News Release

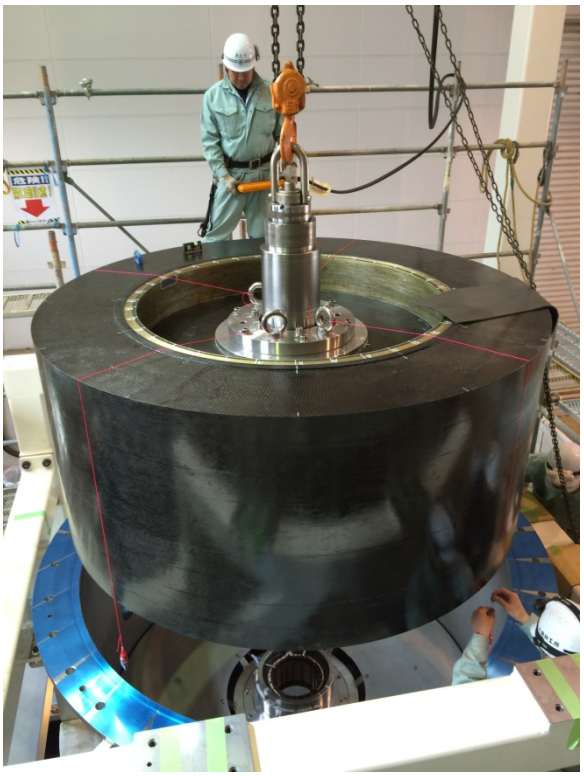
No. 2015001

April 15, 2015

Details of the system

1. Characteristics

The larger and heavier the flywheel is, and the faster it rotates, the larger the amount of energy the power-storage system can store. In this "superconducting flywheel power-storage system," the following technical developments have enabled a large-diameter, heavy-weight flywheel to rotate with higher speeds and less power loss.



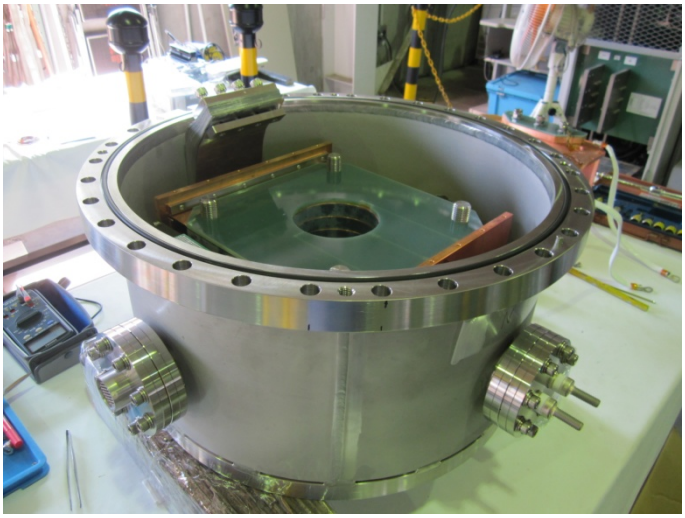
World's largest class CFRP flywheel

(1) Large-sized CFRP flywheel

For CFRP (carbon fiber-reinforced plastic) flywheels which have been developed so far, have a 1-meter diameter has been the upper limit due to restriction in strength and cost. For this system, however, higher strength and reliability were attained by a better method of weaving carbon fiber and a 2-meter-diameter flywheel was developed. This flywheel is made by stacking nine layers of CFRP rotors with a 2-meter outer diameter, 1.4-meter inner diameter and 10-centimeter thickness. With this method, flywheels of different storage capacities can be made by changing the number of layers.

(2) Superconducting magnetic bearing

The superconducting magnetic bearing of this system uses a high-strength, high-temperature superconducting magnet made of a second-generation high-temperature superconducting wire material containing yttrium. The rotating shaft also uses high-temperature superconducting bulk. We have succeeded in lifting the 4-ton flywheel without any contact by refrigerating the bearing to 50 K, that is, -223 ℃, and creating a powerful magnetic field. This technique has made it possible to rotate the flywheel at a



Superconducting magnetic bearing to support heavy-weight flywheel

highspeed, with less energy loss. Furthermore, since this system operates at significantly higher temperatures than 20 K or -253℃ of the previous superconducting coil, the refrigeration cost can be reduced.

The completed system is the world's largest-class flywheel power storage system which has 300-kW output capability and 100-kWh storage capacity by rotating the flywheel which is 2 meters in diameter and weighs 4 tons.

2. Schedule for grid-connection tests

Basic performance of this machine will be tested and adjusted in confirmation tests and moved to a megawatt-class solar power plant at Komekurayama in Yamanashi Prefecture. There, it will be connected to the solar power system and the power grid of Tokyo Electric Power Company, and confirmation testing will be started to help stabilize fluctuating supply of renewable energy.

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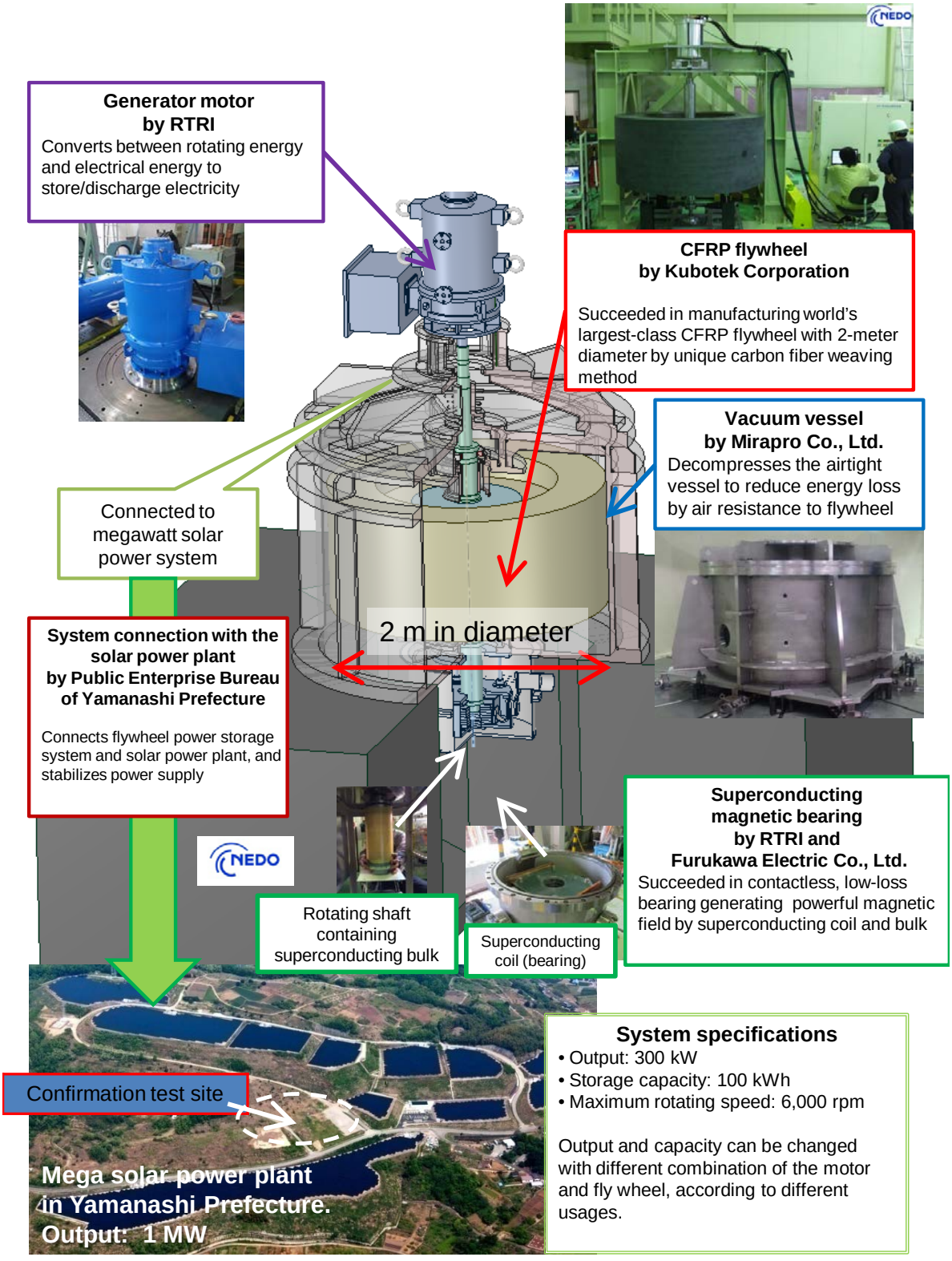

System configuration

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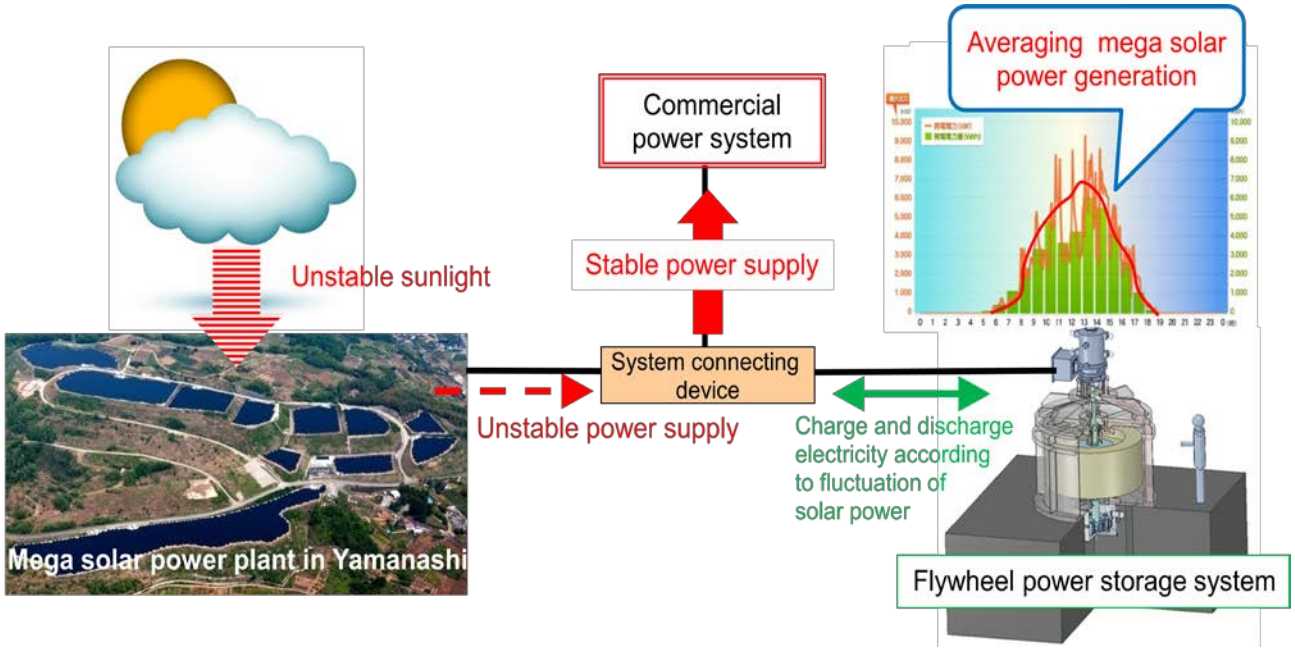

Outline of the entire system