

Land to north of, Bronwylfa Road, Wrexham

Legacy ESS

Economic Impact Assessment

Innova

28 November 2024

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Executive Summary

LICHFIELDS



The economic benefits of

Legacy ESS

The proposed development of Legacy ESS, located in Wrexham, could provide a range of economic, energy supply and environmental benefits.

The Growing Need for Energy Storage



600%

Growth in renewable energy generation (2009-2023)



57% Carbon reduction in the UK since 1990

The 2050 target is 100% reduction from 1990 levels



46.8%

Proportion of UK energy from renewable sources



2035

Net Zero Strategy ambition to decarbonise UK power system by 2035

Construction Benefits





50 FTE Jobs

Construction jobs (per annum)



60 FTE Jobs

Supply chain jobs (per annum)



£12.3m GVA

Gross value added (per annum)

Operational Benefits





Supporting employment across the energy storage sector (onsite and offsite jobs)



£795,000

Business rate contribution (per annum)



Supporting economic output through supplying clean, domestic energy

Energy Security and Environmental Benefits





400 MW

Energy capacity (MW)



Providing flexibility in the grid network



157,000 tonnes

Enabling renewable energy generation that could offset 157,000 tonnes of CO₂ (p.a.)



105,000

Equivalent of taking 105,000 cars off the road

Analysis and design by Lichfields (November 2024)

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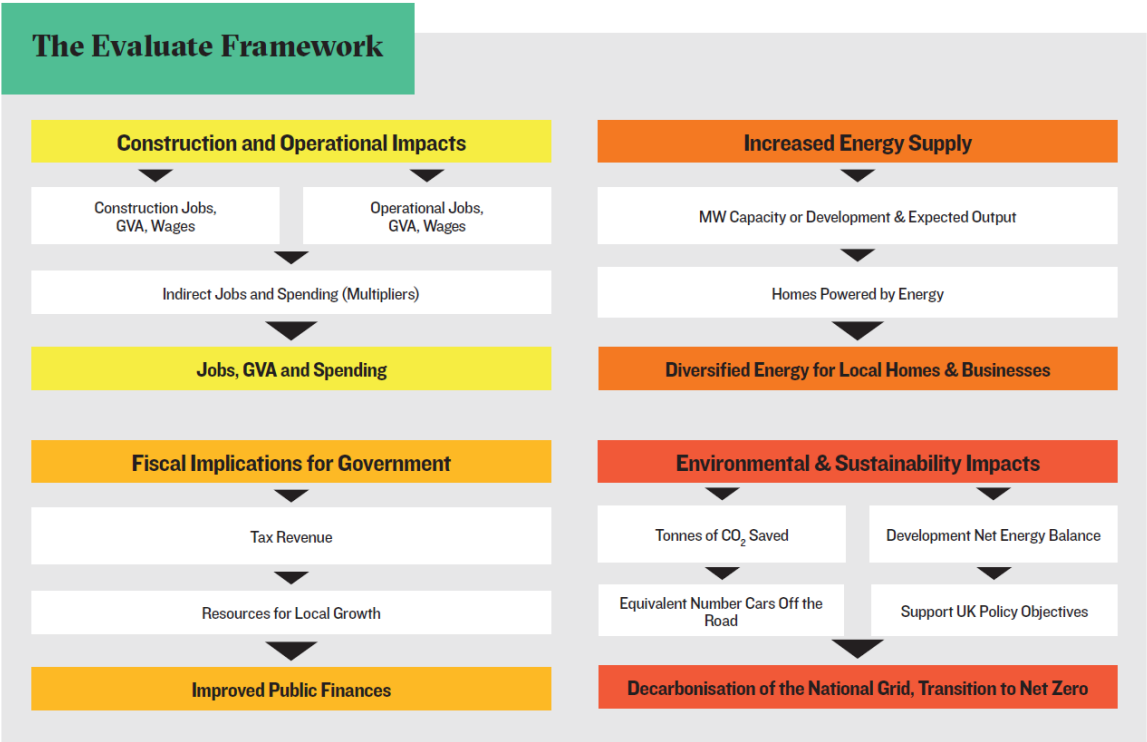
1.0 Introduction

1.1 This report has been prepared by Lichfields on behalf of Innova to examine the economic, energy and environmental impacts of the proposed Legacy ESS development. The proposals would result in the delivery of an energy storage facility (ESS) with a power capacity of up to 400MW on land north of, Bronwylfa Road, Rhostyllen, Wrexham.

Methodology

1.2 This report draws upon the Evaluate framework developed by Lichfields, which provides an analytical assessment of the economic impacts arising from the proposed development (Figure 1.1). The framework is underpinned by Lichfields’ expertise in economic assessment methodologies and is regularly applied to renewable energy projects including, solar farms, private wire networks, and Battery Energy Storage Systems. The framework was used to shape the broad methodology applied in assessing the economic impacts of the proposed development.

Figure 1.1 Evaluate Analytical Framework



Source: Lichfields

1.3 The analysis focuses first on the key quantifiable impacts of the proposed development during the construction phase, as well as the operational impacts which could come forward upon completion. The energy supply and environmental impacts of the development are then considered.

Report Structure

- 1.4 The remaining sections of this report are structured as follows:
- **Section 2.0** summarises the relevant policy and strategy documents at a national, regional and local level;
 - **Section 3.0** provides an overview of local baseline conditions with respect to the economy and energy generation/consumption;
 - **Section 4.0** outlines the potential economic impacts generated during the construction phase of the proposed development;
 - **Section 5.0** considers the operational impacts that could be generated upon completion of the development;
 - **Section 6.0** provides an overview of the energy supply and environmental impacts associated with the proposal; and
 - **Section 7.0** draws together the key conclusions of the assessment.

2.0 Policy Context

UK Context

Invest 3035: The UK's Modern Industrial Strategy Green Paper (2024)

- 2.1 The Industrial Strategy Green Paper, published in October 2024 sets out the government's vision for a modern Industrial Strategy, and presents a 10-year plan to: deliver certainty and stability; encourage investment in high growth sectors; and drive the UK's growth mission. The document states that jobs will be at the heart of the Industrial Strategy, supporting key growth sectors to create high-quality, well-paid jobs across the country, backed by employment rights for a modern economy.
- 2.2 Whilst the Green Paper is a consultation document, it sets out a clear ambition that the Industrial Strategy will focus on tackling barriers to growth in the UK's highest potential, growth-oriented sectors and places, creating the right conditions for increased investment, high-quality jobs, and benefitting communities right throughout the UK.
- 2.3 Net Zero is a core focus of the Green Paper, which sets out a commitment to achieve sustainable growth in alignment with Net Zero and wider environmental objectives. The Paper outlines the ambition for the UK to be a global climate leader and build a strong and sustainable economy, creating good, well-paid jobs in the green sectors of today and of the future.
- 2.4 The Net Zero objectives for the Industrial Strategy are identified as:
- 1 Capturing the growth opportunities of the Clean Energy Mission and Net Zero transition;
 - 2 Identifying and supporting the Clean Energy industrial sectors with the greatest growth potential; and
 - 3 Aligning sector plans with Net Zero and environmental objectives.
- 2.5 The Industrial Strategy Green Paper identifies eight growth-oriented sectors, which include Clean Energy industries. The Paper highlights that Clean Energy industries are a major driver of global growth and that there is global demand for low-carbon products. The Paper acknowledges that whilst some of the largest Clean Energy infrastructure projects in the world have been delivered, the UK can go further. The Paper also notes the value of onshoring of energy:
- 'Moving to clean homegrown sources of electricity will reduce the UK's dependence on volatile fossil fuel imports, improving energy security and helping to protect billpayers from rising and volatile energy prices.'*

Levelling Up White Paper (2022)

- 2.1 The Levelling Up White paper outlines proposals to level up the UK economy. It identifies the need for a multi-factor approach to transform places and boost local growth. This includes an emphasis on: strong innovation and a climate conducive to private sector

investment; better skills; improved transport systems; greater access to culture; stronger pride in place; deeper trust; greater safety; and more resilient institutions.

2.2 The ‘*Levelling Up*’ strategy is underpinned by 12 core missions. Those considered to be most relevant to this development are:

- **Living Standards** – By 2030, pay, employment and productivity will have risen in every area of the UK, with each area containing a globally competitive city, and the gap between the top performing and other areas closing.
- **Well-being** – By 2030, well-being will have improved in every area of the UK, with the gap between top performing and other areas closing.

UK’s Build Back Better: our plan for growth

2.3 Build Back Better takes a transformational approach, tackling long-term problems to deliver growth that creates high-quality jobs across the UK, with a focus on three priorities: levelling up the whole of the UK; supporting the transition to Net Zero by 2050; and supporting a vision for Global Britain. With respect to the Net Zero priority, the Plan outlines that the *“UK will continue to be at the forefront of tackling climate change and is already a world leader in clean growth. The UK will deliver the Ten Point Plan for a Green Industrial Revolution, leveraging significant private sector investment and supporting up to 250,000 highly-skilled jobs”*.

2.4 The three priorities will be achieved by delivering activity focussed on the following core pillars of growth:

- **Infrastructure:** stimulate short-term economic activity and drive long-term productivity improvements, and help achieve Net Zero via £12 billion of funding for projects through the Ten Point Plan for a Green Industrial Revolution;
- **Skills:** support productivity growth through high-quality skills and training, including skills bootcamps, apprenticeships and further education investment; and
- **Innovation:** support and incentivise the development of the creative ideas and technologies that will shape the UK’s future high-growth, sustainable and secure economy.

2.5 In recognising the UK’s significant progress towards the 2050 goal (100% carbon reduction relative to 1990 levels), the Plan acknowledges that significant further investment will be needed. In support of this, *“Future policies will set a clear direction for millions of people and businesses, shifting incentives to favour low carbon technologies and tackling barriers to action. Moving decisively in areas of comparative advantage could generate new future-proofed jobs and export opportunities, and establish the UK as a global leader across the low-carbon economy.”*

British Energy Security Strategy (2022)

2.6 The Energy Security Strategy outlines the ambition to reduce the reliance on imported energy that, at present, leaves Britain vulnerable to fluctuations in oil and gas prices. This requires an increase in energy supply from domestic sources, whilst simultaneously focussing on achieving the Net Zero targets.

- 2.7 The Strategy outlines a need, at the national level, to prioritise:
- Anticipating future requirements to minimise cost and disruption; and
 - Enabling hyper-flexibility in matching supply and demand so that minimal energy is wasted.
- 2.8 With reference to the need to achieve greater flexibility, the Strategy advises that “*all forms of flexibility will be encouraged*”, including “*sufficient large-scale, long-duration electricity storage*”.

Net Zero Strategy: Build Back Greener (2021)

- 2.9 Government’s Net Zero Strategy, prepared by the Department for Business, Energy & Industrial Strategy (‘BEIS’), sets out the plans and ambitions for reducing emissions across each sector of the economy, with the ultimate aim of achieving Net Zero by 2050. The document details the delivery pathways, policies and proposals for achieving a decarbonised economy by 2050, supporting green jobs and economic opportunity.
- 2.10 The strategy is underpinned by eight key target pathways to support this ambition. Those most relevant to this assessment include:
- Power;
 - Fuel Supply & Hydrogen;
 - Industry; and
 - Supporting the transition with cross-cutting action.
- 2.11 Underpinning these target pathways are ten ‘essential planks’ viewed – by Government – as critical to achieving Net Zero. These include the following:
- Integration of low carbon energy sources in a smart and flexible way - “*fully decarbonising the electricity system could rely on large-scale long duration storage to manage peaks in demand.*”;
 - Increase energy efficiency – “*The low carbon energy system depends on overall energy demands reducing significantly. This means all demand sectors becoming far more efficient, through adoption of new technologies, better energy management, and direct investment in energy efficiency measures.*”
- 2.12 The ‘Power’ target pathway is most relevant to the Legacy ESS proposals. The target outlines the national approach towards energy generation, noting that reducing delivery risk is essential to decarbonising the power grid. It identifies a need to “*explore the case for market intervention for long duration storage*”, highlighting that energy storage can provide important low carbon peaking capacity during periods of high demand and extreme periods of low energy generation: “*long duration storage technologies could provide a range of system stability services such as the provision of inertia.*”

Welsh Context

Planning Policy Wales (Edition 12)

- 2.13 The latest edition of Planning Policy Wales (PPW) came into effect on 19th July 2024, updating previous iterations of PPW first published on 5th December 2018. It sets out the land use policies of the Welsh Government and how the planning system can deliver sustainable development.
- 2.14 Paragraph 3.30 of the Document outlines that, in 2019, the Welsh Government declared a climate emergency to co-ordinate action nationally and locally to help combat the threats of climate change. It states:
- “The planning system plays a key role in tackling the climate emergency through the decarbonisation of the energy system and the sustainable management of natural resources. The transition to a low carbon economy not only brings opportunities for clean growth and quality jobs, but also has wider benefits of enhanced places to live and work, with clean air and water and improved health outcomes.”* (Lichfields’ emphasis)
- 2.15 Paragraphs 5.7.1 – 5.7.15 set out priorities with regard to energy. The key points include:
- “Low carbon electricity to become the main source of energy in Wales”;
 - “Overall power demand is expected to increase as a result of growing electrification of transport and heat”, with renewable energy used to meet this demand;
 - “The system will need to integrate renewable generation with storage and other flexibility services, in order to minimise the need for new generation and grid system reinforcement.” In this regard, the PPW states that the “planning system should optimise energy storage”;
 - “Energy storage has an important part to play in managing the transition to a low carbon economy. The growth in energy generation from renewable sources requires the management of the resultant intermittency in supply, and energy storage can help balance supply and demand. Proposals for new storage facilities should be supported wherever possible.”; and
 - PPW sets out a target for Wales to generate 70% of its electricity consumption from renewable energy by 2030.

National Development Framework (Future Wales: The National Plan 2040)

- 2.16 Achieving decarbonisation is a regular and key theme throughout the National Plan. Targets will be achieved in accordance with the Low Carbon Wales and Economic Action Plan strategy documents. With regard to renewable energy, the document broadly states that Future Wales will:
- Support a low carbon economy and decarbonisation of industry, and the growth of sustainable and renewable energy; and
 - Recognise the importance of future key sectors such as renewable technologies.
- 2.17 The Plan states that: “Wales can become a world leader in renewable energy technologies. Our wind and tidal resources, our potential for solar generation, our support for both

large and community scaled projects and our commitment to ensuring the planning system provides a strong lead for renewable energy development, mean we are well placed to support the renewable sector, attract new investment and reduce carbon emissions.” The Plan also notes that the transition to a low carbon economy is an opportunity to build a more resilient and equitable low-carbon economy.

- 2.18 The Plan sets out a number of policies related to renewable energy, including Policy 17 (Renewable and low carbon energy and associated infrastructure). The policy states that Welsh Government “*strongly supports the principle of developing renewable and low carbon energy from all technologies and at all scales to meet our future energy needs*”.
- 2.19 It also advises that “*in determining planning applications for renewable and low carbon energy development, decision-makers must give significant weight to the need to meet Wales’ international commitments and our target to generate 70% of consumed electricity by renewable means by 2030 in order to combat the climate emergency*”.
- 2.20 When submitting planning proposals, the policy advises that applicants should “*describe the net benefits the scheme will bring in terms of social, economic, environmental and cultural improvements to local communities*”.

Economic Action Plan

- 2.21 The Economic Action Plan supports the delivery of Prosperity for All – the national strategy for Wales. It sets out a vision for inclusive growth based on strong foundations, future industries and productive regions, with aims to build resilience and future proof the economy. The Plan focuses funding support on businesses which align with decarbonisation objectives, are innovative and entrepreneurial, support skills development and high quality employment, and support automation, research and development.
- 2.22 The Plan identifies national thematic sectors and foundational sectors. Thematic sectors include high value manufacturing, and enablers (key drivers of wider competitiveness such as renewable sectors).

Prosperity for All: A Low Carbon Wales (2019)

- 2.23 Acting as a delivery plan for Wales’ transition to a low carbon economy, the document sets out the following vision: “*In 2050, Wales will be among the best places in the world to live, learn, work and do business. Our businesses, public services, third sector and government will have worked together to achieve the goals that we set in the ground-breaking Well-being of Future Generations Act and the target to reduce emissions by at least 80% against the 1990 baseline.*”.
- 2.24 Interim emission targets are set out as follows: 27% reduction by 2020; 45% reduction by 2030; and 67% reduction by 2040. The plan highlights that these targets may be more challenging to achieve compared to the equivalent target set out across the UK as a whole, due to “*Wales having a greater share of ‘hard to reduce’ emissions and fewer suitable sites to store CO₂.*” Furthermore, with Wales a net exporter of electricity, reducing carbon emissions whilst maintaining broadly similar levels of electricity production provides the additional challenge of ensuring Wales can continue to achieve domestic economic targets.

Local Context

Wrexham Local Development Plan

- 2.25 The Wrexham Local Development Plan (LDP) was adopted in December 2023 and sets out the policy framework to deliver sustainable development across the Borough over the period 2013 - 2028. The vision established by the Plan is summarised below:
- “By 2028, Wrexham will be an attractive, distinctive and accessible place where people will want to live, work, visit and invest. Wrexham’s economy will be strong, resilient and responsive to its gateway location within Wales. Wrexham County Borough will be a sustainable place...”*
- 2.26 This is supported by 12 strategic objectives. Those that are considered most relevant to the proposed development are summarised below:
- SO1 - Ensuring that the role of Wrexham City as a National Growth Area is strengthened. This will be achieved by maximising the economic potential of Wrexham;
 - SO2 - Support a vibrant, diverse and competitive local economy that provides a range of job opportunities and enable new and existing businesses to grow in Wrexham County Borough; and
 - SO10 - Maximise resistance to, and prepare for the consequences of, climate change by reducing carbon emissions and the demand for energy, and promoting the use of renewable resources. This objective will be achieved by supporting the use of renewable energy resources and low carbon technology.
- 2.27 Policy RE 2 – Renewable Energy Schemes – states that *“proposals to generate energy from renewable and low carbon sources will be supported.”*

3.0 Baseline Conditions

- 3.1 This section provides a summary of key socio-economic baseline conditions in Wrexham including: demographics, labour market conditions; employment structure; and skills/qualifications. In addition, data relating to energy consumption and generation is also considered, given the nature of the development proposals. Where data availability permits, indicators are benchmarked against the corresponding figures for Wales and Great Britain.

Socio-Economic Context

Demographics

- 3.2 It is estimated that the population of Wrexham stood at 136,150 in 2023¹. This represents an increase of 0.1% between 2014 and 2023. This rate of growth is lower than that observed across Wales (3.0%) more widely.
- 3.3 It is estimated that 61.2% of Wrexham's population were of working age (16-64 years old) in 2023 – equivalent to 83,325 people. This is broadly similar to the proportion across Wales (61.1%). However, between 2014 and 2023, Wrexham's working age population contracted by 1.6%, whilst Wales's increased by 1.3% over the same period.

Employment

- 3.4 Analysis of the latest ONS data indicates that the total number of jobs in Wrexham stood at 67,000 in 2022. This represents a 6.3% increase on 2013 levels, which is in alignment with the growth in jobs across Wales (6.3%). Both these figures, however, are considerably lower than the average observed across Great Britain (12.7%).
- 3.5 The same data also provides a measure of the ratio of total jobs to working age population (16-64 year olds), which is used to calculate a job density for a given area. In 2022, Wrexham had a job density of 0.81, which indicates that for every 100 working age residents, the local authority had 81 jobs. This is higher than the corresponding figure for Wales (0.78), but lower than Great Britain (0.87).
- 3.6 The latest economic activity rate amongst 16-64 year olds (i.e. the proportion of working age residents that are in/seeking employment) in Wrexham stood at 82.3% in 2023/24². This is higher than the average across Wales (75.6%) and Great Britain (78.4%).

Unemployment

- 3.7 The latest model-based unemployment rate amongst 16-64 year olds stood at 3.7% in Wrexham³ in 2023/24. This is broadly similar to the average observed across Great Britain (3.8%), but higher than Wales (3.2%).
- 3.8 More recently, Claimant Count data for September 2024 showed that Wrexham had 2,890 residents claiming out-of-work benefits. This represents 3.5% of working age residents in

¹ ONS (2023) – Population estimates by single year of age

² ONS (Jul 2023 to Jun 2024) – Annual Population Survey

³ ONS (Jul 2023 to Jun 2024) – Annual Population Survey

Wrexham, which is broadly in alignment with the Welsh average (3.6%), and lower than Great Britain (4.3%).

Income

- 3.9 In 2023, median weekly *resident*-based earnings in Wrexham stood at £634.90⁴, which is lower than the corresponding averages across Wales (£636.10) and Great Britain (£682.60). Similarly, median *workplace*-based earnings in Wrexham stood at £630.70 in the same year, which is below the averages observed across Wales (£633.70) and Great Britain (£682.60).

Employment Structure

- 3.10 Table 3.1 provides an overview of the structure of employment, by broad industrial group, in Wrexham⁵. This shows that the groups which account for the greatest proportion of employment in the local economy are:

- Manufacturing (19.8% of all jobs in Wrexham);
- Health (19.8% of all jobs in Wrexham); and
- Retail (8.2% of all jobs in Wrexham).

Table 3.1 Employment proportions by broad industrial group

	Wrexham	Wales	Great Britain
Manufacturing	19.8%	10.4%	7.7%
Health	19.8%	14.7%	13.2%
Retail	8.2%	9.0%	9.3%
Business administration & support services	7.4%	6.5%	8.6%
Education	6.6%	8.6%	8.6%
Accommodation & food services	5.8%	8.7%	7.1%
Public administration & defence	5.8%	7.7%	4.4%
Construction	4.1%	5.1%	4.9%
Arts, entertainment, recreation & other services	4.1%	4.7%	4.3%
Transport & storage	3.7%	4.2%	5.0%
Professional, scientific & technical	3.3%	5.1%	8.8%
Wholesale	2.9%	2.2%	3.7%
Mining, quarrying & utilities	2.1%	1.6%	1.3%
Agriculture, forestry & fishing	1.6%	2.8%	1.6%
Motor trades	1.6%	1.9%	1.8%
Information & communication	1.6%	2.2%	4.3%
Financial & insurance	0.8%	2.8%	3.4%
Property	0.7%	1.5%	1.9%

Source: ONS (2022) Business Register and Employment Survey

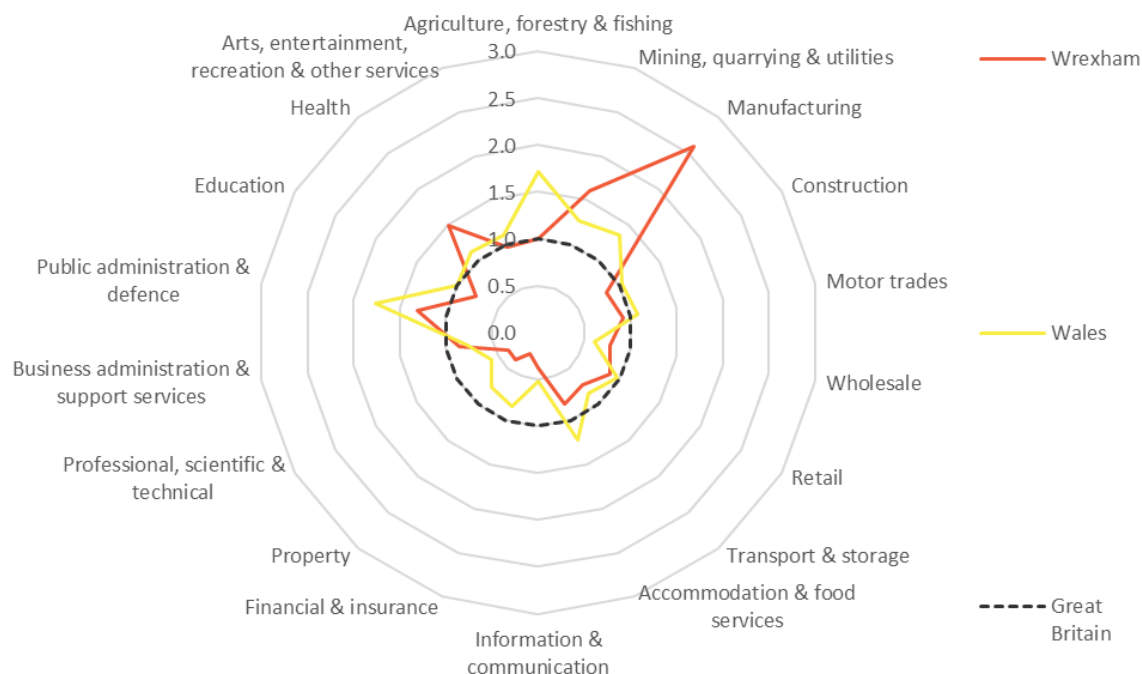
- 3.11 Wrexham has a number of industries that are over-represented locally compared to a regional and national level. This can be seen by analysing location quotients (Figure 3.1).

⁴ ONS (2023) – Annual survey of hours and earnings – resident and workplace analysis

⁵ ONS (2021) – Business register and employment survey

Location quotients are used to quantify how prominent (as a percentage share of the overall employment base) a particular employment sector is in an area compared to the sector's representation at the national level.

Figure 3.1 Sector representation by broad industrial group



Source: Business Register and Employment Survey (2022) / Lichfields analysis

3.12 Table 3.2 below outlines those sectors that are over-represented in Wrexham compared to Wales and Great Britain.

Table 3.2 Over-represented sectors in Wrexham

Sector	Location Quotient	Percentage share of Wrexham's employment base
Manufacturing	2.58	19.8%
Mining, quarrying and utilities	1.60	2.1%
Health	1.49	19.8%

Source: BRES (2022) / Lichfields analysis

3.13 Conversely, Table 3.3 highlights those industries that are under-represented when compared to Wales and Great Britain.

Table 3.3 Over-represented sectors in Wrexham

Sector	Location Quotient	Percentage share of Wrexham's employment base
Financial and insurance	0.24	0.8%
Professional, scientific and technical	0.38	3.3%
Information and communication	0.38	1.6%
Property	0.38	0.7%
Transport and storage	0.74	3.7%
Education	0.76	6.6%

Sector	Location Quotient	Percentage share of Wrexham's employment base
Accommodation and food services	0.81	5.8%
Construction	0.84	4.1%
Retail	0.89	8.2%
Motor trades	0.92	1.6%
Arts, entertainment, recreation and other services	0.97	4.1%

Source: BRES (2022) / Lichfields analysis

Qualifications and Occupations

3.14 The latest ONS Annual Population Survey data (2023) indicates that the skills base of Wrexham is characterised by:

- A higher proportion of residents who have obtained an NVQ4+ level qualification (45.2%) compared to Wales (43.2%), but lower than Great Britain (47.3%)
- A higher proportion of residents with primary level and above (NVQ1+) qualifications (87.7%) compared to Wales (87.5%), but lower than Great Britain (89.0%); and
- A lower proportion of residents with no qualifications (7.2%) compared to Wales (8.6%), but higher than Great Britain (6.5%).

3.15 This data is summarised in Figure 3.2.

Figure 3.2 Proportion of residents with qualifications



Source: ONS Annual Population Survey/Lichfields analysis

3.16 As shown in Figure 3.3, Wrexham's occupational profile can be described as follows:

- **Standard Occupational Codes 1 – 3:** 45.8% of residents are employed in professional, technical or managerial roles (generally characterised as higher skilled roles). This is lower than both Wales (47.2%) and Great Britain (52.9%); and

- **Standard Occupational Codes 7 – 9:** 26.7% of residents are employed in lower skilled roles, such as sales, operatives and elementary occupations. This is higher than the corresponding averages across Wales (23.7%) and Great Britain (20.5%).

Figure 3.3 SOC occupation by proportion of employment



Source: ONS Annual Population Survey / Lichfields analysis

Energy

Energy Consumption

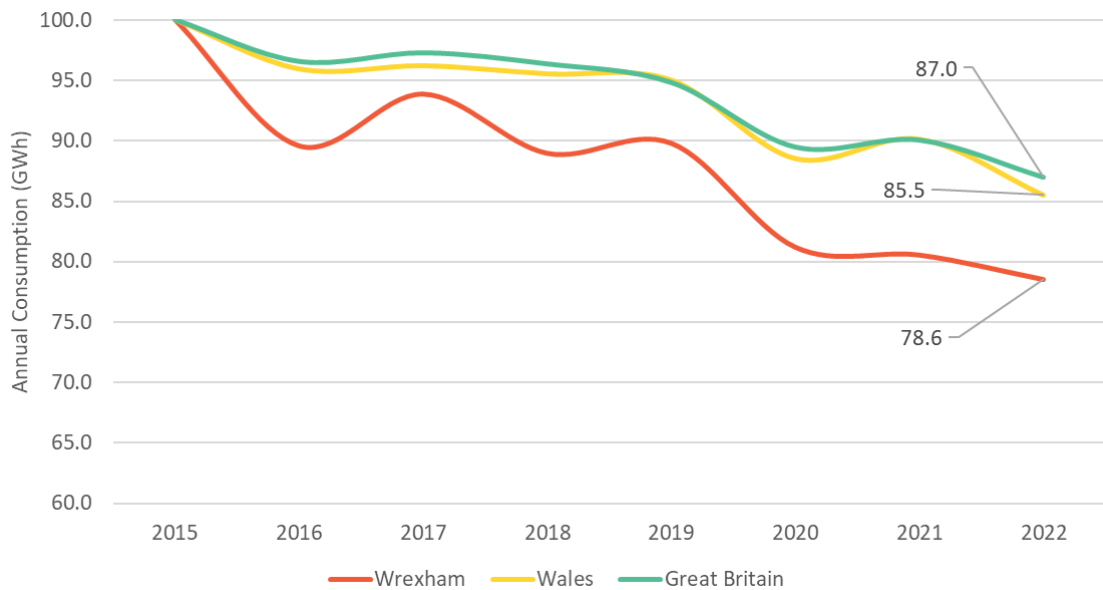
3.17

The most recent energy consumption data for Wrexham, Wales and Great Britain is presented in Figures 3.4 and 3.5⁶. The former illustrates that total energy consumption⁷ has generally been on a downward trajectory over the period 2015-2022 in each of the three geographies considered. Wrexham in particular experienced a marked decrease in consumption over the 7-year period, with GWh consumption in 2022 approximately 21.4% lower than 2015. By way of comparison, Wales experienced a 14.5% decline in energy consumption – and Great Britain a 13.0% decline – over the same period.

⁶ BEIS Regional and Local Authority electricity consumption statistics (published 2022): <https://www.gov.uk/government/statistical-data-sets/regional-and-local-authority-electricity-consumption-statistics>

⁷ Domestic and non-domestic energy consumption combined

Figure 3.4 Annual electricity consumption (indexed) (2015-2022) (GWh)

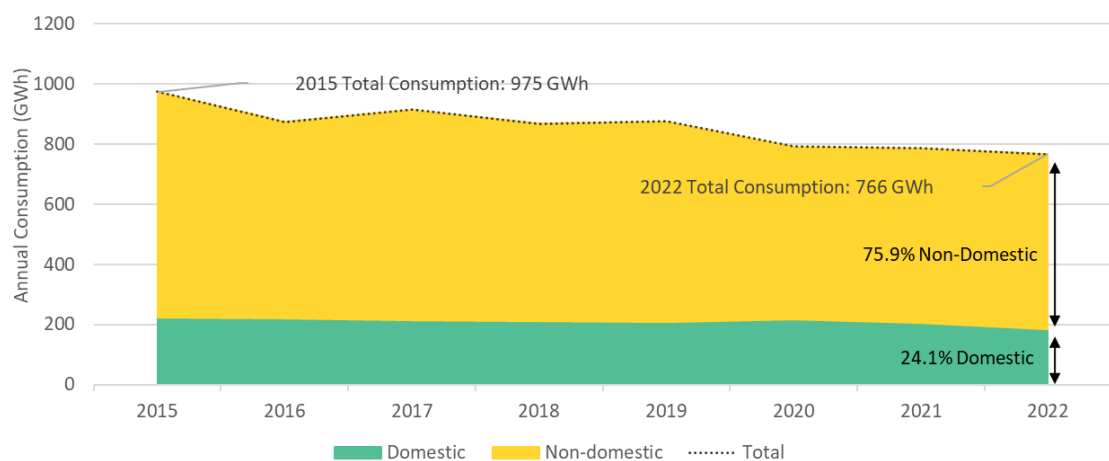


Source: BEIS data / Lichfields analysis

3.18

Figure 3.5 provides a breakdown of demand by domestic and non-domestic consumption within Wrexham. This shows that, in 2022, total energy consumption stood at 766 GWh – equivalent to a mean consumption of 11.9 MWh per electric meter. This is higher than the averages observed across both Wales (8.4 MWh) and Great Britain (7.9 MWh). The data also highlights that energy consumption in Wrexham is primarily driven by *non-domestic* demand, accounting for 75.9% of total energy use in the area in 2022. Consumption across Wales and Great Britain is similarly led by *non-domestic* demand (with non-domestic demand accounting for 66.8% and 62.3% of consumption respectively).

Figure 3.5 Annual Domestic / Non-domestic consumption in Wrexham



Source: BEIS / Lichfields analysis

Energy Intensity

- 3.19 Data from ONS provides an estimate of balanced Gross Value Added ('GVA' – a measure of economic output) at the local authority level. When considered in conjunction with the level of energy consumption within the same timeframe, this can provide an indication of an area's energy intensity. A high energy intensity implies that a comparatively large amount of energy is required to generate a given level of economic output.
- 3.20 Table 3.4 indicates that – in 2022 (the latest available data) – Wrexham's energy intensity was comparatively high. On average, 196 MWh of energy was required to generate £1 million in GVA. This is higher than the corresponding figures for both Wales (176 MWh per £1m GVA) and Great Britain (129 MWh per £1m GVA) and is likely to reflect the structure of the Wrexham economy.

Table 3.4 Balanced gross value added and Energy Intensity (2022)

	Wrexham	Wales	Great Britain
Total Energy Consumption (2022) (MWh)	765,986	13,154,549	250,020,739
GVA (2022) (£m)	£3,913	£74,543	£1,940,267
Energy Intensity (MWh consumed per £m GVA)	196	176	129

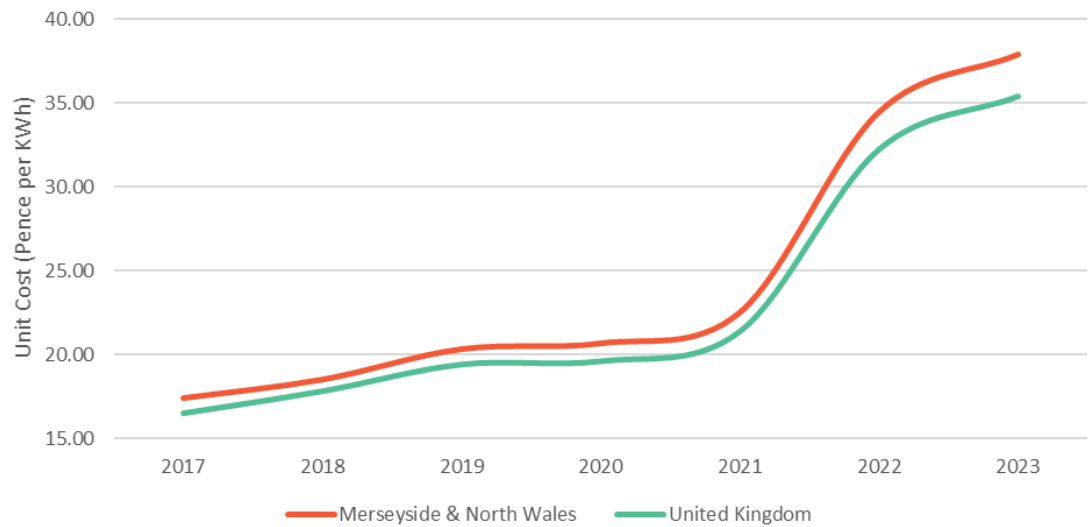
Source: ONS / BEIS / Lichfields analysis

- 3.21 This serves to highlight the importance of increasing the level of energy that can be generated locally from renewable sources. The proposed development can make a positive contribution in this regard.

Energy Prices

- 3.22 Data provided by the [Department for Energy Security and Net Zero \(DESNZ\)](#), summarised in Figure 3.6, shows the average cost of domestic energy per unit between 2017 and 2023. It demonstrates that in each year, the average energy cost per unit across Merseyside and North Wales was higher than the national average. The latest year of data indicates that the average energy cost in Merseyside and North Wales (37.89 pence per KWh) was 7.1% higher than across the UK more widely (35.38 pence per KWh).
- 3.23 Figure 3.6 also highlights the sharp rise in the cost of energy over this period across Merseyside and North Wales, as well as the wider UK. Between 2017 and 2023, costs in Merseyside and North Wales are estimated to have risen from 17.42 pence per kWh to 37.89 pence per kWh (a 118% increase). This is slightly higher than the rate of increase observed across the UK (115%).

Figure 3.6 Average electricity unit cost



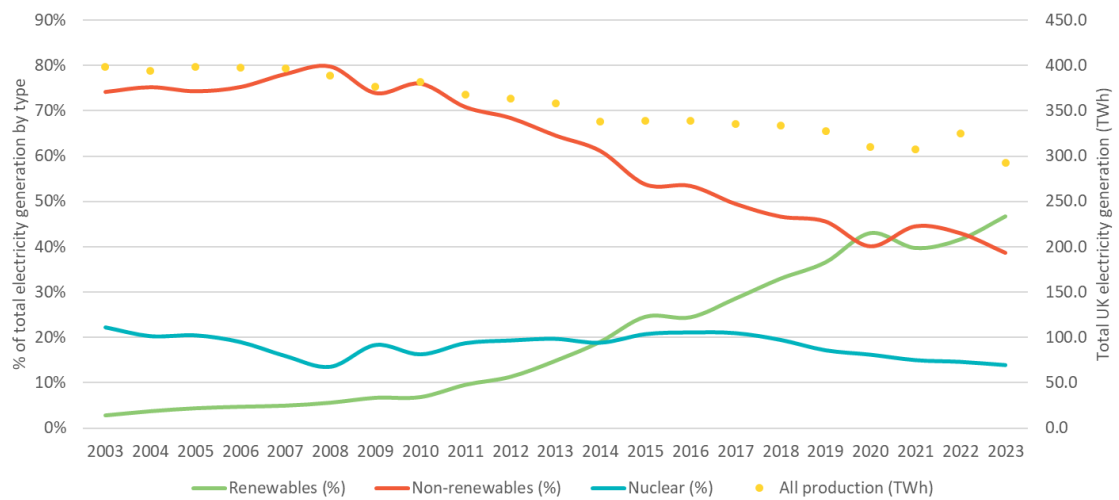
Source: Table 2.2.3 Average annual domestic standard electricity bills in for UK regions / Lichfields analysis

Energy Production

- 3.24
- At the national level, there have been significant changes in recent years to the composition of electricity supply, by source. The latest available Government data⁸ indicates that renewable energy⁹ accounted for 46.8% of UK energy supply in 2023. This compares with 13.9% of supply from nuclear and 38.8% from other forms of supply¹⁰.
- 3.25
- As Figure 3.7 shows, the renewable energy sector has experienced an extended period of sustained growth, with its contribution to supply increasing by a total of 40.1 percentage points (from 6.7% to 46.8%) between 2009 and 2023. This compares to a 4.5 percentage point decrease in the contribution attributable to nuclear energy and a 35.2 percentage point decrease with respect to other non-renewable forms of energy.

⁸ BEIS (2023) Energy Trends: UK electricity
⁹ Comprising of biomass, wind (onshore and offshore), solar, hydro, wave/tidal and energy supplied from battery storage
¹⁰ Comprising of coal, gas, oil and other fuels

Figure 3.7 UK electricity production by source



Source: BEIS / Lichfields analysis

3.26

Table 3.5 provides a more granular breakdown of the growth in renewable sources of energy from 2014 to 2023. This demonstrates that offshore supply has experienced the largest proportionate increase (270.6%), followed closely by growth in solar PV generation (242.8%).

Table 3.5 Power generation (TWh) by renewable supply type

	2014	2023	% Change
Offshore wind	13.4	49.7	270.6%
Bioenergy	22.6	34.1	50.7%
Onshore wind	18.6	32.6	76.0%
Solar PV	4.1	13.9	242.8%
Hydro	5.9	5.5	-6.0%

Source: BEIS / Lichfields analysis

4.0 Construction Impacts

- 4.1 This section sets out the potential economic impacts arising from the construction phase of the Legacy ESS proposals. The key impacts relate to the employment opportunities and additional economic output that could be generated.

Direct Employment

- 4.2 As construction projects are often comprised of a series of discrete elements of work undertaken by specialist contractors, the number of workers on site generally fluctuates over the duration of a build period. During the peak phase of construction, it is estimated – by Innova – that the proposed development could generate 100 direct Full Time Equivalent (FTE) jobs. This corresponds to an average of 50 FTE jobs supported per annum throughout the build period.
- 4.3 The extent to which the employment opportunities created by the construction of the proposed development will be taken up locally cannot be estimated with any certainty until contracts have been let. However, it would be reasonable to expect at least a proportion of these jobs to be taken up by the local workforce.

Indirect Employment

- 4.4 Construction typically involves purchases from a range of suppliers, who in turn purchase their goods and raw materials from businesses further down the supply chain. It is anticipated that businesses in Wrexham and the wider region could benefit from supply chain linkages and trade connections established during the construction of the Legacy ESS development. This would support additional indirect jobs.
- 4.5 The relationship between the initial (direct) and total economic effects is referred to as the ‘multiplier effect’. It demonstrates that an initial investment can have much greater ‘spin-off’ effects as it works its way through the wider economy.
- 4.6 ONS UK Input-Output Tables indicate that infrastructure developments in the UK have a Type I¹¹ employment multiplier of 2.21 during construction. Applying this to the level direct employment referred to above indicates that the proposals could be expected to support 60 indirect jobs (120 during the peak phase). Therefore, in total, the proposed development is expected to support 110 direct and indirect jobs per annum throughout the construction phase (including 220 FTE jobs during the peak construction period).
- 4.7 In addition, local businesses would generally be expected to benefit from a temporary increase in demand as a result of expenditure by direct and indirect workers during the construction/ installation of the proposed energy storage facility. This could be expected to include wage spending of workers in shops, bars, restaurants and other services and facilities. This helps to support further induced jobs. The quantum of induced employment generated by the proposed development is not captured in the above employment forecasts. This is because the Input-Output Tables provide Type I, rather than Type II¹², multiplier

¹¹ Type I multipliers include direct and indirect effects

¹² Type II multipliers include direct, indirect and induced effects.

estimates. As a result, the estimate of employment outlined in the analysis above could be considered conservative.

Economic Output

- 4.8 The construction/installation phase of the development would also contribute to local economic output, as measured by Gross Value Added (GVA). GVA is a measure of the difference between what is produced as output (goods and services) and the inputs (raw materials, semi-finished products etc.) used in the production of those outputs. It represents the additional value that is added through economic activity.
- 4.9 It is anticipated that the proposed development could generate £12.3m of additional GVA per annum during construction/installation phase (it should be noted that not all of this will be retained locally).
- 4.10 This has been estimated having regard to:
- The average GVA for a FTE construction worker in Wales (£92,465 per annum)¹³;
 - A Type I GVA multiplier for infrastructure developments in Wales of 2.27¹⁴; and
 - The level of direct employment to be supported during the construction phase (50 FTE jobs).
- 4.11 This estimate of economic output accounts for direct and indirect effects only. An additional level of induced GVA could also be expected but is not captured in the above estimates. This is because the multipliers published in the ONS Input-Output Tables are Type I, as outlined above.

¹³ Experian 2023 – raw data provided in 2019 prices, therefore this has been inflated to 2024 prices using the UK government GDP deflator

¹⁴ ONS UK input-output tables

5.0 Operational Impacts

- 5.1 This section assesses the economic impacts that could be generated during the operational phase of the proposed development. The analysis draws upon publicly available datasets and Lichfields' expertise in economic impact methodologies.

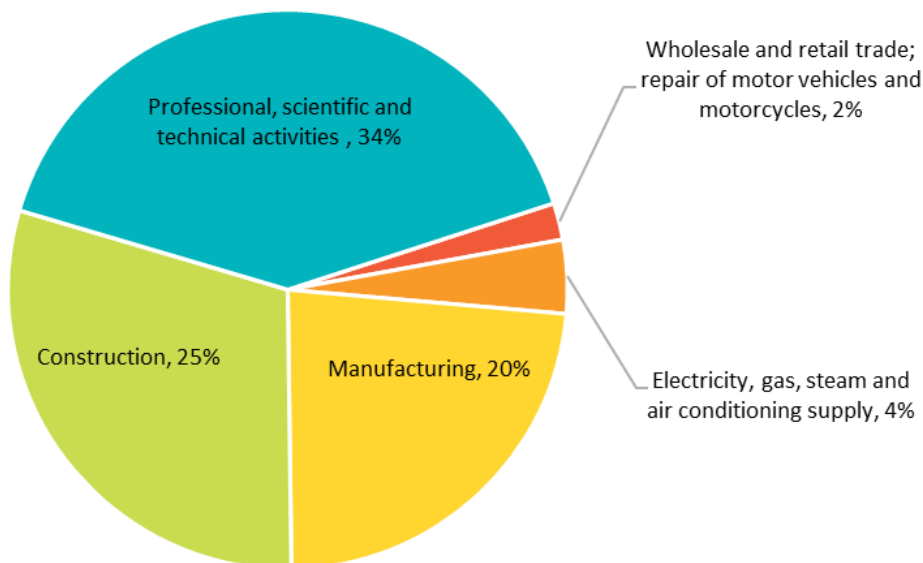
Employment Impacts

- 5.2 It is estimated, by Innova, that the proposed development could support approximately 25 permanent FTE jobs in operational and maintenance roles.
- 5.3 In addition to the direct employment considered above, the proposed development would support further employment across the local economy (and beyond) in the form of both:
- Indirect jobs: jobs supported by the supply chain expenditure associated with the proposed development; and
 - Induced jobs: jobs supported by the wage expenditure of direct employees - as well as the wage spending from additional jobs in the supply chain - in shops, bars, restaurants and other service facilities.
- 5.4 Based upon a review of relevant research¹⁵, an 'industrial' multiplier has been applied. This results in an employment multiplier of 1.29 at the local level, rising to 1.44 at the regional level. Applying this to the 25 FTE direct jobs outlined above, it is estimated that the proposed development could generate approximately 5 'spin off' FTE jobs at the local level, rising to 10 FTE jobs across the wider region.
- 5.5 In addition to the direct onsite roles, the proposed development could also support a much wider range of jobs across the sector. Data published by the Low Carbon and Renewable Energy Economy survey highlights that 5,600 FTE jobs were supported in the UK energy storage sector in 2022 (the most recent data available). In the same year, it is understood that the UK had approximately 3,090 MW of energy storage capacity in the development pipeline or installed and fully operational¹⁶. This provides an indicative estimate that approximately 1.8 FTE jobs were supported across the UK for every MW of energy storage capacity installed/ in development. In the context of the proposed development, this data helps to provide a sense of the potential the proposal offers in supporting offsite employment opportunities across the wider energy storage sector.
- 5.6 The same data indicates that the energy storage sector supports employment across a host of occupations, including 34% from professional, scientific and technical activities (see Figure 5.1). The delivery of a new energy storage facility could help to support such opportunities *offsite*.

¹⁵ Housing and Communities Agency Additionality Guide

¹⁶ Renewable Energy Planning Database (2024)

Figure 5.1 Energy Storage employment (FTE) by Industry



Source: LCREE / Lichfields analysis

Economic Output

- 5.7 The additional direct employment supported, as well as the energy produced/stored by the proposals, could also be expected to make a positive contribution towards local economic output, measured on the basis of Gross Value Added (GVA).
- 5.8 GVA is a commonly used measure of productivity and economic performance. It is calculated as the value of the output created by an industry or organisation less the cost of purchased inputs used in its production. In measuring economic growth, economists typically have regard to the quarterly (or annual) change in GVA for a given area.
- 5.9 A best-practice methodology for assessing the potential GVA uplift from a proposal is based upon the application of 'GVA per worker'. This indicates that the proposed development could support a permanent uplift in GVA of approximately £2.8m, based upon:
- The level of direct FTE employment supported by the proposed development; and
 - The average GVA per workers of employees in the utilities sector¹⁷
- 5.10 In addition, the proposed development could support a greater level of economic output offsite. This is through jobs supported in the wider economy, as well as the scheme's potential role in supporting Wrexham to pursue future economic growth whilst contributing towards a reduction in carbon emissions by providing local businesses with access to clean energy.

¹⁷ Experian (2023) - raw data provided in 2019 prices, therefore this has been inflated to 2024 prices using the UK government GDP deflator

Fiscal Impacts and Community Impacts

Business Rates

- 5.11 The proposed development will generate an increase in business rate receipts. This could provide Wrexham County Borough Council with additional revenue through the UK Government's Business Rate Retention scheme, helping to fund investment in important local infrastructure and services.
- 5.12 Business rates are calculated having regard to the Valuation Office Agency's ('VOA') assessment of a property's Rateable Value. The Rateable Value of battery storage sites located across England appears to vary considerably depending on the scale of the development and its location. Focusing exclusively on larger-scale sites (≥ 50 MW capacity) Lichfields' analysis has identified Rateable Values which range from £224,000 to £540,000. These figures translate to Rateable Values per MW capacity of £3,530 to £10,800.

Table 5.1 Rateable Value of Energy Storage sites in England

Site Name	Rateable Value	Installed Capacity	RV per MW capacity
Stonehill, Minety	£540,000	50MW	£10,800
Burwell	£224,000	50MW	£4,480
Green Lane, Thurcroft	£300,000	85MW	£3,530

Source: VOA / Renewable Energy Planning Database / Lichfields analysis

- 5.13 No data is currently available regarding the Rateable Value of schemes that are of comparable scale to the proposed Legacy ESS. This makes it more challenging to accurately quantify the level of business rates that could be generated by the proposed development. Nevertheless, the above information can be used to provide a high-level illustration of the potential scale of business rates that could be provided by a scheme of this scale.
- 5.14 Applying the minimum RV per MW capacity figure (£3,530 per MW) to the capacity of the proposed development (400MW) suggests that the Rateable Value of the proposed development could be in the order of £1.4 million. Having regard to the Welsh standard business rate multiplier (56.2p for every £1), this would correspond to business rates in the order of £795,000. Whilst the final Rateable Value and corresponding business rates may differ from this high-level estimate, it serves to highlight the significant fiscal impact that could be generated by the proposed development.

6.0 Energy and Environmental Impacts

6.1 This section provides an overview of the energy supply and environmental impacts associated with the Legacy ESS. Whilst there is some overlap between the two, for the purpose of this assessment, they have been defined as follows:

- Energy supply impacts: the potential for greater energy security and resilience in the energy grid; and
- Environmental impacts: the potential for the proposals to help support the shift towards low carbon energy generation, thereby reducing emissions.

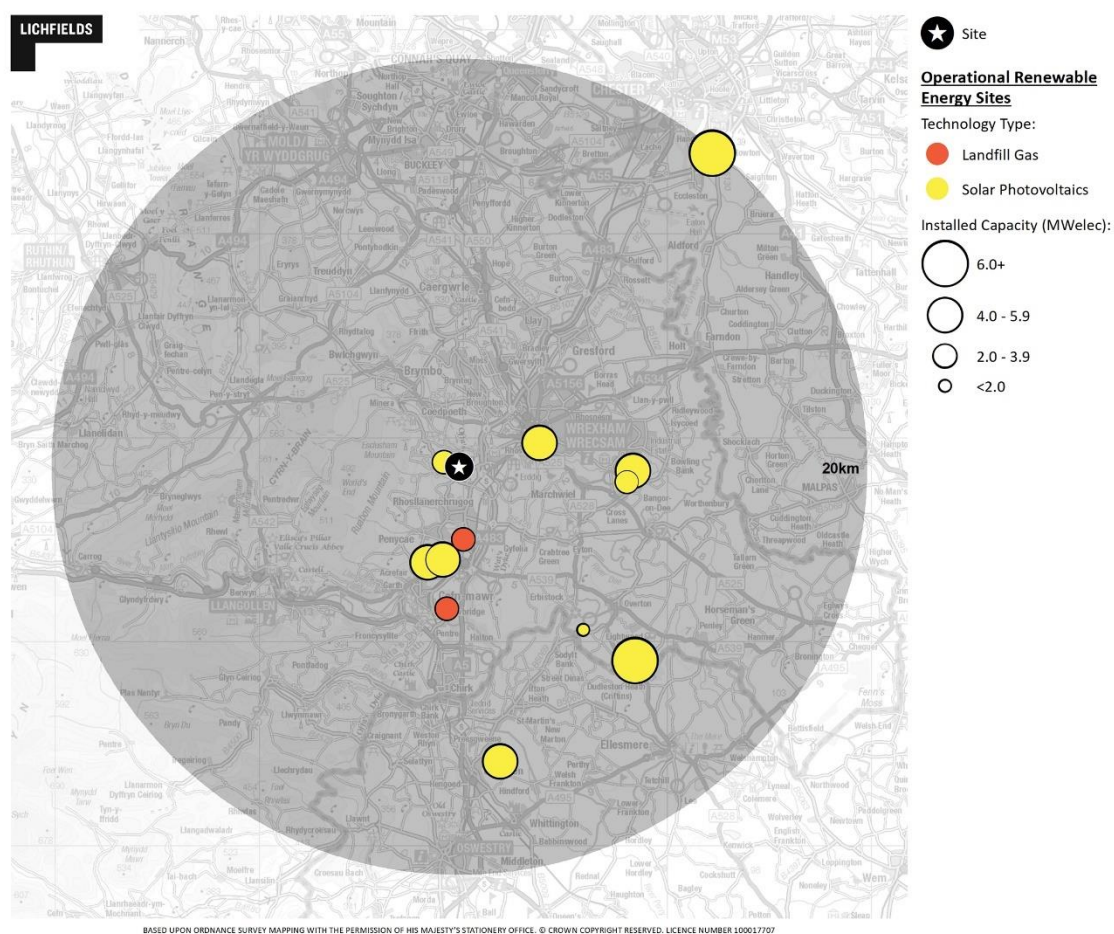
Energy Supply Benefits

Energy Storage Capacity

- 6.2 The proposed Legacy ESS will have a power capacity of up to 400 MW and will be able to discharge at full power capacity for up to 2 hours, thereby resulting in an energy storage capacity of up to 800 MWh. In addition, it is expected that the battery will cycle 2 times per day, therefore indicating a *daily* storage capacity of up to 1,600 MWh (1.6 GWh). Assuming the facility operates at full capacity, this offers the potential to store over 584,000 MWh (584 GWh) of energy per annum.
- 6.3 For context, BEIS data for 2022 indicates that the total annual energy consumption (domestic and non-domestic) in Wrexham stood at 766 GWh (see Figure 3.5). This translates to an average daily consumption of 2.1GWh. The data therefore suggests that – should the development operate at full capacity – it could store sufficient energy to meet over 75% of local demand.
- 6.4 In addition, BEIS also provide information regarding renewable energy generation in the Wrexham. This indicates that the Borough generated 55 GWh of renewable energy in 2022. Whilst the proposed development may also store energy from electricity generators located outside of Wrexham, this serves to highlight that the proposed development has the potential to store all of the renewable energy generated across the Borough¹⁸.
- 6.5 With this in mind, there are a number of electricity generators – across a range of technology types – located within 20 miles of the application site (Figure 6.1). In total, these generators provide capacity to generate 51.8MW of energy. In contrast, there are no energy storage developments within the same 20-mile radius.

¹⁸ Assuming the annual level of renewable energy generation remains constant.

Figure 6.1 Renewable energy sites within 20 miles from application site



Source: BEIS Planning Database (2024) / Lichfields

Flexibility of the Grid Network

- 6.6 Energy storage systems also help to provide additional flexibility in the grid network. At any given moment, the supply of electricity must equal the corresponding level of demand. In the past, this was carefully managed by switching on/off non-renewable (coal, oil and gas) power plants, depending on the level of energy needed throughout the day.
- 6.7 Renewable energy generators, however, are more intermittent and are therefore less flexible. Solar power, for example, is often produced during hours of the day where electricity demand is lowest. Energy storage systems provide the vital infrastructure to store any excess energy supply, which is then released into the grid during later hours where demand is higher. Given that energy storage systems are highly responsive, this ensures a consistent energy supply at all times. As the UK transitions away from the use of coal and gas – towards more renewable sources of energy – the importance of increasing the volume of energy storage systems will continue to grow.
- 6.8 Similarly, the provision of additional energy storage across the UK will minimise the *curtailment* of energy generation. Curtailment is the process of purposefully restricting the generation of new energy due to an oversupply in the grid in a given moment. Over the

period 2012-2020, curtailment in wind energy rose by approximately 3.6TWh¹⁹, representing a c. 350% rise over the 9-year period. This is estimated to have cost UK consumers £299 million²⁰ in 2020, further emphasising the need for a substantial increase in infrastructure to manage fluctuations in energy supply and demand.

Consumer Pricing Benefits

- 6.9 The reduction in reliance on oil and gas supplies also presents significant long-term consumer pricing benefits. At present, UK residents and industry are at greater risk of price fluctuations and interruptions to supply resulting from external factors including:
- Regulatory failures;
 - Geo-political instability; and
 - Conflict/breakdown in diplomatic relations in other parts of the world.
- 6.10 In contrast, the development of energy storage facilities – alongside the wider transition towards renewable energy sources – could help to alleviate these risks. This will be achieved by reducing the impacts of demand/supply shocks and providing consistent consumer pricing during peak/off-peak periods. Indeed, some consumers are currently charged at a higher rate for using power during peak times (a practice known as a demand charge). The implementation of energy storage systems can be used to meet peak consumption (the highest amount of power a customer draws from the grid) with energy stored cheaply when demand is low, thereby potentially reducing the amount customers pay for energy during peak times.

Environmental Benefits

- 6.11 As outlined in Section 3.0, the UK has experienced a significant transition away from non-renewable sources of energy supply towards lower carbon renewable sources over the last 15 years. This has translated to a considerably lower carbon footprint in the grid network. Figure 6.2 provides an index of the UK's carbon intensity – i.e. the tonnes of CO₂ generated per MWh of energy produced – over the period 2009 to 2024. It demonstrates that – on average in 2024 – energy generation has resulted in c.56% less CO₂ per month relative to the corresponding figures recorded in 2009.

¹⁹ NationalGrid: A Connected Future (2022)

²⁰ Drax Group Plc; Lane Clark & Peacock.

Figure 6.2: UK Energy carbon intensity by month index (January 2009 = 100)

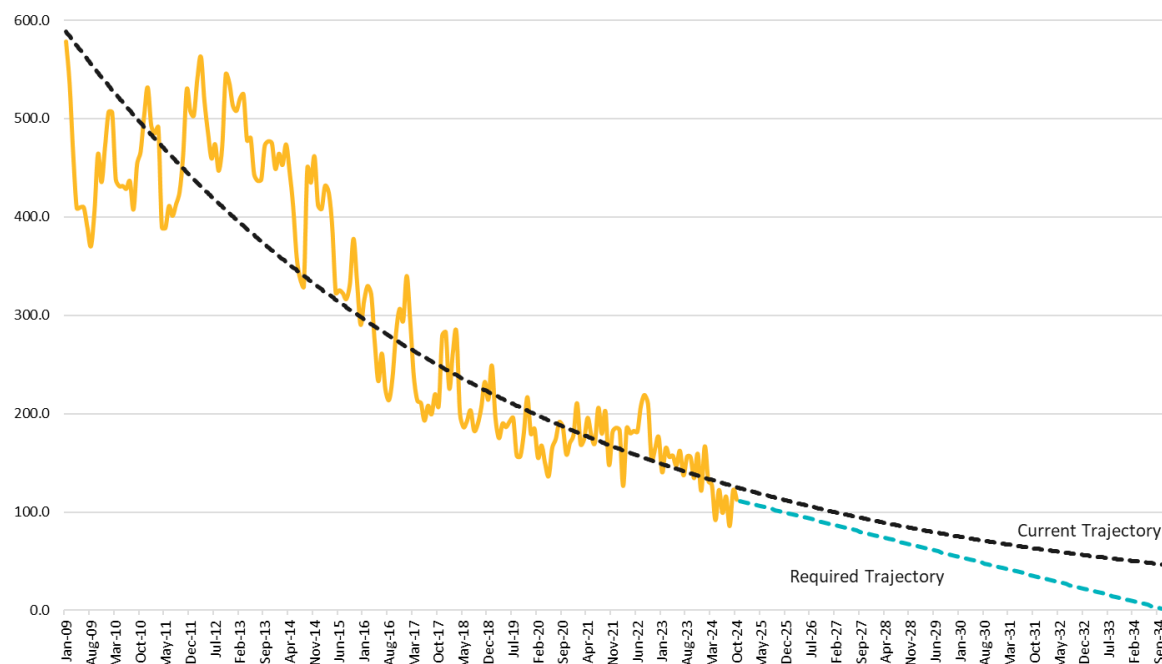
	January	February	March	April	May	June	July	August	September	October	November	December
2009	100.0	92.5	80.3	70.7	70.8	70.8	67.3	64.0	70.1	80.2	75.3	81.6
2010	87.6	87.5	75.8	74.6	74.6	74.1	75.4	70.5	78.4	80.6	86.9	91.9
2011	85.2	83.8	84.9	67.3	67.2	71.1	69.3	71.4	73.6	80.1	91.5	87.8
2012	87.0	93.5	97.3	89.5	84.0	79.4	81.9	77.3	81.5	94.2	92.7	88.7
2013	87.8	90.0	90.7	82.6	83.1	76.7	75.5	75.7	81.7	82.5	82.1	77.6
2014	80.3	78.3	81.9	77.1	70.9	62.0	58.2	56.9	77.8	75.2	79.8	71.2
2015	70.5	74.6	73.5	67.5	55.8	56.3	55.7	54.7	57.4	65.3	57.7	50.2
2016	54.5	57.0	55.5	47.0	40.3	45.1	38.8	36.9	40.9	48.8	53.0	50.9
2017	58.8	50.7	41.1	36.8	36.4	33.3	36.0	34.4	38.0	35.9	48.3	48.9
2018	39.0	45.2	48.9	34.5	32.2	33.3	35.1	31.5	32.7	35.6	40.1	37.0
2019	43.0	33.8	30.2	32.8	32.2	33.1	33.8	27.1	27.0	31.1	37.4	31.0
2020	31.9	26.8	28.9	25.8	23.6	28.5	30.1	33.1	32.2	27.4	29.4	30.8
2021	36.4	29.2	30.1	33.8	30.8	29.4	35.6	31.0	34.9	25.5	31.3	32.1
2022	31.6	21.8	32.0	31.1	31.5	31.4	35.9	37.8	36.2	26.5	28.4	30.4
2023	24.2	28.5	26.9	27.1	25.4	28.0	23.7	27.0	26.9	23.2	27.5	21.0
2024	28.8	22.7	22.0	15.8	21.1	17.1	20.0	15.7	21.0	19.4		
Month-by-Month Difference (2009 - 2024)	71%	70%	58%	55%	50%	54%	47%	48%	49%	61%	< Average = 56%	

Source: ESO's Carbon Intensity Dashboard / Lichfields analysis

- 6.12 Given the legal, policy and strategic targets to decarbonise the grid by 2035 and achieve Net Zero by 2050, this trend of decreasing carbon intensity looks set to continue. This will place an increased reliance on *zero* carbon sources of energy. The latest data suggests that, in 2023, 46.8% of the UK's energy supply was generated from renewable sources. This type of energy generation has a negligible carbon footprint. Similarly, nuclear power – which contributed 13.9% of the UK's energy generation in 2023 – also produces a limited level of CO₂ throughout its lifecycle. Broadly speaking, therefore, approximately 61% of the UK's energy generation in 2023 did not generate any carbon emissions. This is in comparison to just 26% in 2009.
- 6.13 However, despite this recent progress, evidence from the Climate Change Committee suggests that the UK (based upon its current trajectory) is not on track to achieve a decarbonised grid network by 2035²¹. Based upon past trends, an indicative trajectory of the decarbonisation of the UK's grid network is presented in Figure 6.3. This highlights the importance of accelerating the deployment of renewable energy generation to meet environmental targets. As previously outlined, by increasing the capacity of energy storage, the Legacy ESS proposals could help to unlock the potential for greater renewable energy generation, replacing higher-carbon sources.

²¹ Climate Change Committee (March 2023)

Figure 6.3: Grid energy decarbonisation trajectory (2009 – 2035)



Source: Lichfields analysis

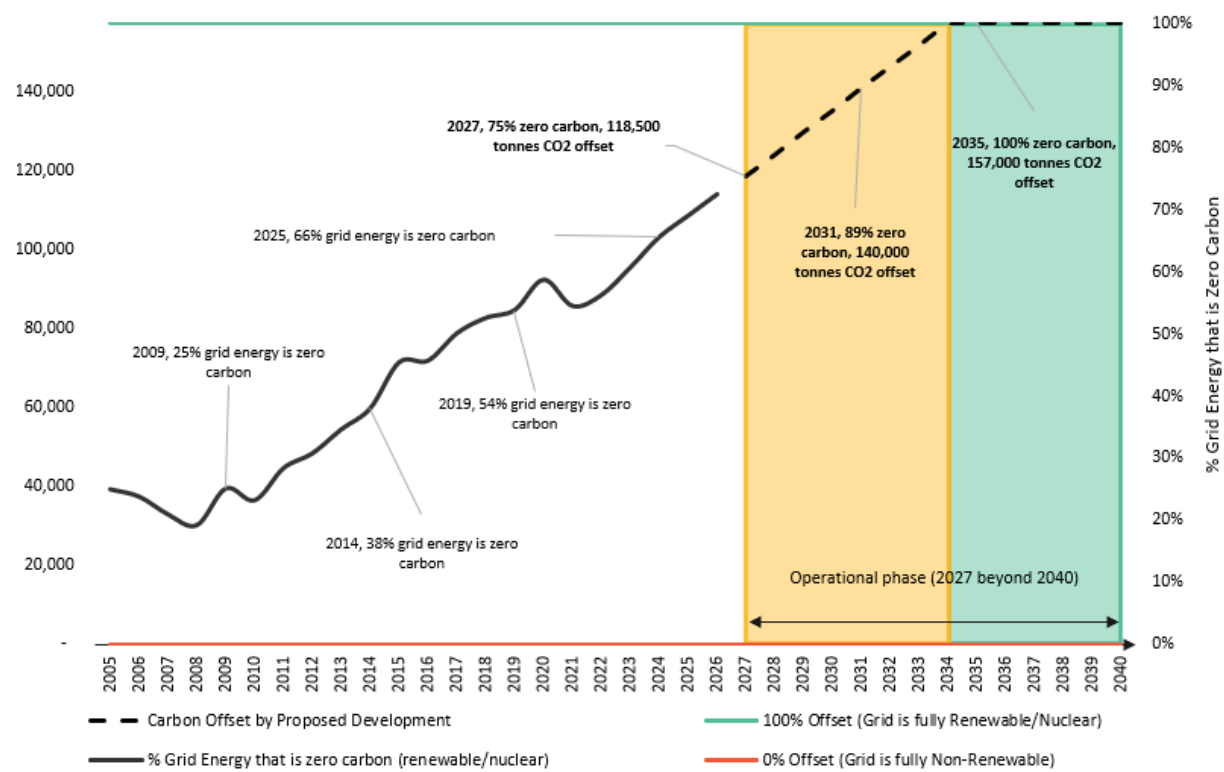
- 6.14 Assuming the UK accelerates its generation of zero carbon energy to align with the required trajectory modelled in Figure 6.3, it is estimated that by 2027 (the first *full* calendar year in which the proposed development is expected to be operational) approximately 75% of grid energy will be zero carbon. Taking into account the energy storage capacity of the proposed development (1,600 MWh per day), this indicates that 1,200 MWh of *zero carbon* energy could be stored by the proposed development per day in 2027. This translates to a daily CO₂ saving of 325 tonnes compared to energy derived from non-renewable sources²². Over the course of a year, this amounts to an average of 118,500 tonnes of CO₂ per annum.
- 6.15 As shown in Figure 6.4, the carbon reductions derived above are likely to increase progressively each year as the proportion of clean grid energy rises, until the grid reaches full decarbonisation by 2035. Under such a scenario, all energy stored by the proposed development (1,600 MWh per day) would be zero carbon by 2035. The proposed development would therefore offset 430 tonnes of CO₂ per day. This amounts to 157,000 tonnes over the course of a year by 2035, which is equivalent to:
- Taking 105,340 cars off the road²³; or
 - Planting 630,000 trees²⁴.
- 6.16 By helping to cut CO₂ emissions, the proposed development can make a significant contribution towards Wrexham County Borough Council's ambition of becoming a carbon neutral economy, as well as the UK Government's aim of achieving Net Zero greenhouse gas emissions by 2050.

²² Having regard to the UK Government GHG Conversion Factors for Company Reporting data, which indicates that the average non-renewable energy source in the UK has a carbon intensity of 0.27 tonnes of CO₂ per MWh.

²³ Based upon Department for Transport data for the average level of CO₂ produced by a car per km, and the average number of km travelled per car per year in the UK.

²⁴ Based upon data from EcoTree - How much CO₂ does a tree absorb?

Figure 6.4 CO2 offset by Legacy ESS



Source: Lichfields analysis

7.0 Conclusions

- 7.1 The proposed development of Legacy ESS is located on land north of Bronwylfa Road, Wrexham. It presents an opportunity to deliver both economic and environmental benefits and support the UK in realising its strategic ambitions. The key quantifiable benefits of the proposed development include:
- Creating 50 direct FTE jobs and a further 60 indirect (supply chain) jobs per annum throughout the construction phase;
 - Delivering an uplift in Gross Value Added (GVA) (economic output) of £12.3m per annum throughout the construction period;
 - Generating 25 permanent FTE onsite employment opportunities during the operational phase, as well as supporting a wider range of roles/jobs offsite across the energy storage sector;
 - Supporting additional GVA during the operation of the proposed development;
 - Generating an uplift in business rates in excess of £795,000 per annum; and
 - Providing an energy storage capacity of up to 800MWh per cycle (1,600MWh per day). This level of energy storage will contribute towards increasing the flexibility of the grid network. It also unlocks the option for further development in renewable energy generation across the region, which will support the UK Government's 'Net Zero' ambitions.

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