

Energy Management Research at *Kyōsō-no-Mori*

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Decarbonization, electrification, the full liberalization of the domestic power market, and creating disaster-resistant energy systems have become issues of public concern in Japan. To address these issues, Hitachi has started researching energy management at *Kyōsō-no-Mori* facility at the Research & Development Group's Central Research Laboratory in Kokubunji, Tokyo. The energy society of 2030 will see the arrival of a decentralized world characterized by growing decarbonization activities among suppliers, and consumers who become suppliers. Hitachi is responding by researching direct current (DC) microgrids, energy management systems based on energy sensing and data control, and energy shares that ensure economic rationality and resilience. Energy shares are rooted in value trading made possible by blockchains and artificial intelligence (AI). Hitachi is also promoting research on RE100* and zero emissions. RE100 is a project designed to achieve zero emissions with 100% renewables in particular areas. Instead of just building a research and development (R&D) site, the company is building an environment for energy showcasing (visualization of energy) that will enable collaborative creation (co-creation) with customers. These efforts are designed to accommodate Japan's coming energy deregulation and the opening of new energy markets. They will also enable new users to create energy services.

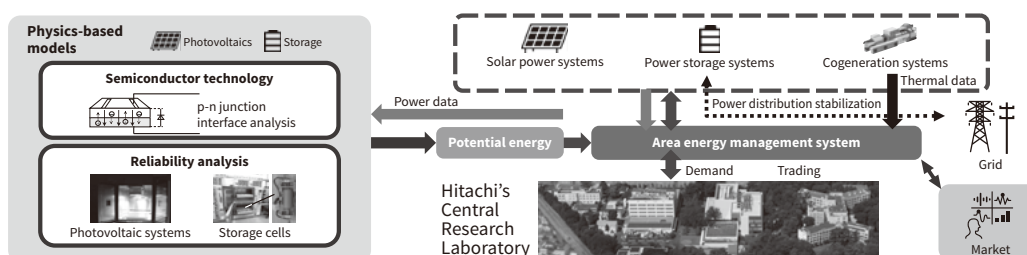
(1) Research on area energy management systems driven by physics-based models of energy assets (photovoltaic systems and storage batteries) involves the use of physics-based

models to analyze power data and provide rapid and highly accurate calculations of potential energy per unit of time. The calculated potential energy is used to manage asset life. It is also being used for controlling the process of balancing energy supply and demand among consumer facilities, promoting energy-saving and decarbonization.

(2) Energy system costs resulting from asset control and trading market forecasting are also being researched. This research involves proposing operation plans for economically viable energy balancing capacity (storage batteries and cogeneration systems). Energy balancing capacity will be used as security to increase the accuracy of blockchain- and AI-based trading, providing financial returns and ensuring that decarbonization is economically rational. Hitachi is focusing on these technologies to work on consumer (edge) control-based ways to achieve zero emissions with 100% renewables in particular areas.

Hitachi will work on R&D designed to achieve a number of objectives in the coming years. One is to improve the accuracy of 5G-based facility energy demand forecasting technology. Another is to provide an environment for demonstrating new technologies (local hydrogen technologies and technology for analyzing changes in consumer energy consumption behaviors). This environment will be used to achieve complete RE100 zero emissions without relying on environmental certificates, enabling energy self-sufficiency or closed-cycle resource recycling.

* A global corporate renewable energy initiative whose members are committed to sourcing 100% of the energy needed for their corporate activities from renewable energy.



Overview of RE100/Zero Emissions Research Being Done at *Kyōsō-no-Mori*