

Foresight Group

UK Opportunity in Clean Energy

Local Government - Levelling Up Report
September 2023

Foresight



Section 1: Clean Energy in the UK

Systemic View of the Energy Transition

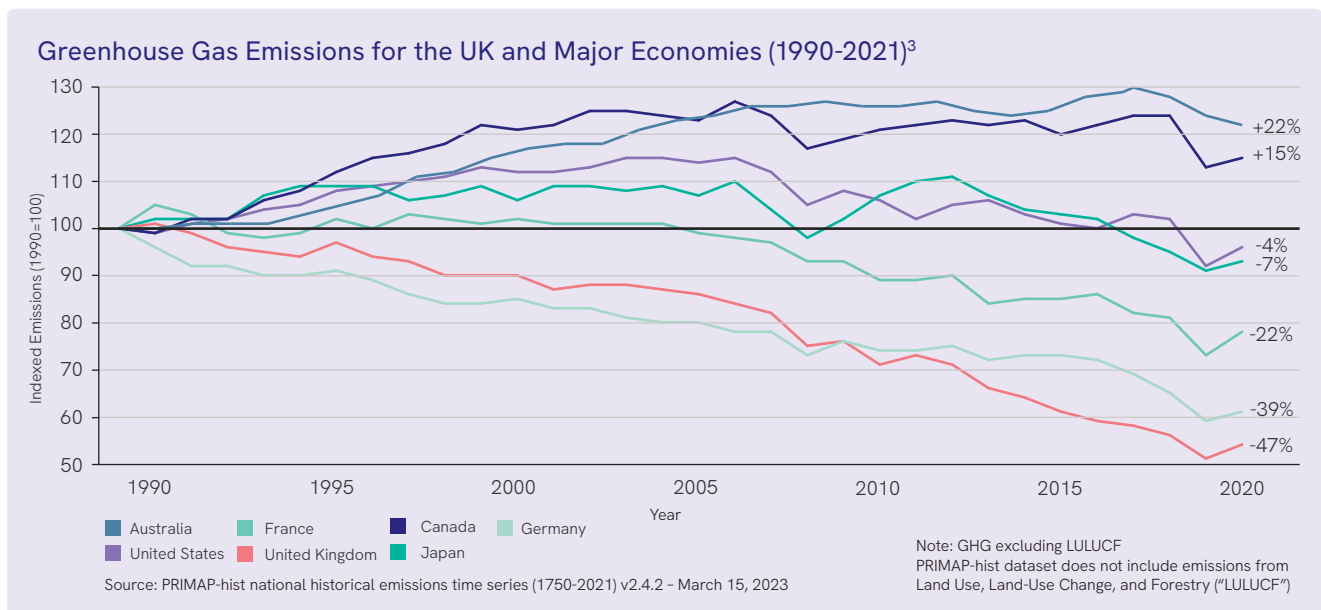
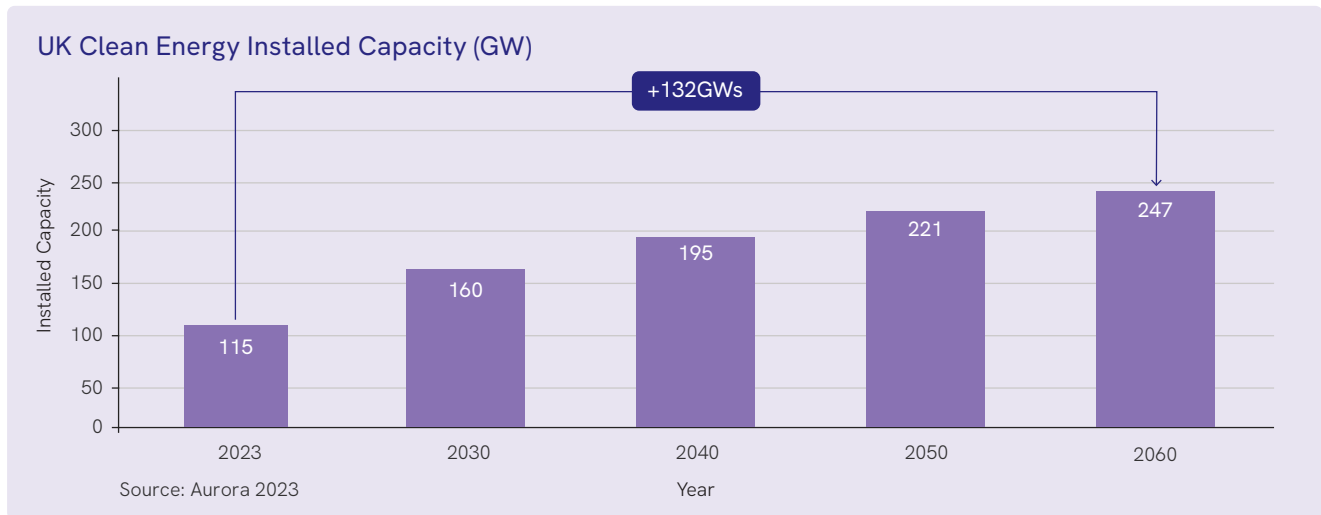
There is a transformational change underway in global energy markets driven by evolving patterns of both energy production and usage, predominantly reflecting the rapid growth in clean energy generation over the past 15 years. As the global energy system decreases its reliance on fossil fuels, the new energy landscape is increasingly characterised by decentralised, lower emission generation with greater levels of interconnection between markets. Large-scale coal and gas-fired power stations are being retired and replaced by a diverse mix of smaller low-carbon power plants. Typified by solar plants and wind farms, the intermittent and geographically distributed nature of these new assets requires more flexible, smarter infrastructure and additional connectivity to accommodate their investment and build out. This fundamental transformation is resulting in a wave of high-quality infrastructure investment opportunities. Foresight has classified these investment opportunities into three broad areas:

- Clean Energy Generation.
- Clean Energy Enabling Infrastructure.
- Transmission and Distribution.

UK Market Overview

The UK government’s net zero strategy published in 2021 committed the UK to reduce greenhouse gas (“GHG”) emissions to 1990 levels by 2050. According to a UK Parliament report in 2023, to achieve this target by 2050 almost all UK energy will be consumed in the form of electricity. While various low-carbon technologies will play key roles, the UK clean electricity generation capacity will need to be five times its current size, rising to 209GW from 42GW in 2018.¹ Crucially, this forecast assumes no increase in power demand, indicating the real figure could be substantially higher as homes, business, industries and the wider economy electrify with the energy transition. As shown below in 2023, the UK is estimated to have 115GW of electrical generative capacity and is forecast to add 132GW of peak generation capacity over the next 37 years, more than doubling current installed capacity.²

While significant clean electricity capacity needs to come online to achieve the UK target of net zero by 2050, the UK has been performing very well in comparison to its peers. The graphs below show the forecast installed capacity of clean energy to 2060 under Net Zero, and the progress the UK has made in reducing its GHG emissions since 1990.



1. BEIS Select Committee, January 2023
2. Aurora Energy Research, April 2023

3. Powering Up Britain - The Net Zero Growth Plan, March 2023

Role of Investment

The UK’s rapid growth in clean energy and peaking capacity has been driven by strong public sector investment, highlighting the government’s commitment to the net zero targets, committing its £30 billion of domestic investment noted in the Spending Review 2021, £6 billion for energy efficiency for 2025-2028 in the Autumn Statement 2022 and up to £20 billion for Carbon Capture Utilisation and Storage (“CCUS”) in the Spring Budget 2023.⁴ This is supported by the UK’s public financing institutions, the UK Infrastructure Bank (“UKIB”) providing £22 billion in funding as well as the British Business Bank (“BBB”) and UK Research and Innovation (“UKRI”) so far supporting £505 million of equity investment into clean technology companies between 2014-2022.

Since the implementation of Electricity Market Reform (“EMR”) in 2013, the UK has moved away from fossil fuel generation⁵ towards clean electricity generation with coal capacity falling by over 80%, from 20GW (23% of total) to only 4GW in nine years. This has been driven by a wave of Solar Photovoltaic (“PV”) and onshore wind projects, with clean energy increasing by 3.6x to >55GW in 2022.⁶

While public funds have been key to priming complementary private sector finance to date, significantly more private capital investment is still required to achieve net zero. As more clean energy generation capacity is added to the grid, new flexibility and grid strengthening technologies are needed to ensure energy supply is matched to demand. Moreover, harder to decarbonise areas of the economy, such as manufacturing and transportation, are also targeted for net zero.

These areas are more complex and will require strong policy leadership from the government to unlock private capital, such as clarity in revenue models, financing mechanisms and market frameworks.

Project Development Stages

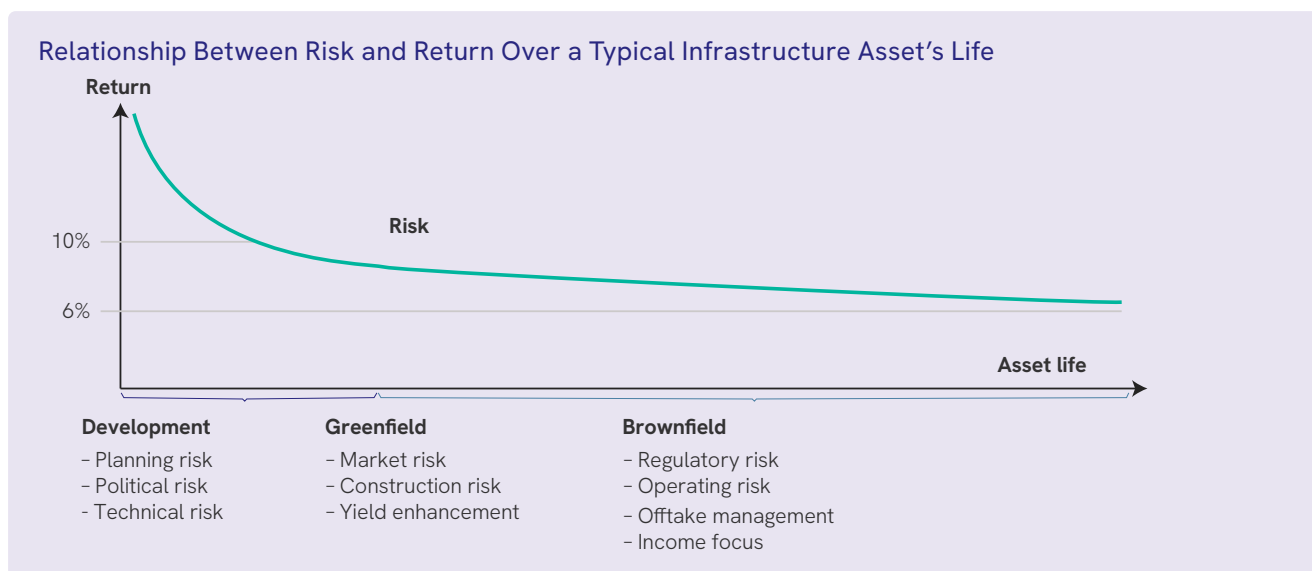
For investors there are a range of strategies and methodologies available to gain exposure to clean energy infrastructure. By targeting investment at particular development stages of a project or the associated business model, investors can adjust their risk and return profile. Typically, energy infrastructure investments are made at one of the following three stages: Development, Greenfield or Brownfield. Shown here is a visualisation of the risk profile of a typical asset life, discussed in more detail below.

A **Development** stage asset is where the necessary permits and consents for the project have not yet fully been secured. Investing at this stage presents an opportunity to gain exposure to higher returns, commensurate with an increased risk profile.

A **Greenfield** project is typically when capital is invested at the Ready-to-Build (“RtB”) stage. Projects are likely to have all permits and consents secured with capital required to fund the construction costs i.e. Capital Expenditure (“Capex”). Investments here offer a medium level of return although construction risk needs to be managed.

A **Brownfield** opportunity is an asset which is already operational. This typically presents the lowest risk and the lowest return across the three stages.

Based on Foresight’s experience, in the UK we have seen significant competition for Brownfield investments from investors over the past five years has seen downward pressure on pricing with limited upside potential, resulting in a shift in investment focus to Greenfield and Development platforms as investors seek to benefit from the potential value uplifts associated with these stages. The below graph illustrates the typical risk and return relationship across infrastructure assets.



4. HM Treasury 2021, 2022, 2023.

5. Thermal electricity generation typically involves burning a fossil fuel such as coal or Natural Gas (methane) to either boil water to generate steam or using the resulting hot gases from combustion itself to spin large turbines, generating electricity

6. Aurora Energy Research, April 2023

Asset Business Models

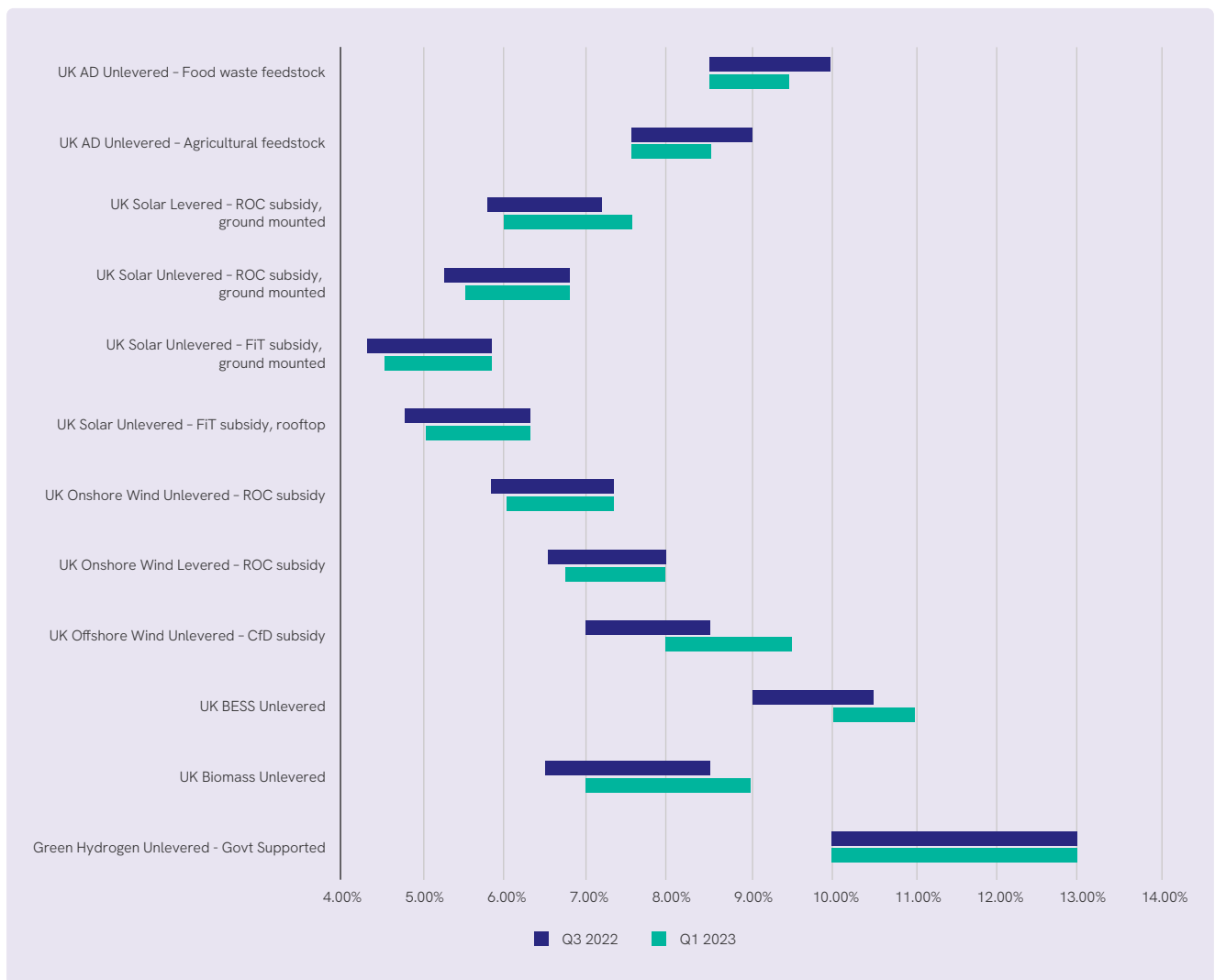
Another common way investors can control their risk exposure is through the underlying business model the asset employs.

Towards the lower end of the risk spectrum and therefore expected returns, clean energy assets can sell a high percentage of the electricity produced via contracts with specific offtakers. Arrangements like this are typically formalised via Power Purchase Agreements (“PPA”), whereby a customer eliminates power price volatility over a period of time ranging from months to many years, creating proportionate revenue certainty for the asset owner but lowering available returns as market-driven upside is reduced. Risk is transferred to the PPA counterparties. Investors seeking higher returns can seek projects with less contracted or entirely unsecured offtake arrangements (the latter known as “merchant” or “market risk”), with electricity sold directly into the grid at the prevailing wholesale market price. With storage assets, this merchant profile is used to boost returns discharging at corresponding higher price periods during the day, known as Trading Arbitrage or Balancing Mechanism.

Government support also provides a pathway for de-risking assets for investors. Across clean technologies like solar, onshore and offshore wind and soon to be hydrogen, market-based mechanisms known as Contract for Difference (“CfD”) are available to subsidise revenues for projects. Support is provided to projects via sequential auction processes known as Allocation Rounds (“ARx”), whereby developers bid for revenue support based on respective production cost. Briefly, a CfD pays the project the value difference between cost of production and sale price of the clean energy produced.

UK Return Trends in Clean Energy

The below graph shows select illustrative return ranges in the UK clean energy sector based upon Foresight’s market knowledge. Please note that Green Hydrogen is still at a nascent stage and the figures below are Foresight’s estimates.



Section 2: Policy and Regulation Driving Clean Energy Development in the UK

UK Policy Advantage

The UK government has developed and achieved its strategic priorities for the energy sector through market reforms and white papers over the years. It seeks to position the UK as a leading global player in clean energy and infrastructure development by building upon its strong engineering and technology-focused workforce track record of supporting entrepreneurs and developing policy frameworks.

Key papers include the Energy White Paper (2020), Ten Point Plan for a Green Industrial Revolution (2020), Net Zero Strategy (2021), British Energy Security Strategy (2022), Energy Security Plan (2023) and the Net Zero Growth Plan (2023). These detail the government’s aim of reaching net zero targets whilst driving economic growth, reducing dependence on imported fossil fuels for heating and power and delivering on its levelling up agenda whilst ensuring consumer energy bills remain affordable.

Energy policy reforms have paved the way for the ambitious target of no coal by 2035 along with the immense rise in solar PV and onshore wind capacity increasing from 15GW in 2013 to more than 55GW today⁷. Three key strategic pillars are designed to support private sector investment of around £100 billion in the clean energy sector in the period to 2030 with the expectation that this will support up to 480,000 jobs:⁸

- **Enabling Clean Energy and Net Zero:** driving the net zero transition to increase and diversify the supply of energy whilst seizing the opportunities of a green economy.
- **Ensuring Energy Security and Protecting Consumers:** developing a competitive energy system that is secure and resilient from supply shocks, domestic or internationally, whilst providing protection for consumers in terms of service and pricing.
- **Ensuring the Energy System is Fit for the Future:** delivering a system capable of capturing the full benefits of low-carbon flexibility and enabling a smart, digital and secure energy system.

With underlying policy support for the clean energy sector, the UK has seen a range of solutions for clean electricity generation and has supported technologies to reach maturity over the intervening years. This has created an experienced project financing ecosystem and a significant number of investment firms with proven experience in asset operation and management of clean energy technologies.

The Changing Regulatory Environment

While electricity and energy market regulation in the UK has historically supported the rollout of clean energy, the regulatory environment is continuing to evolve. Most notably, there is a trend of moving away from direct subsidies and capital grants to market-based mechanisms like CfDs via allocation rounds as the government continues to focus on measures to reduce overall cost of energy to consumers. CfDs are typically 15-year contracts which act to stabilise the wholesale power market by covering additional costs incurred above a set strike price. Conversely, the electricity generating project repays the government if the market price is above the set strike price. This mechanism caps returns but also limits downside by effectively eliminating pricing risk.

CfD mechanisms are expected to continue to drive the growth of clean electricity capacity by providing stable and inflation-linked power revenues to the project, increasing investor appetite and as a result, producing a lower cost of capital financing reflective of the significant revenue certainty. This in turn encourages developers to ensure they use appropriate risk mitigation arrangements during the construction phase to preserve this lower cost of capital to maximise their potential success rate in the allocation auctions.

The benefit of this mechanism has been most profoundly seen in the wind sector with offshore wind, the largest technology by capacity, witnessing a significant fall in the strike price from £150/MWh in AR1 (2017) to c.£37.34/MWh for both AR3 (2019) and AR4 (2022) as the financial benefits of the CfD mechanism were combined with the growing maturity of the sector and technology.⁹

Onshore wind saw a similar fall in its strike price from £79.23/MWh (AR1) to £42.47/MWh (AR4), as costs fell towards offshore wind levels, squeezing available returns and increasing competition for investors.¹⁰

Based upon the perceived level of success of this mechanism, the UK government is seeking to apply it across a variety of technologies such as LDES, CCUS, Hydrogen and Interconnectors. Broader market policy is also being developed with the intended aim of supporting initiatives focused on Capacity Market reform, Market design (via REMA),¹¹ Electricity Generator Levy (“EGL”), UK Emissions Trading Scheme (“ETS”), Offshore Transmission (“OTNR”), Access Reform from Ofgem, Transmission Charges, Interconnector Trading and the development of a Regulated Asset Based (“RAB”) scheme to facilitate the construction of the planned new nuclear build out. Understanding the detail and interaction of these various regulatory mechanisms will be key to assessing future revenue streams for generation, storage and transmission investments.

The rapid rise in clean electricity generation has required a corresponding increase in grid capacity to connect these new generation and storage assets. Distribution Network Operators (“DNO”) are now having to delay grid connections in the future to allow additional construction time for reinforcing works to manage the additional electricity to be fed into the grid. The National Grid’s regulator, Ofgem, is introducing policy reforms like the recently announced Access Reform to mitigate such delays, however grid connections will remain a salient constraint to much project development.

7. Aurora Energy Research, April 2023

8. Powering Up Britain – The Net Zero Growth Plan, March 2023

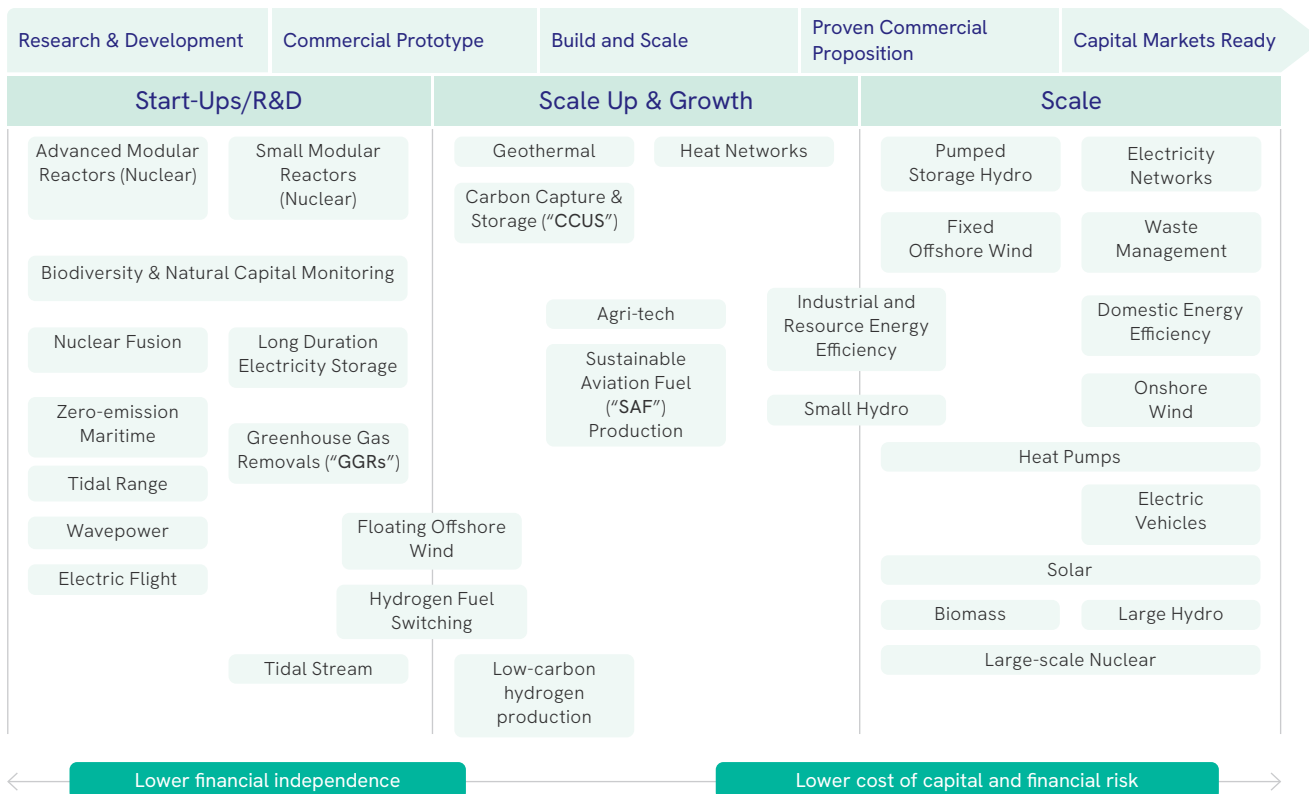
9. BEI 2019, BEIS 2022, Department of Energy & Climate Change 2019

10. Department of Energy and Climate Change (“DECC”) 2019, Baringa 2023

11. Review of Electricity Market Arrangements (“REMA”)

Section 3: Where Foresight Sees Opportunity

UK Clean Energy Technology Landscape



Source: HMRC, Mobilising Green Investment, 2023 Green Finance Strategy March 2023

With the UK government committed to fully decarbonise the power system by 2035, it is apparent that significant capital investment will be required from both the private sector (expected to be more than £100 billion) and public sector to facilitate this transformation and deliver wider decarbonised growth.¹²

In order to provide an overall view of the technological landscape in the UK, the chart above summarises the commercial maturity and stage of development for each technology forming part of the UK government’s plan to reach net zero and other environmental goals.¹³

Key Opportunity Sets

Focusing on the key clean energy technology sub-sectors, we must consider the scale of investment required to drive impact. The following sectors will likely continue to see the development of large-scale, centralised infrastructure assets, within an investment community consisting of leaders in green project financing and investment structuring.

- Offshore Wind:** The planned build out of up to 50GW capacity by 2030 will, despite the disappointing outcome for this year’s allocations, continue to be supported by policy instruments such as the CfD scheme especially with the emergence of floating offshore wind projects, supplemented by the provision of a £160 million funding scheme to kick-start investment in associated manufacturing and port infrastructure.¹⁴

- Nuclear:** Used reliably and safely in the UK for over 60 years, nuclear generation is set to remain a core source of electrical generation delivered via a combination of a few large-scale plants (including Hinkley Point C and Sizewell C) and the potential development of Small Modular Reactors (“SMR”). Development of bespoke financing regimes is underway to attract institutional investors with long-dated, index-linked revenues.¹⁵
- CCUS:** Plans to utilise the potential CO₂ storage capacity (estimated at 78 billion tonnes) of the UK continental shelf are being supported with £20 billion of government funding to unlock private investment and job creation. Eight projects have been announced to form the first two CCUS clusters, in the North-East and North-West with plans to expand.¹⁶

As clean energy solutions become increasingly decentralised, several clean energy sub-sectors, as summarised below, are expected to provide investors with attractive investment opportunities to deliver a substantial boost to regional growth whilst investing in the development of new clean industries and local supply and support businesses.

- Solar:** Maximising the deployment of both large-scale ground and rooftop solar (commercial, industrial and residential) is a key initiative given the ease to deploy and its overall cost effectiveness. A pathway to reach 70GW by 2035 will be led by a new Solar Task Force due to be established by early 2024.¹⁷

12. BEIS, Plans unveiled to decarbonise UK power system by 2035, 2021

13. HMRC, Mobilising Green Investment, 2023 Green Finance Strategy March 2023

14. Baringa 2023

15. BEIS, DESNZ, 2023, Policy paper, Advanced Nuclear Technologies

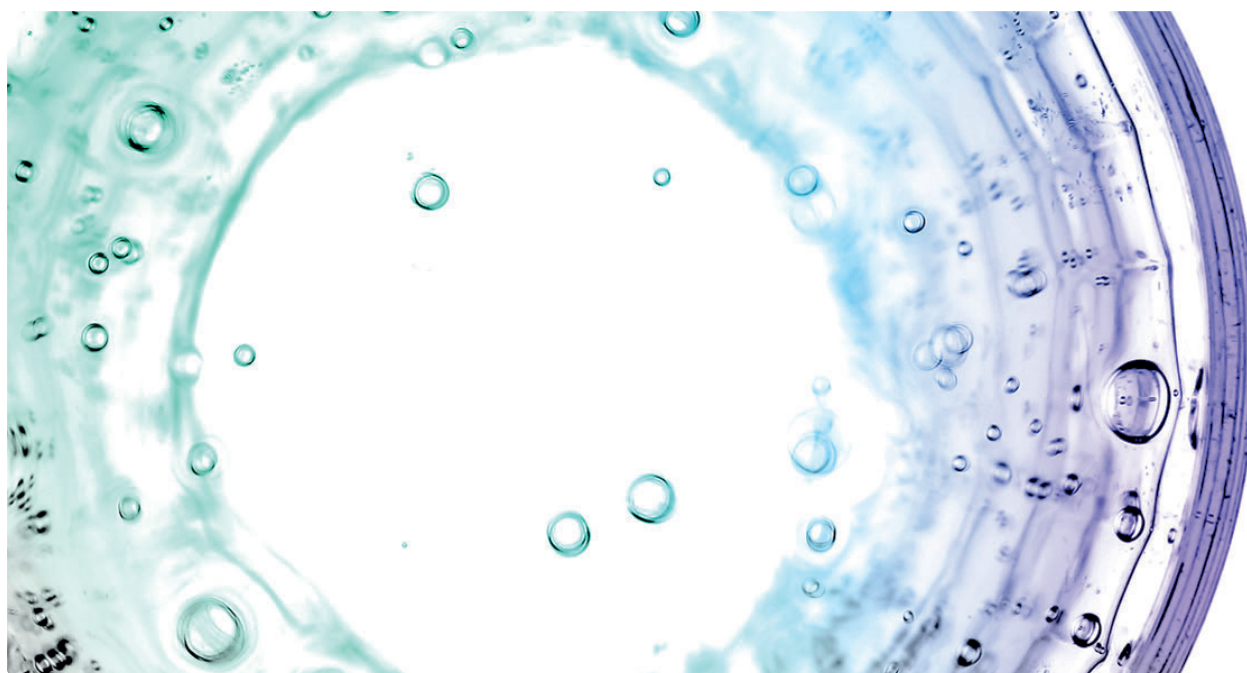
16. UK Prime Minister’s Ten Point Plan, 2020

17. DESNZ 2023

- **Energy Storage:** UK battery capacity is forecast to reach 4GW by the end of 2023 with expectations of reaching 24GW by 2024.¹⁸ Development of Long Duration Energy Storage (“LDES”) facilities is expected to play a significant role in this, with technologies such as Pumped Storage Hydro (“PSH”), Liquid Air Energy Storage (“LAES”), Flow Batteries and Compressed Air Energy Storage (“CAES”) complementing the shorter-duration lithium-ion solutions.¹⁹
- **Hydrogen:** As a potential zero-carbon energy vector offering a decarbonisation solution to otherwise hard-to-abate sectors, the UK is striving to be an early mover in the production of both green hydrogen and CCUS-enabled blue hydrogen.²⁰ 17 projects have recently been announced with a combined capacity of 262MW for CfD negotiations as part of the UK’s initial electrolytic hydrogen allocation round.²¹
- **Energy Efficiency and District Heating:** Decarbonising the way homes and business are heated is a key government objective with expectations of the deployment of over 1.9 million heat pumps by 2035.²² Targeted regulation alongside a new Clean Heat Market Mechanism is to be introduced in 2024, designed to create and attract finance to this emerging market activity.²³
- **Electric Vehicle and Infrastructure:** Ambitious plans to ban the sale of new petrol and diesel vehicles from 2030 is expected to require 300,000 public electric charge points distributed across the UK.²⁴ Investments in business models based upon developing large-scale local authority schemes and rapid charging capacity along major road networks are considered to be the most robust opportunities alongside potential investments in battery manufacturing plants.

The table below gives indicative investment metrics based on Foresight’s experience summarised by technology:

Sector	Ticket Size (£m)	Construction Period (Yrs)	Asset Life (Yrs)	Contracted Revenue Share
Solar	25-100	1.0-1.5	30-40	Low-Med
Onshore Wind	20-100	1.0-2.0	30-35	Low-Med
Offshore Wind	1,500-4,000	2.0-4.0	30-40	Med-High
Bioenergy	20-100	1.0-3.5	25-40	Med
Battery Storage	25-75	1.0-1.5	20	None
Hydrogen	25-100	1.0-2.0	30-40	Med-High
Pumped Hydro	100+	4.0-6.0	100-120	Low
Interconnectors	100+	3.0-4.0	30-40	Med
EV Charging	20-50	2.0-4.0	15	None
Nuclear	30,000-40,000	6.0-13.0	20-60	High
SMR	1,800-4,000	2.0-4.0	40-60	High



18. Rystad Energy, 2023

19. Aurora 2023

20. Powering Up Britain – The Net Zero Growth Plan, March 2023

21. Hydrogen Business Model/Net Zero Hydrogen Fund: negotiations list for allocation round 2022, August 2023

22. UK Government, Heat Pump Investment Accelerator Competition (HPIAC) 2023

23. <https://www.gov.uk/government/consultations/clean-heat-market-mechanism>

24. HM Government, Taking charge: the electric vehicle infrastructure strategy, 2022

Investing from LGPS Pools and Schemes

Given the government's focus on attracting UK pension capital to help finance the regional Levelling Up agenda, the pertinent question is how investors can best achieve local impact whilst maintaining investment disciplines and diversification across their various UK infrastructure allocations. As a sustainability-led investment manager active in the UK, Foresight believe the following may assist LGPS institutions in finding a balanced way of constructing a clean energy investment strategy across the regional LGPS Pools as well as individual schemes:

- The creation of five "Net Zero Hubs", entities funded by the DESNZ to accelerate regional efforts to drive low-carbon, clean growth initiatives (covering the Greater South-East, South-West, North-West and Yorkshire, North-West and Midlands) should provide a pipeline of fundable net zero projects within the specific regions that investment managers or investors can engage with and consider for investment. To provide capital efficiently at scale, the LGPS Pools may be better suited to engage across the regional hubs. A larger regional catchment area is also more conducive to developing a well-diversified portfolio across multiple technologies.
- Provisions to expand English devolution offers the potential for individual LGPS schemes to work in conjunction with the combined authorities to structure and finance transformational investments in those local areas. An initial example set by the West Midlands Combined Authority ("WMCA") following their Devolution Deal saw the funding of the Sprint A45 bus programme provided by a combination of the WMCA and the private sector (UK Investment Bank) paving the way for a fleet of new hydrogen buses across Birmingham by 2030.
- In addition to specifically sourcing regional transactions, individual schemes should continue to work with the LGPS Pools and appropriate investment managers, or directly if they have the resources, to access nationally significant projects such as; onshore or offshore wind, larger solar and storage farms, and new build nuclear especially where such projects may fall within their regional remit.
- For smaller regional projects, individual schemes may wish to consider providing debt solutions (senior or junior) as opposed to assuming equity investment in all instances and work with the local authority or the UKIB on a blended finance solution to mitigate the higher risk profiles that can sometimes be associated with smaller projects.

When considering projects initiated to help drive the Levelling Up agenda, lines between the real asset disciplines of infrastructure and private equity will blur as net zero and clean energy transition investments develop. Foresight Group is currently developing a Levelling Up strategy that will invest flexibly across UK SMEs and mid-market real asset development platforms to provide appropriate risk-adjusted financial returns alongside tangible and measurable progress towards the Levelling Up agenda.

For both Pools and individual schemes, working with an investment manager with deep experience and track record of making UK regional investments, whilst combining the disciplines of infrastructure and private equity, would be a progressive way to address some of the challenges inherent in addressing the UK clean energy opportunity at the national and regional levels as well as the Levelling Up agenda.

Section 4: Foresight Track Record & Experience

Foresight Group is a sustainability-led international alternative asset investment manager, specialising in investing in sustainable infrastructure internationally and regional UK&I private equity. Foresight's Infrastructure division provides global institutional investors access to sustainable investment opportunities in real assets across private and listed markets. Foresight manages an array of established infrastructure funds, including listed funds, managed accounts and unit trusts, with a particular focus on technologies across the spectrum of clean energy infrastructure spanning generation, flexibility and grid assets. Foresight has a team of over 170 experienced investment professionals, with strong networks across the UK, Europe and Australia to source, develop, operate and manage sustainable investments on behalf of investors.

As of 31st March 2023, Foresight managed over 400 infrastructure assets valued at c.£10 billion, across 12 distinct infrastructure sectors, including assets with c.4.4GW of total clean generative capacity, of which >250 assets are in the UK with c.2.3GW of generating capacity.

Investing with Foresight

Foresight's mission is to align its investment strategies to the key sustainable investment themes shaping our economies, societies and the planet. Strategies are designed to create a resilient, decarbonised world and to deliver measurable environmental and social impact alongside sustainable returns for investors.

With a long history of developing customised investment solutions for a broad range of investor types, Foresight pairs investment discipline with a flexible approach to sustainable product development and award-winning sustainability and impact reporting capabilities.

The team remains interested in connecting with UK institutions seeking to drive forward UK energy system development and the Levelling Up agenda.

For more information, please contact us:

Ed Wilson | Managing Director
ewilson@foresightgroup.eu

Jai Mallick, CFA | Senior Investment Manager
jmallick@foresightgroup.eu

Tom Borg, MBA | Investment Associate
tborg@foresightgroup.eu

Important Information:

This document has been issued by Foresight Group LLP (“Foresight”) which is authorised and regulated by the Financial Conduct Authority (“FCA”) under firm reference number 198020 on 12/09/2023. Foresight’s registered office is at The Shard, 32 London Bridge Street, London, SE1 9SG. This document has not been approved as a financial promotion for the purpose of Section 21 of the Financial Services and Markets Act 2000 (“FSMA”).

This document is intended for discussion purposes only and does not create any legally binding obligations on the part of Foresight. Without limitation, this document does not constitute an offer, an invitation to offer or a recommendation to enter into any transaction. The information contained in this document is confidential in respect of which we are under obligations of confidentiality to third parties and is also of a commercially sensitive nature and should not be reproduced, disclosed, distributed to or used by any other person. The distribution of this document is intended to be to institutional investors only and in certain jurisdictions may be restricted by law.

Foresight has taken all reasonable care to ensure that the facts stated in this document are true and accurate in all material respects and that there are no other material facts the omission of which would make misleading any statement in this document. Certain of the information contained in this document has been obtained from published sources prepared by other parties. Neither Foresight nor any other person assumes any responsibility for the accuracy or completeness of such information which we believe to be reliable. However, we do not represent that it is accurate, current, complete or error free.

Assumptions, estimates and opinions contained in this document constitute our judgment as of the date of the document and are subject to change without notice. Any forward looking statements or projections are based on a number of assumptions as to market conditions and there can be no guarantee that any projected results will be achieved. Past performance is not a guarantee of future results.

If you are not an institutional investor you should not read any further and immediately return this document to Foresight Group LLP. You may not distribute this document, in whole or in part, without our express written permission.

