Germany showing the way for storage

Market update | As with solar, Germany has been one of the leading early adopters of storage. Andy Colthorpe speaks to analyst Valts Grintals about the key drivers emerging for storage in this pioneer country

Germany's energy storage market seems to be in good health, with just over 50,000 residential system installed to date and a number of large-scale projects getting the go ahead or already in action. While the federal elections later this year may bring some big changes, at the moment the country seems to be staying the course of its Energiewende ('energy transition') process. Although work remains to be done on decarbonisation and in coupling the heat, transport and energy sectors, the early stage energy storage market is showing promise. Delta-ee analyst Valts Grintals discusses his research and analysis of the German market.

PV Tech Power: What are the key trends you are seeing in the residential storage market?

Valts Grintals: The annual market in 2016 reached around 24,000 units [sold], which is actually higher than expectations, indicating that customers are really warming up to installing storage even if the economics are not there yet. There has been significant growth from 2014 to 2016 and we see in the future the market slowing down a bit but still growing, so an annual market growing up to around 30,000 units by 2019 and then after that higher growth again as the economics become more appealing, [with] paybacks below 10 years.

Really the market is driven by growing electricity prices, customers wanting to play their part in reducing the carbon footprint and becoming more self-sufficient, having less reliance on utilities. I think within the next five years storage will become part of the standard PV installation. We see within the next few years half of new PV installations also adding storage. As for the retrofit market, we see that starting to develop a bit more after 2020, once the cost of the batteries is low enough.

Do you think providers like Sonnen that have tried to do something different with SonnenCommunity [a peer-to-peer energy trading platform]is a quicker way to change the economics and how do you view that kind of offering?

It's a really interesting business model. At the moment I think Sonnen is just trying to grow its customer base to reach a certain number, to have this aggregated capacity to actually tap into different value streams like PCR [primary control reserve] or participating in the wholesale energy market. So they're really trying to position themselves as an energy supplier almost. By having this [newer] SonnenFlat proposition, where customers with SonnenBatteries installed can pay a flat monthly fee for their energy [while Sonnen nets revenue for grid services], this is a business model that right now, they primarily are just investing in to get a bigger customer base. As it develops their main aim is to tap into different value streams in Germany and I think they're launching that in Australia as well. So from their side, I think it's a longer term investment in the future.

At the moment what does a typical or average German residential storage system among the 50,000+ already installed look like?

Really it's a wide range of capacities. I think most of the installations are between 4kWh to 8kWh. In the UK you would assume to have slightly smaller systems because PV installations are slightly smaller and demand in the UK is lower than in Germany. People in Germany installed bigger PV systems so will need bigger storage units. It ranges between how big is your building and what is your electricity demand, but I think in terms of power, most systems are about 3kW.

It depends on how the system is sized according to demand but the average assumption is that it goes up to 60% self-consumption if you have an integrated PV-plus-storage system. If you go for a bigger storage system or increase the size of the PV you can go higher but there's a trade-off in how cost-effective it is to actually do that.

It seems quite competitive already. Who are some of the bigger players and what are your expectations?

I think Sonnen will have a good position in Germany especially. The market is still fragmented because a lot of players are launching products [including] companies from Spain or Austria that are seeing this opportunity in Germany because there's actually a market where you can sell some units. I think Sonnen will be leading, I think Fenec has a good market share as well, LG Chem is well-positioned in a lot of the markets including Germany, E3/DC has a good position at the moment as well in the German market. As the market grows, it will change and it will depend on who has the best business model really.

What is happening in the commercial and industrial (C&I) segment?

There will be C&I customers who have PV and use slightly bigger storage units than residential scale to improve their self-consumption, because electricity prices are still high for smaller C&I customers.

Overall, from a capacity standpoint it's the smallest section of the market, it's still only emerging but we see it growing quite a lot. It will still be the smallest part of the market even by 2020, 2021, but it will have good growth starting off with the smaller scale C&I segment. It actually makes sense in a lot of cases.

Then, in the longer term there will be the opportunity for bigger

Credit LG Chem

A battery storage park in Feldheim, Germany, co-located with wind turbines. Integrating large volumes of renewables into the grid will be a key long-term driver for storage in Germany

scale industrial applications on peak shaving, as demand charges in individual German regions are high and expected to grow.

So are the economics already working out for C&I customers?

It's very similar in terms of how the market will develop in the shorter term, starting with smaller C&I customers and early innovators, to how the residential market has been developing right now: early innovators installing storage to improve their self-consumption as well as to be greener.

In the longer term, as we see how the peak demand charges develop, it improves the economic case for storage, so this would be additional value that storage can easily tap into and has been proven to work in the US and has been also of quite significant value at least for now in the UK as well.

Even though overall the German grid is in a good situation, there are regions where there is high peak demand and you get charged a lot, whereas in some regions high peak demand has less of an effect. Overall though, demand charges are going up and the value in using storage to avoid those charges will improve.

Delta-ee's research forecasts commercial installations to exceed 10MW per year in the next three years. What limits that market potential?

To make a good business case for the value the customer needs to get from the storage, there's a lot of effort, a lot of bespoke analysis, that goes into deploying relatively small amounts or small capacity or small amount of units, at least at the moment because there is no standardised solution. It's really hard to create a standardised solution if the market is developing and there is a lack of certainty as well about how demand charges will look, what you can participate in as a C&I customer.

What are you seeing in the utility-scale segment?

The market topped after 2016 or [has] gone down a bit. The key driver for installing big-scale storage was PCR and a lot of the installations in the pipeline thought the value of PCR will go up. The assumptions behind how much money they will make from PCR did not meet reality; the value of PCR actually went down, which kind of slowed down the market a lot after 2016.

In the long term, there will be a drop in 2017, but then it will have steady growth after that because of renewable energy integration being the key driver for installations.

I think there's quite a few large capacity wind [projects] and there is a big opportunity to have storage installations co-located with those; as they run out of the feed-in tariffs (FiTs) they will need something else, so that wind energy can be used to participate in wholesale markets, for example. Where storage comes in is as a replacement to the FiT. That's where we see storage coming in further down the line: for renewable energy integration and to prevent renewable energy curtailment and integrate into the grid.

In our view, around 500MW of cumulative capacity of front-of-meter batteries will be installed in Germany by 2021, with the biggest traction coming in 2016 because of the PCR installations.

Is the design of things like wholesale markets in Germany good for large-scale storage?

I think it's still slightly behind the US where they're trying to solve the issue of the wholesale price settlement timeframe. As you decrease the settlement timeframe it enables storage to be one of the rare technologies that can respond to that price signal, so if you have half-hour price signals it needs to compete with gas etc. As it goes below five minutes, storage becomes the technology that you can maximise the benefit from.

With utility-scale projects, as with other countries we've seen the growth of revenue and application-stacked projects. Is that something that's made its way into Germany's utility-scale sector?

The big difference is that they don't have that many values to stack in Germany. PCR is almost bundled values; it's like frequency response plus a capacity market, to use a UK example. The UK has this fragmented market that allows you to stack things together. In Germany, the main value is PCR or renewables integration, so there's no stacking; the focus at the moment is on providing one value. In the future it might change.

I think in the long term, renewables integration is a key value for storage and we will see longer duration storage in front of the meter, because there's a lot of buzz in the UK around stacking different values but there's also not a lot of long-term certainty – FFR (firm frequency response) might change, TRIAD (commercial time of use mechanism) might go away, DuOS (grid fees) will change. Even though you can stack different values there's a lot of uncertainty.

In Germany it's actually easier from an investment perspective because you know or have more certainty around the value in renewables integration or self-consumption improvement, in PCR as well.