![MITSUBISHI ELECTRIC - Changes for the Better]

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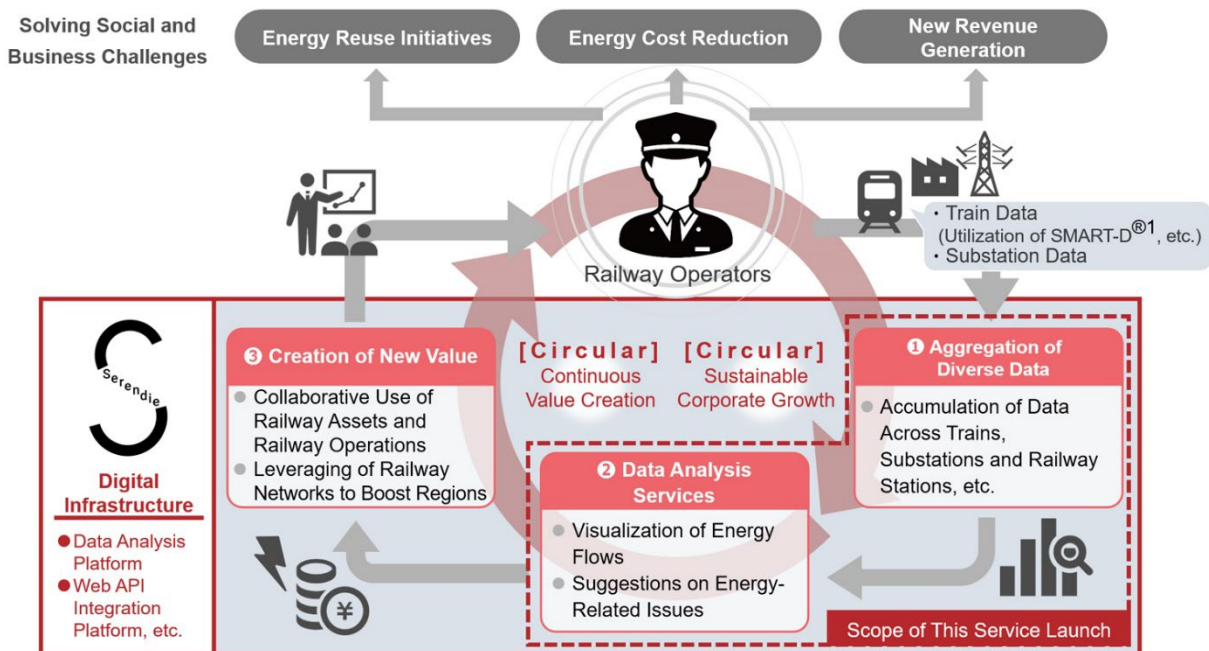Mitsubishi Electric Corporation   Mitsubishi Electric Corporation

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Mitsubishi Electric Launches Railway Data Analysis Service Utilizing Serendie Digital Platform

Assesses and proposes optimal power utilization methods to railway operators through DX

"Data Analysis Service for Railways" System Diagram

TOKYO, July 11, 2024 – Mitsubishi Electric Corporation (TOKYO: 6503) announced today that it has launched a railway data analysis service utilizing Serendie[TM2], its digital platform for the optimal use of energy and the optimal deployment and operation of railway assets by railway companies. The new service is available for immediate use.

In the railway industry, various measures aiming at the realization of carbon neutrality and decarbonization are being implemented. These include the use of renewable energy such as photovoltaic (PV) power generation by railway operators and the introduction of environmentally friendly train equipment. To further accelerate

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[1] A device that is installed on existing railway vehicles to collect various data from the Train Control Management System (TCMS). SMART-D is an abbreviation for Small Monitor Analyze Record Terminal-Depot

[2] A digital platform to facilitate co-creation initiatives aimed at accelerating the company's transformation into a "Circular Digital-Engineering Company." Serendie is a portmanteau of "serendipity" and "digital engineering."

these efforts, it is necessary to optimize overall energy usage by coordinating the use of railway assets at substations and stations among train operators, utilizing railway-related operational data, including operational information.

Mitsubishi Electric's new railway data analysis service makes use of its Serendie digital platform, which collects and analyzes data such as the power consumption of trains, substations and stations, as well as the operational status of trains. This is used to identify potential issues railway operators might face when aiming at decarbonization and to propose optimal solutions and utilization methods. For example, the service will propose appropriate locations for Station Energy Savings Inverters (S-EIV®[3]) and the optimal operation of railway assets, taking into account station congestion levels, operating schedules, and operating conditions. Its proposals are based on the visualization of the surplus power generated during the braking of train (surplus regenerative power).

Using these proposals, Mitsubishi Electric will help railway operators introduce the equipment they require to ensure optimal power consumption and the energy-saving operation of trains, contributing to the optimization of their energy usage through collaboration in the use of railway assets. Furthermore, by analyzing and utilizing the data collected during railway operation and facilitating the coordination of railway power systems with the availability of power systems in areas along railway lines, the company will help realize optimal energy supplies and thereby promote decarbonization.

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[3] A device that directly supplies surplus power, which cannot be consumed by trains running nearby, from the regenerative power generated during braking to the electrical facilities of the station. S-EIV is an abbreviation for Station Energy Saving Inverter

Details of the New Service
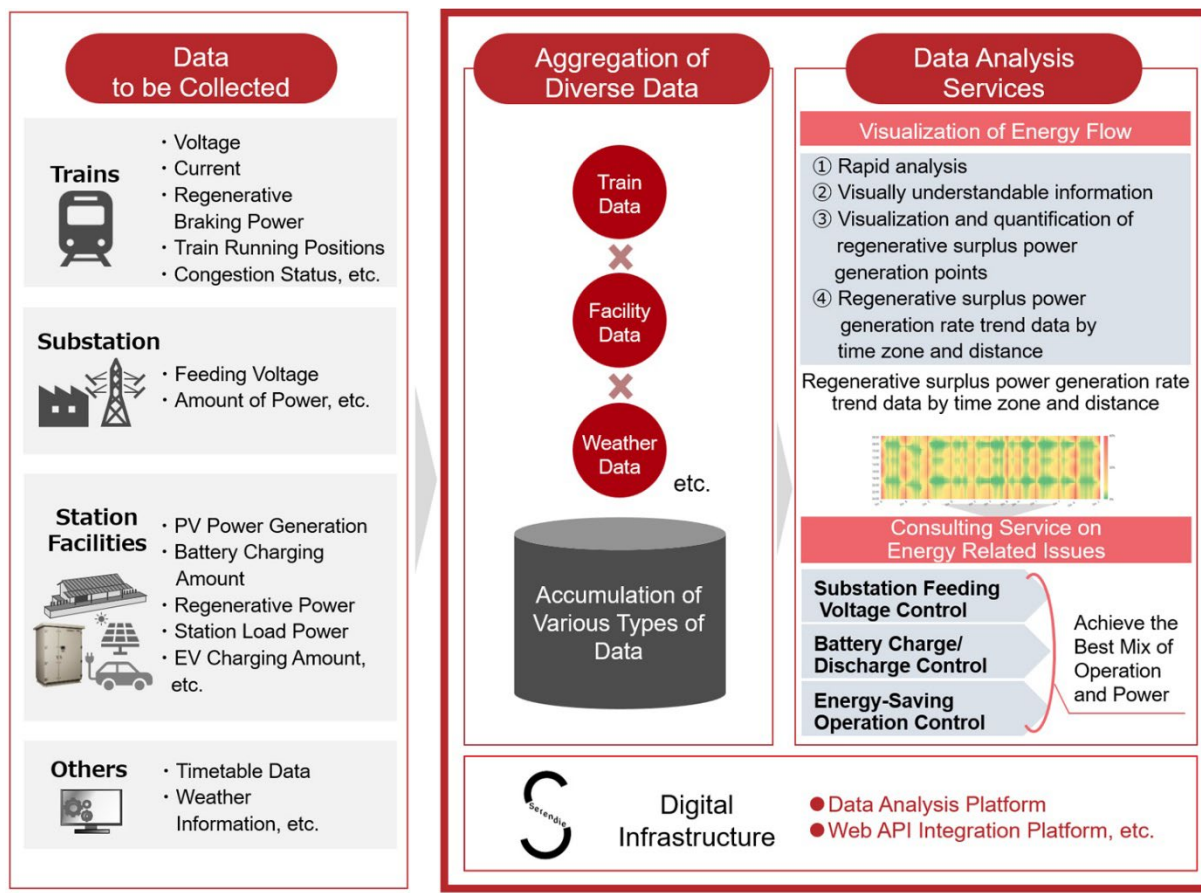
Concept of Data Analysis Service in the Railway Sector

1) *Supports railway operators' consideration of energy-saving measures through analysis of train, substation and station facility data*
   - By leveraging the expertise Mitsubishi Electric has accumulated in the railway business and using its newly constructed Serendie digital platform, the service quickly analyzes large amounts of data and accurately grasps issues specific to individual railway operators. In addition, the company helps railway operators consider energy-saving measures by providing comprehensive feedback on the results of their analysis.
   - The service identifies locations and timeslots when and where surplus regenerative power is likely to be generated and its amount, and indicates these on maps (Figure 1) and graphs (Graph 1). It provides data covering the return on investment and proposes optimal installation locations for the S-EIVs.
   - The service denotes the surplus regenerative power and feeding voltage[4] of entire railway routes and proposes optimal substation voltage levels, taking into account the efficiency of railcar-mounted equipment and the voltage generated through regenerative power.

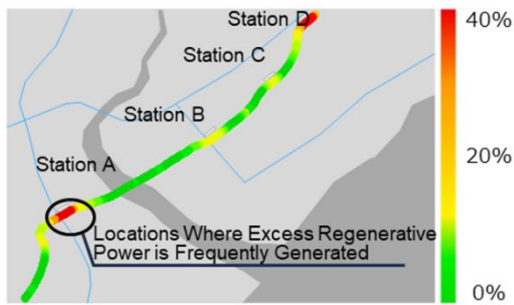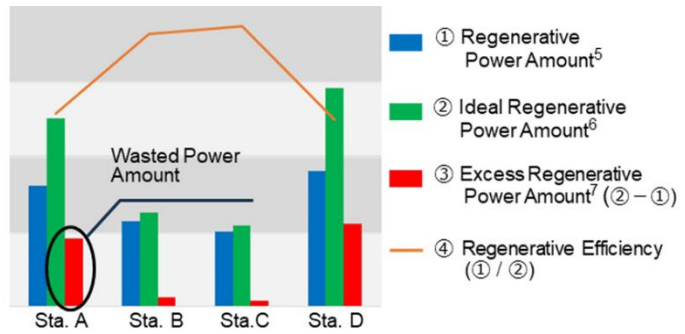[4] The voltage used when a train is running

Figure 1. Mapping of Excess Regenerative Power on a Map

Graph 1. Graph Showing Excess Regenerative Power

2) *Proposes optimal energy utilization through the integration of the collaborative use of railway assets and energy-saving operation*

- Utilizing the Serendie digital platform, the service helps railway operators formulate optimal train operations based on an analysis of captured data such as power usage, train operational status, occupancy rates, station congestion, and weather data. It also suggests the measures to streamline the substation infrastructure through the suppression of peak power demand.

- The service provides suggestions of ways to optimize the usage of electricity, helping to conserve energy while ensuring passenger convenience, aiming for both the safe and stable train operation required by railway operators and the realization of carbon neutrality, now recognized as a key social issue.
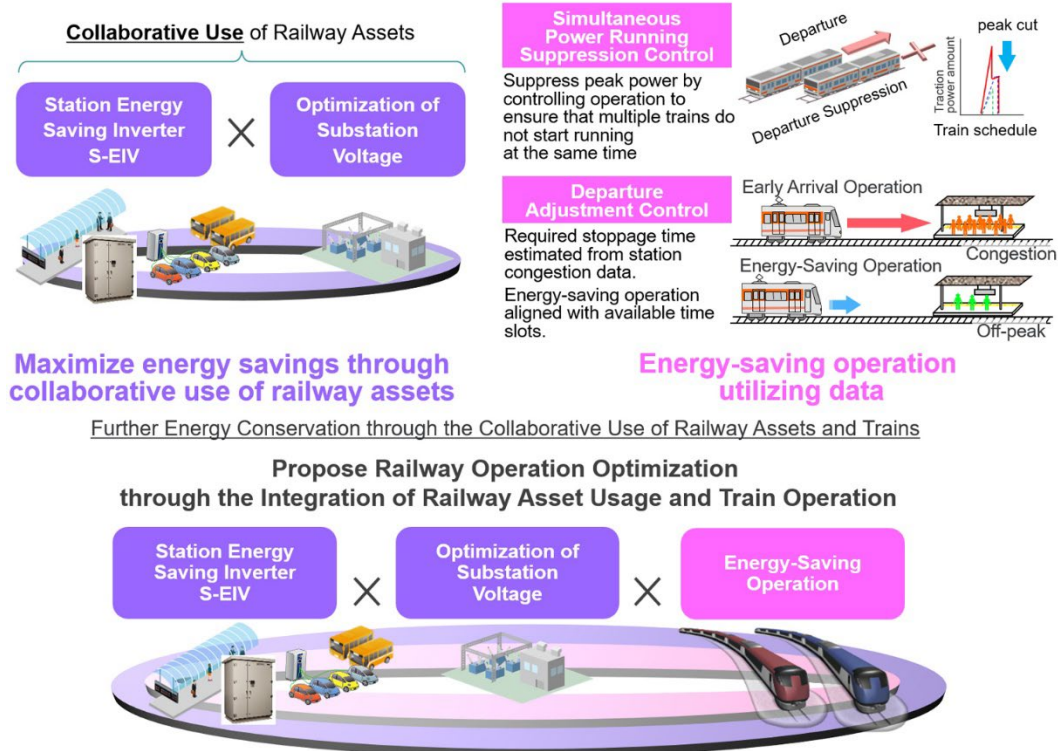

Diagram highlighting the integration of the collaborative use of railway assets and energy-saving train operation

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[5] Amount of regenerative power that is generated during train braking and consumed by other trains
[6] Amount of regenerative power in condition all the braking energy is converted to electric power
[7] Amount of regenerative power that is not converted to electric power but to heat energy due to air brake

Future Plans and Prospects

Mitsubishi Electric aims to contribute to the optimization of energy usage along railway routes and the surrounding areas by analyzing and utilizing railway-related data and by ensuring coordination between railway power grids with the overall power grids in surrounding areas. As well as deploying data analysis to optimize energy usage, the company will promote the strengthening of overall regional infrastructure, for example by improving disaster resilience through the securing of emergency power supply facilities in stations and other public places. As a "Circular Digital-Engineering Company", Mitsubishi Electric aims to create and deliver new value that will address social issues by leveraging the expertise the company has gained through its business activities as well as analyzing and utilizing diverse data sources and identifying potential issues.

SMART-D is a registered trademark of Mitsubishi Electric Corporation.

Serendie is a pending trademark of Mitsubishi Electric Corporation.

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