Contribution to the Battery Circular Economy

President and Representative Director
Takahiro Okazawa

HIOKI

HIOKI Long-term Management Policy Vision2030 press conference

Vision 2030

Mission - Why contribute to society? -

To contribute to social stability and development by promoting customers' safe and effective use of energy through electrical measurement

Vision - Where we want to be in 10 years –

"Beyond Measure"

As an industry front-runner, Hioki will become a solution-creator that helps forge a sustainable society together with customers worldwide by continuing to evolve what it means to "measure."

Beyond Measure ➡ **Creation of new measurement and inspection standards**

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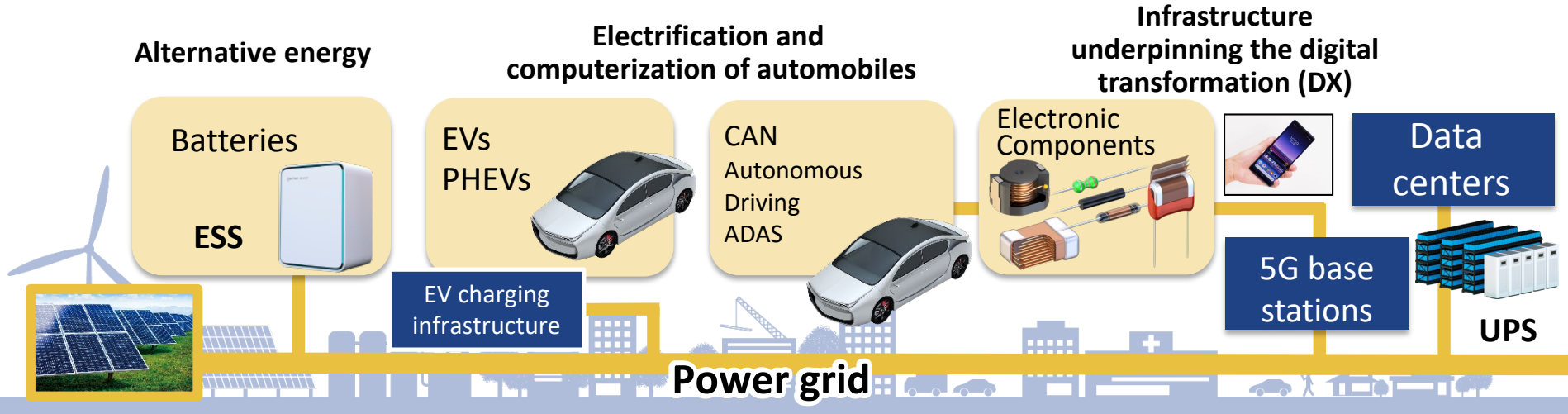
Vision 2030 Beyond Measure

Hioki is committed to pushing the boundaries of
measurement as an industry front-runner,
and to becoming a solution creator that works with
customers worldwide to realize a sustainable society.

Future Directions of HIOKI's Businesses

Bringing products to every field that will use electric energy as infrastructure in the future

Focusing development resources on the key markets that comprise a new social system



Sustainability of Society

Decarbonization efforts are progressing around the world.

	CO_2 reduction intermediate target	CN＊year of achievement
USA	50-52% reduction from 2005 levels by 2030	2050
China	GHG peak out by 2030	2060
EU	55% reduction from 1990 level by 2030	2050
UK	78% reduction from 1990 level by 2035	2050
Japan	46% reduction from 2013 level by 2030	2050

[Source] National Research and Development Corporation New Energy and Industrial Technology Development Organization (NEDO)
TSC TREND Trends in major overseas countries (US, China, EU, UK) related to carbon neutrality towards COP26
Created by our company based on each country's CO_2 reduction targets (page 8) for https://www.nedo.go.jp/content/100938612.pdf CN.

＊CN：carbon-neutral

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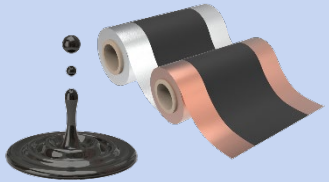
Contribution to the Battery Life Cycle

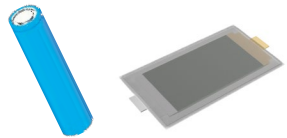
Electrical Measurement Technology to Improve Battery Performance

Battery Materials



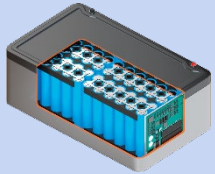
Battery Measurement Our Top Share

Battery Cells



Huge Investment in the Industry Next Growth Areas

Module Pack Technologies



Growing Interest in Environmental and Other Social Issues

Recycle Reuse

Electrochemical Analysis

Quality Check

BMS Inspection

Deterioration Diagnosis Technologies

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Expanding Battery Measurement Solutions

Material processes for cell manufacturing

Assembly process for cell manufacturing

Performance inspection of finished cell products

Assembly process for module and pack manufacturing

Module and pack performance inspection

Slurry

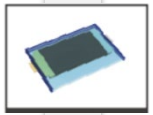
Slurry Test

Electrode Sheet

Electrode Resistance Measurement

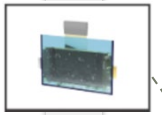
Tab Welding

Welding Quality Inspection



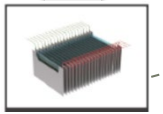
Seal, Vacuum and Drying

Contamination and Internal Short-circuit Inspection

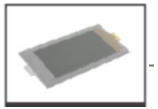


Injection and Impregnation

Voltage Between Electrode and Enclosure



Charge/Discharge, Formation and Aging



Cell Inspection

EOL

Analysis

Internal Resistance Open Circuit Voltage

Analysis and Characterization

Module Inspection

Welding Quality Inspection

EOL

Pack Inspection

BMS Board Test

Module and Pack Test

ATE Test System (High Volume)

+

+

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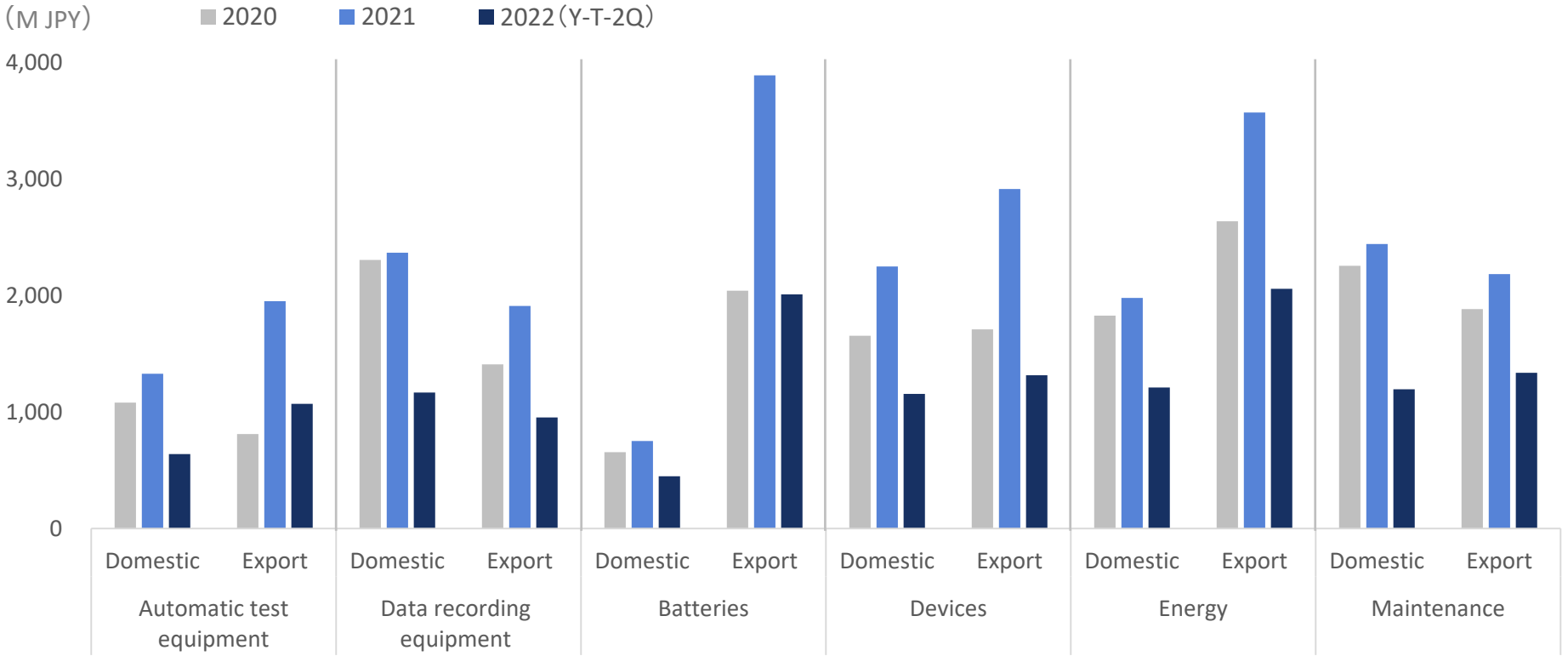
Sales by market/ application



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HIOKI's Strengths in Battery Measurement

- Battery testers that ensure cell safety and quality have become the **de facto standard**.
- **Driving the creation of value chain** in automotive batteries.
- **The essential measurement lineup** for the battery circular economy is now complete.
- Trust cultivated through 36 years of history and **partnerships with top global manufacturers.**

Our Battery Measurement History

1996

3550 series
PORTABLE TYPE

2006

3554
PORTABLE TYPE

2016

BT3554-01
With Bluetooth

L2020
L-shaped probes

Commemorating the 36th Anniversary of the HIOKI Battery Tester Series

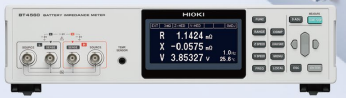
36 years

1986
AC mΩ HiTESTER
3225

1998
AC mΩ HiTESTER
3560

2010
BATTERY HiTESTER
BT3562, BT3563

2015
BATTERY
IMPEDANCE METER
BT4560



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Laws and Regulations Around the World

Actively promoting electrification of automobiles worldwide

	Regulations and Roadmap for EVs	Year
USA	Passage of the Inflation Reduction Act, phasing in conditions beginning in 2023 to create a North America-centric EV and battery manufacturing supply chain.	2030
USA state-level	Mandatory in California and NY, 15 other states to follow, 100% of new vehicle sales projected to be BEVs/PHEVs/FCVs.	2035
EU	Change the method of calculating CO_2 emissions of PHEVs from 2026, when 100% of new car sales will be BEVs/FCVs only	2035 (2026)
China	50% of new vehicle sales to be BEVs/PHEVs/FCVs by 2035, with the remaining 50% to be HEVs	2035

[Source] Created by our company based on the laws and regulations of each country and region.

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EV Plans of OEMs

Movement to respond to laws and regulations in various countries ahead of schedule

	EV plans for new car sales	Year
Volkswagen	50% of global sales to be BEVs 70% or more in Europe, 55% or more in North America, 50% or more in China	2030
GM	100% of global sales to be BEVs	2035
Stellantis	BEV/PHEV sales to be at least 70% in Europe and 40% in the U.S. (BEVs to account for at least 80% of total sales)	2030
Renault	100% of European sales to be BEVs	2030
Hyundai	100% of global sales to be BEVs/FCVs	2030
Honda	100% of global sales to be BEVs/FCVs Aiming for BEV/FCV to account for over 80% of global sales by 2035	2040 (2035)

[Source] Created by our company based on materials published by each company.

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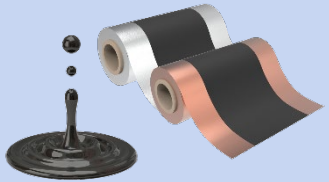
Contribution of Batteries to the Circular Economy

Electrical Measurement Technology to Improve Battery Performance

Battery Materials



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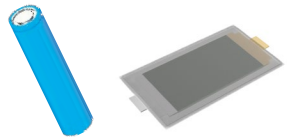
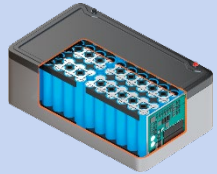


Huge Investment in the Industry Next Growth Areas

Module Pack Technologies



Growing Interest in Environmental and Other Social Issues

Rebuild
Reuse
Recycle

Electrochemical Analysis

Quality Check

BMS Inspection

Deterioration Diagnosis Technologies

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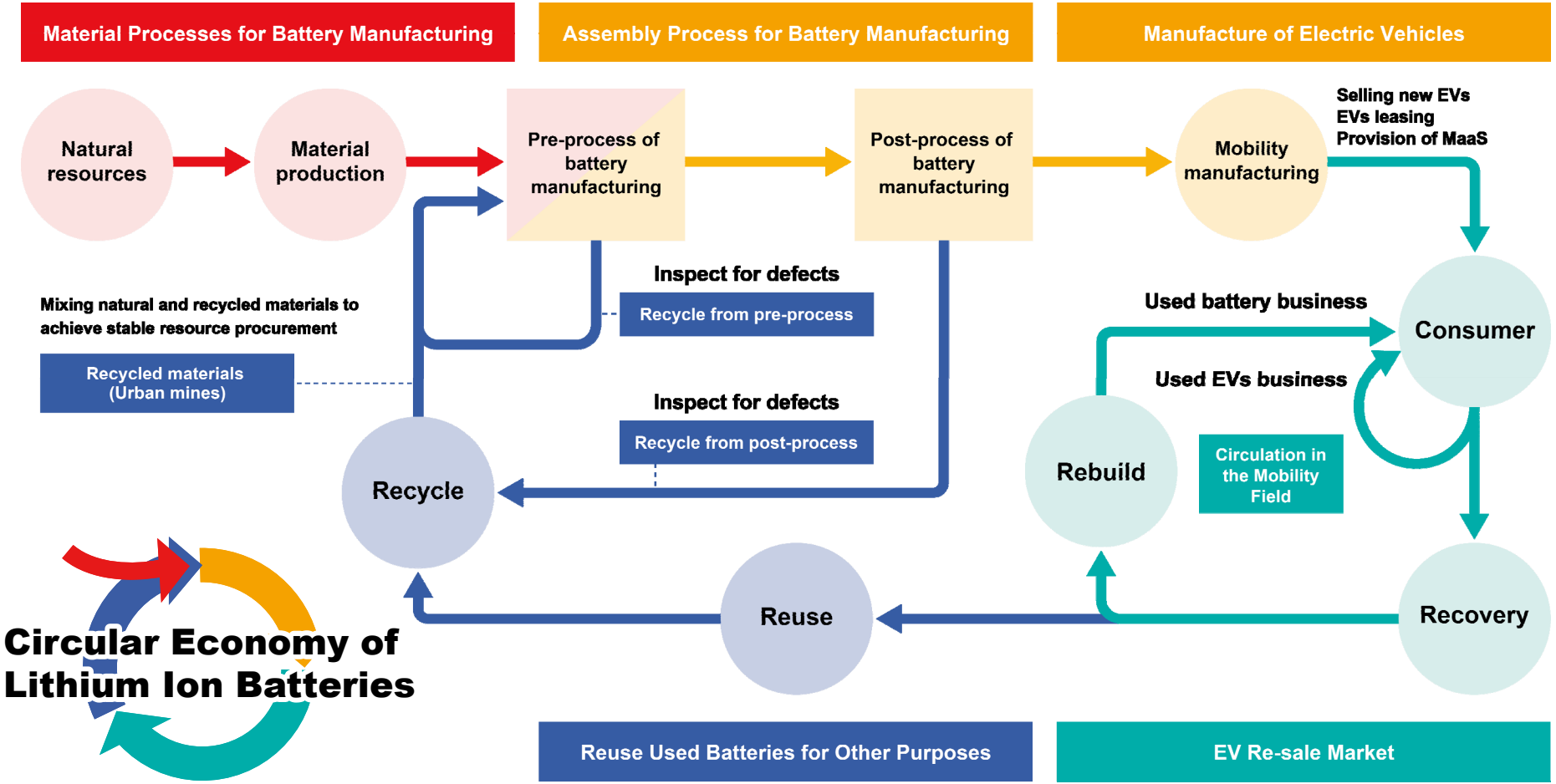

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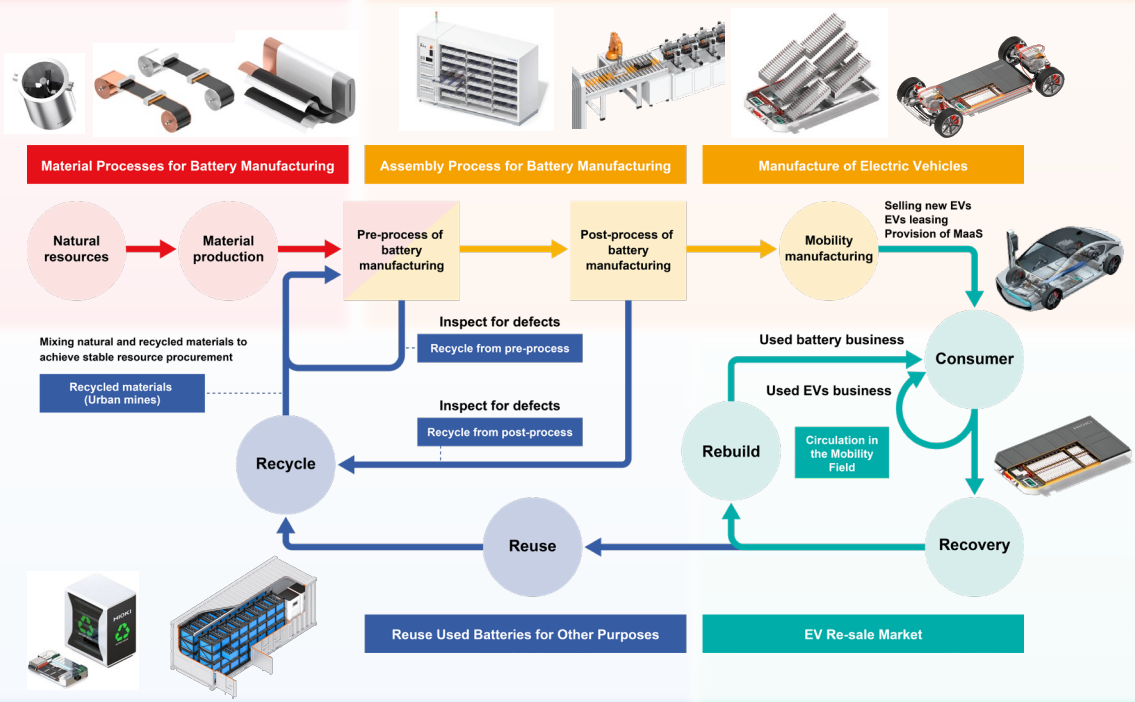
To create high-performance batteries

- We developed the world's first measuring instrument to determine the optimal manufacturing process
- Join LIBTEC

To supply safe, high-quality batteries

- Three products will be developed for battery safety inspections



- Consortium Participation
- Collaboration with other industries

- New technology has been developed to directly measure battery packs in vehicle-mounted condition

To connect technology and society

For effective use of resources

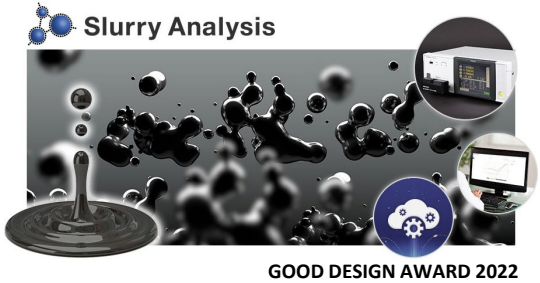
HIOKI

To create high-performance batteries

- High-performance batteries that can withstand rapid recharging and long-term use require advanced manufacturing processes.

World's first instrument for determining optimal manufacturing processes

The world's first technology has realized numerical process management, replacing process management that depended on the experience of engineers.



GOOD DESIGN AWARD 2022

Slurry condition measurement

Resistance measurement of electrodes

Join LIBTEC

LIBTEC Web (Chairperson: Dr. Yoshino)
Consortium for Lithium Ion Battery Technology and Evaluation Center (LIBTEC)

Development of measuring instruments for next-generation batteries such as all-solid-state batteries and next-generation manufacturing processes that significantly reduce CO_2 emissions is also underway.

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To supply safe, high-quality batteries

- Technology for mass production of batteries for EVs has been established, and the issue has moved to the stage of improving battery safety and quality.
- Stable supply of reliable, long-lasting batteries is essential for realizing a battery circular economy.

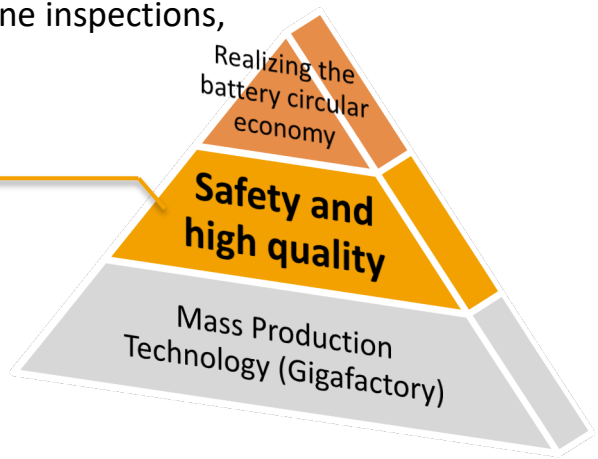
Detects latent battery defects that were previously invisible

The system detects latent battery defects that have been missed in production line inspections, thereby preventing battery fires and waste batteries.

Battery Insulation Tester
BT5525

Welding Resistance Meter
RM3546

DC Hipot Tester
ST5680

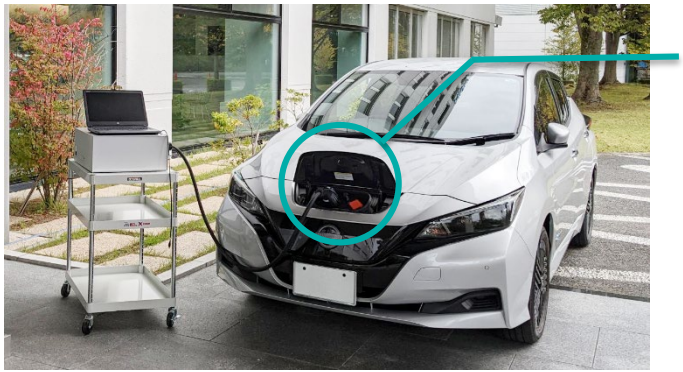


For effective use of resources

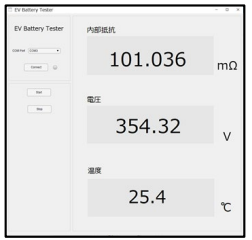
- Batteries for EVs use scarce materials and a lot of energy, and a value chain that extends the life of batteries as long as possible is essential for effective use of resources.
- In the used car market, one of the value chains, the value of used EVs is estimated to be low due to the lack of standards for judging value, and the market is barely functioning.

A new technology has been developed to directly measure the battery pack as it is installed in a vehicle.

Measurement technology to understand the condition of batteries enables value judgments to be made using common indicators, as well as enabling reliable long-term use of batteries.



Measurement can be easily made through the quick charging ports of EVs and PHEVs.

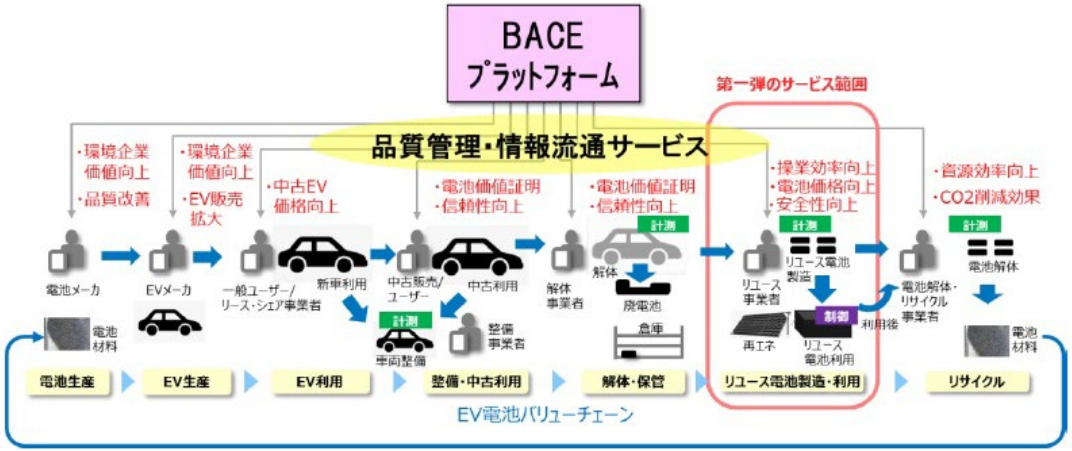


To connect technology and society

- Batteries for EVs will continue to be used for in-vehicle applications in used vehicles and rebuilds, and then be reused in stationary energy storage systems and other applications.
- Battery reuse is a new market, so a new value chain needs to be established to promote its widespread use.

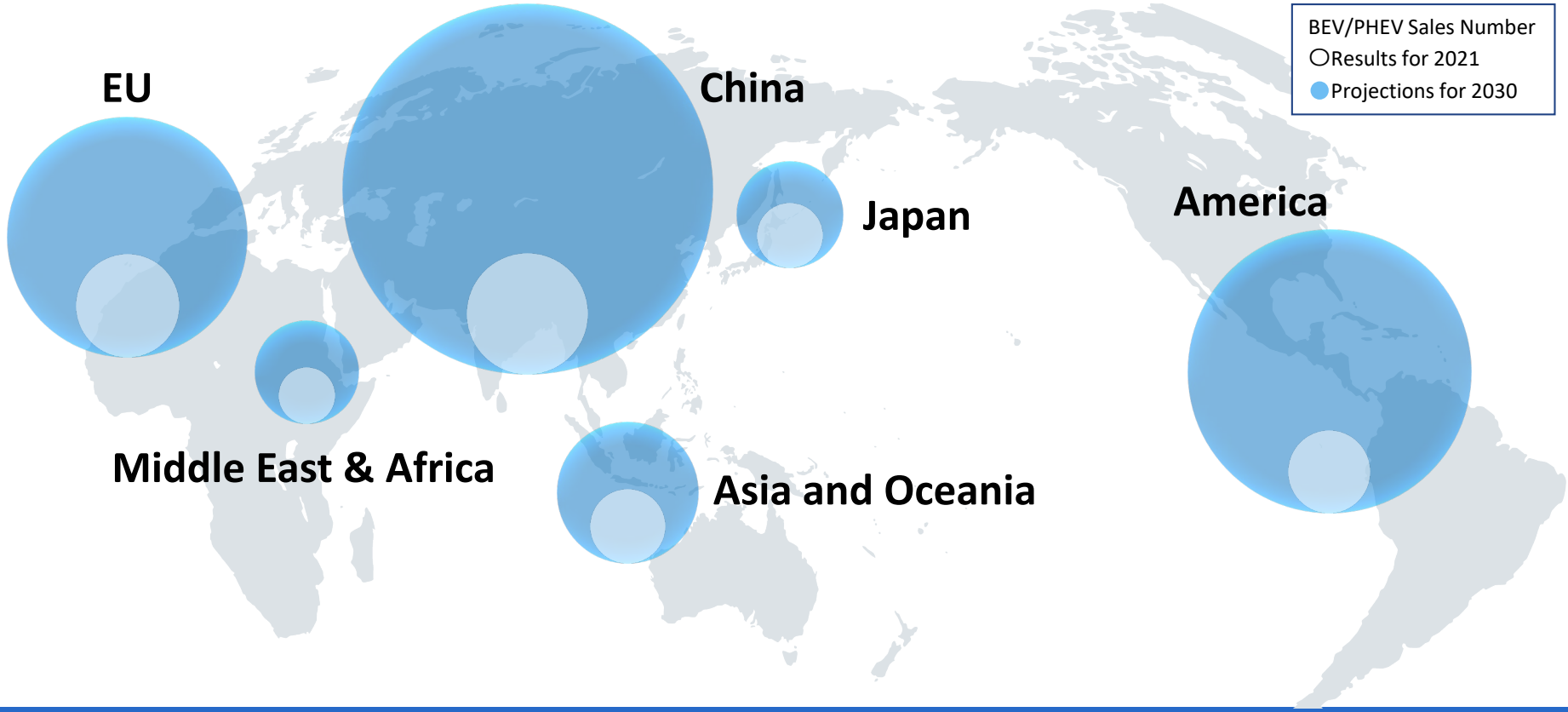
Collaboration with other industries to promote battery reuse

Participation in the Battery Circular Ecosystem Consortium hosted by the Japan Research Institute, and promotion of initiatives with financial institutions and trading companies.



[Source] Japan Research Institute website
https://www.jri.co.jp/page.jsp?id=102307

2030 EV Sales Forecast



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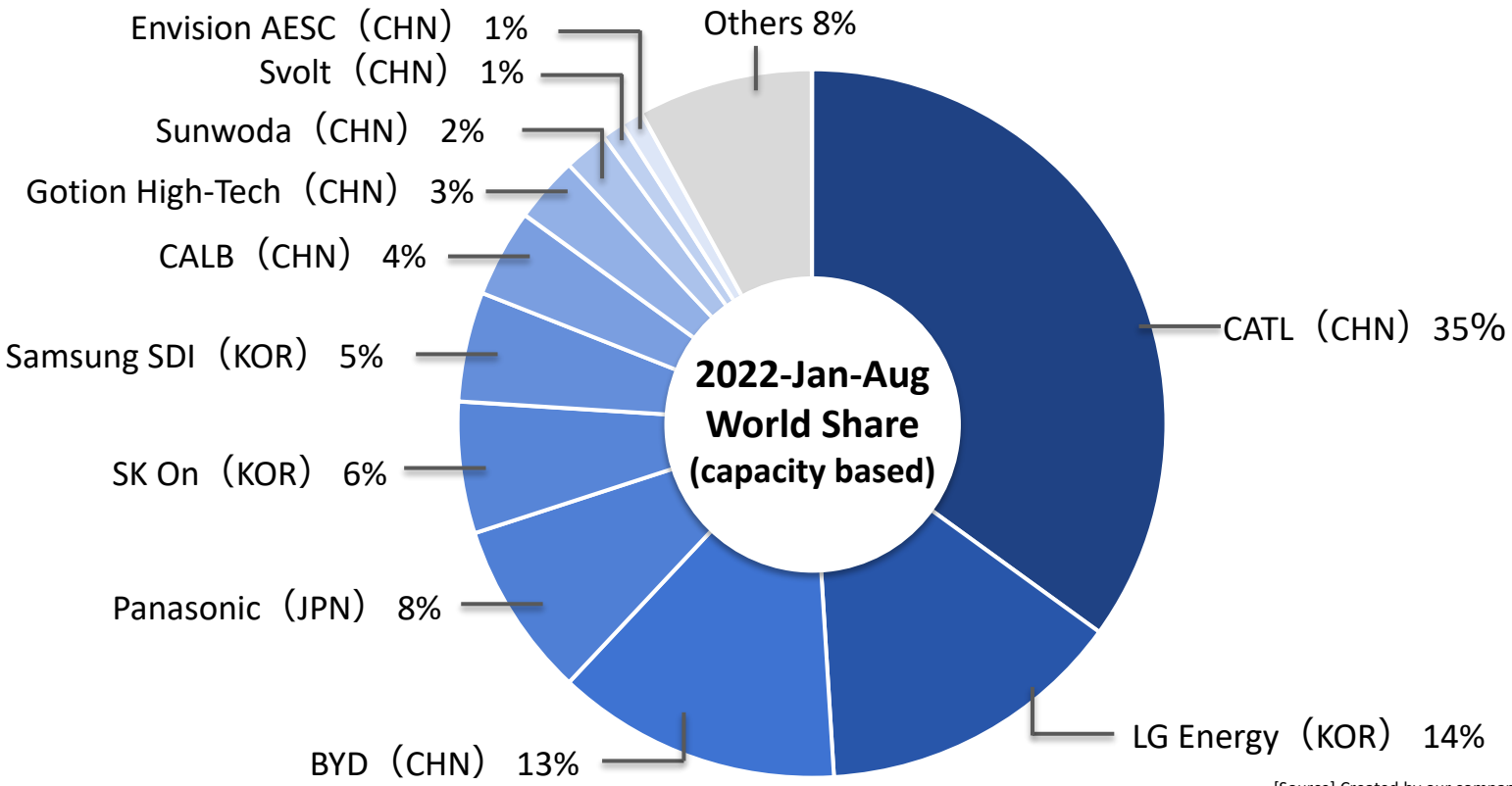
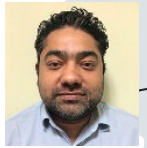
World's Leading Battery Manufacturers



[Source] Created by our company based on SNE Research data.

Global Network

HIOKI EUROPE GmbH



HIOKI INDIA PRIVATE LIMITED

HIOKI SINGAPORE PTE.LTD.

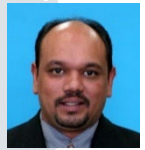
PT. HIOKI ELECTRIC INSTRUMENT

H.Q.

HIOKI KOREA CO.,LTD.

HIOKI (Shanghai) MEASUREMENT TECHNOLOGIES CO., LTD.
HIOKI (Shanghai) TECHNOLOGY DEVELOPMENT CO., LTD.
HIOKI (Shanghai) MEASURING INSTRUMENTS CO., LTD.

HIOKI TAIWAN CO.,LTD.



HIOKI USA CORPORATION

Group Company HQ
Major Group Company Locations

Sales managers at each location

Thank you for your attention.

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