

Technological Development

Technological Development Is Crucial to Further Strengthen Competitiveness

The Osaka Gas Group views R&D as the most effective means to differentiate itself from competitors and to strengthen its competitiveness. With this aim, the Group is strategically investing resources in fields such as energy and the environment.

Priority Technological Development Fields

Commitment to Decentralized Energy Systems

The Osaka Gas Group is stepping up its commitment to maximizing efficiencies in power supply from fuel cells and gas-engine cogeneration and in low-cost energy supply to help achieve energy security, energy conservation, and peak-power demand cuts, which have become leading social priorities since the earthquake disaster in Japan. We are promoting technological development for the commercialization of “smart energy houses” that feature three types of batteries (residential fuel cells, solar cells, and rechargeable batteries) as well as “smart energy networks” that make the best possible use of decentralized energy systems.

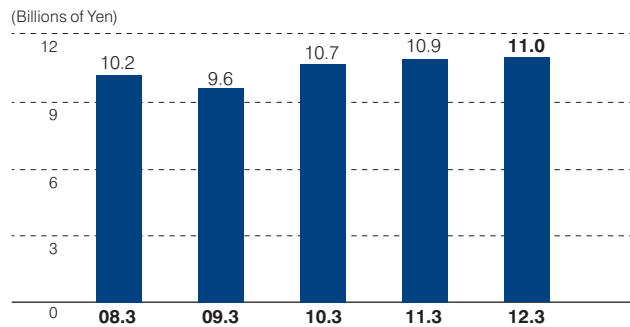
Technological Development for a Low-Carbon Society

Osaka Gas recognizes the extremely important role it plays in preventing global warming through its focus on advancing energy businesses. We are working diligently to promote advanced use of natural gas through means such as increasing the efficiency of gas appliances, optimize renewable energy and gas systems, and improve energy transparency using information and communication technology (ICT) for energy-saving controls.

Developing Technologies that Contribute to Environmental Preservation

By expanding upon its catalyst, bio, carbon material, and other core technologies, the Osaka Gas Group is developing a diverse range of technologies that contribute to environmental preservation, including wastewater treatment technology, methane fermentation technology for raw garbage, and compression technology for coal mine methane (CMM).

Research and Development Expenses (Consolidated)



Examples of initiatives For information on residential fuel cell systems, please refer to pages 30-31.

Smart Energy Houses

The Osaka Gas Group is working to develop “smart energy houses” that combine comfort and environmentally friendly living. The houses employ three types of batteries (residential fuel cells, solar cells, and rechargeable batteries) and IT to facilitate “smart” production, storage, and utilization of electricity and heating. To accelerate development for commercialization, we have built two experimental homes: one to assess the technology, and the “Experimental Home Residence” to study actual living conditions. Testing began in February 2011.

In January 2012, impressed with the “Experimental Home Residence” and its three-battery system, the Institute for Building Environmental and Energy Conservation (IBEC) certified it as a Lifecycle Carbon Minus (LCMM) home*, the first time the designation was received in Japan.

* LCMM homes achieve negative CO₂ balances in their overall lifecycles through the use of solar cells and other renewable energy resources and minimal CO₂ emissions in home construction, installation, and waste disposal.

Conceptual Diagram of a Smart Energy House



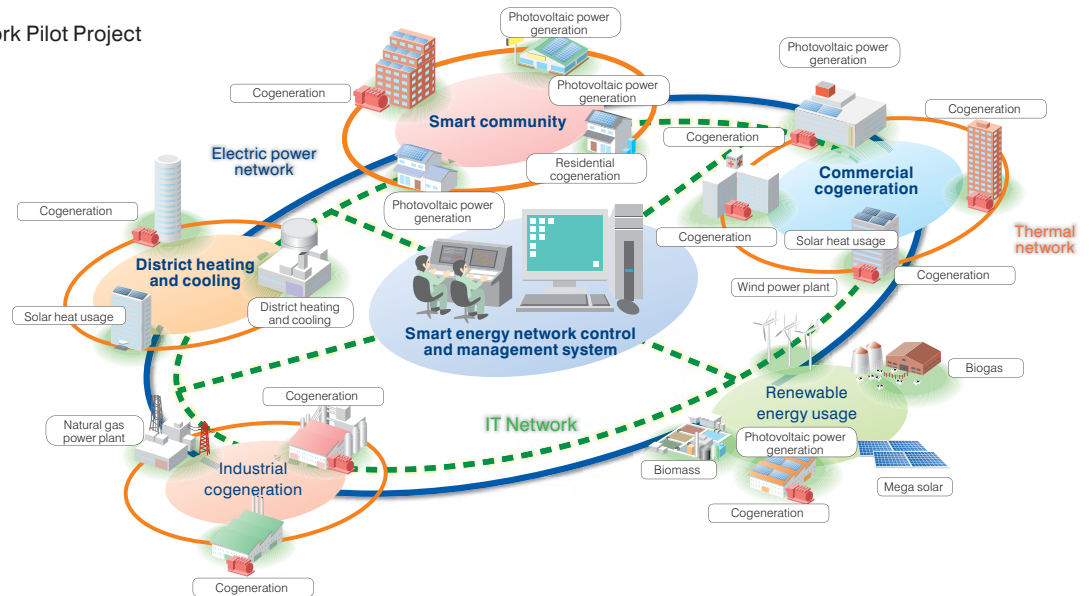
“Smart Energy Network”

A “smart energy network” is a next-generation energy system that optimizes the energy supply and demand balance by combining gas cogeneration systems with photovoltaic units and other devices to facilitate the exchange of heat and electricity that is produced among multiple energy consumers.

Osaka Gas has partnered with Tokyo Gas Co., Ltd., in a project to demonstrate how to best harness energy tapped from multiple sources, forming an energy community in conjunction with nine customers throughout the Kansai region. This “smart energy network” is now being verified.

Overview of Smart Energy Network Pilot Project

- Electric power network
- - - IT network
- Thermal infrastructure

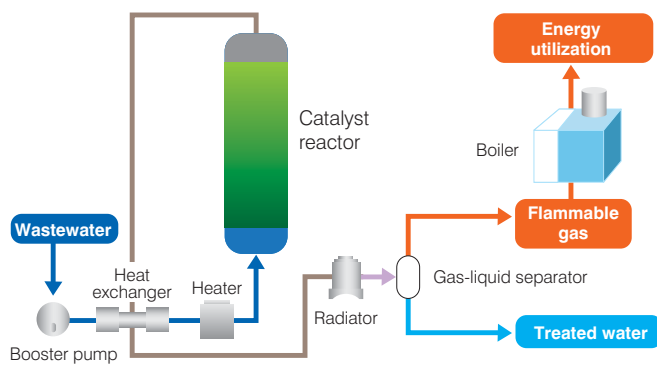


Energy-Creating Wastewater Treatment Process

Osaka Gas has developed a method to rapidly decompose and process organic wastewater produced at semiconductor, chemical, and other plants using catalyst technologies. The process creates a flammable gas composed primarily of methane that can be effectively recycled inside factories as fuel for boilers or other purposes. This reduces CO₂ emissions by roughly 110%* and wastewater treatment costs by about 40% compared with conventional combustion processes. Verification testing of an actual wastewater plant has been under way since the fiscal year ended March 31, 2011.

* Figure includes benefits of introducing the treatment process, which cuts emissions by 85%, and the flammable gas produced, which allows fuel used by boilers or other equipment to be reduced by 25%.

Diagram of the Energy-Creating Wastewater Management Process



(Operating conditions) Temperature: 200–300°C, Pressure: 5–10MPaG, LHSV: 1–10hr⁻¹

Commercializing Low-Density CMM Enrichment Technology in China

The Osaka Gas Group has started a business under consignment from the New Energy and Technology Development Organization (NEDO) to compresses low-density coal mine methane (CMM) for supply as city gas in China. The Company’s proprietary methane-absorption technology compresses CMM that is now dissipated into the atmosphere. Lu’an Mining Industry Group Co., Ltd. utilizes this resources to supply energy to some 18,000 households located its near mines. It is capable of reducing annual greenhouse gases emissions by about 10% (approximately 91,000 tons). We plan to promote introduction of the technology at other mines in China.

Until now, CMM with less than 30% methane has dissipated into the atmosphere as a wasted resource.

Diagram Explaining Low-Density CMM Compression Technology

