Battery Pollution®

Dealing with the dark side of the battery revolution®

Introductory Corporate Overview

Pursuing battery recycling technology & complementary hazard mitigation products

Workbook Overview

1. Our Technology Based Focus

i. Hybrid Operating Model Broken Into Four Verticals
ii. Scalable Technology To Meet Global Demands
    i. Battery Recycling & Black Mass
    ii. End Of Life & Crisis Management
    iii. 2nd Life Battery Manufacture
    iv. Robotic Dismantling & Mechanical Shredding

2. Target Market Opportunities

i. The Global Battery Recycling Market
ii. The Battery Pollution Problem
iii. Strengthening Unit Economics
iv. Supply Chain Of Critical Battery Commodities

Battery Pollution is an Australian technology based battery recycling company looking to solve a number of emerging issues stemming from societies addiction to the convenience of lithium based batteries

We are advancing proprietary technology & operational processes in a number of areas with significant global commercial application & relevance

Our initiatives have a narrow focus on solving specific challenges and unlocking even larger opportunities

We are bespoke by design and operationally driven. We are not trying to “boil the ocean” unlike many global players – but rather execute on the delivery of a world class vertically integrated lithium cell recycling & reuse operation

Acknowledging The Problem

The world is living in denial – fascinated by all things around the energy transition without understanding either the consequences for our environment nor the unique challenges lithium based batteries represent

In 2019 as a part of renewable project developments, **Battery Pollution's** founder began to focus on operational complexities and social consequences of the decommissioning and demobilising of large Battery Energy Storage Systems as a part of Environmental Impact Studies on solar farm projects

This led to the commencement of a journey of detailed investigation on the challenges we will all face with the rapid uptake of large scale battery based technology – from electric vehicles through to decentralised energy storage systems (in industrial, residential & commercial applications)

Richard Paddock's 2016 article in National Geographic titled "*The Toxic Toll of Indonesia's Battery Recyclers*" proved to be a pivotal "call to action"

Battery Pollution has been so named to highlight the coming challenges which are captured in the Company's caption of "**Dealing with the dark side of the battery revolution®**"

Our mission is to deliver a compelling commercial proposition leveraging proprietary approaches & technology to provide a cleaner, circular economy based approach to the end of life management, recycling & reuse of lithium battery cells

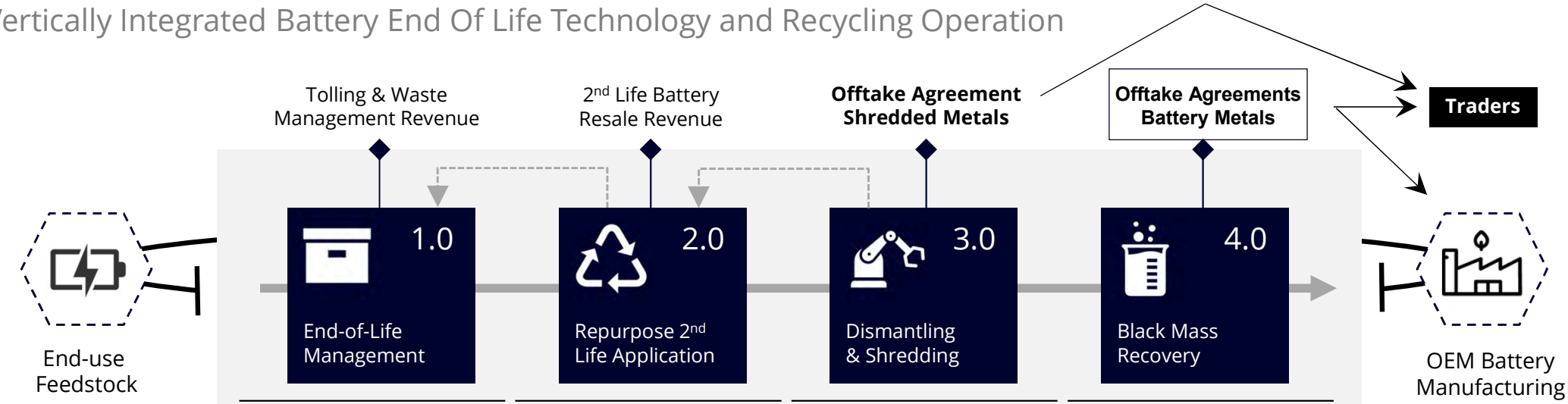
Our Technology Based Approach

Specific technology & engineering initiatives

1.0

Hybrid Operating Model Broken Into Four Verticals

Vertically Integrated Battery End Of Life Technology and Recycling Operation



	Transport and monitor hazardous Lithium-ion battery waste - Fire Suppression - IoT Enabled Safe Transportation Units - First Responder Kits - Battery SOH & Stability Monitoring	Repurposing battery cells with high SOH via the production of 2nd life battery units - Promotes Circular Economy - Alternative To Shredding - C & I BESS market	Automated and safe dismantling and shredding of batteries - Discharging Batteries to Capacitors/BESS & *Energy Scavenging* - Robotic disassembly - Proprietary pre-treatment prior to shredding	Proprietary Pyrometallurgy & Hydrometallurgy process to recover battery grade metals - Sovereign capability - Exportable technology - Products ready for reuse in battery manufacturing
Positive Environmental Outcomes	• Minimise & mitigate damage from "thermal runaway" events • Improve First Responder & Public Safety	• Effective reuse of quality cells • Promotes Australian sovereign manufacturing • Small BESS for targeted markets – including exploring "budget" models	• Lower environmental footprint as a result of optimised disassembly process • Circular economy – basic metals • Higher quality of "Black Mass for recycling through advanced pre-treatment	• Lower reliance on virgin mining activities • Lower secondary impact – including fuels used in transportation • Sovereign capabilities to produce battery ready materials

Creating the circular economy for the lithium-ion battery sector Across SEA and Oceania

Scalable Technology To Meet Global Demands

Putting in place technology & patents leads to flexibility in the business model applications – including potential for licensing & operating as a service (Labs processing Black Mass on 3rd party basis adopting "pathology lab" business model)

Technology Portfolio – Various Patents In Process

Technology

Innovation Focus

Smart Transportation	Battery Fire Suppressants	Second-life Applications	Disassembly Process	Chemical Extraction
Safe transport of spent or unstable battery cells –at surface & underground use	Suppress fire combustion from liquids or vapours escaping	Producing usable battery units from spent battery cells	Advanced robotic/human "hybrid" disassembly& pre-treatment process	Novel chemical process to recover valuable battery metals – ready for manufacturing reuse

Global Bias

All Elements Designed For Leverage In International Markets

Australian Innovation	Technology is Borderless	Global Solution, Local Use	South East Asia Reach	
Business model & technology being advanced and "hardened" in Australia	Domestic & Regional collaborative approach	Targeting specific Asian economies as a technology partner of choice	Problems of toxic battery waste amplified in emerging economies	Leading Australian professional services Firms engaged Q2 2023 to assist with R & D Grants / Incentives & various Patent Applications

Battery Recycling & Black Mass

Chemical Extraction

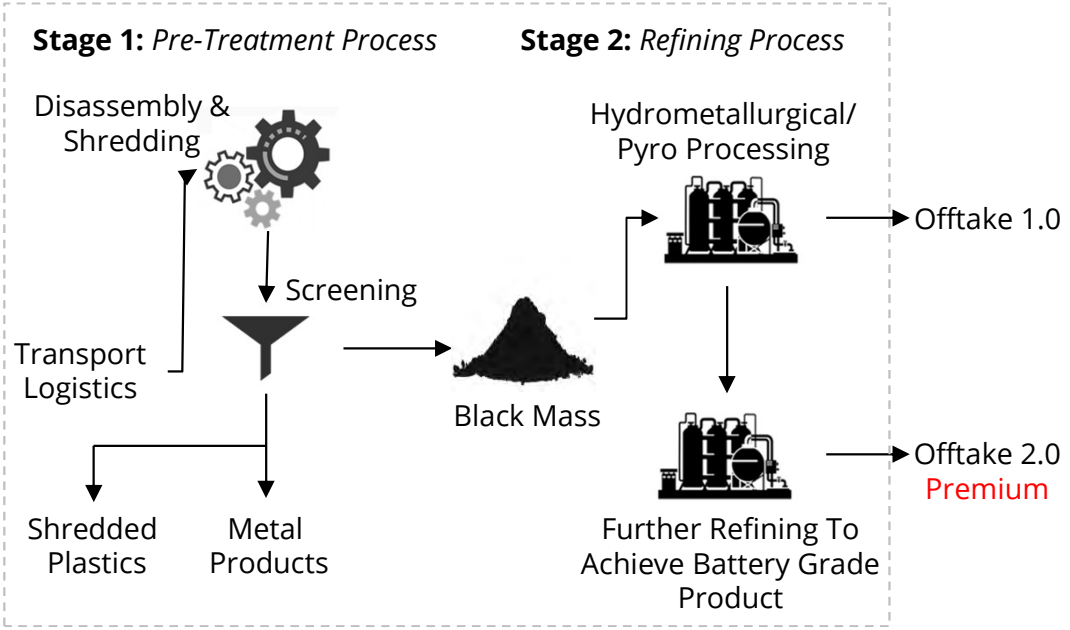
Developing optimised solutions to dismantling & shredding

The actual process of battery recycling combines traditional metal parts processing with chemical process to recover metals

The approach to the construction of the recycling facility is reasonably straightforward and progress to date includes:

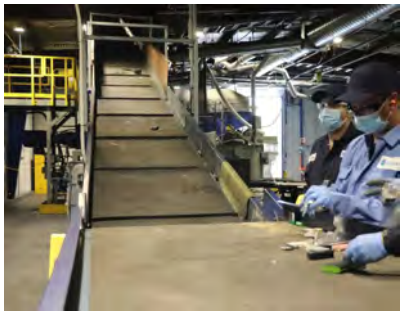
- Discussions are progressing with Tier 1 OEMs in relation to the supply of an initial pilot plant for shredding
- Site inspections of leading Korean recycling player undertaken 2022
- Recruitment of senior operational talent for shredding and process engineering advanced
- Discussions with EPA on approvals advancing
- Discussions on feedstock supply advancing
- Likely initial location will be either at the University of Newcastle facility or at Tomago on the northern outskirts of Newcastle (NSW)
- Offtake discussions already advanced with 3 players including leading Japanese Trading company who have been supplying Black Mass for chemical engineering process

General Example Of Process Flow For Metals Recovery



THE UNIVERSITY OF NEWCASTLE AUSTRALIA

University of Newcastle a key partner in the advance of 5 separate commercial initiatives & agreements



End of Life & "Crisis" Management

IOT Transportation Unit

Battery Fire Suppressants

Complementary Proprietary Hazard Facing Products

Specific Lithium Fire Hazard Opportunities

Our study of the market has given a unique perspective on the broader risks, challenges and opportunities that will present as a result of the intense fires that Lithium Cobalt Batteries produce. We are exploring & advancing specific products:

i. Fire Suppression materials – static & as extinguishing agent

ii. IoT Enabled Safe Transportation Units leveraging AI (*data pattern recognition*)

iii. First Responder Hardware & Specialist Equipment for Lithium based fires

iv. Mobile Sensor Based Battery SOH & Stability Monitoring in Crisis Conditions

Generation1 prototype of proprietary "Smart" Battery Transportation Unit – latest model subject to current patent application

Granular / spherical application used as a packing material in the Transportation Units or as a packing agent for our battery manufacturing strategy

Developing a proprietary base material that can be used in a variety of Lithium Fire Suppression Applications

Base Material being advanced for potential use in extinguishers

Sacrificial Glass

Fire Suppressant Technology

X-Li

Lithium Fire Suppression Technology

Multiple product trademarks in process or already registered

Example of Key Target Market

We are very focussed on exploring opportunities for improving response to traditional "thermal runaway" events relating to large Grid facing Battery Energy Storage System's that catch fire

All product development paths based on undergoing rigorous pilot projects combined with progressing various regulatory and insurance based approvals to meet accepted commercial standards

2nd Life Battery Manufacture

Second-life Applications

Leveraging Cells with High SOH For Target c. 15 – 20 kWh Repurposed Batteries

Single Unit BESS Focus

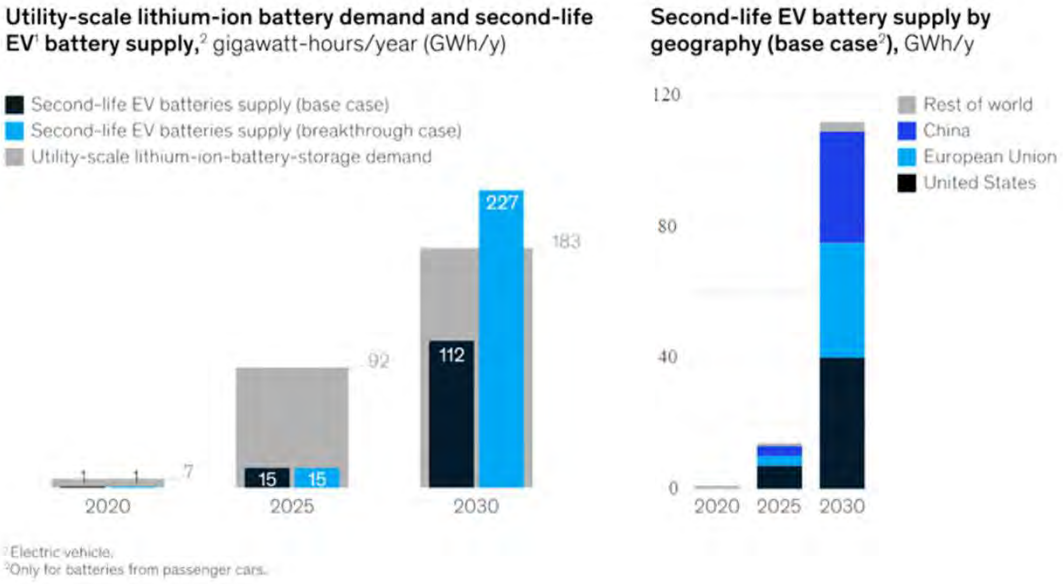
The production of 2nd Life batteries will be focused on capitalising on a number of specific end markets which will benefit from the growth in the application of commercial sized batteries over the coming decade:

1. Home storage units
2. Light commercial storage resulting in on site charging of a variety of commercial vehicles
3. "Destination" charging stations which will be a rapidly growing category driven by consumer "range anxiety". Destination convenience charging will become a frequent offering and feature in the tourism and Air BNB marketplaces

Discussions commenced with:

- specialist charging station operators to potentially venture and offer an integrated battery to fuel tank offering
- remote mine site camp operators to include an integrated solar panel & BESS storage solution

Second-life lithium-ion battery supply could surpass 200 gigawatt-hours per year by 2030.



USA Startups advancing 2nd life batteries

ReJoule smartville REPURPOSE ENERGY

Li2 BATTERIES
TECHNOLOGY FOR THE CIRCULAR ECONOMY

Robotic Dismantling & Mechanical Shredding

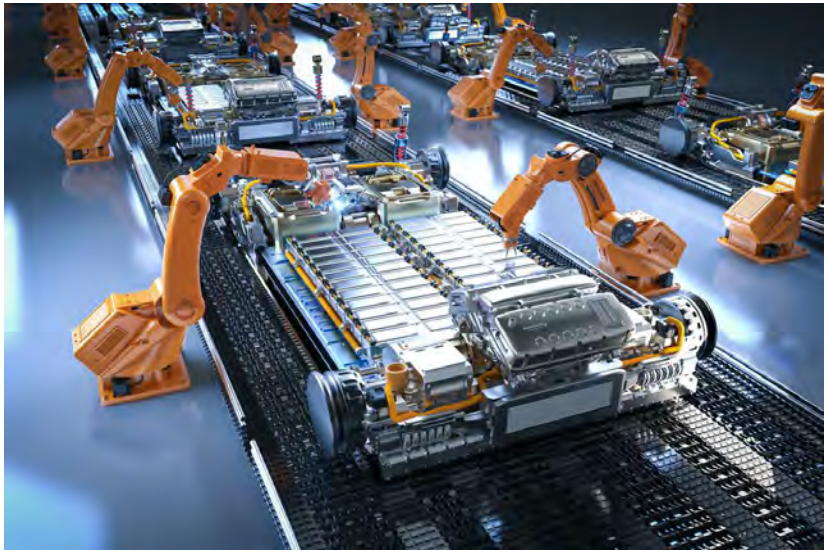
Disassembly Process

Advancing optimised solutions to dismantling & shredding

Battery recycling must balance efficiencies in pre treatment with the need for high quality recycled materials

The challenges of handling these battery packs are many and include:

- Physical movement of cells in an efficient way
- Positioning of cells to allow effective disassembly
- Dealing with the many screws and parts that "bind" the cell packs
- Time to complete a disassembly process in a consistent and sustainable fashion
- Weight of battery units – many hundreds of Kgs



Our approach has a heavy focus on pre treatment of units before mechanical shredding takes place. In contrast with other recyclers we are striving to produce a much higher quality black mass which we believe will achieve 2 things:

1. Allow a more efficient hydrometallurgy process for the separation of battery metals
2. Positions our chemical process to scale more efficiently

There is a balance of "volume" vs "quality" and we are collecting data that will allow robust analysis to take place

Role of Mechanical Shredding ?

We are in discussion with OEMs on alternative units to effect mechanical shredding of battery cell packs. We do not believe that this is a high part of the battery recycling technology chain and intend to enter into a number of OEM relationships as part of the development of an industry typical "hub & spoke" styled strategy. Spokes are the mechanical shredders with the hub being the high value Black Mass processing plant.

KATANA ROBOTICS

KATANA ROBOTICS

Target Market Opportunities

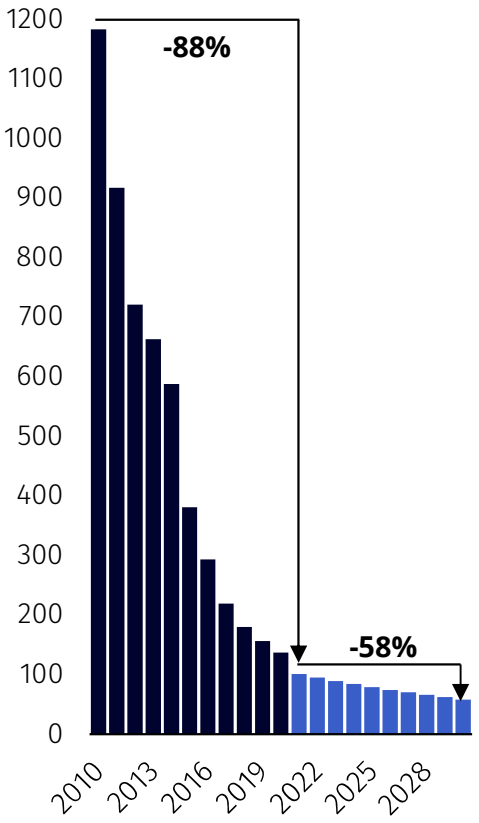
Dealing with the dark side of the battery revolution

2.0

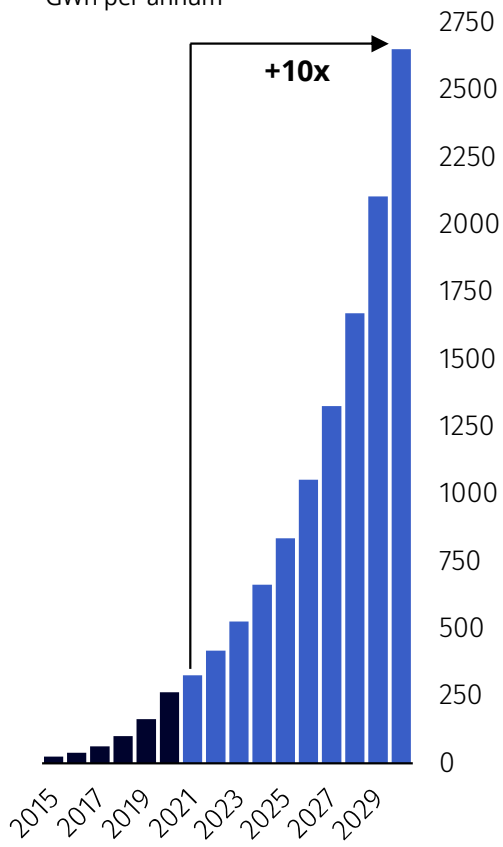
The Global Battery Recycling Market

A large market opportunity with strong tailwinds from sustainability and electrification megatrends

Global Price for LIB Packs
Real US$/kWh



Global LIB Demand
GWh per annum



There are several drivers behind why battery recycling will be a big part of the supply solution:

1. Recycling will be required to meet demand for battery metals, as there is limited primary supply even at high prices without crowding out other industries.
2. The economics of high cobalt, nickel and lithium battery recycling are very strong.
3. Regulation, especially in Europe, makes recycling mandatory and requires minimum recycled content levels by decade end.
4. Recycling provides responsible and ethical supply. ESG and consumer expectations give auto makers with strong recycling credentials a margin and cost of capital advantage.
5. The CO2 intensity of EV manufacturing (is double ICE vehicles) unless the metals are re-used.
6. The largest auto markets in the world (Europe, USA, China, Japan) rely on long supply chains for primary metals – recycling closes the loop and de-risks that supply chain (via resilient domestic supply).

Source: World Economic Forum (2019) A vision for a Sustainable Battery Value Chain in 2030; Bloomberg NEF (2020)

The Battery Pollution Problem

Over half of battery waste is generated from non-compliant batteries before they leave the manufacturing facility

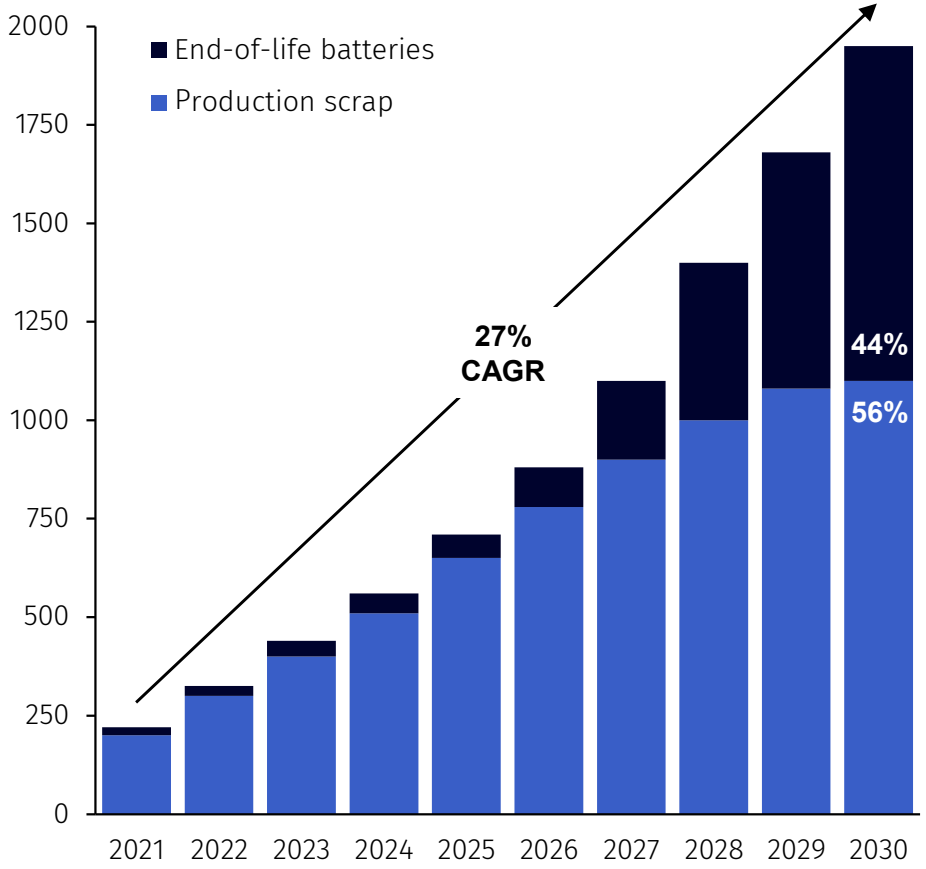
Battery waste is already a problem and it is only going to get worse.

- Batteries that have been in operation for several years are exhibiting shorter than expected life-spans and there are multiple instances of batteries being recalled
- Batteries are susceptible to combustion, particularly in high impact environments, which can be extremely detrimental (see below images)

There is currently a sizable global battery waste market built on production scrap.

- By 2030, 56% of recycling volume will be from manufacturing scrap (over one million mega-tonnes of batteries).
- Battery OEM's have an average production yield of <80% implying that over 20% of cells are rejected on non-sufficient quality and need to be scrapped as hazardous waste.

EV batteries and scrap volume for recycling
kMT, global



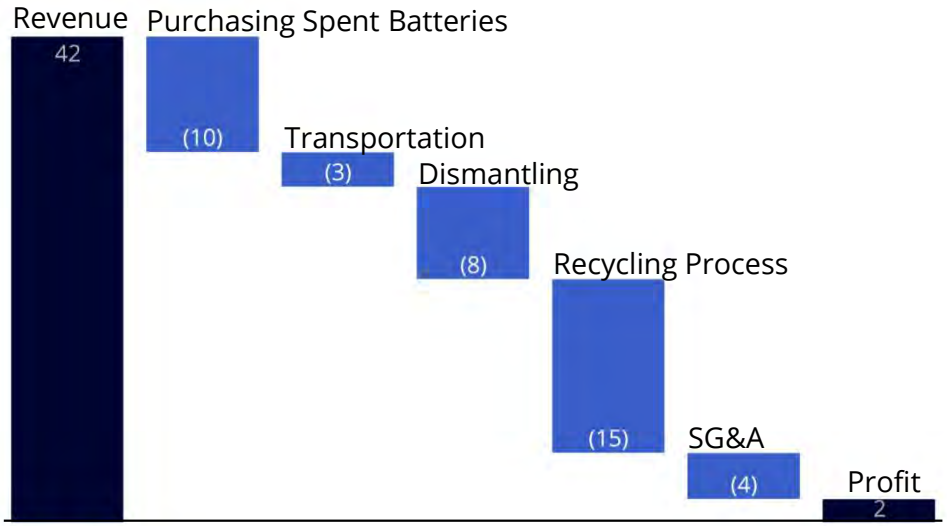
Source: World Economic Forum (2019) A vision for a Sustainable Battery Value Chain in 2030; Bloomberg NEF (2020)

Battery Fires

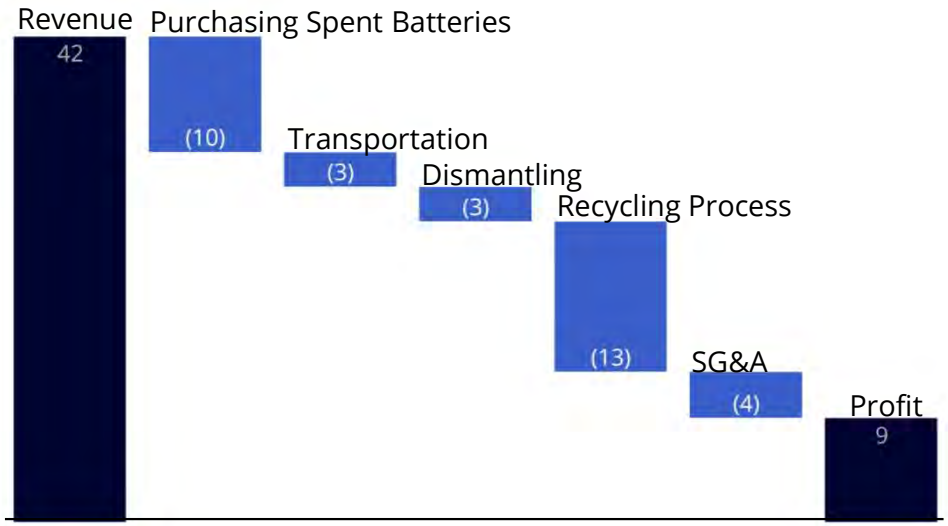
Strengthening Unit Economics

The economics of battery recycling are radically improving with major international players achieving profitability.

European Recycling Cost Structure
US$/kWh, 2022



Chinese Recycling Cost Structure
US$/kWh, 2022



1. Assumes processing capacity of >50,000 tons of 80kWh battery packs per year
2. Recyclers pay for the spent battery and receive no financial support

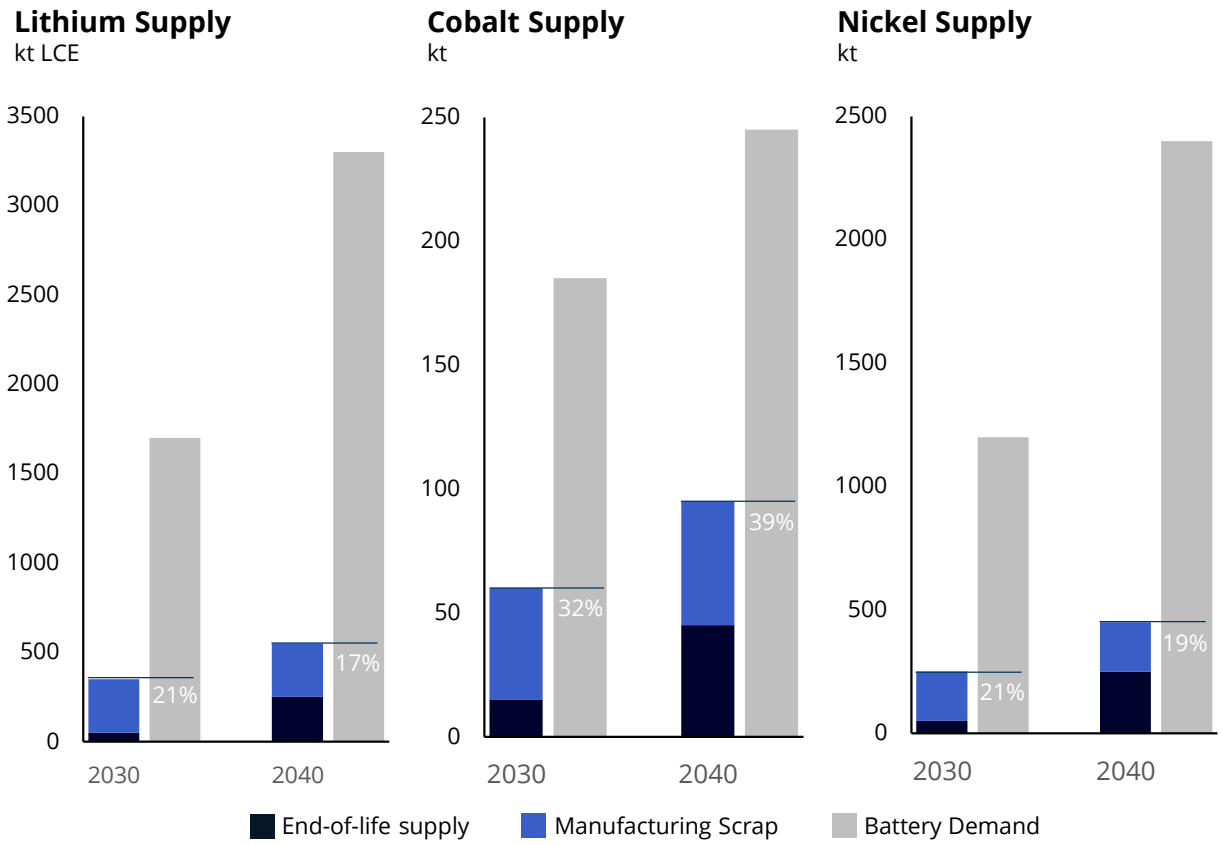
Source: NRI Estimation, AABC Europe 2022

In Europe and China, LIB recycling is already profitable due to scale merits even when assuming the recycler pays to aggregate the spent batteries.

- Economic viability of battery recycling is heavily contingent on volume of throughput material which is ballooning with the adoption of electric vehicles in all major economies.
- Sufficient volume is required to drive transport efficiency and operating leverage on fixed cost machinery.
- Automation is also a focal point for industry improvement as firms can generate cost efficiencies by using robotic dismantling to replace labour-intensive work.

Supply Chain Of Critical Battery Commodities

The commodity supply chain for ethically sourced battery metals is undergoing increasing strain due to rapid demand for batteries



1. First in grey, the volume of the three major battery commodities that will be demanded in 2030 and 2040.
2. Second, the volume of each commodity that could potentially be supplied by battery recycling companies in each year at a competitive price point. Recyclers pay for the spent battery and receive no financial support

Source: Wood Mackenzie 2022

Key Observations

Commodity Production

- Economists predict that there will be a supply shortfall for these elements by as early as 2030.
- The mobile and stationary battery boom has catapulted lithium prices to record levels and the world is going to need five times more lithium by the end of the decade.
- From the chart, manufacturing scrap is the major contributor to battery waste and will be for several decades.

Pricing Model

- We expect earnings sensitivity to directionally follow major commodity prices. However, the ability for recycling operators to manage-the-spread and embed “fee-for-service” in supply pricing means real world commodity price sensitivity tends to be less than static analysis concludes.
- We estimate run-rate earnings to likely be ~50% of commodity volatility, but it remains uncertain given the nascent stage of the sector.

Important information

This is a general introductory information presentation only, on what is a rapidly developing business model – as such it is highly likely that the operational development of the Company has progressed beyond what is outlined here, or potentially in a different direction (be that positive or negative). It is not published for any specific purpose other than general discussion and is not a document on which any capital raising is intended to be conducted in any country. Whilst reasonable care is taken in preparing this document data and business facts do change & evolve and any reader needs to independently check all facts to ensure their current relevance. General images in this document are public sourced – other than the Battery Box on page 8 which is a version of technology the Company is progressing.

"Battery Pollution" is an Australian registered business name of one of the special purpose vehicle companies that are being utilised to progress technology & operational initiatives. Brands & logos appearing in this document are all subject to trademark registration initiatives, but are included for reference only and are not all trademarks being pursued.

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