

US energy storage in 2021: Notes from a maturing industry

US energy storage | The US energy storage industry remained “remarkably resilient” during what most of us have found to be a difficult year - to say the least. Andy Colthorpe speaks with Key Capture Energy’s CEO Jeff Bishop and FlexGen’s COO Alan Grosse - two companies that made 2020 one of growth in their energy storage businesses - to hear what lessons can be learned and why economics rule.



Credit: FlexGen

For so many reasons, 2020 will be a year that is remembered for a long time, but not remembered with fondness. It will be difficult to forget the pandemic which has taken so much from us all and whichever side of the political fence you are on - or even if you take no side at all - the world seems a very divided place. And that’s before we even start thinking about the climate crisis.

For the US energy storage industry, still the world’s leader in adopting batteries for the grid and for renewables, it has however been a year in which clear steps forward have been taken. Research firm Wood Mackenzie Power & Renewables found that in the third quarter of 2020, 467MW / 764MWh of energy storage was deployed around the US across all market segments. This was more than double what was recorded in the previous highest deployment quarter and Wood Mackenzie head of energy storage analysis Dan Finn-Foley

described the industry as having been “remarkably resilient” to the impacts from coronavirus lockdowns.

All this, despite reported supply chain slowdowns earlier in the year, permitting delays due to officials staying at home and the difficulties of getting onto sites and customers’ properties. In an interview for Energy-Storage.news in late November, US national Energy Storage Association (ESA) CEO Kelly Speakes-Backman said that 2021 will be an “important year for energy storage” and that the industry will continue to grow at an accelerated rate - with at least 3.6GW of storage expected to come online.

The prospect of working with the incoming Biden-Harris administration, which included climate protection and environmental concerns prominently in campaigning during the election is also a welcome one, Speakes-Backman said. Meanwhile, a lot of progress happens at

state level, and the ESA CEO pointed out in her interview that Arizona, Maryland, Nevada and Virginia were among states to step forward and show leadership on energy storage policy, along with the more commonly talked-about likes of California and Hawaii.

Speaking for this article with Jeff Bishop, CEO at developer Key Capture Energy (KCE) and Alan Grosse, chief operating officer (COO) at installation services and technology provider FlexGen - two contrasting companies that have managed to make 2020 a pretty good year, energy storage-wise - we hear how they approach the industry and its variety of business models; which regional markets in the US work best and why; which technologies and partner companies they rely on to get the job done and the future of energy storage both as an enabler of renewable energy and a cleaner grid and as a competitive alternative to existing grid infrastructure options.

Expecting everything to be in flux

Jeff Bishop, Key Capture Energy’s CEO says that 2020’s been a year of “expecting everything to be in flux,” which for someone involved in an industry as nascent and disruptive as energy storage is perhaps a more familiar feeling than it would be for many others. Yet KCE’s plan to get more than 1GW of projects in operation by the end of 2023 remains on track, Bishop says, and 2021 “will be an exciting year”.

“We knew going into this industry that storage was going to be really hard. Each project presents a unique mix of technical, commercial, regulatory, and development in ways that didn’t exist with wind or solar as those industries were emerging and taking off,” Bishop says.

The way KCE has made energy storage project development stack up, is by looking at the energy landscape and trying to “figure out what the grid needs in five to 10 years from now,” Bishop says.

One of several FlexGen projects the company has delivered, stabilising power supply to communities around Houston, Texas. Each is around 10MW / 11MWh.



Credit: Key Capture Energy

"There are opportunities that allow for certain technologies over others and we approach energy as if we were a thermal independent power producer (IPP). So: if you were a natural gas company 10 years ago, what are the fundamentals you would need and what are the core competencies that you need in a company?"

The answer, Bishop says, is strong project development teams, engineering, procurement and construction (EPC) teams or partners, market development staff that watch what's going on day-to-day, combined with commercial structuring that allows KCE to recover its capital expenditure (CapEx) to put back into growing the pipeline of projects still to come.

"That's how we approached the industry. Because we do not have tax equity, we do not need the same structures that a wind or solar company would need, or the 20-year contracts. Instead, we're able to go out into the market, get, let's say, four to 10 year off-take contracts that cover a debt service, so that we can put project debt on these projects and then be able to construct projects that are above our cost capital."

Typically, KCE will go into states and regional transmission organisation (RTO) territories of the US where the company figures and expects there will be a market in two to five years' time, but isn't one yet today.

"We start small, and do 10 or 20 megawatt projects initially to figure out all the known unknowns within a given market. And then once we get comfortable with the revenues, with the market

Key Capture Energy's KCE NY 1 project in upstate New York, on which the developer worked with NEC.

structure, with the regulatory environment, commercial structures, then we expand and go bigger into the 50 to 200 megawatts-sized projects."

Opportunities driven by competitive advantages

FlexGen's path into the grid-scale utility energy storage market has been a very different one, COO Alan Grosse says, if only because the company actually began doing microgrids, including several projects for the US military.

The opportunity for batteries really came onto FlexGen's horizon with equipment cost reductions from around 2014 onwards. Before that, battery storage's cost was "prohibitively high," Grosse says, and the majority of FlexGen's projects were megawatt-scale microgrids using ultracapacitors that "only had enough storage for about 30 seconds worth of full power deployment".

But FlexGen also made its way into Texas from 2018, focusing on the one-hour duration battery storage systems that make economic sense trading energy and grid services in the state's Electricity Reliability Council of Texas (ERCOT) market. The "lion's share" - or indeed the Li-ion's share - of what the company has delivered this year as a technology and project services provider have been one-hour batteries in Texas and elsewhere.

"The perspective is one in which, wherever the market provides an opportunity, that's obviously where you want to play. And so we are seeing a number of these ancillary services markets in Texas, in particular," Grosse says, along with energy

arbitrage and trading, to a lesser extent.

FlexGen's next year or so is also expected to be busy - Alan Grosse says that the company "will probably buy a little over 1.1GWh of energy storage for delivery between now and the first half of 2022". FlexGen has done some international projects but focuses mainly on the US.

"Within the US market, which is obviously the one in which we play the most, our biggest markets in order of where we see quoting activity, where we're building systems and where we see the market opportunity, are Texas, California, and then the northeastern US, so Massachusetts, to some degree and some of the independent system operator (ISO) zones in New York. Those are the areas that we see and then if I had to take a fifth, I would say of all places: Indiana."

Grosse mentions Indiana, he says, because of the phaseout of coal. FlexGen is not an avowedly climate agenda-driven company with a mission, but Grosse says the economics of renewables-plus-storage are a "slam dunk" while states, utilities - and hopefully eventually the Federal government once more - are decarbonising and adopting clean energy policies and goals.

While the coal shutdowns also mean that more natural gas could be expected to come online in many places, FlexGen's COO argues that a recently completed project the company did in Indiana epitomises how energy storage can be paired even with natural gas to provide efficiency and reliability increases and ultimately, a transitional pathway to decarbonisation.

FlexGen added 12MW / 5.4MWh of lithium-ion batteries to a natural gas plant for a utility in Indiana that can black start the turbines. Previously, this was done exclusively with diesel engines which are dirtier, noisier and less reliable, requiring frequent maintenance and incurring fuel costs. That customer is doing a Request for Proposals (RFP) for multiple gigawatts of solar, and has a number of coal plants in the process of closing down.

"Our black start project is colocated at an 800MW coal plant. They're closing that coal plant down and they put the battery in to make their gas turbines more reliable because they're in the process of building out a massive, massive footprint of solar and battery - solar-plus-storage."

Forecasting the unexpected

One of KCE's major system integrator partners, NEC's Energy Solutions division, exited the industry in 2020, with reports

claiming the company had not been able to make the business profitable despite a market-leading position. It's hard to tell what the industry will exactly look like in a few years from now, but again, this in itself is perhaps no surprise.

"In any new industry, there will always be consolidation, there will be growth, there will be new owners. That's the maturity of an industry as it continues to grow," Jeff Bishop says.

"As we look at the system integrator landscape, there are starting to emerge 'Tier 1' system integrators and who they will be a year or two or three from now, it may change, but that still doesn't change the ultimate underlying economics that so many of these projects have. Whenever you go with somebody that has really strong warranties, you can get project finance on them."

Speaking of warranties, much industry discussion in 2020 centred on lithium iron phosphate (LFP) batteries versus nickel manganese cobalt (NMC) for building energy storage systems. FlexGen's Alan Grosse says that his company and many

others remain firmly technology agnostic. Largely, the strength of warranties and performance guarantees currently dictates which technology is bankable for any given project.

The number of LFP providers' batteries and systems that have undergone UL 9540A testing has grown, Grosse says. With UL 9540A test data available, "the end customer is going to be able to get insurance". Without UL 9540A for battery systems and UL 174 for inverters, it's a "non-starter" for larger projects to get that insurance, he says. LFP providers are increasingly also able to offer performance warranties down to 50% state of health of the system.

"When you open up that additional range - people talk about cycles, again, we try to avoid talking about cycles, because it really boils down to what's the megawatt-hour throughput through the system - the more you can put through the system, the higher value system."

In other words, so much is dictated by the economics. KCE's Jeff Bishop says that ultimately, the energy storage industry's



Credit: Key Capture Energy

After focusing on relatively small projects in Texas like the one pictured to figure out the market, Key Capture Energy is now developing much larger battery storage systems.

success or failure will come down to whether the industry is able "to compete in order to provide the attributes the grid needs".

The early success of solar and wind was closely tied to the US states that had high renewable energy aspirations. A growing number of US states - seven at the time of writing - have in place energy storage deployment targets at policy level. So, how much does energy storage still need policies to push it through, versus providing economic competition for existing infrastructure solutions?

"One way of looking at it would be what happened with wind and solar, where you initially had the state mandates that created local ecosystems of jobs and opportunity and economic development in California, in Massachusetts, in New York," Jeff Bishop says.

"Then, once the economics fully hit everywhere, it became purely economics. And so in a similar way, for energy storage, there will be places that will really be looking at the next generation, and how to incentivise your overall workforce for the next 10 years.

"They may want to come out and really be leading the transition with pilot projects, etc. But then fundamentally - and it always comes down to economics - how do you compete? And in those scenarios, you're going to be seeing really interesting markets popping up and in ways that people weren't expecting two years ago.

"When we started developing in Texas, everyone told us it wasn't a real market. Nobody would be building projects there. Today, we're the largest owner of storage - we're currently building 200MW more in Texas, and everybody follows Texas right now."

Stepping on the gas

With coal on its way out and decarbonisation across many parts of the US now an integral part of state level policies, could the demise of natural gas be the next step? Gas is seen by many as an interim solution in the energy transition and provides flexibility to energy networks that have adopted a greater share of renewables, but the tide could be turning against this last great dinosaur of the fossil age.

Tom Buttgenbach, CEO of developer 8minute Solar Energy, says that projects such as his company's Eland Solar & Storage Centre, currently being constructed in the Mojave Desert in California, pairing 400MWac of solar PV with 300MW / 1,200MWh demonstrate both the "cost and reliability advantages in pairing solar with storage".

"For the first time ever, solar paired with storage is not just lower cost but also more reliable than fossil fuel power plants," Buttgenbach says.

Not only has the Eland project achieved the lowest cost solar-plus-storage power purchase agreement (PPA) in history, costing less than fossil fuel generation (<US\$20 per MWh for solar and <US\$40 per MWh combined with batteries) but the 8minute CEO points out that projects such as Eland "offer 98% to 99% reliability - much higher than a gas plant in the mid-80% range".

"Our solar-plus-storage power plants can come online in a fraction of a second, compared to several minutes for a gas plant and can be optimised to deliver a range of flexible grid services depending on what a utility needs."

"Eland, for example, with a record-high capacity factor of 60% during the summer months, will be able to dispatch power during the day and well into the evening and night - and will do so with existing transmission. By using existing transmission



Credit: 8minute Solar Energy

Rendering of 8minute's Eland Solar & Storage Center in California.

capacity more efficiently, our Eland plant will deliver low-cost renewable energy to Los Angeles quickly and is helping avoid multi-year, multi-billion-dollar investments in new infrastructure."

Meanwhile, the inauguration of President-elect Joe Biden and the US' re-entry into the Paris Agreement could mean a policy landscape much less favourable to all fossil fuels, Key Capture Energy's Jeff Bishop says.

"The Clean Power Plan under the Obama Administration really drove utilities to rethink their entire playbooks. Overnight, no utility board was willing to sign-off on a new coal plant when there was not a clear path to long-term cost recovery. Similar motivations - political or regulatory - could take place in the next few years, effectively removing new natural gas plants from the utility integrated resource planning framework. I am unsure what form this will take in the next four years, but it's quite clear that changes at the federal, regional, and state level are further accelerating the clean energy transition".