

Press Release

KYOCERA Develops Industry's First 3-Kilowatt Solid-Oxide Fuel Cell for Institutional Cogeneration

Most efficient SOFC on the market using proprietary ceramic technology

Kyoto/London, 27 July 2017 – Kyocera Corporation (President: Hideo Tanimoto) today announced the launch of the industry's first 3-kilowatt solid oxide fuel cell (SOFC) cogeneration system for institutional applications*1. The system, which is available from this month in Japan, utilizes Kyocera's proprietary ceramic technologies to deliver 52% generation efficiency — the highest of any comparable SOFC system currently on the market*2 — and an overall efficiency of 90% with exhaust heat recovery*3.

The new system integrates Kyocera's cell stacks*4 delivering proven technology with a successful track record of [mass-production for the residential market](#). In addition to effectively generating energy by using these cell stacks, the system design enables the use of exhaust heat from the power generation process to heat water. These characteristics make the system well-suited for retail establishments and other commercial enterprises, including small restaurants.

Development Background

Japan's Ministry of Economy, Trade and Industry (METI) has set a residential-use fuel cell target of 1.4 million units by 2020, and 5.3 million units by 2030, as part of its vision for a hydrogen-based society. METI has supported the research and development of industrial-use SOFC systems with the goal of commercial availability during 2017.

The fuel cell system produces electricity and heat (hot water) by extracting hydrogen from utility-supplied gas or liquid petroleum (LP) gas and triggering reactions with oxygen in the air. Previous SOFC systems have also utilized ceramics as the electrolyte to recycle exhaust heat and achieve higher power generation efficiency but there has been a longstanding challenge with durability until Kyocera's cell stacks.

Kyocera began developing proprietary ceramic technologies for SOFC applications in 1985. In 2011, the company began mass production of world-leading cell stacks*5 for the residential-use "ENE-FARM type S." A more efficient and compact cell stack launched in April 2016 serves as the foundation of the new 3kW SOFC system.

As a form of distributed power generation, SOFCs offer great potential to reduce energy losses associated with power transmission. Furthermore, the exhaust heat from power

generating processes is effectively used for other purposes including heating water. The SOFC system offers substantial energy savings and lower CO₂ emissions than conventional cogeneration systems using internal-combustion engines or gas turbines.

Main Features & Specifications



Power generation unit

Specifications

Rated Output of Power Generation (AC)	3kW
Rated Power Generation Efficiency	52.0% (LHV, default)
Rated Overall Efficiency	90% (LHV, default)
Dimensions	1,150 W × 675 D × 1,690 H (mm)
Weight	375 kg
Gas type	City gas (13A)

* A hot water storage unit (200L) separately sold by Noritz Corporation is also required.

1. Market's highest SOFC power generation efficiency at 52%

The new SOFC system achieves a 3kW power rating by incorporating four of Kyocera's small and highly efficient 700W cell stacks, which have a proven track record in ENE-FARM type S residential SOFC systems sold in Japan. By utilizing exhaust heat from power generation, the new system achieves the industry's highest power generation efficiency at 52%, and total energy efficiency of 90% with exhaust heat recovery.

2. Capable of load-following operation based on demand

The system is capable of adjusting power generation in proportion to demand. In addition to providing a steady 3kW of power, the system can be used as a demand-regulated power supply.

*1 First commercially available SOFC cogeneration system in the 3-5kW class for institutional applications, based on research by Kyocera (as of June 1, 2017).

*2 Highest efficiency of any 3-5kW class SOFC system currently on the market. Based on research by Kyocera (as of June 1, 2017), allowing approx. -2.0% of margins for the absolute value due to the progress of use.

*3 Allowing -2.0% of margins for the absolute value due to the progress of use.



*4 The cell is a single power-generating unit comprised of a fuel electrode, electrolyte and air electrode; the stack is a collection of cells.

*5 World-leading cell stack for residential SOFC fuel cells with a rated power output under 1kW.

“ENE-FARM” is a registered trademark of JXTG Nippon Oil & Energy Corporation, Tokyo Gas Co., Ltd., and Osaka Gas Co., Ltd.

For more information on Kyocera: www.kyocera.co.uk

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 231 subsidiaries (as of March 31, 2017), are information and communications technologies, products which increase quality of life, and environmentally friendly products. The technology group is also one of the oldest producers of solar energy systems worldwide, with more than 40 years of experience in the industry.

The company is ranked #522 on Forbes magazine's 2017 "Global 2000" listing of the world's largest publicly traded companies.

With a global workforce of over 70,000 employees, Kyocera posted net sales of approximately €11.86 billion in fiscal year 2016/2017. The products marketed by the company in Europe include printers, digital copying systems, microelectronic components, and fine ceramic products. The Kyocera Group has two independent companies in the United Kingdom: Kyocera Fineceramics Ltd. and Kyocera Document Solutions.

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 approximately €360,000 per prize category).

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