

A developers' eye view on North America

#SmartSolarStorage2020 | Last year saw large-scale storage come of age in the USA and Canada, with some heavyweight storage portfolios starting to take shape. Speaking to four leading North American developers, Andy Colthorpe takes the pulse of a market poised for growth

There is no doubt 2019 was a massive year in the US and Canada for energy storage. One of the biggest drivers was the advent of economically competitive solar-plus-storage, where business models and savvy policy came together to heat up a market that has long been simmering. Not forgetting too that ancillary services and capacity, utility resource planning and other drivers kept standalone storage in the spotlight.

Considerations around the best battery chemistries, the best-designed incentive programmes, the existence or absence of supportive regulatory programmes and well-designed market structures are among the many factors that can make or break a project or pipeline of projects.

For both solar-plus-storage and standalone energy storage, nothing happens without developers ready and willing to take on those questions and get projects built and commissioned. So, who better to ask than four of North America's fast-rising players about the state of the region's storage market as it stands, seemingly, on the cusp of rapid expansion?

8minute Solar Energy – Tom Buttgenbach, CEO, president, co-founder

PV Tech Power: What are some of your most significant accomplishments in 2019, and what were some of the challenges along the way?

Tom Buttgenbach: Last year was a big year for 8minute's solar-plus-storage projects. We're extremely proud of The Eland Solar Centre, which will deliver up to 400MW of clean energy to the grid, with the additional capability of storing up to 300MW/1,200MWh, dispatchable for use when the sun is not shining (typically in the evening and night-time hours, when the load is still high). Eland, which holds the

price record for solar-plus-storage in the US is a game-changer for the renewable energy industry and a huge win for California.

But big projects are happening outside of California as well. We also announced the Southern Bighorn Solar & Storage Centre, which includes a 475MW_{DC} (300 MW_{AC}) solar array with 540 MWh of Li-Ion battery energy storage and will be built in Clark County on the Moapa River Indian Reservation, about 30 miles north of Las Vegas, Nevada. Together, projects such as Eland and Southern Big Horn's advanced dispatch capabilities, are dispelling misconceptions about the availability, reliability, and long-term viability of clean solar power.

In all, I think 2019 will be remembered as the year that large-scale solar-plus-storage arrived in force.

What sort of technologies are you using at the moment, and what's exciting about future technology development and innovations?

8minute is technology-neutral as a company, but there are obviously exciting technological innovations in hardware throughout the entire industry. But one of the under-covered aspects of large-scale solar-plus-storage is software.

Earlier this year, we partnered with Doosan GridTech to develop an advanced energy software control solution for dispatching energy from advanced PV solar-plus-storage centres (PVS). We're using the new software first at the Springbok 3 Solar Farm, in Kern County, California.

This partnership pairs Doosan's flexible software platform and energy storage expertise with our forward-thinking PVS dispatch approach to maximise asset value creation. This new control solution will improve PVS plant output predictability and unlock additional value streams.



Credit: 8minute Solar Energy

8minute Solar Energy's Eland Solar Centre features a 300MW/1,200MWh storage facility

I believe that dispatchable large-scale solar paired with energy storage will be the backbone of the 21st-century grid. Smart, innovative software that communicates with the grid is a hugely important part of that future.

What do you expect to see this year and beyond 2020?

We're at the beginning of one of the most massive economic and technological transformations in history: the transition away from fossil fuels. The transition will happen much faster than most people realise because renewables, and solar in particular, have economics on our side. Fossil fuels are in decline, and once industries and technologies go into decline, it can become a rapid process even if incumbents are seemingly entrenched.

I can already beat a gas peaker anywhere in the country today with a solar-plus-storage power plant. Who in their right mind today would build a new gas peaker?

Ultra-low-cost large-scale 'solar-plus-storage centres' are changing the equation on the grid much faster than most people realise. We are a factor of two cheaper. We can cut the head and tail off the so-called duck curve, which will be a memory as more storage comes online. The fact is

that storage can be both centralised and distributed in a way that will make the grid more resilient and efficient – not to mention cleaner and cheaper.

I think solar and storage will continue to grow on the grid. All the great things the industry accomplished in the last decade are just the beginning. Solar will be nearly free in the coming decades. As a result, it becomes economically beneficial to design the entire system around those cheap electrons.

GlidePath – Sean Baur, engineering manager

PV Tech Power: What are some of your most significant accomplishments in 2019, and what were some of the challenges along the way?

Sean Baur: GlidePath added more than 250MW to its portfolio in 2019 – that number includes construction of self-developed storage projects and acquisitions of both storage projects and renewable energy assets that will be paired with storage in the future. GlidePath has also grown its development portfolio to about 1.6GW of similar projects across a variety of markets.

We are seeing a major proliferation of battery OEMs and integrators providing viable products in the space, increasing competition and pressuring the more established firms.

Regulations and fire codes are forcing standardisation across the industry. Battery safety has always been a top priority and we hope it won't take incidents or negative headlines to keep the industry focused on safety going forward.

What sort of technologies are you using at the moment, and what's exciting about future technology development and innovations?

We are primarily focused on projects using lithium-ion batteries and are seeing a mix of more established nickel manganese

cobalt (NMC) suppliers and newer-to-the market lithium iron phosphate (LFP) OEMs. LFP appears to be well-positioned this year, with more certainty around tariffs – as most of the major players are in China – allowing them to really showcase their price competitiveness and increasingly dependable technical performance.

On a forward-looking basis, we see that integrators are thinking more creatively about [battery] augmentation as project lives are extended and project-owners look for longer performance guarantees. One of the most exciting areas of growth here, also applicable to solar-plus-storage, is the scale-up of DC-DC converter technology. This will be vital as battery systems age and need to be augmented, especially with some of the modular augmentation strategies that we are seeing proposed from suppliers.

We are happy to see more thought around the technical aspects of battery augmentation, and especially the push towards truly agnostic augmentation regimes where the augmentation battery vendor (or even chemistry) can be different than the original installation. This is being promised by some integrators, so we look forward to seeing how this is implemented across power electronics, switching and protection, communications and controls.

What do you expect to see this year and beyond 2020?

We are happy to see serious discussion of the value of limited-energy duration projects to serve in wholesale markets. We predict that this will be resolved this year for markets such PJM and NYISO, but the actual resolution is harder to predict. What we would like to see is an immediate transition to valuing storage projects at or near their current penetration levels, with a longer-term discussion surrounding the potentially declining ability to supply capacity services as the resource mix on the

grid changes over time.

Implementation of fast frequency response in ERCOT is a good step to expanding out the ability of storage projects to provide more ancillary services, not just PJM RegD. This, combined with the Fast AGC developments in MISO, indicate that more market operators are starting to recognise and implement programmes to value the unique capabilities of storage.

Key Capture Energy – Jeff Bishop, CEO and co-founder

PV Tech Power: What are some of your most significant accomplishments in 2019, and what were some of the challenges along the way?

Jeff Bishop: We kicked 2019 off by starting operation of our first project, KCE NY 1, the largest operating battery storage project in New York. KCE NY 1 serves the state's electrical system by enhancing power grid performance and reliability and will help reduce greenhouse gas emissions.

The 20MW energy storage system supports Governor Andrew M. Cuomo's Green New Deal, the most aggressive climate change initiative in the nation, which mandates New York's energy storage target of 3,000MW by 2030.

We also were awarded the Orange & Rockland award for a Non-Wires Alternative (NWA) to be deployed in 2020 and were pleased to start construction on three Texas battery projects. We ended the year with over 1,000MW of battery storage projects in development, ranging from 5MW to 200MW in New York, Texas and in New England.

What sort of technologies are you using at the moment, and what's exciting about future technology development and innovations?

We work with leading system integrators such as NEC Energy Solutions (NEC) and Powin Energy Corporation (Powin). Our KCE NY 1 project is using NEC's end-to-end grid storage solution and its AEROS proprietary energy storage controls software. The system includes a flexible design to accommodate wholesale market opportunities in the NYISO market. NEC's grid storage solution architecture offers parallel redundancy for better system reliability with high availability and field serviceability.

We have partnered with Powin on several projects, currently under construction or in development. Powin provides fully integrated battery energy storage systems including cells, enclosures,



GlidePath's Prospect Storage project in Texas looks set to compete in the ERCOT market



Key Capture Energy's 20MW entry into New York in 2019 showed the state's concrete ambitions for cleaner energy, Jeff Bishop says

cabling, transformers, inverters, and all software and controls systems. Powin will be responsible for commissioning the battery energy storage systems and for scheduling the systems.

KCE uses lithium-ion batteries and continues to work with a large swath of vendors to assess the best technology for each solution that we are developing. It is exciting to see the decline in battery costs and we believe that we will see more and more large-scale energy storage projects competing in non-traditional markets.

What do you expect to see this year and beyond 2020?

At the close of 2019 there were 528MW of storage projects operating across the country. However, we are seeing strong development interest in storage with a total of more than approximately 45GW of projects in queues across CAISO, PJM, NYISO, ISO-NE, ERCOT, SPP and MISO. When a state sets a goal, like California, Massachusetts or New York have done, that gives developers like us a clear framework to operate in and confidence that the inevitable challenges we will face as an emerging technology solution (market access, development soft costs, clear timelines and structures) will be figured out.

For the industry to mature and those ~45GW of projects to go from being under development to operational, the wholesale electricity markets will need to be designed to take full advantage of energy storage's potential. Storage can provide a wide range of services to the grid, but only if storage has a seat at the table – across stakeholder processes at the wholesale level, through proceedings before the Federal Energy Regulatory Commission, and through regulatory policies enacted by legislatures and state commissions.

Productive discussions with regulatory bodies and ISOs, as policies and markets

are formed, will be essential. If we can work together with regulators and generators to allow for technology neutral compensation to the products a generator provides to the electric grid, storage will play a key role in the clean energy transformation.

Convergent Energy + Power – Frank Genova, CFO/COO

PV Tech Power: What are some of your most significant accomplishments in solar-plus-storage and/or standalone energy storage in 2019, and what were some of the challenges along the way?

Frank Genova: We were acquired by Energy Capital Partners (ECP), a private equity and credit investment firm with greater than US\$20 billion in capital commitments. This provides us with a flexible and scalable capital structure that will allow us to grow our pipeline in the rapidly evolving energy storage sector. Also, we completed, to our knowledge, the first solar-plus-storage tax equity closing for three projects on the Delmarva peninsula on the East Coast.

We also set a new industry record for the largest behind-the-meter battery energy storage system (10MW/20MWh), matching our previous record set in 2018. This system was developed as part of a joint venture with Shell New Energies, designed to reduce their facility's peak consumption of energy by one third while increasing reliability and long-term sustainability of the grid. Our energy storage solutions are also now available to existing Shell Energy North America customers in Canada.

Last but not least, 2019 was a year in which we really grew the M&A side of business, acquiring around US\$70 million of new projects; these acquisitions are for both standalone storage and solar and storage projects, with varying levels of merchant and contracted revenue streams.

On the challenges front, the lack of familiarity with storage—or misconceptions

about it—continues to hold back development and growth in certain instances. Projects not coming to fruition, particularly after being awarded and announced, is not uncommon in the sector and can breed customer scepticism. Another challenge is the tax equity process for solar and storage. At distributed scale, it's an expensive, time-consuming, one-off process. Lastly, safety-related issues that occur do hurt the overall reputation of the industry.

What sort of technologies are you using at the moment, and what's exciting about future technology development and innovations?

For us, anything in the one- to six-hour range is going to be lithium-ion, a combination of lithium iron phosphate (LFP) and nickel manganese cobalt (NMC) depending on pricing, available area, etc. We are seeing opportunities outside of that range, but based on our strategic focus they're still few and far between.

There are some interesting flow battery technologies out there that we're following but it's a smaller subset of our total opportunity set. Looking forward, we're somewhat bullish on certain flow technologies and zinc-based chemistries due to the fact that their primary performance characteristics such as cost, safety, abundance of raw materials, commercialisation process and so on, align well with where we see value in the market. Although these chemistries are not being manufactured at scale, the developers have the right viewpoint on the market and could be well positioned as they continue commercialising their products.

What do you expect to see this year and beyond 2020?

In 2020 we're expecting to see continued price declines on battery storage technologies, a greater understanding and adoption from stakeholders and off-takers (on both the C&I and utilities side), a broadening of the opportunity set – pricing comes down, the opportunity set increases – and ultimately, more favourable market conditions and market treatment for storage.

Some other things we expect to see include a consolidation of developers and assets – we're already seeing a lot of developers flipping and/or selling their platforms. [Also], more educated customers, a greater demand for storage across customer segments, and a focus on storage as a part of corporate social sustainability efforts. ■