

Hitachi High-Tech Group CONFIDENTIAL

NaatBatt 14th Annual Meeting & Conference

Digital Innovations for Battery Ecosystems

Lithium-ion Battery Life Cycle Management

21 February 2023

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Industrial Solutions Division

Hitachi High-Tech America and Hitachi America, Ltd. R&D Solutions

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(Hitachi America, Ltd. R&D Solutions)**
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(Hitachi High-Tech America)**

1. Hitachi Overview

Vision

Deliver innovations that answer society's challenges with our talented team and proven experience in global markets. Together, we can inspire the world.

Mission

Contribute to society through the development of superior, original technology and products.

Values

Harmony | Sincerity | Pioneering Spirit



1910

FOUNDED BY
NAMIHEI ODAIRA

#29

**MOST INNOVATIVE
COMPANIES IN 2020**

BY BOSTON CONSULTING GROUP

TOP 100

**GLOBAL INNOVATOR for
10 CONSECUTIVE YEARS**

\$84.1B

REVENUE (FY2021)

853

HITACHI GROUP
COMPANIES

OT

OPERATIONAL
AND
INDUSTRY
EXCELLENCE

112 YEARS

10TH

**LARGEST
TECH
COMPANY IN
THE WORLD**

BY REVENUE
(FORTUNE GLOBAL
500)

INDUSTRY

MOBILITY

SMART LIFE

ENERGY

368K

EMPLOYEES

119K

GLOBAL PATENTS

\$2.6B
BILLION USD

ANNUAL
INVESTMENT
IN R&D

IT

62 YEARS OF
DIGITAL INNOVATION

LUMADA

IOT

Cloud

Machine
Learning

AI

Advanced
Analytics

LEADER IN INDUSTRIAL IOT
PLATFORMS IN 2020 GARTNER
MAGIC QUADRANT

COMMITMENT
TO UN SDGS

FORTUNE 500

GLOBAL TECHNOLOGY COMPANY

PLANETARY BOUNDARIES



CO-CREATION FOR SOCIETY



WELLBEING



Customer (Power, Transport) Customer (Financial, Public Services)

Customer (Industry, Urban)

Customer (Vehicle)

Green Energy & Mobility

Support the energy shift for decarbonization and provide safe, comfortable and clean mobility

Energy

Rail

Number of employees: 58,000

Digital Systems & Services

With cutting-edge CPS, improve the efficiency of systems which underpin society

Front business

IT services

Services and platforms

Number of employees: 97,000

Connective Industries

Create a resilient supply chain and innovate industries and cities

Urban

Industries

Advanced technologies

Number of employees: 82,000

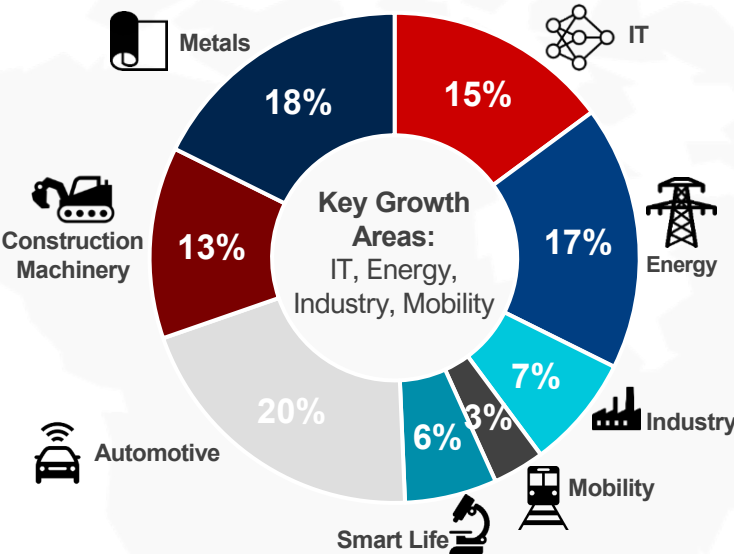
Hitachi Astemo

Contribute to vehicle electrification and autonomous driving

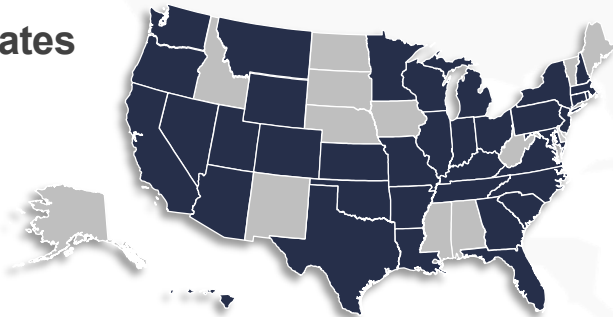
Automotive components (EV)

Number of employees: 64,000

Sales Composition



U.S. Presence: 37 States



HITACHI IN NORTH AMERICA
(U.S. AND CANADA)

1959	Year of first U.S. subsidiary
\$12.7B	Total Sales FY2021
28K+	# of Employees
97	Companies
78	Manufacturing Sites
30	R&D Laboratories

Environmental Vision

Hitachi will resolve environmental issues and achieve both a higher quality of life and a sustainable society through its Social Innovation Business, in collaboration with its stakeholders

Long-term Environmental Targets: Hitachi Environmental Innovation 2050

For a decarbonized society

Achieve carbon neutrality by FY2050 through the value chain

Reduce CO2 emissions by 50% by FY2030
(compared to FY2010)

Achieve carbon neutrality by FY2030 at business sites
(factories and offices)

For a resource-efficient society

Build a society that uses water and other resources efficiently with customers and society

Efficiency in use of water/resources by FY2050

50% improvement
(compared to FY2010 in the Hitachi Group)

For a harmonized society with nature

Impacts on natural capital

Minimized

Environmental Action Plan



To achieve its long-term environmental targets, Hitachi sets indicators and targets every 3 years. "Environmental Action Plan for 2021" covering the targets for FY2019 thru FY2021 is in progress.

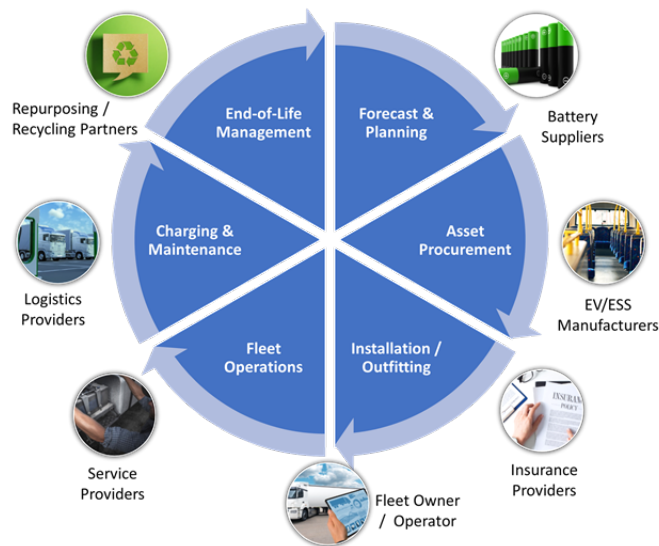


2. Digital Innovations for Battery Ecosystems (Hitachi America, Ltd. R&D Solutions)

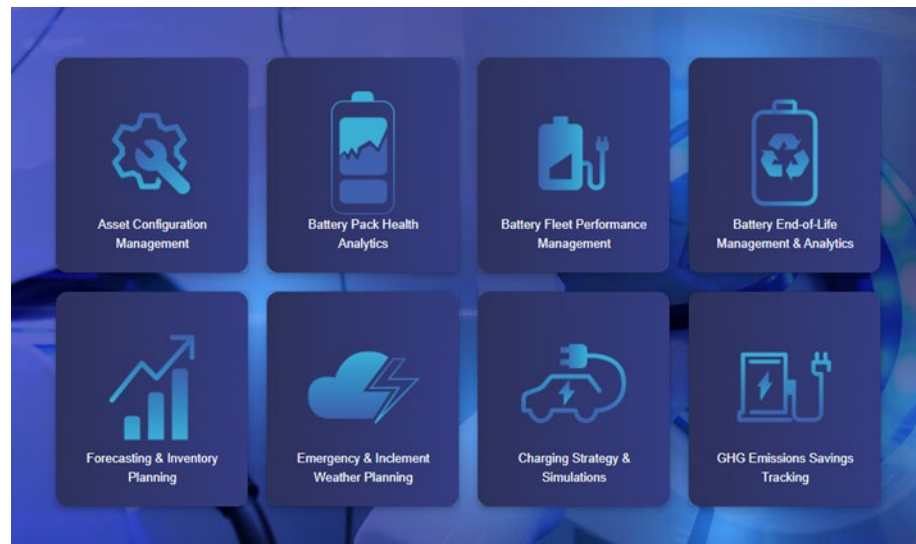
2-1 Digital Innovations for Battery Ecosystems

We are developing innovative digital solutions to address the challenges of battery ecosystems:

- Blockchain based trusted platform to connect the stakeholders in the battery ecosystem
- Analytics based solutions to enable data-driven decision making
- Micro-apps tailored for each stakeholder in the battery ecosystem



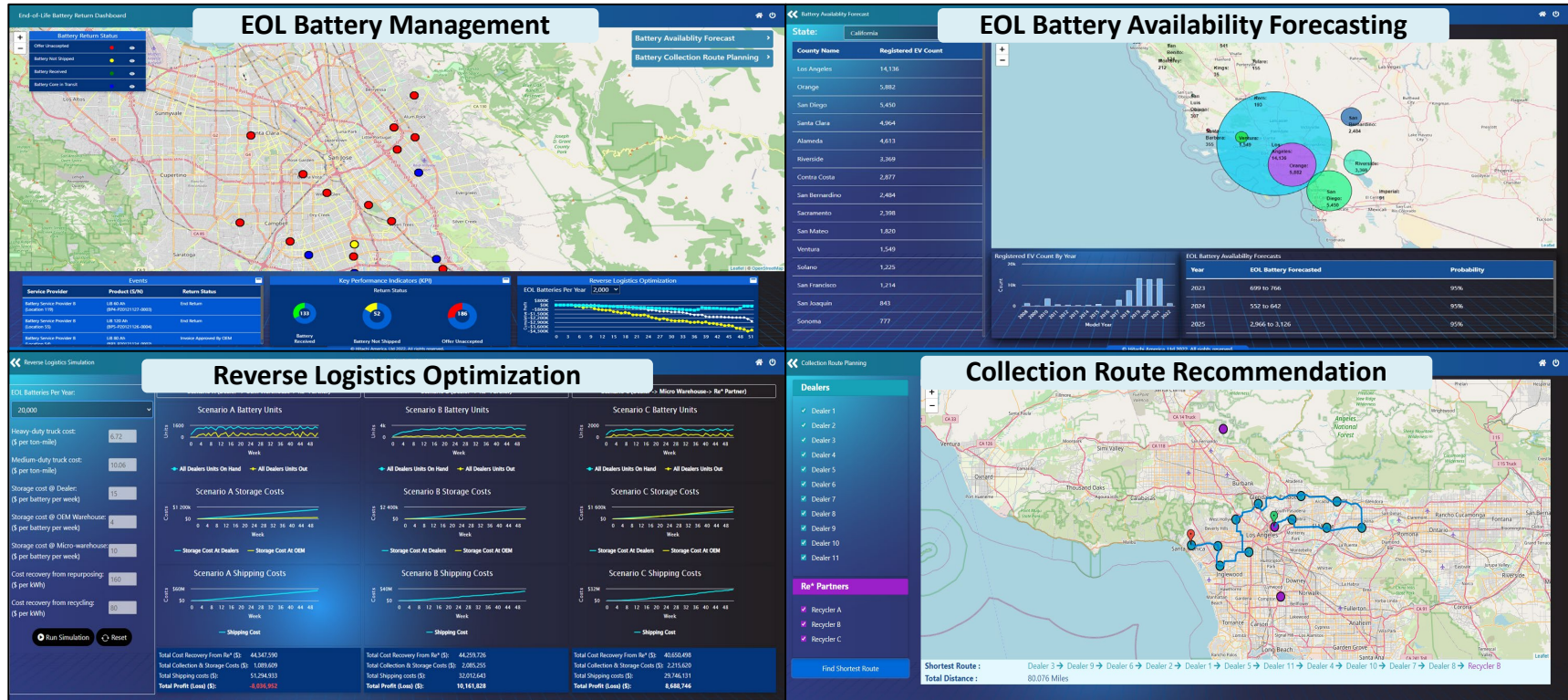
Battery Ecosystems Participants



Digital Solutions For Battery Value Chain

2-2 End-of-Life (EOL) Battery Management and Analytics

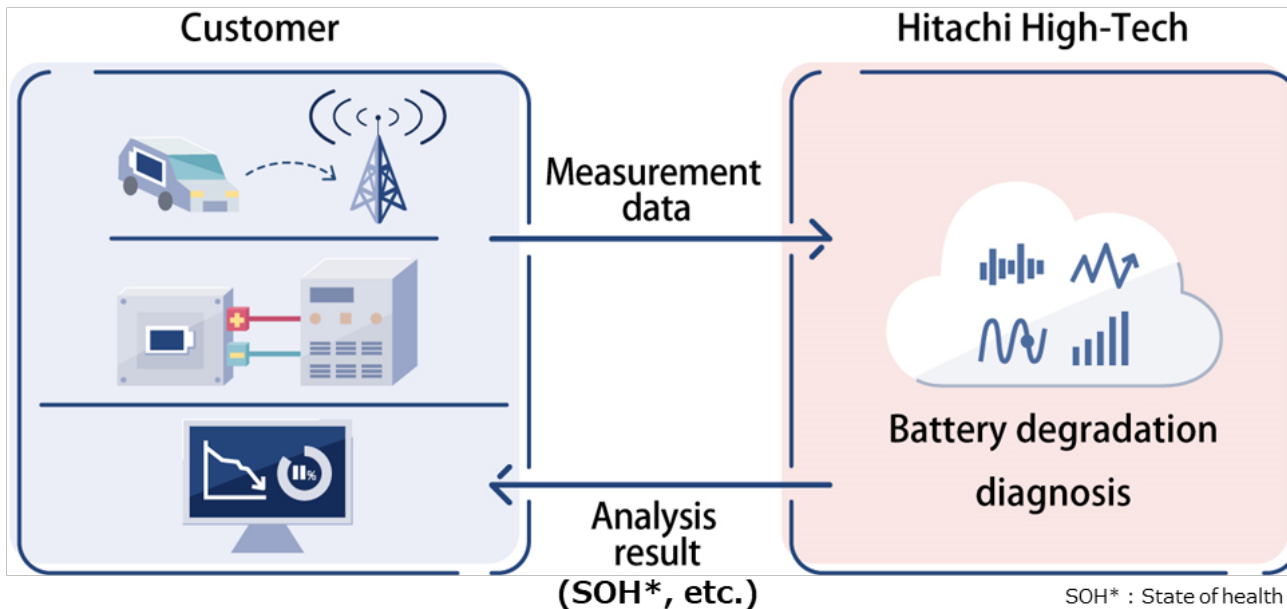
An innovative solution to track and forecast retired battery availability, estimate the remaining value of batteries, optimize transportation costs, and connect relevant stakeholders through a trusted platform.



3. Lithium-ion Battery Life Cycle Management (Hitachi High-Tech America)

3-1 Lithium-ion Battery Life Cycle Management

Solution Outline



Measurement data from the various operation equipment is analyzed in the cloud.
Analysis results are displayed on dashboard.

Features

1. Remote Battery Diagnosis & Rapid Battery Diagnosis
2. Applicable with current equipment customers own
3. Cloud-based diagnostic system

3-2 LiB-LCM: Applicable Business Sectors

Solution for Recyclers



- ✓ Sorting next life/real EOL as recycling

Solution for Regeneration Business



- ✓ Degradation diagnosis • Residual value grasp
- ✓ Precise grading for reuse
- ✓ Used car assessment

LiB-LCM



Solution for Battery manufacturers



- ✓ Identifying defective product and performance in pre-shipping inspection
- ✓ Analytical consulting for R&D

Solution for EV & Equipment OEM



- ✓ On-BMS installation
- ✓ Acceptance/Pre-installation inspection

Solution for ESS operators



- ✓ Degradation status monitoring
- ✓ Abnormal Deterioration Detection
- ✓ EOL management for 2nd life

Solution for Fleet operators



- ✓ Degradation-based management
- ✓ Abnormal Deterioration Detection
- ✓ EOL management for 2nd life

Hitachi members attending NaatBatt 2023

Hitachi High-Tech America, Inc. members:



Ryo Kobayashi (Director)



Eric Yoshimura (Manager)



Monica Degnan (Western Area Sales Manager)

Hitachi America, Ltd. R&D Solutions members:

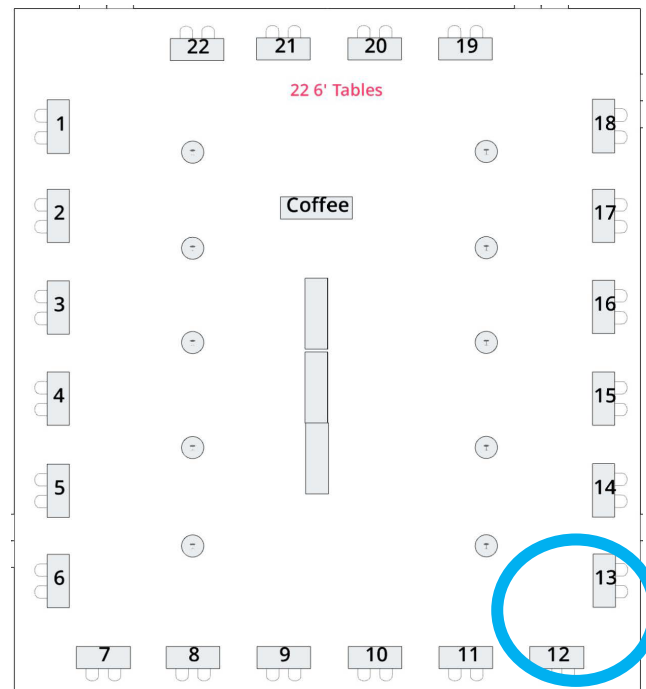


Amit Kumar (Sr. Manager, Solutions)



Pierre Huyn (Principal Research Architect)

NaatBatt 2023 exhibitor booths: #12 and #13



END



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Creative Minds. Innovative Solutions.