Growing The Battery Storage Market 2020

*Exploring Four Key issues*

From the Producers of the Energy Storage World Forum

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What Developments Are Needed To Grow The Battery Storage Market Going Forward?

Battery storage has grown significantly over the last few years. Electrochemical storage is now pushing the 1 GW mark up from a few hundred megawatt just a few years back. Key regions, such as Europe, South Korea and the US, are leading growth. Massive investments predominantly in lithium-ion batteries are driving down costs while project developers are continuously getting better at designing and building customised storage systems. These developments are being driven by more favourable markets and regulation, improving system costs, increased access to finance and a need to upgrade ageing grid infrastructure. At the same time, battery storage is still only a small part of the total power market and there is substantial room for further deployment. Navigant expects a total installed grid-scale battery capacity of 14 GW by 2023. This number is staggering as it does not include projections for residential or commercial and industrial (C&I) both of which have sizable market potentials. This white paper takes a look at four of the key issues still to be addressed if the battery storage market is to reach its projected potential in the 2020s. The issues were identified by delegates of the Energy Storage World Forum 2017 (http://energystorageforum.com) in Berlin and represent a peek in to the top issues on the battery storage agenda going forward. In turn these include:

1. **Continuing to build trust from traditional lenders and increasing the bankability of storage projects.** A key focus here is increasing the length of warranties, developing appropriate codes, standards and regulations (CSR) and the role EPCs can play by providing integrated solutions and ‘fully wrapped’ warranties.

2. **Opening up markets to energy storage, increasing revenue certainty and reducing cost.** Energy storage can offer a number of applications to the power system. Markets and regulations therefore need to open up to storage while the industry continues its focus on cost reductions.

3. **Unlocking new geographic markets for battery storage.** The large majority of battery projects are found in a handful of countries. Overcoming barriers to deployment in these markets, such as a lack of access to finance, can pave the way for markets with vast deployment potential.

4. **Developing the C&I market segment.** The C&I market segment is only recently being explored by project developers and constitutes a significant growth opportunity. Key factors such as increasing energy bills and price volatility could drive market growth going forward. Developing hybrid storage systems with the ability to respond to a wide variety of needs is also a key for unlocking future C&I growth.

“This report takes a look at a few of the key issues still to be addressed if the battery storage market is to reach its projected potential in the 2020s.”
Issue 1: Increasing “Bankability” And Trust From Traditional Financiers

While batteries are considered more bankable now than in the industry’s early years, there is still work to be done to attract low cost capital from the financing community in particular for residential but also for grid-scale projects. “Bankability” refers to how credible a storage project’s overall economic viability is considered by traditional lenders. Unproven technologies are often funded by investors willing to accept higher levels of perceived risk for a higher return. Once lenders have confidence in the technology to deliver a predicted revenue stream, that technology can access a larger pool of capital in the form of debt and equity. To this end a project generally has to undergo a rigorous independent assessment including detailed analysis of the economics as well as of the project’s technology, manufacturing, engineering and construction aspects.

While there are a number of considerations that go into the technology assessment, the length of warranties, maturity of the supply chain, product support infrastructure and the existence of codes, standards and regulations are essential. The economic assessment generally focuses on estimated costs and revenues and to what degree real-life financial performance can perform on par, or above, with financial models. As an example, the ‘Jake’ and ‘Elwood’ battery storage projects in Chicago were the first debt and equity financed utility scale projects in North America funded in 2015. This was accomplished through a robust warranty provided by a single OEM while certainty on the project finances was secured through a hedge on frequency regulation prices.

Manufacturing And Engineering: Guaranteeing Performance And Ensuring Reliability In The Storage Asset

Warranties

How do warranties affect bankability? The longer a manufacturer can guarantee the operation and reliability of a battery system the less risky it will seem to lenders. Different types of warranty are product warranty e.g. a guarantee that the storage asset should operate free of any defects for a certain number of years and performance warranty e.g. a guarantee of a certain capacity and availability over the lifetime of the system. Extended warranty options guaranteeing up to 10 years is common in today’s market although the specifics of the warranty can differ and certain parts (e.g. inverters, transformers and switchgears) can be covered for...
more or less time. In general, project developers seek to be protected at least for the duration of the contract term it has negotiated with a counter party. For residential systems some vendors currently offer up to 15-year warranties although the average warranty period is around 7 years.\textsuperscript{2}

The Role Of Vendors And EPCs In Guaranteeing ‘Fully Wrapped’ Warranties

Vendors and engineering, procurement and construction (EPCs) companies can play an important role in ensuring bankability by providing one-stop shop solutions for lenders. Due to the complexity of storage projects, having one provider to manage the sourcing and integration of system components can reduce costs and avoid overlaps or gaps in the construction phase hence invoking confidence in the lender. These warranties are so-called ‘fully wrapped warranties’ in which the developers guarantee a single warranty on an entire project. For example, a fully wrapped warranty was considered a key ingredient for the successful financing of Renewable Energy Systems’ (RES) 300 kW battery system provided to Western Power Distribution in the UK in 2015. This approach is becoming increasingly common in today’s market as developers now have enough data and experience with Li-ion projects to do so.

There are a number of additional ways vendors and EPCs can increase bankability. Tim Mueller, Chief Technology Officer at Belektric, said his company protects lenders against low storage system performance by using tried and tested inverters from their established PV business as well as designing and manufacturing containers for the storage system themselves hence relying on a closed quality control system.\textsuperscript{3} They are also working with a few large established battery suppliers such as Samsung, which are now able to provide performance warranties of up to 20 years on their Li-ion cells – well above the industry standard of 10 years. In general, EPC companies work with qualified suppliers of lead acid and Li-ion batteries, which have a more established track record (see Figure 2).
In their entirety CSR covers the rules and regulations that govern the design, construction, installation, commissioning and operation of storage systems. From an investor point of view,
they are crucial as they provide an industry benchmark for a project and a certain level of guarantee that a project is following best available guidelines. One problem to date has been that battery technology has developed much faster than CSR with a wide variety of configurations, chemistries and applications at different locations in the power system. Many CSR are also national or regional, while manufacturers and developers tend to operate internationally. As the number of stakeholders in the sector grow, input to CSR development and modification becomes crucial to convey to traditional lenders that the industry is capable of safe and reliable operation.

A number of initiatives over the last years have produced CSR for the standard battery chemistries including lead acid and Li-ion. In Europe these standards have been developed by the International Electrotechnical Commission (IEC) and cover technical features, testing and system integration. However, newer battery chemistries lack the required standards and according to the IEC work is underway to develop these with a focus on:

- Terminology
- Basic characteristics of storage systems and their components including capacity, power, discharge time, lifetime and standard unit sizes
- Protocols and security standards for communication between components
- Interconnection requirements
- Mechanical and electrical safety
- Guidelines for implementation

In 2016 IEC published a standard (IEC 61427-2) for a methodology to compare and test different battery chemistries in four different grid-scale applications. Once the necessary codes and standards have been developed, organisations such as DNV GL play a key role in carrying out the testing and certification required to prove the safety and reliability of a project.

“Developing comprehensive and ‘wrapped’ warranties, alongside appropriate codes, standards and regulations is an important step towards increasing confidence from traditional lenders.”

Project Finance: Using Advanced Tools To Accurately Simulate Revenue

In addition to having confidence in the technology, lenders must also have confidence in the project’s finances. Energy storage is unique due to its ability to capture a number of revenue streams across the energy system. This can be positive for the lender, as it can increase profitability, but it can also add complexity both to the operational demands on the storage asset as well as to the tools used to predict future revenue streams.
Making Energy Storage Bankable: Key Points

• Increasing the bankability of battery storage projects is key to enable access to a larger pool of finance including debt and equity thereby allowing more rapid and cost-effective deployment
• Lenders must have confidence in both the technology and the finances of a project
• Improved warranties and standards and certifications are key to inspire confidence in lenders
• Codes, standards and regulations (CSR) exist for traditional chemistries but are lacking for more novel ones
• Advanced simulation tools based on real-life data should be used to estimate future revenue streams

The End of the Preview Version

This is the preview version of the whitepaper, where we have described the bankability of the Energy Storage and how to improve it. The full research contains 23 pages and takes a look at 3 more issues:

• Improving battery storage economics: improving revenue certainty and achieving cost reductions;
• Unlocking new geographic markets for storage;
• Developing new commercial and industrial applications.

If you want to continue reading, download the full version at https://energystorageforum.com/download-whitepaper
This whitepaper is part of the upcoming 6th Residential Energy Storage Forum, that takes place 30 March – 02 April, 2020 in Munich. The Forum dives deep into Residential Energy Storage and Instalation, covering the Installation Process, Policies & Regulations, Business Models, Storage Technologies and more.

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