LION E-Mobility: Equity Story

Investments for a long term success

1. Market Growth
   - Strongly growing market in both Automotive and Non-Automotive
   - Substitution of lead acid and nickel metal hydride batteries
   - Demand for Stationary Storage Solutions to support renewables

2. Positioning in LMI
   - Long and deep understanding of lithium-ion battery technology
   - **DNA in battery testing services. Constant feedback loop is key**
   - Test facility in association with TÜV SÜD AG
   - Inhouse development of battery management systems and energy storages

3. Leverage Technology Leadership
   - TÜV Battery Testing JV is blue-print
   - Partnerships with established suppliers/ OEMs will be key for LION’s Equity Story

4. Senior Management Commitment
   - Directors and Senior Management are the largest shareholder group and thereby ensure credibility and stability / are aligned with remaining shareholders
2019 at LION E-Mobility

1. LION E-Mobility completed 2 funding rounds
   - Mr. Ian Muhkerjee underwrote and subscribed to the Q2 2019 rights issue
   - Additional €2.5mln raised in Q3 2019 from several investors

2. LIGHT BATTERY Development – Test & Touch modules available
   - Significant progress in Development of our LIGHT BATTERY
   - First testing results impressive – see details
   - Availability of Test & Touch Modules

3. We hired many experienced Engineers in 2019
   - >10 experienced Engineers joined LION Smart in Q3/Q4 2019
   - More to join as project pipeline improves

4. Senior Management / Processes Changes at LION Smart
   - Operational changes to support growth/ clear structures
   - BoD changed in 2019 to represent the ownership structure of LMI
NEW REVENUE OPPORTUNITIES FOLLOWING BMW COOPERATION

1st Client: LION ELECTRIC CO. - Canada

LION E-MOBILITY AG

TÜV SÜD joint venture
- Many years of expertise in battery testing (TÜV SÜD) and battery pack engineering
- LION Smart is joint venture partner with TÜV SÜD in TÜV SÜD Battery Testing GmbH
- State of the art laboratory in Garching (Germany) with more than 7 years of experience in testing automotive lithium-ion batteries

Provide necessary information to LION Smart

As LION Smart is
- based in Garching (next to Munich)
- Experienced in battery integration, battery technology and BMS technology
- Experienced in working with the i3-battery

Project communication and project handling can be assumed to be uncomplicated

Full responsibility of:
- Electrical integration
- Communication integration
- Safety integration
- Cooling integration

LION Smart can act as multiplicator for additional customers, enabling BMW to sell and ship additional batteries without high additional engineering effort

Additional applications coming

€8,5MLN for 2020
> € 10MLN for 2021
> € 10MLN for 2022
Battery Development

Development Goals for LIGHT Battery

- Safety
- Superior Thermal Management
- Energy Density
- Modularity
- Cost
**LIGHT Battery Concept**

**General Overview**

**Cell**
- LIGHT Battery concept is based on cylindrical cells
- Format 18650 is current cost champion, 2170 is expected to be cost champion in 2025
- 2170 Cells are superior in energy density
- No single source dependency due to various possible suppliers

**Supercell**
- Designed for fully automated production
- Number of parts minimized to meet stringent cost targets
- Improved safety through single cell fuse, cells immersed in non-flammable coolant and thermal propagation barriers

**Module**
- Parallelized immersion cooling for each Super-Cell
- Adjustable Module Length (via serial connected super cells)
- Printed electronic LSCM in each supercell allows measuring temperature, voltage and impedance

**Battery Pack**
- Super slim height of ~100mm on pack level possible
- No cables in the module significantly reduce cost and assembly effort
- Structural integration of Modules in battery pack (possible integration in crash backup structure)

Cylindrical cell combines high mechanical stability with equalizing effects over lifetime, highly cost competitive and safety at high energy density
**LIGHT Battery Modularity**

1-Dimensional Scalability of Modules – 34P Supercell

<table>
<thead>
<tr>
<th>Configuration</th>
<th>34P - 6S</th>
<th>34P – 12S</th>
<th>34P - 16S</th>
<th>34P - 20S</th>
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<tr>
<td># of Cells</td>
<td>204</td>
<td>403</td>
<td>544</td>
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<td>Energy content per Module</td>
<td>3.7 kWh</td>
<td>7.4 kWh</td>
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<td>Voltage Range</td>
<td>18V – 25.2V</td>
<td>36V – 50.4V</td>
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<td>60V – 84V</td>
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<tr>
<td>Capacity</td>
<td>170Ah</td>
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![Diagram](image-url)
Testing during development

Thorough and Extensive Testing is Key to Success

One of the leading test laboratories for lithium-ion batteries in Europe is just next door:
- Strong focus on safety tests
- Strong focus on automotive batteries
- State of the art equipment (200kN shaker in the build-up stage right now)

Safety
- Multiple separate independent test rooms
- Highest safety standard
- Gas scrubbing
- Explosion proof
- Testing of up to >100 kWh
- Overcharge, Overdischarge, Short-Circuit, Crush, Nail-Penetration
- Testing according to ECE R 100, upcoming GTR etc.

Performance
- Cell, Module and Pack level
- >200 cell test channels
- >30 module and pack test channels
- Maximum power: ±800kW (will be extended to ±1.200kW)
- Maximum voltage 1.200V
- Temperature -40°C to +80°C and higher
- Testing >90% according to customer standard

Environmental
- Climate chambers 9m³, 11m³, 15m³ for largest battery packs
- Battery pack sizes up to >100kWh, 4.000mm x 2.000mm x 1.500mm
- Temperature -40°C to 80°C and higher
- Humidity up to 95% r.H.
- Vibration 200kN
- Testing according to ISO 16750, IEC 60068, LV124

Almost 10 years experience in Automotive lithium-ion battery testing
LION and HÖRMANN Gruppe

Hörmann and LION cooperation for Battery Pack supply

- Hörmann Automotive is interested to step into e-Mobility
- Hörmann is very experienced in automatization and production
- Cooperation on battery knowhow and industrialization level

Value Chain E-Mobility Battery

LION and Hörmann offer a strong position along the value chain
**LION E-Mobility: Shareholder Structure**

Senior Management as largest Shareholder Group

- Founder & Employees: 38%
- Strategic Seed Investors: 36%
- Institutional Investors: 15%
- Free Float: 11%

**Facts**

- **Head Office**: Switzerland
- **Industry Sector**: E-Mobility; Segments: Battery-Tests, -Prototyping, -Management-Systems
- **WKN**: A1JG3H
- **ISIN**: CH0132594711
- **Symbol**: LMI
- **Listings**: Xetra, Frankfurt, Munich
- **Internet**: www.lionemobility.com
- **52-Week-Range**: 1.93 – 4.40 EUR
- **Outstanding Shares**: 9,239,992
- **Market Capitalization**: 31.4 Mio. EUR (16.01.2020)
LION E-Mobility at a glance
Built to electrify the future

Investments

LION E-Mobility at a glance

LION E-Mobility North America Inc.

LION Smart GmbH

Battery-Management-Systems

Battery Systems Engineering

Battery Testing

LION Smart GmbH

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<th>Year</th>
<th>In k€</th>
<th>FTEs</th>
<th>Revenue</th>
<th>Net income</th>
<th>Total balance sheet</th>
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TÜV SÜD Battery Testing GmbH

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Contact

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