

Mitsubishi Electric and Musashi Energy Solutions Sign Partnership and Co-Development Contract

Collaboration expected to advance carbon neutrality in the global railway industry



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Yoshio Nagatsuka, General Manager, Traction Systems Department, Itami Works, Mitsubishi Electric
Kouji Takahashi, Chief Executive Officer, Musashi Energy Solutions
Masaru Maeda, Managing Executive Officer, Musashi Seimitsu Industry

TOKYO, May 15, 2024 – [Mitsubishi Electric Corporation](#) (Chiyoda-ku, Tokyo) and Musashi Energy Solutions Co., Ltd. (Hokuto City, Yamanashi Prefecture), a subsidiary of Musashi Seimitsu Industry Co., Ltd. (Toyohashi City, Aichi Prefecture), announced today their signing of a partnership and co-development agreement on May 14 for Innovative Energy Storage Devices to be incorporated into Innovative Energy Storage Modules, and Battery Management Systems (BMSs) that monitor and control battery usage for railway operators and rolling stock manufacturers.

Under the joint-development agreement, Mitsubishi Electric's advanced technologies will be leveraged in Innovative Energy Storage Modules to upgrade Musashi Energy Solutions' Innovative Energy Storage Devices with functions for vibration resistance, insulation and waterproofing to be utilized in railcars and any other vehicles. The devices are expected to achieve the long service life and high safety levels of Hybrid Supercapacitors (HSCs),* as well as high output density not possible with conventional lithium-ion batteries and high-capacity density not possible with conventional HSCs. In addition, the modules are expected to provide optimal output density and capacity density to absorb high regenerative power generated during railcar braking and output running power.

The Innovative Energy Storage Module will enable power storage for hydrogen fuel cell hybrid trains, diesel hybrid trains, overhead catenary-less trains, substation peak shaving, brake resistor replacement, etc., as well as various railway solutions, both onboard and above ground, to support carbon neutrality.

* Energy storage device that improves energy density by using a carbon-based material to absorb lithium ions as negative electrode material in order to add lithium ions based on the double-layer capacitor principle

In the future, Innovative Energy Storage Modules and BMSs combine technologies from both companies, including Mitsubishi Electric technologies for manufacturing compact energy-saving power electronics devices and for high-precision estimation of battery state of charge (SOC) and state of health (SOH), and Musashi Energy Solutions technologies for manufacturing pre-doped** Energy Storage Devices, a byproduct of the company's HSC expertise. The goal is to contribute to more sustainable railways by reducing both CO₂ emissions and power consumption as well as streamlining facilities. Mitsubishi Electric's global sales network will be used to sell Innovative Energy Storage Modules to railway companies overseas as well as in Japan.

Railway companies, especially in the EU, are strengthening their sustainability initiatives by introducing eco-friendly railcars equipped with energy storage technology to reduce both CO₂ emissions and power consumption, and other technologies for streamlining facilities and managing shifting power peaks. In addition to railways, various infrastructure also require more stable and effective power utilization through the use of advanced energy storage technology.

Mitsubishi Electric has a strong presence in rolling stock electrical equipment markets in Japan and overseas. Through initiatives such as the development and manufacture of energy-management systems for railways and the company's Station Energy Saving Inverter (S-EIV®),*** which makes effective use of regenerative energy, Mitsubishi Electric is contributing to greater power-supply stability and sustainability for railways.

Musashi Energy Solutions has been a world-leading mass producer of HSCs since 2011. The company provides space-saving and weight-reduction devices to meet market demands for rapid charging and discharging, energy regeneration and peak-power assistance.



Innovative Energy Storage Device

Size: W150mm × D15.8mm × H93.2mm



Innovative Energy Storage Module

Expected size: W330mm × D400mm × H130mm

** Technology for pre-storing lithium ions in the negative electrode to increase the device's output and service life

*** Enables excess regenerative power generated during braking but not usable by the vehicle to be supplied directly to the electrical facilities of a nearby station

Roles of Each Company

Company	Role
Mitsubishi Electric	Engineering, development and manufacture of Innovative Energy Storage Modules and BMS for sales to railways
Musashi Energy Solutions	Engineering, development and manufacture of Innovative Energy Storage Devices

S-EIV is a registered trademark of Mitsubishi Electric Corporation.

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About Mitsubishi Electric Corporation

With more than 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Mitsubishi Electric enriches society with technology in the spirit of its “Changes for the Better.” The company recorded a revenue of 5,257.9 billion yen (U.S.\$ 34.8 billion*) in the fiscal year ended March 31, 2024. For more information, please visit www.MitsubishiElectric.com

*U.S. dollar amounts are translated from yen at the rate of ¥151=U.S.\$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2024

About Musashi Energy Solutions Co., Ltd.

Musashi Energy Solutions is a pioneer in the mass production of Hybrid Supercapacitor, which are characterized by high output, long life and high safety. It is a sustainable energy device that is expected to make a great step towards the realization of a carbon-neutral society.

Musashi Energy Solutions Website: <https://www.musashi-es.co.jp/en/>

About Musashi Seimitsu Industry Co., Ltd.

Musashi Seimitsu Industry Co., Ltd. is a global auto parts Tier1 company for automobiles and motorcycles, whose headquarters is located in Toyohashi, Japan. It has 35 manufacturing sites spreading across Europe, North and South America, China, and South East Asia. Musashi specializes in designing, developing and manufacturing products such as Differential Assemblies, Transmission Gears and Assemblies, and Linkage and Suspension (L&S) products especially for the future automobiles including electric and autonomous vehicles. Musashi is also generating and expanding new businesses through open innovation with global startups to contribute to the SDGs in wider business domains. Musashi AI, a leading-edge AI technology subsidiary to lead Industry 4.0, is one of the examples.

Musashi Website: <https://www.musashi.co.jp/en/>

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