LION E-Mobility AG

Automotive - Germany

Buy (Initiation) 25.04.2023

EUR 11.00 (Initiation)

Hear Them Roar // ready to charge ahead; Initiate with BUY

LION is on the brink of becoming a **fully automated producer of lithium-ion battery packs** for a wide range of applications such as buses, commercial vehicles, marine, industrial vehicles but also stationary energy storage with an **annual production capacity of 2 GWh or roughly 45k battery packs** (the serial production should start withing the next weeks).

LION's vast battery know-how (one of the first battery technology consultancy businesses in Germany; founded in 2008) **coupled with the experience as supplier of engineering services for the BMW i3 battery pack**, forms the ideal foundation of successfully running an own battery pack production.

What makes it even better, **LION was able to acquire the license and all necessary equipment to manufacture the SE09** (former BMW i3 pack) from BMW. Despite being "the new kid around the block", LION is able to offer customers a product with an **established reputation for safety, quality and reliability as well as an automotive qualification.** Thanks to its history as battery technology consultancy business, LION is able to engage potential customers as full service one-stop-shop with services from design over prototyping of new pack formats, development, testing and series production.

Stellar growth ahead. Over the next eight years, the demand for Li-ion batteries in Europe and the US is expected to 7-8x compared to 2022. This opens massive growth opportunities for the industry. The **market for battery pack manufacturing looks set to grow to $ 33bn** (vs. $ 4.5bn in 2022), carried by the electrification of mobility solutions and the broader energy transition.

LION is seen to be able to reap the industry's growth opportunities. Until 2026e, the company is seen to grow sales by 35% p.a. to € 176m. Thanks to a high degree of production automation and scale effects, **EBIT should increase at a 145% CAGR, with the margin reaching 6.7% by 2026e.**

Newsflow looks set to remain positive as dynamic sales growth on the back of customer wins and a strong order momentum (€ 45m during the first six weeks of the year) should become a recurring theme. Also, LION is in an advanced development stage for a new, immersion cooled battery pack which would be suitable for applications where performance is more important than price.

Initiate with BUY and € 11 PT based on SOTP (DCF for the pack production and multiples for the JV).

Y/E 31.12 (EUR m)	2020	2021	2022	2023e	2024e	2025e
Sales	18.4	28.4	53.8	74.9	105.7	139.0
Sales growth	950.2%	54.3%	89.1%	39.4%	41.1%	31.5%
EBITDA	-1.6	-1.2	0.5	0.2	3.8	8.4
Net debt (if net cash=0)	-0.8	-0.2	7.8	10.2	8.2	3.8
FCF	-2.0	-0.6	-5.3	0.3	2.0	4.4
Net Debt/EBITDA	0.0	0.0	16.6	53.2	2.2	0.5
EPS pro forma	-0.09	-0.12	0.03	-0.03	0.10	0.41
EBITDA margin	-8.6%	-4.3%	0.9%	0.3%	3.6%	6.1%
ROCE	-16.0%	-14.3%	2.1%	-0.8%	4.3%	13.0%
EV/sales	1.7	1.1	1.1	0.9	0.6	0.4
EV/EBITDA	-19.8	-25.1	131.7	333.5	16.5	6.8
PER	-46.6	-36.9	147.4	-156.4	41.2	10.4
Adjusted FCF yield	-4.0%	-3.2%	-1.4%	-1.2%	3.6%	9.2%

Source: Company data, NuWays, Close price as of 24.04.2023

Share Performance

High/low 52 weeks (€)	5.00 / 2.04
3m rel. performance	5.7%
6m rel. performance	50.1%
12m rel. performance	84.8%

Market data

Share price (in €)	4.30
Market cap (in € m)	53.1
Number of shares (in m pcs)	12.4
Enterprice value (in € m)	64.0
Ø trading volume (6 months)	3,900

Identifier

Bloomberg	LMIA GR
Reuters	LMIA.F
WKN	A2QH97
ISIN	CH0560888270

Key shareholders

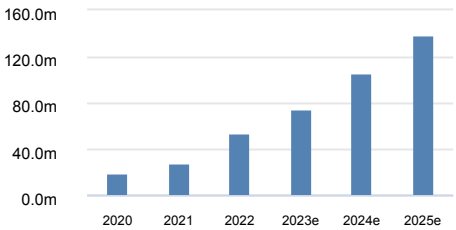
Ian Mukherjee	38.7%
Founders	6.0%
Free Float	55.3%

Estimates changes

	2023e	2024e	2025e
Sales	0.0	0.0	0.0
EBIT	0.0	0.0	0.0
EPS	0.0	0.0	0.0

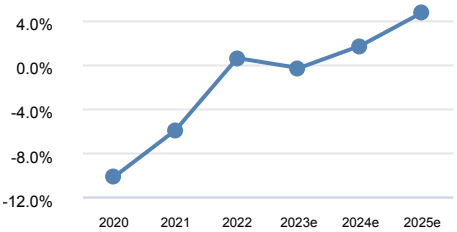
Comment on changes

Sales (2020-25e)



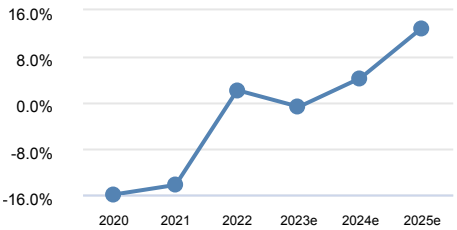
Source: NuWays Research

EBIT margin (2020-25e)



Source: NuWays Research

ROCE (2020-25e)



Source: NuWays Research

Company description

LION is a fully automated producer of lithium-ion battery packs for a wide range of applications such as buses, commercial vehicles, marine, industrial vehicles but also stationary energy storage with an annual production capacity of 2 GWh, the equivalent to 45k battery packs.

Guidance

- Sales 2023: € 70-75m
- Sales 2024: >€ 100m

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- On the brink of becoming a **fully automated producer of lithium-ion battery packs** for a wide range of applications
- LION **acquired the license and all necessary equipment** to manufacture the former BMW i3 battery pack
- **Expansion of the product portfolio looming**: a LFP-based battery pack and an immersion cooled battery pack

What started as a small consultancy business with a focus on battery technology in 2008 is on the brink of **becoming a fully automated producer of lithium-ion battery packs for a wide range of applications** such as buses, commercial vehicles, marine, industrial vehicles but also stationary energy storage (the serial production should start within the next weeks).

Simply put, LION is the nexus between battery cell manufacturers such as CATL, Samsung SDI or SK Innovation and vehicle/stationary storage manufacturers that are too small to operate and utilize their own battery pack production. **LION's typical customer requires several hundred to a few thousand battery packs annually**.

LION's extensive battery technology know-how coupled with the experience as supplier of engineering services for the BMW i3 battery pack (250k produced packs until the model was retired in 2022), forms the ideal foundation of successfully running its own battery pack production.

Typical use cases/customers

Mandrill's M-TWO

- Single pack system
- Electric off-road side-by-side
- Other suppliers include Vitesco

Lion Electric's busses

- Multi pack system (2-3)
- Selling school busses in North America
- Standing order for 2.5k busses from Amazon

Stationary Energy Storage

- Multi pack system (>10)
- Large scale systems with >100 packs
- Used to support renewables & factories

Source: NuWays, Company data

An overview of products & services

Currently, LION offers 1) a standardized product – the former BMW i3 battery "SE09" as well as 2) battery testing services through its 30% subsidiary TÜV SÜD Battery Testing:

(1) SE09 battery pack manufacturing & integration

Following the retirement of the BMW i3 in 2022, **LION has acquired the license and all necessary equipment to manufacture the former BMW i3 SE09 batteries & modules**, modify and improve those and derive new products based on the SE09 batteries & module.

During the past few months, the company focused on training its production employees, moving the manufacturing equipment from BMW's former production site in Garching (close to Munich) to Hildburghausen (Thuringia), building a new warehouse, water retention basin as well as fire safety system and fine-tuning production

processes with the help of BMW. Once completed (eNuW: mid-May), the site is **able to produce roughly 45k NMC (nickel manganese cobalt) lithium-ion battery packs** with an equivalent of 2GWh per year.

Importantly, LION also supports its customers with the integration of the battery pack (already during prototyping phases) into the final product as it is crucial to fine-tune the battery management system (BMS) and other electronics to each individual use case. For example, stationary energy storage requires a very different charging/ discharging behavior compared to a school bus.

(2) TÜV SÜD Battery Testing JV – a nice add on

In 2010, TÜV SÜD (internationally active, independent testing, inspection and certification of technical systems, facilities and objects of all kinds to minimize hazards and prevent damages) decided to become active in the field of battery testing. Given its lack of know-how, they turned to LION, which had a well-known and highly experienced battery consultancy business at that time.

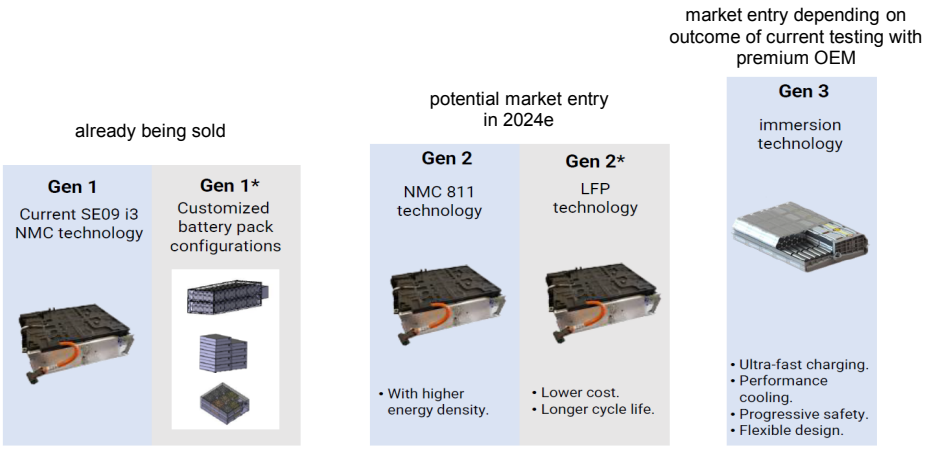
Together, they developed the full testing scope (e.g. performance, abuse, environmental and crash) for battery cells, modules, systems and packs, for which LION received a 30% stake in the newly founded company.

Taking into account the accelerating electrification trend and the hence increasing demand for battery testing, the Joint Venture should make for an attractive earnings contributor going forward (€ 500k impact on 2026e EBT).

Expansion of the product portfolio looming

Producing the former BMW i3 SE09 battery packs is only the first step. In fact, the company is already working on diversifying its product portfolio. The two most promising product innovations are LFP-based battery packs (1) and a high-end immersion cooling-based battery pack (2).

Planned product portfolio expansion



Source: NuWays, Company data

(1) Gen 2 // LFP to fully break into the energy storage market

From H2 '24e onwards (eNuW), LION should be able to also offer customers battery packs (same form factor as SE09) with a different cell chemistry, namely lithium iron phosphate (LFP). As LFPis the cell chemistry of choice for stationary storage solutions and increasingly gaining traction in the automotive space (safer and more durable), the introduction of a LFP-based battery pack would allow to **better reap the stellar growth opportunities of the storage and automotive market**. In our view, LIONs would have to invest some € 4m in order to make the necessary adjustment to its production lines (module assembly). This would ultimately allow LION to

produce both battery pack generations on its existing production line.

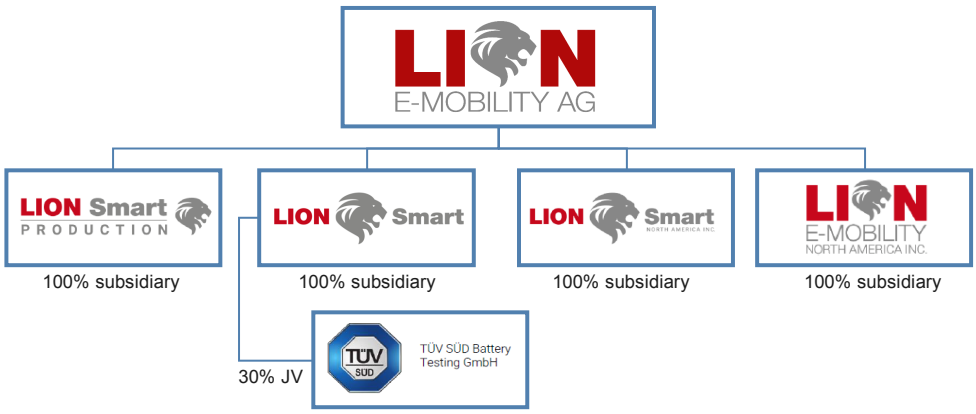
(2) Gen 3 // Immersion cooling for hypercars or super heavy-duty industrial vehicles

Battery technologies have already come a long way, yet minimizing charging times and maximizing the output in a short period of time remains challenging. The batteries simply get too hot if a lot of energy goes in or comes out quickly. LION (in cooperation with the Vestaro Consortium, which among others includes Evonik) has been working on an immersion cooled battery pack since 2019. Importantly, LION is **currently testing prototypes with a premium OEM.**

Since the battery is expected to be offered at a significantly higher price (eNuW: >2x of the SE09), we don't regard it as suitable for the automotive mass market but rather hypercars such as McLarens, Lamborghinis and Bugattis or super heavy-duty industrial vehicles such as fully loaded dump truck in a mine.

While LION's customer base is constantly growing, in currently comprises 10 OEMs across several industries, including Karsan Otomotiv (TUR), Dannar (USA), Mandrill (GER), Torqeedo (GER), BPW Bergische Achsen (GER) and Lion Electric Company (CAN).

Group structure

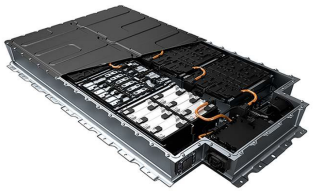


Source: NuWays, Company data

While **the listed AG is headquartered in Baar** (Switzerland), the company's operations are located in Germany with a small sales office in the USA. Its German operations are split between two sites: (1) **Hildburghausen**, which contains the module and pack production and (2) **Garching**, which features the R&D and sales departments.

LION E-Mobility AG

Full note / Initiation - 25.04.2023

	SE09 packs	Light Battery*	TÜV SÜD	Group
Products				
Application areas	Buses, commercial vehicles, marine, industrial vehicles, stationary energy storage	Hypercars, super heavy-duty industrial vehicles	Testing for batteries across all areas incl. EVs, industrial products, energy storage, medical, consumer electronics	
Customers	BMW, Lion Electric Company, Karsan Otomotiv, Mandril, Torqeedo, BPW, etc.	Currently in advanced testing with permium OEM	Most of the German automotive OEMs and leading names across industries	
Competitors	Accumotive, Akasol, BMZ, Forsee Power, Kreisel Electric, Leclanché, Microvast, Proterra, Webasto	AVL, Ricardo Engineering, Kreisel Electric, Xing Mobility, Tesla, McLaren, Moveko	Dekra	
Raw materials	Around 60% of raw materials are attributable to battery cells (currently prismatic, with immersion cooling also cylindrical). Electronics, steel and metal components, wire harnesses and the battery management software account for the rest		n.a.	
Suppliers	Currently, all used battery cells are supplied by Samsung SDI (5% global market share). Yet, LION could also use cells from any other battery major: CATL (34%), LG (14%), BYD (12%) Panasonic (10%), SK Innovation (7%)		n.a.	
Production sites	Production site in Hildburghausen and R&D center in Garching		Testing facility in Garching	
Sales '25e	139.0	n.a.	21.0	**139.0**
EBIT '25e	6.6	n.a.	2.3	**6.6**
EBIT margin '25e	4.8%		11.0%	**4.8%**
ROCE '25e				**13.0%**

Source: NuWays, Company data; *Product not launched yet

Competitive Quality

- A **sound competitive quality grounded in several entry barriers**: a proven product with automotive qualification, a one-stop-shop and a high degree of automation
- A **niche focus with a solid customer base** to kick off production with
- Strong **problem solver capabilities** thanks to a vast technological know-how

A sound competitive quality grounded in entry barriers

While the overall market for battery pack manufacturing is rather fragmented with a particularly large number of very small players, LION possesses a sound competitive quality, which is grounded in several entry barriers:

1. **A proven product with automotive qualification**
2. **A one-stop-shop build around batteries and integration**
3. **High degree of automation**

1. A proven product with automotive qualification

Despite being the “new kid around the block”, LION’s current product, the SE09 battery pack of the former BMW i3, has an **established reputation for safety, quality and reliability**. Until the retirement of the BMW i3 in 2022, more than 250k SE09 packs have been produced. As LION has acquired the license and all necessary equipment to manufacture the SE09 pack from BMW (incl. extensive training of the manufacturing workers), the packs have an automotive qualification from day one onwards.

Why an automotive qualification matters: Introducing a new car component isn’t as simple as plug-and-play. Automakers are particular about what they include in their vehicles, especially when it comes to safety relevant parts such as batteries. Before a battery pack can make it into a vehicle, OEMs verify that it adheres to a laundry list of strict manufacturing and performance guidelines.

It hence goes without saying that having an **automotive qualification**, especially when **received from an industry big-shot such as BMW, serves as strong proof-of-concept for any potentially new customer.** As obtaining an automotive qualification is usually a lengthy and costly process, it should keep smaller players at a distance.

2. A one-stop-shop build around batteries and integration

Thanks to LION’s history as battery technology consultancy business, coupled with the experience gathered through the TÜV SÜD Battery Testing JV and battery pack production expertise, the company is able to engage potential customers as full service one-stop-shop: LION offers customers services from design over prototyping of new pack formats, development, testing and series production (module and pack).

As part of its service offering, LION also develops customized BMS, which simply put are the brains of any lithium-ion battery system. They monitor and manage i.e. the voltage or the temperature between the individual battery cells within a module as well as among the modules within a system. This has major implications on energy efficiency as well as safety of the battery system.

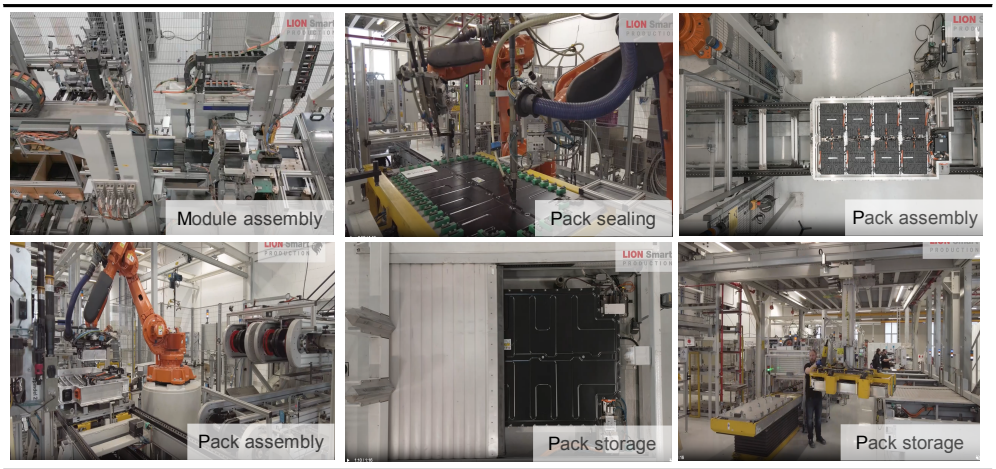
LION’s one-stop-shop approach allows its customers to reduce complexity and ultimately costs, strengthening customers’ loyalty.

3. High degree of automation

LION's production site in Hildburghausen is highly automated, which poses a notably barrier to entry, particularly for smaller players. In our view, a high degree of automation is key for profitability. Mind you, we model a 7% terminal EBIT margin despite plenty of efficiency gains and scale effects. While LION purchased the necessary equipment from its long-standing partner BMW used, setting up a similar production would cost north of € 40m (eNuW).

Importantly, the company **should not have to deal with the typical start-up risks** of a new, in particular automated, production, as all the equipment was already used by BMW to produce more than 250k SE09 battery packs and most of LION's manufacturing employees were trained by BMW on the exact same equipment while it was still at their site.

Automated modules & pack assembly



Source: NuWays

A niche focus to avoid the industry's big shots

With a current production capacity of roughly 45k battery packs, an equivalent of 2GWh, LION can be considered a rather smaller player in the industry. As a result, the company is currently focusing on customers with smaller series that require several hundred to a few thousand battery packs annually. While this reduces LION's cluster risk, it also shies away large competitors.

Going forward, we however do see a possibility of LION supplying battery packs to mid-sized series (~10k vehicles p.a.) of larger OEMs, depending on demand.

A solid customer base to kick off production with

With the release of the 2023/24e guidance in November of last year, the company also mentions that the 2023e guidance is based on 10 individual customers. While some of those names are still confidential, we have found six companies that are openly speaking about using the SE09 battery packs (only produced by LION).

Among its customers is the Lion Electric Company (no connection to LION E-Mobility). Besides school buses, the company is beginning to gain traction with its semi-trucks and minibuses. Due to strong demand, the company is currently expanding its production volumes from 2.5k vehicles to 25k. While Lion Electric is also working on building up its own battery pack production, we expect LION to continue being a supplier.

Customer overview

Customer name	Application
1. Karsan Otomotiv	Minibuses
2. Dannar	Mobile Power Station with various heavy duty attachments to lift, dig, push and sweep
3. Mandrill	Off-road side-by-side
4. Torqeedo	Electric motors + battery system for boots
5. BPW Bergische Achsen	Semi-truck "BAX"
6. Lion Electric Company	School buses, semi-trucks, minibuses

Source: NuWays

Problem solving capability paves the way for new products

When founded in 2008, the LION Smart GmbH (pure battery consultancy business) was one of the first companies in Germany to develop and test Li-ion batteries for automotive applications. Thanks to the now 14 years of experience in that field with countless research projects for industry leaders such as VW, BMW, BOSCH, Airbus and Toyota, the company developed excellent problem solver abilities.

A prime example for that is the LIGHT Battery (currently in advanced testing with a premium OEM), an immersion cooled battery pack that enables industry leading C-rates (measures charging and discharging times).

The problem: While Li-ion batteries for automotive applications have come a long way during recent years, increasing the C-rate remains one of the biggest challenges. Simply put, the higher the C-rate of a battery, the faster it can be charged and discharged. Naturally, a lot of energy quickly going in and out of battery cells creates high temperatures. The hotter a battery cell gets, the higher are the chances of serious damage and a significantly reducing lifetime.

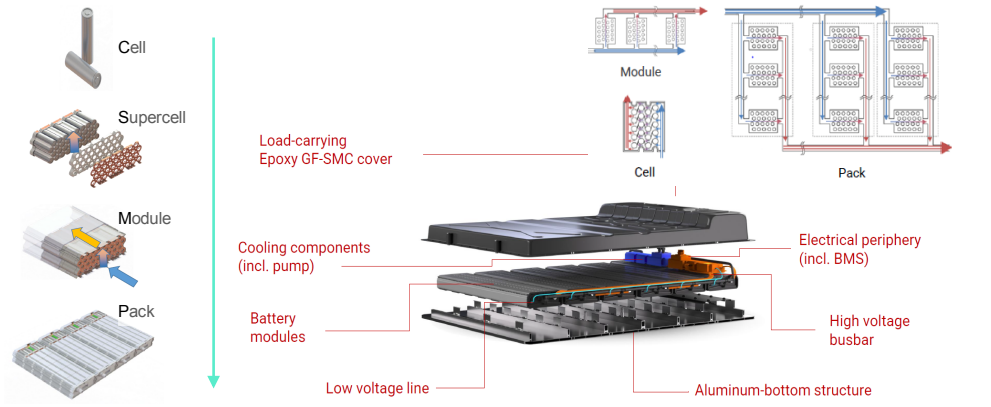
C-rates

0.1C	0.2C	0.5C	1C	2C	3C	4C
10 hours	5 hours	2 hours	1 hour	30 minutes	20 minutes	15 minutes
← Slow charge				Fast charge →		
← Steady driving				Fast acceleration →		

Source: NuWays

The solution: In theory, the solution can be simple. One needs to design an immersion cooled battery pack, similar to a high-end computer, which is submerged in a non-conductive/non-flammable liquid and connected to a heat exchanger that keeps pumping cold liquid into the computer. This is exactly what LION in cooperation with the Vestaro Consortium (Evonik, Lorenz Kunststofftechnik, Forward Engineering and Minth) is working on.

LIGHT Battery - immersion cooling



Source: NuWays

In detail: The LIGHT Battery features cylindrical 21700 cells with enough space in between them to let a fluid path through. Before being packaged into a module as with the SE09, several cells are packaged into a supercell and equipped with a wireless single cell BMS (connected to a master BMS in the dry area). This eliminates the need for a wiring harness and enables a more flexible design. The final pack is divided into a wet and a dry part with the latter mainly housing the master BMS, cooling components (e.g. pump and heat exchanger), the high voltage busbar and other electronic components.

The result: While still being in advanced testing with a premium OEM, the preliminary results speak for themselves. By being able to essentially control the cells' temperature, allows for very fast charging (<10min from 10% to 80%) without overheating the cells, the maintenance of the optimal temperature while driving and fast but safe discharging period (e.g. a racecar driving >250 km/h or a fully loaded mining vehicle going uphill).

Importantly, there are also downsides to the technology. Once qualified, the final pack is likely to sell at a significantly higher price compared to the SE09 pack (eNuW: around € 25k vs € 13.5k). Also, the liquid adds weight, which needs to be compensated for by stronger engines. We hence don't regard the LIGHT Battery as suitable for the automotive mass market (at least for now) but rather hypercars such as McLarens, Lamborghinis and Bugattis or super heavy-duty industrial vehicles.

Business Quality

- Increasing returns as the new production plant ramps up; **ROCE to increase from -0.8% in 2023e to 18.5% by 2026e**
- **Working capital improvements** thanks to rising inventory turn
- **FCF to reach € 7.2m by 2026e** compared to negative € 5.3m in 2022e

Business quality to thrive on ramp-up

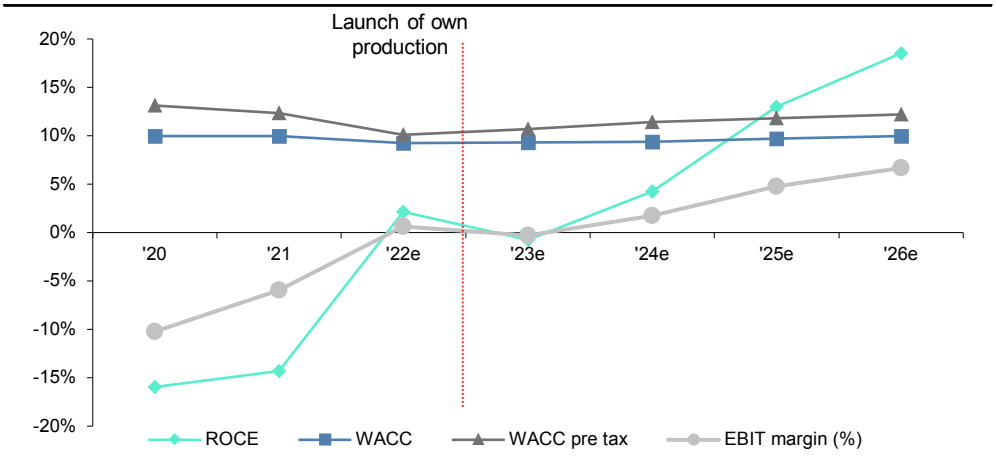
LION's business quality should thrive on the ramp-up of its own battery pack production at its site in Hildburghausen, driven by a **strong order momentum as underpinned by the € 45m order intake from 10 customers** during the first six weeks of the year. In detail, we expect the ROCE (EBIT/avg. capital employed) to reach a strong level of 18.5% by 2026e (vs. -0.8% in 2023e). This should predominantly be driven by an improving profitability (EBIT margin from -0.3% in 2023e to 6.7% by 2026e):

1. **Economies of scale:** The significant growth in sales and production volumes look set to drive strong economies of scale on procurement volumes, personnel costs, D&A and several other fixed costs such as admin and sales. Beyond 2026e, we see further upside with utilization rates reaching the theoretical annual production capacity of 45k packs.

2. **Efficiency gains:** Efficiency gains as well as learning curve effects look set to add to profit growth as the company fine tunes its processes, reduces quality costs, increases production speed and develops innovations.

An additional driver behind the strongly increasing ROCE is the **rising capital turnover** (sales/avg. employed) is **further increasing to roughly 2.5x by 2026e** (1.85x in FY 2023e). This is primarily driven by anticipated 35% sales CAGR (2022-26e).

Returns



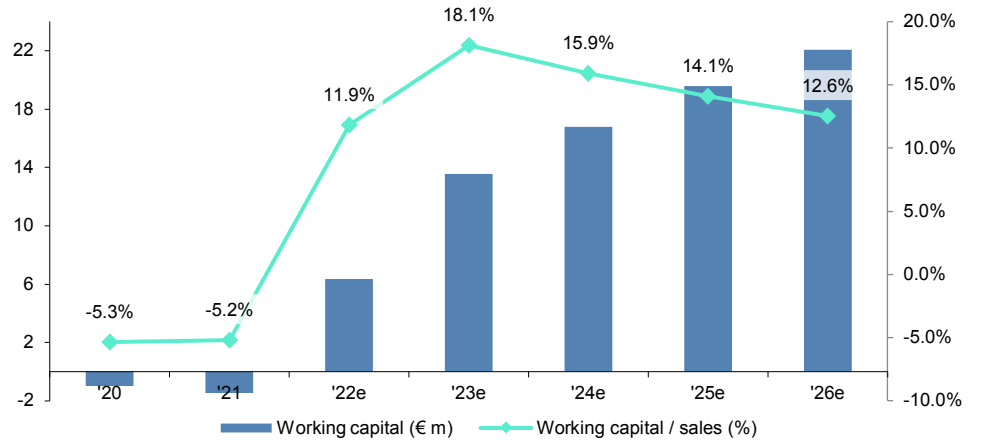
Source: NuWays

Some improvement potential for working capital intensity

Working capital intensity for LION is **moderate at around 18% in 2023e**. While days to collect receivables and pay payables are not excessive (FY 2023e: 45 and 30), the inventory turnover looks rather sluggish at only 4.5x. Going forward, we model stable days to collect receivables and pay payables but **expect the inventory turnover to increase to 6x by 2026e** carried by (1) operational improvements allowing for efficiency gains and higher throughput rates and (2) the company's ability to work down some of its start-up related safety stock.

Hence, the **working capital to sales ratio should decrease to 12.6%** by 2026e.

Working capital



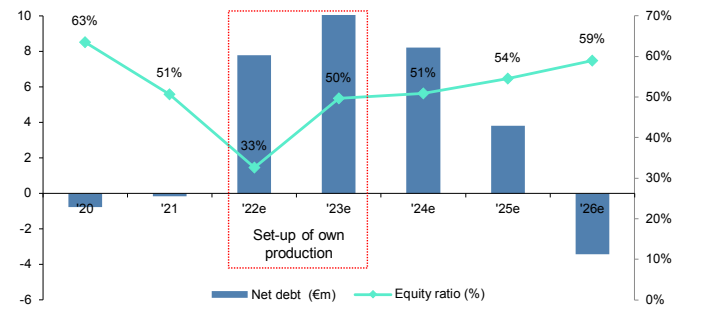
Source: NuWays Research

LION looks set to **already generate a positive FCF in FY 2023e** (eNuW: € 0.3m). **Until FY 2026e, this is seen to further grow to € 7.2m**, or around 53% of EBIT-DA. Here is why:

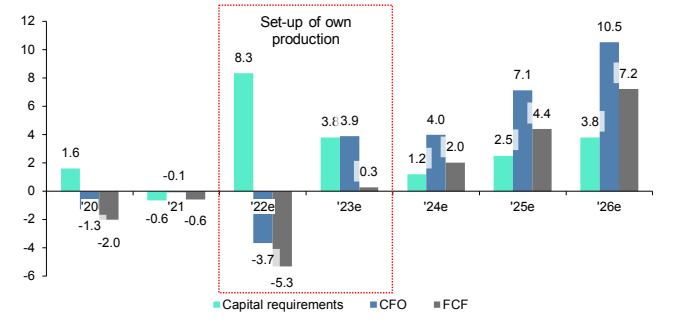
- **Normalizing capex.** Following the currently undergoing set-up phase of the company's production site in Hildburghausen, which includes acquisition of BMW's former production equipment, building a new warehouse, water retention basin installing a new fire safety system, LION's capex should largely decrease to a maintenance level of 1.5-1.8% of sales. A possible expansion of LION's product portfolio (e.g. LFP-based packs or LIGHT Battery), would result in additional capital requirements, which the company could easily finance thanks to its improving op. cash flow.
- **Improving working capital.** As described above, once fully up and running, LION should be able to reduce its working capital ratio from >18% in 2023e to around 13% in 2026e.
- **Operating performance.** As described above, LION is seen to quickly improve its profitability, thanks to the planned ramp-up of production.

Following the set-up of its production and thanks to an improving FCF generation, LION is seen to quickly turn its net debt position (~ € 10m in FY 2023e) **into net cash. By the end of 2026e, we expect LION to have € 4.2m net cash and an equity ratio of 59%.**

Solvency



Capital requirements, CFO and FCF



Source: NuWays

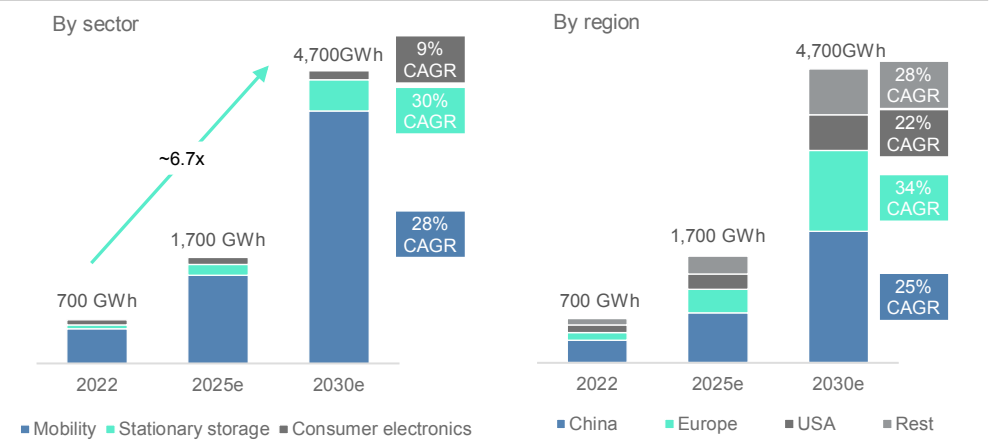
Growth

- **Demand for batterypacks is seen to grow at a 30% CAGR** (2022-30e) stemming from the electrification of mobility and the broader energy transition
- **35% sales CAGR 2022-26e** thanks to its new production plant ramping up
- **Disproportionate growth in EBIT** due to the positive operating leverage and efficiency gains as the utilization increases; 145% CAGR (2022-26e)

Relevant market growth driven by megatrends: electrification and renewable energies

The need significantly reduce CO2 emissions through the electrification of mobility and the broader energy transition is fuelling a substantial surge in the worldwide demand for batteries. McKinsey anticipates a significant surge in the global demand for Li-ion batteries over the next eight years: Overall **demand looks set to 6.7x** from 700 GWh in 2022 to 4,700 GWh by 2030.

Global Li-ion battery cell demand



Source: NuWays, McKinsey

Batteries for mobility applications, such as electric vehicles, are seen to **account for the vast bulk of demand in 2030** of about 4,300 GWh. This is an unsurprising trend given the fact that the industry is going through significant structural changes. This is largely driven by three major catalysts:

1. A shift in regulations towards sustainability, which includes the implementation of new net-zero emission targets and guidelines. This shift includes programs such as Europe's "Fit for 55," the US Inflation Reduction Act and the 2035 ban on internal combustion engine (ICE) vehicles in the EU.
2. Greater customer adoption rates and increased consumer demand for environmentally friendly technologies, with up to 90 percent of total passenger car sales involving EVs in select countries by 2030.
3. The announcements made by 13 out of the top 15 OEMs to ban ICE vehicles and achieve new emission-reduction targets.
4. Massive subsidy programs such as the US Inflationary Reduction Act and the EU Net Zero Industry Act

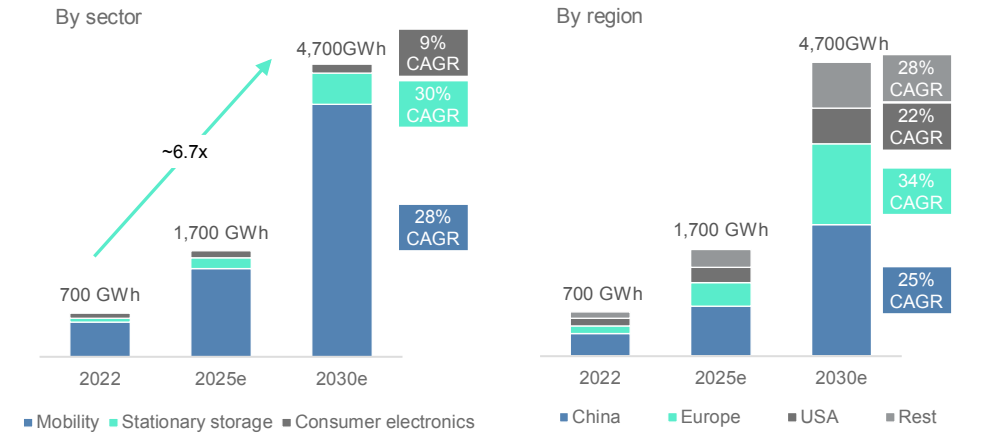
Demand for stationary energy storage systems is seen to grow at a **30% CAGR until 2030,** stemming from increasing adoption rates across various applications such as grid stabilization, frequency regulation and renewable energy integration. Likely tightening regulation in regards to environmental related topics could even

render those estimates as conservative. With roughly 750 GWh of capacity, energy storage solutions alone should exceed today's global Li-ion demand across all application areas.

Based on the rising demand for Li-ion batteries across industries, McKinsey anticipates **a five-fold increase in revenues across the entire value chain, from approximately $ 85bn in 2022 to more than $ 400bn in 2030.** Europe in particular should be marked by stellar growth rates, driven by efforts to decrease its dependency on China. Until 2030, the European market is seen to grow to $ 118bn, implying a global market share of 29.3% (vs 15.3% in 2022).

LION's addressable market, battery pack manufacturing in Europe and the US, looks set to also experience similar growth. Although being only $ 4.5bn in size in 2022 (eNuW), **it is seen to grow to $ 33bn by 2030**. While LION has so far no US-based production, the company would consider building one, depending on the development of its customer base during the next 2-3 years. This would allow a better penetration of the $ 11bn US market (by 2030). In order to set up a greenfield US-based production, the company would have to invest € 30-35m, eNuW.

Value of the Li-ion battery value chain in $ bn



Source: NuWays, McKinsey

Putting it all together – 35% sales CAGR 2022-26e

All in all, we expect the strong growth prospects of the underlying end markets in combination with LION's sound competitive quality to **drive the group's top-line by 35% p.a. until 2026e**, easily meeting its 2024e guidance of € 100-110m sales.

Taking into account (1) the strong start into 2023e with order intake of € 45m during the first six weeks, which serves as strong proof of concept, (2) the theoretical ability to produce battery packs worth € 400m at its Hildburghausen site (assuming stable pack pricing and 100% utilization of its current production line) and (3) a likely accelerating trend towards electrification of mobility solutions as well as an industrial battery storage market that is just beginning to emerge, our current estimates could prove themselves as rather conservative during the next 12 months.

		2021	2022e	2023e	2024e	2025e	2026e	CAGR '23-26e
Group sales (€ m)		**28.4**	**53.8**	**74.9**	**105.7**	**139.0**	**175.9**	**32.9%**
	yoy		*89%*	*39%*	*41%*	*31%*	*26%*	
# of battery packs		n.a.	n.a.	5,550	8,702	12,715	17,386	**46.3%**
	yoy				*57%*	*46%*	*37%*	
ASP (€ m)		n.a.	n.a.	13,500	12,150	10,935	10,115	**-9.2%**
	yoy				*-10%*	*-10%*	*-8%*	
Capacity utilization				12%	19%	28%	39%	

Source: NuWays

What is behind our growth estimates:

- **# of battery packs:** For now, LION's typical customer requires several hundred to a few thousand battery packs annually in order to equip their rather small-scale series' productions. Within the next years, the number of customers is seen to grow from 10 (incl. Lion Electric, Karsan and Dannar) in 2023e to 18 by the end of 2026e. Accordingly, LION looks set to sell ~17.4k battery packs (which would still imply only 39% capacity utilization) by 2026e, up 214% compared to 2023e.
- **LFP-based packs could accelerate growth.** As LFP is the cell chemistry of choice for stationary storage solutions (safer and more durable), modification of the current production line could notably accelerate our estimated volume ramp up.
- **ASP development:** For 2023e, we expect an average sales price of € 13,500 per battery pack. Going forward, we model a roughly **9% price decrease p.a.** on the back of gradually decreasing battery cell prices (normalization of lithium carbonate prices). During the past twelve months, China has massively invested into decreasing the global market deficit of lithium carbonate to 20-30kt from roughly 76kt a year ago; prices collapsed by 50% yoy. Going forward, China is expected to try defending its position as the lithium supplier of the world, allowing supply to grow with demanding and likely allowing prices to further normalize. Mind you, given the "open book accounting", LION should have to pass on lower input prices to its customers.

Importantly, we have **so far not included any sales from the Light Battery**, as it is still in a development and testing phase.

Mid to high single-digit EBIT margins as sales volumes grow

Overall, LION's **EBIT is seen to disproportionately grow from € 0.3m in 2022 to roughly 11.8m by 2026e** (145% CAGR), implying a margin of 6.7%. The key drivers behind this are:

- **Economies of scale:** The significant growth in sales and production volumes look set to drive strong economies of scale on procurement volumes, personnel costs, D&A and several other fixed costs such as admin and sales. Mind you, **we see further margin upside beyond 2026e driven by increasing utilization rates**. At the current build-out stage, the factory in Hildburghausen should have an annual production capacity of 45k battery packs. In 2026e, we model an annual production of 17.4k packs.
- **Efficiency gains:** Efficiency gains as well as learning curve effects look set to add to profit growth as the company fine tunes its processes, reduces quality control costs, increases production speed and develops innovations.

Margin upside from new products: While still being an R&D project, the company's "LIGHT Battery", which is based on immersion cooling, should offer higher margins compared to the standard battery pack production. In our view, this should be driven be the significant advantages, such as faster charging/discharging, an increased lifetime and improved safety characteristics. With application areas such as hypercars or super heavy-duty industrial vehicles, performance and reliability are more important than price, which should allow for margins.

(in € m)	2021	2022e	2023e	2024e	2025e	2026e	CAGR '22-26e
Net sales	**28.4**	**53.8**	**74.9**	**105.7**	**139.0**	**175.9**	**34.5%**
yoy		*89%*	*39%*	*41%*	*31%*	*26%*	
+/- in finished goods	0.5	0.3	0.0	0.0	0.0	0.0	
% of sales	1.7%	0.6%	0.0%	0.0%	0.0%	0.0%	
Total sales	**28.9**	**54.1**	**74.9**	**105.7**	**139.0**	**175.9**	**34.3%**
yoy		*87%*	*38%*	*41%*	*31%*	*26%*	
Material expenses	25.9	46.5	64.8	89.8	116.0	144.2	
% of sales	91.2%	86.4%	86.4%	84.9%	83.4%	82.0%	
Personnel expenses	3.1	3.9	5.7	7.4	9.0	11.0	
% of sales	10.8%	7.2%	7.6%	7.0%	6.5%	6.3%	
Other op. expenses	2.6	3.7	5.0	5.8	7.0	8.8	
% of sales	9.2%	6.9%	6.7%	5.5%	5.0%	5.0%	
Other op. income	1.5	0.4	0.7	1.1	1.4	1.8	
% of sales	5.2%	0.8%	1.0%	1.0%	1.0%	1.0%	
EBITDA	**-1.2**	**0.5**	**0.2**	**3.8**	**8.4**	**13.6**	**132.4%**
yoy		*-138%*	*-59%*	*1860%*	*124%*	*62%*	
margin	-4.3%	0.9%	0.3%	3.6%	6.1%	7.8%	
D&A	0.5	0.1	0.4	1.9	1.8	1.9	
% of sales	1.6%	0.3%	0.6%	1.8%	1.3%	1.1%	
EBIT	**-1.7**	**0.3**	**-0.2**	**1.8**	**6.6**	**11.8**	**145.3%**
yoy		*-119%*	*-170%*	*-913%*	*260%*	*78%*	
margin	-5.9%	0.6%	-0.3%	1.7%	4.8%	6.7%	
Interest expense	0.0	0.1	0.5	0.6	0.6	0.6	
Implied int. rate	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	
Interest income	0.1	0.1	0.1	0.1	0.1	0.1	
Investment income	0.1	0.1	0.3	0.4	0.5	0.5	
EBT	**-1.5**	**0.4**	**-0.4**	**1.7**	**6.5**	**11.8**	**133.4%**

Source: NuWays

Key P&L items in detail:

- **Material expenses:** The lithium-ion cells explain around 70% of the material expenses and are currently entirely sourced from Samsung SDI. Thanks to uniform dimensions, LION would also be able to source the cells from any other manufacturer. The remaining 30% of the material expenses are stemming from the casings, wiring, electronics and the battery management software. As “open book accounting” is particularly common within the automotive industry, LION should generally be able to pass on changes in material costs to its customers.
- **Personnel expenses:** In order to facility the targeted strong volume and sales growth, we expect LION to continue building up its workforce, particularly in regards to production workers. Based on our estimates, the company would need to introduce a second 8-hour shift from 2025/26e onwards. In our calculations, we reflect an average salary of € 44k per production worker, € 85k per engineer or project manager and € 120k per management and board member plus 25% incidental wage costs at a 5% inflation rate p.a.
- **Other op. expenses:** These include expenses related to overhead (excl. personnel), rental, marketing, shipping costs, third-party R&D, legal, etc.
- **D&A:** The increase of D&A is related to the company’s current efforts to set up its serial production. While most of the machinery is comparably old and should therefore not have much value left in the books, LION is investing in a new storage facility and a large water retention basin (fire safety).
- **Investment income:** The increase in investment income is solely stemming from LION’s 30% stake in TÜV SÜD Battery Testing GmbH, which should experience strong growth going forward (eNuW: 15% CAGR 2021-26e) on the back of an accelerating demand for battery testing (increasing number of EV in % of total automotive production numbers, and other industries such as stationary storage beginning to emerge).

Valuation

We value LION based on a **SOTP calculation,** which derives a **fair value of € 11 per share**

- **A DCF model is used to value the battery pack manufacturing business** points towards a fair value of € 10.5 per share
- **A peer group valuation with** transactions in the private space supports the DCF-derived value
- The TÜV SÜD Battery Testing JV's fair value stands at € 0.5 per share based on peer multiples

DCF model points towards a fair value of € 10.5 per share

We use a DCF model to value LION in order to capture the promising mid- to long-term prospects stemming from the ramp-up of the current production line at the new site in Hildburghausen.

We model **34.5% sales CAGR in the short-term** (2022-26e), a **mid-term growth rate of 13.8% p.a.** (2026-30e) and a **long-term growth rate of 2.5%**.

The discount factor (WACC) of around 10% is made up of a risk-free rate of 2.5%, a 6% equity risk premium and a beta of 1.25x.

The **terminal EBIT margin is set at 7%**, reflecting the company's sound competitive quality as well as an improving fix cost coverage on the back of strong sales growth. In order to be conservative, this is only slightly above our margin estimate for 2026e of 6.7%

DCF (EUR m) (except per share data and beta)	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	Terminal value
NOPAT	-0.2	1.4	5.2	9.2	11.6	13.4	15.1	16.1	16.6
Depreciation	0.4	1.9	1.8	1.9	2.0	2.3	2.5	2.9	2.9
Increase/decrease in working capital	-0.2	0.8	0.2	-0.5	-3.0	-2.0	-1.6	-1.4	-0.3
Increase/decrease in long-term provisions and accruals	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capex	3.6	2.0	2.7	3.3	3.9	4.4	4.8	5.1	2.9
Acquisitions	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital increase	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cash flow	**-4.6**	**2.1**	**4.5**	**7.2**	**6.7**	**9.3**	**11.2**	**12.5**	**16.3**
Present value	-4.3	1.8	3.5	5.1	4.3	5.4	5.9	6.0	98.7
WACC	9.3%	9.3%	9.7%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%

DCF per share derived from	
Total present value	126
thereof terminal value	78%
Net debt (net cash) at start of year	0
Financial assets	5
Provisions and off balance sheet debt	1
Equity value	131
No. of shares outstanding	12.4
Discounted cash flow per share	**10.5**
upside/(downside)	**144%**
Share price	**4.30**

DCF avg. growth and earnings assumptions	
Short term growth (2022-2026)	34.5%
Medium term growth (2026 - 2030)	13.8%
Long term growth (2030 - infinity)	2.5%
Terminal year EBIT margin	7.0%

WACC derived from	
Cost of borrowings before taxes	6.5%
Tax rate	15.0%
Cost of borrowings after taxes	5.9%
Required return on invested capital	10.0%
Risk premium	6.0%
Risk-free rate	2.5%
Beta	1.25

Sensitivity analysis DCF

WACC \ Long term growth	1%	1.5%	2.5%	3.0%	3.5%
12.0%	7.0	7.4	7.9	8.2	8.5
11.0%	7.8	8.4	9.0	9.4	9.9
10.0%	8.9	9.6	10.5	11.1	11.7
9.0%	10.2	11.2	12.5	13.3	14.3
8.0%	11.9	13.4	15.3	16.6	18.2

Sensitivity analysis DCF

WACC \ EBIT margin terminal year	5%	6%	7%	8%	9%
12.0%	6.3	7.1	7.9	8.7	9.5
11.0%	7.1	8.1	9.0	10.0	10.9
10.0%	8.2	9.4	10.5	11.7	12.8
9.0%	9.6	11.1	12.5	14.0	15.4
8.0%	11.6	13.5	15.3	17.2	19.1

Source: NuWays

Transactions in the private sector point towards significant upside

Given the limited availability of listed peers, we regard a classic peer group analysis as not suitable. We took a closer look at private transactions within recent years, which clearly underpin our bullish view on LION. **Average transaction multiples were around 3.3x EV/Sales based on 1-yr forward-looking sales figures**.

One of the most prominent transactions was the takeover of listed Akasol. In 2021, **Borgwarner bought the company for $ 847m,** or 4x the sales estimate for 2022. While Akasol is no apples to apples peer to LION and Borgwarner also had to pay a premium in order to take the listed company private, it clearly underpins the current attractive valuation of LION (0.6x EV/Sales '24e).

Date	Detail	Purchase price	Sales multiple	FY	FY +1	FY +2
Jul 22	Nikola buys Romeo Power	$144m	1.6x '22e	1.6x		
Jun 22	Chardan NexTech combines with DragonFly Energy	$500m	1.9x '23e		2.0x	
Dez 21	Deere buys Kreisel Electric	$276m				
Nov 21	Cummins buys stake in Sion Power	$20m				
Sep 21	Generac buys Off-Grid Energy	$77m	6.0x '21e	6.0x		
Aug 21	European Sustainability Growth Acq combines with ADS-Te	$356m	4.0x '22e		4.0x	1.5x
Aug 21	Sensata buys Spear Power Systems	$130m	7.4x '21	7.4x		
Feb 21	Borgwarner buys Akasol	$847m	4.0x '22e		4.0x	
Jan 21	Alusa Energy combines with Freyr	$529m	12x '21e	12.0x		
Mrz 20	Bollore buys Blue Solutions	$117m				
Sep 19	EnerSys buys SiteTel Sweden	$185m	1.2x '19e	1.2x		
Jun 19	Cummins buys Hydrogenics	$256m	6.0x '19e	6.0x		
Okt 18	SolarEedge buys Kokam	$111m	3.5x '18e	3.5x		
Jun 18	Voltabox buys Navitas Systems	$42m	4.0x '18e	4.0x		
Mai 16	Total buys Saft	$1,200m	1.4x '16e	1.4x		
	Average EV/Sales multiple			**4.8x**	**3.3x**	**1.5x**
	LION E-Mobility sales (€ m)			**74.9**	**105.7**	**139.0**
	implied EV (€ m)			**358.8**	**351.0**	**208.5**
	upside			*444%*	*449%*	*250%*

Source: NuWays

TÜV SÜD Battery Testing JV – Not core but certainly of value

30% of the TÜV SÜD Battery Testing JV is owned by LION. Our derived fair value for that stake is based on our 2024e sales estimate of € 18.2m (15% CAGR), an EBIT margin of 10% and a fair 1-yr forward EV/EBIT multiple of 10.2x, which is based on the current multiple the Industrial Maintenance Service peer group in Europe trades on.

Consequently, LION's 30% in TÜV SÜD Battery Testing should be worth € 18.6m or € 0.49 per share.

	2021	2022e	2023e	2024e	2025e	2026e
Sales (€ m)	**12.0**	**13.8**	**15.9**	**18.2**	**21.0**	**24.1**
yoy		*15%*	*15%*	*15%*	*15%*	*15%*
EBIT	**0.9**	**1.2**	**1.4**	**1.8**	**2.3**	**2.7**
yoy		*40%*	*15%*	*28%*	*27%*	*15%*
margin	7.4%	9.0%	9.0%	10.0%	11.0%	11.0%
Valuation 10.2x EBIT (€ m)	9.1	12.7	14.6	18.6	23.5	27.1
LION's 30% stake (€ m)	2.7	3.8	4.4	5.6	7.1	8.1
Per share	**0.22**	**0.31**	**0.35**	**0.49**	**0.57**	**0.66**

Source: NuWays

Theme

- A strong start into the year, underpinned by a € 45m order intake during the first six weeks of the year
- 2024e guidance with upside thanks to a solid customer base
- Regulatory changes to accelerate LION's geographical expansion

Strong start into the year

Mid-February, LION announced to have **already received orders worth € 45m for FY 2023e** from both, mobility and industrial (stationary storage) customers. Accordingly, the company was able to book already **orders worth more than half of the planned sales for 2023e within the first six weeks of the year.**

This clearly underpins the attractiveness of LION's offering. Importantly, several customers have also already placed first orders for 2024e and beyond. We would expect additional insights into the orderbook with Q1 figures on May 4th. Note that revenues from the new production site will first appear in the H1 report as LION was still setting up the equipment during Q1.

2024e guidance with upside

At the end of November 2022, **management issued a guidance for 2023e and 2024e**. Management expects € 70-75m for 2023e. For 2024e, the company expects sales of € 100-110m, implying 7.4k-8.1k sold battery packs.

While our estimates are in line with the guidance, we do see upside to 2024e. Considering that in 2023e LION is only producing for 8-9 months (series production doesn't start until mid-May), the 2024 guidance hence only implies that the production is running for full year. Any additional customer wins (typical order sizes of a few hundred to a few thousand battery packs p.a.) would therefore allow to company to outperform its targets.

US Inflation Reduction Act could trigger a geographical expansion rather sooner than later

The Inflation Reduction Act (IRA) of 2022 makes the **single largest investment in climate and energy in American history**, enabling America to tackle the climate crisis, advancing environmental justice, securing America's position as a world leader in domestic clean energy manufacturing, and putting the United States on a pathway to achieving the Biden Administration's climate goals, including a net-zero economy by 2050.

In sum, the IRA entails an **investment of $ 369bn over the next 10 years** to fight the ongoing climate crisis and the US energy infrastructure. This includes tax credits, research loans, and grants to increase domestic manufacturing capacity for wind turbines, solar panels, batteries, electric vehicles and other essential components of clean energy production and storage. $ 72bn in tax credits, loans and grants are geared towards the EV value chain. **Automakers have already committed $32.5bn to manufacture batteries in the US**.

While a recent study done by McKinsey expects the value of the US Li-ion battery value chain to 5x until 2030 (~ $12bn to $61bn), these developments might prove them conservative soon. For now, LION focuses on ramping up its battery pack production in Germany. Nevertheless, depending on the development of its customer base and how quickly investments in the US begin to materialize, we see a high likelihood that the company would also build-up a US-based battery pack production rather sooner than later.

Company Background

- A closer look into the value chain, battery cell types and customer base
- Experienced management and Board of Directors

The EV battery value chain

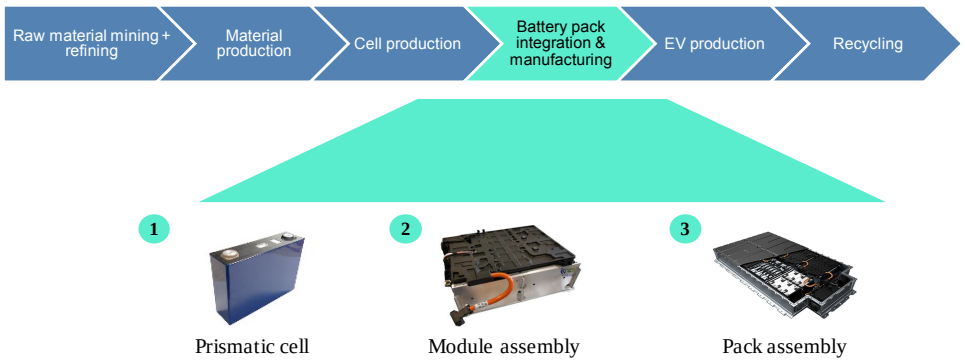
Producing an EV battery is a lengthy and complicated process and can generally be divided into three major steps: Firstly, the mining and refining of raw materials such as nickel, cobalt, graphite, manganese and lithium carbonate as well as their subsequent processing to turn them into a “ready-to-go” input for the cell production. During this step, 45% of the value is added.

Secondly, the cell production, which accounts for 30% of the value added. Here, companies such as CATL, Samsung SDI or SK Innovation are mainly manufacturing the electrodes and separators as well as the assembly of the cell.

LION has focused its efforts on the third major step, namely the **pack integration and manufacturing**, which accounts for some 20% of the value added. Its key steps are:

1. **Cell selection:** As all use cases are different, it is necessary to adapt the battery cells used accordingly. Thanks to is extensive expertise as battery consultancy, the company is able to always meet its customers requirements.
2. **Module assembly:** The individual battery cells are packaged into modules, connected to each other and equipped with module-level BMS.
3. **Pack assembly:** Several modules (8 in the case of the i3 battery) are packaged into a battery pack, equipped with wire harnesses, electronics, the master BMS, closed and tested.

EV battery value chain



Source: NuWays

Currently, all of LIONs battery packs are based on prismatic NMC (nickel manganese cobalt) cells. Going forward, this might change. For once, the company plans to launch a 2nd generation pack, which would be based on LFP (lithium iron phosphate battery) in order to better capture the growth potential of the stationary energy storage market.

With the potential launch of the LIGHT Battery (i.e. immersion cooling), LION would also have to start utilizing cylindrical cells they allow coolants to flow through the space between them.

	Prismatic	Cylindrical	Pouch
			
Advantages	- Optimal utilization of pack compartment space - Not subject to swelling - Lighter than cylindrical cell (no steel case), leading to the highest energy density	- Suited for automated manufacturing - Easier pack thermal management (space between cells offers room for coolants) - Mechanical stability (he round shape of the battery distributes the internal pressure almost evenly)	- Lowest weight among cell types - Flexible designs are possible, can fit in any space
Disadvantages	- Generally more expensive - The corners can put pressure on the seperator and electrode	- Low packaging density - Battery packs with high number of cells become complicated	- Can easily be punctured and can swell - Most pouch cells need to be customized
Applications	EVs, including off-highway industrial trucks and forklifts, communication-based stations, grid energy storage, medical fields	Power tools, toys, lamps, EVs, e-bikes and portable mobile energy systems	Smartphones, drones, laptops, wearable devices

Source: NuWays

Overview of known customers and fields of application

With the release of the 2023/24e guidance in November of last year, the company also mention that the 2023e guidance is based on 10 individual customers. While some of those names are still confidential, we have found six companies that are openly speaking about using the SE09 battery packs (only produced by LION).

For instance, the Lion Electric Company (no connection to LION E-Mobility) is a manufacturer of school buses and is beginning to gain traction with its semi-trucks and minibuses. Due to strong demand, the company is currently expanding its production volumes from 2.5k vehicles to 25k. While the company is currently building its own battery pack production, LION should continue to supply SE09 packs, in our view.

Customer name	Application
1. Karsan Otomotiv	Minibuses
2. Dannar	Mobile Power Station with various heavy duty attachments to lift, dig, push and sweep
3. Mandrill	Off-road side-by-side
4. Torqeedo	Electric motors + battery system for boots
5. BPW Bergische Achsen	Semi-truck "BAX"
6. Lion Electric Company	School buses, semi-trucks, minibuses

Source: NuWays

Group structure

Headquartered in Switzerland (Baar), the **LION E-Mobility AG** is listed in Germany and the legal entity that holds 100% stakes in the operating units of the group.

The **LION Smart Production GmbH**, located in Hildburghausen, is the group's operating unit and responsible for the production of all modules and packs. Production is seen to start during the next few weeks..

LION Smart GmbH, located in Garching by Munich, used to comprise the company's old business, i.e. buying packs from BMW and selling them to other

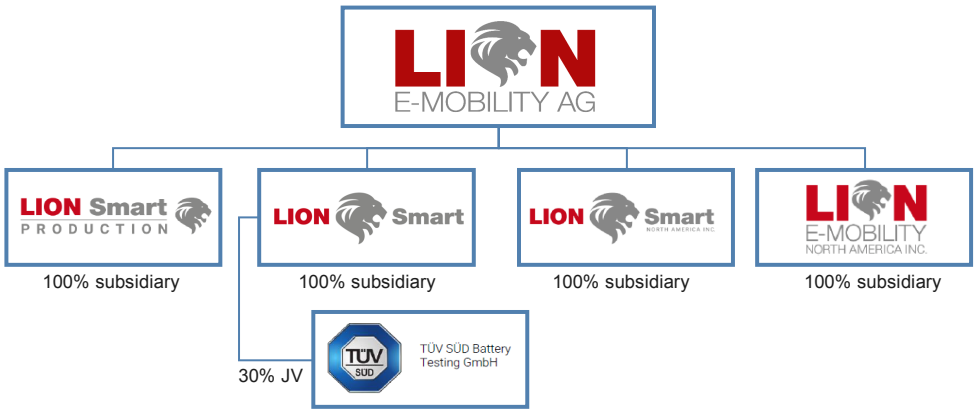
companies. Going forward, the LION Smart GmbH will comprise the group's R&D efforts for immersion cooling and host the group's sales force.

LION Smart North America Inc. is a newly formed US subsidiary. If LION would decided to build a US-based production (similar to Hildburghausen), it would also be done through LION Smart North America.

LION E-MOBLITY North America Inc. has no operational usage to the group and has been replaced by LION Smart North America Inc.

The **TÜV SÜD Battery Testing GmbH** is a Joint Venture (LION owns a 30% stake) with TÜV SÜD. Founded in 2010, the company offers the full testing scope (e.g. performance, environmental, abuse and crash) for battery cells, modules, systems and packs. Its customers include most of the German automotive OEMs, Tier 1 suppliers companies from a variety of industries such as energy storage, rail, medical, consumer products, aerospace and industrial applications.

Group structure



Source: NuWays

Management

Winfried Buss – CEO and MD of LION Smart GmbH

Winfried is Managing Director and CEO at LION Smart. Before joining LION, he was the Managing Director and CEO at Nidec GPM GmbH, an automotive supplier of oil pumps, cooling systems, water pumps and more. Prior to Nidec, Winfried was the Managing Director of Fuba Automotive Electronics - a Delphi spin-off. Winfried started his career as Business Director at Delphi.

Michael Geppert – CTO and Head of Integration

Michael is the CTO of LION Smart. He studied at the Technical University of Munich and is a founding member of LION along Tobias Mayer. Both are responsible for Technology. Michael has been a member of the Board of Directors since 2018.

Jörg Peter Hahn – Head of Finance

Jörg has been the Head of Finance at LION Smart since November 2022. He studied at the university of Hohenheim in Germany. He started his career at DZ Bank as a credit analyst for two years. Later, he worked at IBM as a Management Consultant for 4 years. Before joining LION, he worked at many companies like Istobel, BDT Media Automation, WiredMinds, Detecon International and APS Networks.

Board of Directors

Alessio Basteri – Chairman of the Board of Directors

Alessio joined LION's Board of Management in 2018. Before joining LION, he was the CEO and founding member of Acquarius Advisory SAGL, a Swiss corporate finance consultancy specializing in EV and technology companies. At Acquarius, Alessio was involved in cross-border transactions in the EV sector in Europe and Asia. Since June 2019, Mr. Basteri has been the Chairman of the Board.

Tobias Mayer – Member of the Board of Directors

Tobias is the co-founder of LION Smart GmbH. He studied engineering at Technical University of Munich from 2005 to 2011. During university, he founded LION along two other friends from university. He has extensive experience in design, automotive engineering, and product development. Before founding LION Smart, he worked for BMW in project and quality management.

Ian Mukherjee – Member of the Board of Directors and anchor investor

Ian has been a strategic investor in LION before he joined the Board of Management in 2019. Prior to joining the board, he was the founder and Chief Investment Officer of Amiya Capital, a fund with $ 1.8bn AUM. Prior to founding Amiya, Ian was a Partner and Managing Director at Goldman Sachs where he worked for 14 years - including 6 based in Asia.

Company history

2008 - Foundation of LION Smart GmbH and start of laboratory operations in Frieding, Bavaria // LION was one of the first companies in Germany to develop and test Li-ion batteries for automotive applications

2010 - Foundation of the joint venture TÜV SÜD Battery Testing GmbH with TÜV SÜD AG // LION still owns 30% of the JV

2011 - Foundation of LION E-Mobility AG & IPO on the First Quotation Board of the Frankfurt Stock Exchange // Listing on the Open Market of the Munich Stock Exchange in 2012

2013 - Consulting services for MaxSolar, Tesla, The Mobility House, Schletter, DewertOkin // Participation in the BMBF-funded project Visio.M with partners Daimler, BMW, Siemens, Continental, TU Munich

2016 - Presentation of the first wireless battery management system in a BMW i3

2017 - LION established its US entity, LION E-Mobility North America // LION's joint venture with TÜV was recognized as one of the few battery test laboratories in Europe which provided market approval to manufacturers of electrical and electronic products

2019 - LION offers integrated business solution for trucks & buses // Canadian OEM begins ordering BMW i3 battery systems to electrify busses and trucks

2020 - Expansion of North American business as LION wins Vicinity Motor Corp. as customer, development and integration of LION’s battery systems into a shuttle bus

2021 - Major contract to supply battery packs & collaboration with German OEM (LIGHT Battery)

2022 - Founding of LION Smart Production GmbH and acquisition of the product and production license as well as production equipment for the high-voltage battery

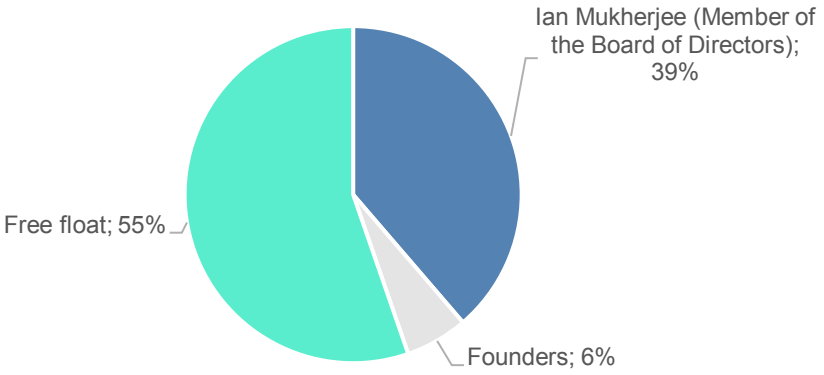
system used in the BMW i3

2023 - Start of production at its own facility in Hildburghausen // LION entered a new business phase of series production of batteries

Shareholder structure

LION hast roughly 12.36m shares outstanding. Ian Mukherjee, who is also on the Board of Directors is the group's largest individual shareholder with 38.7%. The founders of LION SMART GmbH own another 6%. The remainder, roughly 55% are considered free float.

Shareholder structure



Source: NuWays

Investment risks

As with any investment, there are certain risks associated with investing in Lion E-Mobility. The key investment risks, in our view, are:

- **Operational risk:** The ramp-up of additional production capacity or the switch to a new generation of battery packs (i.e. LFP based cells) might take longer or cost more than initially expected.
- **Technology risk:** Potential changes in technology pose a general risk, which could have a negative effect on the dynamics of the Li-Ion market as well as LION's competitive position.
- **Market risk:** One risk factor is the development of the global economy, which will have an effect on the development of LION's end-markets. A significant deterioration of the global economy hence could have negative implications on the order behaviour and unit purchases of the company's existing and prospective customers.
- **Share price volatility:** Disruptions on the capital market could come with notable share price movements, which can be unrelated to the operational performance of the company. Limited liquidity can also cause additional volatility during eventful times.

Financials

Profit and loss (EUR m)	2020	2021	2022	2023e	2024e	2025e
Net sales	**18.4**	**28.4**	**53.8**	**74.9**	**105.7**	**139.0**
Sales growth	*950.2%*	*54.3%*	*89.1%*	*39.4%*	*41.1%*	*31.5%*
Increase/decrease in finished goods and work-in-process	0.0	0.5	0.3	0.0	0.0	0.0
Total sales	**18.4**	**28.9**	**54.1**	**74.9**	**105.7**	**139.0**
Other operating income	0.1	1.5	0.4	0.7	1.1	1.4
Material expenses	14.0	25.9	46.5	64.8	89.8	116.0
Personnel expenses	2.3	3.1	3.9	5.7	7.4	9.0
Other operating expenses	3.7	2.6	3.7	5.0	5.8	7.0
Total operating expenses	**20.0**	**30.1**	**53.6**	**74.7**	**102.0**	**130.6**
EBITDA	**-1.6**	**-1.2**	**0.5**	**0.2**	**3.8**	**8.4**
Depreciation	0.3	0.5	0.1	0.4	1.9	1.8
EBITA	**-1.9**	**-1.7**	**0.3**	**-0.2**	**1.8**	**6.6**
Amortisation of goodwill	0.0	0.0	0.0	0.0	0.0	0.0
Amortisation of intangible assets	0.0	0.0	0.0	0.0	0.0	0.0
Impairment charges	0.0	0.0	0.0	0.0	0.0	0.0
EBIT (inc revaluation net)	**-1.9**	**-1.7**	**0.3**	**-0.2**	**1.8**	**6.6**
Interest income	0.1	0.1	0.1	0.1	0.1	0.1
Interest expenses	0.0	0.0	0.1	0.5	0.6	0.6
Investment income	0.5	0.1	0.1	0.3	0.4	0.5
Financial result	0.5	0.2	0.1	-0.2	-0.2	-0.1
Recurring pretax income from continuing operations	**-1.3**	**-1.5**	**0.4**	**-0.4**	**1.7**	**6.5**
Extraordinary income/loss	0.0	0.0	0.0	0.0	0.0	0.0
Earnings before taxes	**-1.3**	**-1.5**	**0.4**	**-0.4**	**1.7**	**6.5**
Income tax expense	-0.4	-0.4	0.0	-0.1	0.4	1.4
Net income from continuing operations	**-0.9**	**-1.2**	**0.4**	**-0.3**	**1.3**	**5.1**
Income from discontinued operations (net of tax)	0.0	0.0	0.0	0.0	0.0	0.0
Net income	**-0.9**	**-1.2**	**0.4**	**-0.3**	**1.3**	**5.1**
Minority interest	0.0	0.0	0.0	0.0	0.0	0.0
Net profit (reported)	**-0.9**	**-1.2**	**0.4**	**-0.3**	**1.3**	**5.1**
Average number of shares	10.0	10.0	12.4	12.4	12.4	12.4
EPS reported	**-0.09**	**-0.12**	**0.03**	**-0.03**	**0.10**	**0.41**

Profit and loss (common size)	2020	2021	2022	2023e	2024e	2025e
Net sales	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Sales growth	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
Increase/decrease in finished goods and work-in-process	0.1%	1.7%	0.6%	0.0%	0.0%	0.0%
Total sales	**100.1%**	**101.7%**	**100.6%**	**100.0%**	**100.0%**	**100.0%**
Other operating income	0.4%	5.2%	0.8%	1.0%	1.0%	1.0%
Material expenses	76.1%	91.2%	86.4%	86.4%	84.9%	83.4%
Personnel expenses	12.7%	10.8%	7.2%	7.6%	7.0%	6.5%
Other operating expenses	20.2%	9.2%	6.9%	6.7%	5.5%	5.0%
Total operating expenses	**108.7%**	**106.0%**	**99.8%**	**99.7%**	**96.4%**	**93.9%**
EBITDA	**-8.6%**	**-4.3%**	**0.9%**	**0.3%**	**3.6%**	**6.1%**
Depreciation	1.6%	1.6%	0.3%	0.6%	1.8%	1.3%
EBITA	**-10.2%**	**-5.9%**	**0.6%**	**-0.3%**	**1.7%**	**4.8%**
Amortisation of goodwill	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Amortisation of intangible assets	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Impairment charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
EBIT (inc revaluation net)	**-10.2%**	**-5.9%**	**0.6%**	**-0.3%**	**1.7%**	**4.8%**
Interest income	0.4%	0.2%	0.1%	0.1%	0.1%	0.1%
Interest expenses	0.3%	0.1%	0.2%	0.7%	0.6%	0.4%
Investment income	2.8%	0.5%	0.2%	0.4%	0.3%	0.3%
Financial result	2.9%	0.6%	0.1%	neg.	neg.	neg.
Recurring pretax income from continuing operations	**-7.3%**	**-5.4%**	**0.7%**	**-0.5%**	**1.6%**	**4.7%**
Extraordinary income/loss	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Earnings before taxes	**-7.3%**	**-5.4%**	**0.7%**	**-0.5%**	**1.6%**	**4.7%**
Income tax expense	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Net income from continuing operations	**-5.0%**	**-4.1%**	**0.7%**	**-0.5%**	**1.2%**	**3.7%**
Income from discontinued operations (net of tax)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Net income	**-5.0%**	**-4.1%**	**0.7%**	**-0.5%**	**1.2%**	**3.7%**
Minority interest	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Net profit (reported)	**-5.0%**	**-4.1%**	**0.7%**	**-0.5%**	**1.2%**	**3.7%**

Source: Company data, NuWays

Balance sheet (EUR m)	2020	2021	2022	2023e	2024e	2025e
Intangible assets	**2.5**	**3.1**	**3.1**	**3.8**	**4.5**	**5.1**
Property, plant and equipment	0.5	0.4	2.1	9.6	9.0	9.3
Financial assets	4.2	4.4	4.6	4.6	4.6	4.6
FIXED ASSETS	**7.3**	**7.9**	**9.8**	**18.0**	**18.1**	**19.0**
Inventories	0.1	0.2	6.9	16.6	21.1	25.3
Accounts receivable	2.1	4.2	4.5	6.2	8.7	11.4
Other assets and short-term financial assets	4.4	2.4	2.4	12.4	12.4	14.4
Liquid assets	1.2	1.2	2.5	2.1	4.1	8.5
Deferred taxes	1.1	2.2	0.0	0.0	0.0	0.0
Deferred charges and prepaid expenses	0.1	0.1	0.1	0.1	0.1	0.1
CURRENT ASSETS	**9.0**	**10.3**	**16.4**	**37.4**	**46.5**	**59.7**
TOTAL ASSETS	**16.3**	**18.2**	**26.3**	**55.4**	**64.5**	**78.7**
SHAREHOLDERS EQUITY	**10.3**	**9.2**	**8.6**	**27.5**	**32.8**	**42.9**
MINORITY INTEREST	0.0	0.0	0.0	0.0	0.0	0.0
Provisions for pensions and similar obligations	1.9	0.6	0.6	0.6	0.6	0.6
Other provisions and accrued liabilities	0.0	0.0	0.0	0.0	0.0	0.0
short-term liabilities to banks	0.0	0.0	0.0	0.0	0.0	0.0
Accounts payable	3.2	5.9	5.0	9.2	13.0	17.1
Accounts receivable	2.1	4.2	4.5	6.2	8.7	11.4
Other liabilities (incl. from lease and rental contracts)	0.4	0.6	1.0	5.0	5.0	5.0
Deferred taxes	0.0	0.7	0.7	0.7	0.7	0.7
Deferred income	0.0	0.0	0.0	0.0	0.0	0.0
Current liabilities	**3.6**	**6.5**	**6.0**	**14.2**	**18.0**	**22.1**
TOTAL LIABILITIES AND SHAREHOLDERS EQUITY	**16.3**	**18.1**	**26.3**	**55.4**	**64.5**	**78.7**

Balance sheet (common size)	2020	2021	2022	2023e	2024e	2025e
Intangible assets	**15.4%**	**17.3%**	**12.0%**	**6.9%**	**6.9%**	**6.5%**
Property, plant and equipment	3.2%	2.0%	8.0%	17.3%	14.0%	11.8%
Financial assets	26.0%	24.1%	17.5%	8.3%	7.1%	5.8%
FIXED ASSETS	**44.6%**	**43.4%**	**37.4%**	**32.5%**	**28.0%**	**24.1%**
Inventories	0.8%	0.9%	26.2%	30.0%	32.8%	32.1%
Accounts receivable	12.9%	23.3%	17.1%	11.1%	13.5%	14.5%
Other assets and short-term financial assets	26.9%	13.1%	9.1%	22.4%	19.2%	18.3%
Liquid assets	7.6%	6.8%	9.7%	3.8%	6.4%	10.8%
Deferred taxes	6.7%	12.0%	0.0%	0.0%	0.0%	0.0%
Deferred charges and prepaid expenses	0.5%	0.4%	0.5%	0.2%	0.2%	0.2%
CURRENT ASSETS	**55.4%**	**56.6%**	**62.6%**	**67.5%**	**72.0%**	**75.9%**
TOTAL ASSETS	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
SHAREHOLDERS EQUITY	**63.5%**	**50.7%**	**32.6%**	**49.6%**	**50.8%**	**54.5%**
MINORITY INTEREST	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Provisions for pensions and similar obligations	11.7%	3.5%	2.4%	1.1%	1.0%	0.8%
Other provisions and accrued liabilities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
short-term liabilities to banks	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Accounts payable	19.8%	32.4%	19.0%	16.7%	20.2%	21.8%
Accounts receivable	12.9%	23.4%	17.1%	11.1%	13.5%	14.5%
Other liabilities (incl. from lease and rental contracts)	2.3%	3.5%	3.8%	9.0%	7.7%	6.4%
Deferred taxes	0.0%	4.0%	2.8%	1.3%	1.1%	0.9%
Deferred income	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Current liabilities	**22.0%**	**35.9%**	**22.9%**	**25.7%**	**28.0%**	**28.1%**
TOTAL LIABILITIES AND SHAREHOLDERS EQUITY	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Company data, NuWays

Cash flow statement (EUR m)	2020	2021	2022	2023e	2024e	2025e
Net profit/loss	-0.9	-1.2	0.4	-0.3	1.3	5.1
Depreciation of fixed assets (incl. leases)	0.3	0.5	0.1	0.4	1.9	1.8
Amortisation of goodwill & intangible assets	0.0	0.0	0.0	0.0	0.0	0.0
Others	-0.1	-0.1	0.0	0.0	0.0	0.0
Cash flow from operating activities	-1.3	-0.1	-4.7	2.9	2.7	5.1
Increase/decrease in inventory	-4.3	-0.0	-6.7	-9.8	-4.5	-4.1
Increase/decrease in accounts receivable	-1.2	-0.8	-0.2	-1.7	-2.5	-2.7
Increase/decrease in accounts payable	3.1	2.6	-0.9	4.2	3.8	4.1
Increase/decrease in other working capital positions	1.6	-0.7	1.2	7.0	4.0	3.0
Increase/decrease in working capital	-0.9	1.1	-6.7	-0.2	0.8	0.2
Cash flow from operating activities	**-1.3**	**-0.1**	**-3.7**	**3.9**	**4.0**	**7.1**
CAPEX	0.7	0.5	1.7	3.6	2.0	2.7
Payments for acquisitions	0.0	0.0	0.1	5.0	0.0	0.0
Financial investments	0.6	0.0	0.0	0.0	0.0	0.0
Income from asset disposals	0.2	0.3	0.0	0.0	0.0	0.0
Cash flow from investing activities	**-1.2**	**-0.2**	**-1.7**	**-8.6**	**-2.0**	**-2.7**
Cash flow before financing	-2.4	-0.3	-5.4	-4.7	2.0	4.4
Increase/decrease in debt position	-0.1	0.4	9.0	2.0	0.0	0.0
Purchase of own shares	0.0	0.0	0.0	0.0	0.0	0.0
Capital measures	2.0	0.0	0.0	0.0	0.0	0.0
Dividends paid	0.0	0.0	0.0	0.0	0.0	0.0
Others	-0.1	-0.1	0.0	0.0	0.0	0.0
Effects of exchange rate changes on cash	-0.0	0.0	0.0	0.0	0.0	0.0
Cash flow from financing activities	**1.8**	**0.3**	**9.0**	**2.0**	**0.0**	**0.0**
Increase/decrease in liquid assets	-0.6	-0.0	3.6	-2.7	2.0	4.4
Liquid assets at end of period	**1.2**	**1.2**	**4.8**	**2.1**	**4.1**	**8.5**

Key ratios (EUR m)	2020	2021	2022	2023e	2024e	2025e
P&L growth analysis						
Sales growth	950.2%	54.3%	89.1%	39.4%	41.1%	31.5%
EBITDA growth	n.a.	-46.3%	-129.6%	-115.6%	704.3%	4288.5%
EBIT growth	n.a.	-31.2%	-117.3%	-86.6%	465.5%	-3028.0%
EPS growth	n.a.	-31.9%	-131.6%	-76.4%	257.8%	-1601.3%
Efficiency						
Sales per employee	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EBITDA per employee	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
No. employees (average)	0	0	0	0	0	0
Balance sheet analysis						
Avg. working capital / sales	9.3%	-1.7%	5.0%	8.1%	11.0%	11.9%
Inventory turnover (sales/inventory)	n.a.	181.0	7.8	4.5	5.0	5.5
Accounts receivable turnover	41.8	54.4	30.4	30.0	30.0	30.0
Accounts payable turnover	63.9	75.3	33.9	45.0	45.0	45.0
Cash flow analysis						
Free cash flow	-2.0	-0.6	-5.3	0.3	2.0	4.4
Free cash flow/sales	-10.9%	-2.0%	-9.9%	0.4%	1.9%	3.2%
FCF / net profit	216.8%	49.4%	neg.	neg.	155.5%	86.2%
Capex / sales	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Solvency						
Net debt	-0.8	-0.2	7.8	10.2	8.2	3.8
Net Debt/EBITDA	0.0	0.0	16.6	53.2	2.2	0.5
Dividend payout ratio	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Interest paid / avg. debt	17.5%	3.4%	1.8%	7.7%	5.4%	5.0%
Returns						
ROCE	-16.0%	-14.3%	2.1%	-0.8%	4.3%	13.0%
ROE	-8.9%	-12.7%	4.2%	-1.2%	3.9%	11.9%
Adjusted FCF yield	-4.0%	-3.2%	-1.4%	-1.2%	3.6%	9.2%
Dividend yield	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
DPS	0.0	0.0	0.0	0.0	0.0	0.0
EPS reported	-0.09	-0.12	0.03	-0.03	0.10	0.41
Average number of shares	10.0	10.0	12.4	12.4	12.4	12.4
Valuation ratios						
P/BV	4.2	4.7	6.2	1.9	1.6	1.2
EV/sales	1.7	1.1	1.1	0.9	0.6	0.4
EV/EBITDA	-19.8	-25.1	131.7	333.5	16.5	6.8
EV/EBIT	-16.6	-18.3	189.4	-283.1	33.7	8.7

Source: Company data, NuWays

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Company	Disclosures
LION E-Mobility AG	2,8

Historical target price and rating changes for LION E-Mobility AG

Company	Date	Analyst	Rating	Target Price	Close

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According to Article 4(1) No. i of the delegated regulation 2016/958 supplementing regulation 596/2014 of the European Parliament, further information regarding investment recommendations of the last 12 months are published under:

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