Accelerating to 100%

Policy | Andy Colthorpe speaks to Janice Lin of the California Energy Storage Alliance on what sort of role energy storage will play in reaching the '100% carbon-free retail electricity' goal of the state's SB100 legislation

Along with leading the formation of the Global Energy Storage Alliance in 2014 and remaining its chair until earlier this year, Janice Lin, head of Strategen Consulting, is executive director of the California Energy Storage Alliance (CESA). There's probably nobody better to ask about how SB100 can be viewed in the wider context of what's happening in California's energy storage industry.

We heard from commentators at SPI this year that before long it might be more common to see new solar with storage than without. Lin agrees that energy storage is only going to become more closely partnered with clean energy generation.

"Solar and storage will be like peanut butter and chocolate, they're way better together! I've had developers tell me, at least going forward in the West, they don't see a lot of solar procurement without storage and they're proactively including storage in their business now," Lin says.

And it isn't just the likes of California's big investor-owned utilities (IOUs), which are mandated to procure energy storage or to consider it in their resource planning, getting involved. Municipal utility Los Angeles Department of Water and Light uses a 20MW battery at the 250MW Beacon Solar Plant and Beacon Energy Storage System in the Mojave Desert. It provides AC frequency control, voltage support and assists in the utility's compliance of balancing requirements, helping keep T&D lines stable, while allowing more power to be usable from the PV.

That said, the "beautiful thing" about energy storage is that it can be deployed with solar onsite, but it doesn't have to be, Lin continues.

"Storage can do so many things for the grid and it need not necessarily be directly coupled with PV. There's discussion in California to deploy solar but to have it integrated with distributed, customer-sited storage, as the means by which you improve the capacity factor and shift peaks. This is something that can only be done by a community choice aggregator in California. So there's been creativity on the deployment model – and the lines between utility-scale and behind-the-meter (BTM) are really blurring."

SB100 is ambitious, but a logical next step

We have often heard that increasing the value of BTM storage could be a question of allowing aggregated residential or C&I storage systems to work together as networks, trading energy or performing virtual power plant (VPP) roles. Lin says there's already precedence for BTM systems providing services to utilities in this way.

"Where they (utilities) used to procure local capacity in very large contracts with generators, they're doing it in an aggregated fashion from smaller aggregated assets behind-the-meter."

So how is the state supporting this shift? Does it even need supporting or will market forces take care of everything? Janice Lin is quick to point out that SB100 has not just appeared from thin air, and the 100% renewables policy sits alongside other policy and regulatory initiatives that have already changed the game.

Credit: Andy Colthorpe

A zero-emissions electric bike. Janice Lin says now more than ever, decarbonisation and energy network modernisation is a multi-sectoral goal

"California historically has been a leader for how to use distributed resources generally for grid support and those aggregated BTM local capacity procurements that happened some years ago here, I think that was the first time anywhere in the world that was done. Now we have multiple programmes to encourage BTM storage."

These include the SGIP (Self Generation Incentive Programme), which gives Californians a discount on energy equipment that achieves greenhouse gas (GHG) savings. The state also has programmes for demand response, another market opportunity for energy storage asset owners.

The challenge, and not only in California, is to raise the market value of BTM storage by allowing greater recognition of the services and benefits it can provide. Previously, we heard from Janice Lin and others on the expected big impact of FERC Order 841, a Federal Energy Regulatory Commission (FERC) ruling which instructs regional or state T&D networks to create frameworks for energy storage to participate in wholesale electricity markets. That ruling is still in the process of being hammered out and so Lin offers a more general comment on how the value of storage can be better recognised.

"One of the challenges for BTM storage is getting the signals – the market signals – right. For the most part, BTM storage is deployed today to help the host customer manage their electric bill. Typically it's to avoid a demand charge, conduct some energy arbitrage and

of course the price signal that guides that behaviour is going to be the electricity tariff. But as we know, electricity tariffs are an artificial construct, they're regulated and they weren't designed to optimise shifting on the part of a consumer for the benefit of the grid overall."

"So we're still learning about how BTM storage functions, we're still learning how that impacts GHG emissions. Also, how do you share the asset? If you're using it for the host but also want to use it to provide, say, local capacity, how do you actually implement this multi-use functionality and make it count towards your overall electric power sector planning? In that regard I think we're really still learning. There's been a lot of progress but I think from here on out, it'll just get more exciting and when we overlay the power of smart computing, data analysis [and] smart algorithms, we're really just entering a very exciting time where distributed energy resources can be a key tool for grid planning going forward."

Tech wars? Not so much

California obviously has Silicon Valley and its technologists, and whether or not it is only hype that means California is better known as a tech centre than, say, Bangalore, the state has numerous software, hardware, system and equipment makers that have brought commercialised technologies into the energy storage industry. Lin says that she believes – and we get the impression she's explained this once or twice before – the technology is there, but the regulatory and policy spaces have yet to catch up.

"What's needed is innovation on the regulatory side and the market design side so that the value that newer, yet commercially available technologies can deliver be recognised and be compensated for the value they can provide today to the grid. We need regulatory innovation to keep pace, with commercially available technology innovation."

From first-hand experience, Lin says she knows it is hard but not impossible. Policy makers and regulators Lin has herself worked with were absolutely willing to make changes once they could be helped in understanding the value of those changes. "Regulators will innovate when they understand the value that is at hand," she says.

Time and again the California 'duck curve' is cited as the ongoing puzzle of balancing solar production versus overall demand. Lin says that is changing, as distributed renewables increasingly generate during the day and with the help of storage, can be dispatched later and later into the evenings as peaks tail off. The graph over the course of a week or a month will start to look less duck-like and begin to resemble a "saw-toothed monster", Lin jokes.

"If you look at the spread of a week and look at the net load it kind of looks like a saw-toothed monster! I call them 'icicles of opportunity' because it gets that wonderful renewable energy in the middle of the day and use it to address demand later in the evening. We need a roadmap for how to integrate storage and use storage in a smart way and in a cost-effective way, taking advantage of its multi-use capabilities, smart recharging all of our electric vehicles (EVs) so there are multiple solutions to managing and integrating our abundant low-cost renewables. That's what we've got to figure out going forward."

Multi-sectoral goals

No one – at least not anyone sane – believes any single clean, renewable or distributed energy technology can slow global warming or give people low cost, reliable energy forever. Lin agrees with the wisdom of the increased trend in Europe to talk about sector coupling i.e. solving energy problems by looking holistically at the electricity, heat and transportation sectors. One great example is how batteries will increasingly be used to buffer electric vehicle chargers as solar provides the charge, while vehicle-to-grid (V2G) technology could make EV batteries themselves into grid assets.

Energy Storage North America, the trade show Lin, Strategen and CESA helps to runs each year in California, focused this year on transportation as well as the power sector when it took place at the beginning of November in Pasadena.

"There's a growing recognition that this goal [SB100] is a multi-sectoral goal. It's not just the power sector. We have to think clearly about the transportation sector, we have to think creatively about how we retire gas resources and eventually someday maybe only use a handful of them for emergency backup or using them entirely on renewable fuel, whether biogas or green hydrogen. These are all pathways that we need to figure out in the coming years."

And it is a transition, Lin argues. There will still likely be some role for gas in the near if not long-term future, but even there, gas-plus-storage achieves emissions reductions over standalone gas. It may be controversial to hear, but Californians cannot just expect to wake up tomorrow (or even in 2045 by which time the target must be achieved) to a 100% renewable energy world.

"You can't get to the goals of SB100, just by snapping your fingers and you're there. You have to have a rational plan for going from A to B and a plan for having optimised the use of the assets that we already have. Whether that's an existing gas plant, T&D, natural gas infrastructure, existing solar and wind, geothermal, you name it. So storage has a really important role in finding a rational, reliable and cost-effective pathway forward."

Getting there is only part of the journey

Nonetheless, it is obvious the pride Lin takes in the energy storage industry in her home state and it appears SB100 will bring a lot of what she has worked for over the past 20 years into reality.

"I think SB100 is the policy impetus to really amp up storage here in California. How do you achieve an emissions-free power sector without energy storage? It's just not possible. I would also argue that some of the other policy work on storage that has already been undertaken has given our legislators courage that this is even achievable.

"We're going to definitely get there. There are multiple pathways forward, of different storage solutions that can assist everything from short, duration, longer durations, and really long bulk duration storage with green hydrogen, pumped hydro, compressed air and so on.

"It's not a question of technology. It's truly a question of how do we get there in a way that has the best outcomes for ratepayers and ensure grid reliability and resiliency and equity for all Californians. That's the challenge before us." ■