

Automotive Batteries

[Target] Executive Summary
June 2021

Prepared for [Client]

Project Summary

The following Executive Summary report prepared for [Client] summarizes research conducted by an independent consultant and AlphaSights. A total of 10 industry experts in the automotive/low voltage batteries industry were interviewed. The following report captures their sentiments, aggregates themes across interviews, and presents patterns. This report does not provide strategic recommendations or advice.

Key research questions:

1. What are the major trends and factors impacting this industry?
2. What are key technology trends, issues, including regulatory issues?
3. Who are the major industry players? What is the competitive landscape?
4. What are the economics of the industry – drivers of growth, margins, costs?
5. What are the strengths and weakness of [Target]?



Methodology:

- 10 Phone interviews lasting 45-60 minutes conducted by independent consultant, executed with the support of the pre-aligned interview guide
- Conducted between: June 10th - June 18th, 2021



Interviewees:

- 10 professionals, with direct experience in the automotive/low voltage batteries industry
 - Roles: Director and above
 - Direct experience in automotive/low voltage batteries
 - Full interview list on next slide

Interviewee List

	Role in Market	Employee's Title
1	Customer	CEO of Logistics Company
2	Customer	Former Vice President Merchandising
3	Competitor to [Target]	Director Reserve Power Business Development & Marketing
4	Competitor to [Target]	Director EMEA, Product Management and Application Engineering, Network and Motive Power
5	Competitor to [Target]	Vice President - Motive and Reserve Power
6	Competitor to [Target]	Director, Sales
7	[Target]	Former President and CEO
8	[Target]	Former Executive Director - Global Aftermarket Strategy
9	[Target]	Former Vice President and General Manager Americas
10	[Target]	Former Vice President Business Operations, Global Procurement and Recycling

Screening Criteria:

- Must be familiar with trends impacting the automotive/low voltage battery industry and be able to compare competitor companies in the industry and speak to customer markets
- Must have held a role as a Director or above in an automotive/low voltage battery function
- Ideally have been active in the industry in the last 24 months (either directly or through consulting)

1. Industry Overview

The total automotive battery industry is approximately 400 million units and US\$20 Billion, and accounts 80-85% of all low voltage batteries. Other industries using low voltage batteries are the reserve power, motive, and specialty markets.

Experts estimated growth in the market to continue at historic levels of 3-6% year-over-year, tracking the growth in automobile parque and closely following GDP growth.

Generally, experts did not see a risk of the low voltage batteries being phased out due the enormous installed base and low costs of lead based batteries.



Estimated Market Size 2021

\$20 billion



Total number of automotive batteries sold each year

400 million units



Historical and projected year-over-year growth rates are estimated at

3-6%

1. Industry Overview

The automotive battery industry is over a century old, and lead-acid batteries have have had incremental technological advancements over many years.

- As recently as 30 years ago, there were thousands of battery manufacturers globally versus several hundred in the industry currently. Consolidation and increasing capital requirements have driven the decrease in players in the industry. Further consolidation is expected in the future as smaller players become less viable.
- The competitive landscape is largely divided along geographic areas due to the high weight/cost ratio of lead acid batteries.
- [Target] is the dominant player in North America, Latin America and Europe, and among the leaders in China and the rest of Asia.

1. Industry Overview – Automotive battery market

Within the automotive industry, the broad divisions are OE and Aftermarket. The aftermarket is further divided by channel.

- **OE**

- Auto manufactures choose one battery manufacturer for each new model design, keeping the same supplier throughout the life of a model design
- Volumes are high (on a single SKU) and relatively predictable
- Margins are lower than for aftermarket
- Demands on quality and availability extremely high



- 20-25% of market in mature markets
- 40-50% in China

- **Aftermarket***

- OES (OE Service - dealers)
- Wholesalers/Distributors
- Battery Specialists
- Retailers
- Installers



- 75-80% of market in mature markets
- 50-60% in China

* Further detail on Aftermarket on next page




1. Industry Overview – Automotive aftermarket channels

The automotive aftermarket for batteries mirrors most other aftermarket parts, with multiple channels that overlap, and perform different roles within the supply chain.

- **OES**
 - OE Dealers will buy the exact battery used in OE production to service new vehicles
 - Margins are higher than for OE production
- **Wholesalers/Distributors**
 - Buy in large quantities from manufacturers
 - Supply to non-OE installers/repair shops and smaller retailers
 - Maintain inventories on most popular SKUs
- **Battery Specialists**
 - Similar to distributors, but maintain larger inventories of less common SKUs
- **Automotive Parts Retailers/Big Box Retailers**
 - In the US, larger chains (e.g., Autozone, Walmart) buy direct from manufacturer
 - In non-US markets, retailers buy from distributors
 - Retailers will sell direct to “do it yourself” consumers and sometimes installers
- **Installers**
 - Install batteries for consumers
 - Typically buy from several distributors/retailers based on availability

1. Industry Overview – Non-automotive uses of lead acid batteries

Beyond the automotive industry, the main industries that use lead acid batteries are Reserve Power, Motive, and Specialty/Other

- **Reserve or backup power**
 - Telecom – cell towers/switching centers, broadband, long haul fiber
 - Datacenters
 - Utilities – generation, transmission, distribution (across all utilities) ~10% of market
- **Motive**
 - Material handling (primarily forklifts)
 - Automated guided vehicles (e.g., in warehouses)
 - Airport equipment – tugs, baggage carts
 - Golf carts ~10% of market
- **Specialty/Other**
 - Marine/watersports
 - Quads/All terrain vehicles (ATVs)
 - Emergency lighting
 - Building automation
 - Medical equipment ~1% of market


1. Industry Overview – Key Buying Factors

Key buying factors for batteries align closely with KBFs for other automotive parts.

- **OE KBFs**
 - Credible supplier – large enough with a background in industry
 - Sufficient production capacity (always meeting OE production schedules is critical)
 - Quality
 - Cost
 - Weight
- **Aftermarket KBFs**
 - Availability of product – maintaining inventory to mitigate supply chain issues
 - Quality – especially in private label batteries
 - Cost – clear understanding of how fluctuations in raw material prices are handled
 - Terms – days to pay, consignment, returns, etc.
- **Consumer KBFs**
 - Price
 - Warranty

2. Technology Overview – Lead acid batteries

Lead acid battery technology is fairly simple and well over a century old, with several key innovations in recent years.

- **SLI (starting, lighting, and ignition) batteries** are a basic flooded lead acid battery still used in a majority of vehicles.
 - Primary innovations have come in reducing materials required by engineering changes
 - **EFB (Enhanced flooded batteries)** are a significant improvement over SLI batteries, cost 25% more, and can be built in SLI plants with limited capital investment.
 - EFB batteries can meet the needs of entry level start-stop vehicles, a middle step between SLI and AGM
 - **AGM (Absorbed glass mat)** batteries are the most advanced lead-acid batteries today, cost 2-2.5x SLI, and require all new plants.
 - AGM is required on most new start-stop vehicles, due to increased electrical demands in non-entry level vehicles
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- 85% of market
 - 50% of new vehicles
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- EFB and AGM account for 85% of total market
 - 50% of new vehicles have AGM or EFB

2. Technology Overview – Lead-acid versus Lithium-ion batteries

Lead-acid batteries and Lithium-ion batteries are largely not interchangeable currently, but some advisors felt that Lithium Ion could replace Lead-acid in some applications in the future. Currently Lithium-ion is used for propulsion and lead-acid for all auxiliary applications in Electric Vehicles.

	Advantages	Disadvantages
Lead-acid batteries	<ul style="list-style-type: none">• Lower cost• More recyclable• Wider range of operating temperatures• Lead easily available	<ul style="list-style-type: none">• Heavier• Lower cycle life (fewer charges)• Lead is toxic
Lithium-ion batteries	<ul style="list-style-type: none">• Lighter• Quicker recharge time• Much higher cycle life	<ul style="list-style-type: none">• Higher cost• Dangerous in extreme temperatures, toxic, flammable• Difficult to recycle• Lithium mined in few countries

2. Technology Overview - Key Regulations

Lead acid batteries are heavily regulated, across the three areas below, in mature markets, but major players typically exceed the regulatory requirements.

1. **Manufacturing** has strict requirements in mature markets for emissions, handling of lead and other hazardous materials, etc., which required significant capital improvements historically.
 - Major players have already made the capital investments to meet current and expected regulatory requirements even in developing markets
 - Increased regulation in developing markets, particularly in China, is expected to drive many smaller players from the market as capital requirements increase
2. **Transportation regulations** limit the ways that lead acid batteries can be transported, increasing the importance of a large footprint of plants and distribution centers.
3. **Recycling** is critical to the economics of lead acid batteries, driving a 98-99% recycling rate of all materials in batteries, the highest rate of any industry.
 - Some advisors felt that the industry need to do a better job of letting governments know how environmentally advanced the industry is, to avoid additional regulations that do not improve the environmental situation

2. Technology Overview - Trends

Key trends fall along three broad areas:

1. **Increased load requirements** as new vehicles move to predominantly start-stop, increased demands from electronics, and more sensors.
 - As requirements increase, basic flooded batteries will begin to be phased out
2. **Improvements in battery engineering** continue to improve the capabilities of existing lead-acid technologies.
 - AGM and EFB continue to improve on capabilities with new designs to reduce material requirements, and additional improvements such as adding carbon
3. **Electric vehicles** will drive increased demand for lithium ion batteries as the main propulsion battery, but auxiliary batteries will remain lead-acid for the foreseeable future.
 - Key threat to lead-acid batteries will be commodization as auxiliary batteries as improvements in battery management systems reduce capability requirements
 - One advisor did state that he believed lithium ion batteries would also be used for auxiliary batteries in the future, at least in high end vehicles

3. Competitive Landscape – North America

The three largest players are [Target], East Penn, and Stryten (formerly Exide Technologies).

- **[Target]** is by far the largest player
 - Estimated to have over 50% overall share
 - Share in the OE market over 70%
 - Share in Mexico with LTH brand is 70%
- **East Penn** is the second largest player
 - Estimated to have 25% share
 - Strong player, but limited growth aspirations
 - Owned by a family trust
- **Stryten Manufacturing (formerly Exide Technologies)**
 - Estimate 10-15% share
 - Stryten bought Exide after Exide had 2 bankruptcies
 - Has taken some share recently as they have rebuilt



**Market = ~100 million
units**

3. Competitive Landscape – Europe

The largest player in Europe is [Target], with no clear second player.

- **[Target]** is by far the largest player
 - Estimated to have 50% overall share
 - Operates under the Varda brand
- **Banner** is the 2nd/3rd largest player
 - Estimated to have 10-15% share
 - Based out of Austria
- **Exide Technologies GMBH** is 2nd/3rd largest player
 - Estimated to have 15% share
 - Based out of Germany
 - Originally part of company that included Exide in US, now totally independent
- **A number of other players** follow the top three
 - GS Yuasa (headquartered in Japan)
 - Mutlu (Turkey)
 - Many other regional players make up the rest of the market



**Market = ~60 million
units**

3. Competitive Landscape – China

The three largest players are Camel, Fengfan, and [Target], together taking about 50% of market.

- **Camel** is the largest player in China
 - Estimated to have as much as 25-30% share
 - Non-government owned
- **Fengfan** is the second largest player
 - Primarily under the Sail brand
 - Government sponsored company
- **[Target]** is the third largest player
 - Operates under Varda brand
 - Close to being second largest player
 - China is the only market where [Target] did not enter with an acquisition, instead building greenfield operations
 - Not the low-cost leader in China due to building more advanced manufacturing facilities (i.e., exceeding regulatory requirements)
- **An estimated 80 manufacturers** make up the remaining 50%
 - Increasing regulatory and capital requirements are expected to reduce this number in coming years



**Market = ~90 million
units**

3. Competitive Landscape – Latin America

[Target] is the number one player throughout Latin America, with regional players filling the second roles across markets.

- **[Target]** is the largest player in Latin America
 - Estimated to have over 30% share market wide
 - Leading player in all major markets
 - Leverage reputation of LTH brand (Mexico) in smaller markets
- **Moura** is the 2nd/3rd largest player in Latin America
 - Estimated to have 10-15% share
 - Based in Brazil, the largest market in Latin America
- **Tudor** is the 2nd/3rd largest player in Latin America
 - Estimated to have 10-15% share
 - Also based in Brazil
- **An estimated 30 manufacturers** make up the remaining market
 - Similar to Europe with many regional players

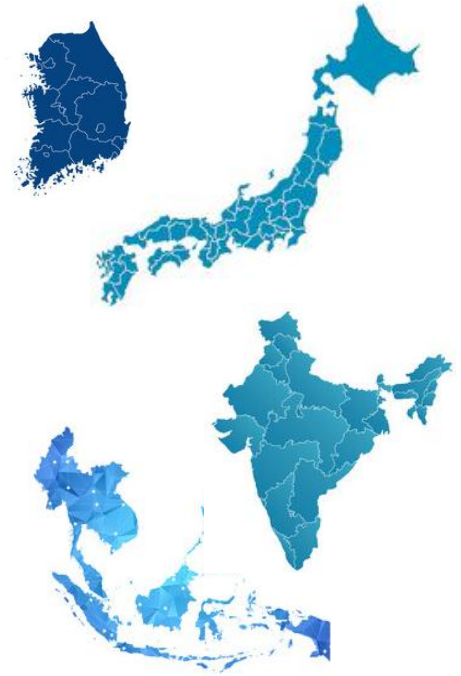


**Market = ~50 million
units**

3. Competitive Landscape – Rest of Asia

Within each of the key subregions of Asia, different players lead the market.

- **GS Yuasa** is the largest player in Japan and SE Asia
 - Headquartered in Japan
 - Manufacturing plants throughout SE Asia
- **Exide Industries** and **Amara Raja** are the two major players in India
 - Amara Raja is a joint venture with **[Target]**
 - Exide Industries unrelated to other Exide companies
- **Seabang** and **Atlas** are the two largest Korean manufacturers
 - Korea is the only market with significant exports (75% of production)
 - **[Target]** is the third leading player in Korea



**Market = ~30 million
units**

4. Economics – Margins

Very few of the advisors would talk about margins, but high level estimates were offered for some segments.

- **Margins on sales to OE's** are the lowest across the industry
 - Overall OE margins range from 8-12%
 - Lowest margins are on basic SLI batteries (low technology) and China (high competition) – ~8%
 - Highest margins are on AGM (higher technology) and Europe – ~12%
- **Margins in the aftermarket** are significantly higher
 - Overall margins are 2-3x OE margins
 - Margins are the highest in US retail as sales are direct to retailers (no wholesalers) – ~30%
 - Margins in all other markets are lower due to another step in distribution (wholesalers) – ~20-25%
- **Margin improvements** are driven around two main areas:
 - Continued reductions in material costs
 - Higher technologies that can demand higher pricing

4. Economics – Key Cost Drivers

There are three main cost elements for batteries: materials, labor, logistics.

- **Materials** account for 80% of the cost of batteries
 - Lead accounts 80% of BOM, or 60% of total costs
 - A key factor in reducing lead costs is a strong recycling program ([Target] has the largest)
 - Engineering advances continue to reduce materials required
- **Labor** accounts for an additional 10% of total costs
 - Automation is beginning to make inroads, but still relatively low
- **Logistics** make up the remaining 10% of total costs
 - Lead acid batteries are heavy relative to their price, limiting the geography that can be economically served from a plant or distribution center
 - Manufacturing and distribution footprint is the key driver of logistics costs
 - [Target] has by far the largest footprint globally, and within most markets except Asia (where they are among the leaders)

4. Economics – Growth Trends

Automotive batteries have typically grown with the growth in the car parque, which in turn is driven by overall GDP growth.

- **Overall growth** is expected to average **3-6% globally**
- Some of the **additional growth in revenue is being driven as more expensive technologies**, EFB and AGM, become more prevalent
- The **highest growth geographies** are **China** and the **developing parts of Asia**
- While not expected to affect overall battery demand, the **DIFM (do it for me) segment is expected to grow faster than the DIY** (do it yourself) segment, as batteries become more complex and less servicable by consumers
- As cars last longer, the **car parque will continue to grow**
 - Average of vehicles in the US is now over 12 years, lasting an average of 20 years
 - Batteries are replaced every 3-5 years, meaning 3-4 replacements over the lifetime of a vehicle
- **Cyclicalit**y is low in the industry

4. Economics – Effects of Covid

While none of the advisors was able to say specifically how much Covid impacted the battery market, anectdotally, it seems to have **increased demand somewhat**.

- As more people stayed home and drove their vehicles less, it has led to **more premature failures** as batteries have reduced life when not used regularly
- As fewer new cars were sold, more people held onto their old vehicles, which drives **increased aftermarket demand**
- Demands for **recreational/sport vehicle batteries were up 30%**, likely because outdoor activities were more available versus other options during the height of Covid
- None of the advisors mentioned significant supply chain issues due to Covid, likely due to the localized nature of production

5. Target Scan – Overview

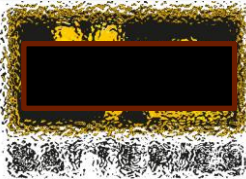
Overall, [Target] is the leading player in the automotive battery industry, and the **only truly global player**.

After becoming the leading player in the US through acquisitions and organic growth, [Target] **bought the market leaders in several markets**, including Varda in Europe and LTH in Mexico. China is the only market where [Target] entered with greenfield sites versus acquisition.

Every advisor mentioned **scale** and **technology** as a key advantages of [Target]. Most advisors felt [Target] was the **low cost producer**. [Target] has an even **larger share advantage in the OE new vehicle market**.

Most of the legacy management team has turned over, and little was known about the new team, but overall performance has apparently been maintained.

[Target] In-house brands



4. Target Scan – ERP

While none of the advisors were able to comment on when [Target] had last updated their ERP, evidence suggests they have maintained their systems sufficiently.

- **Production planning capabilities** was mentioned several times as a strength of [Target], which requires complex coordination between different plants, distribution centers, and suppliers. Because [Target] has the largest and most complex footprint, production planning is even more challenging.
- One advisor, with an OEM, said he **could not recall a production stoppage** with his company caused by [Target] in more than 20 years.
- Most automotive manufacturers are moving to using **Industry 4.0 based systems**, and [Target] integrates easily with those systems.

4. Target Scan – Carve-out

Advisors who were more familiar with the carve-out were only willing to speak in general terms, and others had only a passing knowledge, but several key themes came through:

- The carve-out was a move by the parent, to focus on fire, HVAC, and security equipment for buildings, typical in large conglomerates
- The move was subsequent to the spin-off of Target, Parent's former Automotive business
- Changes perceived in the marketplace were viewed as minimal, such as more flexibility in dealing with retailers, more streamlined internal business processes (from not having to adhere to Parent's overall KPIs and processes)
- Most of the legacy management is gone, but no knowledge on the current management team

4. Target Scan - SWOT

Strengths

- Largest footprint globally
- Low-cost producer (most markets)
- Technology leader
- High quality and reliability
- Excellent production planning

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Weaknesses

- May have over invested in AGM technology, versus EFB
- North American, [Target]-owned, distributor (Interstate) may be weak
- Not low-cost in China

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- Failure to maintain technology leadership through innovation
- Long-term, some possibility of Lithium Ion replacing significant parts of market (though [Target] does have Lithium Ion capabilities)

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Threats

- Possible increase in production capacity as industry is at capacity
- Increase presence in developing markets as demand warrants (Rest of Asia near-term, Africa long-term)

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Opportunities