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Pricing in Waste

Battery project developers need to think about waste. To be exact, they need to consider – and factor into their financial models – the costs to be incurred when any battery project reaches the end of its working life.

A developer who adopts a wait-and-see attitude – on the basis that these are unknown future costs and the technicalities of disposal are uncertain - may find funding harder to attract. The reason is obvious: the project plan and financial model has a black hole. If the black hole is small, well, there's no harm. But this particular black hole is by no means guaranteed to be small.

What it means for a battery to reach the end of its working life differs for different technologies in major ways.

By and large, Lithium-ion batteries (**LI**) have a 10-year life, which means that at (about) the end of 10 years, the charge one can hold has degraded to an uneconomic extent (it degrades annually at a broadly pre-known rate). And yes, it's true, as someone pointed out, LI lifespan is improving. I propose to assume that LI will continue with a 10-year lifespan until there is actual improvement.

The alternative batteries (long duration or **LDE** batteries) are too early in development to know their lifespans or they don't degrade for ~20/20+ years.

Despite different lifespans, all batteries face a waste problem: they all become waste and there are rules governing what can be done with waste.

Broadly and simply, all the bits of a battery, once it is waste, have to be dealt with in specific ways. To the greatest extent possible, the battery has to be recycled, where what is intended by that title is not re-use as the same, but as a different, thing **if** the amount of recovery needed exceeds a minimum. Amazon cardboard boxes are a good example. They could be recycled to become new

cardboard boxes if all that was needed was a bit of cosmetic attention. If they need more, they have become waste.

So then, at year 10 in the case of an LI battery and (say) year 20 in the case of an LDE battery, what happens? Answers differ according to technology.

In the case of an LI battery, year 10 is not the end of the term. The project will have a term of 20 (maybe more) years. The owner has a battery that has run out of juice. What does it do?

One suggestion made by various developers is that the LI 10-year battery can be replaced by shipping in another of the same kind and leaving the existing (now mainly useless) battery in place until the whole scheme ends.

There are many problems with that (the need for new planning, the need for a new EPC contract, etc.) but concentrating just on the battery to be replaced, there is one big problem. The original battery is now waste because it is “unsuitable, unwanted or surplus to requirements” and it isn’t fit for the use it was either intended or sold to have. There is pretty much no way around its classification as waste – waste that is sitting on LPA permitted land.

Another suggestion from a developer was that the manufacturer of the original LI battery would at year 10 be required to replace the battery that is no longer fit for use and to take the ‘unwanted’ battery away. There are multiple problems with this. The manufacturer might want to sell a new battery to the LI project at year 10, but it won’t do so if it has to deal with the waste battery unless paid to do so. The cost? It’s a finger in the air, but at a guess it’s the cost of disposing of the waste plus a hefty premium. But frankly, I can’t see that they would do it. They are manufacturers, not waste disposers. In addition, there are rules (many rules) on shipping waste. One of those rules is likely to be the prohibition of the import of waste by the country of the manufacturer.

The same developer suggested the manufacturer would re-use the battery, which is why it would take it away. But that battery is waste and not capable of

re-use because, like the Amazon cardboard boxes, a bit of tinkering won't make it saleable or usable, but anything more than tinkering makes it waste (and subject to the waste rules).

The same will be true of the LDE batteries. They also become waste, just at a *further* 10 plus (and sometimes plus, plus) years out.

At some variable time, then, all batteries come to be waste (in the case of LI batteries half-way through the 20-year project term and at its end and, in the case of LDE batteries, at the end of the project term).

For both, an obvious question is: can you just leave the battery on site, which morphs into the more legalistic: can you store waste on the site? Once morphed, it is clear the answer is neither simple nor what our leave-it-to-the-future developer hoped for.

There isn't a simple full answer to this because batteries are so different, there is a plethora of legislation covering different details and, to some extent, it seems not to be wholly consistent. Nonetheless, it is obvious, by now, that a simple one-word answer to the question 'can waste can be stored on site' is 'no'. Yes, you can probably store it for *some* time, subject to conditions.

How long is "some" time and what happens when that time comes to an end? Whatever waste legislation applies (and there is much), the sharpest way to approach this is to think about the planning consent for the site. Perhaps (if the battery contains only non-hazardous waste) the LPA will do nothing for 12 months. Thereafter it surely will. 'The LPA may never find out' isn't an appropriate response, even if accurate. If it *does* find out, the developer is in breach of planning consent.

A further issue is hazardous waste.

All the LDE technology manufacturers insist that 'their' batteries contain nothing hazardous, that all elements can be recycled. Although I have doubts about one of the technologies I've reviewed, I see no reason to doubt them.

Shorter term LI batteries? It's complicated. The hazardous waste legislation doesn't specifically classify LI as hazardous – but the Environment Agency and the legislation seems to do just that, even if only by implication.

The consequence of something being classified as hazardous waste is that its 'holder' (in the case of LI, the project owner at 10 years and again at 20 years) must obtain a licence to hold the waste battery on the site. But it's a breach of planning consent and the LPA will likely require disposal.

Once classified, there are regulations governing how any waste is to be disposed of – in abundance. Currently, none specifically deal with 'generation' batteries imported by developers.

But we expect new regulations, and I see no reason why, broadly, they won't correspond to the regulations for smaller batteries with a slightly extended reach. Summarising their possible effect: owners of batteries will be required to have them notified, registered and to belong to an appropriate disposal scheme, into which they will be required to make payments. The costs will be greater for LI batteries, of course, because they contain hazardous waste and their waste comes into being every 10 years.

But even in the absence of new regulations, LPAs enforcing breaches of planning consent are likely to have the same financial impact.

So, it is obvious that there is a price to be paid for battery waste. What it might be is not obviously negligible and is something the developer should know to fill the black hole in its model.

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