

Lithium-ion battery manufacturing plants – risk and insurance considerations



The huge global demand for mobile devices, electric vehicles, and all kinds of technological gadgets, has led to a growing need for lithium-ion batteries (Li-ion). The first Li-ion batteries were not cheap to produce, but production costs have reduced dramatically in recent years as Li-ion has become the fastest growing rechargeable battery segment. Driven primarily by automotive sales, it is estimated that global Li-ion battery output is set to increase from just below 200GWh in 2019 to anywhere between 1,100GWh and 2,000GWh by 2030.¹

The structure and quality of the insurance and surety arrangements established, could represent a key element in delivering these projects on time and on budget. In fact, the availability of sufficient insurance will also be key to new start-up companies raising finance for their projects. In this brief document, our construction specialists provide a high-level overview of the key project risks and insurance issues for companies within this construction segment.

RISK AND INSURANCE CONSIDERATIONS

Fire and explosion

Fire is the main concern for insurers of battery factories. The high concentrations of energy, oxygen, and combustibles in cells when charged, and the potential for thermal runaway, is present during the testing and commissioning phase — when the highest asset values are accumulated, in close proximity, and at risk. Significant damage at this point is also likely to cause the most substantial project delays.

There is a perception that fire protection standards have not kept up with the pace of Li-ion battery manufacturing technology. The effects of thermal runaway are hard to control and can take significant time to extinguish properly. Toxic fumes can also provide further challenges and hazards

for fire-fighters as different battery types may need to be approached in different ways — meaning specialist knowledge may be required to control the fire optimally.

The relative merits of a range of different fire suppression systems are varied but not comprehensive; some have significant environmental risks. As such, insurers still view Li-ion fire potential as one of the most significant risk factors to consider when underwriting battery factory projects.

Moving away from the thermal runaway concerns, the potential for fire to occur at any earlier point during construction also needs to be factored into underwriting considerations, especially given the hazardous chemicals stored onsite and the presence of critical, high value and sensitive machinery.

Also, explosion risk is present throughout the process, particularly during any solvent recovery processes and in relation to any thermal boilers.

Insurers will require that appropriate fire risk protections are established — especially from the point that hazardous chemicals arrive at the site — and that relevant fire protection standards and codes are followed and incorporated. Insurers will require details about the type and capacity of fire detection and suppression systems, as well as whether they are established in accordance with the latest appropriate expected fire codes.

1 | Energy Storage Grand Challenge: Energy Storage Market Report, U.S. Department of Energy, December 2020.



Close attention will be paid to fire separation between the process buildings — it is currently common for connections to exist either directly or via bridge or conveyor systems.

Insurers will also be keen to establish what the procedures are following a fire within the facility, and how these are communicated to the workforce.

Defects and machinery breakdown

For the construction of any process-driven industrial project, insurers will consider the level of defects and maintenance cover that they will be willing to take on; preferring developers to rely on the guarantees and warranties issued by the suppliers and manufacturers. Given the potential for damage during testing and commissioning and initial operations, it is important to consider the level of cover against such warranties, thus ensuring no specific gaps in cover in the event of a major loss.

Building design is also, of course, of key interest and insurers will take comfort if the entire factory planning and design is trusted to engineers and contractors who are highly experienced in this sector.

Proto-typicality

Li-ion battery production output has accelerated at a phenomenal speed, but there is still a race to fill demand. As such, battery technology and the manufacturing process are advancing at a rapid rate. Insurers are therefore paying careful attention to the process methodology involved and whether any of it can be deemed to be prototypical in any way. Insurers will generally not insure prototypical risks and will require that any process has (or will in the near future) have, a proven reference plant, or that any “first of a kind plants” are simply scale-ups or alternative arrangement of existing technology. This will be key to obtaining the widest insurance programme at the lowest cost.

Delay risk

Insurers will always closely examine the potential risk and consequences of delay, should Delay in Start-Up (DSU) insurance be requested by the insured — or more commonly, required by project lenders.

Many risks have the potential to considerably impact the project schedule. Concerns are exacerbated as battery manufacturing operations move to high-throughput continuous process with large single machines.

The trend in the Li-ion industry is towards new technology and larger factories to take advantage of economies of scale. However, this can lead to increased vulnerability to high delay

losses due to the scale and unique long-lead replacement times for key equipment.

Insurers will seek to understand the basis of the revenue stream in some detail. To that extent, the following information will assist them in that process:

- Full breakdown of the projected revenue.
- Assumptions/strategies taken into account in the operation of the factory.
- Whether there is a degree of redundancy designed into the system.
- Lead times for the replacement of critical equipment.

In the current construction insurance marketplace there is likely to be little appetite to insure the full revenue consequences of a delay, and developers should consider this potential in their project financial model.

Third party and environmental liability

Accidents affecting Li-ion battery factories can also have a major impact on the properties or health of third parties. Not only can the direct results of fire cause a significant hazard, but the common requirement for massive amounts of cooling water can have further consequences. Fire tests carried out by the National Fire Protection Association (NFPA) on Li-ion batteries, have shown that significant amounts of hydrogen fluoride can be released. When in contact with water, this becomes hydrofluoric acid — one of the most corrosive types of acid, which can affect respiratory systems and even dissolve glass. Insurers need to fully understand emergency procedures to ascertain how far the effect on the surrounding environment will be contained and controlled.

The impact of lenders, and operational insurance considerations

While established global battery manufacturing companies do not commonly seek to raise debt against their projects, there are many companies that do utilise project finance and as such need to comply with the requirements finally agreed with lenders. Aside from the usual lender requirements, the borrower needs to be conscious of the required commitment of operational insurances, which must be maintained throughout the period of their loan agreement.

Given that these commitments will commonly involve the procurement of product recall and liability insurance — a historically difficult market for Li-ion producers — the borrower and their broker should carefully consider what they commit to lenders. They will also need to be cognisant of the lenders’ resultant perception of the operational manufacturing facility risk profile.

These considerations extend to the contractual commitments to original equipment manufacturers (OEMs) under supply agreements, further underlining why the interaction of contractual commitments, finance requirements, and insurance availability at commercially reasonable terms all need to be considered in unison.

Key takeaways and actions

In order to obtain optimum terms from the construction (re)insurance market, be prepared to have robust answers to how fire protection has been factored into the project design during construction, through testing and commissioning, and into operations. Insurers will need to understand not only how a fire will be prevented, but also how the loss will be minimised and its consequences contained, should such an eventuality occur. There is no simple answer as to which fire codes are best applied in which territories; a bespoke approach is often needed, and active engagement with insurers at an early stage will help to generate the best results.

It is also important to consider that for many of the new and pending "gigafactories" around the world, the scale of the development will mean that global (re)insurance capacity beyond that of the country of construction will be required. Indeed, any major battery factory developer will ultimately be accessing the same key underwriters.

As technology advances, it will always be important to demonstrate to insurers that the process being utilised is to a large extent proven technology and to provide reference plant examples. For projects seeking to insure delay risk, it is vital that the key equipment supply chain's impact on a project's critical path is considered, together with what can be done in the event of loss. The difference in minimum insurance requirements between those developers utilising non-recourse project finance and those who do not, is stark. Any project finance requirements need to be factored into insurance programme design and construction contract drafting at an early stage.

We expect to see increasing numbers of battery factories being developed and insured in the coming years. These are not currently deemed to be high risk by insurers, and with good quality information to mitigate their key concerns, excellent results can be achieved in the construction (re)insurance market.



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