

Technological Development by the Osaka Gas Group

The Evolution of Residential Gas Appliances Development of Residential Cogeneration Systems

The Group launched sales in 2003 of ECOWILL, a one-kilowatt residential gas-fired cogeneration system, and is now engaged in developing fuel cells to enhance its product lineup.

For residential cogeneration systems that use polymer electrolyte fuel cells (PEFC), the Group participated in a major testing program conducted by the New Energy Foundation that began in fiscal 2007. Since then, we have installed and operated an aggregate total of 365 PEFC cogeneration systems and worked to improve their reliability. A major problem standing in the way of commercialization had been durability. In March 2008, durability of 40,000 hours was set as the provisional commercialization target, and in June 2009, the product was launched on the market under the name ENE·FARM.

Residential cogeneration systems that use solid oxide fuel cells (SOFC) have a high power efficiency of 45% (lower heating value basis), so even customers with minimal heating demand can expect exceptional energy efficiency benefits. The Group is participating in a study being run by the New Energy Foundation that started in fiscal 2009 and has since installed an aggregate total of 45 units as of fiscal 2010. Operating data is being collected from units in use at actual residences. The product has been under joint development with Kyocera Corporation since 2004, and in March 2009, Toyota Motor Corporation and Aisin Seiki Co., Ltd. also joined the partnership. Development is being accelerated by integrating and utilizing the technologies and expertise of each company, with completion scheduled for the first half of the next decade.

Easier to Use Cooking Stoves

Responding to the changing lifestyles of consumers in recent years, particularly changing eating patterns at home and the trend toward shorter meal preparation times, the Group developed and marketed the Class S Premium cooking stove with Si sensor, which features an automatic grilling function with 24 settings. The on/off switch for the burner has a ring-shaped indicator that displays the status of the burner, indicating whether the burner is on or off and its position on the stove top. This makes the stove easier to use and provides the consumer with greater peace of mind.

Research into Comfort

In addition to developing air conditioning units and other appliances, the Group researches the efficacy of its appliances and publicizes its findings in response to growing consumer interest in the area of health and beauty. Recently, our research has shown that continued use of a mist sauna alleviates eye wrinkles and conspicuous pores (after one month of continuous use) and reduces bodyweight and waistlines (after three months of continuous use). In addition, research has made clear that bathroom heaters lessen heat shock and can be effectively used when bathing with the upper half of the body out of the water. This sort of health and beauty information helps create consumer loyalty for gas-fired appliances.



The MIST KAWACK makes it easy to enjoy a sauna experience in the home

Sophisticated Technologies for Energy Solutions

In the commercial and industrial markets, we are working to strengthen our ability to provide solutions tailored to customer needs by improving the efficiency and functionality of gas cogeneration systems and gas heat pump (GHP) air conditioners.

High-Efficiency Cogeneration Systems

Since first launching a 9.8-kilowatt micro cogeneration system in 1998 that featured the lowest output in Japan at the time, Osaka Gas has worked to enhance its lineup of cogeneration systems in line with the various needs of its customers. In November 2008, we developed and marketed a 35-kilowatt micro cogeneration system with a power efficiency of 34%, the highest efficiency in the world among systems with output of less than 100 kilowatts. The system uses a Miller cycle gas engine we developed to improve engine efficiency. Moreover, up to eight units can be run in parallel, even during power outages, enabling the system to handle even larger load requirements.

Advanced Gas-Fired Air Conditioning Systems

In 2006 Osaka Gas enhanced its lineup by launching High Power EXCEL, an industrial gas heat pump with a generator that can generate electricity for the building while heating and cooling. In addition, in October 2008 we developed and marketed a 71-kilowatt (25-horsepower) gas heat pump capable of generating electricity that can be networked with a three-phase power grid. Combining a highly efficient air conditioning system with high-efficiency power generation serves to reduce carbon dioxide emissions by around 7% compared to a traditional gas heat pump with the same air conditioning capacity and standard commercially available power.

In addition to air conditioners, we have developed a number of other technologies that help the environment and save energy. These include Eco Micelles, an additive for building air conditioning units that reduces water pressure loss, which received the Minister of the Environment's Commendation for Global Warming Prevention Activity, and Ene Small, an energy measuring device with minimal wiring that enables data to be collected inexpensively to facilitate energy-efficient building operations, including air conditioning.



The High Power EXCEL commercial-use gas heat pump functions simultaneously as an air conditioner and electric power generator

Technologies to Develop New Business

To ensure the safe and stable supply of gas to customers, we carry out routine patrols of all gas transmission pipelines and supply facilities as well as taking such preventative measures as regularly replacing old pipelines.

Furthermore, in the fiscal year ended March 31, 2009, we developed and installed an additional cut-off history function for microcomputer-controlled meters to achieve greater safety, an increased lineup of regulators to achieve stable supply, and new construction techniques for gas transmission pipelines to achieve more efficient transmission pipeline construction. Osaka Gas remains fully committed to the research and development of technologies that support the stable supply of gas.

Initiatives to Improve Services and Productivity

In the past, the services provided by Osaka Gas included a strong element of relying on intuition and experience. We are now taking a scientific approach to our services, incorporating knowledge gained from ergonomics and psychology to achieve behavior observation, analysis and improvements. In the fiscal year ended March 31, 2009, we implemented a variety of improvements that included the sharing of sales expertise, store layouts that make it easy for customers to select products, increased productivity by personnel achieved by work-friendly office environments, and increased efficiency in kitchen environments achieved by workflow analysis.

Developing Technologies for Environmental Conservation

Gas-to-liquids, or GTL, is an environmentally friendly liquid fuel made from natural gas and other substances and manufactured via synthetic gas (a gas mixture of hydrogen and carbon monoxide). Osaka Gas partnered with JGC Corporation to develop a synthetic gas production process called Advanced Auto Thermal Gasification, or A-ATG, which is a simple, compact method for reducing carbon gas emissions during the production process. Successful tests have been run on the process at a pilot installation*. Since fiscal 2009 we have been working to develop an A-ATG process for offshore GTL production equipment. Because GTL would be produced from gases associated with offshore oil fields that are normally burnt off because they are difficult to use effectively, this process would reduce carbon gas emissions and make effective use of resources.

As another initiative to help prevent global warming, progress is being made on making a coal mine methane (CMM) compression system feasible for practical application. This system compresses low-density methane gas released into the air by coal mines in China for reuse as fuel for cogeneration systems and boilers. It utilizes an Osaka Gas materials technology that selectively absorbs methane from mixtures of air and methane. Verification testing on the low-density CMM compression system at the Fushun Coal Mine in Liaoning Province, China was conducted in fiscal 2010**. Low-density CMM with a methane density of approximately 21% was successfully compressed to a density of approximately 48%.

* This research is being done on contract from Japan Oil, Gas and Metals National Corporation.

** Collaborative research project with the New Energy and Industrial Technology Development Organization in fiscal 2007 and 2008



A-ATG Pilot Equipment (verified)



Low-concentration CMM (coal mine methane) enrichment equipment (verified)

Linking Technologies With Early Commercial Returns —Thorough Technology Management

We have invested our resources strategically in technology development, deeming it to be the most effective method of differentiating ourselves in the market to bolster our technological competitiveness. In this harsh business environment, we will manage technologies so technological development translates into early commercial returns and will robustly promote the development of technologies that facilitate growth in a variety of business fields.