PFR Power Finance & Risk

PFR Energy Storage Roundtable 2020

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● PFR ENERGY STORAGE ROUNDTABLE 2020

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EDITOR'S NOTE

Energy storage remains one of the hottest topics in the infrastructure investing and project finance world. Long hailed as the panacea for all of the intermittency issues associated with adding wind and solar to the grid, battery storage seems set to demolish California's dreaded duck curve and finally render baseload and peaking thermal power redundant, if you listen to its advocates. As costs for lithium ion and other technologies gradually come down, the silver bullet of energy storage appears tantalizingly within reach.

An important driver pushing forward the development of the asset class in the past 12 months has been systematic procurement activity by utilities, most prominently in California. While electric distributors have long been asking for storage options as part of their renewable energy procurement efforts, only recently have companies like ***Southern California Edison*** *and* ***Pacific Gas & Electric*** *begun to hand out revenue contracts on the scale required for a regular project finance market to materialize.*

But there is still plenty of work to do, and a lot to figure out. For instance, what ownership structures will emerge as financial investors get involved?

Some developers, such as ***Advanced Microgrid Solutions*** *and* ***Engie Storage****, appear to have pivoted away from owning their own projects toward providing software, asset management and energy marketing services. By relinquishing ownership but taking market risk, Engie has opened up a comfortable space for financial and tax equity investors to get involved. Another developer,* ***Strata Solar****, toyed with the idea of owning and financing its Ventura project in California before recently deciding to sell it to fund manager* ***Capital Dynamics*** *instead. As small pilot projects give way to fully-fledged, investable assets, nimble start-ups are being displaced in requests for proposals by big hitters – better known for their gas burning assets – like* ***LS Power*** *and* ***Vistra Energy****.*

While project finance bankers will undoubtedly be reassured to see bigger balance sheets on the other end of their deals, there are still plenty of risks for them to get their heads around. How much long-term performance data is available? Who is providing technology warranties, and for how long? What are all these revenue streams for, exactly, and what happens if something goes wrong?

To address these questions and more, Power Finance & Risk recently brought together a leading energy and infrastructure attorney, two senior project finance bankers, a private equity official and top executives from two energy storage project developers for a virtual roundtable discussion. If you are interested in the future of financing energy storage – and who isn't? – you will not want to miss it.

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PFR: For the last few years, a tidal wave of standalone battery storage deals has been predicted. But, with the exception of a few high-profile deals, so far it's been more talk than action. Why might this be?

Mike Lorusso, CIT Bank There's a few parts to this answer. The first is that the initial hype might have gotten ahead of the actual opportunities that were available to come to market. That's why there was a lot of interest in financing these transactions, but there didn't seem to be many coming to fruition.

Another part is that there's also a lot of activity taking place behind the scenes by developers that haven't come to the market yet. There are a lot of responses to RFPs, and a lot of development activity that just hasn't come to be for now.

Finally, the opportunities that have come to fruition so far have been smaller and done on balance sheet rather than coming to the market for financing.

Those essentially are the three reasons why we haven't seen as much financed so far as perhaps the expectations were two years ago.

Krish Koomar, esVolta Where we are today in battery storage is where we were in solar 15 years ago, although it's becoming more mainstream as we speak. Mike's right – there's a lot of work being done behind the scenes that hasn't come to the forefront yet.

But looking at **Southern California Edison**'s announcement of 700 MW plus of awards to solar-plus-storage, **Hawaiian Electric**'s announcement of 16 proposals in PPA procurement and Nevada putting out huge amounts of energy storage bids, we're starting to see real action coming into the limelight. The next two years will be very interesting.

Santosh Raikar, Silverpeak I have a different perspective on that. Unlike solar or wind, a battery is a unique, multidimensional device. But what is lacking is two things.

First, there is no particular guidance from the higher-up entities – e.g. ISOs, RTOs, etc. – who are responsible for transmission grid operation. If a developer or any sponsor wants to put up a battery, they don't know where to go. There has to be a systemic approach towards providing market signals so that market participants can identify the opportunities and go after them. There was a FERC order that came out recently, which will potentially make life easier, but overall this is still lacking.

Second, developers will need to find business models. With solar or wind projects, people will just fly by or drive by, and they will identify a site next to a substation. Then, if they think that it's windy enough or sunny enough, they will put up a project. That business model is going to be harder for batteries because, as I said, it's a multidimensional device with multiple uses.

So we need to come up with business models that can create value both for ourselves as sponsors as well as society in general.

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Javier Cavada, Highview Power The coming two or three years are going to be fascinating. There is a lot of noise about batteries, a lot of headlines, a lot of effort. Things are happening, but still today 99% of megawatt-hours of battery storage in the States are coming from hydro and other larger-scale storage. But there is also compressed air, liquid air energy storage, and a suite of other technologies entering this market. These newer technologies, which can cover existing technology limitations, are not yet being massively deployed.

"The coming two or three years are going to be fascinating. There is a lot of noise about batteries, a lot of headlines, a lot of effort."

PFR: Would anyone say that the limiting factor is the availability of capital? Or, as Javier alluded to, is it that there aren't enough projects with a combination of attractive cash-flow profiles and scale to attract that capital?

Claus Hertel, Rabobank Capital is plentiful. If you look through March, there was tons of capital on senior, mezzanine and equity. It's plentiful and available.

After the crisis, for the first six weeks, as liquidity premiums and wholesale funding markets collapsed, that was not the case. But it's coming back. Deals are getting done, and for the right project there will be capital available throughout the balance of the year.

Having said that, it's going to be available for the really good projects that use lithium-ion and not some of the newer technologies, because lenders are not willing to take technology risk, or new types of sector risk, at this point. They're willing to take risk around proven technologies, around structures that are viable and vetted and where the cash flows are not merchanty in nature. Those are the deals that will get done and have strong sponsor support.

Lorusso, CIT I agree that the capital is there. It's just that the viable projects have not been as plentiful as expected. There's also been hesitation by the developers and sponsors to bring deals to market that they felt had too much of a merchant element to it or were too small to do right now.

So, there's a bit more of a focus on doing the deals on balance sheet until there's more critical mass, or more of a receptivity in the marketplace for what is being developed. But the capital is certainly there once the projects come to market.

John Leonti, Troutman Sanders Storage developers need the policies of various states and FERC to catch up with their products. Solar and wind have the ITC and PTC, while standalone storage has been competing largely on a market-driven basis.

Now that states are stepping up through various integrated resource plans, through renewable portfolio standards, over the next two or three years you're going to see some really interesting transactions in the solar-plus-storage space.

Koomar, esVolta From a developer's perspective, specifically speaking about esVolta, we have two operating assets, two construction assets and eight to-be-constructed assets in the next two years. We have demonstrated that there is capital for the right projects.

We also recently announced an equity transaction at the project level with a strategic, and Mike's team did our debt financing. So we see both debt and equity available for the right set of projects. It's up to the sponsor how it's packaged, how to manage development risks, and to make sure that the project is viable for capital. But the capital is there, is the short answer.

PFR: What were the lessons learned from the financing that Mike's team at CIT led for esVolta? As I recall, it was a $140 million financing for a 136 MW/480 MWh portfolio earlier this year. Quite a unique deal, in that all eight of the projects were relatively large in size and had PPAs with a range of utility and non-utility offtakers.

Koomar, esVolta It's actually commendable that CIT was able to dig into our portfolio projects, parse through the risks and come up with a structure that's palatable to the lender group.
Lorusso, CIT In doing battery storage, certainly at this stage, you need to be flexible with the structure. You can't take a standard model and try to hammer a project into it. You need to take the project with all its commercial nuances and structure around that.

You can't do anything with too much merchant risk, but there's really nothing right now that's fully contracted. If there were, it would be plain vanilla and many lenders would jump in on that. There are a lot of different revenue streams in these projects, so you need to focus on the primary ones and structure your transaction around those.

Obviously, flexibility goes both on the sponsor side as well as the lender side.

Hertel, Rabobank And your timing was impeccable as well!

PFR: Speaking of timing, lets address the elephant in the room, which is the COVID-19 pandemic. What has been the impact of the pandemic on the battery storage market so far, and what are we likely to see play out in the short- and long-term?

"In doing battery storage, certainly at this stage, you need to be flexible with the structure. You can't take a standard model and try to hammer a project into it."

Koomar, esVolta I can speak to that, as we have two projects under construction. We're seeing some delays because of disruptions in the supply chain, with the components and the equipment needed for the projects. But I don't think in the long-term the projects will be impacted as much as people worry about.

There's going to be noise, but it's really up to the sponsor and the financials to manage those risks actively. So, in my opinion, they're workable disruptions.

Cavada, Highview The larger-scale projects with many people working on them have been demobilized. We cannot ignore the fact that there is a bigger risk, a bigger cost, and that projects have been delayed. They've not been postponed for very long or cancelled, but the economics are adding pressure.

Raikar, Silverpeak In the short term, there

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has been an impact on construction, but compared to other sectors, we have been somewhat spared from most of the aggravation. In the long run, energy storage has a much better, bullish story. Every recession brings out the winners and losers because you have to come up with new business models and new technologies. I don't think this will happen overnight, but in the long run, you will see significant improvements.

This is because people are realizing that when economic activity is low globally, there is a positive climate change impact in terms of cleaner air, sunnier days, and less smog. This is going to drive interest towards electric cars, and if we look into how many batteries are being used in the power sector, it's miniscule compared to the batteries being used in the automotive sector. We're going to ride the tails of the car industry, in terms of efficiency and costs, and therefore in the long run we will see more and more opportunities to deploy batteries.

"We're going to ride the tails of the car industry, in terms of efficiency and costs, and therefore in the long run we will see more and more opportunities to deploy batteries."

The other factor is telecommuting, or working from home. Because people are not travelling as much and working from home instead, they need reliable electricity supply. Even in the US, where there is a significant amount of transmission and distribution network support, we have observed outages and things of that nature due to fire risks, for example in Northern California. So there will be higher demand from residential applications for the continuity of electric supply, and these drivers will help batteries in the long run.

PFR: In terms of nearer-term impacts, will there be a flight of capital to support existing clients? And if so, what happens to smaller developers and new market entrants?

Hertel, Rabobank Post-crisis, there definitely will be a flight to quality and a flight to existing clients. A lot of clients, at least from our side – and especially on the food and agribusiness side, as we're a large food and agribusiness bank – drew on their liquidity facilities and made committed capital calls, which we honored. That's where our focus is, in managing balance sheets. Part of that was a flight to existing clients – how we can service their needs and their deals in the pipeline?

Going forward, the capital has been extended, and there's not too many liquidity issues anymore. So there's still a large focus on existing clients, but there will be newer developers, or developers that have limited capital or that don't have strong backing either on the private equity side or the sponsor side, who will have some difficulty attracting debt capital. That's just going to be the case for the balance of the year.

Sponsors that have some experience putting projects together, like Krish's team, will continue to attract debt capital, but it's going to be a tough ride for some of the smaller names out there.

Lorusso, CIT Development capital is going to be stressed in the near term as that's the riskier end of the investment profile. Smaller, undercapitalized, early-stage developers are going to be challenged. Once those deals are ready to come to market, then debt capital and equity should be there for those better structured transactions with stronger equity support.

PFR: Would any of the developers like to pitch in on that?

Koomar, esVolta Yes, the development part's hard, so whether you spend your development dollars on the right projects is the trick when it comes to smaller developers like us, because it's the most expensive capital. It's the 'dry-hole risk' as they call it in the oil and gas industry – you try ten projects, figure out how many of those are going to succeed, and how much dead deal costs you have to deal with.

It's a very dynamic, daily decision making process, which can get smaller developers into trouble pretty quickly if not managed actively, and even larger developers too. Then your development expense write-off becomes a big overhang of the overall business.

Leonti, Troutman Battery storage is a little different than solar and wind because there may not necessarily be a long-term RPS or something like that they're bidding into. Developers may not want to keep their interconnection queue out there for an extended period of time, and once that opportunity passes, it really does hit your development capital.

The smaller developers have to pick their projects correctly more often than not, or else they will see a significant drain on their capital. The smaller developers are going to struggle a bit in the near-term.

PFR: That's a good segue into the next question, which is what will 2020 look like in terms of deal volume for standalone storage and renewables-plus-storage financings, as well as asset sales?

Koomar, esVolta From the developer's side, after we closed the portfolio financing in February, we announced a new project, the Black Walnut project, that we entered into with a CCA in California. So we are continuing to see growth. Again, we have to measure it in terms of how we pick projects and which ones we go after. But even with the Covid-19 situation, we still signed the PPA with the CCA in April. So I don't think there's any shortage of opportunities. It's really about picking the right ones.

Cavada, Highview 2020 is not going to be a year of the same erratic news, despite the situation in which we are right now. Before the pandemic, Highview Power closed out a $46 million financing round from **Sumitomo Heavy Industries**, and that's really making 2020 for us.

"Development capital is going to be stressed in the near term as that's the riskier end of the investment profile. Smaller, undercapitalized, early-stage developers are going to be challenged."

With that deal, we are building two large projects, one in the US and one in the UK, and both will be the largest long-duration battery storage projects, in terms of megawatt-hours, globally. We're talking about several hundred megawatt-

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Source: esVolta

hours and starting construction at the end of summer. That's why I was talking about mobilization before, because I'm pretty worried about getting people on the ground in July.

As for all this advice that the market is receiving today, we see it very much as a catalyst, as a booster for renewables-plus-storage as the new normal. We see, frankly, gas peakers as our competitor, more than any other dynamic storage project.

Let's not forget, everybody has targets for the year-end, and the year is going to be short. So we'll start chasing them after we're able to leave the house.

Lorusso, CIT You're going to see a few opportunities come out in the second half of 2020 as we all get back to whatever our "new normal" work environment is going to be. But it's going to be driven by a few factors.

One is seeing a transaction like esVolta get financed commercially. It's giving all the developers a little more confidence to come out with their deals. And those are going to be deals that have been done primarily on balance sheet to date, combined perhaps with some new assets in construction. You also will have a couple of small operating projects with some other in-construction assets, and we will see more of those opportunities this year and next year as a result of where we are in the development cycle.

Hertel, Rabobank I agree with that, Mike. What stage of the development cycle you're at and what capital you have committed is important, because you're not going to get financed until you've hit FNTP, or if you're at that stage where you're starting construction. It takes a long time – a couple of months, five, six months – to get a deal over the finish line. So at best, we get maybe one, two, three more deals done this year. Otherwise, they flip into next year.

PFR: Which states have the best incentives for storage in terms of helping deals cross the finish line, and which states are catching up?

Cavada, Highview Definitely for larger-scale or really long-duration storage, we look at the states where wind and more solar resources have already been deployed, and where there is instability and a need for grid services. Mainly California, but also in Arizona where I consider smaller batteries, the electrochemical batteries, classified as having a bit of fire-risk.

Very cold places like Vermont are also pretty good. I would say Vermont is in the top four, along with Texas, Arizona and California, for the type of storage that is really large, and is looking for round-the-clock renewable power.

Hertel, Rabobank The New York program is relatively attractive for a developer, and we've seen developers go in there and develop projects either to hold them or to sell them at FNTP. You also have the value stacking VDER program, where you have fairly diverse revenue sources, some contracted, some merchant, and some state incentives. As a lender, that's definitely something we can work with.

PFR: In terms of asset ownership, there also seems to be a shift among some market participants, like Advanced Microgrid Solutions and Engie Storage, away from project ownership and development towards providing services, like software for asset management and energy marketing. Is this a real trend, and if so, what is driving it?

Lorusso, CIT We're going to see an evolution of ownership in storage, the same as we've seen in pretty much every other renewable power sector. Initially, it's going to be the pure-play focused developers that are going to develop, own and operate the assets.

Once there's a proof of concept by them, you'll see the more traditional renewable players, especially in solar, coming in with other private equity investors. When there is an operational history established, you'll see the longer-term owner, such as infrastructure funds, come in, and utilities will dabble in it as well. They prefer not to own, but I'm sure they see the value and importance in storage and will own that as well.

Raikar, Silverpeak There is a significant opportunity here with regard to providing ancillary services, because a battery is really capturing temporal or spatial differences in prices in the context of transmission networks. Building around it is really a software or a mathematician's dream, because there's a significant amount of opportunity for optimization. That value-add will be differentiated too, because you can earn incremental sources of revenues. So there is an opportunity here for newer start-ups who can build around such services.

The second thing I would look at is the recently developed Engie business model, whereby Engie goes to solar developers and says: 'Let me put a battery on your project and I will optimize it and cut you a check,' for $10 million or whatever it is.

That sort of thing to me is very interesting, because if you think about it, they're basically buying an option on the project, and they're paying an upfront premium. The developer is happy because they get money for the battery, and by adding on the ITC that is available, you can make the math work.

That is what is required. I don't think the typical developer model whereby someone looks at a project and installs it and then skips away and cuts the check is going to work. You need a lot more sophistication from an engineering perspective and a mathematics perspective.

PFR: Speaking of cutting the check, are there any creative strategies that developers are using to make banks more comfortable with financing their projects? And

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likewise, have there been any recent innovations on the lending side?

Hertel, Rabobank The last deal that was done with CIT and Krish was actually very interesting in terms of innovation, because it was a portfolio and there were some merchant aspects to it. But I don't see anything else coming down the pipe really that's going to innovate the lending sector.

Unlike traditional renewables, the deals are more or less amortizing and have a payout due to the maintenance requirements of a battery system after seven to ten years, whereas capital expenditures need to be put in for it to continue its lifetime.

Leonti, Troutman On a portfolio basis, it's mixing and matching assets like storage and gas assets that have been financed together, as well as solar-plus-storage, and under-construction and operational assets. Really just bringing a portfolio approach to the storage asset, so that you have some contracted revenues to mitigate the merchant side. That's something we've been seeing in the market that has helped bring financing to the table.

Koomar, esVolta Energy storage projects generally do have a merchant component, which investors have to accept coming in. Our transaction got acceptance by a group of experienced lenders, as well as independent engineers, and that was a big leap in the industry in itself, in terms of accepting the merchant risk and structuring around it, and understanding the cash flows from the projects.

Lorusso, CIT Yes, it was more than just innovation, although we deserve credit for that! But it was more about a constructive approach as we would be sitting around a table with Krish, rubbing our foreheads, and saying to him, 'Oof, you want us to give you *how much* credit for *that* revenue stream?'

Koomar, esVolta (Chuckles) Yes!

PFR: Another large deal that's underway is the $400 million to $600 million capital raise for Key Capture Energy, which is being touted as "the biggest storage deal of the year." What are the prospects of that deal and other large-scale deals getting done this year?

Hertel, Rabobank They've mandated one or two institutions to raise the equity to get those projects off the ground. From a lender's point of view, identifying who the equity is, is paramount in moving the debt financing forward.

We've been speaking with Key Capture and they do have some existing projects which they can allocate to a portfolio financing. That can actually provide some revenue stability in the early years of any potential transaction.

PFR: We've covered a couple of the larger transactions, but what are the lessons learned from smaller deals? Such as those that large European banks and specialized project finance lenders have worked on, say, in the $30 million to $50 million range?

Hertel, Rabobank I can speak from past experience, from my pre-Rabobank days. Having the right sponsorship in place is important in having the appropriate capital behind you. That's one aspect of it.

Ensuring there's a commitment to the business is another. You mentioned AMS before. AMS switched from being an asset owner to a software provider, and I know we're in that financing along with CIT. I'm not sure what kind of an effect that's going to have. It's been negligible to date, but it's ensuring there's a commitment to the business.

Also, choosing the right IEs and also, if there is a type of dispatch risk, choosing the appropriate software and market consultant and dispatch adviser to help you navigate what that risk is, are important aspects.

Lastly, is technology. Lithium-ion is the standard technology. Whether it is **LG Chem**, **Samsung**, or **Powin**, you need to have a good idea of how that particular lithium-ion technology fits the uses of the battery, and how that can change over time as the battery usage may change with respect to merchant usage. And what effect that will have on the battery in terms of module replacement, upgrades, capex and so forth.

Those are all things that need to be very closely looked at, especially if there are different uses of the battery, for which you now have value stacking. There could be six or seven different uses, and you don't really know five to 10 years out what the exact uses will be.

PFR: Will lenders be comfortable with the existing technology guarantees 10 years from now?

Lorusso, CIT Well, right now, that's what we're getting. We try to limit the term of exposure in transactions to mitigate technology and performance issues and exposure to the guarantees, because you're taking a corporate entity risk. So it's unlike a PPA with a utility offtaker that's providing an essential service, where you can go out 15, 20 years. For warranty purposes, you're now looking at the credit of a corporate entity. So how far out do you want to go? I think that's one of the gating issues on the terms of financing that we've seen so far.

As Claus mentioned, new technologies are something that banks are averse to until they've been commercially proven. Right now, lithium-ion is obviously the primary technology that we've seen through car batteries in electric vehicles and such. It has had more time for proof-of-concept and proof-of-performance .

Cavada, Highview They're not really comfortable with the guarantees and the performance guarantees. Even with lithium-ion being so well-known, we all have it in our phones, in our cars, and being the standard technology, the traction is tiny.

Still, the potential is enormous. The technology guarantees are developing together with the users of the technology. The level of comfort is really small, and while there is enormous potential for making it better, there's still the notion that this is new technology, and even if it's not new, that this is a new application for an old technology.

Hertel, Rabobank With respect to the warranties, if you have a panel or a turbine and it doesn't work, you're going to claim the warranties. But in a battery, there's all these different variables that are written in these documents which make it very ambiguous: 'We're not going to pay if the heat or humidity was above a certain level,' and that could be due to software not correctly monitoring the battery usage or the heater humidity level, and the battery blows up. 'We're not going to pay you, and you're stuck.' Those are the things that I worry about when I look at these transactions.

Raikar, Silverpeak Has anyone seen any insur-

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ance products around this, in the way we thought of insurance in the solar market, albeit more for the credit quality than the product itself?

Koomar, esVolta We have been approached by a couple of very famous underwriters willing to underwrite the performance risk, but it's not fully baked yet, and cost-wise rather expensive at this point.

"We have been approached by a couple of very famous underwriters willing to underwrite the performance risk, but it's not fully baked yet, and cost-wise rather expensive at this point."

PFR: The recent fires at various electrical facilities, like last April's fire at Arizona Public Service's McMicken storage unit, have raised questions over safety, operational risk and also insurance products. What have been some of the key takeaways?

Lorusso, CIT For us, it's been more technical in nature, making sure that the battery assembly and fire protection are adequate to prevent such incidents. The focus has been more on prevention versus insurance. You want to get as much and as good insurance as you can get, but we want to be confident that the event won't happen, in addition to what we would do if it happens.

Cavada, Highview Definitely, that fire was not the first time. Arizona has been making big headlines, and also big statements, about how they're not really willing to take on lithium-ion batteries, at least until all these fires are sorted. But South Korea was claiming 50 cases last year, and it's the place where most of the battery packs are being manufactured. So, still it's a product where you really need to invest not only in the cells, but also in the full protection of your asset.

Koomar, esVolta esVolta has two operating assets, and our assets are approaching close to three years of operating history. Safety is something our president takes very seriously. We have safety chats, whether they're at the office level or the plant level. We are also careful about choosing our technology. We've chosen a lithium-ion chemistry that's less prone to fire risks than others.

Remember, these projects are not going to be in remote areas where the wind projects are. They're actually closer to the load pockets compared to wind or solar projects. So it's even more important that developers take extra precautions to make sure they're safe.

PFR: John Leonti, is there anything from the legal side that you'd like to add with regards to the fires?

Leonti, Troutman From the lender perspective, we certainly see heightened diligence on understanding the protocols and the technical details surrounding front-end fire prevention and fire mitigation. As the industry evolves, you're going to see due diligence teams on the lender side dig in with independent engineers on the pure technical design and development of the projects.

PFR: How are banks pricing construction risk versus operating risk for standalone battery storage these days?

Lorusso, CIT We can't give that up!

PFR: I had to ask...

Lorusso, CIT I would again draw an analogy to solar. There is generally a premium for battery storage just because of the newness of it. But otherwise, we look at it similarly to solar construction, in that it's essentially assembly, versus a combined-cycle power plant, which is true construction. So there's nothing different to it compared to the approach of solar except somewhat of a premium given the uniqueness of batteries at the moment.

Hertel, Rabobank Yes, there's definitely a premium attached, and as you get into the operating phase, you're definitely 50 bp above where solar is priced right now. Given the current environment, probably add another 25 bp to it, given the liquidity concerns, although, as mentioned before, they're somewhat easing.

PFR: To what extent have non-bank lenders played a role in the development of the project finance market for standalone battery storage assets?

Lorusso, CIT There hasn't been enough of a sample set, as there's only been a few deals done. At the moment I would say there's no need, there's just not enough activity to have demonstrated that.

Koomar, esVolta If you're looking for development capital, which banks don't really play in, there are non-bank development capital providers available, but that's expensive, and they can act more like equity owners. You've got to weigh your risks and rewards in accepting those financings.

PFR: Javier, is there a significant role that non-bank lenders play in the liquid air energy storage market?

Cavada, Highview Definitely. Our technology uses all material components coming from the oil and gas industry to recreate a compressor energy storage system by cooling, by liquefaction. So in that sense, we don't bring any new technology. We're bringing a new application for established, familiar technology. We're giving it a new life.

We see investors that are not banks coming into our projects, quite the contrary to lithium-ion. We don't see banks coming into our projects. Our projects are more geared towards infrastructure funds with ambitions for big assets that are going to last 20, 30, 40 years.

In that sense, we are more similar to an open-cycle gas turbine kind of business. Banks don't have the risk appetite to think that there is anything else other than lithium-ion batteries, even in places like Arizona where there are fires happening.

We're getting the traditional, large US and Canadian infrastructure funds who really want to own an asset that is hundreds of megawatts in size. Any system with our technology is larger than any lithium-ion system – our smaller projects that are in development are 400 MWh.

But first, the banks will want to see several projects already built and running.

PFR: How long do you think it will take for banks to come round to financing battery

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storage technologies other than lithium-ion?

Cavada, Highview It's a matter of getting projects running. We estimate that banks will be able to enter after one year of operations, because we're talking about long-term contracts, 10-year contracts. But you cannot renew them after the first 10 years.

It's a good return on investment because we're talking about larger projects with good economies of scale, and a fairly local supply chain. Everything is done in the country with the labor that you have there.

"When we're presented with new technologies on the lending side, we'll look at both the how and the why. How is this technology being used, what's the application?"

There are a lot of tailwinds, so today will be lithium-ion's day. But lithium-ion is one-hour duration; you could say technically up to four hours, but the average installed basis is 1.1 hour duration. Our systems are normally 10 hours, 12 hours, so it will be easy to catch up in a couple of years.

PFR: Anyone from the lending side who'd like to add to that? Any other storage technologies that can compete with lithium-ion, and if so, how long it might take for them to become serious contenders?

Hertel, Rabobank I've looked at some in the past. I think the first step for these new technologies is to become commercial and to have manufacturing and to have warranties behind them. If you look at Powin five years ago, they were a very unknown entity, and now they're being installed in a lot of projects, but again that's lithium-ion.

In terms of some of the newer technologies, they need to be commercially viable, and then you need to have some history, some track record. I would say at least three years.

Cavada, Highview With technologies like ours, the component manufacturers are big companies like **Baker Hughes**, **MAN** and **Siemens**, where they are providing the guarantees. So, it's not only the bank's appetite, it's also the market need for long-duration storage. In that sense, lithium-ion is flying, but it's flying very low.

Lorusso, CIT When we're presented with new technologies on the lending side, we'll look at both the how and the why. How is this technology being used, what's the application? Often, we see it's a new application for an existing technology.

There's not only the performance of the technology, but is it a proper application, and why is it better than what we've seen in this application previously?

Raikar, Silverpeak In the longer run, we need to look for alternatives to lithium-ion, partly because it's a very sophisticated product that is being used for a dumb application, which is the power grid. Dumb in the sense that you have no restrictions around space and you don't need a fast charging/discharging time.

But my fear is, in the same way we strangulated thin film technologies in the solar space, I think we are going to strangulate some of these newer battery technologies, because the lenders want a track record. But until you have some deployments, you're not going to get a track record. So it's a chicken-and-egg story.

PFR: Across the various technologies, is there a role for mezzanine finance or royalty investments given the higher risk profile?

Raikar, Silverpeak It's an emerging asset class with a decent amount of technology risk. So you would expect that some of the non-traditional lenders should be involved in the space, but they haven't been, partly because the business models have focused on contracted cash flows or semi-contracted cash flows, for which the banks are the cheapest source of capital. There has been a fair amount of liquidity in the bank market. If you look into the pricing for solar and wind projects, which are cookie-cutter, the pricing is so attractive that banks are thinking that by taking some incremental risk they can earn maybe 100 bp more. So it's hard to see how the non-banks could potentially participate.

As newer technologies come in, there will be a market for the non-traditional lenders, like mezzanine financing, to provide financing by taking that increment of risk, so that these newer technologies can see the light of the day.

Developers are the ones who need to step out of their comfort zone and take on challenging projects, challenging because of the newer technology or challenging because of the newer business model.

Lorusso, CIT Historically, we haven't seen much need for mezzanine financing in the power industry. The reason is that the revenue stream, the upside potential, is in a narrow range. Even with merchant risk, it tends to be a reasonably narrow range – as opposed to, for example, leveraged finance where there's a huge involvement of mezzanine financing.

That's because in leveraged finance you're looking at multiples of Ebitda growth, and in order to leverage that up, you need to get higher-priced, riskier debt involved there. For example, if you're buying something at 10x Ebitda, and you may get senior debt at 1.5x, and you get mezzanine debt at another 2x, and that's your capital stack. In the power sector, we're already giving 60% to 80% leverage on these deals, and the upside potential beyond that for the equity is not that huge. It's good, but it's not going to be multiples as it could be in a leveraged finance deal with the expected growth. Because of that, the need has been a lot less, traditionally, for mezzanine financing here.

Banks tend to get comfortable, as far as the technology risk and merchant risk goes, to give enough leverage to fill what the sponsors need. The only place we've seen participation in mezzanine finance may be behind the equity to leverage up the equity itself, rather than at the project level. I don't see much of an opportunity for it in batteries.

PFR: Let's talk a bit about counterparty negotiations. Generally speaking, have revenue contracts become more complex, more tailored in structure? And what does a financeable standalone battery storage PPA look like?

Koomar, esVolta The basic ingredients of a PPA are still the same. Do you have the stability of the cash flows? What does the stability of the cash flows mean from a PPA standpoint?

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What's the blend between the capacity payment and energy payment and the O&M payment?

But in energy storage, and mostly in California, there are two sets of contracts. One is the capacity-only contract, and then the rest is merchant because all you're selling is the capacity to the utility.

The other model is the tolling contract. esVolta actually has done both types of PPAs. The tolling contract is fully wrapped and fully contracted with the utility, and you cannot sell any attributes of the project to anybody else, and is similar to wind and solar tolls.

And then, it really comes down to the specifics within the project itself in terms of availability, efficiency ratio, warranty terms. It's really all the same things that you have seen and heard in solar and wind, but you just have to make sure that you get the technical parameters right, when it comes to energy storage.

Lorusso, CIT The PPAs themselves are not that much more complex than we've seen in other technologies. It's more the interaction of that PPA with all the various revenue streams on a merchant basis that you have to consider as well.

That interaction with the ancillary services, dispatching, trying to optimize the operations of the storage facility together with your requirements under the PPA tends to be where the complexity arises. That's where logistics and technology, as well as the actual performance band of the storage facility itself comes into play.

Raikar, Silverpeak Do you guys have any experience with solar-plus-storage, or renewable energy-plus-storage type of PPAs or offtakes? We are financing a wind project with a co-located solar project and what we are hearing from hedge providers is that they would be willing to pay slightly more for the PPA if we do both of the segments, not necessarily together, but with the same counterparty. I'm wondering how would it work if I were to throw a battery into that?

Leonti, Troutman We've seen transactions like that with solar-plus-storage. Sponsors place a hedge on the deal mainly to redefine the shape, so that you can deliver it in the morning or in the evening. Different hedge providers have a different view on whether or not that's actually adding value to the transaction.

That said, we have seen some cases, particularly in California, where the sponsor was able to get a better price because of the delivery times, particularly in the morning and evening hours. So we've certainly seen that modification of the shape to improve the pricing.

The one thing I would add, on the two types of contracts that Krish described, the tolling agreement and capacity agreement, is that a lot of solar developers who are playing in the busbar PPA market are very used to the tolling agreement. Basically, you build it, you operate it, but the utilities really are taking the power and instructing you.

When you're talking about a capacity contract, where the utility is only taking the resource adequacy, it requires the sponsor/developer to otherwise monetize and optimize all the other revenue streams. That's an added complication that internally they need to build the systems to be able to actually trade those other attributes that are associated. You can't just give it all to the utility. So we've been seeing some education on that side as well.

Koomar, esVolta Well said. That's an area where developers really need to get up to speed. To understand that there's one side, the technical part, and on the other side, the market risks. It's bit of a long learning curve.

PFR: Are hedge providers showing more interest in standalone battery storage projects?

Koomar, esVolta They are. Actually, one of our projects is a fully hedged project. I don't think we have disclosed the counterparty publicly, so I'd like to keep it confidential, but we are seeing it, yes.

Leonti, Troutman Are you doing that on a forward basis, or did you structure it as a put?

Koomar, esVolta We've signed an NDA, so I can't say.

Leonti, Troutman Fair enough. We're seeing hedge providers kick around the idea of structuring a put for these transactions, particularly in Ercot. The fixed volume plus the reg-up and the reg-down revenue that you would expect over a calculation period. And if your revenue fell short of that, you could exercise the put. So for project financing purposes, it's really nice because you pay the upfront premium, which theoretically you can finance through the debt, and then the debt doesn't have to worry about competing collateral, whether it's a first lien, or something along those lines. So it'd be interesting to see if that type of product is able to roll out here.

Koomar, esVolta That's interesting. You said that's in Ercot markets?

Leonti, Troutman That's where we've seen it discussed. That's one of the more active markets right now for storage.

PFR: John, anything else that's happening on the hedge side in terms of what we might see for the rest of the year or going forward?

Leonti, Troutman That's what we're seeing that's new. We've certainly seen short-term forward contracts for reg-up and reg-down, anywhere between one and three years. But in terms of something long-term that would support a project financing, we haven't seen much yet in the hedge space.

PFR: I also wanted to touch on the role that tax equity plays. We have an ITC for solar-plus-storage, but what about standalone storage and wind-plus-storage?

> **"We're seeing hedge providers kick around the idea of structuring a put for these transactions, particularly in Ercot."**

Leonti, Troutman Certainly in California you're seeing all types of integration of batteries with solar projects, either new projects being built as solar-plus-storage, or as an add-on of the battery, and in both those cases I'm sure the parties will look to monetize the ITC.

The wind side is more undefined, and the industry is really looking for guidance on how that would work, particularly in the PTC market. If the wind project had taken the ITC, there

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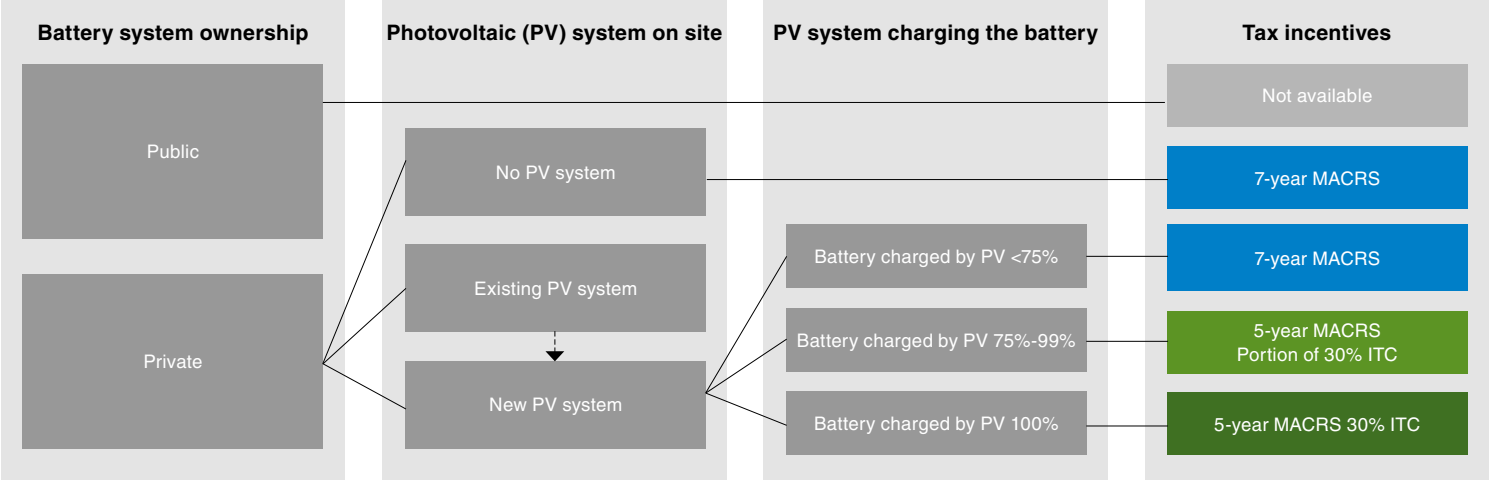
Federal Tax Incentives for Energy Storage Systems



Source: NREL

would be more certainty on what that would look like.

Raikar, Silverpeak I am of the opinion, and this is my personal opinion, not my firm's opinion, that you could potentially qualify for the ITC. There is an IRS private letter from 2012, which addresses this particular concern.

The problem is, there have been more standalone financing projects than renewable energy-plus-storage projects. But there is a case to be made that you could potentially qualify for the ITC.

Leonti, Troutman The industry would really welcome some guidance on a few things, like the PTC point, the co-location of the battery with the facility. That would really help push forward the ability to monetize the ITC in connection with batteries.

PFR: If you had a wish list for what you'd like to see in the battery storage market over the coming years, in terms of financing, policies at the state level or RTO/ISO level, what would be on your list?

Raikar, Silverpeak If I start, it'll probably take a lot of time! The first thing I would like to see is some sort of ITC mechanism from the federal government. It is a very important piece of equipment from the transmission perspective, and the ITC would go a long way in terms of helping the stragglers in renewable energy and the penetration for the renewables.

The second thing is I would like to see is technological leap frogging and some more risk-taking from the financing parties, and that includes us as private equity.

The third thing is some sort of a capacity market in Ercot, not a full-fledged capacity market that we see in PJM, for example, but some sort of semblance that provides certain revenues for a period of time.

Hertel, Rabobank More simplicity around revenue schemes, revenue contracts, and aside from the frequency regulation market, which is 100% merchant and which exists in PJM, there's no real clarity around revenue schemes in the balance of the 45 states. We really haven't seen projects or deals come to fruition aside from solar-plus-storage, but standalone, utility-scale storage, that's something that I'd like to see in the rest of the region.

Koomar, esVolta Santosh, I agree that ITC would be nice, but we're sort of indifferent from a developer perspective whether there's ITC for standalone battery storage or not because we currently play only in the standalone space.

But one thing I would say is, if there is a tax incentive, it needs to be in the form of refundable credits so that it doesn't differentiate small sponsors versus large. That difference disrupted a lot of renewable growth initially because it wasn't a level playing field for those who can access the tax benefits versus those who can't. And one way or the other, it would be good to eliminate the uneven playing field between solar-plus-storage, and standalone storage.

Leonti, Troutman Clarity at the state level in terms of policy, particularly around pricing, would be great. There's a lot of markets where batteries make a lot of sense, and just getting the clarity from the state commissions on how they want to move these products forward would be very helpful for financing.

Cavada, Highview I'm a supporter of the ITC, of course, and I was tempted to say carbon tax, but that depends on the technology diversity that we were talking about. Apart from that, revenue transparency, being able to contract the revenues, and long-term contracts. We know that the biggest hurdle to get financiers ignited is the risk and the lack of long-term contracts.

Lorusso, CIT Evolving technology so that there are broader applications for batteries would be one, as well as acceptance by more states to allow continued integration into the grid.

The complexity of offtake arrangements is a good thing. We're okay with that because it keeps it a more sophisticated players' game, which we excel in.

That's probably it, the growth of the technology, broader applications as a result, and then the expanding acceptance of it by other grid systems in the country. ■

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