Development of Li-Ion battery market
AGGREKO KEY FACTS

- temporary power generation equipment
- temperature control equipment
- headquarter in Glasgow, UK
- 9,920 MW fleet
- 1,720m £ revenue
- 208 location worldwide
- 6,000 employees
- 124 counties where we operate
Younicos -> AMSS
- ESS products and projects
- Hardware and software products
- ON and OFF grid applications
- Main components
  - Thermal generation
  - Renewable s (Solar / Wind)
  - Battery Storage
  - Software plattform

**Our Products**
The products we use are much more than big boxes – they power cities, they cool rockets and help communities thrive.

**Power**
Whether a developing country is seeking a multi-megawatt power plant while a permanent grid is established, or a small entertainment company wants to put on a local event with the help of reliable rental power, we have the experience and know-how to get the job done.

**Heating & Cooling**
When it comes to temperature control, we’re the ones you want on your team. Because we’re also experts in providing stable, ambient temperatures for all types of industry and circumstance – essential for health and working conditions – and to enable operations to run safely.

**Battery Storage**
Our fully integrated, plug-and-play battery storage solutions ensure maximum system effectiveness and efficiency. They have been optimised across every component to deliver optimal system performance, minimise operating costs and shrink your carbon footprint.
GLOBAL STORAGE DEPLOYMENTS

<table>
<thead>
<tr>
<th>Year</th>
<th>MW</th>
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</thead>
<tbody>
<tr>
<td>2015</td>
<td>2,000</td>
</tr>
<tr>
<td>2016</td>
<td>4,000</td>
</tr>
<tr>
<td>2017</td>
<td>6,000</td>
</tr>
<tr>
<td>2018</td>
<td>8,000</td>
</tr>
<tr>
<td>2019</td>
<td>10,000</td>
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<tr>
<td>2020</td>
<td>12,000</td>
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<td>2021</td>
<td>14,000</td>
</tr>
<tr>
<td>2022</td>
<td>16,000</td>
</tr>
</tbody>
</table>

- **Utility-scale**
- **Residential**
- **Commercial**
- **Other**

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Do not use the bullet point button to format your text.
GLOBAL STORAGE PRODUCTION

- China: 56%
- USA: 12%
- South Korea: 12%
- Europe: 12%
- Japan: 5%
- Other: 2%

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FROM CELL TO ESS

- Cell
- Module
- Rack
- DC Container

Cost structure LiB battery products:

- Cell
- Module
- Rack
- Container

Michael Schreieder
TYPES OF LITHIUM ION CELLS

Cylindrical

Pouch

Prismatic

Michael Schreieder
This template has been set with the correct Aggreko colours. You can find the colours on the top line of the colour palette, as follows:

- WHITE
- DARK GREY
- MID GREY
- BLACK
- ORANGE
- MID BLUE
- LIGHT BLUE
- GREEN
- PURPLE
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### DIFFERENT CHEMISTRIES

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<th>Technology</th>
<th>LFP</th>
<th>NMC</th>
<th>NCA</th>
<th>LMO</th>
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<tbody>
<tr>
<td>Energy Density</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Power Density</td>
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<td>3</td>
</tr>
<tr>
<td>Lifetime</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Michael Schreieder
SPECIFIC COSTS BATTERY CELL NMC

- Electrolyte
- Separator
- Cu foil
- Al foil
- Binders
- Anode
- Cathode
- Process
- Lithium
- Cobalt
- Nickel
- Manganese

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LITHIUM AND COBALT

Lithium supply and demand

Cobalt supply and demand

Source: Bloomberg New Energy Finance, press releases, Avicenne, USGS, IDTechEX, Deutsche Bank

Source: Bloomberg New Energy Finance, press releases, Avicenne, USGS, IDTechEX, Waaltdaily, LME
• global production of Li-Ion batteries per country
• including currently commissioning factories
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LI-ION WORLD MARKET 2017

- Panasonic
- Samsung
- LG Chem
- CATL
- BYD
- Listen
- NEC
- BAK
- OTHER
BATTERY PRICE DEVELOPMENT

- USD per kWh
- LiIon NMC type
- Battery Module based
OUTLOOK LI-ION MARKET

- prices will stay around 150 $/kWh for ESS
- difference between EV and ESS market
- local production will rise
- China dominant player
Thank you for your attention!

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