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# Property Insurance Considerations For Green Energy Storage

By **Jeffrey Weinstein and Bruce Kaliner** (November 27, 2018, 1:44 PM EST)

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Energy storage is the missing link for the renewable energy power sources of wind and solar, which are intermittent with nature. When the sun sets, the wind dies down or electricity demand peaks, rather than turning to traditional fossil fuel power generating sources, energy storage that captures renewable energy can be used.

Earlier this year, Gov. Andrew Cuomo announced a 1,500-megawatt energy storage target of 2025 for the state of New York[1]. In September 2018, Gov. Jerry Brown of California signed a bill that places California on a path of using 100 percent clean electricity by 2045.[2] A quick Google search reveals that energy storage is on the cusp of transforming the energy generating business and is propelling dynamic change.

These growing numbers mean that battery storage issues can have significant ramifications for the property insurance industry. The market for energy storage, including batteries, is expected to exceed $1 billion in 2019.[3]

Current commercial energy storage includes batteries, hydroelectric pump storage (water released from a reservoir into a water turbine) and molten salt thermal storage (to generate steam for generators which is primarily used in concentrating solar plants). Some of the other storage technologies include: superconducting magnet energy storage system, mechanical flywheel energy storage, regenerative hydrogen fuel cells and compressed air energy storage.

Lithium-ion batteries currently are in wide use but other types of batteries in commercial use exist, such as lead-acid, zinc-ion and flow batteries (electrolyte is stored outside of the battery), among others. Just recently, in September 2018, a company announced that it would be the first to commercialize the use of zinc air batteries and it sees the potential for a $50 billion market[4].

Currently, the Hornsdale Power Reserve (in South Australia) has the largest lithium-ion battery installation in the world, comprised of a 100MW/129MWh Tesla Powerpack system. It is a battery storage facility used to stabilize the South Australian electricity grid, to facilitate integration of renewable energy in the state and to assist in preventing load-shedding events.[5] According to a news article on the Hornsdale Power Reserve facility, "[l]ess than a month after Tesla unveiled a new backup

power system in South Australia, the world's largest lithium-ion battery is already being put to the test. In the past three weeks alone, the Hornsdale Power Reserve has smoothed out at least two major energy outages, responding even more quickly than the coal-fired backups that were supposed to provide emergency power."[6]

As a starting point, battery storage is rapidly evolving and pushing the boundaries of new technology. One overarching issue of the commercialization of any new technology is what happens if it fails or malfunctions. If a battery storage facility requires physical repair or has software system control issues, the initial question is the timeline for repair and placing the facility back on line. Depending on the technology employed and its level of commercialization, lead time to procure the part(s) from the original manufacturer or for the software developer to update the software may play a significant role. A potential scenario is that a few years into operation of a battery storage facility, the original manufacturer has moved on to a different battery technology so parts or servicing is limited or the manufacturer owning the proprietary technology is no longer in business. Any delay affecting the duration of repair or replacement can extend a business interruption claim. In this regard, both the insured and underwriter need to take into consideration the appropriate time element waiting periods used to protect their respective interests.

Another potential risk for battery storage systems is what damage, if any, can be expected from a catastrophic event (i.e., fire, hurricane, wind, flood, storm surge or earthquake) or other events such as prolonged heat waves. For example, lithium-ion batteries have the potential to catch on fire and operation at elevated temperatures can lead to problems, such as "thermal runaway" (a cycle in which excessive heat keeps creating more heat) until the battery cells fail or ignite. In August 2012, a fire broke out in a battery storage building at a wind farm in Hawaii. Given the number of individual battery cells and the confined space in the building, fire crews had to wait more than seven hours after the blaze began before entering the building. The firefighters faced thick smoke, toxic fumes and other hazards[7].

Until there is more history with battery storage systems, it is hard to predict or model risk. Obviously, fire or flood can cause immediate damage but other weather events such as excessive temperatures can lead to a secondary issue, such as overheating, that can result in damage to battery cells and/or deterioration in electrical storage capacity.

As batteries are used and age or if they undergo over-depletion, capacity may be diminished and useful life may be shortened. This can lead to a situation where a battery storage loss takes place but pre-loss, the storage capacity already was in a diminished state. Therefore, an issue may arise as to whether the insured can seek a full replacement that not only repairs or replaces the damaged battery system but also restores the lost capacity. From an equitable standpoint, the insured should be placed in the identical position as it was at the time of the loss. Therefore, based upon policy wording, consideration may need to be given to the remaining service life (capacity) of the batteries at the time of the loss and whether the damage is beyond repair that requires full replacement.

Separately, long-term performance and expected capacity design parameters of battery storage will have the potential to implicate common property policy exclusions for wear and tear, gradual deterioration, corrosion, defective workmanship and materials, inherent vice, and latent defect. Application of any of these exclusions will require a detailed understanding of the loss and what took place. As with any new technology, a forensic examination to determine the root cause of the battery storage loss for purposes of applying policy limitations may be a challenging task. As noted by Michael Pagano of Envista Forensics,[8] "As utility scale battery systems are developed and deployed, it will become increasingly important for the experts and engineers to stay atop of the technology regardless

of how steep the learning curve becomes. With increased deployment comes the greater probability that failure experts will have to be nimble to grasp new, less obvious failure modes."

Design defect may also come into play if it turns out there is a software design flaw that damaged the battery storage system or the software for the control system (battery management system) failed to protect and monitor operating temperature or cell voltage, which could have led to overcharging and subsequent damage. The potential "ensuing damage" in these scenarios can add a whole new level of complexity to an already oft-debated coverage issue.

In line with system operating software is the recognition that there are ongoing cyberattacks on infrastructure, including utilities. Given that energy storage systems are connected to the internet for monitoring, utility demand and communication, this access is a vulnerability that can be exploited. Many property policies do not cover cyber events.

In sum, these are exciting times in the field of battery storage technology and the insurance industry will be on a learning curve to assess the scope and extent of the new risks that this technology will present.

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[1] https://www.nyserda.ny.gov/-/media/Files/Programs/Energy-Storage/Energy-Storage-Fact-Sheet.pdf

[2] http://time.com/5391881/brown-signs-bill-100-percent-clean-energy-california/ (Time Inc., Sept. 10, 2018).

[3] https://www.reuters.com/article/us-usa-batteries-report/u-s-energy-storage-market-to-nearly-triple-this-year-report-idUSKCN1GI135 (Reuters Business News, March 6, 2018).

[4] https://www.nytimes.com/2018/09/26/business/energy-environment/zinc-battery-solar-power.html (The New York Times, Sept. 26, 2018).

[5] https://hornsdalepowerreserve.com.au/overview/

[6] https://www.washingtonpost.com/news/the-switch/wp/2017/12/26/teslas-enormous-battery-in-australia-just-weeks-old-is-already-responding-to-outages-in-record-time/?noredirect=on&utm_term=.69f7596b62fa (The Washington Post, Dec. 26, 2017)

[7] http://www.hawaiinewsnow.com/story/19173811/hfd-battling-kahuku-wind-farm-blaze/ (Hawaii News Now, Aug. 1, 2012).

[8] Mr. Michael Pagano, PE, CEM, CEP, is a Principal Consultant Mechanical/Electrical at Envista Forensics.