ACELERON

Enabling Batteries to Die Another Day:

Improving Battery Economics through the Circular Economy for Africa

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Transforming Energy Access

EXECUTIVE SUMMARY

The global market for lithium batteries is anticipated to reach $174 billion by 2027 and their use will be critical in the development of energy access in Africa, particularly in reaching the 2030 goal of full energy access across the continent.[1]

Batteries to support this energy access goal are crucial, particularly in remote areas where grid access is lacking. Challenges remain to be addressed to achieve a scenario where batteries are able to support energy roll out without negative economic or environmental costs, namely alternative financing options, battery delivery timelines and quality and durability of said batteries.

Aceleron are tackling these challenges in the following ways:

Increasing impact of sustainable batteries by improving finance options through cost reduction. By moving component part production to China, a 30% cost reduction was achieved and combining this with the use of second-life cells which also greatly reduces the bill of materials cost of a battery pack. These reduced costs would allow a £1,000,000 input of debt finance to fund 75% more batteries than a higher cost option. Funders in the industry can make positive impacts on waste through stipulating positive end of use management for their projects across the continent.

Alternative shipping methods to reduce risk of delays. By shipping component parts to Kenya and employing a local workforce to assemble second-life batteries, higher quality battery packs and reduced costs are able to be achieved. Local labour is also supported by Aceleron's new battery design which allows for easier manufacturing in Kenya. The industry as a whole must work together to create initiatives to create secure supply chains of second life battery packs to propagate circular economy models.

Improving quality and durability of products. Battery quality and durability have been improved to extend the battery life, through design and material improvements. To support these developments a certification strategy has been developed for high confidence in the products, reducing the risk for funders, by providing confidence the batteries will retain residual value. Commercial entities must own the lifecycle of the batteries they purchase which would reduce waste and provide added benefits for them such as improved company reputation.

ABOUT ACELERON

Aceleron is an award-winning clean technology company started when co-founders Dr. Amrit Chandan & Carlton Cummins dismantled and tested hundreds of battery packs and realised that batteries are not designed to be maintained. Anticipating a future with tonnes of unnecessary battery waste and a lack of energy access in many parts of the world, they designed a technology platform for energy storage which is built with sustainability in mind. Based on this technology platform, Aceleron has developed the world's most sustainable lithium battery packs in a full circular economy approach; maintainable, upgradable and recyclable. Aceleron is empowering global communities by increasing access to energy storage solutions.

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INTRODUCTION

The number of people in Africa gaining access to energy has improved between 2013-2019 with 40m more people achieving access. However, the number of people without access is still in excess of 580m people. The COVID pandemic has set back progress with the number of people without access set to increase in 2020, making the aim to achieve energy access across the continent seem more distant.[2] Indeed the current projections show over 500 million without access to energy in 2030, due to population growth and continued effects from COVID. This needs to be addressed quickly through creating technology which is easier to access. There are two remaining challenges which must be addressed to allow lithium batteries to reduce this gap in energy access without negative environmental consequences. They include answering the following questions: (i) how to deal with the battery when it reaches end-of-life, and; (ii) how to finance the battery such that the battery is more affordable and therefore more accessible to a larger number of people. The large number of batteries required in Africa as well as worldwide require a strong waste strategy to ensure packs are well managed at end-of-first life. Studies have shown that lithium batteries commonly have between 70%-80% of their capacity left at the end of their first life, highlighting the need for both design for reuse and second-life applications, to enable use of all batteries to their full potential. Additionally, the higher cost of lithium batteries compared to the incumbent lead-acid technology means there is a finance gap to fill. Both companies and end users alike can benefit from the use of lithium batteries, though debt financing and cost to end users remain a challenge to be addressed.

This paper presents Aceleron's perspective on the challenges lithium batteries still face in their application across Africa, how we are addressing these challenges and learnings we've gained along the way, as well as future work and suggestions for others in the industry.

CHALLENGE 01

Reducing costs of batteries to make them easier to finance and therefore increase the impact that sustainable batteries could have.

BACKGROUND

Batteries are a useful addition to renewable energy propositions such as wind and solar to enable people to take control of their energy and use it any time rather than only during specific periods. The extra costs of adding batteries to these systems, however, can often be a challenge. This is a particular challenge for lithium batteries, which typically have much longer lifetimes and higher capacities but come at a significant capital cost in comparison to lead acid batteries. This funding gap is a key challenge and needs to be addressed.

Asset finance funding is one option which can make lithium batteries more affordable for people, by reducing upfront costs and spreading cashflows over a period of time. It also allows for the development of an ESaaS (energy storage as a service) model which suits Aceleron's technology as battery maintenance can be built into a service offering.

ESaaS is new model under development by Aceleron where the battery cost can be spread out over time and, for a monthly subscription, service, maintenance and end-of-life disposal is also included in the battery cost. A representative example for a mini-grid is shown below in *Figure 1* where the upfront cost is of the Aceleron battery is lower than a standard lithium-ion battery and the total cost of ownership over the period is comparable to a lead acid battery.

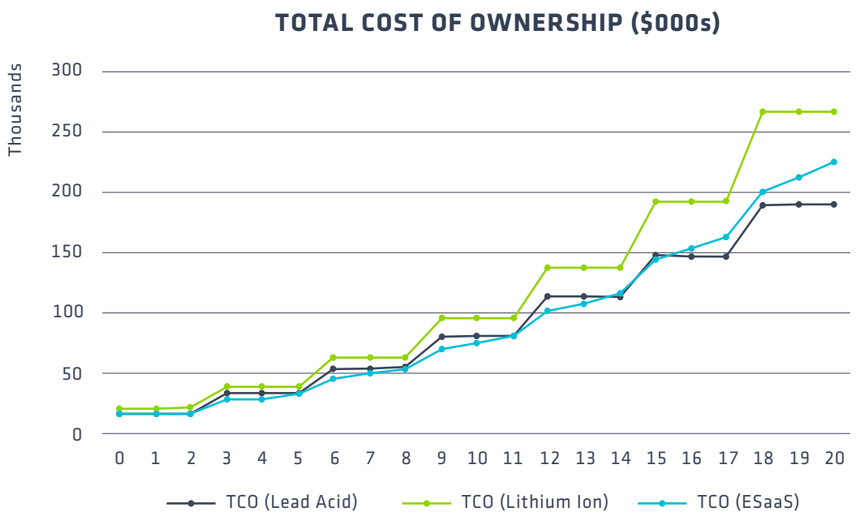

Figure 1 ESaaS Model for Lithium ion vs Lead Acid and Lithium Ion batteries for a growing mini-grid over time.

Aceleron conferred with three funders in the development of this section including a finance consultant who works with numerous funders, additionally a further 20 investors have provided insight into Aceleron's proposed ESAAS model over the recent year. These insights were gained through discussions and interviews with said funders.

Typically, to ensure that an asset can be debt funded, funders are keen to demonstrate the following:

The asset cannot easily be moved, and if it can, that it can be tracked to allow for recovery and re-sale. In the case of a battery system, there is inherent risk of theft due to the packs being easily portable, therefore mitigation strategies against this are required. One possibility is to ensure security is in place for larger installations, such as mini-grids, where the batteries are able to be installed inside a building or be placed under surveillance to ensure theft is a lower risk factor. For smaller systems (pico-solar applications), such as those which may be used in users' homes alongside solar panels, a GPS system may be installed within the battery, to allow tracking to take place. This option also has the benefit of additional data which can be used to better understand how customers are using their batteries which could lead to future developments.

The asset has a residual value and that there is a re-sale market. Lead-acid and traditional lithium batteries are typically used to their limit within a project and are no longer able to work after 3-5 years, depending on the technology and project demands. Lead-acid batteries typically have a good residual value due to the metal value of lead whereas traditional lithium batteries have a poor residual value due to the poor metal recovery economics. However, as the Aceleron battery is designed for maintenance and reuse, it is able to hold residual value much better than a traditional lithium battery and can either be placed into a second-life market, or be maintained and used within the same market.

The customers are credit-worthy. Many customers in this ESaaS market are still in a start-up or early-stage enterprise which makes it challenging to raise debt finance. This is for several reasons, such as funders typically preferring to provide funds to companies who have previously used debt financing, as well as the need for companies to have a strong source of capital for asset finance when typically, company capital is also needed to continue research and development. To ease these points, it is important for battery packs produced to have a lower cost to make them easier to finance.

LEARNINGS

Working with partners on projects across Africa has provided lessons on alternative options to tracking assets for resale. For example, Aceleron is working with a partner, Mobile Power, in Sierra Leone, Liberia and Nigeria, who operate a unique pay-per-use battery sharing business, based on daily battery rentals to solve energy access at a community level.

Mobile Power has solved the many challenges of renting portable batteries in these markets by focusing on business model innovation and the incentivisation of key local entrepreneurs. Control of the Battery assets and incentivisation of behaviour is implemented all the way through Mobile Power's technology stack. A key learning is that preventing battery losses in the first instance is far more important than mitigating loss after default, e.g. through expensive

GPS hardware. Mobile Power's currently enables more than 250,000 rentals a month with a loss rate of only 2%. These fundamentals mean that Mobile Power's financial performance is unusually high for the sector and has proven to be very attractive to funders in the energy access sector.

Another partner, Ethio Resource Group, based in Ethiopia are working with Aceleron to use an ESAAS model to extend the range of their mini-grid. They are also working with known end-users who are happy to accept the financial liability of the battery if it is lost or stolen. These alternative strategies are working well, though both would benefit from battery cost down.

Aceleron have looked to achieve cost down of its battery packs for ESaaS in Africa in two ways: improved manufacturing and increased use of second life cells. Aceleron's initial batteries were built in the UK through a manufacturing partner. Although there were many benefits when working with a partner based in the same country, this came with high costs which were unsustainable in the market. Therefore, a new manufacturing partner was sourced in China where >90% of the global battery packs and components are manufactured. The new manufacturing partners purchasing power and familiarity with battery pack design meant that significant cost down of the battery pack was achieved even considering the higher logistics costs. Additionally, the use of second-life cells recovered from the waste stream locally in Kenya has a significant reduction on the overall BoM cost whilst also reducing battery waste and lifetime carbon emissions. As can be seen in *Figure 2a*, battery cells are responsible for over 50% of the overall first-life battery pack costs, which is largely a factor of our relatively low volume production (thousands of units

BATTERY PACK COST BREAKDOWN

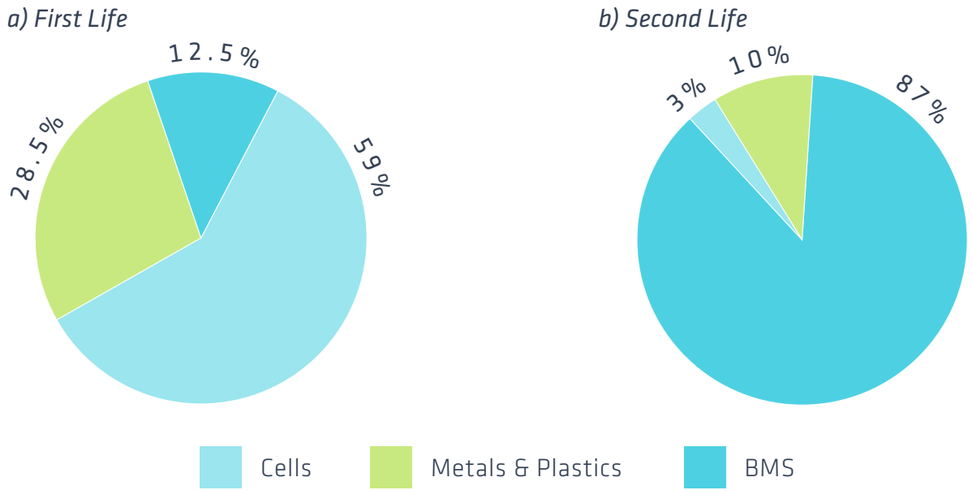

Figure 2 – a) Breakdown of the overall costs of a first life battery pack into its component parts and b) Breakdown of the overall costs of a second life battery pack into its component parts.

vs millions). Through the utilisation of cells from the local waste-stream, the initial cell costs are greatly reduced, as can be seen in *Figure 2b* and although testing of cells to ensure they are appropriate for second life increases operational costs, the cost savings achieved reduces the overall pack costs.

Overall, battery component part costs are expected to reduce as the market increases and demand grows. The latest *BloombergNEF* estimate puts pack costs at $100 per kWh by 2023 based on the continued cost reductions over the last ten years of 89%.[3]

FUTURE WORK

As Aceleron scale, its production costs will fall with increased volume. For example, currently cell costs are particularly high, which is impacted by the small number of cells purchased from the supplier each time. As cells are typically bulk purchases, price breaks do not come until millions of cells are ordered at a time, which would equate to tens of thousands of packs.

Further analysis is required on understanding the exact cost per second life cell, when considering the extra time required for cell testing, including understanding how these costs can be further improved by reduced testing times.

Overall, the impact of cost down of battery packs through a combination of second-life cells and lower costs due to volume purchasing can allow far more batteries to be purchased within a set amount of debt financing, as shown in *Figure 3*.

THE NUMBER OF UNITS ABLE TO BE FUNDED BY £1,000,000 OF DEBT FUNDING BY DIFFERENT MODELS.

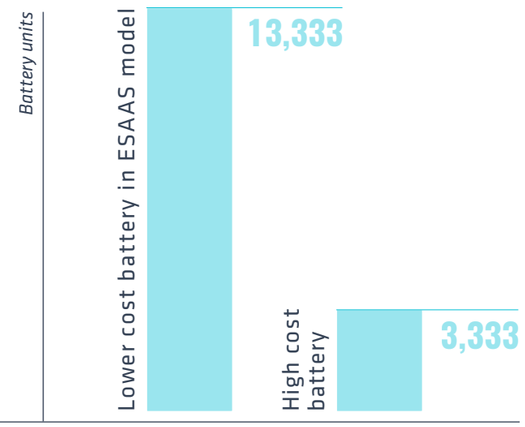

Figure 3 - Graph showing the greater purchasing power of £1 million pounds of debt funding when using a lower cost battery in an ESaaS model compared to a relatively high-cost battery without a ESaaS model.

SUMMARY

By reducing battery costs through the use of second life cells, it is possible to provide higher levels of confidence in ESaaS models run by SMEs, by reducing the risk to the funder overall. An increase in ESaaS offerings can provide the opportunity to utilise lithium-ion batteries in more projects across the continent and if Aceleron batteries are used, waste can also be reduced.

CALL TO ACTION

Projects around the world require batteries to enable improved access to energy, many funded through mechanisms by which a funder defines the requirements. In these cases it is imperative that funders consider both the lifetimes of batteries used as well as what will happen to them at the end of the project or battery life. By stipulating positive end of life management at such early stages, optimum end of life battery management can be achieved. This will also help with the economic case, making the total cost of ownership a key consideration instead of the myopic viewpoint about upfront cost.

CHALLENGE 02

Speed of battery delivery to meet customer needs.

BACKGROUND

A further challenge delivering batteries to customers within an ESaaS model is delivery times which typically need to match user demand and to allow products to become an asset which is bringing in revenue.

Typically, battery packs are not built in-country but are instead sent from overseas, most commonly China. Since the beginning of 2020, the COVID pandemic, followed by blocked shipping traffic in the Suez Canal, has impacted shipping greatly. The pandemic changed shopping habits worldwide, causing an increase in product demand from Asia whilst there was a general slowdown in production. This, coupled with countries going into and coming out of local lockdowns, has had a knock-on effect on the general availability of shipping containers which in turn has caused supply issues for products globally. These factors combined have meant costs of shipments have sky-rocketed and those from China to developing regions have been the worst hit. The United Nations, specifically UNCTAD have provided suggestions for policy makers to prevent such a shortage again, companies must also consider how to mitigate against this risk.[4]

The data used in this section was collected through discussions with 11 manufacturing partners, based in China, the UK and Kenya over the last 12 months. The conclusions were drawn through data collection with potential partners when considering how Aceleron's manufacturing process could be improved.

LEARNINGS

Shipment of parts and complete battery packs have impacted Aceleron's ability to provide batteries to the market since the start of the pandemic (Q1 2020). To mitigate against similar issues in the future the sourcing of parts and building packs was assessed with three different options taken into consideration.

	UK production	China production	Kenya production	Notes
Emissions	✕	○	✓	1.
Speed of Delivery	✕	✕	✓	2.
Regulations	✕	✕	✓	3.
Cost Materials	✕	○	○	4.
Cost Cells	✕	○	✓	5.

1. Shipments required from China in all cases make this the baseline, with negative emissions from the UK for extra shipping and positive impact from Kenya production with the opportunity to use local labour and second life cells.

2. Shipments of batteries are more likely to cause delays than typical parts, therefore use of second life cells from Kenya provides an imporoved impact on delivery times.

3. Regulations from both the UK and China have increased over the last 18 months due to COVID and Brexit.

4. Parts for each option would include purchase of parts in China, providing a baseline cost for all materials. Though an increased cost for shipment to the UK before final shipment to Kenya, increases these costs further.

5. Cell costs in the UK are higher than those purchased in China, while an improved impact is achieved in Kenya with the ability to use second life cells.

✓ Improved Impact ○ Neutral Impact ✕ Negative Impact

Table 1 - Factors influencing the three options for the optimum route for battery manufacturing.

Option 1 - Procuring parts in China with shipment to UK for battery build and final shipment to Kenya for sale. Many battery components are produced in China, such as cells, electronic components, metals and plastics. Typically, the production costs for a majority of these items are much lower compared to UK suppliers and the cells/electronics cannot be produced in the UK at all. Therefore, when battery packs are built in the UK, component parts must initially be shipped. Shipment of these parts to the UK, building in the UK before final shipment to Kenya for sale and use is an expensive option which also has much higher emissions than other alternatives and so Aceleron has moved away from this method of manufacture.

Option 2 - Parts procurement and build in China, shipment to Kenya for sale. Using a single location for part production and battery pack build can improve the quality control of the produced packs and so this is a sensible option for first life battery packs. However, shipment of completed packs comes with many regulations and this can cause unexpected delays, along with the global shortages already faced.

Option 3 - Parts shipment to Kenya for build in-country before sale in Kenya. This option reduces risk of shipment delays, while also reducing emissions from the first option. Furthermore, the use of local labour in Kenya is desirable, particularly using Aceleron staff who have extended second-life cell knowledge. This can reduce the overall cost as well as ensure high quality products.

Aceleron have used unskilled labour to produce high quality battery packs in recent years. From this several lessons were learned. Using the Aceleron battery design, battery packs can be assembled by hand, without the requirement for welding, this enabled a process to be

developed around the battery packs, to facilitate training of staff to high standards. Taking into account the skill and education level of the workforce, a learning process was developed to enhance knowledge and build a desirable workplace. The process includes standard operating procedures which are highly interactive utilising images and videos alongside steps in the build process. Quality programs were also put in place which include team breakdowns of packs which have been built earlier in the week to assess any issues, the interactive and collaborative nature of these efforts have had a positive influence on skill improvement and efficiency amongst the workforce.

A further important aspect of **option 3** is the security of supply of second-life cells, which can be supported through good e-waste management in Kenya. The importance of e-waste management for reducing waste and carbon emissions cannot be understated and GOGLA, the global association for the off-grid solar energy industry have an e-waste Toolkit to help business improve their dealings with their e-waste.[5] Drivers to improve e-waste management are shown in *Figure 4* and the low cost for collection to companies is an important factor for increased end-of-life management.

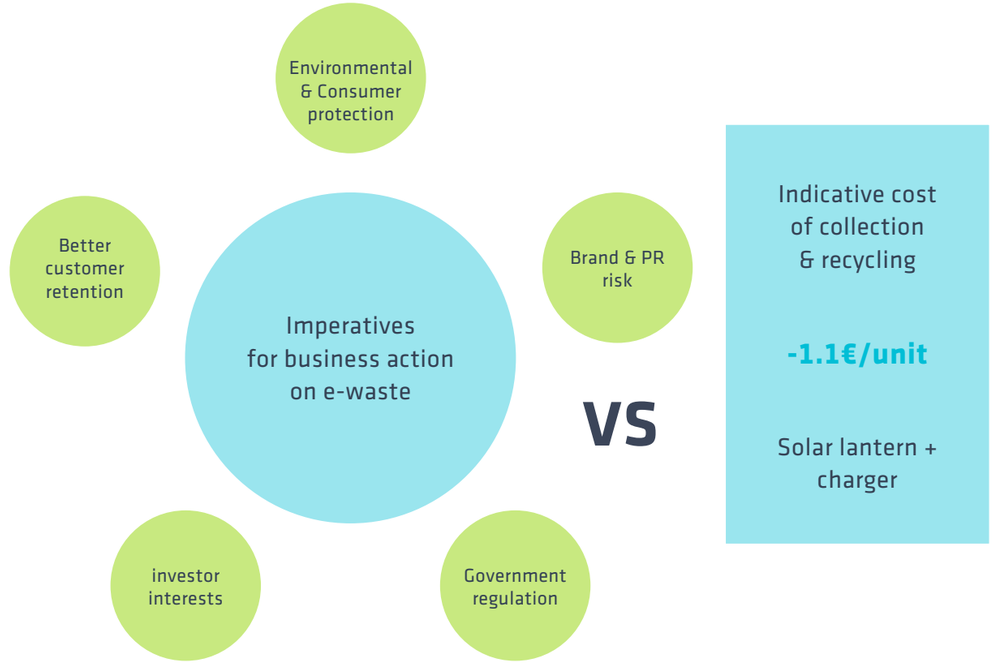

Figure 4 - Image showing the key factors on increased company action on e-waste. Key driver data supplied by GOGLA.

Management of e-waste will also benefit from better traceability, enabling companies to understand their e-waste better and how it could potentially be improved, through repair and refurbishment.

Local use of e-waste is also important, to enable carbon emissions at end of life to be reduced as much as possible, as well as to ensure waste which is been created in-country can be dealt with in country, with lack of lithium-ions recycling options across Africa, this is particularly important for batteries.

FUTURE WORK

Currently Aceleron's second life battery supply is heavily focused on the off-grid solar energy industry, from such appliances as solar lamps. Expansion of this supply into other sectors such as e-mobility waste is desirable to reduce the risk of a single sector supply, to allow this technical and economical understanding is required.

Aceleron have combined its capabilities in Kenya to include: battery pack manufacture, maintenance and re-manufacture. The need of local waste-management across Africa is apparent. Therefore, Aceleron plans to develop a mobile battery repurposing facility which is capable of easy movement and can deliver manufacture, maintenance and re-manufacture of batteries.

CALL TO ACTION

Collectively the Industry needs to work together to establish secure supply chains for second life battery cells in order to propagate circular economy models. We need to have a collective view that says, end-of-life of electronic goods are managed and cared for by the producer, with a clear intent to reuse as much as possible. This supply chain would ensure battery waste is being sustainably handled at the end of its first life, thus reducing emissions. The local supply of battery cells would also mean that manufacture using local labour is possible, creating jobs for local communities. Governments, donors and battery manufacturers can all aid these efforts through ensuring policy is in place and followed, which should mandate batteries are handled correctly at the end of their first life. Additionally, initiatives such as that suggested by the Closing the Loop on Energy Access in Africa White Paper produced by the World Economic Forum which highlights the need for further circular battery centres across Africa, would play an important role in understanding the next steps of research whilst enabling different players to work together.[6]

CHALLENGE 03

Improvement of quality and durability to meet customer expectations as well as impacts on financing.

BACKGROUND

The durability and quality of batteries is also important when considering funding as well as customer satisfaction. Improved quality and durability reduces the risk of loss while the battery is still in the ESaaS model. Battery use to achieve greater energy access across Africa is not new, though frequently lead-acid batteries are installed due to their lower initial cost. This, however, can be a false economy. As Terry Pratchett once said in his book "Men at Arms":

> *"The reason that the rich were so rich, Vimes reasoned, was because they managed to spend less money.*
>
> *Take boots, for example. He earned thirty-eight dollars a month plus allowances. A really good pair of leather boots cost fifty dollars. But an affordable pair of boots, which were sort of OK for a season or two and then leaked like hell when the cardboard gave out, cost about ten dollars. Those were the kind of boots Vimes always bought, and wore until the soles were so thin that he could tell where he was in Ankh-Morpork on a foggy night by the feel of the cobbles.*
>
> *But the thing was that good boots lasted for years and years. A man who could afford fifty dollars had a pair of boots that'd still be keeping his feet dry in ten years' time, while the poor man who could only afford cheap boots would have spent a hundred dollars on boots in the same time and would still have wet feet.*
>
> *This was the Captain Samuel Vimes 'Boots' theory of socioeconomic unfairness."*

Though lead acid batteries are the oldest rechargeable batteries, they are often still the most cost effective, particularly for certain applications which are highly price sensitive. This battery chemistry has undergone innovations over the years, moving from a format which needed to be topped up with acid to keep it running to a sealed format (SLA lead acid batteries) where the internal acid cannot leak and yet another innovation uses glass mats (AGM lead acid batteries) between the battery plates to improve their durability. Though durability has improved, lithium-ion batteries have several characteristics which mean they are far more durable, they have longer lifespans, achieving more cycles and each cycle is able to reach lower levels of discharge, while their voltage stays stable until their end-of-life, providing consistent capacity. This means that in many cases, Lithium batteries are able to offer a lower total cost of ownership

or Levelized Cost of Energy. However, battery cost is so sensitive that lead acid batteries are still often used. One way to overcome this is to use a lithium battery which is maintainable, where the residual value can be realised and therefore, they can be more easily financed. Aceleron's USP in the lithium market is the capability to maintain batteries throughout their life, to do this our patented design uses compression rather than welds and therefore it is much easier to swap out cells and components, therefore making it easier to realise the residual value.

This challenge was developed through discussions during the development of the certification matrix, which included consultation with seven test and certification houses based both in the UK and China.

LEARNINGS

To assess the possibility of increased internal resistance in the Aceleron design, research and design has been dedicated to testing, including comparisons to the highest quality conventional lithium batteries on the market. The tests conducted focus on longevity testing, which involves full charge and discharge cycles at rates which are expected from normal use by end users, combined with other characterisation techniques. The Aceleron battery and the comparator conventional lithium battery were in the optimum range which would be expected by industry to qualify as 'high quality'. As a result of this study, further developments were carried out on the Aceleron pack. These included altering the plates used within the battery which, despite the higher cost, provides both increased quality and durability. Additionally, algorithms assessing cell test results of second life cells were able to match cells which will work optimally together in a second life pack, resulting in a better performing second life battery. One important point to note is that, when the battery reaches a predetermined threshold (e.g. 70% of capacity remaining), the conventional lithium battery would be discarded whereas the Aceleron lithium battery can be maintained and brought back to 100% of original capacity. This has a significant impact on the total cost of ownership.

To confirm the quality of the second-life products, longevity testing was also carried out on a conventional lithium-ion battery, which is commonly used in Kenya. The second-life battery showed a lower degradation per cycle than the brand-new battery pack, highlighting that using high quality component parts and building high quality packs can produce second life batteries which are higher quality and have better durability than brand new packs.

To confirm the quality and durability of these packs, certification is a desired output to enable funders and end users alike to have confidence in the battery safety and capability.

Aceleron has investigated market trends and legislation in order to identify current certification requirements for numerous markets around the globe. A plan for the exact legal requirements for the 2nd life products to ensure that end users receive their energy storage solutions optimally and safely was formulated. Checks and documentation recording on all the components is carried out to ensure that the products used by end users are safe and meet the criteria for use.

Certification Name	What is the certification for?	EcoStore	EcoSol
UN38.3	Handling & transportation	REQUIRED	REQUIRED
RoHS	Restriction of hazardous substances	REQUIRED	REQUIRED
CE	EU Standards	REQUIRED	REQUIRED
UKCA	UK Standards	REQUIRED	REQUIRED
MSDS	Material Safety Data Sheet	REQUIRED	REQUIRED
UL1973	Standard for Stationary Storage and Vehicle Aux Power	Optional	Optional
UL1974	2nd Life Batteries	REQUIRED	REQUIRED
UL2054	Household and Commercial Batteries	Optional	Optional
IEC62133	Portable Applications	Optional	Optional
IEC62619	Portable Applications	REQUIRED	REQUIRED

Figure 5 - Certification matrix showing the required and optional standards for each of Aceleron's batteries which are likely to be sold in Kenya and Africa. The larger EcoStore battery will be used for UPS and larger home energy storage requirements, while the EcoSol is a smaller battery more likely to be used for lighting in homes.

Aceleron has also investigated the requirements for application specific possibilities including solar energy storage, electricity grid connection, uninterrupted power supplies (UPS) and small electric vehicles. Although these certifications are not normally carried out by battery manufacturers, Aceleron has decided to certify to a higher standard to enable the use of energy storage products in various applications without the requirement for additional certification by the customer.

These certification requirements listed in the certification matrix (*Figure 5*) above are useful worldwide. However, Aceleron will initially be aiming for the light-eMobility vehicles (e.g. 2 wheelers, 3 wheelers etc.), solar energy storage and UPS certification. These are particular markets which the ESaaS model fits well into and are developing at a rapid pace in Kenya. Additionally, certifications specific to Kenya are available, such as the Kenya Bureau of Standards certification, diamond mark of quality, which can be helpful for end users as this will be something they identify with and may have seen on other products.

Generally improved durability products have a higher upfront cost but lower costs for servicing or reduced costs from needing to replace later so a lower total cost of ownership. Positively impacting the financing options through increased residual value.

FUTURE WORK

Next steps in this area are complete the certification levels listed in the certification matrix (*Figure 5*), although this is a higher amount of specification than required for the battery, the battery packs will be ready to be deployed into different use cases, reducing the time taken for due diligence required by companies wishing to use the battery packs in their applications. Furthermore, this high certification level will highlight the high quality and durability of the Aceleron packs to funders and end users.

CALL TO ACTION

Companies and bodies purchasing batteries and associated products, must own the lifecycle of the battery. This is not just good for the planet but also good for company reputation. Products must be of a reasonable quality with the ability to perform to the expected standard at minimum, with consideration for end-of-life being an added bonus. This recommendation would allow for reduced waste which is produced upon batteries not performing to stated standards or reaching their end-of-life before expected.

CONCLUSION

Battery cost, durability, quality and delivery all contribute the ability to provide ESaaS model funded by debt finance. Aceleron are reducing costs through volume manufacturing and use of second-life cells to provide a stronger case for debt finance. Quality and durability have been improved through material improvements and these are expected to increase the residual value remaining in the product and positively impacting finance options. Finally, delivery of component parts into Kenya with use of local labour will reduce impacts from shipping difficulties as well as produce high quality products for the market.

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MAY YOUR BATTERIES ALWAYS BE MAINTAINED!

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