NEXTENERGY SOLAR FUND

(NESF LN)

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Price (p)	**107.00**
Shares in issue (m)	590
Mkt Cap (£m)	631
Net debt (£m)	200
EV (£m)	831
BVPS (p)	120.9

Share price performance	
1m	-2.6%
3m	-2.4%
12m	4.5%
12 m high/low	123/95.4
Ave daily vol (30D)	830,207

Shareholders	
Om Residual Uk Ltd	14.1%
Valu-Trac	9.0%
Prudential Plc	8.7%
Artemis Investment	7.9%
Hargreaves Lansd'n	6.2%
Investec Plc	4.7%
Fundrock Partners	4.4%
Legal & General	4.0%
Privium Fund	3.6%
Abrdn Plc	3.0%
Total for top 10	65.5%

Next news Finals Q3

Business description

Solar generation investment fund

THE OPPORTUNITY IN STORAGE

NextEnergy Solar Fund (NESF) is increasing its involvement in energy storage with an expansion of its mandate to allow investment in standalone energy storage of up to 25% of its GVA, up from 10% previously. We think this is a strong move for the fund, giving it exposure to a growing asset class essential for the decarbonisation of the UK power sector and also offering added diversity to the existing solar PV portfolio. We see room for c.30GW of storage capacity in the UK with pricing remaining strong as renewable penetration increases. We therefore see this strategic move by NESF as positive.

Storage increasingly essential in a decarbonising market

The requirement for energy storage in a market dominated by intermittent renewables is essential. We would go so far as to say that designing a renewable energy system without storage is like designing a car without brakes, it is that essential. Simply looking at the chemical energy storage in the gas and coal in a pre-decarbonisation electricity system shows over 50 days of storage in the UK. Most of this will be removed if we are to meet the 1.50C target of the Paris Agreement and electrify the energy system.

30GW market in the UK

Academic studies on storage show consistently high storage levels to balance decarbonised networks. Storage demand increases as renewable energy penetration increases. With c.40% penetration in the UK, storage needs are still relatively small as high gas penetration can provide much of the flexibility the system needs. But as penetration rises to 50% and beyond, storage becomes increasingly essential. We estimate c.30GW of storage capacity can be added in the UK.

Capacity Market also adding value

The recent T-1 short term and T-4 long term Capacity Market auctions have delivered high prices and NESF is already benefiting. The 50MW Camilla project will see additional revenue of over £0.5m annually from 2026 to 2032 with similar amounts for 23/24 and 25/26. Despite this market de-rating storage according to duration it is clear that this is now an attractive addition to the revenue stack.

NESF well placed to take advantage of the opportunity

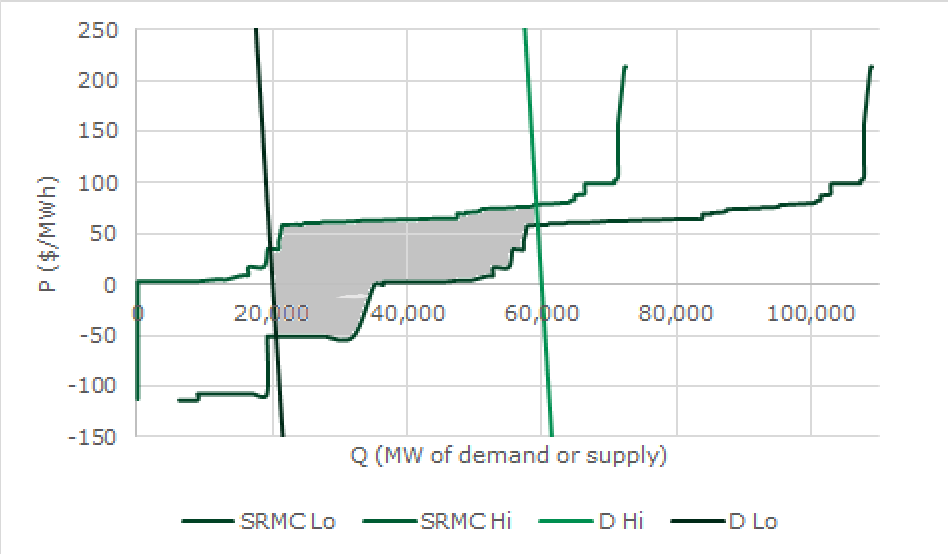
NESF is already active in the storage market in the UK and is operating two small-scale batteries with a 50MWh project in construction and a 250MWh project about to enter construction. The fund's strategic relationship with storage specialist Eelpower is targeting up to £300m of investment opportunities for NESF. The fund also has approval for c.20MW of co-located storage at its existing UK portfolio of 91 solar assets. Taken together these introduce a strong level of diversity to the fund's solar PV portfolio adding optionality across the asset base.

STORAGE ECONOMICS

Storage economics can be complex with storage assets taking advantage of multiple market opportunities to form a revenue stack. We have simplified our analysis to focus on just the ability to conduct simple trades across time periods. There will be many additional aspects to consider but on the whole we see our analysis as presenting a strong base case for storage.

We can examine the economics of electricity storage using a traditional supply and demand graph. Because of the instantaneous nature of the market with demand changing every 20 ms (in a 50Hz system), we really need to show two demand curves, one with the peak demand in the year (D Hi) and one with the minimum demand (D Lo). Also, because intermittent renewable supply varies, we think it helpful to show the limit points in two supply curves (based on short run marginal cost), one with all renewable capacity available (SMRC Lo) and one with no renewable capacity available (SRMC Hi). Prices across the year should all fall in the shaded area between the curves.

Electricity market supply and demand in a 60GW peak market



Source: Longspur Research, BNEF, National Grid FES

The average price for the year will be predominantly in the middle of the shaded area. It can be estimated using assumptions of average demand and supply. Full forecasts are available using Monte Carlo simulation techniques to capture the variation in demand and weather-related supply to pinpoint the exact point in the middle of this area.

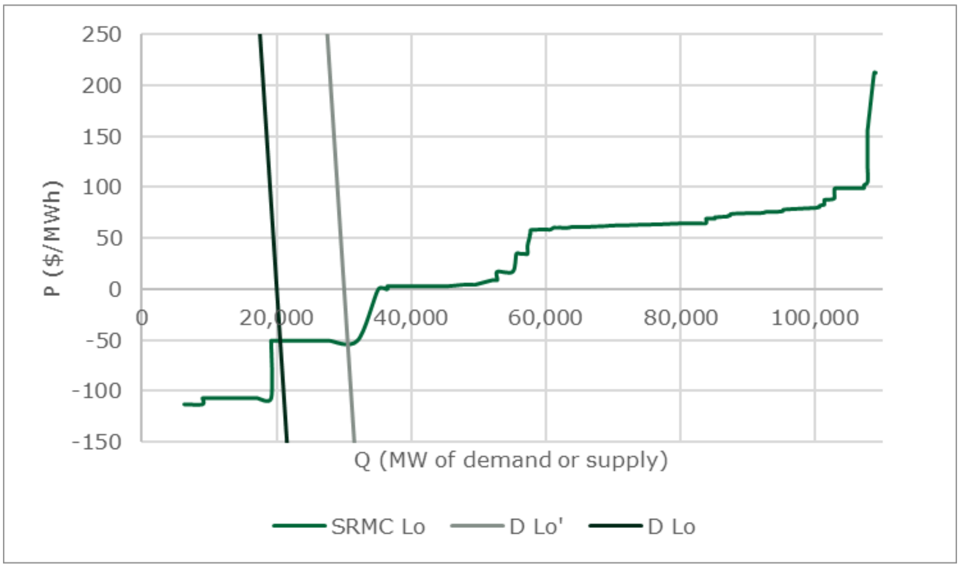
The low supply curve includes renewables with negative short run marginal costs resulting from subsidy programmes. The subsidy is only paid when the generator runs, so there is the potential that they are prepared to bid negatively, down to the level of subsidy. This may be rare but does happen and is increasing as more renewables are added to the system.

Adding storage

Storage is both a source of demand and supply. Storage charges as demand and discharges as supply. This charging and discharging can be delivered, and can change direction, more rapidly compared to any other assets on the grid. Charging will ideally take place when supply is at a maximum and demand at a minimum. With negative pricing, energy storage could be paid to charge.

Battery storage makes money by taking advantage of multiple opportunities across time between and within the various energy markets including the day ahead, intraday and imbalance markets. However, to understand the overall opportunity we simplify our analysis to an assumption that discharging will try to take place when demand is at a maximum and supply at a minimum. While storage will also sell services to the ancillary markets and the capacity market, it can make money from trading the difference between the high demand/low supply periods and the low demand/high supply periods. If we add storage capacity two things happen. The capacity moves the low period demand curve to the right to represent the additional demand caused by charging.

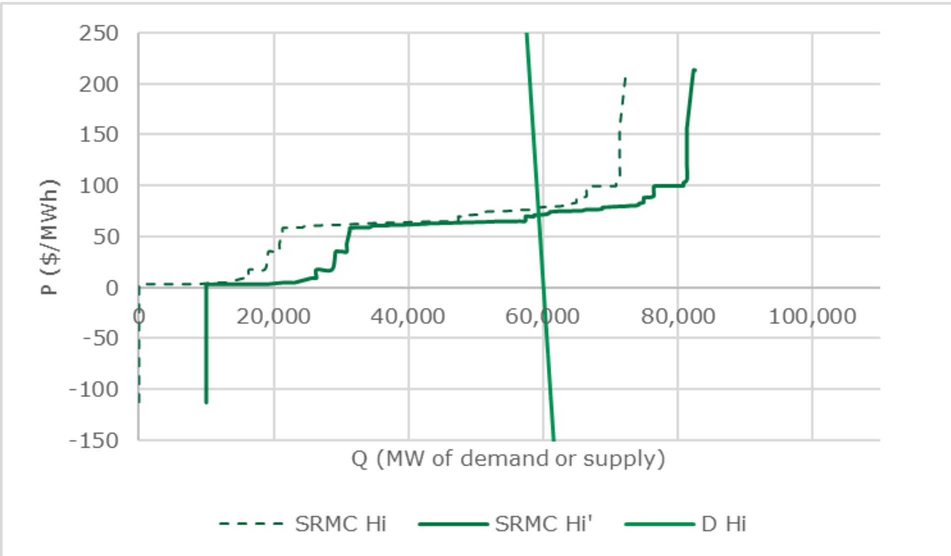
Impact of 10GW of storage charging



Source: Longsur Research

Then the high period supply curve is moved to the right (new supply is added), representing discharging.

Impact of 10GW of storage discharging



Source: Longspur Reseach

Looking at these graphs we can see that we can add over 30GW of new storage before the charging cost rises materially above zero and before the discharge price falls below £50/MWh. We would caution that this is the extreme range available, but it does give a useful illustration of the fact that trading spreads can remain attractive even with a lot of new storage capacity in the market. It also assumes that all this storage is effectively acting as a single resource when there are a range of opportunities for storage in the GB market which could add to the level of storage the market can accommodate.

30GW represents c.50% of the peak demand in our market example. This is below the current peak in the market but in line with expectations as heat pumps and EV charging become more prevalent. The overall outcome is a significant opportunity and if this opportunity presents itself in other similar markets, we are underestimating the opportunity for stationary energy storage systems globally.

PRICING OF TRADES

Power trading is just one element of the revenue stack of a typical battery installation but can deliver a high proportion of the value. The economics of power trading, or arbitrage to use the energy industry term, are based on the ability to buy power and charge batteries when prices are low and to sell power by discharging when prices are high. Our analysis of the past three years suggests that the average spread between high and low prices can be significant and make power trading a key part of the battery revenue stack. We think we can read forward from this recent past to show that projects can deliver even stronger returns as renewable penetration grows with planned developments of offshore wind projects in the North Sea.

Power prices in 2022, and storage spreads in particular, were clearly exceptional. We also see them as an example of the way in which power markets are likely to develop going forward with relatively high gas prices determining peak and peak load prices and higher renewables penetration keeping “off peak” prices low. Low off peak prices will occur more often as renewable penetration increases.

Power markets are seeing growing penetration of intermittent renewable energy in the form of wind and solar PV. At the same time gas prices have been rising and were already doing so before the Russian invasion of Ukraine. While they have already fallen back and may fall further, we think it likely that, in Europe at least, they will remain higher than before 2021.

Broadly speaking, generators in electricity markets compete on the basis of their short run marginal costs. When renewables are running, they have a very low short run marginal cost.. As renewables take up more of the system, low price periods become more frequent. However, when there are not enough renewables to meet demand, more expensive fossil fuelled generation becomes price setting. With high fossil fuel prices this makes these periods very expensive. Even when fossil fuel prices normalise, these periods are expected to remain expensive as fossil fuel generators will increasingly have to cover costs and margin over a shrinking number of operating hour.

We can look at the distribution of prices in what the power industry has historically termed a price duration curve with highest prices shown first at the left hand end and low prices at the right hand end.

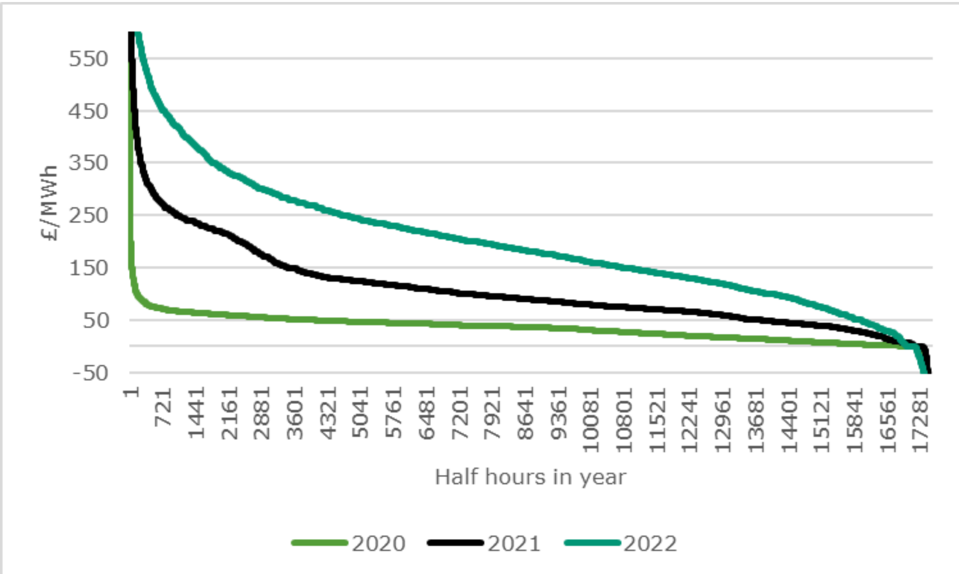
Price duartion curve 2020

Source: Longspur Research, ELEXON

The experience in 2020 was unusual with exceptionally low demand due to COVID lockdowns. While this meant that there were relatively more periods when renewables were price setting, penetration rates remained low so these periods were still not particularly frequent. With lower overall demand pricing was weak across all periods.

2021 was a more normal year with renewable penetration as a percent of demand growing but gas prices also starting to rise leading to higher peak prices. 2022 saw high gas prices but demand had grown so renewables set prices less of the time.

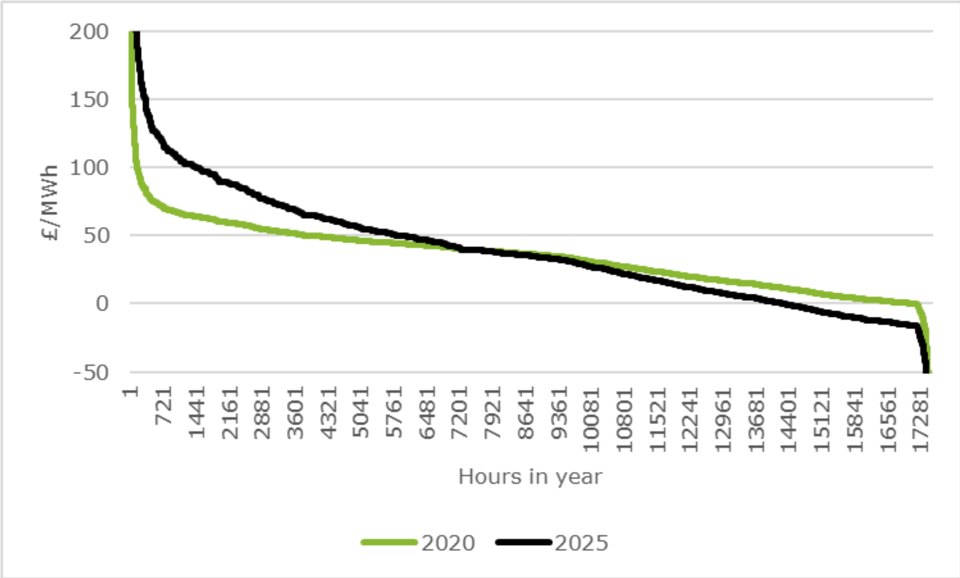
Price duration curves for 2020, 2021 and 2022



Source: Longspur Research, ELEXON

We expect gas prices to fall back towards 2021 levels but to still remain well above 2020 levels as more reliance is placed on higher cost LNG trains as the UKCS sees further decline. We also expect renewable penetration to increase. The likely outcome is that high prices will drop compared with the exceptional 2022 outcome but remain above 2021 and a gradually more extended low price regime will apply at the right hand end of the curve.

Expected price evolution

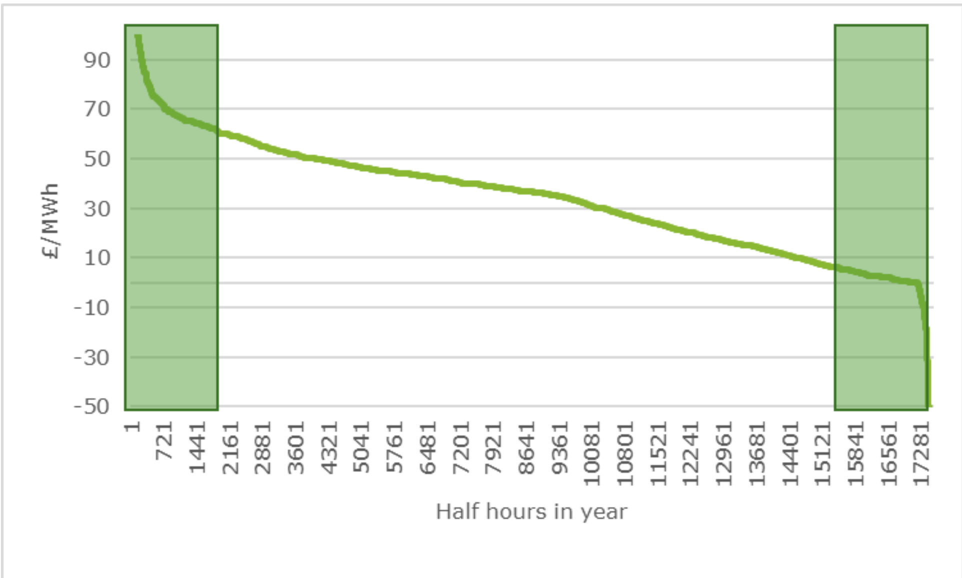


Source: Longspur Research, ELEXON

IMPACT FOR A TYPICAL BATTERY

Looking at the price duration curves we can estimate the average charging cost and discharging price assuming utilisation of 8.3% based on 2 hours of storage duration with one cycle a day (2/24=0.083). The resulting average spread will then be the difference between the average prices in the two green boxes below.

Calculating the storage spread



Source: Longspur Research, ELEXON

We have shown the top and bottom 8.3% of prices in the table below. 2020 shows low spreads based on low gas prices. 2021 starts to reflect higher gas prices to deliver a spread of £352/MWh, with a charging cost of £8/MWh and a discharging price of £360/MWh. 2022 sees the spread rise to £498/MWh as high gas prices drive peak power prices.

Storage spreads

£/MWh	High 8.3%	Low 8.3%	Spread
2020	89	-5	94
2021	360	8	352
2022	508	10	498

Source: Longspur Research, ELEXON

Both 2020 with its low demand and 2022 with high gas prices were exceptional but 2021 could represent a sensible base case going forward. Given our expectations of how the market will evolve, 2021 could even look quite conservative given it assumes that charging costs stay on the high side when they are likely to fall as renewable penetration grows . In our view 2020 represents a useful low stress case and 2022 is a potential high case.

CAPACITY MARKET LOOKING ATTRACTIVE

Also available in the revenue stack in the UK is the Capacity Market. While storage capacity is derated to reflect its availability to discharge during potential stress events, capacity market payments can still be an attractive addition to revenue. Pricing is on the increase and more batteries are participating with new projects eligible for fifteen year contracts.

The capacity market is a Government scheme run and administered by the system operator (SO) who are the National Grid. The SO runs auctions for capacity to be available in four years' time (T-4 auctions). Additionally, top up capacity needs are met through auctions for delivery in a year's time (T-1 auctions).

Auction winners must be available to operate if called in times of system stress. Failure to respond when called results in penalties worth 1/24th of the clearing price applied per MW for under-delivery in each settlement period with a cap of 200% monthly contract value and 100% annual contract value. Existing plants can get contracts for one year, or three for plants that carries out upgrades. New generation capacity can get 15 year contracts via T-4 auctions, although the duration of CM contract secured must reflect the plant's end of contract capability, taking into account degradation and the requirements of the extended performance testing for storage. In practice this means that many storage operators opt for CM contracts over a larger proportion of installed capacity for a shorter contract term, or a longer contract term but over a smaller proportion of capacity. Auctions pay as clear (i.e everyone gets the clearing price).

The most recent auctions have seen a strong rise in pricing and battery projects are taking advantage of this with 107 battery units with 1.1GW of derated capacity winning contracts in the T-4 auction, the majority of which were new projects. Storage capacity is de-rated to reflect its duration but the capacity market can still be an attractive addition to the revenue stack.

Capacity market auction results

£/kW/year	T-1	T-4
2018/19	6.40	19.40
2019/20	0.77	18.00
2020/21	1.00	22.50
2021/22	45.00	8.40
2022/23	75.00	6.44
2023/24		15.97
2024/25		18.00
2025/26		30.59

Source:National Grid ESO, EMR Delivery Body

NESF already benefiting from the Capacity Market

NESF has already proved that it can find value for its storage projects in the capacity market. Its first standalone battery project, the 50MW Camilla project developed under the JV with Eelpower, has won contracts in both the recent T-1 auction and the recent T-4 auction. This means it can expect to earn £557k over winter 2023/24 and £576k per annum between 2026 and 2032. These add to the existing capacity market contract for winter 2025/26 which is expected to earn £305k. Phase one of the project with one-hour of duration giving 50MWh is expected to be energised and grid connected in Q2 23 and includes preparatory infrastructure in readiness to add a second hour's duration, taking capacity to 100MWh, once development work is complete.

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