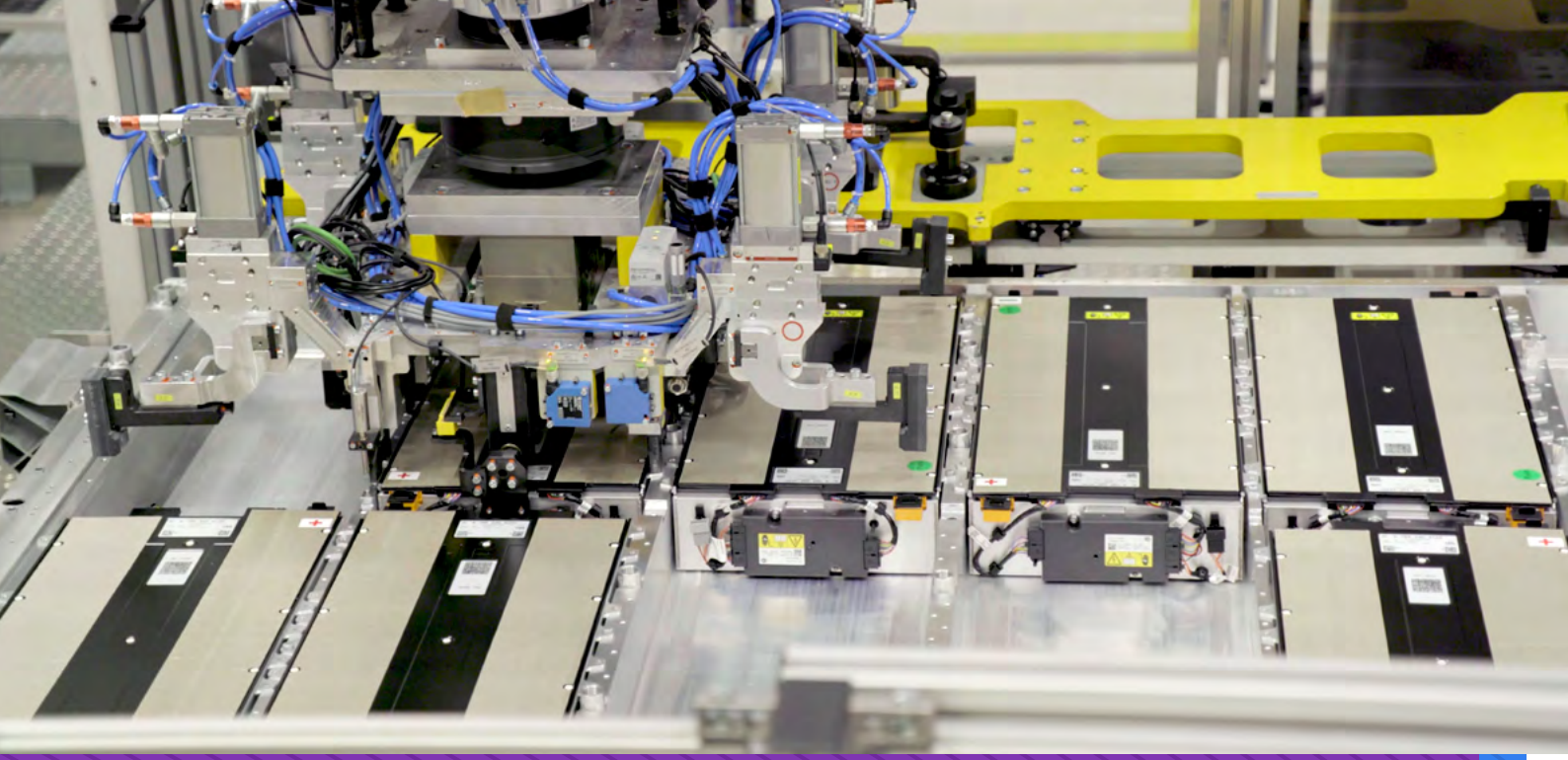

The developing BESS market 2024

Battery energy storage systems (BESS) are playing an increasingly integral role in the transition to a lower-carbon global economy. Below, we examine the state of the market for BESS this year and beyond.

The importance of BESS

BESS enables the storage of excess variable energy generation, enhancing the grid's capacity and reliability. BESS are able to store excess energy produced in periods of low demand, which can be discharged into the grid during periods of high demand. BESS operators can therefore receive financial returns for meeting surging energy needs.

The high investment in the BESS industry has brought with it great opportunities and challenges while providing added security to grid infrastructure.

Further BESS investment expected

Investment in BESS is predicted to continually grow over the course of the 2020s. McKinsey & Company analysis[1] shows more than $5 billion was invested in BESS in 2022, an almost threefold increase from the previous year. Looking ahead, it's expected the global BESS market will reach $120-$150 billion by 2030.

BESS project operators: Time to review asset valuations

The increasing level of investment in BESS has prompted competition between all major integrators seeking to capitalize on the opportunity to expand market share and capitalize on demand. This has resulted in pricing reductions from all major BESS system integrators.[2]

With the reduction in costs, BESS project operators would be prudent to ensure the replacement costs of their assets are accurately valued for 2024 and declare updated values to their insurers. BESS projects operating for several years may have lower replacement costs in 2024 than they had earlier. If you are declaring higher replacement values to insurers, you could face over-insuring the assets without additional coverage and higher derived premiums.

[1] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/enabling-renewable-energy-with-battery-energy-storage-systems
[2] https://www.energy-storage.news/huawei-and-byd-among-global-top-five-system-integrators-of-2022-amidst-china-price-war/

Experienced EPC contractors key to overcoming supply chain delays

The acceleration of investment and construction of BESS has led to bottlenecks along the supply chain. For example, the U.K.'s National Grid has experienced a large number of delays, some in excess of a year, on sites connecting to the grid. The National Grid is looking to resolve these issues by streamlining the connection process, removing the need for non-essential engineering works prior to connection.[3]

The shortage of experienced engineering, procurement and construction (EPC) contractors within the sector has driven project delays. Experienced EPC contractors with demonstrable history of large-scale deployment of BESS are crucial to ensure the successful completion of BESS projects.

Revenue challenges prompt revised projections

Once operational, we have seen BESS in the U.K. face issues incorporating new projects efficiently to the grid, with operating capacities curtailed. BESS sites are running at below their projected capabilities, which has led to revenues being less than expected a year ago.[4]

Incorporating BESS into grid networks requires upgrading and digitalization of the grid, adding to the complexity and challenges of the electricity market. While BESS can be used as part of a grid's balancing mechanism, currently in the U.K. BESS are being overlooked for more traditional energy sources such as gas. However, Gore Street Energy Storage Fund recently stated its international assets in the U.S., German and Irish markets generated more than two and half times more revenue than U.K counterparts.[5]

With this in mind, revenue projections need to be reviewed and possibly revised. Operators need to ensure they accurately declare annual revenue figures to insurers, broken down into monthly projections. The early high electricity market revenues seen in the last few years appear to be dwindling with increased deployment and a general reduction in the electricity wholesale prices. The market pricing volatility creates a real opportunity for projects to either be over-insured and paying too high a premium or under-insured and not adequately protected in the event of a loss.

Due to volatile energy prices in recent years, insurers have brought in the market-wide adoption of the business interruption volatility clause, which limits revenue coverage increases to 110% of the declared monthly revenue.

BESS insurance market appetite 2024

Insurer confidence in BESS has steadily grown over the last few years, leading to a marked increase in supply of available capacity and a relative flattening of premium rates. The insurance market had initially started with relative caution for BESS due to several well-publicized incidents in South Korea where there have been around 30 BESS fires since 2017; so many the Korean authorities imposed a moratorium on building BESS until the causes were investigated[6].

Initially there were only a few lead insurers providing terms, with follow capacity somewhat restricted. While the sector is maturing quickly, regulatory frameworks and best practice fire protections have been struggling to keep up.

The relatively low-level loss activity in 2023[7] in the context of large-scale global deployment has given insurers confidence to enter the market, providing increased competition on rates and terms. However, insurers are closely watching equipment performance and are likely to rapidly adjust their appetite and capacity where there is evidence of sub-optimal performance. The market is already positioned around preferred and less preferred technology providers, equipment, and manufacturers and integrators, but the landscape is highly dynamic and liable to substantial development over the next few years.

A BESS project's ability to demonstrate effective risk management against thermal runaway during the design and planning stage is of primary risk focus for insurers. Site layout, battery manufacturer quality, and experience and compliance with (National Fire Protection Association) NFPA 855 and (Underwriter Laboratories) UL9540a testing are some of the main components to demonstrate equipment and a BESS site's long-term risk resilience.

As noted, manufacturers and integrators are not all viewed equally by insurers and each are formulating their own views with their in-house engineers. Insurers' analysis of a technology is largely formed by battery chemistry, UL testing results and the large-scale deployment of the technology versus the number of known incidents.

[3] https://www.solarpowerportal.co.uk/national-grid-to-streamline-10gw-of-battery-storage-for-connection/
[4] https://www.solarpowerportal.co.uk/gresham-house-uk-bess-subject-to-weak-revenue-environment/
[5] https://www.energy-storage.news/gore-streets-international-assets-generate-2-6x-more-revenue-than-gb-ones-nav-down-2-3/
[6] https://www.pv-magazine.com/2023/07/04/whats-behind-south-koreas-battery-fire-accidents/
[7] https://storagewiki.epri.com/index.php/BESS_Failure_Event_Database

Preferred lithium chemistry

Lithium nickel manganese cobalt oxide (NMC) chemistry was used in many of the early utility scale BESS projects. NMC has better energy density than LFP (lithium iron phosphate), meaning more power per MW than its LFP counterpart.

However, the sourcing of cobalt in Central Africa comes with concerns in supply and ethical considerations for manufacturers' environmental, social and governance (ESG) credentials. As the sector has developed with safety at the forefront, LFP has become the more popular chemistry for manufacturers and insurers alike, being cheaper to manufacturer and with better resilience to thermal runaway than NMC.

UL9540a testing: What to look at from a risk perspective

(Det Norske Veritas) DNV Scorecard 2022 goes into detailed analysis about the safety of anonymous OEM's (Original Equipment Manufacturers') UL (Underwriter Laboratories) testing data. The scorecard demonstrates how the different battery chemistry and OEM selection can affect performance results and failures leading to thermal runaway incidents and claims.

The venting temperature and the thermal runaway temperatures are key to thermal runaway exposure evaluation. Higher temperatures for both venting and thermal runaway are viewed more favorably. A good distance between the venting and thermal runaway temperatures is a desirable result from the test.[6] UL results for LFP versus NMC varies from manufacturer to manufacturer, from model to model. As a general trend, LFP is seen as more resilient to thermal runaway.

Insurers require full UL9540a cell, unit and module testing data for the model of batteries selected for their site. If full UL testing is provided, London Engineering Group 2 (LEG2) coverage will be available for consequential loss and damage from the defective part. For example, if the battery catches fire, insurers will cover the damage to the surrounding site. The damage to the battery itself should be covered under the manufacturer's warranty provisions.

If full UL9540a is not provided, then insurers will be likely to increase their premium ratings and also restrict coverage to LEG1, as the technology is not yet test proven and deemed prototypical. LEG1 offers the most limited form of defects-in-design clause and would not respond for defects to the defective item, or any ensuing consequential loss and damage.

For example, a fire arising from an inherent manufacturing defect, with loss or damage sustained to the property surrounding the inherent defective component part (the downstream consequential damage resulting from the defect), would not be covered under the insurance. This downstream consequential damage to the original defective part being damaged would also need to be part of the policy response and indemnified to trigger coverage for the ensuing loss of revenue. Such restricted defects coverage would not meet lenders' insurance requirements as a bankable proposition.

[6] https://www.dnv.com/power-renewables/energy-storage/2022-battery-scorecard.html

Layout design impacting insurer risk ratings

Early engagement with insurance advisors and insurers' engineers at the site outline planning stage, can help BESS projects operators reflect best practice guidance in the site layout and ensure they optimize megawatts per m^2. The site layout has a significant impact on insurers' probable maximum loss (PML) or worst-case scenario loss at site.

The higher the PML at site, the higher insurers' risk ratings and premiums. The most significant driver for a high PML is container spacing. When spacing is less than 3 meters, it increases the risk that thermal runaway would spread between containers, resulting in a larger loss.

Another major exposure insurers consider is whether export equipment, such as the site transformer or substation, is fewer than 8 meters to the nearest container. While exporting power to the grid moves through these components, if they are the subject of an outage, the whole site's ability to export is diminished. With transformer replacement potentially having long lead times, the site's revenue will be significantly impacted, resulting in a large business interruption claim.

Establishing tomorrow's risk-resilient BESS projects

The development of the BESS market is still in its relative infancy, compared to more established clean energy markets. As the industry matures, there will undoubtably be challenges along the way. The large-scale deployment of safe, robust technology, in an effective regulatory framework, will be of paramount importance for the long-term viability of the industry.

A cost-effective risk transfer strategy that aligns best practice site layout, battery chemistry, manufacturers and/or integrators, can form the foundations of a risk-resilient BESS project, providing bankability for developers in the long term and confidence for insurers.

To discover further insight on recent developments in insurance markets for the key natural resources sectors, watch this video.

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