EDISON

Spotlight - Update

Ensurge Micropower

Accelerating commercialisation

Technology

7 March 2023

Ensurge Micropower has brought in battery expert Mark Newman as interim CEO to accelerate commercialisation. His five-point action plan builds on the company's achievements in FY22, which include shipping its first samples of both packaged microbatteries and unpackaged cells in coin format to customers and receiving its first production order for delivery in FY23.

Losses widen as company readies for production

Ensurge did not generate any revenues during FY22. Payroll costs were $1.6m higher year-on-year, at $8.9m, as management increased spending on operations to support sampling and production readiness. This resulted in a widening of EBITDA losses, excluding share-based payments, by $2.1m to $16.7m. Investment in capital expenditure was only $0.5m (net), as most of the work adapting the roll-to-roll (R2R) facility for manufacturing microbatteries was completed in FY21. Free cash outflow totalled $20.8m, leaving $3.4m cash (gross excluding restricted cash) at end-FY22.

Cash runway extended into Q223

Following the private placement in February, which is subject to shareholder approval, management notes that Ensurge will have sufficient funds to support operations into Q223. The company is seeking alternative sources of financing to continue operations through and beyond Q223 and is targeting 30% cost reductions to reduce the cash burn rate. It is seeking to conclude equity investments in the US subsidiary within the next three months from either strategic partners or financial institutions. It is also exploring a potential listing of the US subsidiary on the Nasdaq or making an exit via a trade sale.

Valuation: Potential market of over 1bn units a year

Ensurge is initially targeting the medical wearables and hearables markets, followed by the connected sensor and sport & fitness wearables markets. Our scenario analysis calculates that a 5–10% share of these markets represents annual revenues of $330–550m and EBITDA of $211–365m. Management has stated that when the R2R factory in San Jose is fully utilised it could potentially generate EBITDA of more than $100m, depending on product mix.

Historical financials

Year end	Revenue ($m)	EBITDA ($m)	PBT* ($m)	EPS* ($)	DPS ($)	P/E (x)
12/19**	1.2	(30.6)	(35.9)	(5.51)***	0.00	N/A
12/20	0.5**	(11.3)	(14.9)	(0.34)***	0.00	N/A
12/21	0.0	(14.6)	(17.8)	(0.09)***	0.00	N/A
12/22	0.0	(16.7)	(20.8)	(0.10)	0.00	N/A

Source: Company data. Note: *PBT and EPS are normalised, excluding amortisation of acquired intangibles, exceptionals and share-based payments. **Discontinued business. ***Adjusted for 9:1 share consolidation in March 2022.

Price	NOK0.21
Market cap	NOK46m

Share price graph

Share details

Code	ENSU
Listing	OSLO & OTCQB
Shares in issue (excluding shares from February private placement)	216.7m
Net debt ($m) at end-December 2022 (including finance leases and restricted cash)	13.4

Business description

Ensurge Micropower's solid-state lithium battery technology combines advanced energy cell design with proprietary materials and manufacturing innovation to produce thin, flexible batteries that can power safer and more capable wearable devices and connected sensors.

Bull

- Ensurge's solid-state batteries are highly suitable for the hearables and medical wearables markets.
- Markets for microbatteries are already established.
- When fully equipped, Ensurge's volume manufacturing facility should be able to generate c $100m EBITDA.

Bear

- Ensurge has yet to generate meaningful revenues from microbattery sales.
- Revenue growth dependent on companies incorporating microbatteries in their products.
- Cash runway currently extends only into Q223.

Analyst

Anne Margaret Crow +44 (0)20 3077 5700

tech@edisongroup.com

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Progress towards commercialisation

First production order

In December 2022, Ensurge received its first production order, which is for 150,000 units of its rechargeable 1–100 milliampere-hour (mAh) solid-state lithium microbattery. The value of the order was not disclosed. Ensurge expects additional orders in 2023 and beyond from this lead customer, which is an innovator in the digital health market. The production order is for a customised version of the packaged microbattery. The company has converted its production line to this lead production customer's target form factor and performance requirements.

The production order follows successful sampling during H222 of both unpackaged unit cells and complete packaged microbatteries by multiple manufacturers and potential strategic partners.

Packaged batteries now in qualification

Ensurge has delivered packaged battery samples for evaluation to customers including a leader in the hearing aid market and the digital health innovator mentioned above. Packaged microbatteries are formed from unit cells stacked on top of each other and sealed in a protective package with connectors. The prospective partners and customers evaluating Ensurge's technology are able to mount the complete microbatteries on printed circuit boards and evaluate how well they perform in prototype products. Altogether, Ensurge has signed five contracts with hearing aid and wearables companies. Management estimates that these collectively represent potential product revenue of over $50m/year. These customers are interested in complete microbatteries in the 1–100mAh range, which can provide faster charging or higher energy density than conventional rechargeable microbatteries, can be mounted on customers' circuit boards using conventional reflow assembly techniques (unlike typical lithium-ion coin cell batteries) or can be customised to create novel form factors such as rings. These form factors are only achievable with batteries formed on a flexible substrate, such as the ultra-thin steel substrate used by Ensurge.

Ensurge was able to make these initial deliveries once it had made successive improvements to the process of stacking and packaging multiple unit cells into a single battery. These included a significant reduction in the impedance of the microbatteries. The technology team is continuing to work on reducing the impedance further to achieve target capacity and cycling for the stacked and packaged batteries. In addition, the team is working on implementing several improvements that will increase the energy density as well as streamline the manufacturing process to help with scaling. The team expects to file several patents in the coming months based on these innovations.

Technology performance verified by customers

Ensurge is complementing potential sales of complete packaged microbatteries with potential sales of its core microbattery building block, referred to as the 'unit cell'. It is in active discussions with four large multinational corporations that are interested in unit cells rather than packaged batteries because each of them has technology that could be combined with Ensurge's core cell technology to create solutions enabling applications yet to exist. These applications expand the market beyond the 1bn unit market discussed below. Ensurge has already shipped unit cells in a conventional coin cell format to ease testing and evaluation to three of these strategic partners. An evaluation report from one of these, who is a leader in consumer electronics, verified Ensurge's own capacity and energy density calculations. Ensurge intends to expand the contracts with these three partners to include deliverables. The company expects to sign a fourth strategic collaboration contract with a global information and communications technology corporation in the next month. The collaboration will potentially deliver technology attributes at the unit cell level beyond Ensurge's current roadmap.

This development work will be defined to meet the demands of the third party's aggressive wearable device roadmap, potentially delivering substantial improvements with regards to usability.

Continuing to expand customer pipeline

Ensurge's pipeline currently consists of over 20 qualified leads. Combining this with the unqualified leads from the recent Consumer Electronics Show gives the company more than enough customers to fill the existing fabrication capacity. Ensurge is therefore becoming more picky and, under new CEO Mark Newman's direction (see below), is focusing on those customers that are willing to pay for collaboration and development work.

Financing

During FY22 Ensurge undertook a series of fund-raising exercises, leaving it with a cash balance of $5.0m (including restricted cash of $1.6m) at end-December 2022. These included:

- Private placing in March raising NOK100m gross ($9.7m) at NOK5.40/share.
- Funding in July raising NOK57m gross ($5.5m), of which NOK46.7m was from convertible loans bearing 5% interest with a conversion price of NOK3.00/share, and NOK10.3m from a private placement at NOK3.00/share.
- Private placement raising c NOK55m ($5.3m, gross) at NOK2.0/share in November and December.
- In February 2023, Ensurge announced a private placement raising NOK50m ($4.9m) at NOK0.1/share. The placing is conditional on securing shareholder approval at an EGM to be held on 14 March. The company has secured bridge funding to provide finance until the EGM takes place.

Management estimates that the most recent placement should provide sufficient funds to support operations into Q223.

The company is seeking alternative sources of financing to continue operations through and beyond Q223. It is seeking to conclude equity investments in the US subsidiary within the next three months from either strategic partners or financial institutions. It is also exploring a potential listing of the US subsidiary on the Nasdaq or making an exit via a trade sale. In parallel, in line with the new CEO's action plan (see below), Ensurge is aiming to realise c 30% cost reductions to reduce the cash burn rate and seeking to generate cash upfront from collaboration work for customers and partners (see above) and by selling surplus machinery.

Management changes

Battery expert Mark Newman became interim CEO on 8 February 2023, having served as non-executive director since May 2022. He will resume his non-executive role when a permanent CEO is in place. He has replaced Kevin Barber, who served as CEO since November 2018 and was central to the decision in 2020 to reposition the company to develop rechargeable solid-state lithium microbatteries.

Mark is founder and CEO of Electric Revolution Ventures, which is both a strategic investor and an ecosystem connecting startups with supply chain partners, specialists and businesses across the electrochemical value chain. Until recently he was chief commercial officer and head of strategy at fast-charge battery pioneers, Nyobolt, in which he was also a seed investor. Before that, Mark spent 11 years as managing director and senior analyst covering technology at Bernstein, where he spearheaded the electric revolution thematic research covering batteries, semiconductors and the entire electric vehicle value chain. He was previously director of strategy at Samsung in Korea, where he led several strategic initiatives, venture investments and acquisitions. Mark is also an investor in several other start-ups and adviser to Ivanhoe Capital Acquisition and SES.ai, which recently combined to form Nasdaq-listed SES. SES is commercialising next-generation lithium-metal batteries. Mark currently serves on the board of the Faraday Institution, which is the UK's flagship battery research programme.

Mark has presented the new management action plan to take the company into the commercialisation phase to the board. His priorities for the next quarter are:

- **Accelerating commercialisation** by working closer with customers to get the technology and product offering ready so that microbatteries can be manufactured at volume, as well as planning for production.
- **Generating cash from the existing customer base** by requiring them to make upfront payments for any collaborative or development work or potential licences.
- Realising 30% **cost reductions** to reduce the cash burn rate.
- Raising **additional finance** (see above).
- Ensurge expects to have sufficient capacity to meet customer demand during FY23. However, management expects that **additional capacity** will be required from FY24 onwards, which will require Ensurge to start placing orders for critical pieces of equipment in early FY23.

Valuation: Addressing a market of over 1bn units/year

We continue to present a scenario analysis rather than a formal valuation based on peer multiples because Ensurge does not expect to generate revenues from its solid-state battery technology until later in FY23. Referencing research from IDTechEx and others, management notes that the medical wearables, hearables, connected sensor and sport & fitness wearables markets are predicted to grow to more than 1bn units per year by 2025. This excludes applications addressed by strategic partners (see above) rather than microbattery customers.

As discussed in our March 2022 note, these markets require batteries in the 1–70mAh capacity range. This capacity range is already covered by conventional lithium-ion batteries, although the relative size of lithium-ion batteries compared to solid-state batteries makes it likely that a material percentage of device manufactures will elect to pay a premium for the solid-state option. Ensurge has had detailed conversations with potential customers with which it has shared design details, and in H121 stated that it believed a price of $3–10/unit was achievable.

Exhibit 1: Potential annual revenues from milliwatt-hour market ($m)

		Market share (%)				
		1%	3%	5%	7%	10%
Price/unit ($)	1	11	33	55	77	110
	2	22	66	110	154	220
	3	33	99	165	231	330
	5	55	165	275	385	550
	7	77	231	385	539	770
	10	110	330	550	770	1,100

Source: Edison Investment Research

Our scenario analysis presents the annual revenues realisable from these markets for a range of unit prices and levels of market penetration. Our analysis shows that a 5–10% share of these markets at a $3–10 price range represents annual revenues of $330–550m. Based on previous management guidance of c $20m fixed costs (current levels are $16.7m) and 30% variable costs, this gives an EBITDA range of $211–365m. Management notes that when the R2R factory in San Jose is fully equipped and utilised it should be able to output several hundred million mAh of batteries each year, potentially generating EBITDA of more than $100m, depending on product mix.

We note that the asset value of the R2R facility has been fully written down, resulting in a $25.8m impairment in FY19.

Exhibit 2: Financial summary

US$m	2019*	2020	2021	2022
Year-end December	IFRS	IFRS	IFRS	IFRS
PROFIT & LOSS	**USD**	**USD**	**USD**	**USD**
Revenue	1.2	0.5*	0.0	0.0
EBITDA	(30.6)	(11.3)	(14.6)	(16.7)
Operating Profit (before amort. and except.)	(34.5)	(11.4)	(14.6)	(17.1)
Intangible Amortisation	0.0	0.0	0.0	0.0
Exceptionals	(42.4)	0.0	0.0	0.0
Share-based payments	(0.2)	(0.7)	(4.9)	(4.0)
Operating Profit	(77.1)	(12.0)	(19.6)	(21.1)
Net interest	(1.4)	(3.6)	(3.2)	(3.7)
Exceptional charges relating to issue of warrants	0.0	(23.2)	(8.2)	0.0
Profit Before Tax (norm)	(35.9)	(14.9)	(17.8)	(20.8)
Profit Before Tax (FRS 3)	(78.5)	(38.8)	(31.0)	(24.6)
Tax	0.0	0.0	(0.0)	0.0
Profit After Tax (norm)	(35.9)	(14.9)	(17.8)	(20.8)
Profit After Tax (FRS 3)	(78.4)	(38.8)	(31.0)	(24.6)
Average Number of Shares Outstanding (m)	6.5	43.7	194.1	215.2
EPS - normalised ($)	(5.51)**	(0.34)**	(0.09**)	(0.10)
EPS - IFRS ($)	(12.05)**	(0.89)**	(0.16)**	(0.11)
Dividend per share ($)	0.00	0.00	0.00	0.00
EBITDA Margin (%)	N/A	N/A	N/A	N/A
Operating Margin (before GW and except.) (%)	N/A	N/A	N/A	N/A
BALANCE SHEET				
Fixed Assets	0.6	0.8	2.6	2.7
Intangible Assets	0.0	0.0	0.0	0.0
Tangible Assets	0.0	0.2	2.0	2.2
Other	0.6	0.6	0.6	0.6
Current Assets	11.7	6.9	7.8	5.8
Stocks	0.0	0.0	0.0	0.0
Debtors	2.8	1.1	0.9	0.9
Cash excluding restricted cash	7.3	4.2	5.3	3.4
Restricted cash	1.6	1.6	1.6	1.6
Current Liabilities	(6.8)	(32.7)	(7.1)	(9.0)
Creditors	(5.5)	(29.5)	(2.0)	(2.8)
Short term borrowings excluding finance leases	(1.4)	(3.2)	(3.9)	(0.7)
Finance leases	0.0	0.0	(1.3)	(1.4)
Derivative and short-term convertible debt	0.0	0.0	0.0	(4.0)
Long Term Liabilities	(25.1)	(21.9)	(16.8)	(16.2)
Long term borrowings excluding finance leases	(11.8)	(9.7)	(5.9)	(6.8)
Finance leases	(13.2)	(12.2)	(10.9)	(9.5)
Net Assets	(19.7)	(46.9)	(13.5)	(16.6)
CASH FLOW				
Operating Cash Flow	(29.1)	(11.9)	(14.5)	(20.3)
Net Interest	(1.4)	(3.2)	(3.2)	(2.2)
Tax	0.0	0.0	0.0	0.0
Capex	(5.1)	(0.3)	(1.8)	(0.5)
Acquisitions/disposals	0.0	0.0	0.0	0.0
Proceeds from issue of shares	0.0	13.3	25.2	17.6
Other items	0.0	0.0	(4.5)	(1.3)
Net Cash Flow	(35.5)	(2.1)	1.1	(6.7)
Opening net debt/(cash) including restricted cash	(31.0)	17.6	19.3	15.0
Finance leases initiated	0.0	0.0	0.0	0.0
Other	(13.1)	0.4	3.2	8.3
Closing net debt/(cash) including restricted cash	17.6	19.3	15.0	13.4

Source: company reports. Note: *Discontinued business, **Adjusted for 9:1 share consolidation in March 2022.

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