Daihen's Proprietary Innovative Energy-Management Technology Contributes to the Realization of a Decarbonized Society

Synergy Link™

Role of Energy Management

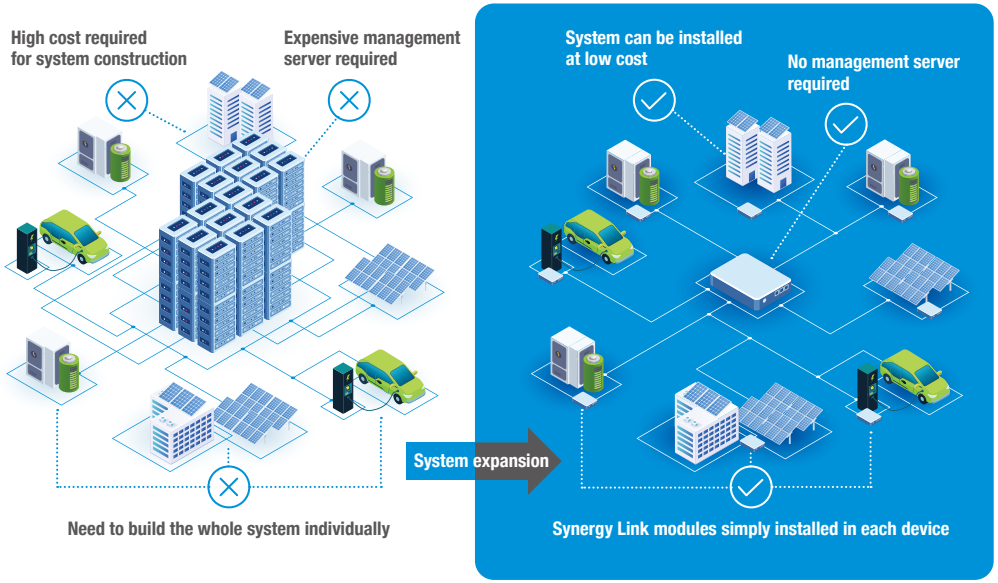
"When considering installing solar power or converting company vehicles to EVs for decarbonization, it's hard to know what to look for when choosing equipment and systems."

An important part of decarbonization is **to use renewable energy sources such as solar power without waste.** The key to this is **control technology** that collectively controls the equipment responsible for power generation, power storage, and consumption to maintain a state of balance. This is energy management. We believe that the most important criterion for selecting equipment and systems for decarbonization **is the ability to perform this energy management in a low-cost and hassle-free manner for all the equipment that will be installed sequentially.**

What is "Synergy Link" Innovative Energy-Management Technology?

Conventional energy management is based on a method in which a centralized arithmetic unit communicates with each device individually to determine its status and then issues individual operating commands to each device to achieve an optimal balance for the entire system. However, with this method, as the number and type of devices to be controlled increases, such as storage batteries, solar power generation, V2X (EV), and BEMS, the amount of information processing by the central monitoring equipment exponentially increases, resulting in higher energy-management costs. In addition, the arithmetic system must be modified each time the number of devices increases or decreases. To solve this problem, Daihen has installed a small arithmetic unit (Synergy Link module) on the side of each device, which allows each device to operate optimally according to the overall situation, thereby reducing the cost of energy management. We have developed a unique and innovative autonomous decentralized cooperative system that can manage and control the entire system in an optimal manner.

Synergy Link is Daihen's proprietary control system that incorporates this innovative system.



How Synergy Link Works

To explain how Synergy Link works, consider a case in which each device is kept in optimal operating condition while maintaining the amount of electricity used at a level that does not exceed the target value. First, a small arithmetic unit (Synergy Link module) installed in the power receiving panel grasps the difference between the amount of electricity used and the target value every second and transmits the information to each device. This is called an "overall guidance command." For example, when a storage battery receives an overall guidance command, the Synergy Link module installed in the storage battery performs an optimization calculation dedicated to the storage battery every second based on the remaining charge and other data, determines the amount of charge and discharge (kW), and outputs the data. Since the amount of electricity used changes according to the output of the storage batteries, the overall guidance command changes every second. Upon receiving the changed overall guidance command, the storage battery performs optimal calculations to determine the amount of charge and discharge, and outputs it. This operation is repeated to achieve overall control without the need to install a central arithmetic unit.

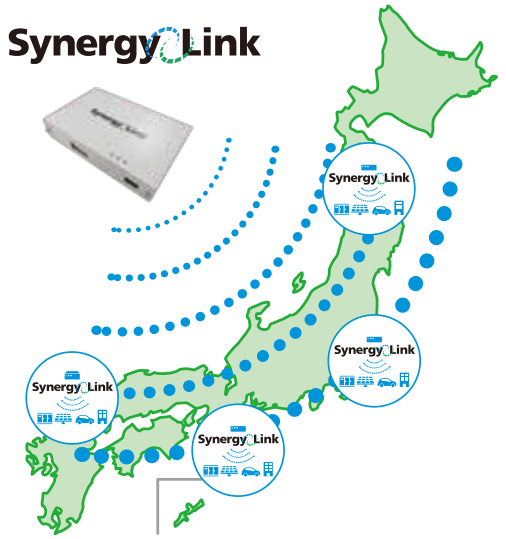
The Merits of Synergy Link

The small arithmetic unit (Synergy Link module) installed on the equipment side is less expensive than a arithmetic unit that controls the entire system from a single location, because the amount of information processing is much smaller. Also, even if the number of devices increases or decreases, Synergy Link allows each device to individually perform optimal calculations based on the overall guidance commands, so there is no need to modify the arithmetic system. It has been theoretically proven that the overall control results are exactly the same between a system in which the entire system is controlled by a single arithmetic unit and control using Synergy Link, which uses small arithmetic units installed in each device.

From Site-by-Site to Region-Wide Energy Management

The first step in realizing a decarbonized society is to save energy and maximize the use of renewable energy at the business and factory level. But to decarbonize society as a whole, it is necessary to use renewable energy without waste by integrating energy across multiple sites and to constantly balance power generation, power storage, and consumption across the region. By simply connecting multiple offices with Synergy Link, each office can easily and autonomously transfer energy to other offices that have Synergy Link-equipped equipment so that the entire system is in balance. Furthermore, if Synergy Link is extended to the entire region, a smart city can be realized where renewable energy can be used without waste throughout the entire region. In addition, by using Synergy Link to control equipment at offices and factories according to the supply and demand situation of the entire power system, it is easy to use the system as a virtual power plant (VPP).

We believe that Synergy Link can make a significant contribution to the realization of a decarbonized society.



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Contact
EMS Department SE section 06-7175-8599 https://www.daihen.co.jp

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