

Press Release

Generating and storing energy and heat from the sun and from gas

**KYOCERA presents its new, highly-efficient
Energy Management System at the Intersolar 2012**

Kyoto / Neuss, 28 March 2012 – Owing to the lower feed-in tariffs, private solar energy system operators benefit increasingly less from feeding their self-generated power from photovoltaic plants into the national power grid. Current draft laws suggest further cuts, thereby presenting the industry with new challenges. Intelligent solutions for a more effective use of energy are in demand – which operate regardless of direct sunlight. At the Intersolar in Munich (13.-15.06.2012, Stand: A3.240), the technology group and solar energy pioneer, Kyocera, is exhibiting a concept that enables the generation and storage of solar energy and heat. The new "All-in-One"-concept by Kyocera combines photovoltaics with a lithium-ion battery, a fuel cell and an intelligent Energy Management System (EMS).

The Kyocera innovation relies on the combination of three essential components: photovoltaics, energy storage system and cogeneration. Photovoltaic modules on the roof produce solar power. This can be stored by means of a lithium-ion battery and used regardless of sunlight. A fuel cell installed in one's house produces electrical power and heat from natural gas, which is used for the preparation of hot water and heating support. The Energy Management System regulates the energy flows between energy producers, end users and the national power grid.

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Storage of solar energy, heat generation

The product life of the lithium-ion battery is about five times as high as conventional lead-acid batteries and has a capacity of 7.1 kWh. The storage medium weighs around 200 kilograms and has a size of 120x90x35cm. Electric power and heat are produced from natural gas via the installed fuel cell. The energy is also stored in the lithium-ion battery, whereas the heat is directly used for the preparation of hot water and heating support.

Kyocera developed the fuel cell in cooperation with the companies Osaka Gas, Aisin, Chofu and Toyota. The Solid Oxide Fuel Cell System (SOFC-System) comprises a hot water supply unit and heating unit and achieves an efficiency of 46.5%¹ – the highest in the world² for a fuel cell for small-scale applications. The overall energy efficiency of the system is 90%.¹ This is achieved by the use of ceramic in the energy-producing fuel cell stack. Thereby, a high operating temperature of 700 - 750 °C is reached in the cell; this heat-energy can be efficiently used to convert the process gas into hydrogen.

Energy Management System regulates energy flows

The Energy Management System regulates the energy flows between the photovoltaic plant, the lithium-ion battery, the fuel cell, and the national power grid – individually, in accordance with the generation of power and the power demand of the household. That means: in times of peak consumption, the stored solar power is used before power from the national power grid is used. In addition, the Energy Management System maintains the power supply even

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in the event of power outages.

The EMS is the result of many years of research and development. Kyocera is currently working on adapting the innovative system to the requirements of the European market.

¹ Indication for the lower calorific value (lower heating value - LHV). The gross calorific value - less the latent heat of evaporation of the water that formed during combustion of the fuel.

² For fuel cell cogeneration systems for small-scale applications. As of 13 March 2012, based on research by Osaka Gas.

About Kyocera

Headquartered in Kyoto, Japan, Kyocera Corporation is one of the world's leading manufacturers of fine ceramic components for the technology industry. The strategically important divisions in the Kyocera Group, which is comprised of 208 subsidiaries (as of March 31, 2011), are information and communications technologies, products which increase quality of life, and environmentally friendly products. The technology group is also one of the largest producers of solar energy systems worldwide.

With a global workforce of about 66.000 employees, Kyocera posted net sales of approximately €10.74 billion in fiscal year 2010/2011. The products marketed by the company in Europe include laser printers, digital copying systems, microelectronic components, fineceramic products and complete solar power systems. The Kyocera Group has two independent companies in the Federal Republic of Germany: Kyocera Fineceramics GmbH in Neuss and Esslingen and Kyocera Mita Deutschland GmbH in Meerbusch.

The company also takes an active interest in cultural affairs. The Kyoto Prize, a prominent international award, is presented each year by the Inamori Foundation — established by Kyocera founder Dr. Kazuo Inamori — to individuals and groups worldwide who have contributed significantly to the scientific, cultural, and spiritual betterment of humankind (converted at present €500.000 per prize category).

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