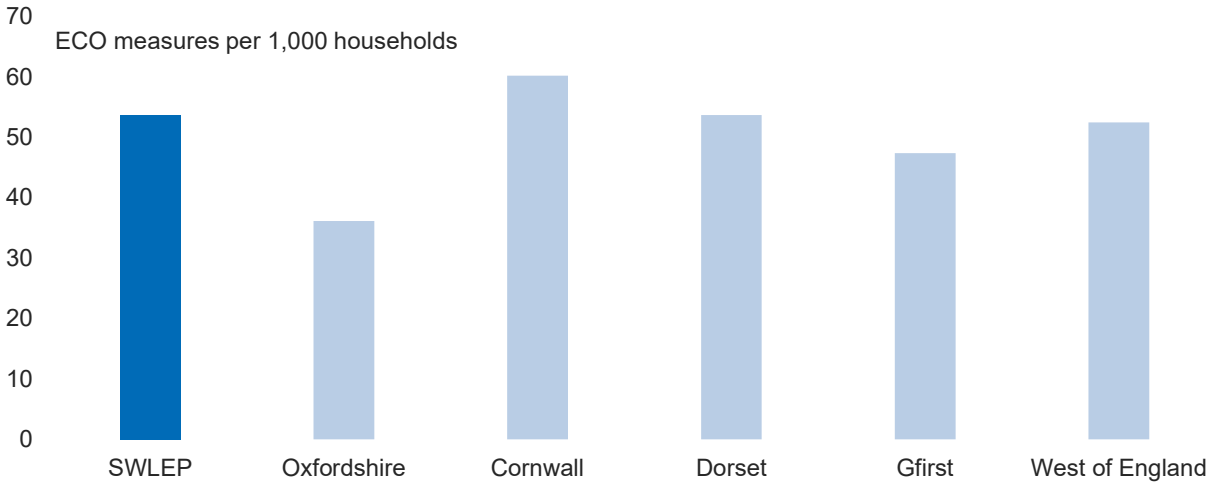
Measures to address fuel poverty through addressing household energy use are delivered through national and local programmes.

Swindon and Wiltshire partner on the Warm and Safe Wiltshire[48] scheme which is delivered by the Centre for Sustainable Energy and provides energy advice and information about tariffs, warm homes discount and access to energy efficiency grants. While telephone advice services are open to all, they are targeted at people with lower incomes and health conditions, given the important relationship between public health and cold homes. Efforts are being made to increase the uptake of services through adult social care and health referrals among others.

The Energy Company Obligation (ECO) is the government's main policy to address fuel poverty. It requires energy suppliers to deliver energy efficiency measures to fuel poor households. The ECO is made up of the following three obligations:

- The Affordable warmth scheme to improve the affordability of domestic heating. Measures include insulation, boiler replacement and central heating upgrades in fuel poor households.
- Targeted funding for insulation in hard to heat properties. This component will end in 2018.
- Help households in the most deprived rural areas. This component ended in 2015.

15,890 ECO measures were installed in Swindon & Wiltshire up to September 2017, 54 per 1,000 households[49]. The rate is higher than for comparable LEP areas. While more measures have been installed in Wiltshire (9,321) than in Swindon (6,569), Swindon's rate of installation is much higher at 71 per 1,000 households, higher than for most South West local authorities.



ECO Energy efficiency measures installed per 1,000 households

The government is consulting on changes to the ECO scheme and is committing £640 million per annum of funding until 2022[50]. It indicates a greater focus on the Affordable warmth scheme in future, more support for measures in solid wall homes and it expands eligibility for help to households claiming child benefit, disability benefits, in addition to the fuel poor, 6.5 million in total.

There are three aspects of particular relevance to Swindon & Wiltshire:

- There will be an expanded role for local authorities in identifying households to the scheme. The Flexible Eligibility element allows up to 25% of measures to be referred by local authorities.

[48] https://www.warmandsafewiltshire.org.uk/
[49] BEIS 2018 Household Energy Efficiency National Statistics
[50] BEIS 2018 Energy Company Obligation ECO3: 2018 – 2022

- It proposes a target to improve the equivalent of 17,000 solid walled homes per year.
- It aims to provide a route to market for innovative measures and new products.

2.7.4 Energy efficient new buildings

The 2013 building energy regulations remain in force today. They requirements comprise a fabric energy efficiency standard the home must meet, at a minimum. In addition, a carbon compliance limit ensures that carbon emissions are reduced through energy efficiency above the minimum standard or low and zero carbon heat and power. While requiring better energy conservation than 10-20 years ago (2013 required a 6% uplift in target emissions rating over 2010 levels), the emissions from new home today are not consistent with our long term climate change commitments and will need to undergo a deeper energy efficiency retrofit in future.

The Swindon & Wiltshire Strategic Housing Market Assessment 2017 established that the assessed need for housing over the 20-year period 2016-36 is 73,000. If these homes are built to the current minimum home energy performance standards they will increase the area's total domestic heating demand by 10% or more along with a growing demand for electricity.

The draft of the new National Planning Policy Framework (NPPF) continues to provide significant support for renewable and low carbon energy and sets out how LPAs should proactively respond. One of the core principles that underpins the draft NPPF is that planning should support the transition to a low carbon future.

> "New development should be planned for in ways that…can help to reduce greenhouse gas emissions through its location, orientation and design."

While changes to the national policy context for housing in recent years have led to confusion and uncertainty about what can and cannot be done to raise the energy performance of new buildings, recent clarifications have led to renewed local authority momentum towards increased local energy standards.

Many larger cities have adopted ambitious zero carbon policies of their own as well as those requiring building integrated renewables. For example, Leeds requires all developments with 10 homes or more to reduce emissions 20% below the current 2013 building regulations. South Gloucestershire Council are considering options for meeting a net zero emissions standard, potentially through a 19% reduction in in emissions below 2013 building regulations combined with on-site renewables and off-site carbon reductions, in line with the 2016 zero carbon homes policy.

2.8 Energy evidence summary

The analysis of local energy evidence provides the basis for targeting interventions in the energy sector. In combination with stakeholder consultation it has helped identify Swindon & Wiltshire's distinctive strengths and the opportunities as well as its challenges and constraints. The local context must of course be understood within the broader changes to the energy system underway nationally as well as global technological and political developments.

The big energy sector trends that the strategy needs to take into account include:

The continuing transformation of the electricity system

- Innovation & new products are reducing energy consumption.
- A continuing shift towards low & zero carbon electricity. Coal generation is heading towards zero.
- A move towards active management of power networks is making them more efficient & resilient.
- Decentralised generation, demand side response and energy storage are increasingly important providers of grid security & flexibility.

A low carbon transport revolution is beginning

- Pure electric vehicles are increasingly competitive on a whole life cost basis. Falling battery prices will soon make up-front costs comparable, driving uptake.
- An increasing range of EVs from the major marques and new producers mean they will become the mainstream choice for new vehicles in the 2020s.

Grasping the clean growth economic opportunity

- The low carbon economy is already a significant and growing part of the UK economy.
- Low carbon energy technology is expected to become a £1trillion a year global export opportunity.
- Hydrogen sector is already working together in order to realise the benefits of transformative products and processes by energy consumers.

Taking on the decarbonisation challenges

- Ensuring the energy supply is reliable, affordable and accessible.
- Decarbonising heating & identifying a viable route towards the widespread use of green gas and/or electrification.
- Delivering infrastructure & development that is consistent with the long term emissions trajectory.

3 SWLEP's strategic energy priorities

SWLEP is committing to concerted and sustained action to grow the local low carbon economy. SWLEP's role in supporting commerce and investing in growth means it is well placed to make an important contribution toward energy and climate change goals. SWLEP is intent on taking a wide-ranging role in the energy and sustainability agenda; making the connections between energy, circular economy and water efficiency.

SWLEP is prioritising action where it can have the greatest impact and where it aligns with its existing objectives. Delivering public energy infrastructure, addressing market failures and creating the enabling environment for increased clean economic growth.

To achieve the above, SWLEP's strategic energy priorities are therefore:

- Smart grid and mitigating constraints
- The transition to electric transport
- Hydrogen technology innovation and deployment
- Low carbon growth

The energy strategy priorities have been established through analysis of the evidence collected and through stakeholder consultation. They combine distinctive interventions that respond to the characteristics of the local economy, like hydrogen technology, with a recognition that SWLEP should also support clean growth across all sectors, contributing to a diverse, productive and clean local economy over the long term. It also recognises that there many opportunities to take advantage of new and cleaner energy technology that will be common to LEPs across the country where shared efforts can deliver infrastructure that secures the benefits of new energy technology.

The strategic priorities are described below along with key actions to deliver them.

3.1 Smart grids and mitigating constraints

The lack of affordable access to electricity network capacity is a constraint to new development in Swindon and Wiltshire. Without access to grid capacity growing businesses might decide to expand elsewhere and new employment sites fail to come forward. Accelerating the development of a clean, flexible and resilient power system unlocks economic growth. Investing in strategic energy infrastructure will make Swindon & Wiltshire a more attractive place to establish and grow a business. This strategic priority can help enable a wide range of energy activities and aligns strongly with SWLEP priorities and remit.

3.1.1 Electricity infrastructure study

SWLEP can play a more active role in de-risking strategic development sites and making them more attractive locations for investment. A robust understanding of the area's energy supply infrastructure, current 'pinch points' and how proposed new development and growth will exacerbate network strain will provide a basis for SWLEP energy infrastructure investments.

An energy infrastructure study would model energy demand from homes and workplaces to 2036 while taking account of new consumption from the electrification of transportation and heating in order to identify where capacity is anticipated to become constrained. This provides the basis for identifying solutions, which could involve prioritising sites through the planning and investment process, by securing upgraded power infrastructure or with on-site flexibility. This evidence could contribute to the emerging Local Plans to inform site viability assessments and plan allocations.

3.1.2 Flexible connections

A typical connection agreement gives full access to the grid at the agreed capacity forever regardless of whether it is fully used or maximises benefits. While this gives long term certainty to the individual, the underutilised capacity has a big impact on the overall system when grid capacity is scarce, as in Swindon & Wiltshire.

Flexible connection arrangements let new users make use of this underused capacity if they are willing to reduce their consumption during peak times, at certain times of the day or year. These 'non-firm' connection agreements can be cheaper because they avoid the need for expensive network reinforcements.

For the energy consumers, a flexible connection could mean having an onsite generator or energy storage system on site to guarantee electricity supply. Many commercial processes also have some flexibility allowing demand to be reduced for short periods without affecting productivity. For new renewable energy generators, a flexible connection could mean curtailing generation on the sunniest or windiest days or co-locating energy storage.

The benefits of flexible connections: savings example

Connecting a new business to the power supply costs £50,000 but the need to reinforce the network increases costs to £350,000. Alternatively, a flexible connection would cost £80,000 (with additional costs for control software and sensors) with the connection curtailed 2-3% of the year.

SSE have already started to introduce flexible connections for new generation. Flexible connections for energy consumers in Swindon & Wiltshire are expected to become available in the next 12 months, part of SSE's emerging South of England Active Network Management scheme.

3.1.3 Electricity infrastructure

A flexible connection will not be suited to all businesses or new development sites and may not be able to avoid the need for substantial grid reinforcements. Energy infrastructure is an increasingly prominent constraint in some areas and de-risking strategic development sites makes them more attractive locations for investment. There are a range of mechanisms through which SWLEP can invest in energy infrastructure, including commercial partnerships with energy flexibility operators or through public energy service companies like PPS. Securing upgrades to power infrastructure could be used to bring forward well located renewable energy projects that are sized to drive growth in the local economy. SWLEP can consider taking an ownership stake in energy infrastructure.

3.1.4 Energy storage

Energy storage has a vital role to play in transforming our power supply. Storage, working in tandem with smart grid technology can make the national grid more dynamic and resilient. Energy storage does this by flexibly offering to fulfil a range of different functions, including helping energy consumers to manage their energy demand, mitigating local grid constraints, and storing energy from renewables to smooth variable supply. These permit network capacity to be used more effectively and efficiently, facilitating demand growth and allowing more renewable capacity to connect to constrained distribution infrastructure. SWLEP can ensure that Swindon & Wiltshire benefit from the deployment of energy storage by creating a good investment climate:

- Using an electricity infrastructure study to identify areas where energy storage can maximise local benefits to the DSO in future.
- Working with the local authorities to ensure positive planning for energy storage in revised Local Plan policies and with officer guidance.
- Supporting the delivery of consented prospective schemes, such as the consented 50MW Li-ion storage proposal in Swindon initially developed by PPS.

3.1.5 Network operator collaboration

SSE is becoming a Distribution Service Operators (DSO) in order to address the need for grid flexibility. The transition to DSO holds the potential to ease the connections process, increase the availability of flexible connections and facilitates the emergence of new network investment mechanisms and energy markets. Markets for local network services are expected to be in place in 2021/22.

The DSO's goal will be to reduce connections costs by favouring flexibility services. They will also create local markets for third parties to provide flexibility services. For example, this could be a local demand response market around a heavily constrained substation.

Network Innovation project examples

SSE is a partner in the Optimise Prime innovation project which will be a large data-driven electric vehicle trial that will generate knowledge about business use of EVs and how charging can be optimised for the network.

WPD's Heat and Fleet Hydrogen Heat and Fleet Viability Assessment is researching the use of hydrogen electrolysers to balance renewable energy generation to enable further generation connections. The stored hydrogen gas will be used to in a fuel cell to heat and power a building, combined with electricity output and in hydrogen vehicles.

The DSO transition requires deep technical and organisational change and will happen incrementally over the next five or more years. Flexible connections offers will be followed by the roll out of targeted constraint management zones. A South of England Active Network Management zone is also to be introduced.

3.1.6 SWLEP actions

Action/project	Timeframe	Intervention description
Strategic energy infrastructure investment plan	Short	Identify energy infrastructure projects prioritising investments that help deliver development/business growth, but also generation. This would indicate the nature of the constraint and the options for overcoming it, prioritising clean and flexible solutions.
DNO strategic collaboration	Short	Enhanced strategic collaboration with SSE to improve the sharing of knowledge, included future energy demand from site allocations, pre-planning enquiries and site planning progress.
Positive planning for energy storage	Short	Creating a positive planning and investor (ie; end-user engagement) framework for energy storage will encourage development to come forward where need is greatest. This can help reduce local network constraints and bring forward the benefits of DSO over the medium term.
On-site flexibility to overcome grid constraints	Medium	Encouraging use of flexible connections, private wire connections and clean on-site generation to bring forward constrained developments at lower cost and to allow businesses to overcome electricity-related constraints to growth. SWLEP provides advice or technical support. This could also include direct support to pathfinding projects (on-site generation, storage or DSR) for replication.
De-risking strategic employment sites	Medium	Strategic investments in site grid infrastructure, prioritising flexible and smart grid energy technology, to make development sites more attractive to inward investment

Network innovation	Long	Explore options with SSE for network innovation projects to address local challenges or exploit opportunities. Active engagement to bring DSO pilots to Swindon and Wiltshire.

3.2 Hydrogen technology innovation and deployment

Swindon and Wiltshire can be a nationally significant leader in hydrogen technology. SWLEP will grow the existing cluster of hydrogen technology businesses, it will work with neighbouring LEPs and local authorities to increase hydrogen innovation and will support trials that deploy hydrogen to enable new commercial applications. SWLEP will support hydrogen fuel cell passenger cars as part of its comprehensive approach to new energy vehicles described in Section 0.

3.2.1 Growing the local hydrogen economy

Hydrogen has the potential to be an all-purpose clean energy source that can fuel vehicles, homes and businesses without harmful emissions. While the market for hydrogen technology is less mature than for some competing technologies there is huge potential for growth.

SWLEP has been a supporter of hydrogen technology commercialisation and is helping the region to capitalise on the global opportunity. SWLEP has worked closely with the Hydrogen Hub who have been instrumental in building hydrogen transport infrastructure in Swindon and in demonstrating the technology, including leasing fuel cell vehicles to local businesses.

SWLEP can build upon this distinctive feature of the local economy by making a long term commitment to the hydrogen economy. This should include a deeper engagement with industry and a shared roadmap of actions and investments that can support growth.

SWLEP will be ideally placed to support the delivery of hydrogen infrastructure in response to new deployments and emerging demands. This could include strategic supply infrastructure, like the generation of green hydrogen, or more tactical demand side pathfinding deployments, like the use of hydrogen forklifts in distribution centres and logistics.

The Committee on Climate Change will be publishing its Hydrogen Review later in 2018 and will include a review of the importance of hydrogen in meeting the UK's long term carbon targets across all sectors including the heating of buildings, in transport and in industry. A roadmap will help SWLEP respond tactically to any near term opportunities that arise which could be catalysts for hydrogen technology innovation and deployment.

3.2.2 Hydrogen research and innovation

Many prospective applications of hydrogen are still in the lab and the local cluster of hydrogen technology businesses are already working closely with research and technology institutions. The government has reaffirmed support for research through the Industrial Strategy and Clean Growth Strategy. Commercialisation is being driven through the £23 million Hydrogen Transport Programme and the £5 million BEIS Hydrogen Supply Programme.

Swindon & Wiltshire does not have a major research institution and this could hamper the growth of the cluster. The SWLEP will explore the business case for a hydrogen focussed research and technology institution as part of its aim for a multi-campus university to be located in Swindon & Wiltshire, or to support such an institution in the wider region. There are several automotive focussed facilities nearby which could be potential candidates, including the University of Bath's £60 million Institute for Advanced Automotive Propulsion Systems that is being developed further along the M4.

3.2.3 Hydrogen heating

While attention has focussed on hydrogen fuel cell vehicles, green hydrogen is one of the routes towards decarbonised heating and could be a low carbon replacement to natural gas serving boilers and appliances. The National Infrastructure Assessment[51] recommends demonstrations are undertaken in order inform the long term approach to decarbonisation, including establishing that it is safe to replace natural gas with hydrogen, and progressively larger hydrogen heating trails including at least 10,000 homes.

3.2.4 SWLEP actions

Action/project	Timeframe	Intervention description
Grow the hydrogen economy	Short	Comprehensive road map to growing hydrogen economy delivered by SWLEP to include: • Working with the Hydrogen Hub and collaboration with the Oxfordshire Hydrogen Hub • Strengthened relationships with industry • Encourage utilisation of hydrogen infrastructure • Lobby government to increase the funding available for hydrogen deployment • Attract technology innovation funding
Hydrogen infrastructure & deployment	Medium /long	Maintain and grow hydrogen infrastructure in response to new deployments and emerging demands, including the generation of green hydrogen. Support the deployment of hydrogen transport applications, potentially including fuel cell forklifts, vans and HGVs in distribution centres and logistics operations.
Hydrogen research and technology institutions	Medium	Build business case for a hydrogen focussed research and technology institution to be located within Swindon & Wiltshire or the surrounding region.
Hydrogen heating trials	Long	Support to hydrogen heat and fuel cell CHP demonstration projects, including direct support to demonstration projects at neighbourhood scale or in partnership with public sector organisations.

3.3 The transition to new energy vehicles

A low carbon transport revolution is underway and new energy vehicles –battery electric and hydrogen fuel cell vehicles - are becoming increasingly commonplace. A comprehensive network of charging infrastructure and fuelling stations will accelerate the transition and will make sure that new energy vehicles are a viable option in both urban and rural areas.

3.3.1 Charge point network

The replacement of the internal combustion engine with zero emissions battery electric vehicles is now widely predicted and the range of benefits – from air quality to running costs – are well described. But it will only happen where a coherent network of chargers that make both local every-day and long distance journeys easy. The UK Government in the Industrial Strategy[52] and the Clean Growth Strategy[53] highlight the ambition to develop one of the best electric vehicle charging networks in the world. This ambition is being kick started with the Automated and Electric Vehicles Act 2018[54] which will require service stations to provide public charging points. Through its interoperability and data provisions it intends to ensure that chargers have common access and payment methods and are

[51] https://www.nic.org.uk/wp-content/uploads/CCS001_CCS0618917350-001_NIC-NIA_Accessible.pdf
[52] https://www.gov.uk/government/policies/industrial-strategy
[53] https://www.gov.uk/government/publications/clean-growth-strategy
[54] http://www.legislation.gov.uk/ukpga/2018/18/contents/enacted/data.htm

'smart' so that they contribute to grid stability, instead of threatening it. The Road to Zero[55] strategy includes a number of other provisions including proposals for charge points to be built into new street lighting and designed in to new homes.

The Plugged in Places scheme[56] was a multi-year project sponsored by the Office for Low Emission Vehicles which encouraged local authorities to set up plug-in vehicle charging schemes.
The lessons from Plugged in Places should be used to ensure Swindon & Wiltshire's scheme is a success. This means public sector interventions in the EV charging network should be strategic and should complement private chargers and should invest for the long term to ensure that redundant technology is not installed. Prioritising investment in the most important locations and ensuring that they are well managed will maximise the benefits.

Many chargers will be provided by the private sector in response to demand and will be operated at car parks to attract customers. But strategic interventions from the public sector will be needed to provide the infrastructure needed by early adopters and to create a critical mass of accessible fast, rapid and superchargers to catalyse wider adoption. This could include hospitals, schools and public and car parks. Charging at transit nodes like train stations and park and rides will make multimodal journeys viable. Access to charging must also be equitable. Private sector installed EV charge points will appear first on busy roads and in town centres where they can will be used most. Rural areas and shared on-street residential charging in contrast are more likely to be underserved which could slow the pace of adoption.

There are different models for delivering charging network and involving independent specialist operators can be an effective way to manage the technology and delivery risks. A range of ownership and partnership approaches should be considered at the outset and SWLEP should ensure that sufficient resources are made available to deliver the chosen option.

3.3.2 Hydrogen refuelling stations

While battery electric appears to be securing a dominant lead in the passenger vehicle market, there are many potential niche applications for hydrogen fuel cell vehicles. Swindon & Wiltshire's distinctive hydrogen economy and existing hydrogen filling stations makes it a unique place for trials and deployments. In addition to supporting the two publicly accessible hydrogen fuelling stations in Swindon SWLEP will explore strategic expansions to allow travel across the region, potentially with a 'hydrogen highway' along the M4 corridor.

3.3.3 Public sector new energy vehicles

The public sector can lead by example and should add new energy vehicles into the public sector fleet, starting where whole life benefits are greatest. The public sector is uniquely placed to account for lower whole life costs in its purchasing decisions. Adopting EVs early can help each service gain practical experience which will help shape a wider rollout in future. This would include the local authorities but also the fire service, NHS and police for example. As well as reducing whole life operating costs and tackling pollution, it also induces demand for the charge point network roll out.

New energy vehicles offer huge potential in public transport and electric buses and taxis are becoming a cost effective option. SWLEP can play an important role in bringing their adoption forward – benefiting from the experiences of electric buses in Salisbury - with an integrated package of support that includes the rollout of associated charging and refuelling infrastructure.

[55] Department for Transport 2018, The Road to Zero Next steps towards cleaner road transport and delivering our Industrial Strategy
[56] Lessons Learnt from the Plugged-in Places Projects

3.3.4 SWLEP actions

Action/project	Timeframe	Intervention description
EV charging infrastructure plan	Short	EV charging plan to establish a strategic basis for the deployment of an EV charge point network across Swindon & Wiltshire that compliments and supports private sector installations and meets the needs of rural areas to ensure broad access and equity. Links to be made to the strategic energy infrastructure investment plan. This could identify the need for further actions such as the installation of charge points at workplaces and the electrification of company vehicle fleets.
Grow and maintain the public EV charge point network	Medium	Deliver a comprehensive EV charge point network in Swindon & Wiltshire, including: • Public sector estate and transport nodes • Rural EV charge points • Helping businesses to deploy EVs Explore how charge points on public sector estate could be built, operated and maintained using charge point operators. Establish governance mechanisms to ensure an equitable and accessible network is maintained and that it adapts to need for expansion and technology developments. Ensure that information about the availability and status of charge points is accessible through a range of sources and apps.
Support the roll out of high power EV chargers	Medium	A core network of high power rapid chargers at petrol stations and transport node car parks will be key enabler for widespread EV uptake. This may be constrained by available grid capacity. Targeted network investments to help overcome grid constraints where necessary.
Convert the public sector fleet to new energy vehicles	Medium	Direct support for shifting public sector vehicle fleet to new energy vehicles in Swindon & Wiltshire across the LA, police, NHS etc.) Support the rollout of associated charging and refuelling infrastructure.
Deploy electric buses and taxis	Medium	Electric buses and taxis are becoming a cost effective option. SWLEP to engage in investment planning for local public transport and support to bus fleet upgrades. Electric vehicle subsidies for tax drivers. Package of incentives could include purchase rebate and reduced licencing fees.
Hydrogen refuelling stations	Short/ Medium	Complete deployment of 2 refuelling stations. Maintain and grow the hydrogen infrastructure network in response to new deployments and emerging demands. Explore how partnerships can deliver a wider network of refuelling stations, such as along the M4 corridor
Charging infrastructure as part of new developments	Medium	Promote a planning requirement for EV charging infrastructure in new strategic developments. Building in EV charging as part of development masterplans will ensure that high quality and accessible infrastructure is designed in from the outset.

3.4 Low carbon growth

The aim of SWLEP is to stimulate local growth and increase productivity. Looking ahead, the low carbon economy will be increasingly integral to that. SWLEP will support clean growth in the business community and it will help Swindon and Wiltshire deliver a sustainable physical growth pattern, consistent with the long term decarbonisation pathway. This will include:

- Embedding low carbon growth in SWLEP's decision making
- Low carbon construction and development

3.4.1 Embedding low carbon growth in SWLEP's decision making

In addition to growing the size of the clean technology sector, the SWLEP can help all businesses grow in a low carbon way by embedding new processes in its decision making and the way it fulfils its core functions. By prioritising funding for projects that are consistent with energy objectives, by offering preferential loan rates to low carbon investments and demanding enhanced standards in infrastructure the SWLEP can drive broad improvements in the local economy. SWLEP will review how its funding opportunities can be aligned with the energy strategy objectives. SWLEP will need to develop a consistent and transparent criteria-based approach to making these decisions.

SWLEP will require dedicated effort and access to energy expertise if it is to embed low carbon in all its decisions, services and investments. This increase in capacity will enable partnership working and coordination with the DNO, the local authorities and other key partners but will also allow it to tactically respond to competitive funding opportunities. The need for energy expertise has been recognised by the BEIS Local Energy Programme which is helping to establish a regional Energy Hub for the South West LEPs that will have a team of energy specialists and access to further technical, financial, legal support. It will be up and running later in 2018. SWLEP should explore how it can increase its capacity to deliver the energy strategy and how it can maximise the benefit from the Energy Hub.

3.4.2 SME energy efficiency

Smaller businesses face a number of additional barriers to reducing their energy costs and implementing energy efficiency measures. The strong base of SMEs in Swindon & Wiltshire make them an important target for support at the SWLEP. The SWLEP intends to use its ESIF allocation to establish an energy efficiency investment fund targeted at SMEs to help address this market failure.

SWLEP are a source of wide ranging business advice to help local businesses grow and improve productivity. The SWLEP will work the Growth Hub to expand its offer to include low carbon growth and SME energy efficiency. This would include tailored support and guidance to help on reducing energy use and signpost to relevant grants and offers.

3.4.3 SWLEP actions

Action/project	Timeframe	Intervention description
Embedding low carbon growth in the LEP's decision making	Short	Integrating the energy priorities into plans, programmes, funding streams, procurement and services to be delivered using a consistent and transparent criteria-based approach. Proactive actions to expand energy activities could include: • Hydrogen technology to be included in Local Industrial Strategy process. • Energy funding sought through Local Growth Deals • Energy considered in the local skills and digital strategies Review of funding streams - review how existing and proposed funding streams aligned with local energy priorities.

Building SWLEPs capacity to deliver the energy strategy	Short	Step-change in SWLEP capacity to deliver energy strategy actions, including access to energy expertise as well as officer time and resources.
Energy advice and information	Medium	Energy to be integrated into SWLEP supported business advice services. To include advice and information to encourage SME action on low carbon growth. Facilitating and communicating funding and grant opportunities.
SME energy efficiency investment fund	Medium	Establish an energy efficiency investment fund for SME energy efficiency measures and technical assistance.

3.4.4 Low carbon construction and development

The legislative context for enhanced energy standards has recently been clarified and makes it clear that local authorities are able to set higher standards than the national ones. Legal interpretation indicates that existing powers enable energy performance standards equivalent to Code for Sustainable Homes Level 4, equivalent to a 19% reduction on current Building Regulations[57]. There are also grounds for more ambitions housing energy performance standards which several authorities have pursued. There are no limits on standards for non-domestic developments, like offices and commercial buildings, as well as 'places' like at the level of a neighbourhood masterplan for example.

The draft revisions to the NPPF, the Clean Growth Strategy and the Prime Minister's statement targeting a halving of energy use in new commercial and residential buildings[58] make the direction of government policy unambiguous. The government has made a commitment to review the national energy standards and has signalled a future consultation on an updated building regulations and technical guidance on how to meet them.

The existing powers enabling a 19% reduction on current Building Regulations is one which the UK's construction industry has considerable experience in delivering. The UK Green Building Council estimate that as of early 2018 around 107,000 homes have already been built to Code for Sustainable Homes Level 4 in England – the equivalent energy standard.

It does not require a radically different approach to design and can be met with enhanced insulation, glazing, airtightness and high efficiency heating. The estimated cost for this approach is between £2-3k for a mid or end terraced home up to £5-6k for a detached house. It can also be met in the majority of cases through roof top solar PV and potentially at lower upfront cost to the developer. Some local authorities are stipulating a proportion of energy or carbon saving from renewables to deliver this.

3.4.5 SWLEP actions

Action/project	Timeframe	Intervention description
Ensuring that SWLEP funded infrastructure & development is low carbon	Short	SWLEP funding is prioritised for low carbon infrastructure and development using a consistent and transparent criteria-based approach. For high profile projects the SWLEP will adopt higher energy performance standards and will collaborate with development partners to deliver low carbon exemplars.
Pressing for higher energy standards and sustainable construction	Medium	Support to LAs in setting efficiency standards through higher buildings energy performance standards.

[57] TCPA, 2018, Planning for Climate Change A Guide for Local Authorities
[58] https://www.businessgreen.com/bg/news/3032709/pm-pledges-aims-to-halve-building-energy-use-by-2030

4 Next steps

Funding and resources will be needed to deliver the energy strategy. As of November 2018, there is no allocated resource and SWLEP should begin by identifying an energy champion in a senior position who will have responsibility for promoting the energy strategy, for embedding energy into SWLEP's decision making and for implementation. Prompt action is needed to ensure the strategy is successfully integrated into the Local Industrial Strategy. This leadership will be a pre-requisite to success.

The BEIS local energy team are making a set of resources available to LEPs and regional energy hubs to help increase their capacity to develop detailed investment business plans as well as their ability to monitor and evaluate the implementation of their strategies. These include cost benefit analysis endorsed by HMT, a review of ERDF low carbon funding and recommendations for future funding, and national benchmarking of energy and low carbon activity by LEPs and city regions.

Within the strategy, each proposed action has been assigned a lead organisation and SWLEP should now work with its partners to assign individuals to own each action along with support, funding and oversight processes. It will also need to establish governance arrangements that potentially includes the local authorities and the South West Energy Hub in the steering group. Mechanisms should be put in place to give voice to business and local energy stakeholders.

The South West Energy Hub is still being established in Bristol under the responsibility of the West of England Combined Authority and its operations are being discussed by South West LEPs. There is hope that sufficient resources are allocated through the South West Energy Hub to enable significant project development across what is a broad geography with diverse energy priorities. SWLEP will proactively engage in shaping the South West Energy Hub so that it can best meet Swindon & Wiltshire's needs. Allocating sufficient resources for delivering the SWLEP prioritised actions will be key to moving the low carbon growth agenda forward.

Appendix A: Summary of SWLEP energy strategy actions

Smart grids and mitigating constraints

Action/project	Timeframe	Intervention description	Impact / outcomes	Delivery lead / partners	Resources
Strategic energy infrastructure investment plan	Short	Identify energy infrastructure projects prioritising investments that help deliver development/business growth, but also generation. This would indicate the nature of the constraint and the options for overcoming it, prioritising clean and flexible solutions.	Creates the basis for effective decision making and delivery of network improvements	SWLEP / LAs	SW energy hub, ERDF TA
DNO strategic collaboration	Short	Enhanced strategic collaboration with SSE to improve the sharing of knowledge, included future energy demand from site allocations, pre-planning enquiries and site planning progress.	Improved coordination of infrastructure planning, development and delivery. Support for strategic energy infrastructure investment plan	SWLEP / SSEN, strategic developers	SWLEP officer time
Positive planning for energy storage	Short	Creating a positive planning and investor (ie; end-user engagement) framework for energy storage will encourage development to come forward where need is greatest. This can help reduce local network constraints and bring forward the benefits of DSO over the medium term.	Improved investment climate for energy storage. Commercial energy storage addresses local network constraints.	SWLEP / LAs	LA officers, SW energy hub
On-site flexibility to overcome grid constraints	Medium	Encouraging use of flexible connections, private wire and clean on-site generation to bring forward constrained developments at lower cost and to allow businesses to overcome electricity-related constraints to growth. SWLEP provides advice or technical support. This could also include direct support to pathfinding projects (on-site generation, storage or DSR) for replication.	Overcome the energy-related constraints to the development of strategic sites and to the growth of business at lower cost using new technology. Creates the enabling environment for improved grid utilisation and low carbon generation.	SWLEP / SSE, Growth Hub, Industry groups	Private and SWLEP

De-risking strategic employment sites	Medium	Strategic investments in site grid infrastructure, prioritising flexible and smart grid energy technology, to make development sites more attractive to inward investment	Overcome the energy-related constraints to the development of strategic sites at lower cost using new technology.	SWLEP / Site developers, land owners, energy service providers	Local Growth Fund, housing funds
Network innovation	Long	Explore options with SSE for network innovation projects to address local challenges or exploit opportunities. Active engagement to bring DSO pilots to Swindon and Wiltshire.	Investment in innovation addresses local network related issues.	SWLEP / SSE	Ofgem network innovation competitions

Hydrogen technology innovation and deployment

Action/project	Timeframe	Intervention description	Impact / outcomes	Delivery lead / partners	Resources
Grow the hydrogen economy	Short	Comprehensive road map to growing hydrogen economy delivered by SWLEP to include: • Working with the Hydrogen Hub and collaboration with the Oxfordshire Hydrogen Hub • Strengthened relationships with industry • Encourage utilisation of hydrogen infrastructure • Lobby government to increase the funding available for hydrogen deployment • Attract technology innovation funding	Increased jobs, GVA and growth in high technology sector. Encourage further clustering of specialist businesses and growth of supply chain. Enhancing the local reputation for hydrogen activity.	SWLEP or Hydrogen Hub	SWLEP
Hydrogen infrastructure & deployment	Medium /long	Maintain and grow hydrogen infrastructure in response to new deployments and emerging demands, including the generation of green hydrogen. Support the deployment of hydrogen transport applications, potentially including fuel cell forklifts, vans and HGVs in distribution centres and logistics operations.	Increase the use of hydrogen existing refuelling infrastructure Infrastructure in place to support growth in hydrogen applications. Enhancing the local reputation for hydrogen activity.	SWLEP or Hydrogen Hub / Oxfordshire HH	Hydrogen for Transport Programme, BEIS Hydrogen Supply Programme

Hydrogen research and technology institutions	Medium	Build business case for a hydrogen focussed research and technology institution to be located within Swindon & Wiltshire or the surrounding region.	Increased innovation in the local hydrogen economy. Encourage further clustering of specialist businesses. Enhancing the local reputation for hydrogen activity.	SWLEP or Hydrogen Hub / OxLEP, WoE	
Hydrogen heating trials	Long	Support to hydrogen heat and fuel cell CHP demonstration projects, including direct support to demonstration projects at neighbourhood scale or in partnership with public sector organisations.	Deployment and demonstration of hydrogen applications beyond transport. Driving demand in the local hydrogen economy. Enhancing the local reputation for hydrogen activity.	SWLEP or Hydrogen Hub	

The transition to new energy vehicles

Action/project	Timeframe	Intervention description	Impact / outcomes	Delivery lead / partners	Resources
EV charging infrastructure plan	Short	EV charging plan to establish a strategic basis for the deployment of an EV charge point network across Swindon & Wiltshire that compliments and supports private sector installations and meets the needs of rural areas to ensure broad access and equity. Links to be made to the strategic energy infrastructure investment plan. This could identify the need for further actions such as the installation of charge points at workplaces and the electrification of company vehicle fleets.	Creates the basis for effective decision making and delivery of EV charging network. Accelerated uptake of EVs.	SWLEP / LAs, Charge point operators, PPS	SW energy hub, ERDF TA
Grow and maintain the public EV charge point network	Medium	Deliver a comprehensive EV charge point network in Swindon & Wiltshire, including: • Public sector estate and transport nodes • Rural EV charge points • Helping businesses to deploy EVs Explore how charge points on public sector estate could be built, operated and maintained using charge point operators.	Delivery of EV charging network Accelerated up take of EVs. Collection of funds to deliver a quality service and increased value from chargers already installed Rural access to the benefits of EVs.	SWLEP / LAs, Charge point operators, local business	Charging Infrastructure Investment Fund, On-street Residential Chargepoint Scheme, private

		Establish governance mechanisms to ensure an equitable and accessible network is maintained and that it adapts to need for expansion and technology developments. Ensure that information about the availability and status of charge points is accessible through a range of sources and apps.			
Support the roll out of high power EV chargers	Medium	A core network of high power rapid chargers at petrol stations and transport node car parks will be key enabler for widespread EV uptake. This may be constrained by available grid capacity. Targeted network investments to help overcome grid constraints where necessary.	Enabling the deployment of a core network of high power chargers.	SWLEP / SSE, service stations	Charging Infrastructure Investment Fund, private
Convert the public sector fleet to new energy vehicles	Medium	Direct support for shifting public sector vehicle fleet to new energy vehicles in Swindon & Wiltshire across the LA, police, NHS etc.) Support the rollout of associated charging and refuelling infrastructure.	Reduced public sector operating costs. Provides opportunity for technology demonstration, such as hydrogen vehicles. Catalyse the transition to new energy vehicles in the public sector. Increase the use of hydrogen existing refuelling infrastructure	SWLEP / LAs, Hydrogen Hub	Public sector capital spending, Clean Growth Strategy implementation funds
Deploy electric buses and taxis	Medium	Electric buses and taxis are becoming a cost effective option. SWLEP to engage in investment planning for local public transport and support to bus fleet upgrades. Electric vehicle subsidies for tax drivers. Package of incentives could include purchase rebate and reduced licencing fees.	Public transport vehicles upgraded. Catalyse the transition to new energy vehicles in public transport.	SWLEP / LAs, bus/taxi operators	Low Emission Bus Scheme, Ultra low emission bus scheme
Hydrogen refuelling stations	Short/ Medium	Complete deployment of 2 refuelling stations. Maintain and grow the hydrogen infrastructure network in response to new deployments and emerging demands. Explore how partnerships can deliver a wider network of refuelling stations, such as along the M4 corridor	Infrastructure in place to support growth in hydrogen applications.	SWLEP / Hydrogen Hub, Oxfordshire HH	
Charging infrastructure as part of new developments	Medium	Promote a planning requirement for EV charging infrastructure in new strategic developments. Building in EV charging as part of development masterplans will ensure that high quality and accessible infrastructure is designed in from the outset.	New developments future proofed. Accelerated up take of EVs	LA / SWLEP	Developers

Low carbon growth

Embedding low carbon growth in the SWLEP's decision making

Action/project	Timeframe	Intervention description	Impact / outcomes	Delivery lead / partners	Resources
Embedding low carbon growth in SWLEP's decision making	Short	Integrating the energy priorities into plans, programmes, funding streams, procurement and services to be delivered using a consistent and transparent criteria-based approach. Proactive actions to expand energy activities could include: • Hydrogen technology to be included in Local Industrial Strategy process. • Energy funding sought through Local Growth Deals • Energy considered in the local skills and digital strategies • Review of funding streams - review how existing and proposed funding streams aligned with local energy priorities.	Mainstreams energy into SWLEP decision making and activity.	SWLEP	SWLEP
Building SWLEPs capacity to deliver the energy strategy	Short	Step-change in SWLEP capacity to deliver energy strategy actions, including access to energy expertise as well as officer time and resources.	Improved delivery of energy investments, increase in funding awards and accelerated progress with actions.	SWLEP / Energy Hub, PPS	SWLEP / Energy Hub
Energy advice and information	Medium	Energy to be integrated into SWLEP supported business advice services. To include advice and information to encourage SME action on low carbon growth. Facilitating and communicating funding and grant opportunities.	Increased SME uptake of energy efficiency and low carbon technology.	Growth Hub	SWLEP
SME energy efficiency investment fund	Medium	Establish an energy efficiency investment fund for SME energy efficiency measures and technical assistance.	Increased SME uptake of energy efficiency.	SWLEP	ESIF

Low carbon construction and development

Action/project	Timeframe	Intervention description	Impact / outcomes	Delivery lead / partners	Resources
Ensuring that SWLEP funded infrastructure & development is low carbon	Short	A consistent and transparent criteria-based approach established to ensure that low carbon priorities are taken into account in all SWLEP investment decision-making Collaborate with partners to ensure that high profile projects adopt higher energy performance standards and are low carbon exemplars.	SWLEP investments and supported development is consistent with local energy priorities and the long term emissions trajectory. Enhanced reputation for Swindon & Wiltshire.	SWLEP	All SWLEP investments
Pressing for higher energy standards and sustainable construction	Medium	Support to LAs in setting efficiency standards, through higher buildings energy performance standards.	New construction is low carbon and ensures that increases in energy demand and emissions are minimised from the outset.	LA / SWLEP	Developers


RICARDO
Ricardo
Energy & Environment