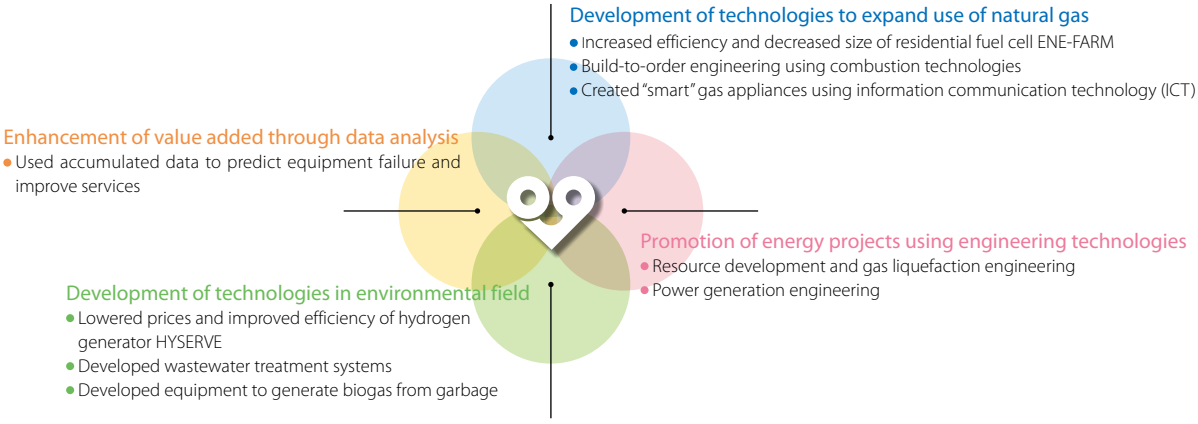
Technological Development

Technological Development Strategy

Technology-Driven Solutions and Innovation

The Osaka Gas Group aims to spur innovation for the next generation and provide optimal solutions to its customers by leveraging its accumulated core technologies.



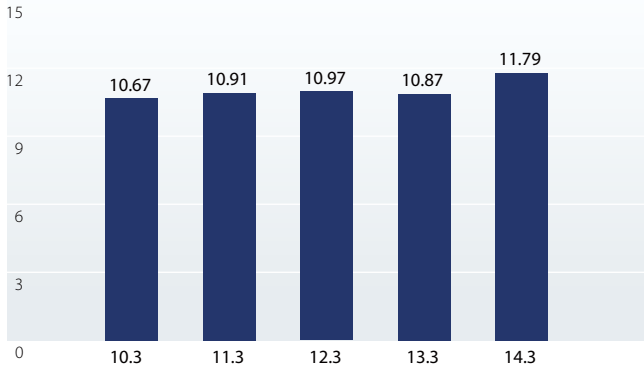
Priority Fields in Technological Development

Osaka Gas aims to improve its engineering capabilities in growth fields, such as upstream businesses and the electric power business.

Looking ahead to the full liberalization of electric power and gas retail activities, Osaka Gas is developing new gas equipment, such as fuel cells, to increase its competitiveness. Osaka Gas is also focusing efforts on information communications technology (ICT) and big data analysis to provide new services that enhance value added in the gas and electricity businesses.

Research and Development Expenses (Consolidated)

(Billions of yen)



Major Initiatives

Toward a Hydrogen Society

Compact-Type On-Site Hydrogen Generator HYSERVE

HYSERVE is a system that produces high-purity hydrogen from city gas, using high-performance steam-reforming catalysts that were independently developed by Osaka Gas. Its features include a compact size, low price, high efficiency, and easy operation.

Osaka Gas succeeded in the commercialization of HYSERVE-300, which features three times the hydrogen generation capacity of the previous model. Sales began in December 2013 to hydrogen stations and mid-scale hydrogen users.

HYSERVE-300

Clean Energy Hydrogen Stations

Osaka Gas plans to construct a commercial on-site hydrogen station with a compact hydrogen generator, the HYSERVE-300, next to a natural gas vehicle refueling station in Ibaraki-city, Osaka Prefecture. Operations are slated to commence in spring 2015.

We hope to contribute to the realization of a low-carbon society through the sale of HYSERVE for hydrogen stations and the supply of hydrogen for fuel cell vehicles that automakers plan to begin selling to the general public.

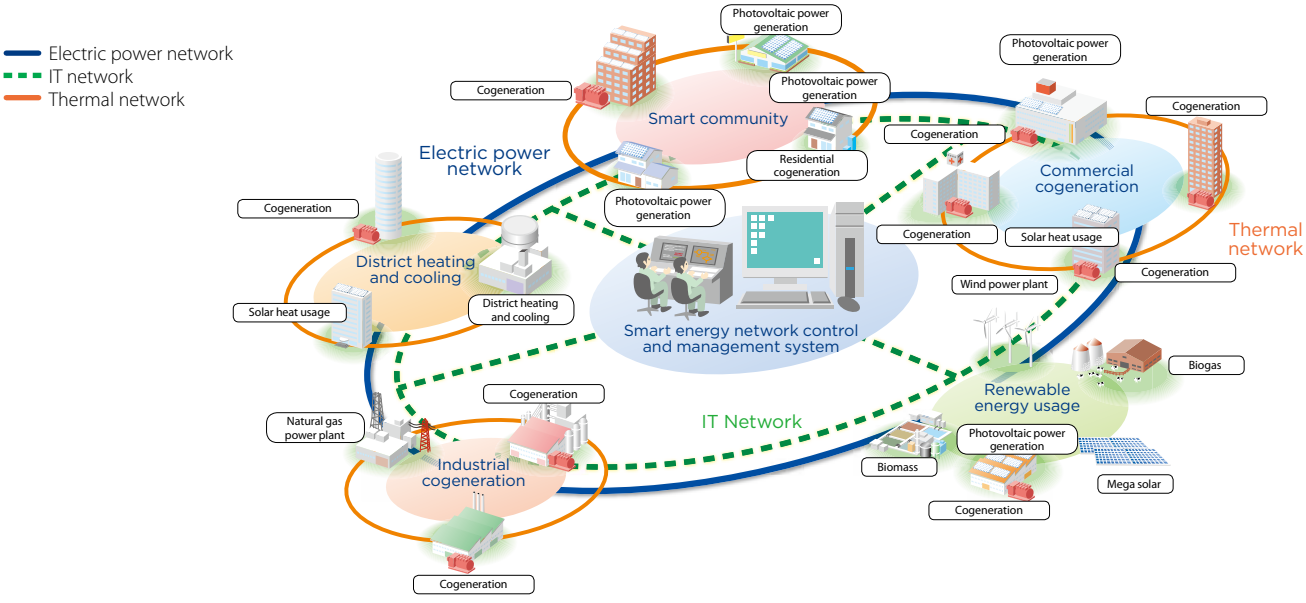
Osaka Hydrogen Station (Operated in April 2011)

Major Initiatives Smart Energy Networks

A "smart energy network" is essentially an energy community that is composed of gas cogeneration systems, renewable energy, and information and communication technology (ICT). Far more than providing energy flexibility, smart energy networks are next-generation energy systems that create new value by combining distributed energy sources through a process of integrated control. In specific terms, this new value is derived from (1) the pursuit of further reductions in energy consumption and CO_2 emissions, (2) efforts to enhance energy security, and (3) the growing use of renewable energy. Osaka Gas has jointly participated with Tokyo Gas in a pilot project that has been selected as a "Dispersed Energy Compound Optimization Demonstration Project," and is funded by Japan's Ministry of Economy, Trade and Industry, in conjunction with nine customers from May 2010. On the results of this project, Osaka Gas commenced smart service provider business demonstrations from July 2012. Furthermore, from June 2013, Osaka Gas took steps to build a smart energy network for a redevelopment project in the Iwasaki area of Nishi-ku in Osaka. The Company has commenced the supply of electric power* as a designated electricity supplier.

* The supply of electric power represents the first designated electricity supplier application in Japan since the relaxation of requirements following revisions to Japan's Electric Utilities Industry Law in the fiscal year ended March 31, 2012.

Overview of Smart Energy Network Pilot Project



Major Initiatives Construction of a Large-Capacity PCLNG Tank*

A large-capacity LNG tank (230,000 m³) that uses the latest technology is currently under construction at Osaka Gas' Senboku No. 1 Works, with a scheduled completion date of winter 2015.

Development and Commercialization of 7% Nickel Steel That Reduces Use of Rare Earth Metals

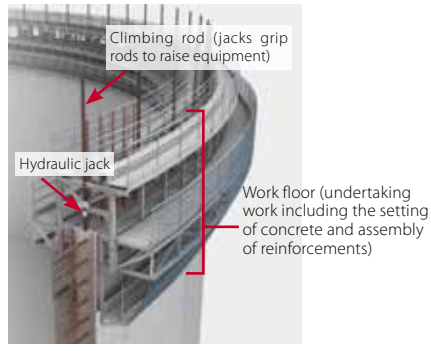
For over half a century, 9% nickel steel (containing 9% nickel, a rare earth metal) has been used as a material for the internal lining of LNG tanks. Osaka Gas developed and commercialized a new 7% Ni-TMCP steel material that cuts the volume of nickel (Ni) used in tanks and successfully reduced material costs. By utilizing thermo mechanical control process (TMCP) technology, which uses computers to precisely control the steelmaking process, this material delivers a level of performance that exceeds that provided by 9% nickel steel.

Slipform Construction Method Considerably Shortens Time to Build Outer Tank

Osaka Gas built an outer tank using the slipform construction method, a first for a PCLNG tank in Japan. This construction method uses hydraulic jacks to raise integrated formwork and scaffolding equipment, allowing for the continuous placing of reinforcements and concrete without construction joint.

The traditional construction method entails a crane used to install formwork and scaffolding, the assembly of reinforcements, and the pouring and setting of concrete, after which the cycle is repeated when the crane moves the formwork and scaffolding. This traditional method would have taken nine months to construct an outer tank of the same scale, whereas the slipform construction method only took 20 days.

* A double-walled metal tank with dike-type prestressed concrete (a type of reinforced concrete) affixed to its outer layer



Visual representation of the slipform construction method