

# The Augusta Briefing.

4 factors driving the  
financial feasibility of  
battery storage

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## Introduction

As old thermal capacity is switched off and growth in renewables creates issues for grid management and balance, more system flexibility is needed for grid operators. One solution is new build storage, but new build economics are currently challenging.

Over 95% of the world's operating energy storage is pumped storage, but new assets typically require subsidies to help mitigate the upfront cost and many of the best topographical sites are now taken. Lithium-ion (Li-on) storage can help meet the needs of grid operators in constrained areas more quickly and cheaply than pumped storage assets – albeit at 1-4 hr durations.

However, our view on the economics suggests that merchant revenues do not provide for quick payback. While we recognise a UK merchant asset is not necessarily representative of performance in other markets, we expect the merchant model to prevail as system operators resist procuring flexibility under long term contracts. We look at what is likely to change in coming years to reduce underlying equity risk and improve financial returns.

First, the rough maths on a typical UK BESS asset:

A 50MW 1hr Li-on battery asset costs roughly £20m to build. We have simplistically assumed that modest revenues come from ancillary markets including frequency response, TRIADs – which are being phased out – and capacity market revenues with most revenues from trading. In these conditions an average 50MW system should make c.£4k/month/MW.

This equates to £2.4m/year in revenues. Assuming a c.60% EBITDA margin and zero leverage, we get c.£1.6m of FCF/year which provides for a 12+ year payback – and that's before considering what the merchant risk component means for return requirements. So, the question needs to be asked, if batteries are valuable for grid stabilisation and ancillary services, what factors are going to make the equity return more attractive over time?



Charlie graduated from the London School of Economics in 2007 where he completed his BSc. (Honours) in Environmental Economics.

He started his career in 2008, as an energy research analyst for New Energy Finance where he was responsible for the company's offshore wind research and managed several consulting projects for utility, oil and financial clients.

Charlie joined Augusta & Co in early 2011 as an M&A banking analyst. Over the past decade, Charlie has led transactions across a range of different markets and technologies including onshore and offshore wind, flexible generation and storage assets, solar PV as well as service businesses in the value chain. He has advised some of the world's leading investors in European renewables, storage and flexibility markets and helped place several billions of capital into projects and platforms throughout the energy sector.

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## Capex reductions

Some investors question the potential for further cost reductions in Li-on technology in the same way we continue to see cost compression in wind and solar markets. However, the levelised cost of energy of wind and solar took billions of dollars of government subsidies and auctions over 10+ years for capex costs to start to fall.

It's worth noting that these same drivers and a similar government-led procurement process do not underpin the development of Li-on markets. However, there are billions of dollars flowing into battery R&D that have helped drive prices down by 87% over the past decade according to BNEF. Aurora is now forecasting capex costs of roughly £300/MWh (1 hour) by 2030 – a 25% decrease from today.

Unlike renewables these developments are being overseen by global suppliers that have a vested interest in pushing advances in Li-on cells (including cost, degradation and recycling) to make cheaper electric cars with longer range. Utility-scale battery capex can leverage these developments and the important capex per MWh metric will soften in future years.

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## Increase in power price volatility

Power price volatility is increasing – a core value driver for any market trader. You only have to look at the volume of price settlements with a negative system price in UK power markets to see this. The first 5 months of 2020 alone represented a 4-fold increase on 2019, which was already 30% higher than in 2017 according to Exelon. Clearly COVID lockdowns created periods of low demand, but periods of oversupplied renewables are also on the rise.

This could facilitate a richer cycle value and the ability to capture wider spreads. As more renewables enter the system, the risk of the system being out of balance increases due to the intermittency of wind and solar. Solving imbalance without blackouts along with the difference in marginal cost of said renewables and expensive back-up reserves are what is driving much of this increase in price volatility.

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## A level playing field and new market access

As system operators resist procuring frequency and flexibility under long term contract, the challenge is to have faith in the value and monetisation of other income streams, regulatory certainty and the longer-term goal of a level playing field.

In the UK, two big regulatory issues involve market access and grid costs, which have been subject to flux in recent years. Existing 30-minute settlement periods also favour incumbent, gas-fired technologies and at current carbon prices there is currently little emphasis on being in merit from a carbon and price perspective. Reforms in the above areas will allow for a more level playing field for battery assets and their investors. New markets are already opening up and include services such as Reserve, Dynamic Containment, Voltage support and Black Start - most of which should be seen as additive to trading revenues.

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## Machine learning and A.I.

There is a growing role for machine learning and AI in automating and optimising intraday trading strategies and making batteries available 24/7/365 to help manage the grid. Put this in the context of the 100 or so battery systems that are likely to be built in the U.K. in the 2020s (a c.5x increase from the c.1GW operating today) and you realise the instruction and dispatch of these systems requires autonomous systems that can operate independently of human supervisors.

Overlay the potential for much shorter settlement periods and this functionality becomes even more important for capturing value at the margins. Digital systems will of course require traditional oversight and asset management but the route to capturing high value trades - and determining opportunity cost across markets and positions - is already being delivered by algorithms.

Fortunately, trading software remains subject to substantial R&D and is now available in most emerging storage markets and has a growing track record of delivering value to owners.

In summary, we are unlikely to see a real tipping point in battery storage in the next 12-18 months. However, you only need some of these developments to materialise to reduce risks and produce better returns. In the meantime, this industry and its advocates must continue to highlight the role batteries can play in providing stability with minimal costs, losses and emissions.

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Augusta & Co is an independent London-based specialist financial advisory and investment house serving the European renewable energy sector.

We have successfully closed 90 transactions to an aggregate value in excess of €10.2 billion and for 17 years have been at the forefront of pioneering transactions in the sector.

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