## Summary of Business Segments

## Natural Gas Segment



## Service Area of the Gas Segment

With its gas sales volume of 8.05 billion cubic meters, Osaka Gas accounts for approximately 30% of total sales volume in Japan. Osaka Gas supplies gas to 6.6 million customers, which is approximately 25% of the nation's total.

While steadily expanding its service area, the Company currently supplies natural gas to customers residing in 72 cities and 38 towns in six prefectures of the Kansai region spread over approximately 3,136 square kilometers with gas pipelines extending about 55,800 kilometers as of March 31, 2005.



# Characteristics of the Japanese Gas Industry

- While there are more than 200 gas companies in Japan, the market is dominated by a few major gas suppliers, such as Osaka Gas, which by itself accounts for approximately 30% of total gas sales volume in Japan.
- Supply of LNG, one of the main raw materials of gas, is mostly dependent upon import from overseas.
- In contrast to other countries, Japan does not have any gas pipelines interlinked nationally or internationally.
- The gas business is carried out in an integrated manner, from procurement and import to transmission/distribution to downstream gas supply and marketing.



- Compared to other fossil fuels, natural gas has a less adverse impact on the environment.
- Natural gas reserves are more abundant than those of crude oil and, unlike crude oil, are not concentrated in specific geographical locations.

From this standpoint, demand for natural gas is expected to increase in the future as the preferred fuel for the 21st century. The Osaka Gas Group mainly handles energy resources that are friendlier to the environment, giving it an advantage in business development. This trend is more and more accelerated in pace with the development of people's environmental awareness encouraged by the effectuation of the Kyoto Protocol.



Sales volume from April 2004 to March 2005 Source: The Japan Gas Association Web site

# Reserve-Production Ratio of Natural Gas and Oil Natural gas 65

51

Source: Oil and Gas Journal 2003/12, 2004/3

Oil

Emissions of Combustion Product by Fossil Fuel (Coal = 100)								
	CO <sub>2</sub>	SOx	NOx					
Coal	100	100	100					
Oil	80	68	71					
Natural gas	57	0	20-37					

Source: Field test on technology for measuring air pollution caused by thermal power plants Report (1990.3 The Institute of Applied Energy) IEA (International Energy Agency) Natural Gas Prospects (1986)



## **Deregulation in the Electricity and Gas Sectors**

Background to Deregulation and Future Direction									
	Electricity Sector			Gas Sector					
	Scope of Liberalization	Share of national sales volume	Main points	Scope of Liberalization	Share of national sales volume	Main points			
1996			Introduction of independent power producer (IPP) and fuel cost adjustment system	More than 2,000,000 m <sup>3</sup> per year	36%	Introduction of third party access to pipelines and fuel cost adjustment system			
2000	More than 2MW	26%	Creation of power generation and supply business	More than 1,000,000 m <sup>3</sup> per year	40%	Third party access to pipelines made mandatory (major four companies)			
2004	More than 0.5MW	40%	Abolishment of pancake tariff	More than 500,000 m <sup>3</sup> per year	44%	Third party access to pipelines made mandatory			
2005	More than 0.05MW	63%	Creation of wholesale power market						
2007				More than 100,000 m <sup>3</sup> per year	50%				

Source: Denki Shimbun's "Description of Electric Power Liberalization and New Systems" and 2002 Urban Thermal Energy Committee materials

## 1 Natural Gas Segment

Being able to use energy as effectively as possible is important for the environment and economy. We will maintain our competitive edge against other types of energy by providing an optimal energy solutions from the customers' viewpoint.





## **Residential Gas Marketing**

The residential gas engine cogeneration system ECOWILL is a revolutionary new product that generates electricity while supplying hot water. The fiscal 2005 was the second year after the substantial sales took off. Annual sales for fiscal 2005 totaled 8,000 units and a cumulative total for the two years run up 11,000 units, as customers embraced ECOWILL for its high efficiency and convenience in controlling overall energy costs.

The Osaka Gas Group concentrated its efforts on expanding sales of fan heaters and hot water floor heating systems, which contributed considerably to higher residential gas sales. Unlike oil heaters that require refueling, fan heaters are used in more than 30% of the households in our service area. Replacement demand is increasing from customers who have already purchased fan heaters, and new demand is rising as customers switch from heating equipment that uses other types of fuel. To meet this increasing demand and to supply products at competitive prices, the Group is further expanding the sales network to reach volume retailers of electric home appliances.

Sales are steadily expanding for our hot water floor heating systems, which are popular for providing heat from a person's feet upward and keeping room air clean. Hot water floor heating systems have become so popular that they are often included as standard features in newly constructed housing complexes such as condominiums. More recently, in addition to the new housing market, the Osaka Gas Group is encouraging the further proliferation of hot water floor heating systems by proposing their introduction along with other remodeling plans to the approximately 6.3 million homes in the Kansai region.



Gas power generation and hot water floor heating system "ECOWILL"

## Non-Residential Regulated Gas Marketing

Natural gas plays a crucial role as a principal energy source for a wide variety of industry, including steel, metals, chemicals, and machinery. Demand for natural gas is increasing as it compares favorably to other primary energies in terms of energy conservation, space conservation, and cleanliness, and Osaka Gas promotes detailed solution marketing activities based on a firm grasp of customer needs and its strong technologies.

For industrial use, natural gas is increasingly used for such cooling purposes as cooling processes and clean rooms, in addition to thermal energy for furnaces and boilers. Able to generate both heat and electricity simultaneously, cogeneration systems realize substantial energy savings in factory operations, and their utilization is increasing as needs grow for distributed power sources in society.

Gas sales to the commercial, public and medical sectors are increasing due mainly to the use of gas air conditioners and cogeneration systems. Gas absorption air-conditioning systems have become the dominant technology for air conditioning in large buildings, while gas heat pump air-conditioning systems are becoming increasingly popular in small and medium-sized buildings because of their convenience. The air-conditioning system Quick Multi, released in fiscal 2003, can be installed using existing cooling ducts, which acquired a good reputation. Sales are increasing, taking the opportunity of upgrading of air-conditioning systems in old office buildings.

General View of Natural Gas Cogeneration

Regeneburgers enable reductions in energy consumption of 35-50% using the accumulated heat burning method

Customers both large and small deploy cogeneration systems, ranging from major commercial facilities to hospitals, hotels, and retail stores. Our Gene-Light Series of compact 9.8 kW cogeneration systems for small and medium-sized office buildings and shops has been very popular since its launch in fiscal 1999. To date, more than 1,400 customers have installed the Gene-Light Series.



#### Power Generation System (Traditional) **Cogeneration System** Thermal power generation Gas plant Cogeneration Electric power plant Pipeline Electric Primary energy Primary energy energy (petroleum oil, natural gas, coal) (natural gas) Electric 100 100 enerav Efficiently usable Lost energy waste heat 56 20~30 Waste heat Waste heat <u>4</u>00 70~80%

Note: Power generation efficiency is calculated using fiscal 1999 results (LHV standard).

Source: The Japan Gas Association "Gas Cogeneration System"

## 1 Natural Gas Segment

Our energy consulting capability, backed by technological know-how, is one of the greatest strengths of Osaka Gas to stimulate customer demand and provide an optimal combination of products and systems developed to solve a specific problem.

## **Cogeneration Systems**

Installed at the customer's location, cogeneration systems recover heat emitted from power generation and use it for air conditioning and thermal applications. Energy usage efficiency improves approximately 70%–80% with the use of cogeneration systems, as exhaust heat can be effectively utilized, and there is minimal transmission loss because electricity is generated at the customer's location.



Featuring cutting-edge technology, this 1 MW class high-efficiency engine boasts power generation efficiency of approximately 41%.





### Strengths of Osaka Gas Cogeneration Systems

- High efficiency in power generation Compared with the average efficiency of approximately 40% at existing thermal power plants, our advanced cogeneration systems achieve power generation efficiency of around 43%. As a result, there are an increasing number of customers that enjoy the cost benefits of introducing Osaka Gas cogeneration systems.
- Secured service and maintenance quality
   Our maintenance system, which includes the remote
   observation system Echo Line, leads the industry in
   service and maintenance quality.
- 3) A variety of financing schemes Osaka Gas offers various financing schemes that answer customer needs such as for not wanting to own capital assets, and wanting to preset rate fluctuations to changes in fuel costs.
- 4) Services outside the area For franchise chain owners with stores located outside our service area, we meet customer needs through our subsidiary Cogen Techno Service Co., Ltd., which is in charge of cogeneration operations outside our service area.
- 5) A variety of products

In addition to natural gas as a fuel, Osaka Gas also provides a wide variety of cogeneration systems, including engines that use biogas as fuel as well as agricultural systems that supply CO<sub>2</sub> to plants. Through these strengths, the Osaka Gas Group has delivered cogeneration systems with a total generation capacity of approximately 1,500 MW. Osaka Gas is extending natural gas infrastructure to meet future growth in demand in its service area while strengthening ties with local natural gas providers in Western Japan.

## Extending Natural Gas Infrastructure

Osaka Gas is able to provide stable supply of natural gas through existing LNG tanks, vaporizers and other basic infrastructure. The Osaka Gas Group plans to construct the following two high-pressure gas pipelines in areas of growing demand and to improve the stability of supply. 1) Shiga Line

To expand demand and stably supply natural gas in southern Shiga Prefecture, Osaka Gas is constructing the Shiga Line stretching for approximately 46 kilometers between Kusatsu City and Taga Town in this prefecture. The region is expected to have demand for approximately 200 million cubic meters of gas.

2) Mie-Shiga Line

Osaka Gas finalized the plan to construct an approximately 56-kilometer pipeline connecting the Taga Regulator Station on our Shiga Line to the Yokkaichi Thermal Power Plant of Chubu Electric Power Co., Inc., in an aim to improve supply capacity and stability between Kyoto and Shiga.



Expanded Infrastructure for Natural Gas Business



LNG and Gas Wholesale Customers Note: Indicates wholesale supplies of LNG and gas through pipeline

## Strengthening Ties with Local Natural Gas Providers

The Osaka Gas Group engages in the wholesale supply of natural gas to four gas companies in the Kansai region. From April 2004, we started the wholesale supply of natural gas to Itami Sangyo Co., Ltd., in Nishiwaki City. On occasion, gas providers in the Kansai region have approached Osaka Gas with a request to take over their operations. The Company obliges when it deems it will receive a sufficient return on its investment. Osaka Gas has taken over the operations of Miki Gas, Tenri Gas, Nabari Kintetsu Gas Co., Ltd., Sasayama Gas, and Kinosaki Gas in recent years.

For gas providers unable to purchase natural gas from our LNG bases and pipelines in regions spanning from Chugoku to Kansai and Hokuriku, we are actively engaged in LNG wholesale operations supplying gas by trucks. Furthermore, the Osaka Gas Group established Cogen Techno Service in 2000 to promote the proliferation of cogeneration systems along with regional gas providers. The total generation capacity at the customers' sites exceeded 200 MW at the end of March 2005, and thus it has enjoyed favorable growth.



Ujigawa Pipeline Bridge

## 1 Natural Gas Segment

We are actively promoting natural gas upstream operations along with new concepts in the LNG trading and transportation business and the natural resource development business.

## Material Procurement/Natural Gas **Development/Transportation Business**

For the procurement of natural gas, Osaka Gas endeavors to secure price competitiveness in the energy business by reviewing the price structure for existing contracts and shifting to new contracts that are relatively inexpensive. In addition, the Company is branching out to LNG transportation and resource development businesses to expand its business toward the upstream of the natural gas value chain.

The transportation business is designed to increase the transparency of transportation costs and then reduce them by owning, through Osaka Gas International Transport, LNG carriers for the transportation of LNG we purchased under an FOB contract. It also aims at bringing profit by transporting LNG for other companies through utilization of vacant space that we tend to have at the start-up period of the LNG contract. Transportation

contracts mainly for transporting LNG from the Western Australia Expansion Project as well as for Qalhat LNG are measures to realize this policy.

For the expansion of the resource development

- business, it focuses on the following three categories: 1) Participation in the gas field development, aiming at upgrading it to an LNG project
- 2) Participation in the project from which Osaka Gas purchases LNG as one of the minority shareholders (including participation in the liquefaction project only)
- 3) Acquisition of the rights of oil and gas fields in production operation

Currently operating businesses include participation in the Northern Australia Gas Venture and investment to the gas field concessions in operation in Indonesia.







Gas Venture (NAGV)

#### Canada he former Soviet Union 5.3 Oata U.S Algeria 4.5 World's proven natural gas reserves: Saudi Arabia Abu Dhabi 171 Mexico 0.4 Oman trillion cubic meters Nigeria Malaysia Major nations with natural gas reserves Brunei 2.1 0.4 Venezuela 4.3 Indonesia Suppliers to Osaka Gas 2.6 Australia 0.8 Source: Oil & Gas Journal (December 20, 2004)

#### World's major nations with natural gas reserves and suppliers to Osaka Gas