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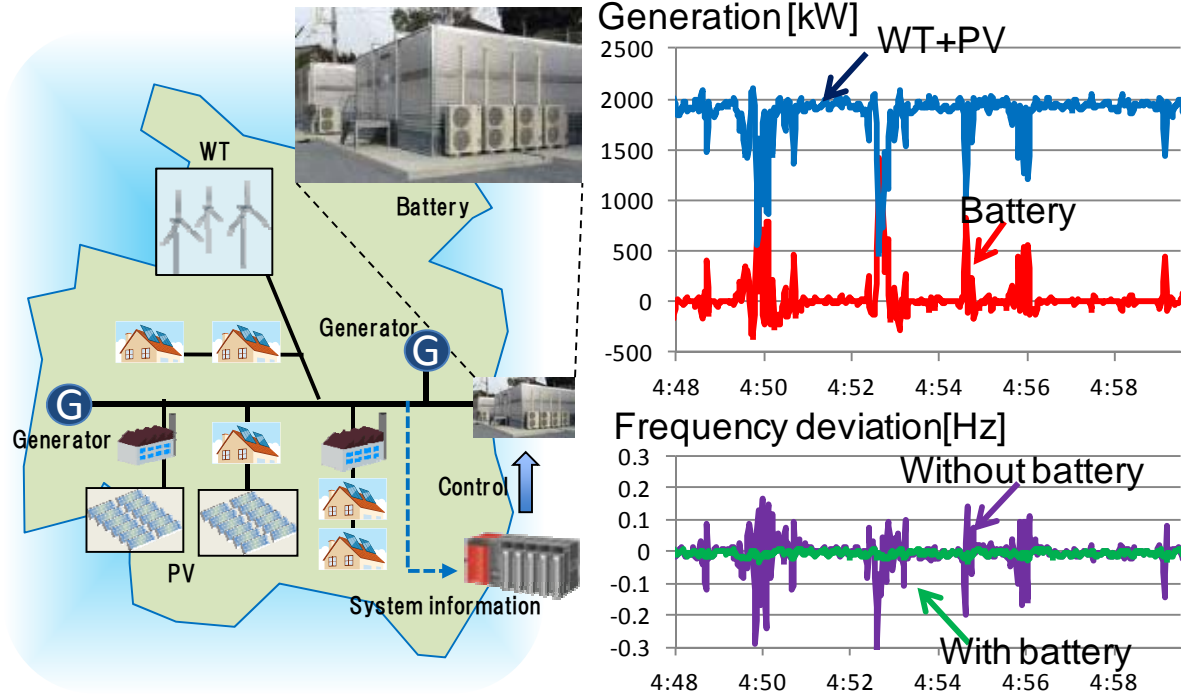
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## Mitsubishi Electric Develops Enhanced Battery-control Technology for Expanded Use of Renewable Energy in Power Systems

**TOKYO, February 13, 2014** – [Mitsubishi Electric Corporation](http://www.mitsubishielectric.com) (TOKYO: 6503) announced today new advanced battery-control technology that estimates fluctuations in renewable power sources, such as photovoltaic and wind-turbine generation, and controls battery charge/discharge to minimize power frequency deviation, thereby ensuring high-quality power systems that make extensive use of renewable energy.



Renewable energy is used widely in power systems because it produces no CO2 emissions, but it has the drawback of unstable power supply. Power utilities need to control power generation to minimize frequency deviation, but the increased use of renewable power can complicate this process because of fluctuations in weather-dependent power generation. This has become real problem for some power systems, especially small independent power networks, such as those on islands.

Mitsubishi Electric’s new battery-control technology for small power systems incorporates demand- and supply-control technology that the company has developed for micro-grids. In particular, the technology helps to minimize power-frequency deviation in systems that make extensive use of renewable energy.

Conventional battery control technology for micro-grids is based on the frequency feedback method. This method controls battery charge/discharge only after frequency deviation is detected, so the level of frequency-control performance is relatively low. Another method maintains constant tie-line power flow at the renewable energy site, but has the drawback of requiring equipment to be installed at every site.

Mitsubishi Electric’s new technology, which estimates total fluctuation based on information about the local power system, controls battery charge/discharge to compensate for fluctuations before frequency deviation occurs. The technology already has been deployed by Kyushu Electric Power Company on a demonstration basis using wind turbines and lithium-ion batteries in Iki, Nagasaki Prefecture.

Mitsubishi Electric has also developed a technology to maximize battery performance. Battery performance deteriorates due to inhomogeneous characteristics that can develop after a long period of use. New monitoring technology from Mitsubishi Electric accurately estimates each battery’s state of health (SOH) by monitoring charge/discharge current, voltage etc., as well as using other evaluation data. The estimated SOH can be used to control the battery for maximized performance, regardless of type or make of battery.

Technology	Function	Performance
New (Mitsubishi Electric)	Controls batteries to compensate for fluctuations in renewable energy power supply and thereby maintain power-system frequency quality	Enables extensive use of renewable energy with appropriate battery sizes
Conventional	Controls generators to match demand and supply to maintain power-system frequency quality	Limits use of renewable energy to about 5% of power system

**Patents**

Pending patents for the technology announced in this news release number four in Japan and two abroad (seven countries).

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### **About Mitsubishi Electric Corporation**

With over 90 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. Embracing the spirit of its corporate statement, Changes for the Better, and its environmental statement, Eco Changes, Mitsubishi Electric endeavors to be a global, leading green company, enriching society with technology. The company recorded consolidated group sales of 3,567.1 billion yen (US\$ 37.9 billion\*) in the fiscal year ended March 31, 2013. For more information visit <http://www.MitsubishiElectric.com>

\*At an exchange rate of 94 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2013