Battery Recycling
Introduction
1 Company Profile
Contemporary Amperex Technology Co., Limited

Main Business

Provide EV battery systems & services for green transportation

Provide solutions and services for clean energy storage

CATL

Abbreviation

2011

Establishment

Ningde, Fujian

Headquarters

300750

Stock Code

Cell → Module → Pack → Rack → Container → Power Station
Promote Renewable Energy Transition & Electrification Globally

**EV Market**

SNE Research:
- CATL ranked No.1 globally in EV battery consumption volume for six consecutive years
- In 2022, CATL held 37% of global EV battery market share

**Global:** 7.26 million EVs powered by CATL batteries
- 60 countries and regions

*Data source: SNE Research, data as of December 31, 2022

**ESS Market**

CATL **ranked first** in the world in terms of ESS battery shipment in 2021 and 2022

In 2022, CATL held 43% of global ESS battery market share

CATL’s energy storage solutions have been recognized by customers in ESS major markets including the United States, China, Germany, Britain, Australia, and other countries & regions. CATL BESS helps to integrate renewable energy and provide auxiliary services to strengthen the grid.

*Data source: SNE Research, data as of December 31, 2022

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CATL’s Global EV Battery Consumption Volume (GWh)

<table>
<thead>
<tr>
<th>Year</th>
<th>Consumption (GWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>10.8</td>
</tr>
<tr>
<td>2018</td>
<td>23.4</td>
</tr>
<tr>
<td>2019</td>
<td>32.5</td>
</tr>
<tr>
<td>2020</td>
<td>36.2</td>
</tr>
<tr>
<td>2021</td>
<td>96.7</td>
</tr>
<tr>
<td>2022</td>
<td>191.6</td>
</tr>
</tbody>
</table>

*Data source: SNE Research
Extreme Manufacturing
Committed to building a smart factory: flexible, efficient, low-cost, self-upgrading and of high quality.

World Economic Forum
Global Lighthouse Network
Ningde plant (2021), Yibin plant (2022)

The World’s First
Zero-Carbon Battery Factory
Yibin Plant

Automation

Big Data

Intelligent

2.2M+
150+
25,000+
340,000+
1000B+
20 Years

System Productivity
(Max Takt Time)
(Product Number of System-level)
(Data Exchange Volume)
(Cumulative Data Points)
(Traceability)

Intelligent Plant
Adopt advanced technologies
Battery Recycling and Circular Economy

Supported by its subsidiary Brunp, CATL is working with customers to create a closed loop of battery production – application – cascade utilization – battery recycling. At the same time, CATL has reached a strategic cooperation agreement with BASF to focus on cathode active materials and battery recycling, to promote CATL’s localization in Europe, which contributes to achieving both companies’ global carbon neutrality goals.

Brunp Recycling, Pioneer of Recycling

*The data above are as of June 30, 2021*
末端：创新加速资源回收

99.3% Ni、Co、Mn recycling efficient

90% Li recycling efficient
2 Global Market Demand
Global Market Demand for Batteries

China
- 2030: Carbon Peaking
- 2060: Carbon Neutral

EU
- 2035: Zero-emission on vehicle

US
- 2030: EV sales share 50%

Global EV battery market trend

7-10x

Global Market Demand for Batteries

Twh/Year

2019A 2020A 2021A ...... 2025ETS 2025NZS ...... 2030ETS 2030NZS

ETS: Economic Transition Scenario
NZS: Net Zero Scenario

Data source: BNEF《Electric Vehicle Outlook 2022》(2022年6月)
# Mineral Reserves and Demand

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Global Reserves (million tons)</th>
<th>Annual Demand of Minerals for EV Batteries: (2030)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li</td>
<td>26</td>
<td>Li 3.8</td>
</tr>
<tr>
<td>Ni</td>
<td>100</td>
<td>Ni 2.1</td>
</tr>
<tr>
<td>Co</td>
<td>8.3</td>
<td>Co 0.3</td>
</tr>
</tbody>
</table>

Impossible to establish a sustainable supply chain for EV globally **WITHOUT RECYCLING**
Closed-loop Recycling
Government actions

- Extended Producer Responsibility Implementation Plan
- EV Battery Recycling and Tracing Management
- EV Battery Recycling Management
- Disposal EV Batteries Secondary and Recycling Industry Regulation

- Battery Regulation: EPR、Recycled Materials Content、Recycling Efficiency
- Critical Materials Act

- Inflation Reduction Act (2022): materials recycled in NA meet the raw material requirement for $3750
3 Challenges & Advice
Major challenges

• Inaccurate tracing system is not able to assure the collection rate of all batteries; (for both EV and secondary use of batteries)

• Difficult to achieve a balance between the battery ownership of consumers and EPR for battery producers;

• Lack of proper regulations and standards for secondary market to assure safety, traceability, etc.

• Need to optimize the recycling capability globally;

• Regulatory barriers make the transportation fee for disposal, waste and used batteries unaffordable.
Advice

• Establish a life-cycle management system, which is critical for the sustainable development of battery industry;

• Develop monitoring tools such as Battery Passport to enhance LCA traceability;

• Introduce proper regulations and standards for secondary market to ensure a safe, environment friendly and traceable operation;

• Facilitate the recycling production capability globally and allow export/import of retired batteries or black mass;

• Develop feasible standards and regulations to distinguish the safety level of retired and waste batteries, to make the transportation fee reasonable and affordable.

• Allow railway to transport batteries and retired batteries in and between major markets like EU, China.

• To comply with some mandatory regulation of the recycled content or materials, such as Co, Ni, Li, relevant regulations should also be implemented to ensure high collection rate of retired and waste batteries for battery producers.
Rooted in the Chinese culture while embracing the global culture, strive to be a global premier innovative technology corporation, deliver excellent contribution to green energy resolution for mankind!