

# Automotive Lithium-ion Batteries



**Ryoichi Okuyama**

Managing Director  
In Charge of Lithium-ion Battery Development, Intellectual Property, and Lithium-ion Battery Business  
GS Yuasa International Ltd.

## Review of the Fifth Mid-Term Management Plan

### Production capacity of batteries for hybrid electric vehicles (HEVs) expanded and preparations of batteries for battery electric vehicles (BEVs) started

The electrification of automobiles is advancing rapidly around the world in order to achieve carbon neutrality. It is expected that demand for lithium-ion batteries will grow even more in the future.

Under this market environment, new vehicle production by automobile manufacturers was weaker than expected and growth in volume was slower than planned during the Fifth Mid-Term Management Plan due to effects from the COVID-19 pandemic, the semiconductor shortage, and other factors. On the other hand, the sales volume of lithium-ion batteries for HEVs increased due to sales to Honda Motor Co., Ltd. as well as the start of deliveries to Toyota Motor Corporation. In addition, both net sales and operating profit increased as a result of sales price revisions in response to soaring prices for raw materials and other factors. Blue Energy Co., Ltd. began operating a second plant in April 2022, and production capacity increased to 50 million cells per year in the second half of fiscal 2022, enabling the Group to reliably meet demand from automakers. Regarding lithium-ion batteries for plug-in hybrid vehicles (PHEVs), Lithium Energy Japan reported impairment losses in fiscal 2020, but business took a turn for the better in fiscal 2022 as a result of increased demand from Mitsubishi Motors Corporation, its main client. In the business for 12V lithium-ion batteries, Europe delayed its restrictions on lead, and we believe that the market will require close monitoring in the future. Regarding batteries for BEVs, we made our first step toward a full-scale entry into the BEV lithium-ion battery market with the establishment of the BEV Battery Development Department in April 2022, resulting in the signing of a basic agreement for collaboration with Honda Motor in January 2023.

The overall business environment has been challenging, but I feel that the measures that we have been steadily implementing until now are finally starting to bear fruit.

## Measures to Achieve Vision 2035 and the Sixth Mid-Term Management Plan

### For BEVs Development of lithium-ion batteries that will become the global standard

Premises of the Vision 2035 are that the trend towards carbon neutrality will take root and that the electrification of automobiles will undoubtedly advance. Currently in the BEV lithium-ion battery market, Chinese and South Korean manufacturers have taken the lead and competition is fierce, and it will be necessary for the Company to align with Japanese automakers and establish a strong presence.

A key feature of the Sixth Mid-Term Management Plan for building the foundations needed to achieve the Vision 2035 is development of high-capacity, high-output lithium-ion batteries. As a first step, we established Honda • GS Yuasa EV Battery R&D Co., Ltd., an R&D joint venture company with Honda Motor in July 2023. This project is an essential element for the Group to make significant strides forward in the future, and we absolutely cannot fail. The first and highest priority of this joint venture company will be to develop high-performance lithium-ion batteries for BEVs that will be highly competitive and become the global standard.

The joint venture company with Honda Motor will serve as a driving force for putting these strategies into practice, and personnel are working with the determination to make this happen.

### For BEVs Building production systems for mass production in 2027

In addition to R&D of lithium-ion batteries for BEVs, we are also making preparations for mass production. This project was certified under the Supply Security Plan for Storage Batteries of the Ministry of Economy, Trade and Industry, and the Company plans to receive up to about 158.7 billion yen in subsidies. We will use the subsidies to launch a new production line in April 2027, and Blue Energy will play a central role in the stable supply of batteries to various automakers. We will also expand whole Group production capacity, which exceed 20 GWh per year in 2035. Achieving this scale of production with high yields will be a major challenge, and we will make steady preparations.

Lithium-ion batteries for BEVs will also be used in the production of industrial lithium-ion batteries used for electric power storage and other applications. We will examine these initiatives, including how to fully leverage Blue Energy and Lithium Energy Japan, during the term of the Sixth Mid-Term Management Plan.

### For HEVs Expanding production capacity in anticipation of growing demand

### For PHEVs Reinforcing measures to acquire orders

We project that demand for lithium-ion batteries for HEVs, primarily from Japanese automakers, will remain robust through the mid-2030s. During the term of the Sixth Mid-Term Management Plan, we will start delivering products to new Japanese automakers in addition to Honda Motor and Toyota Motor which we currently supply products to. To meet this demand, Blue Energy will increase its production capacity from 50 million cells to 70 million cells per year by fiscal 2025 in response to requirements from automakers.

We are reinforcing our measures to acquire orders with the aim of achieving adoption of the lithium-ion batteries for PHEVs that we currently supply to Mitsubishi Motors on a wider range of models. We are also expanding sales of

lithium-ion batteries for commercial EVs and strengthening sales by Lithium Energy Japan.


### Increasing the pace of decision-making and establishing clear policies and direction


Looking at developments in global automotive markets, we expect that the European market will become nearly entirely electrified by 2040, but there have also been reports that internal combustion engine vehicles will be permitted, conditioned on the use of synthetic fuels. The pace of the shift to electric vehicles is difficult to forecast. There will likely be situations when difficult business decisions must be made, and we hope to increase the pace of decision-making by the management team so that establish clear policies and a clear direction.


I request that employees perform their on-site work with the awareness that each individual is a driver of the reforms that will lead to future growth. I also expect that the wide-ranging experience that will be gained through collaboration in the BEV business will become a substantial source of sustenance for growth by employees.

The Lithium-ion Batteries Business Unit has faced numerous challenging goals and has made considerable efforts to achieve commercialization, resulting in stable profitability. During the term of the Six Mid-Term Management Plan, we will lay the foundations for the Group to make great strides in the future. To compete successfully in the BEV lithium-ion battery business, we must take aggressive action with unprecedented speed. Society also holds tremendous expectations for this business, and we will move forward with a strong commitment to succeeding.

## Main Points of the Sixth Mid-Term Management Plan

-  **For BEVs**
- Establishment of Honda • GS Yuasa EV Battery R&D Co., Ltd., an R&D joint venture company with Honda Motor Co., Ltd.
  - Promotion of joint R&D of high-capacity, high-output lithium-ion batteries
  - Preparations for mass production in fiscal 2027

-  **For HEVs**
- Expansion of production capacity of Blue Energy (from 50 million cells/year in fiscal 2022 to 70 million cells/year in fiscal 2025)

-  **For PHEVs**
- Reinforcement of measures to acquire orders in order to expand models that use our batteries

# Automotive Lithium-ion Batteries

## Sixth Mid-Term Management Plan

### Business Policy

**Achieve sustainable growth in the lithium-ion battery business by taking carbon neutrality and government targets as opportunities**

### Strategies and Important Tasks

#### For HEVs, PHEVs

- Improve yield rate and plant utilization rate
- Establish further increasing production system of Blue Energy No.2 plant
- Strengthen development and production systems of batteries for PHEVs

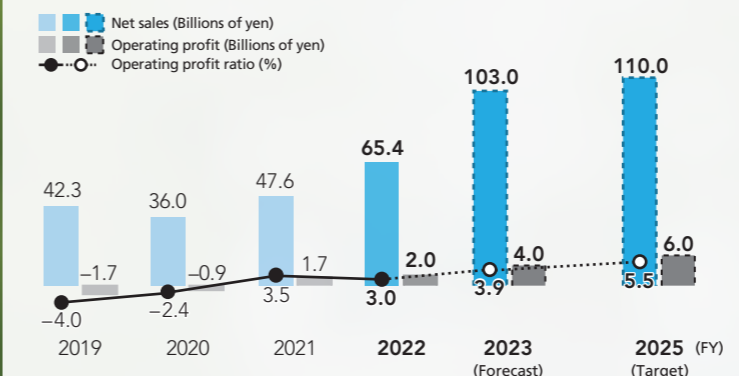
#### For BEVs

- Strengthen development systems
- Prepare to enter business

#### Auxiliary and backup use

- Development of products / preparation of production

## Net Sales, operating income, operating profit ratio



Note: The Fifth Mid-Term Management Plan originally covered the period from fiscal 2019 to fiscal 2021. Due to the impact of the COVID-19 pandemic, however, we have excluded fiscal 2020 as a single-fiscal-year plan and changed the fifth plan to a four-year plan ending in fiscal 2022.

## SWOT

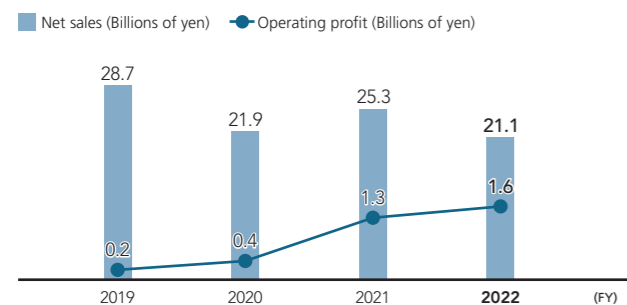
Strengths	Opportunities
<ul style="list-style-type: none"> <li>● Connection with automakers in Japan</li> <li>● Delivery results by BEC and LEJ</li> </ul>	<ul style="list-style-type: none"> <li>● Expanding demand for HEVs by automakers in Japan</li> <li>● Expanding demand for batteries for BEVs</li> </ul>
Weaknesses	Threats
<ul style="list-style-type: none"> <li>● Business scale compared to manufacturers in China and Korea</li> <li>● Concentration of production sites in Japan</li> </ul>	<ul style="list-style-type: none"> <li>● Concerns about stable procurement of raw materials</li> <li>● Legal regulation in Europe and the U.S.</li> <li>● High market share by foreign manufacturers</li> </ul>

## Review of the Fifth Mid-Term Management Plan

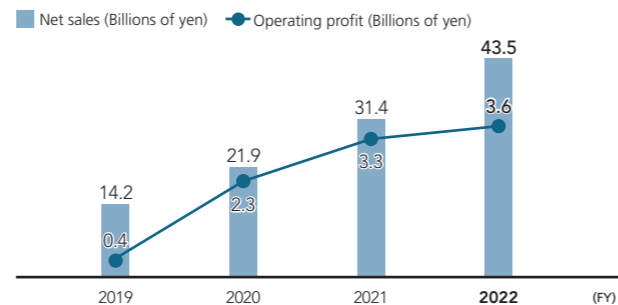
With regard to batteries for HEVs, supply to Toyota Motor started and production capacity was increased to 50 million cells per year with the start of operation of the Blue Energy No. 2 plant. For batteries for BEVs, we established the BEV Battery Development Department. We also decided to collaborate with Honda Motor to conduct research and development of high-capacity, high-output lithium-ion batteries.

Achievements and issues	
<b>Achievements</b>	<ul style="list-style-type: none"> <li>● For HEVs                             <ul style="list-style-type: none"> <li>• Start of supply lithium-ion batteries for Toyota Motor</li> <li>• Start of operation of Blue Energy No. 2 plant</li> </ul> </li> <li>● For BEVs                             <ul style="list-style-type: none"> <li>• Establishment of the BEV Battery Development Department</li> <li>• Signing of basic agreement on collaboration with Honda Motor</li> </ul> </li> </ul>
<b>Issues</b>	<ul style="list-style-type: none"> <li>● Response to entry into BEV market</li> </ul>

### Change in net sales and operating profit of Lithium Energy Japan



### Change in net sales and operating profit of Blue Energy



## TOPIC

### Blue Energy No. 2 plant started operations in April 2022

In order to respond to the growing demand for HEVs, mainly by Japanese automakers, operation of Blue Energy's No. 2 plant started in April 2022. Deliveries to Honda Motor and Toyota Motor are increasing, and Blue Energy plans to expand production capacity to 70 million cells per year in fiscal 2025.



Exterior of Blue Energy No. 2 plant



Honda "FIT HYBRID"



Toyota "Harrier"

## Outlook for the Sixth Mid-Term Management Plan Period

We expect that during the term of the Sixth Mid-Term Management Plan, sales volume of batteries for HEVs will increase, and we plan to increase Blue Energy's production capacity to 70 million cells annually in fiscal 2025. Demand for batteries for PHEVs is expected to remain solid. We established a joint venture company with Honda Motor for next-generation lithium-ion batteries for BEVs.

### For HEVs

- Increase in sales in conjunction with increased demand from Japanese automakers

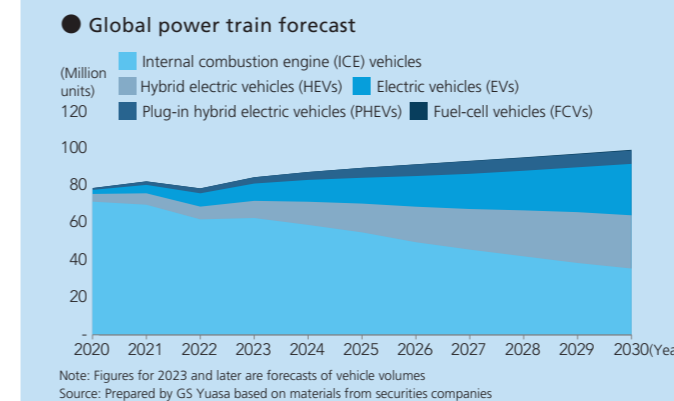
### For PHEVs

- Firm sales as a result of sales activities and reinforcement of production systems

### For BEVs

- Collaboration with Honda Motor on next-generation lithium-ion batteries

### Relevant data



## Outlook for fiscal 2023

In fiscal 2023, the volume of batteries for HEVs will increase, and the scope of models on which our products are used is expected to expand. The volume of batteries for PHEVs will also increase as the semiconductor shortage eases. We expect higher sales and profit for the segment as a whole.

### For HEVs

- Increase in volume due to easing of semiconductor shortage
- Expansion of models using the Company's batteries

### For PHEVs

- Increase in volume due to easing of semiconductor shortage

### For BEVs

- Establishment of Honda · GS Yuasa EV Battery R&D, a research and development joint venture company with Honda Motor

