

# Achieving Sustainable Growth in a Low-Carbon Society

Growing calls for a transition to a low-carbon society on a global scale—Tokyo Gas is working to contribute to the transition to a low-carbon society and to achieve sustained growth. To those ends, we are developing the integrated energy business, with natural gas at its core.

## Outlook for a Low-Carbon Society and the Growth Potential of Tokyo Gas

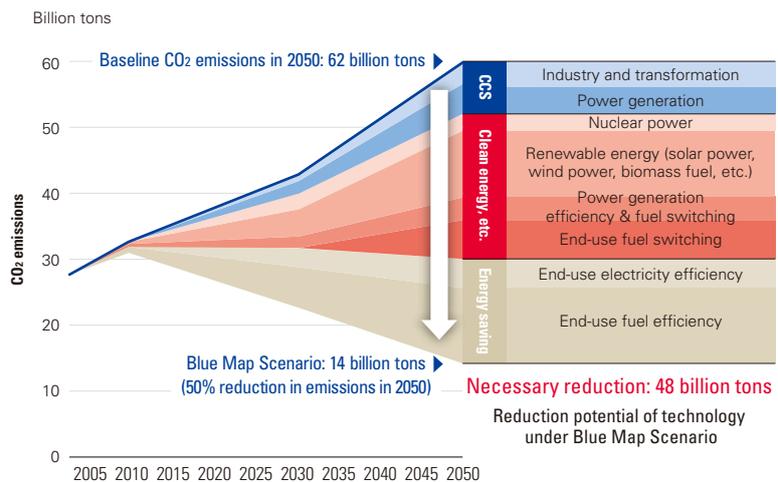
### Social Demand for Realization of Low-Carbon Society

**KEY POINTS**

- Global target—Reduce CO<sub>2</sub> emissions by 50% by 2050 from the 1990 level
- Domestic target—By 2050, reduce CO<sub>2</sub> emissions by 80% from the 1990 level
- Demand for natural gas—Forecast of 34% growth on global basis in comparison with 2005

Due to economic growth in emerging countries, energy demand is steadily increasing, and initiatives to mitigate climate change have become a vitally important issue, not just for Japan but on a global scale. There is an ongoing search for energy with low CO<sub>2</sub> emissions, such as nuclear power and renewable energy, but there remain a number of significant challenges, including construction lead time and limit of supply amount issues. In this setting, natural gas is widely considered to be the source of energy that can make the most realistic and effective contribution to the promotion of global warming countermeasures. Heating accounts for the majority of energy demand, and the use of natural gas to provide heat is certain to expand. Moreover, through cogeneration systems and other technologies, natural gas will also play a more important role with the advanced use of energy, including electricity. Natural gas also has a key role in the International Energy Agency (IEA) scenario calling for CO<sub>2</sub> emissions to be reduced by 50% by 2050.

**IEA Blue Map Scenario: 50% reduction in CO<sub>2</sub> emissions by 2050**



Annually: 32 additional 1,000MW-class nuclear power plants, about 17,000 4MW-class wind power plants, addition of CCS to 35 500MW-class coal-fired power plants.

Source: IEA Energy Technology Perspective 2008

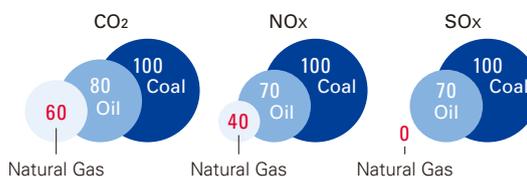
## Clean Energy, Natural Gas

### KEY POINT

- Natural gas: Lower lifecycle and combustion CO<sub>2</sub> emissions than any other fossil fuel

Methane, the primary ingredient of natural gas, has fewer carbon atoms per molecule than other fossil fuels, such as petroleum or coal. As a result, the combustion of natural gas generates less CO<sub>2</sub> than the combustion of other fossil fuels. That is one reason why natural gas is a clean form of energy. Another is that CO<sub>2</sub> emissions are also low during the city gas production process, which entails the gasification and caloric adjustment of LNG. And with pipelines connecting terminals and end-use regions, the city gas supply infrastructure features extremely low energy loss during transmission. As a result, even when considering the entire lifecycle impact, it is clear that natural gas is an extremely environmentally friendly form of energy.

### Comparison of Emissions (Coal = 100)



## High-Growth Market

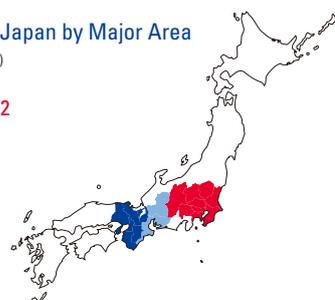
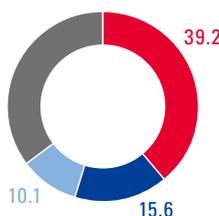
### KEY POINTS

- Largest economic region in Japan, accounting for about 40% of GDP
- Only domestic region expected to enjoy continued population inflow

The service area of Tokyo Gas is centered on the Kanto region. This region has the highest concentration of energy demand in Japan, and industrial demand is expected to lead to continued market growth in the years ahead. The Kanto region, in turn, is centered on Tokyo, which boasts one of the largest economies of any city in the world. In fact, the Kanto region alone accounts for about 40% of Japan's GDP. Overall, Japan's population is declining, but Kanto is the only one region in Japan that is expected to enjoy a continued population inflow. Leveraging the geographical advantages of a large plain, we are aggressively extending pipelines to outlying industrial areas. We are also building a new LNG terminal, the Hitachi LNG Terminal, in northeast Kanto. In these ways, we are preparing to meet further demand growth.

### Breakdown of GDP of Japan by Major Area

(Year ended March 31, 2008)



Total: ¥520.3 trillion

- 39.2% Tokyo area: Tokyo, Kanagawa, Saitama, Chiba, Ibaraki, Tochigi, Gunma, Yamanashi, and Nagano prefectures
- 15.6% Osaka area: Osaka, Hyogo, Kyoto, Shiga, Nara, and Wakayama prefectures
- 10.1% Nagoya area: Aichi, Gifu, and Mie prefectures

Source: Cabinet Office, Government of Japan

## Aiming for Further Growth

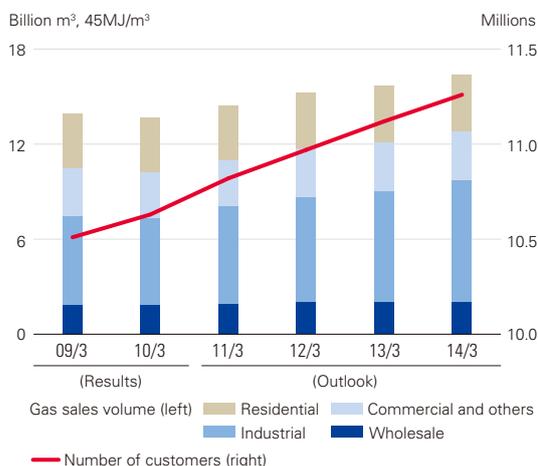
### KEY POINTS

- Gas sales volume in the fiscal year ending March 31, 2014 up by 18% from the fiscal year ended March 31, 2009
- Target of reducing customer CO<sub>2</sub> emissions by 4.5 million tons by 2020

Aiming to increase the value added of natural gas and to support growth in its use, Tokyo Gas is implementing a medium-term management plan with the theme of "evolution and advancement of integrated energy business."

To accelerate business development, we will draw on our strengths—environmentally friendly natural gas, a high growth business area, and our engineering capabilities. In these endeavors, we will give consideration to expanding the shift from other fuels to natural gas; taking steps to foster advanced use of natural gas, such as stepping up the introduction of cogeneration systems; and establishing next-generation energy systems, such as smart energy networks. In these ways, we will strive to contribute to society's transition to a low-carbon society and to achieve sustained growth for the Company.

### Outlook for Gas Sales Volume and Number of Customers



## FEATURE 1

# FUEL SWITCHING AND THE INTRODUCTION OF HIGH-EFFICIENCY EQUIPMENT

### Energy Savings and CO<sub>2</sub> Emission Reductions from Fuel Switching

Natural gas is widely used in industry for such applications as heating, heat processing, drying, food processing, and air conditioning. Industrial furnaces and boilers consume large amounts of fuel, and the switch from heavy oil or kerosene to low-environmental burden natural gas, combined with the installation of high-efficiency equipment, is one of the most effective means of combating the problem of global warming. Specifically, Tokyo Gas provides its industrial customers with a wide range of optimal systems, such as gas engines, gas turbines, steam-turbine cogeneration systems, and boilers.

In particular, the introduction of regenerative burner systems in industrial furnaces facilitates both extremely high fuel efficiency and low NO<sub>x</sub> emissions, and in conjunction with a switch to natural gas, these systems can make possible reductions of up to 50% in energy consumption and up to 55% in CO<sub>2</sub> emissions. The combination of regenerative burner systems and a switch to natural gas is drawing attention as a highly effective environmental countermeasure in this field.

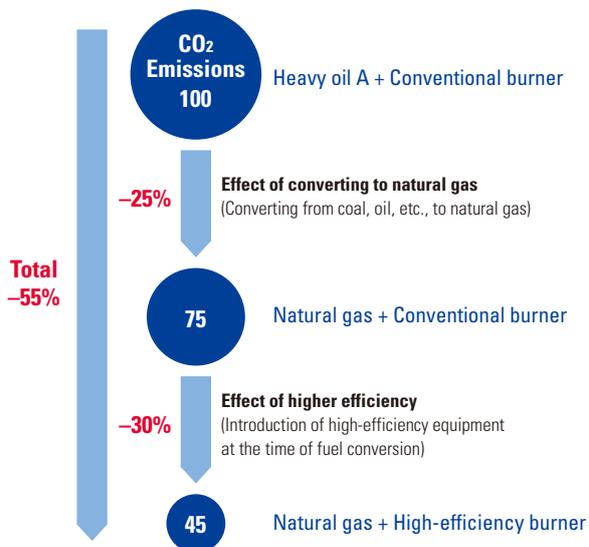
### Expanding Gas Usage with Marketing that Leverages Comprehensive Strengths from the Customer's Perspective

Tokyo Gas has high-level engineering skills that it acquired in the development of its integrated energy business. In addition, the Company has the ability to propose total service solutions incorporating facility optimization and maintenance. In today's market, customer needs are not only increasing but also growing more advanced and diverse, and by providing high-value-added solutions that respond to these needs, Tokyo Gas will strive to meet customer expectations, steadily seize growth opportunities, and contribute to the realization of a low-carbon society.



**Regenerative Burner System**  
This system efficiently recovers the high-temperature exhaust gas from industrial furnaces and uses it to preheat the air utilized for combustion. This system is drawing attention as an effective means to save energy and reduce CO<sub>2</sub> emissions.

### CO<sub>2</sub> Reduction Effect from Using Natural Gas for Industrial Furnaces



### Provision of Value to Customers in Line with Facility Life Cycle



## CASE STUDY: FURUKAWA SKY ALUMINUM CORP., FUKAYA PLANT

### LPG to Natural Gas— The First Step in the Fuel Switch

“It wasn’t simple at first.” That was the recollection of Osamu Kawakami, a key member of the project team. The switch to natural gas at the Fukaya Plant of Furukawa Sky Aluminum, which got underway in 2003, began with the replacement of the LPG facilities. At that time, there was no difference in the price of LPG and natural gas. Even though there were no substantial cost advantages, however, Furukawa Sky Aluminum decided to make the switch because the company was committed to the introduction of clean energy. “We wanted to pave the way for a switch from heavy oil in the future. However, there were challenging issues, such as installing pipelines over a considerable distance and converting facilities to natural gas firing.” Tokyo Gas sent 450 engineers, and with Tokyo Gas and the Fukaya Plant working closely together, the switchover from LPG was completed in only a year, including the pipeline installation.



Aluminum Melting Furnace

### FURUKAWA SKY ALUMINUM, FUKAYA PLANT

Furukawa Sky Aluminum, Japan’s leading maker of aluminum products, is moving ahead with environmental initiatives targeting energy saving and CO<sub>2</sub> emission reductions, centered on a switch to natural gas and the introduction of high-efficiency equipment. The Fukaya Plant is leading the way forward in those endeavors.



From left: Kazuhiko Kobayashi (Tokyo Gas); Hiroyuki Fukui, Osamu Kawakami, and Wataru Shiobara (Furukawa Sky Aluminum)

### Heavy Oil to Natural Gas— Moving Ahead with a Full-Scale Fuel Switch

In 2004, Furukawa Sky Aluminum began to implement a full-scale fuel switch at a melting furnace that had been using heavy oil. Today, the fuel switch process has been completed smoothly at seven melting furnaces. In addition, regenerative burners have been introduced.

“We are seeing the effects in reduced energy consumption and in lower CO<sub>2</sub> emissions. Of course, the switch from heavy oil, which is subject to dramatic price fluctuations, also has substantial cost advantages,” said general manager Hiroyuki Fukui. Osamu Kawakami and Wataru Shiobara both reported that “the exhaust is cleaner, with decreases in SO<sub>x</sub>, from the sulfur in the heavy oil, as well as in particulate emissions. In addition, the natural gas facilities are simpler, making maintenance and management easier. There has been very little trouble.”

The company reports that cleaner exhaust gas is also contributing to improved relationships with the local community. Tokyo Gas is proud to have been able to work together on this with Furukawa Sky Aluminum, its valued customer.

#### PRINCIPAL GAS FACILITIES THAT WERE INTRODUCED

- Aluminum melting furnace
- Heat treatment furnace
- Soaking furnace, heating furnace
- Steam boiler

#### RESULTS

Progress in switch to natural gas:

**80% of total fuel consumption**

CO<sub>2</sub> emission reduction:

**30% reduction from previous level**

Energy saving:

**10% to 30% reduction from previous level**



## FEATURE 2

# SOLUTIONS SERVICES CENTERED ON NATURAL GAS

### The Environmental Friendliness of Natural Gas Cogeneration Systems

As society pursues measures to reduce energy consumption and reduce CO<sub>2</sub> emissions, the ideas of dispersed power generation and waste heat usage through cogeneration systems will play a central role.

Unlike large-scale power generation systems, where the electricity is transmitted over considerable distances to the demand district, with cogeneration systems there is no transmission loss because the power is generated where it is used. Moreover, power generation also creates heat, which has generally been wasted because it was difficult to use. With cogeneration systems, however, this waste heat can be used effectively to meet heat demand, such as for heating and cooling as well as for hot water. Consequently, these systems realize high energy efficiency and make it possible to reduce CO<sub>2</sub> emissions by about 40% in comparison with conventional systems. As of the end of March 2010, there were 1,948 cogeneration systems in operation in our service area, with a total power generation capacity of 1,534,000 kW (commercial use: 1,621 systems, 521,000 kW; industrial use: 327 systems, 1,012,000 kW).

### More-Advanced Use and Area-Wide / Networked Energy Services

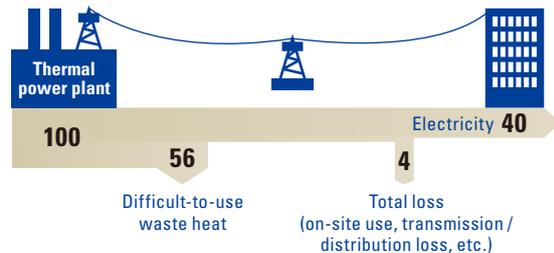
To further advance the use of environmentally friendly natural gas, Tokyo Gas will strive to introduce area-wide / networked energy usage and build optimized energy systems at the local community level. One example of these initiatives is district heating and cooling, in which Tokyo Gas has a history of more than 35 years. These systems contribute to lower energy consumption and reduce CO<sub>2</sub> emissions for an entire district. Currently, the use of these systems is centered on redevelopment areas, such as Makuhari and Shinjuku.

Tokyo Gas does much more than just supply facilities and energy. We are advancing energy service operations and ESCO (energy service company) operations, which provide comprehensive support for reducing energy consumption, such as the necessary technology, human resources, and financial resources. By increasing convenience and enhancing cost merits for customers, we will work to promote the spread of natural gas.

### Comparison of Total Energy Efficiency

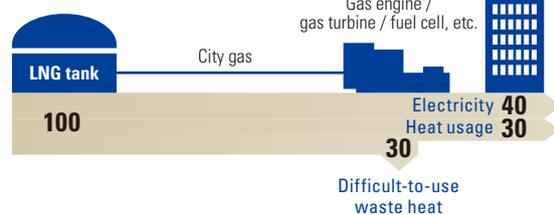
Conventional system\*<sup>1</sup>

Primary energy (coal, petroleum, natural gas, etc.)



Natural gas cogeneration system\*<sup>2</sup>

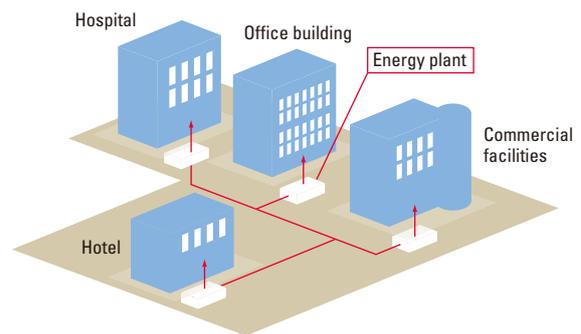
Primary energy (natural gas)



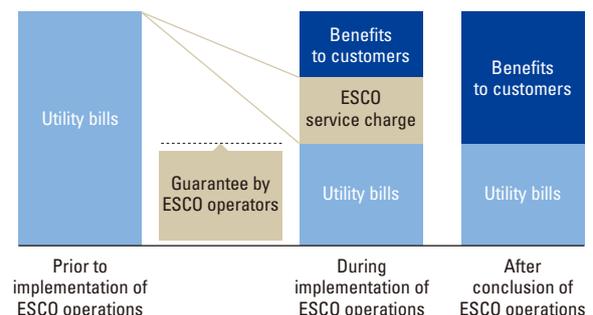
\*<sup>1</sup> LHV standard (LHV = lower heating value: the amount of heat from the combustion of the fuel, not including the latent heat of water vapor condensation) The heat efficiency and total loss from thermal power plants is calculated from the results of 9 electric power companies and electricity wholesale companies for fiscal 2003 (Energy Efficiency Standards Subcommittee of the Advisory Committee on Energy and Natural Resources, September 2005)

\*<sup>2</sup> Efficiency of natural gas cogeneration systems is an example using the LHV standard.

### Diagram of a District Heating and Cooling System



### Economic Benefits of ESCO Operations



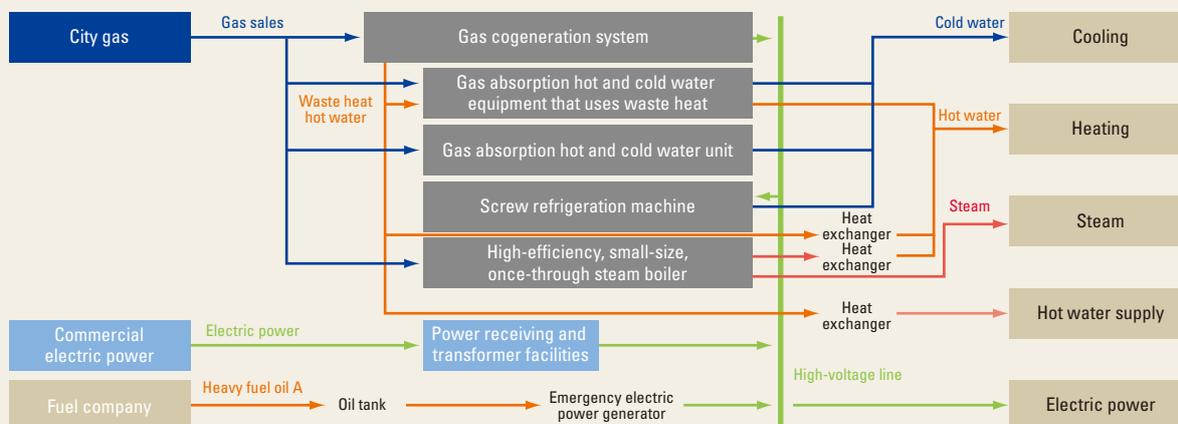
## CASE STUDY: MITSUI MEMORIAL HOSPITAL

### Commemorating the Hospital's 100th Anniversary, Transitioning to Comfortable, Economical, Environmentally Friendly Energy Services on Behalf of Customers

Mitsui Memorial Hospital faced a problem with outdated power facilities. To further enhance the hospital's health care services by increasing the use of IT in hospital administration and introducing the latest sophisticated medical equipment, additional power was needed. This was one reason the hospital decided to rebuild its facilities. Dr. Toru Mannen, who was honorary director at the time, said, "More than anything else, we felt it was important to improve the amenities for our patients." He noted, "For example, patients are taken to the operating room wearing only a single robe, so air conditioning is extremely important. To achieve both a stable energy supply and enhanced amenities, we needed to switch to an efficient system that did not waste energy."

To meet these needs, Tokyo Gas provided energy services with a good balance across all areas, including cost, environmental friendliness, and comfort. Yutaka Kobayashi, from the hospital's Construction Department, said, "With hospital administration costs increasing, we wanted to reduce energy costs as much as possible. That's why we focused on the energy services of Tokyo Gas." "Gas cogeneration systems are the most efficient, and have an extensive track record. What's more, they are environmentally friendly because they use waste heat. That's why we chose natural gas."

#### System Overview



#### Overview of New Energy Services

By combining the latest optimal systems, centered on gas cogeneration systems, high levels of cost savings and environmental friendliness are achieved. We work to offer the optimal mix, including forms of energy other than gas for use in emergencies. Now, the hospital can continue to provide health care services even in the event of a disaster.

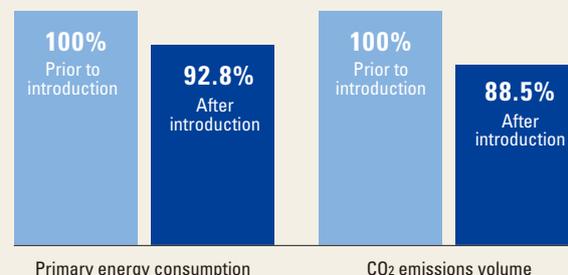


#### MITSUI MEMORIAL HOSPITAL

The Mitsui Memorial Hospital was established in 1906. This central hospital takes a comprehensive approach to the provision of health care services that meet community needs and are based on the patient's perspective.

In 2008, the first system was installed in the in-patient wing. This system will also supply electricity, cold water, and steam to the outpatient wing, which is scheduled for completion in 2010. This area-wide usage will further increase efficiency, and we anticipate substantial reductions in energy consumption and CO<sub>2</sub> emissions.

#### Effect of Introducing Energy System



## FEATURE 3

### DIALOGUE: TOKYO GAS AND THE TRANSITION TO A LOW-CARBON SOCIETY



**“ENE-FARM” residential fuel cell**  
This is a fuel cell cogeneration system that generates electricity from a chemical reaction between hydrogen, which is separated from city gas, and atmospheric oxygen. The waste heat from that process is used for hot water and indoor heating.

**Hidetoshi Nakagami, President of the Jyukankyo Research Institute Inc., which is active in energy and environmental issues, met with Tadaaki Maeda, Vice Chairman of Tokyo Gas. They discussed the importance of natural gas in an energy policy that targets the development of a low-carbon society and the role that Tokyo Gas will play in the years ahead.**

#### The Importance of Natural Gas

**“Japan needs to consider a comprehensive energy policy that includes a shift to natural gas.”**

**MAEDA** First, I would like to hear your thoughts about the role of natural gas in future energy policy.

**NAKAGAMI** This year, the Japanese government has revised the Basic Energy Plan, which outlines the overall direction of Japan’s energy policy. As you know, natural gas plays a key role in global warming countermeasures in Europe and the United States, but the position of natural gas in Japan has not been as clear in past years. Recently, however, there have been comprehensive deliberations on a wide range of topics, including energy security, and as a result, there is a renewed appreciation of the importance of a shift to natural gas.

**MAEDA** Nuclear power and renewable energy have been drawing a lot of attention as ways to control CO<sub>2</sub> emissions, but a shift to natural gas is still seen as the most realistic and effective policy. Even with just a simple shift in fuel from oil to natural gas, it is possible to cut CO<sub>2</sub> emissions

by about 25%. And in most cases, when the fuel is changed, high-efficiency equipment is installed at the same time, so reductions of up to 50% can be achieved. That’s why we’re seeing a rapid increase in the number of customers that want to switch to natural gas, especially large industrial companies.

**NAKAGAMI** Does Tokyo Gas have the infrastructure needed to handle that increase?

**MAEDA** Our pipeline network covers the Tokyo metropolitan area, so we are basically ready in Tokyo. But in the greater Kanto area, there are still some regions where natural gas isn’t used because of a lack of pipeline infrastructure. We consider it part of our mission to facilitate the use of natural gas in those areas.

The first step we are going to take in that direction is to build the Hitachi LNG Terminal and put in a pipeline to northern Kanto. Now we are moving ahead with the conversion to natural gas, principally in industrial areas. In outlying areas, meanwhile, we plan on making full use of trucks and coastal shipping to support growth in the use of natural gas.

#### Increasingly Sophisticated Use of Natural Gas

**“Technology can be used to resolve environmental problems without sacrificing comfortable lifestyles, with a focus on technologies that integrate cogeneration and renewable energy with natural gas.”**

**MAEDA** For many years, you have analyzed and offered opinions about environmental problems from the consumer’s point of view. What are your thoughts about energy saving and environmental problems in housing-related areas, your field of specialty?

**NAKAGAMI** In comparison with many other countries, Japan lags far behind in the use of heat in housing. Indoor heating is a good example. Overseas, central heating is a basic housing amenity, but in Japan individual room heating is still predominant. This is in contrast to hot water heating, which was centralized at a very early stage in Japan. Before a move to central heating got underway, the global warming problem became a focus of attention. Consequently, there was a point of view that we should reduce energy



**Hidetoshi Nakagami**  
President, Jyukankyo  
Research Institute Inc.

Founded Jyukankyo Research Institute in 1973. Is widely active in such fields as energy and global environmental issues as a leader in energy-related problems, especially in the field of housing. Member of a number of advisory councils. Serves as Chairperson, Energy Efficiency and Conservation Subcommittee, Advisory Committee for Natural Resources and Energy, Ministry of Economy, Trade and Industry. Professor, Tokyo Institute of Technology.

environmental problems. Moving forward, to improve environmental friendliness while simultaneously providing highly functional housing, we will need to make effective use of the heat that has been wasted at the point of power generation. And that role will likely be filled by fuel cells and other cogeneration systems. The rapid spread of those technologies should lead to the development of more comfortable lifestyles.

**MAEDA** Last year, we finally commercialized fuel cells for the residential market, and their use has begun to spread. At this point, they are only available for detached housing, but we are now moving ahead with the development of products for multiple dwelling units (MDUs).

**NAKAGAMI** There are numerous MDUs in the Tokyo Gas service area, aren't there? I understand that the installation of these units in MDUs poses some challenges, such as space limitations and restrictive installation conditions, but the next-generation model will resolve some of those issues, right?

**MAEDA** Yes. We are also working on the development of high-efficiency fuel cells, such as solid oxide fuel cells, and on systems incorporating renewable energy. That's a result of our growing understanding of the extremely high level of compatibility between renewable energy and city

usage volume before making qualitative improvements in indoor heating.

**MAEDA** Qualitative improvements in housing have almost become sacrifices, haven't they?

**NAKAGAMI** That's right. If more progress had been made in central heating, we could have realized healthier, more comfortable lifestyles, especially with the aging of society, and then discussed

gas appliances. With renewable energy, such as solar power generation and solar heating, output is unstable due to fluctuations in natural conditions, while city gas appliances can be counted on to work any time. Examples of that compatibility include double power generation, which combines fuel cells and solar power generation, and SOLAMO, where we combine solar-powered water heaters and high-efficiency, latent-heat-recovery water heaters.

**NAKAGAMI** The times are certainly changing, aren't they? Consumers want to live environmentally friendly lifestyles, but in many cases they don't really know how to do so. As such, it is very user friendly of Tokyo Gas to contact customers and offer them integrated systems. I believe customers want the Company to take the initiative in providing integrated energy services.

**MAEDA** Gas companies have the responsibility of providing city gas to their customers on a continual basis, and they have close ties to local communities. As a result, the customers in those communities trust the gas companies. I think we need to build on those relationships of trust. In addition to services, such as supplying gas, gas companies also need to foster the spread of new systems by meeting customer needs in our role as suppliers of gas appliances.

**Smart Energy Networks**  
"These issues extend beyond electricity; we need to build integrated networks that incorporate heat. And we need an open business model."

**MAEDA** In Europe and the United States, they are currently searching for ways to move toward smart energy networks, such as the use of smart grids. What are your thoughts about this trend?

**NAKAGAMI** I think the key points here are establishing information networks that can handle real time demand-side



**Tadaaki Maeda**  
Director, Vice Chairman,  
Tokyo Gas

Joined company in 1970. Has principally been in charge of technological and planning divisions. Became executive vice president in 2006, and assumed current position in April 2010.

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information and working to optimize the demand–supply balance as much as possible. That is true for Japan, too, where the supply-side systems are extremely precise, but, surprisingly, the systems can't handle demand-side information.

Generally, the United States has taken the lead in promoting the idea of smart grids, so these grids are often associated with electricity networks, but it is necessary to think about handling heat as well. In that sense, the term “smart energy network” is an extremely good way of thinking about this issue, and I hope it catches on. For example, the district heating and cooling system that we have seen today is really an extremely large heat network. If it is combined with other systems, there will be whole range of interesting possibilities.

**MAEDA** The majority of energy demand is accounted for by heat, so the idea of a smart energy network that fosters optimization, including not just electricity but also heat, is an idea whose time has come. For example, if renewable energy is introduced on a large scale and output fluctuation adjustments are handled just with conventional, centralized power generation, then facilities costs will expand and heat-related optimization won't be possible. For that reason, we are hearing calls for the “smart” control of heat and electricity through dispersed power sources, such as cogeneration, even in Europe and the United States.

In some urban areas, there are limited places where renewable energy is used, but if advances are made in heat networks that effectively utilize unused energy, such as waste heat from garbage incinerators and cogeneration

systems, it will be possible to make further substantial gains toward a low-carbon society. There is a need for policies coordinated with urban planning.

**NAKAGAMI** In the past, with energy supply systems, bigger meant more efficient. Now, however, when heat is used, overall energy efficiency can be raised by using combinations of smaller dispersed systems.

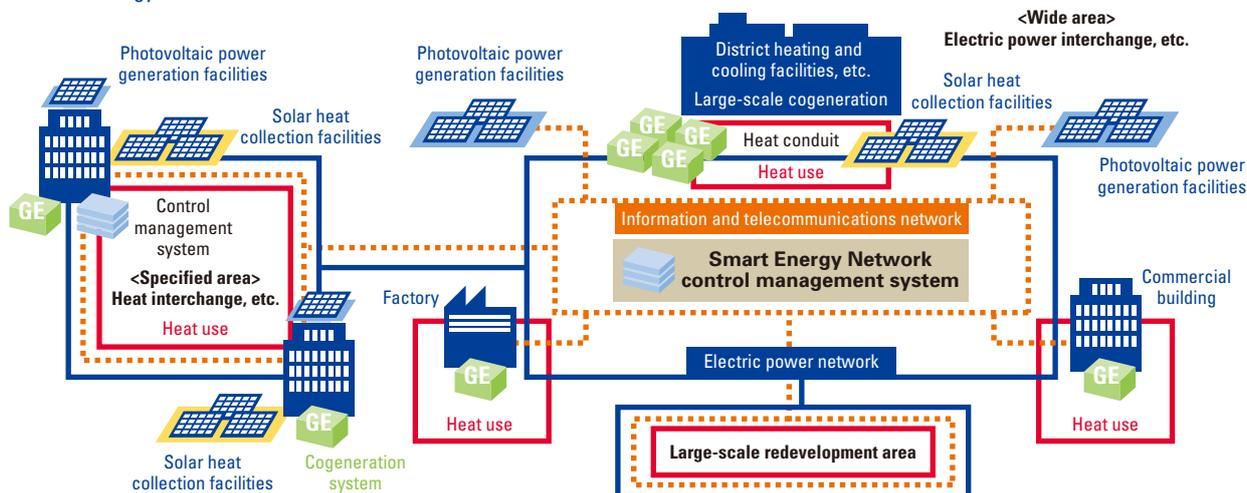
**MAEDA** Large redevelopment areas present real opportunities. A good example is Shinjuku, where a district heating and cooling system has been introduced. To make the most of these areas in the future, I think there is a need for a framework supporting the optimization of energy usage in that area. At that time, perhaps we will see the emergence of a new business model. For example, something like an energy network operator could handle overall coordination including electricity and heat, rather than having an electric power company handle everything on its own. Currently, we are working to deepen energy services, but in the future I would like the Company to try these new types of businesses.

#### Toward a Hydrogen Society

**“When we move beyond a low-carbon society and onto a hydrogen society, the effectiveness of natural gas will come into play to an even greater extent.”**

**MAEDA** From an extremely long-term perspective, looking beyond the low-carbon society, what do you think about the possibilities of hydrogen?

#### Smart Energy Network



**NAKAGAMI** Hydrogen is an extremely clean form of energy, but it also poses many challenges. Nonetheless, the technical challenges are likely to be overcome at some point, so I believe that hydrogen has strong potential over the long term.

The strengths of hydrogen can really be leveraged in fuel cells. It is true that there are some problems with supply infrastructure, but fuel cell cars are also amazing.

**MAEDA** In the Kanto region, we have more than 100 filling stations for compressed natural gas (CNG) vehicles. If the use of fuel cell cars expands to a certain extent, the conversion of these CNG filling stations to hydrogen filling stations would not be all that difficult.

**NAKAGAMI** You have a long-term road map, and you're making steady preparations, is that correct?

**MAEDA** Yes. For now, the most efficient way to produce hydrogen is from natural gas, and we have the technology to separate and collect CO<sub>2</sub> in an efficient manner. In other words, this is both hydrogen production technology and simultaneous CO<sub>2</sub> separation technology. By collecting and storing the CO<sub>2</sub>, it is possible to achieve zero emissions.

**NAKAGAMI** So this is technology that doesn't emit CO<sub>2</sub>? You should make sure that more people know about this.

**MAEDA** If we reach the point where hydrogen is used on a large scale in Japan, then hydrogen will be produced from natural gas at gas fields, and the CO<sub>2</sub> that is separated off in the production process will be sequestered back into the gas fields. At the same time, the pressure from the sequestration will further increase the efficiency with which natural gas can be extracted, so a virtuous cycle will be created, I believe.

**NAKAGAMI** That's quite interesting. If you are thinking about doing that, then upstream operations will be important, right?

**MAEDA** That's right. Upstream operations will be undertaken with the principal objective of bolstering the LNG



The Shinjuku District Heating and Cooling Center supplies indoor heating and cooling to the Shinjuku Shin-Toshin district. Condensing turbine / turbo chiller system with the world's largest capacity in a single unit.

value chain, and securing long-term stable supplies of natural gas. In addition, they will lead to many possibilities in the future.

### Expanding Overseas

**"There is a need to develop superior technologies in emerging countries as well."**

**MAEDA** Finally, Tokyo Gas would like to ask your advice.

**NAKAGAMI** I believe there is a need for frameworks for the introduction of systems like smart energy networks in emerging countries. Emerging countries are about to start building various networks, and if they use the most advanced technology, they will be able to build amazing networks that are not seen even in developed countries. Tokyo Gas has extremely innovative next-generation technologies, so I would like to see you provide know-how and human resources in this field.

**MAEDA** We are receiving requests from overseas for technical cooperation and investment. We would like to make contributions overseas as well in a variety of ways, not only in expanding the entire LNG value chain but also in fostering the spread of smart energy networks.

**NAKAGAMI** I look forward to seeing what you accomplish in the future.