

Energy Highlights

Optimize Customers' Energy Use Comprehensively to Support the Achievement of Carbon Neutrality

DX x GX Microgrid Energy Supply Service

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To achieve carbon neutrality by 2050, industrial organizations are introducing high-efficiency equipment and energy management systems aimed at increasing the efficiency of energy use. However, this imposes new burdens in terms of expenses and human resources. Amid this trend, Hitachi Power Solutions Co., Ltd. commercialized Microgrid Energy Supply Service in October 2022 to make it possible to optimize energy use by using high-efficiency energy supply equipment and implementing a digital transformation (DX) while reducing the burdens borne by customers. We interviewed Kenji Sano, a senior manager at the Solution Business Promotion Division's Front Engineering Department about the reasons for commercializing the service, its model use cases and its future prospects. Mr. Sano is involved in the formulation of the project's overall concept and the promotion of it.

■ Burdens involved in the promotion of energy-saving measures in pursuit of carbon neutrality are an issue

The impact of climate change has been growing more serious with each passing year. The reduction of GHG emissions is an urgent issue for fighting climate change that international society is facing. The 28th Conference of the Parties of United Nations Framework Convention on Climate Change (COP28) held in December 2023 included in its declarations that the renewable energy electricity generation capacity would be tripled by 2030 and the energy efficiency improvement rate would be doubled. This shows that the promotion of the decarbonization of energy and the limiting of fossil fuel-derived energy consumption through thorough energy-saving measures are important in the reduction of GHG emissions.

Against this backdrop, Hitachi Power Solutions started its Microgrid Energy Supply Service in October 2022 with the goal of supporting customers' efforts to achieve carbon neutrality and a green transformation (GX). The service is designed to optimize energy use by introducing high-efficiency energy equipment and utilizing data while reducing burdens in terms of costs and human resources. Mr. Sano has been involved in the formulation of the overall concept of the service and has advanced the project's commercialization. He explains the background behind the commercialization of the service.

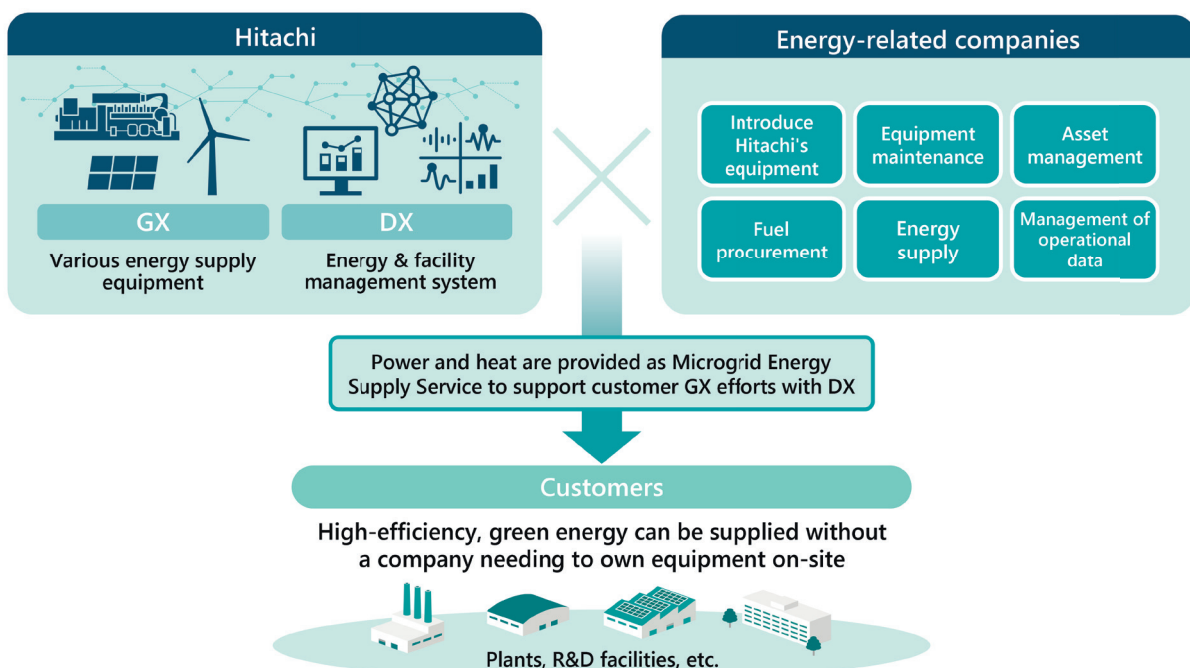
"We had this idea for several years. The decision to commercialize it was instigated by, as you would expect, the government's 2050 Carbon Neutral Declaration. In October 2020, the Japanese government expressed its intention to achieve carbon neutrality, the reduction of GHG emissions to virtually zero, by 2050. The government

declaration accelerated public-private energy reform. Another major factor is a decrease in the working population, which has given rise to problems such as a shortage of engineers engaged in the management and operation of energy equipment, data management and other jobs and the stagnant inheritance of knowledge due to the mandatory retirement of experienced engineers. The energy-saving efforts of companies are more than just reducing power consumption. A multifaceted approach is required, improving the comprehensive energy efficiency, including heat. However, the burdens associated with this in terms of costs and human resources are increasing due to the need to invest in energy saving equipment, in the operation and maintenance of equipment, the management of assets and the management and utilization of data connected to energy and equipment. We saw that there was a growing need for a service that would optimize energy efficiency while reducing the cost- and human resource-related burdens of the entire process from the introduction of equipment to its management and operation. This led to the decision to commercialize the service.” Members of the project, including Mr. Sano, understood these needs through their activities such as discussions with customers. “Before 2020, it seemed that many decisions regarding decarbonization measures made on occasions such as the introduction of photovoltaic power generation systems were made on a site-by-site basis. After the 2050 Carbon

Neutral Declaration, however, the decision to introduce these systems was elevated to the corporate management level and the items to be considered increased to include the method of introduction, burdens related to operation and management, medium- and long-term extensibility, actions to address change and other matters. Today, decarbonization is considered more as a managerial issue than as an environmental issue. We feel that there is a need to optimize energy on a higher level in addition to just introducing equipment.”

■ Using DX to address issues and support customers' GX and achievement of carbon neutrality

Against this backdrop, Microgrid Energy Supply Service was commercialized combining energy supply equipment such as renewable energy power generation systems and cogeneration systems with energy and facility management systems to help customers achieve carbon neutrality. The point is to offer facility management services encompassing the operation and maintenance of energy equipment, the management of assets and more, in addition to supplying energy. Regarding facility management, we create a cycle for analyzing, evaluating and improving facility data including data about customers' energy usage, operations and equipment maintenance using the Lumada model and continue to support



Conceptual image of business (in the case of a consortium with energy-related companies)

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decarbonization and efforts to streamline site operations and increase their sophistication.

“Earlier, I said that the shortage of human resources involved in the continuing improvement of the management and operation of energy-saving equipment and the utilization of energy is a problem customers are facing. It is safe to say that the new service addresses issues such as this using DX and the service supports customers’ GX.” Customers use energy in different ways. For this reason, the service is not provided by Hitachi Power Solutions alone. It may involve a consortium of finance-related companies, energy service providers (ESP) and other businesses as necessary.

“Customers want more than just energy supplied to them. They want value in the form of sustainable, high-efficiency business operations through the optimization of energy use, in my view.”

The feature of the service is primarily solving customers’ issues such as issues related to saving energy and streamlining through the DX of equipment maintenance and management sites. Here, there is a big difference from general ESP businesses. Another feature of the service is to continue to promote customers’ GX and decarbonization in pursuit of individual optimization on a site-by-site basis and overall optimization that combines and comprehensively solves problems faced by customers who own multiple sites or multiple companies in a single area such as industrial complexes.

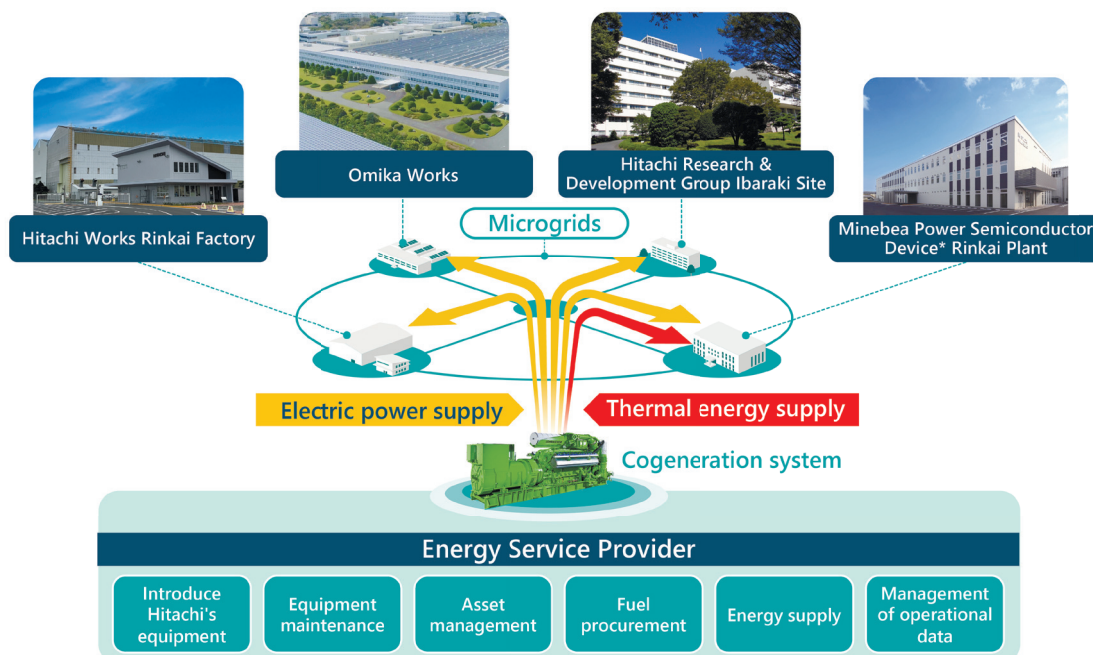
■ Streamlining the energy use of four adjacent business sites for the achievement of carbon neutrality

Microgrid Energy Supply Services have been introduced in four business sites, including Hitachi Group in Hitachi City, Ibaraki Prefecture, as a model use case (*1), and operations have started from December 1, 2023. According to Mr. Sano, the cogeneration system was introduced in this case enables four business sites to share electricity and use the waste heat from the generation of power to operate the air conditioning of clean rooms.

“This makes it possible to use energy more efficiently than if each business site was just supplied energy, and it contributes to the achievement of carbon neutrality. It remains to be seen how it will work since the service has only been operating for less than a year. According to our trial calculations, (*2) the four business sites combined will reduce their CO₂ emissions nearly 15%, which is equivalent to approx. 4,500 tons of CO₂ a year.”

*1 Hitachi Works Rinkai Factory, Omika Works, Hitachi Research & Development Group Ibaraki Site and Minebea Power Semiconductor Device Rinkai Plant (after a stock transfer, Hitachi Power Semiconductor Device, Ltd. was renamed Minebea Power Semiconductor Device Inc. in May 2024)

*2 As of October 2022



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Conceptual image of Microgrid Energy Supply Service installed at business sites in Hitachi City

This model use case is characterized by the configuration of its system to optimize the energy balance between heat and electricity. Having these two different elements, heat and electricity, poses problems that have to be addressed when configuring the system, such as the variation of the business sites' energy demand.

“That was a tough question but we managed to solve it somehow. Because of this, we have been able to accumulate expertise in, for example, finding the best answer in a complex situation and solving problems relating to energy and equipment management by using this service as a hub. Going forward, it will be used to comprehensively optimize energy use at multiple sites with a view toward customers' achievement of carbon neutrality.”

Hitachi, Ltd. and Hitachi Power Solutions are planning to use Lumada in the model use case and continue to implement improvements aimed at increasing the efficiency of the operation of energy equipment and achieving carbon neutrality. We will accumulate knowledge and apply it in providing the service to customers.

In addition, the model use case is positioned as part of a multisite energy management system which has been under development since September 2023 that digitally connects multiple Hitachi Group business sites in the Kanto area and is designed to comprehensively optimize, in terms of supply and demand, energy use and equipment management operations spanning multiple sites.

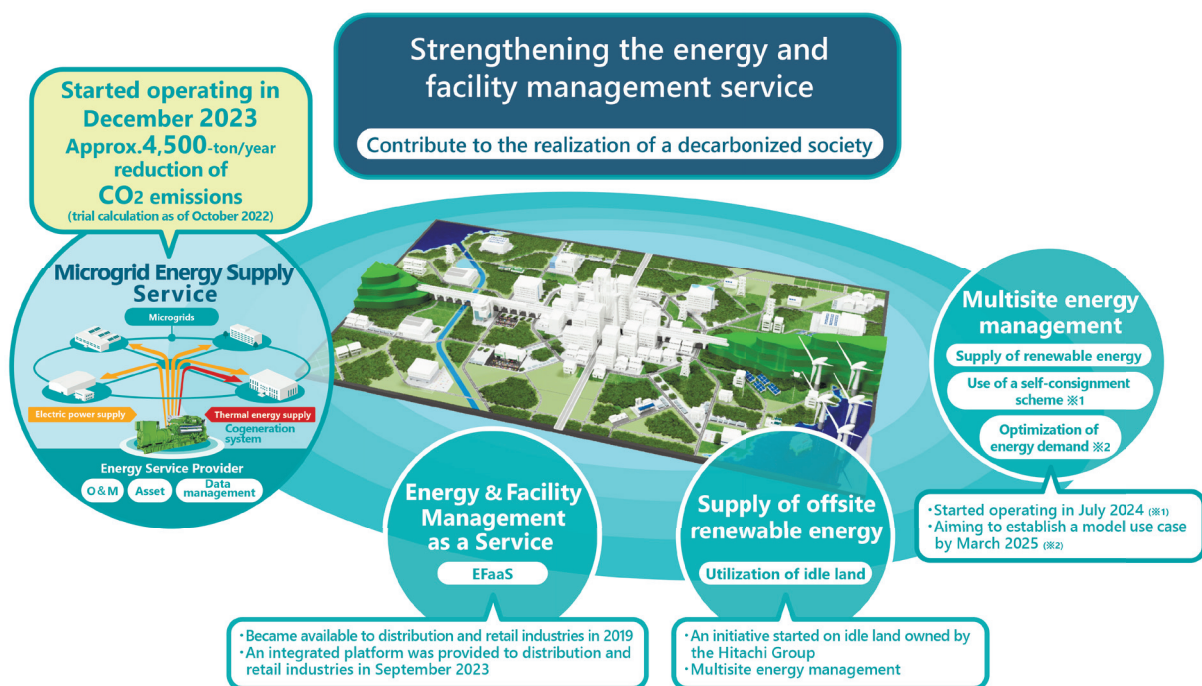
The Hitachi Group set the long-term environmental target of



making its business sites and production activities carbon neutrality by FY2030. Knowledge learned through efforts within the Group will also be applied in the achievement of this target.

■ Ensuring optimal energy use at multiple sites using digital technologies

As many different measures are being implemented for the achievement of carbon neutrality, the GX Acceleration Agency was established in July 2024 as a core organization enabling the government and financial institutions to financially support private companies



Conceptual image of energy and facility management service business

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wishing to invest in GX. This increases the expectations regarding the acceleration of the research, development and implementation of innovative technologies to support carbon neutrality. It is also expected that decarbonization supporting businesses will expand throughout society.

Mr. Sano views the market trends as follows.

“Renewable energy being a larger part of the electrical grid as a whole increases the need for technologies and systems to enable the grid to adapt to the characteristic significant fluctuation of the volume of power generated which is dependent on the weather and the time of day. For example, the popularization of battery energy storage systems storing surplus electric power and cogeneration systems using carbon-neutral fuels (*3) to supplement an insufficient supply of electricity while limiting CO₂ emissions as much as possible is expected to increase the ability to handle fluctuations in the volume of electricity generated. Optimally using energy in consideration of the supply-demand balance throughout the electrical grid while balancing decarbonization and economic efficiency requires a VPP (*4), demand response (*5) and other technologies, and digital technologies will play a more significant role. Going forward, demand for solutions that are compatible with these complicated operations will grow in decarbonization supporting businesses.”

As an effort to move toward this era of digital utilization, Hitachi Power Solutions promotes the above multisite energy management system, Microgrid Energy Supply Service that is part of the above system, and Energy and Facility Management as a Service (EFaaS) to provide facility management in an as a service form. It also operates its offsite renewable energy supply business using idle land (*6) and other businesses. For its decarbonization supporting businesses as a whole, including the above, Hitachi Power Solutions' 2030 sales target is between 40 billion and 50 billion yen.

Mr. Sano says that, as social issues including decarbonization grow more complicated, it is more necessary to participate in collaborative creation with multiple companies rather than the separate efforts of individual companies, to solve these issues.

“In terms of energy use, we see many cases where multiple companies including in-house sites and companies in other industries function as partners to accelerate decarbonization and save more energy, for example, sharing energy, equipment and systems and exchanging knowledge and resources. It is not easy to understand the

problems faced by each customer and site, coordinate different requests and seek solutions. This makes the job worthwhile to me. By offering solutions that can address complicated issues such as these, Hitachi will continue contributing to customers' GX and the achievement of a decarbonized society.”

***3 Carbon-neutral fuels:** Synthetic fuels containing carbon dioxide and hydrogen (synthetic fuels using hydrogen generated by renewable energy are referred to as e-fuels), hydrogen, biomass, etc.

***4 VPP:** Abbreviation for Virtual Power Plant. Functioning like a power station by collectively controlling many different energy resources such as small power generation systems owned by electricity consumers, power generation systems directly connected to the electrical grid and battery energy storage systems using digital technologies.

***5 Demand response:** A mechanism for controlling demand in accordance with the supply of electricity with the goal of stabilizing the electricity supply-demand balance. For example, controlling equipment for purposes such as limiting electricity demand by decreasing the output of equipment when the supply of electricity is strained and charging battery energy storage systems when there is excess supply.

***6 Offsite renewable energy supply business:** A mechanism for supplying power from photovoltaic power generation systems and other sources of renewable energy located outside a company's premises

• This article is published on Hitachi's energy portal site.

https://www.hitachi.com/products/energy/portal/highlights/case_030.html



HITACHI
Inspire the Next

If we change the start, we can start the change.

SILENT INNOVATION.

Every day, transmission lines supply the world's energy. From our daily lives to global manufacturing, it all starts here.

That's why our Power Grids, Energy Solutions, and Nuclear Energy business units are committed to innovation. And now, it's why we strive to make our energy systems carbon neutral.

It may be a quiet change. But it's a big change, because it brings us closer to our goal: A sustainable future for all.

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