Changing dynamics in the UK renewable energy market

An investor's perspective

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January 2022 update

Executive summary

The UK's renewable energy sector has provided investors with stable financial returns and positive environmental credentials.

This paper shows the path to continuing and enhancing these benefits, in an era where Government subsidy support is no longer needed.

We will highlight that:

- Increased renewable energy capacity is essential to meet 'net zero' by 2050[1]
- Unsubsidised renewable energy investment is viable
- Increased renewable capacity will impact power prices
- Power price risk can be mitigated using long-term contracts to facilitate stable, inflation-linked revenues
- Potential for returns can be enhanced and de-risked, and cashflows can be diversified, by asset managers with expertise in battery energy storage

The views expressed herein are at the time of publishing (January 2022) and are subject to change. Past performance is not a reliable indicator of future performance.

1. Net zero carbon emissions by 2050 is targeted in the hope of limiting global warming to 1.5C

01 Meeting net zero by 2050

It is well documented that a substantial change to both electricity supply and demand dynamics is needed for the UK and EU countries to meet their net zero targets by 2050.

Behavioural shifts, such as the electrification of transport and heating, mean that UK electricity demand will likely double from current levels by 2050.[2]

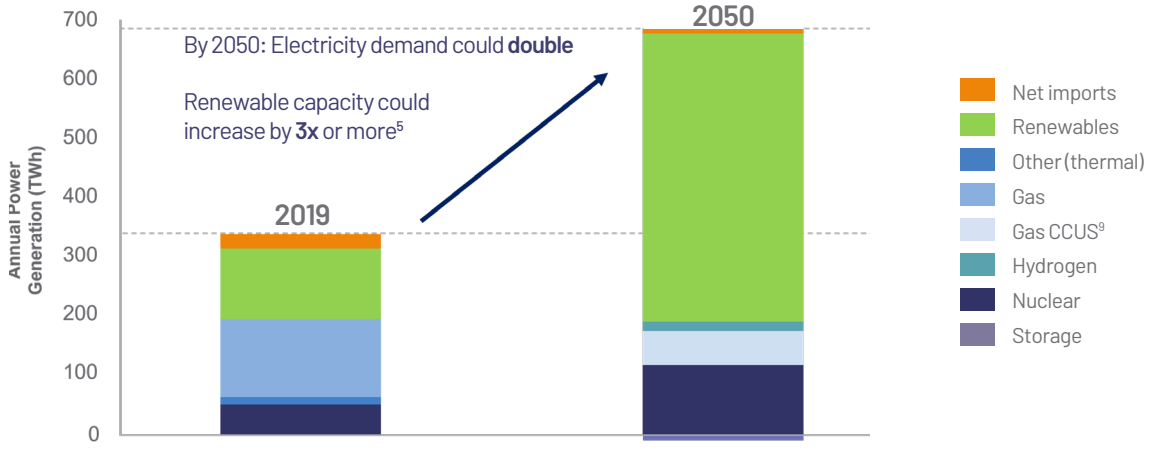
Renewable technologies will need to meet over two-thirds of total demand to achieve net zero targets (from c.40% today). Consequently, renewable energy capacity from solar and wind must triple by 2050.[3]

Funding this capacity represents an investment requirement in excess of £80bn.[6] Project developers have responded by acquiring potential sites to host renewable assets – there is c.18GW of new solar in various stages of planning[7] and c.19GW of onshore wind in development.[8]

Key takeaway for investors

The need for increased renewable energy capacity presents a clear investment opportunity. This scale of build-out will require funding of unsubsidised assets.

Figure 1: UK electricity generation mix in 2019 and 2050(e)[4]



2. *From c.300TWh per annum to c.600TWh p.a. (UK Energy White Paper, 2020)*
3. *Baringa; Aurora*
4. *UK Government Energy White Paper, Energy Trends; BEIS analysis (illustrative data, not a forecast)*
5. *Aurora scenario analysis, based on meeting "net zero" with moderate renewable energy increase*
6. *Gresham House analysis*
7. *Solar Power Portal, June 2021*
8. *Renewable UK, October 2021*
9. *Carbon capture, utilisation and storage*

02 Unsubsidised investment viability

Fighting to acquire existing, operating renewable assets can cause investors to achieve 'bottom of market' returns without any positive contribution to new renewables capacity. The 'additionality' provided from greenfield renewable assets supports net zero targets and can deliver attractive returns without reliance upon subsidies.

Subsidised

The majority of UK renewable capacity was built from 2010 to 2017, at which point the ROC[10] subsidy regime ended. Numerous investment managers raised funds during this time, with restricted mandates now requiring them to compete fiercely on the rare occasion that subsidised assets are sold. We believe successful acquisitions often only occur by accepting the lowest returns or applying bullish valuation assumptions. These assets are typically purchased by investors with long-term investment horizons, so will become increasingly scarce.

Investors requiring subsidised revenue streams will also compete strongly for future subsidy support mechanisms. The UK expects a fourth round of its CfD[11] mechanism to complete in 2022, but we believe competition means that pricing is likely to represent a discount to forecast power prices – no longer a subsidy, but more a "floor price".[12] This is supported by recent declines in the CfD level, with the February 2015 offshore wind subsidy level falling by over 65% by the third CfD auction in May 2019.[13]

Even subsidised projects contain pricing risk, with retroactive changes being made to subsidies applied in Spain, Italy and France in recent years (as recently as November 2020 in the case of France).

Unsubsidised

Unsubsidised renewable assets can target a 1%+ IRR[14,15] premium when compared with the acquisition of existing, operating subsidised assets. Fig. 2 shows the 'levelised cost of electricity' (LCOE) of a range of renewable technologies, indicating the electricity sales price that must be achieved for a particular renewable technology to justify investment.

We believe this shows that:

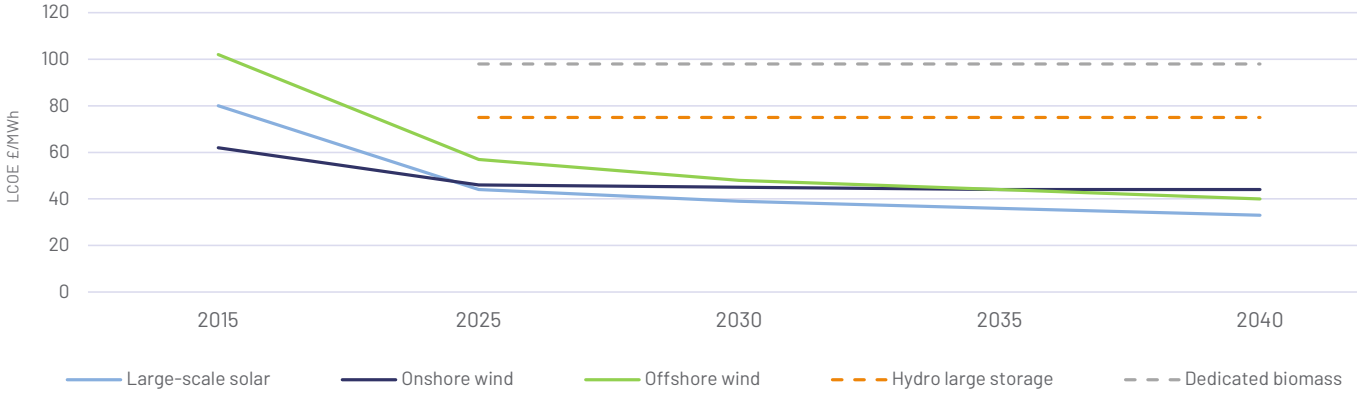
01. Solar and onshore wind have the lowest LCOE, i.e. they are the most economically advantageous renewable energy technologies to invest in

02. Solar, onshore wind and offshore wind technologies have seen a falling cost base since the "subsidy era", with their LCOEs declining over the last decade (supported by reduced input material costs and increased generation via technological enhancements)

Key takeaway for investors

Unsubsidised renewables have attractive returns due to cost and efficiency improvements. The technologies are well-established, therefore the primary risk to recognise and mitigate is power price exposure (which we explore overleaf).

Figure 2: LCOE forecast *(£/MWh)*[15]



10. Renewable Obligation Certificate
11. Contracts for Difference
12. Gresham House analysis, January 2022
13. Department for Business, Energy & Industrial Strategy (BEIS)
14. Internal Rate of Return
15. BEIS

03 Increased renewables and power prices

We believe increased renewable energy capacity will cause power price volatility and a below-average power price for renewables ('cannibalisation').

Cannibalisation

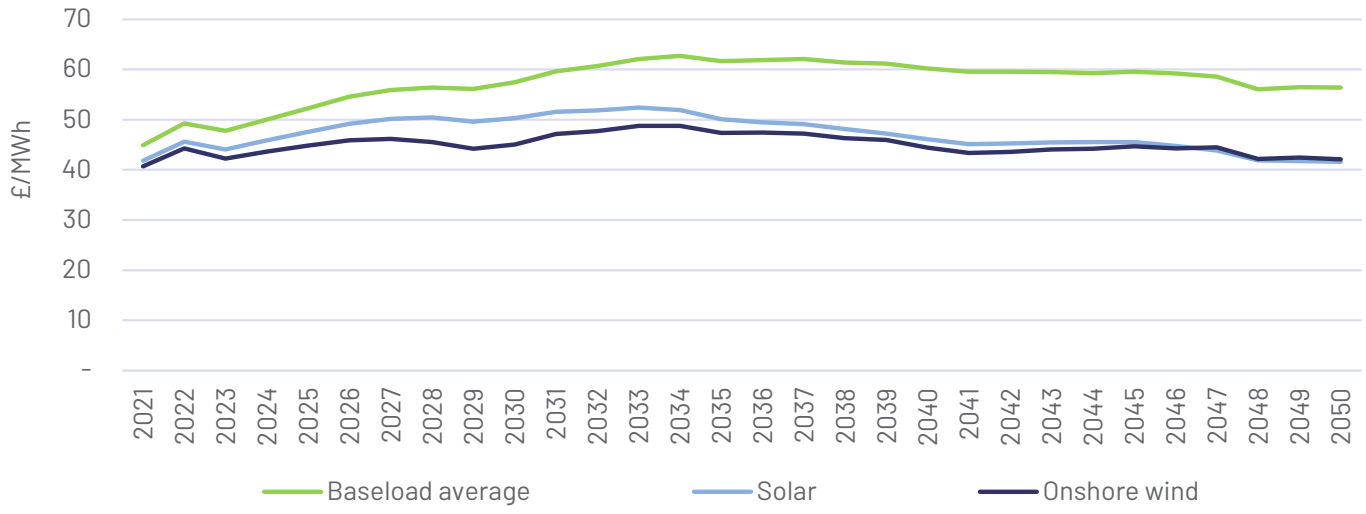
The established renewable energy technologies of solar and wind do not generate electricity consistently 24 hours per day (they are 'intermittent'). When they do generate, they will likely do so at the same time as other similar assets (with renewables accounting for anywhere between 80% and less than 20% of all power generated in a given half-hour period).

This intermittent generation causes mis-alignment between electricity supply and demand. Increased renewable energy capacity will therefore exaggerate existing price slumps during periods of high solar and/or wind generation, leaving power purchasers with the problem of managing the cost of supply uncertainty.

This results in renewables securing lower prices on average than a plant operating as a "baseload" generator (i.e. 24 hours per day, 7 days a week), with Fig. 3 forecasting that solar and onshore wind prices will fall increasingly below the baseload average over the next 30 years.

Implications: Renewable-specific discounts should be acknowledged and captured within the valuation exercises conducted by asset managers.

Figure 3: Renewable-specific power price forecast vs. baseload average *(real, 2020)*[16]



16. *Aurora analysis, Q1 2021*

Volatility

An increase in power price volatility is also forecast due to ongoing mismatching of electricity demand and supply from intermittent renewable generation.

This volatility is already high, as demonstrated by the daily spread between maximum and minimum prices in Fig 4. Over this period, the maximum power price exceeded £500/MWh on 19 occasions and has reached over £3,000/MWh three times in 2021.

Despite leading electricity market advisors[17] anticipating an increased use of electricity storage (specifically using battery energy storage), we believe the range in minimum and maximum power prices is expected to grow on a daily and annual basis due to increased intermittent renewable energy capacity.

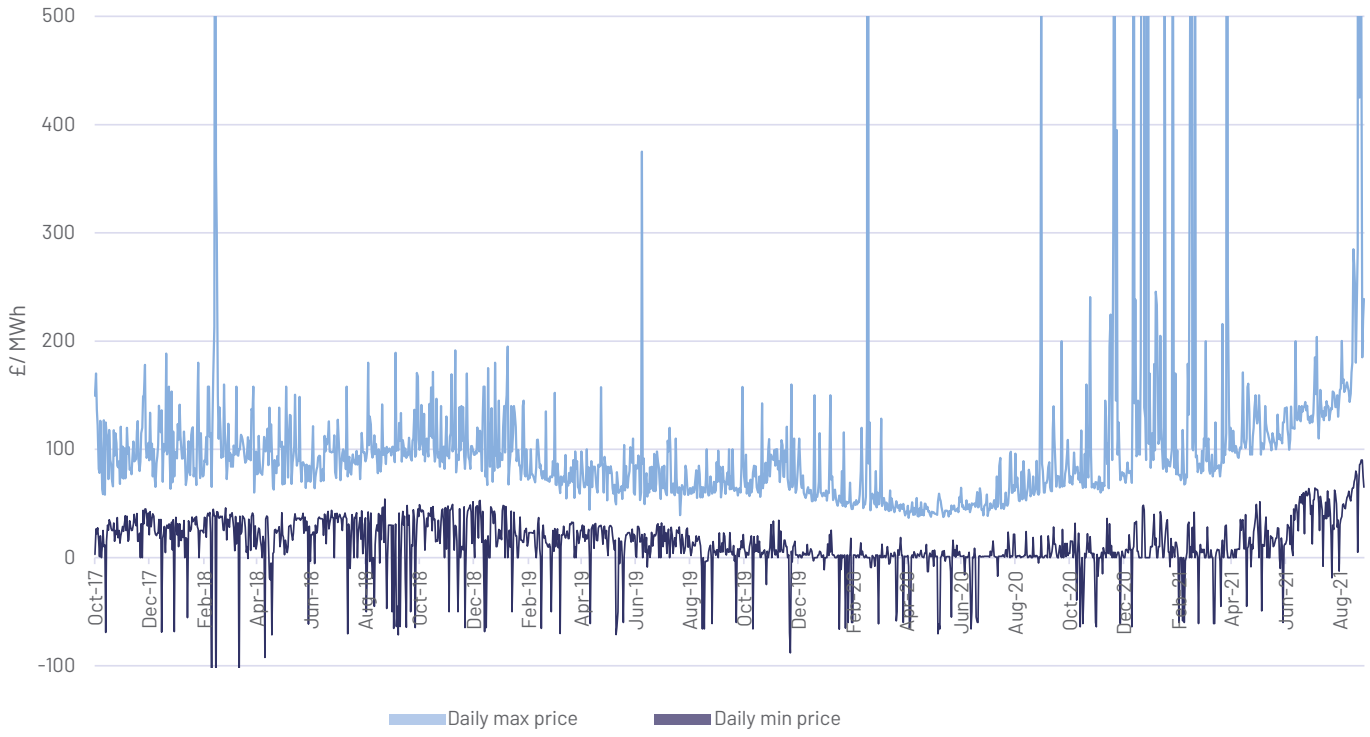
Implications: Most asset managers only consider power price forecasts on the basis of annual averages. This fails to represent the risk that assets could be exposed to if operated on a 'merchant' basis (without a long-term fixed price contract).

It also misses a potential opportunity to maximise revenues by pursuing electricity sales during peak price periods.

Key takeaway for investors

Any investment allocation to renewables should be made based on in-depth analysis of power price trends. Volatility and cannibalisation need to be acknowledged and the risks mitigated as far as possible.

Figure 4: Daily maximum and minimum power prices (£/MWh)[18]



Past performance is not a reliable indicator of future performance.

17. For example Aurora, Baringa and AFRY
18. Elexon; Gresham House, September 2021

04 Power price risk mitigation to facilitate stable revenues

Merchant power price risk can be mitigated using long-term contracts, creating greater certainty over revenue streams versus those of many subsidised assets.

Power purchase agreements (PPAs)

Most renewable assets funded during the 'subsidy era' adopted simplistic contractual structures to govern the sale of their power. Short-term PPAs were typically favoured, often with fully 'floating' merchant power prices, with the investor relying on the 20-year subsidy to demonstrate certainty of cashflows.

This approach means that the renewable asset is exposed to power price movements throughout its life (including during its initial subsidy period, where often only c.50% of revenues were contractually fixed).

It is now possible to secure long-term PPAs from utility and corporate offtakers under contracts of up to 15 years' duration. These contracts can apply to 100% of the electricity generated by a project for the full period.

This approach means that unsubsidised assets often fix a greater proportion of their expected lifetime cashflows than the previous subsidised projects.

Corporate PPAs (cPPAs)

Large corporates have recently shown a strong interest in offering long-term fixed prices to purchase electricity and renewable energy certificates from power generators.

This usually provides corporates with a saving against forecast power prices and supports the net zero goals increasingly being announced by large businesses by granting evidence of green electricity procurement. The marketing potential for the corporate is highly desirable, particularly where a contract unlocks funding a new renewable asset.

In turn, the renewable generator mitigates risk by securing long-term revenue certainty, underpinned by a creditworthy purchaser (recent cPPA purchasers include Tesco, Facebook, Amazon, City of London and Northumbrian Water).

cPPA volumes have grown substantially since 2009, with contracts signed in 15 European countries and UK cPPA capacity now exceeding 1.5GW.[19]

There is strong potential for further cPPA contracting, with specialist platforms emerging to match suppliers with offtakers (e.g. Zeigo and LevelTen) and an increasing number of corporates making strong commitments to procure renewable energy (e.g. the RE100 group).

This momentum has meant that the traditional purchasers of power (the utilities) are now also offering long-term prices (up to 10 years), thus ensuring that new renewable assets are not purely reliant upon the cPPA market.

Key takeaway for investors

Increased availability of long-term fixed price contracts mitigates power price risk and provides cashflow certainty. These contracts are typically signed at levels below merchant prices. Investors should look for managers who can enhance lower prices through additional revenue streams.

19. BloombergNEF 2H 2020 European Solar and Wind Corporate PPA Price Survey. Data to end of November 2020.

05 Using battery energy storage to enhance returns and diversify cashflows

Power price volatility represents an opportunity for sophisticated and experienced asset managers to de-risk and enhance investor returns. This is possible by adding battery energy storage systems (BESS) adjacent to renewable generators ('collocation').

Enhancing returns

BESS profit by importing power during periods of low price and exporting power at periods of high price.

In addition, BESS play a vital role in helping National Grid balance supply and demand, so receive a variety of financial incentives linked to rapid response to National Grid requests.

Collocated BESS enjoy a further benefit, as their capital and operating costs can be shared with the renewable asset.

Cashflow diversification

Investing in BESS alongside renewables creates a natural risk mitigation and cashflow diversification. Any periods of low power price (which would impact a renewable generator if not under a long-term fixed price contract) represent an opportunity for BESS to charge cheaply and pursue larger profits.

Contracted cashflows for batteries

It is now possible to secure a guaranteed minimum annual revenue for BESS (a 'floor'), thus mitigating concerns over reliance upon merchant cashflows. These floor contracts are provided by large creditworthy utilities and traders who are expert in monetising batteries.

As with cPPAs, it is possible to secure these contracts for long durations (up to 10 years).

Past performance is not a reliable indicator of future performance.

Importance of expertise

Whilst an increasing number of renewable asset managers are now seeking assets with collocated battery potential, very few have sufficient expertise to design, construct and monetise the BESS component in an appropriate way.

Decision-making regarding operating BESS takes place on a half-hourly basis, all year round. An expert asset manager therefore has a competitive advantage when targeting the acquisition of collocated projects.

Key takeaway for investors

Power market experts can use collocated BESS alongside renewables to de-risk and enhance cashflows.

This can be done without diluting the benefits of long-term fixed price PPA contracts.

Conclusion

This paper shows the potential to deploy established renewable energy technologies at scale without reliance on subsidies. Power price exposure can be de-risked and upside revenues pursued using collocated battery energy storage.

The key questions and conclusions in each section are as follows:

- The need for increased renewable energy capacity presents a clear investment opportunity (3x existing renewable capacity). This scale of build-out will require funding of unsubsidised assets[5]
- Unsubsidised renewables have attractive returns due to cost and efficiency improvements. The technologies are well-established, therefore the primary risk to recognise and mitigate is power price exposure
- Any investment allocation to renewables should be made based on in-depth analysis of prevailing power price trends. Volatility and cannibalisation need to be acknowledged and the risks mitigated as far as possible
- Increased availability of long-term fixed price contracts mitigates power price risk and provides cashflow certainty. These contracts are typically signed at levels below merchant prices. Investors should look for managers who can enhance lower prices through additional revenue streams
- Power market experts can use collocated BESS alongside renewables to de-risk and enhance cashflows. This can be done without diluting the benefits of long-term fixed price PPA contracts

Not investment advice. Past performance is not a reliable indicator of future performance. Capital at risk.

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20. Gresham House plc Trading Update - 9 December 2021

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