MENA'S POTENTIAL FIRST PF ENERGY STORAGE SYSTEM

THE JORDANIAN GOVERNMENT HAS LAUNCHED THE TENDER FOR WHAT COULD BE THE FIRST PROJECT-FINANCED ENERGY STORAGE SYSTEM IN THE MENA REGION. BY OLIVER IRWIN, PARTNER, AND LAURA CAPELIN, SENIOR COUNSEL, OF BRACEWELL.

Through its launch in 2011 of the first feed-in-tariff programme in the Middle East and the subsequent successful execution of the Seven Sisters solar PV projects in 2014 – at that time the largest collection of privately-owned solar PV projects ever to be realised in the MENA region – Jordan's approach to the development of renewable energy generation infrastructure has served as a template for other governments in the region.

The Jordanian government was heavily incentivised to take this approach by a combination of a pressing need to (i) diversify its energy supply and reduce its dependence on fuel imports – Jordan's imported fuel costs rose significantly between 2010 and 2014 due to disruptions in supply caused by regional unrest and, in particular, the 2011 revolution in Egypt, and (ii) to meet its growing energy demand, which has been fuelled by a high growth rate in both population and urbanisation.

The Jordanian government has sought to leverage the country's favourable geography and climate for wind and solar power generation through the establishment of a defined regulatory structure, the Renewable Energy & Energy Efficiency Law, and a pro-active policy to formulate benign conditions for external investment.

As the cost of renewable energy generation infrastructure and the associated tariffs continues to fall and renewable energy projects become more and more attractive to host governments, the effective integration of future and existing wind and solar power into the electricity grid is likely to require utility-scale energy storage systems to maintain grid stability.

Jordan forecasts installed capacity of more than 1,600MW of PV and 715MW of wind power by 2021, and so in July this year, the Ministry of Energy & Mineral Resources (MEMR) issued an Instruction and Requirements for Proposal Preparation & Submission (IRPP) for an energy storage system at the existing Irbid Substation of at least 30MW import and export power and 60MWh useable energy capacity (the project).

The project will be designed, financed, constructed, commissioned, owned and maintained by a private developer, and Jordan's National Electric Power Company (NEPCO) will operate and dispatch the project.

Energy storage systems are not, in and of themselves, new to the region. By 2016, the Abu Dhabi Department of Energy had deployed 108MW of molten salt battery energy storage systems across the Abu Dhabi distribution network. In addition, earlier this year it was reported that Jordanian head-quartered PV company Philadelphia Solar reached financial close on a 12MWh lithium-ion battery based energy storage project in Jordan.

However, the novelty of this project is that the proposed long-term nature of the offtake agreement is likely to mean that it will be the first project-financed energy storage system in the Middle East and North Africa region.

While other countries in the region, including Lebanon, are also seeking to launch project-financed energy storage systems, Jordan's track record means that participation in its project is being viewed by many as a precursor to others in the region, including the US$200bn 200GW solar park in Saudi Arabia that will reportedly also comprise the world's largest utility-scale storage facility.

Previously deemed to be unbankable, lenders may now entertain the project financing of energy storage systems as a result of the convergence of the following three factors:

- *Maturity of the energy storage system market* – The energy storage system market has developed sufficiently to provide an acceptable number, albeit not a plentitude, of large-scale installations that have accumulated enough operational data to demonstrate with sufficient certainty that an energy storage system is capable of meeting offtaker requirements and therefore of generating a sufficiently predictable revenue stream to cover debt service payments and provide an adequate return to equity investors.
- *Advancement of the technology combined with its decreasing cost* – The technology for battery and energy storage systems has advanced dramatically in recent years, which has, among other things, resulted in considerably longer life spans of the batteries. For example, a 10-year manufacturer warranty for lithium batteries would now appear to be the market standard. This advancement in technology has also coincided with a significant decrease in the cost of the batteries and the rate of decline in costs is expected to further accelerate in the coming years.
- *Financial stability of EPC contractors* – As the energy storage system market has matured and technology has advanced, energy storage systems EPC contractors are increasingly able to provide adequate evidence that they are financially robust entities that are able to provide the performance

guarantees a project company's lenders are likely to require.

The revenue stream

It is intended that the project's operational period will be for at least 15 years: this is a significantly longer offtake agreement than has been seen in other energy storage system projects to-date and supports the potential for a long-term limited recourse financing.

A 15-year operational period is also likely to require the project developers to develop a re-powering strategy to take into account battery ageing considerations. It is well established that an energy storage system can provide multiple services for which the project company may be compensated under the applicable offtake agreement. The services that the project will be expected to provide to NEPCO include:

- Ramp-rate control of base load and renewable power plants so as to smooth their power output (with the objective of reducing (a) the curtailment of PV and wind power plants and (b) power generation of peaking plants);
- Reduction of conventional power plant operations required to maintain NEPCO's spinning reserve (the back-up energy production capacity that can be made available to a transmission system at short notice); and
- Charging of energy at times when renewable energies might otherwise be curtailed.

Pursuant to the terms of a storage lease agreement, NEPCO will be required to pay both a capacity and energy charge to ensure that the batteries contained in the project can be used at any time to accept excess power from the grid, such as during times of peak solar and wind output, and to discharge energy when needed to support the grid.

The capacity payment will provide compensation for the fixed costs of installing the energy storage system, subject to adjustments to reflect reduced available capacity, and the energy payment will reflect the cost of operating the energy storage system through the measurement of energy delivered.

Factors that lenders and equity investors may wish to consider when evaluating the revenue stream for an energy storage project are largely the same as those that should be considered in any project financing, namely:

- *The creditworthiness of the offtaker* – Will the offtaker be able to pay for the services being contracted for in the relevant offtake agreement? In the case of the project, the offtaker under the storage lease agreement will be NEPCO and the storage lease agreement will follow the power purchase agreements for the Jordanian IPP programme insofar as NEPCO's payment obligations will be credit-enhanced by a government guarantee;
- *The track record and balance sheet of the sponsor* – Will the project be efficiently developed and managed to maximise the ability of the project company to make the debt service payments and distributions? In the case of the project, a track record will be harder to demonstrate due to the nascent status of the energy storage market;
- *Finance terms* – Due to the infancy of the energy storage market, these are likely to include robust debt service cover ratios, cash sweeps and, depending on the sponsors' O&M strategy and financing plan, maintenance reserve accounts sized to reflect the advancement of the energy storage technology. As was the case for the Jordanian IPP programme, we would expect that sponsors will initially be required to look to development finance institutions and multilaterals, and potentially export credit agencies, as the debt providers for the project;
- *Political risk and/or adverse regulatory changes* – Jordan's recent success in developing its renewable energy programme will stand the project in good stead but, as the storage developers will be responsible for obtaining all authorisations necessary to implement and operate the project, prudent project finance lenders will still assess the impact of any delay in obtaining a material authorisation on the project's economics;
- *Robust contracting terms with the EPC contractor* – Will the project company be adequately compensated if there are any issues with the energy storage system?
- *Bundling or co-location of the energy storage system with a renewable energy plant* – Will other assets in addition to the energy storage system supplement the revenue stream?

Given the obvious benefits that an energy storage project provides in terms of integrating existing and future renewable energy generation assets and optimising grid stability, we anticipate that in due course, we will begin to see energy storage systems being incorporated into tenders for the construction of new wind and solar projects.

Under such a model, the energy storage services would be paid for by the offtaker as a surcharge in the costs of the energy being generated by the asset rather than as a separate developer. Two simple diagrams illustrate these options, Diagram 1 and Diagram 2.

Risks unique to battery storage

Once the lenders and equity investors are comfortable that a satisfactory revenue stream can be identified, they will then need to confirm that any potential risks that the revenue stream will be interrupted have been minimised to the extent possible and allocated to the party best suited to address them.

The risks set out below are examples of risks in energy storage systems generally, and may not all be applicable to the project:

i) Performance of the energy storage system – An offtaker will require that a target amount of capacity be made available by an energy

FIGURE 1 - OPTION 1, SEPARATE STORAGE PROJECT TENDER

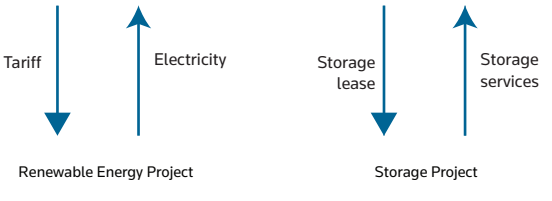
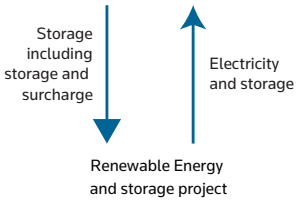


FIGURE 2 - OPTION 2, COMBINED ENERGY GENERATION AND STORAGE PROJECT TENDERTENDER



storage system and, as noted above, the project company's revenue will be reduced to the extent that capacity is not available to the offtaker.

As this is a new technology, the lenders are likely to require that the manufacturer, or the EPC contractor with back-to-back guarantees from the manufacturer if the EPC contract is fully wrapped, provides a performance guarantee for the batteries.

It is the nature of batteries that they will degrade by a percentage each year until replaced, but how the batteries are operated may accelerate the degradation, thereby limiting the energy storage system's capacity. It will be important to have pre-assigned liability if such degradation occurs. For example, in the case of the project, as it will be the offtaker, NEPCO, and not the project company that will control and provide the instructions for how the energy storage system is to be used, it will be critical that:

- *The batteries are suitable for their anticipated use* – Most batteries require a certain amount of cycling each day and it is important that the batteries selected for a project can produce the target capacity based on the duty cycle, ie, the base case for the developer's bid.

While manufacturers may be prepared to provide performance guarantees for a set period, eg, 10 years in the case of lithium ion batteries, the calendar lifespan of batteries may differ from their cycle life span as a result of how they are used.

Accelerated degradation of the batteries may occur if the number of cycles exceeds the duty cycle and as the project company is not in control of the energy storage system, the project company should be compensated for the installation of additional batteries required to maintain the target capacity as a result of the excess cycling.

It should also be noted that it is unlikely that the term of the performance guarantee will align neatly with the tenor of the debt. The lenders may wish to address this by requiring extended performance guarantees, which may increase the cost of the EPC contract.

- *The batteries are operated within manufacturer guidelines* – Utilising the batteries outside of the manufacturer's requirements could adversely affect the cycle life span and performance of the batteries but also have safety and reliability consequences that give rise to other potential liabilities. The offtaker will need to be made aware of the operating parameters of the batteries and the project company will need to be aware of those parameters to manage the offtaker's performance expectations. The project company will need to be compensated for any liabilities that arise as a consequence of the offtaker operating the batteries outside of their manufacturer guidelines.
- *The batteries are disposed of responsibly* – Once a battery has degraded below its useful capacity, it must be disposed of responsibly by the project company. Lenders will require strict environmental policies to be maintained by the project company and the costs of disposing of the batteries properly may be high.

To the extent that a higher number of batteries than anticipated need to be disposed of during the term of the offtake agreement as a result of misuse of the battery by the offtaker, including through excess cycling or operation outside of manufacturer guidelines, the project company should also seek compensation from the offtaker to insulate the project company from these additional costs.

ii) Co-location concerns – It is well established that where an energy storage system is to be co-located with a renewable energy plant, whether built contemporaneously or afterwards, there are a number of issues that will need to be addressed, such as the need for cooperation between the projects, the provision of adequate land rights for the construction of and access to the energy storage system, the right to share grid capacity and confirmation that the insurance portfolio is updated to adequately reflect the highly explosive nature of many energy storage systems.

The lenders will also need to consider, particularly in the situation where an energy storage system is to be co-located with an existing plant, the need to obtain the consent of any lenders that have financed that existing plant to the changes necessary for the co-location.

Lenders for the existing plant should be identified and notified of the intended energy storage system project as early as possible to enable them to do the necessary diligence on the energy storage system and its impact on the existing plant, as they will be unlikely to consent to any changes that could negatively impact the existing plant and impede their own borrower from repaying its debt.

- *Relocation of the energy storage system* – One of the unique features of an energy storage system is that it may be relocated with far greater ease than a wind or solar farm.

To the extent that this option is required by the offtaker, it will be important to specify how this right may be exercised by the offtaker, the compensation to the project company for the interruption in the provision of the services under the offtake agreement during the relocation period, and the liability for the removal and any damage caused either to the site or to the energy storage system during the relocation.

Conclusion

We anticipate that the successful project financing of the project will serve as a template for the financing of other energy storage projects in the region and that developers, contractors, financial institutions and regional governments will all be watching this project with great interest to see if Jordan's recent success in attracting external investment for its wind and solar projects can be replicated with an energy storage project. ■