The future of the energy storage system integrator in a maturing industry

System integrators | Key to the rapid success and growth of the energy storage industry in the US, China and other maturing markets has been the presence of a small number of system integrators. IHS Markit association director Julian Jansen examines what it is that system integrators do that makes them so vital to the industry and why the future ahead looks to be one characterised by growth, competition and consolidation.

The global energy storage industry continues to rapidly expand, creating opportunities for new entrants and incumbents alike. As the market grows, many system integrators are evolving their business model to create a stronger competitive footing. To capitalise in the long-term, different stakeholders focus on growing share as the market accelerates. While this creates price pressure for incumbents, both upstream component suppliers and downstream developers are also looking at ways to diversify and protect their own margins. With the influx of capital to the industry, this creates the perfect platform for diverging competitive scenarios and a fascinating position to explore how the industry could develop.

Despite a market leading position, NEC Energy Solutions has exited the industry.

Credit: NEC ES

Rapid growth, influx of capital set scene for an evolving competitive landscape

IHS Markit projects a tripling in annual grid-connected energy storage installations from 2020 to 2025, reaching 15.1GW/47.8GWh. At the same time, annual hardware revenues (battery modules, PCS and balance of plant) of US$4.2 billion in 2020 will rise to US$9.5 billion in 2025. This rapid acceleration is happening - despite a continuous decline in hardware prices - both for lithium-ion (Li-ion) batteries and balance of plant. This growth is accelerating competition across the industry and is driving the creation of a more global supplier landscape.

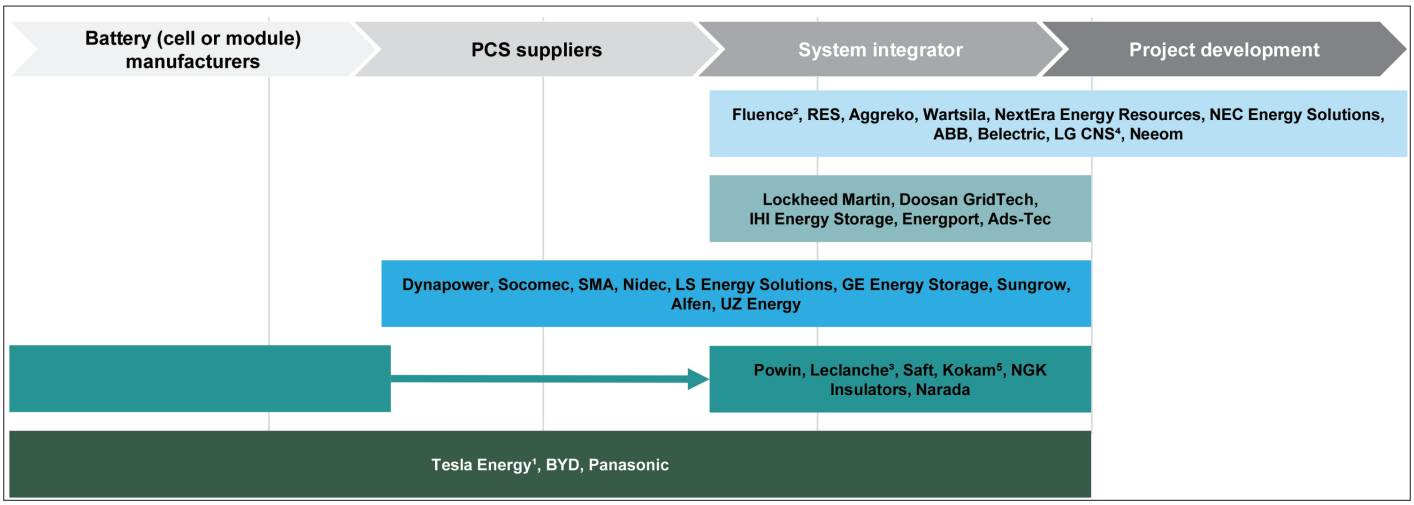
Despite some recent market consolidation, the industry is attracting significant investment. Targeting this market – and in particularly focusing on the role of system integrators – battery and component manufacturers, and increasingly major energy companies and technology conglomerates are joining incumbents in a highly competitive market. At the same time an influx of capital from investors looking to diversify into clean technology industries, is facilitating incumbents and new entrants to compete for market share through the industry's next phase of rapid growth.

The competitive landscape is diversifying. With significant project pipelines dwarfing the existing installed base, energy storage inverter (power conversion system – PCS) manufacturers are expanding their presence targeting solar plus storage applications and existing integrators are challenging the incumbents. As Figure 1 highlights, there are many players active across individual or multiple segments of the value chain, with especially inverter (PCS) manufacturers moving across to offer fully integrated solutions.

There also remains a large degree of regional diversity in the market. As the

What is a system integrator?

- A system integrator is a company that specialises in combining component subsystems and ensuring that these subsystems function together as a whole.
- In the energy storage industry, a system integrator supplies the full battery energy storage system (BESS). As such it is usually responsible for procuring individual components, primarily the battery modules / racks, power conversion system (PCS) and other balance of plant; assembling the system; providing a wrap on warranties; integrating the controls and energy management system (EMS); often providing project design and engineering expertise; and providing operation, monitoring and maintenance services.
- As the industry continues to evolve, many system integrators vary in the degree of both upstream and downstream integration, with specific responsibilities often varying by contract and customer requirements.



Credit: IHS Markit

Figure 1 - Overview of the system integrator landscape.

energy storage market initially grew in selected regional pockets – California, PJM, the United Kingdom, Germany, South Korea, Japan, and mainland China – many local technology firms and new entrants targeted the segment. Following a first phase of acquisitions around 2017 and the development of new regional markets, an increasing number of global players is emerging. However, some markets such as Germany, South Korea and mainland China remain dominated by local players.

The system integrator landscape remains diverse, but market share is becoming more concentrated and signs of consolidation are appearing

Globally, Tesla Energy, NEC Energy Solutions, and Fluence have historically been the leading system integrators. In the future, the system integrator landscape will further diversify, primarily driven by energy storage inverter manufacturers expanding their presence, targeting solar-plus-storage applications and existing players such as Wartsila and Powin Energy targeting strategic opportunities to drive expansion.

At the same time, there will also be consolidation—as illustrated by the recent market exit by NEC Energy Solutions—particularly challenging smaller, regional players. Major system integrators are globalising and can offer more cost-effective solutions based on the scale of their operations. Figure 2 outlines the current installed base and contracted project pipeline by select system integrators (correct as of August 2020, as tracked in the IHS Markit Global Energy Storage Project Database).

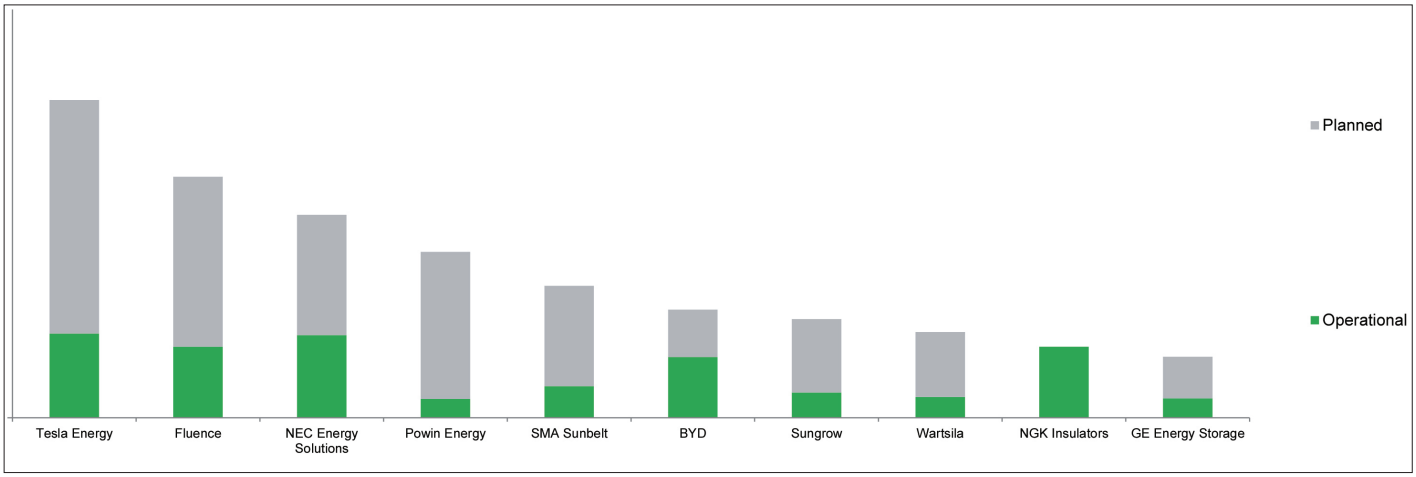
Regional diversity remains significant

In the United States, prior to its exit NEC Energy Solutions was the market leader. Pressure to stay price competitive has led to a recent announcement that its parent company is exiting the market, while honouring existing project commitments. Since then, Tesla Energy, Fluence, Powin Energy and Wartsila remain the strongest competitors in the United States, with rapidly expanding project pipelines.

Smaller suppliers such as GE Energy Storage, Doosan GridTech, IHI Terrasun, Energport or RES are increasingly focusing on perceived higher value, smaller volume projects or targeting specific market niches. Inverter manufacturers such as Sungrow are increasingly targeting the United States market because of the significant pipeline of solar-plus-storage projects, which play into the experience gained and distribution channels established in the solar industry.

As the market is highly price sensitive, most integrators have launched lithium iron phosphate (LFP)-based products in the United States.

In the mainland Chinese market, the upstream supply chain in the energy storage market is highly diverse while the downstream system integrator landscape is more consolidated. A large base of battery manufacturers - especially for LFP batteries - as well as inverter manufacturers, lead to a highly diversified supply chain with many players looking to capitalise from a growing stationary energy storage market. Most recently, UZ Energy and



Credit: IHS Markit

Figure 2 - Competitive benchmark of BESS system integrators globally.

Sungrow have been the most aggressive in expanding their project pipelines, especially as the solar-plus-storage market accelerates. Tier 2 inverter and battery manufacturers are also pushing into the market with very low-cost systems using LFP batteries. Overall, low prices and the strong links between grid companies and local suppliers create an environment that limits the opportunities for international players enter the Chinese market.

The traditional system integrator model will be challenged by new entrants and potential disintermediation

Despite the growth in the market and the continued diversity of suppliers – especially on a regional level – challenges in the system integrator model are being laid bare. In the long run, simple procurement and assembly of components without any further vertical integration will lead to erosion of margins and eventual market exits. New entrants and potential disintermediation will increase price competition as the addressable market for system integrators simultaneously shrinks. While pure-play integrators, i.e. those without in-house manufacturing of components, will face heightening competition and lower hardware margins, they can also pursue a range of strategies to mitigate against decreasing margins from the hardware business.

New market entrants increase competition, with future consolidation likely

For energy storage inverter (PCS) and battery manufacturers, forward integration to supplying the full BESS is a means of differentiation and margin stacking. By focusing on product and component sales and expertise in managing core components of the full system, the supply of standardised BESS provides a logical strategy to deliver growth. This trend is being amplified by increasing commoditisation and decreasing margins in their core component businesses.

Especially PCS, but also solar PV inverter manufacturers are rapidly pivoting towards BESS system integration – Sungrow and SMA Sunbelt being the primary examples. Further competition will likely come from other Chinese inverter suppliers pivoting towards the energy storage market. Nonetheless, many system integrator incumbents will continue to have a competitive advantage in their ability to provide more holistic solutions integrating advanced EMS, analytics, engineering, and long-term operations and maintenance (O&M).

Project pipelines in the US for leaders including Fluence have rapidly grown.

Upstream battery cell and module manufacturers fundamentally have different priorities, as stationary storage is not a primary market for Tier 1 battery OEMs, leading to mixed interest in forward integration. Notable exceptions are leading integrators Tesla Energy and BYD who already have vertical integration from (at least) battery module and PCS, to full system assembly. While forward integration may not be a priority for most Tier 1 battery OEMs, increasing commoditisation and supplier competition could force them to chase perceived higher margin opportunities for full BESS solutions. Battery manufacturers also retain a significant advantage in that they supply the most integral part of the system – both from a cost and operational perspective. Secondly, Tier 2 manufacturers of LFP batteries with under-utilised manufacturing capacity are also likely to forward integrate, starting in the domestic Chinese mainland market and through international distribution partners.

As developers grow project pipelines and leverage engineering expertise, the system integrator model could be threatened

The current consensus role of project developers / IPPs is that they primarily are a buyer or customer to system integrators. However, large incumbents with considerable experience in the renewable business are becoming comfortable to take a growing role in system design and engineering responsibilities to improve project margins. This strategy could follow the example of NextEra Energy Resources which often takes on full system integration or in contrast RES, which will procure standardised integrated BESS, but take on project design and engineering as well as utilising its in-house EMS. Furthermore, as larger developers look to leverage the scale of their project pipelines to procure battery racks at favourable prices, the integrator role as technical expert may become disintermediated as developers gain experience developing and operating storage systems.

Changing product and solution strategies will help strengthen the system integrator model, but the supplier landscape will inevitably change

To thwart the threat of vertically integrated suppliers, new entrants and potential backward integration from developers, the energy storage system integrator must evolve. This evolution will be characterised by offering more holistic solutions that include stronger software and operations offerings and superior project execution. Product standardisation will help reduce system assembly cost and drive procurement scale. Lastly, integrating upstream component expertise or downstream project development and operations capability – mainly through acquisition – will help diversify revenues and stack margin.

Nonetheless, energy storage is characterised by a unique mix of technical, commercial, regulatory and development challenges that will play into the strengths and experience of traditional system integrators to take on and offer a full wrap of technology risk. Therefore, the system integrator model will not become obsolete in the coming five years. Instead, continuous evolution of their business models will create a smaller number of solution providers, while hardware commoditises and smaller regional players consolidate. ■

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Previously, Julian lead IHS Markit's global energy storage research team, providing deep insight on key value drivers and emerging business models accelerating storage deployment across the world, as well as covering technology development and the competitive landscape. Prior to joining IHS Markit, he established and managed the energy storage research area at specialist consultancy firm Delta-ee.