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Launch of New 'Ene-Farm' Home Fuel Cell Product More Affordable and Easier to Install

Tokyo Gas Co., Ltd.
Panasonic Corporation

Tokyo Gas Co., Ltd. (President: Tsuyoshi Okamoto; 'Tokyo Gas' hereinafter) and Panasonic Corporation (President: Kazuhiro Tsuga; 'Panasonic' hereinafter) have jointly developed a new version of their 'Ene-Farm' home fuel cell^{*1}. Panasonic manufactures the fuel cell unit and supplies it to Tokyo Gas in combination with a hot water unit^{*2} and backup heat source^{*2} produced by Gastar Co., Ltd., a subsidiary of Tokyo Gas. The new model will be sold by Tokyo Gas from April 1, 2013.

The price of the new product will be **1,995,000 yen (with the standard backup heat source; including tax; excluding installation fee)**. This is about **760,000 yen less than the recommended retail price of the "Ene-Farm" model currently on the market, made possible** by a reduction in the number of components. The new product also **achieved an overall efficiency of 95.0% (LHV)^{*3} - the world's highest^{*4}**. It is **the first time that the recommended retail price of an "Ene-Farm" product in Japan has been less than 2 million yen.**

Due to a reduction in the size of the equipment, the required installation depth has been decreased from 900 mm to 750 mm. Since the backup heat source^{*5} has also been separated from the hot water unit, the product can now be even more easily installed in a wider variety of places. Moreover, it marks the first time that an "Ene-Farm" product in Japan includes a remote control with color display as a standard feature. Since the size of the screen is also larger, the text and graphics are even easier to view.

The new product will be available to the general public in three models, jointly developed by Tokyo Gas and Panasonic.

Since the world's first 'Ene-Farm' products were put on general sale in May 2009, Panasonic has now shipped a total of approx. 21,000 units throughout Japan as of the end of December 2012, of which approx. 15,000 have been sold by Tokyo Gas. For FY2013, Panasonic will complete a production setup to enable an annual production capacity 50% greater than its current annual production forecast to more than 15,000 units^{*6}, while Tokyo Gas will aim for annual sales of 12,000 units - 70% more than the FY2012 sales target of 7,100 units.

Through the spread of these "Ene-Farm" products, the two companies will contribute to cutting peak electrical consumption, while bringing greater comfort to their customers' lives as well as helping to protect the global environment.

[Product Exterior]



- *1: Development was partially based on results obtained from a project commissioned by the New Energy and Industrial Technology Development Organization (NEDO).
- *2: The hot water unit and the backup heat source were developed jointly by Tokyo Gas, Gastar Co., Ltd., and Rinnai Corporation.
- *3: LHV is short for Lower Heating Value. Value obtained by subtracting the heat of vaporization of the water vapor from the total heat generated when the gas fuel is fully combusted. (Compared with HHV = Higher Heating Value $\approx 0.903 \times$ LHV)
- *4: For a home fuel cell co-generation system. (As of January 17, 2013, according to Panasonic survey.)
- *5: This equipment operates as needed to increase the temperature of hot water for home heating, and to supply hot water when there is no water left in the hot water storage tank
- *6: In addition to Tokyo Gas, Panasonic will also supply this product to other major city gas companies across Japan, to be launched no earlier than April 1, 2013.

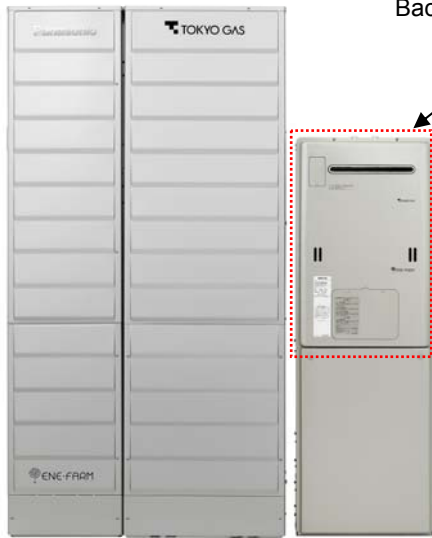
[Major features]

1. Substantial price reduction and the world's best overall efficiency
 Through system simplification, the new product contains about 20% fewer components than the previous model. Materials were revised for the electricity-generating stacks, a key device, and for the fuel processor, which produces hydrogen from city gas, while the size of hot water storage tank was also reduced. Based on these improvements, the new product will be sold for **1,995,000 yen (equipped with standard backup heat source; including tax; excluding installation fee), which is about 760,000 yen lower than the recommended retail price of the current model.** It is the first time that the recommended retail price of an "Ene-Farm" product in Japan will be below 2 million yen. The new product also offers **the world's highest overall efficiency of 95% (LHV).** This was **achieved** by increasing the efficiency of waste heat recovery, through better insulation of circuits for collection of heat created during electrical generation.
2. Easier installation
 By reducing the depth of the equipment from 480 mm to 400 mm, and by moving the fuel cell and hot water unit from the rear to the bottom of the equipment, the depth of the required installation space was reduced from 900 mm to 750 mm. Also, by separating the backup heat source from the hot water unit, the product can now be even more easily installed in a wider variety of places. This will make it even more feasible for installation, especially in houses with limited space such as those in the Tokyo metropolitan area. In addition to the standard backup heat source equipped with home heating, bathwater reheating, and hot water supply functions, there is also a slim-profile model with the same functions that can be installed in even smaller spaces, and a bathwater model designed to supply hot water and reheat water for a Japanese bathtub. The entire lineup consists of four models, enabling customers to choose the optimal product to meet their installation space and functional needs.
3. First remote control of its kind in the industry (installed in the kitchen and bathroom)
 The "Ene-Farm" remote control is the first of its kind in Japan to feature a color display. The screen size has also been increased from 3.5 inches to 4.3 inches, making it easier to see the text and graphs. In "double-generating" homes that have installed both "Ene-Farm" and a solar system, the remote control will display information on electrical generation for the entire home including power from the solar panels, and the increase in electricity sold to the power company due to "Ene-Farm" electrical generation. With a special feature to display "Today's Performance," information such as power generated by "Ene-Farm", the self-sufficiency rate for hot water, and the environmental contribution (CO2 emissions reduction) can be viewed at the touch of a button. This will encourage customers to save even more electricity and reduce energy consumption.
4. Better durability and output optimization
 Thanks to the improved durability of the electrolyte membrane, which forms the core of electrical generation, the new product can operate for 60,000 hours, or 20% longer than the previous model. Also, by reducing the lower limit of the power output from 250 watts to 200 watts, it is even more suitable for customers with minimal power needs.

[Differences with previous model]

- System configuration - New product configuration with separation of the backup heat source from the hot water unit

New product



Left: Fuel cell unit; Right: Hot water unit

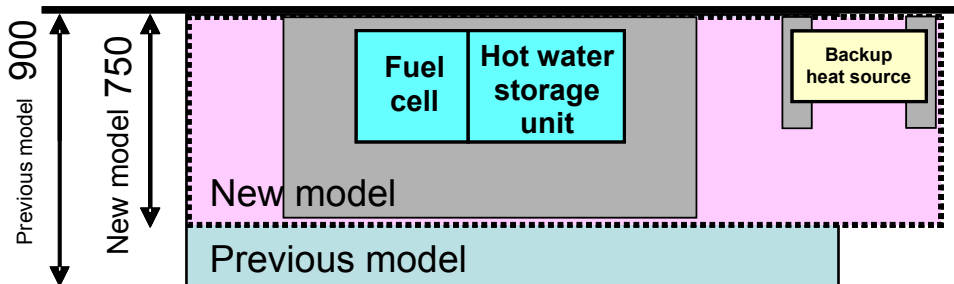
Previous model



Left: Hot water unit; Right: Fuel cell unit

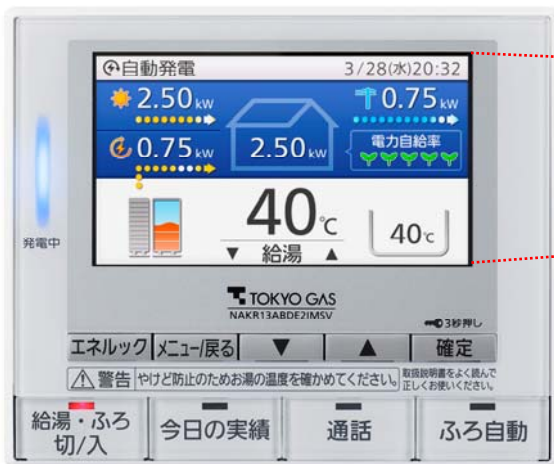
- Easier installation - Reduction of installation space depth (from 900 mm to 750 mm)

Installation space (mm)



- Remote control (installed in the kitchen and bathroom)
 - Large and colored LCD screen for easier viewing of text and graphs

New model (4.3 inches)



Previous model (3.5 inches)



[About Ene-Farm]

The “Ene-Farm” fuel cell co-generation systems generate electricity through a chemical reaction between oxygen in the atmosphere and hydrogen extracted from city gas. The heat generated as a byproduct of this process is also used for hot water supply⁷. This system is extremely eco-friendly. Since the electricity is generated and used at the same place, there are no losses in transmission. Also, all heat produced during electricity generation can be used without waste. Compared to conventional method of using electricity from thermal power plant and hot water supply using city gas⁸, the fuel cell system allows primary energy consumption to be reduced by approximately 37%⁹ and CO2 emissions by approximately 49%. Users can cut around 60,000 yen from annual utility bills, and CO2 emissions by approximately 1.3 tons a year¹⁰.

- *7: The previous model uses a portion of the exhaust heat from electrical generation to heat hot water for home heating. With the new product however, it is entirely heated by the backup heat source.
- *8: Method where electricity is supplied from a thermal power station, and city gas supplied by Tokyo Gas is used for heating.
- *9: Compared with the method (*8) at a rated operation of electricity generation of 0.75 kWh and heat recovery volume of 1.08 kWh / approximately 37 liters at 40 degrees Celsius.
- *10: Conditions used in estimation are as follows:
 - 4-person family in single, detached house (total floor area: 120 m²).
 - Annual burden - Hot water supply: 14.7 GJ; Warming bath water: 1.6 GJ; Cooking: 2.2 GJ; Coolers: 8.3 GJ; Floor heaters: 9.0 GJ; Air-conditioner heating: 4.6 GJ; Lighting and others: 17.9 GJ
 - CO2 equivalent - City gas: 2.29 kg-CO2/m³; Electricity: 0.69 kg-CO2/kWh
 - Primary energy equivalent - Electricity: 9.76 MJ/kWh; Gas: 45 MJ/m³; Hot water/heating efficiency: 80%
 - Gas charges - Conventional system: Using 'Danran Plan'; Ene-Farm: Using 'Eco Plan with Ene-Farm'
 - Electricity charges - Using 'Meter Rate Lighting B' with 40A contract for both conventional system and Ene-Farm.

[Specifications overview]

| | | New model | Previous model |
|----------------------------------------------------------------------|--------------------------------|--------------------------------------------------|-----------------------------------|
| Launch date | | April 1, 2013 (scheduled) | April 1, 2011 |
| Performance | Electricity generation output | 200 W-750 W | 250 W-750 W |
| | Rated generation efficiency | 39.0% (LHV) 35.2% (HHV) | 40.0% (LHV) 36.0% (HHV) |
| | Rated heat recovery efficiency | 56.0% (LHV) 50.6% (HHV) | 50.0% (LHV) 45.0% (HHV) |
| | Overall efficiency | 95.0% (LHV) 85.8% (HHV) | 90.0% (LHV) 81.0% (HHV) |
| | Water tank capacity | 147 liters | 200 liters |
| Dimensions | Fuel cell unit | H1,850 mm × W400 mm × D400 mm | H1,883 mm × W315 mm × D480 mm |
| | Hot water unit | H1,850 mm × W560 mm × D400 mm | H1,883 mm × W750 mm × D480 mm |
| | Backup heat source | H750 mm × W480 mm × D250 mm ^{*11} | (Built into the hot water unit) |
| Weight (dry) | Fuel cell unit | 90 kg | 100 kg |
| | Hot water unit | 55 kg | 125 kg |
| | Backup heat source | 44 kg ^{*11} | (Built into the hot water unit) |
| Installation space (adjacent installation) | | 750 mm (depth) | 900 mm (depth) |
| | | Approx. 2.0 m ² (area) ^{*11} | Approx. 2.0 m ² (area) |
| Recommended retail price (Including tax; not including installation) | | 1,995,000 yen ^{*11} | 2,761,500 yen |
| Free maintenance support | | 10 years | 10 years |

*11: Standard model with functions for home heating, bathwater reheating and hot water supply