

Evolution or revolution?

New York's grid transformed



Credit: Dan Nguyen/Flickr

Grid investment | An ambitious plan is being drawn up to overhaul New York's electric grid infrastructure, an exercise that some have priced at US\$30 billion. Andy Colthorpe looks at the efforts underway to ensure renewables and energy storage are a central part of bringing the state's power system into the modern age

In most developed nations, the grid infrastructure was built decades ago in the conventional "hub and spoke" model, with centralised generation in the middle. Adding more distributed resources including solar and managing a more complex flow of electrons around the network has brought the old-fashioned model of the grid as we know it into question.

From adding renewables, allowing energy storage to provide grid balancing, using demand response to match supply and demand, to building megawatt-scale micro-grids, distributed energy resources (DERs) add not only a new set of technical questions as to how the grid works, but also economic ones in terms of how the market around it should operate. For a network to rely increasingly on distributed resources at the "grid edge", those resources – including PV and storage – will need to be supported in finding a market-based, sustainable solution to their continued deployment, one free from subsidy and incentives.

'Revolutionary, dramatic change'

New York's governor Andrew Cuomo launched New York's Reforming the Energy Vision (REV) programme in April 2014, to "fundamentally transform" the way the

state not only generates, transmits and distributes, but also values and monetises electrons on its network. A convergence of motivating factors inspired this decision, according to William Acker and John Cerveny, executive director and resources director respectively of NY BEST (New York Battery and Energy Storage Technology Consortium).

"One is that New York State has an ageing grid infrastructure, and estimates of the investments that need to be done just to maintain what we have are very, very large," Acker says. This could be in the order of US\$30 billion over the next 10 years. The state, he says, recognised that for that amount of spending, "you've got to do better than just maintaining the status quo".

Second, Acker says, is the fact that New York has in place ambitious goals on both greenhouse gas emissions reduction and for increasing its share of power generated by renewables. New York's recently issued State Energy Plan calls for renewable generation to make up 50% of the state's energy mix by 2030.

"To do that on the grid really requires flexible assets like energy storage," Acker says.

Along with improving the status quo

Hurricane Sandy in 2012 caused a blackout in a large swathe of New York, shown here in area behind the Empire State Building.

and accommodating more clean energy, grid resilience is also a big motivator in a state which has previously been badly hit by storms; memories of the power outages caused by the 2012 Hurricane Sandy still linger. Added to these three major motivations are the aims of maintaining cost-effective electricity and creating long-term stability to the distributed energy resource networks that will be created.

"One more aspect that I think is important, particularly from an energy storage perspective, is the ratio of peak power to average power," Cerveny adds.

"The Public Service Commission (PSC) in its documents pointed out that the top 100 [peak] hours in New York state cost it between about US\$1.2 and US\$1.7 billion dollars a year and so they've been very heavily targeting how we flatten the very top peaks here, and that's part of this process." Among other things, storage-shifted solar could be used to mitigate these peaks (see box).

Track tensions

The REV programme has sought the input of as many stakeholders in the network as possible. NY BEST, which Cerveny has previously described as part technical trade

association, part development agency, was among the organisations invited to join working groups that built the REV framework.

"The PSC put out an initial concept... and then formulated a whole series of working groups that met in the spring and summer of 2014," Acker says.

The input from these groups looked at a system enabling distributed generation "from the point of view of technology, from point of view of market design, from the point of view of customers and economics", and other factors, he says. This led to the issuance of a 'Track 1 Order' by the PSC, a document which laid out the basic principles of REV. While many changes are expected as the process continues, that order created a specific new set of rules for utilities that has underpinned continuing discussions.

"One of the key tenets is that the utilities will – in addition to their role as utilities – create, serve as and eventually have a separate entity known as a distributed system platform provider (DSPP) and that entity [will control] the marketplace for DERs at the edge of the grid," Acker explains.

"...It is tasked with creating a transactive market for DERs, meaning that in the very long run, it really is the market maker that allows people to trade energy, energy services, to buy and sell energy services."

One topic we are forced to revisit often in reporting on solar is how tensions play out between distributed resources and established incumbents of centralised generation such as utilities. Solar companies, especially those with an interest in grid-connected storage, have long been at pains to point out that they do not see utilities as the enemy.

Writing utilities into the fabric of the future electricity market seems like a good way to ensure utilities are encouraged to move to a new business model. Yet it was not taken for granted at the beginning of the REV process that this would be the case, William Acker says, laying out the role of DSPPs.

"The concept of the DSPP is that it enables the DERs



John Cerveny (left) and William Acker of NY BEST.



to interact on the electricity grid, it does not own or control them, except for in special circumstances. For the most part the DSPP is creating the mechanisms of interaction, owning the wires and creating information flow platforms and the way that the market works, but not owning the DERs or controlling them."

So what's in it for the utilities, which in terms of infrastructure are traditionally used to operating on the basis of being rewarded for levels of capital investment in the network?

"That's actually one of the key things being sorted out," Acker says, explaining that in theory, as a DSPP the utility would be "acting as a stock exchange, as the people who are market makers in this process. They're also responsible for maintaining infrastructure".

At present, New York utilities are paid for what they put on to the network. So, for example, while using batteries could be cheaper than upgrading a substation, this does not necessarily translate into a saving for the bill-payer. Modernising the utility business model requires as much thought as modernising the grid itself.

"Right now we have this rather perverse situation that the utility could be incentivised to do the more expensive option because they get return on capital investment. They don't get returns on the cheaper option," Acker says.

An ideal future

Next, Track 2 of REV will attempt to deal with these and other questions through tariff design. It will be a challenging part of the REV design process, as, to simplify the issues massively, in a distributed grid marketplace there will need to be more interaction between the retail and wholesale electricity markets. For instance, the Federal Energy Regulatory Commission regulates the wholesale electricity market at a national level, as well as high-voltage transmission lines, while the Public Service Commission (PSC) regulates the interests of ratepayers and will therefore, it is assumed, also be responsible for overseeing the DSPPs. Once DERs are selling power through DSPPs, the question remains whether that would constitute wholesale electricity sales.

This is just a glimpse of the level of complex questions that the transformed network will have to answer, unpicking details and balancing the sometimes differing aims of stakeholders, from the average citizen footing the bill to transmission and distribution system operators, to the utilities

What REV could do for solar

In addition to extensively re-evaluating the grid, other branches of New York REV are already funding and supporting clean energy and energy efficiency. Along with a range of other REV-related measures, in 2014 governor Cuomo launched NY-SUN, an initiative which is deploying large-scale solar and community 'shared' schemes for renewables in a bid to reach 23GW of deployment in the state by 2023. Building on a record which has seen solar installations grow by more than 300% between 2011 and 2014, according to official figures, NY-SUN consolidates all of the state's solar support programmes into one.

On a related note, when John Cerveny of NY BEST previously spoke to PV Tech Power (Vol.1), he said that with net metering schemes for residential solar in place, New York did not appear to be fertile ground for a solar-plus-storage market at that scale. However, this time he says that net metering's role as a market "shortcut" could be revised.

"It seems likely, given the goals of REV and the design and the desired outcomes, that that [role] will change, but it also seems likely that there'll be a [new] marketplace that decides, if you have PV that's feeding into the grid at times of peak demand, you're going to get paid premium price for it. I think it will change the nature of [the utility] for both PV and PV coupled with storage...it's going to open up a whole lot of opportunities and the work of REV is to make sure the value is appropriately there."

and their shareholders, and on and on.

So how is NY REV going to evolve a new set of rules for New York and what does NY BEST see as the ideal resolution for storage and for renewables?

"We have a few strong desires with respect to how this process is planned through," Bill Acker says, "including a plan that values all of the different services energy storage can provide to the electricity grid".

NY BEST would like to see energy storage valued "in a way that is fair and accurate, including both locational and temporal considerations", meaning that where and when electricity is generated, as well as where it is going to, should partly determine how it is priced. This would of course have obvious ramifications both for storage and solar.

Some of the documents informing Track 2 will be published over the coming months. Though REV may take a long while after that before being finalised and implemented, Acker and Cerveny seem to be both fascinated by the process and excited to be involved, applauding the programme's ambition and scope. As Cerveny previously pointed out, Audrey Zibelman, chair of New York's PSC, was once head of a demand response firm and is knowledgeable about many of the issues at hand, which is just as well, because as Acker points out, for PSC, "...it's not their normal day job to rewrite the rules on how the grid works!" ■