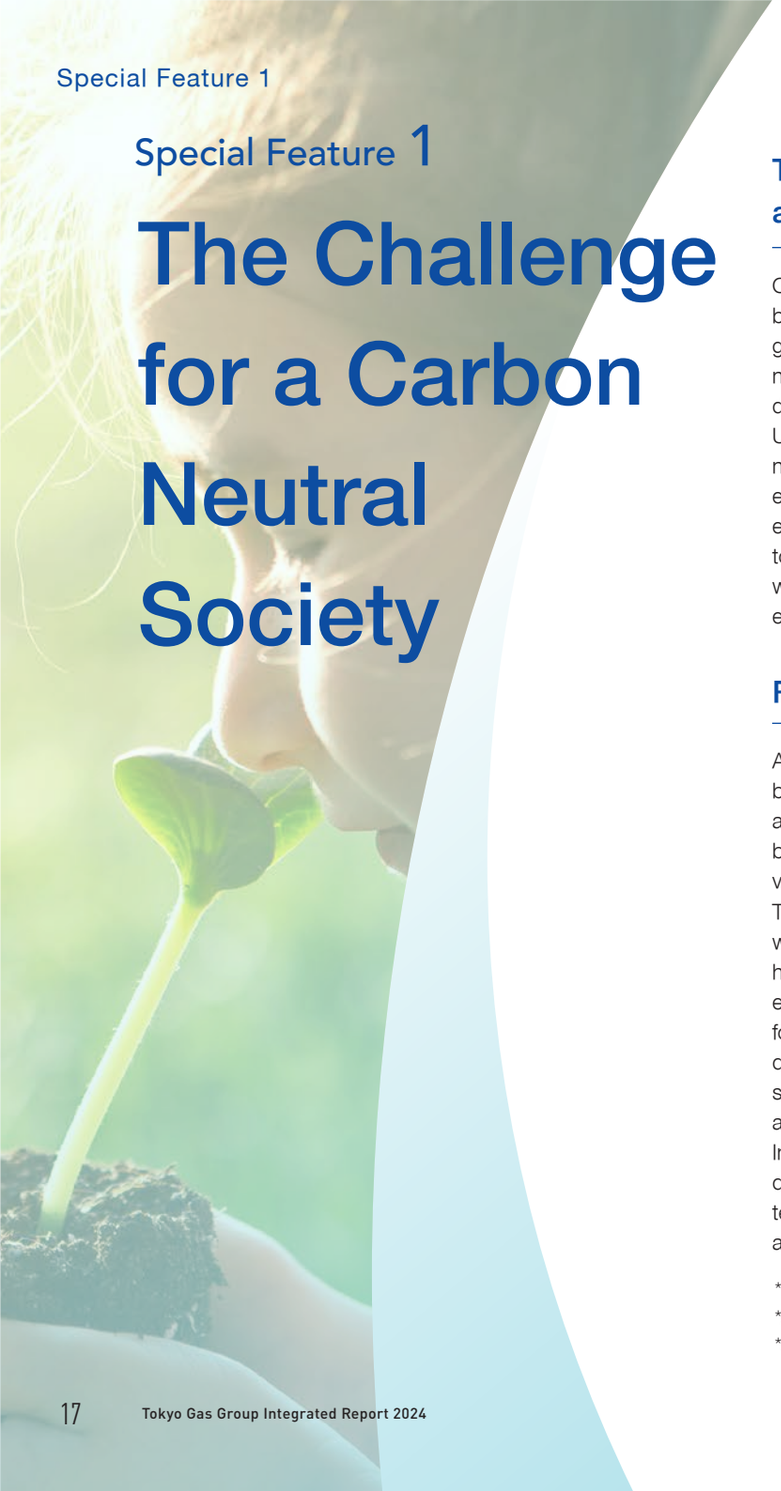
Special Feature 1

The Challenge for a Carbon Neutral Society



The Environment Surrounding Energy and the Role of the Tokyo Gas Group

Of late, the domestic and international energy situation has become uncertain and highly volatile due to heightened geopolitical risks. On the other hand, there continues to be no change in the importance of the trend toward decarbonization.

Under such circumstances, in Japan, which is an island nation with limited resources and where the flexible exchange and substitution of energy in times of crisis is not easy, we recognize that it is the responsibility of our group to achieve the decarbonization of the energy we provide while maintaining a stable energy supply in any business environment.

Responsible transition P. 21

As a group of energy companies that supports society, we believe it is important to achieve a responsible transition to a carbon neutral society without placing an excessive burden on society from perspectives including economic viability and supply stability.

Therefore, during the transition period toward the 2030s, we will make the most advanced use of natural gas, which has the lowest CO_2 emissions of all fossil fuels and is expected to be utilized as a balancing and supply power for the expansion of renewable energy introduction. By doing so, we aim to steadily reduce CO_2 emissions of society as a whole while securing earnings that will serve as a source of investment for decarbonization.

In parallel to this, we will actively work on the technological development for the social implementation of new technologies such as e-methane and hydrogen, while advancing the utilization of renewable energy.

A detailed roadmap for realizing a carbon-neutral society by 2050 P. 18

We set out the 'Carbon Neutrality Roadmap 2050' in March 2024 as a detailed pathway towards the achievement of net zero CO_2 emissions by 2050 as outlined in our group management vision 'Compass 2030'. This roadmap initially presents our vision for domestic energy supply. We have set a basic policy to lead a 'seamless transition to a carbon-neutral society' by taking 'three approaches' that build upon the responsible transition to Net-Zero CO_2.

Three Approaches

The perspective of the best mix: Decarbonize both gas and electricity

We will decarbonize gas and electricity supplied to customers while ensuring stable supply. We will decarbonize not only electricity, but also heating, which accounts for 60% of energy consumption.

The perspective of demand/supply sides: Partner with customers

Going beyond just measures on the supply side, by ensuring effective use of the distributed resources that are also introduced on the demand side, such as photovoltaic systems, storage batteries, and electric vehicles, we will aim for the optimum form of energy use along with our customers.

The perspective of real-world innovation deployment: Optimization of social benefits

We will work on innovation that includes hydrogen, e-methane, new renewable energy sources such as floating offshore wind power, BECCS*1, DACCS*2, and partnerships with startup companies. We will pursue real-world deployment of innovation that flexibly adapts to S+3E*3 needs, while maintaining different choices.

*1 Bioenergy with Carbon Capture and Storage

*2 Direct Air Capture with Carbon Storage

*3 S+3E is Japan's core energy policy to simultaneously achieve stable supply, economic efficiency, and environmental suitability on the overarching premise of maintaining safety.

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Carbon Neutrality Roadmap 2050

Tokyo Gas Group Carbon Neutrality Roadmap 2050
https://www.tokyo-gas.co.jp/en/IR/support/pdf/20240322-03e.pdf

As a detailed pathway toward net zero by 2050, in the field of gas we will seek to achieve 50% carbon neutrality by 2040 through sophisticated use of natural gas, reduction of GHG emissions across the supply chain, and, from 2030 onward, expanded use of e-methane. We will also fully harness innovation in DACCS/BECCS, turquoise hydrogen, etc. In the field of electricity, we will seek to achieve 50% carbon neutrality by 2040 through expanded use of renewables such as floating offshore wind power and, from 2030 onward, efforts such as switching to hydrogen as fuel for thermal power plants. We will completely achieve net-zero CO_2 emissions from thermal power generation in the 2040s, and work to further increase carbon neutrality. In addition to these efforts, we will undertake fuel switching and make maximum use of the latest available energy-saving technology to aim for a 60% reduction in CO_2 emissions by 2040, thus contributing to the achievement of Japan's reduction goal.

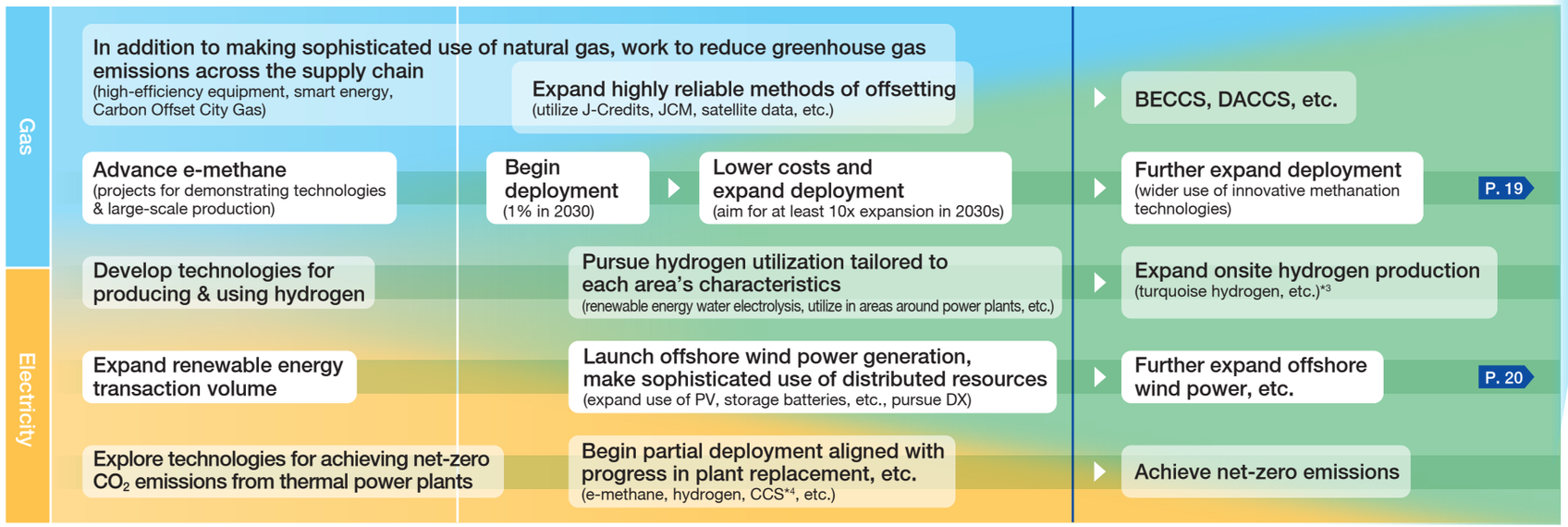
Accelerate Transition 2030 > Lead seamless transition to a carbon-neutral society **2040** > Realize a carbon-neutral society 2050

Vision*1

	2030	2040
CO_2 emissions (vs. FY2022)*2	20% reduction	60% reduction
Carbon neutrality in gas supplied domestically	Begin	50%
Carbon neutrality in electricity supplied domestically	30%	50%

*1 Through a process of revisions, the Roadmap will be evolved into a comprehensive plan covering both Japan and overseas.
*2 Greenhouse gas emissions of the entire supply chain (including upstream) associated with our supply of energy (gas & electricity) to domestic customers, in CO_2 equivalents.

Main actions



* 3 Hydrogen produced through pyrolysis of methane in city gas; this process breaks down methane into hydrogen and solid carbon and hence does not emit CO_2 * 4 Carbon Capture and Storage

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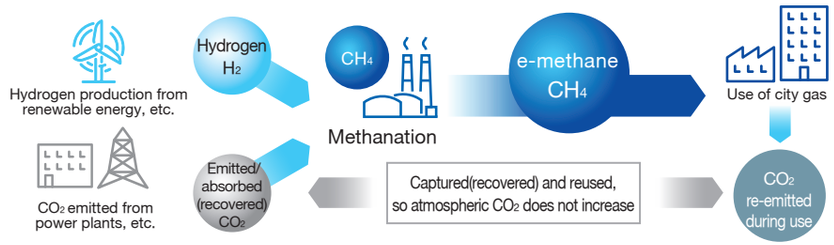
Decarbonization of Gas

e-methane

Methane (the main component of city gas) synthesized from hydrogen and CO_2 as raw materials using a technology called methanation, is called e-methane. The CO_2 emitted through the combustion of e-methane is offset by the CO_2 used in its synthesis, and therefore its use does not lead to a net increase in atmospheric CO_2. e-methane contributes greatly to the decarbonization of heat demand that accounts for 60% of the energy consumed in the residential and industrial sectors. e-methane has the advantage of being able to utilize existing infrastructure and technologies such as city gas pipelines and gas appliances, thereby reducing the additional social costs incurred in developing a carbon neutral society. We believe that it is the Tokyo Gas Group's responsibility and mission to achieve the decarbonization of gas utilizing existing infrastructure, facilities, and technologies.

CO_2 emission reduction effect with e-methane



Establishing a new supply chain for real-world deployment

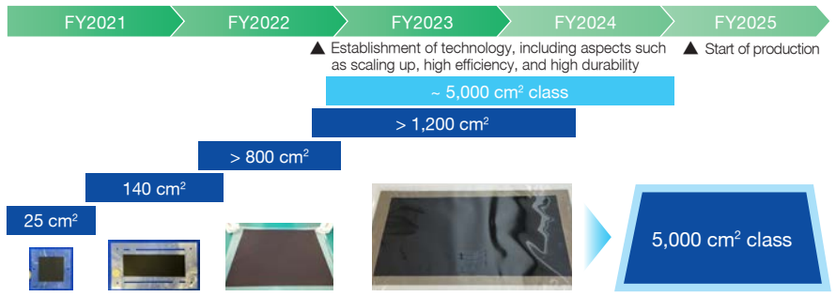
Since FY2021, we have been undertaking small-scale methanation pilot projects, and verifying models of domestic local production and consumption and innovative methanation technologies. In addition, we are promoting e-methane production projects overseas and building international supply chains to achieve our goal of deployment of e-methane at 1% of total city gas demand in 2030 and expand it thereafter. As the flagship project for building this supply chain, we are promoting the ReaCH4 Project in the United States which is being carried out by a Japanese-US consortium. We are also developingprojects in Southeast Asia, Australia, the Middle East, and other places in collaboration with local partners, and will continue to expand the procurement volumes and sources looking ahead to the future. By dispersing and diversifying our procurement areas for e-methane, we will strengthen our business model by securing a stable supply into the future, and fulfill our responsibilities as an energy supplier.

Technological and Systemic Challenges

Hydrogen production technology and cost reduction

To promote the widespread use of e-methane, it is essential to reduce the cost of hydrogen production, which is the raw material for e-methane. This requires reducing the cost of water electrolyzers. In 2021, Tokyo Gas started a joint development with SCREEN Holdings Co., Ltd., a company with expertise in manufacturing technology for CCM (catalyst coated membrane), an important component of PEM (proton exchange membrane) type water electrolyzers. In March 2023, the two companies established scale-up and high-speed mass production technology for CCM. We are considering offering this product to external customers and intend to generate revenue from this technology in the near future. Along with this, the development of innovative methanation technology that greatly improves efficiency by effectively utilizing the heat from the methanation reaction is underway with the support of the Green Innovation Fund. We aim to achieve highly efficient and low-cost production of e-methane by leveraging the technologies and intellectual property we have accumulated in the development of hydrogen and fuel cells.

Transition to scaled-up CCM



Establishing a certification system

In order to deliver e-methane that is produced overseas to customers in Japan as a “zero-emissions” fuel, it is important to establish an international CO_2 accounting system. In addition, as e-methane gets mixed with existing LNG in the process of being distributed, a certification system needs to be established to discriminate between e-methane and LNG and certifies the environmental attributes. To establish these systems, in addition to discussing and collaborating with relevant government ministries and agencies, we will actively work to create international rules by collaborating between private companies such as the e-NG Coalition (an international alliance that aims to expand the global use of e-methane), of which Tokyo Gas participated as a founding member.

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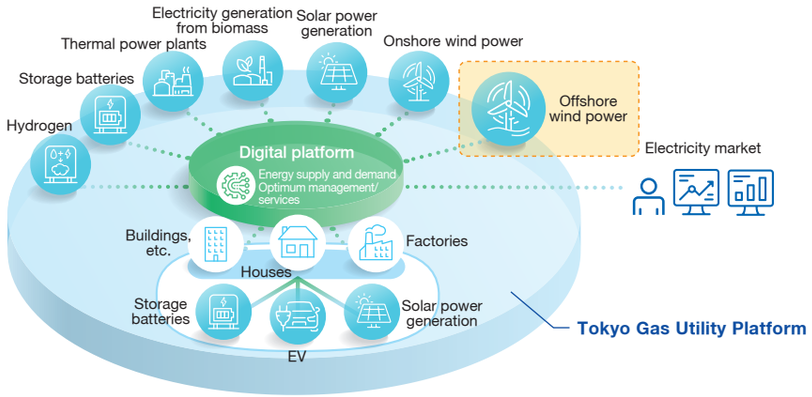
Decarbonization of Electricity

Offshore wind power generation

Our core competence lies in our ability to manage the entire process from LNG procurement to delivering energy solutions to our customers. This capability is underpinned by the trust we have earned from our customers over our 130-year history as a gas utility company.
We are proactively contributing to the decarbonization of energy through various renewable energy initiatives, including development, asset acquisition, operation, and providing/obtaining PPAs, all of which will lead to a stable supply of green power and create our unique renewable energy value chain.
Among renewable power sources in Japan, floating offshore wind power holds significant potential due to the country's limited shallow water areas. It is expected to become a crucial energy resource for achieving carbon neutrality by 2050.

Our Vision through the Renewable Energy Expansion

Value for society: We are committed to building a digital trading platform in the power sector that optimally manages and operates a diverse range of energy assets, including those of our own, and others including our customers.
Through this platform, we aim to leverage assets across the entire energy value chain to provide a stable, environmentally responsible, and flexible energy supply, as well as to provide Non-fossil fuel benefits generated from renewable energy sources.
Value for customers: To meet the growing and diverse renewable energy needs of our customers, we offer multiple decarbonization options, including renewable energy sources, gaseous energy, and non-fossil fuel values.



Initiatives for Commercialization of Floating Offshore Wind

WindFloat - a bankable floating foundation technology

In May 2020, we invested in Principle Power, Inc., a company renowned for its floating foundation proven technology with a world-leading track-record, and became one of its three major shareholders.

R&D for low-cost mass production of floating foundations in Japan

Under the NEDO's "Cost Reductions of Offshore Wind Power Generation (Phase 1)" R&D program in 2022, we have conducted a research and development project aimed for optimal design tailored to Japan's meteorological and oceanographic conditions, reducing costs and establishment of mass production methods based on the WindFloat technology. Furthermore, in March 2024, we established the Floating Offshore Wind Technology Research Association (FLOWRA) to collaborate with members on research and development of common foundational technology and to address cost and risk reduction for floating systems.

Participation in one of the world's few operational floating offshore wind power farms

In August 2024, Tokyo Gas agreed to participate in the WindFloat Atlantic project. Through our involvement in this project, we endeavor to accumulate expertise through operational experience in floating offshore wind power, with a specific emphasis on acquiring advanced O&M techniques that leverage digital and next-generation technology.

Provided by Ocean Winds, and Principle Power.

Proactive investment in overseas offshore wind power

In October 2023, Tokyo Gas made a commitment as a cornerstone investor, contributing 220 million euros, to the Fund established by Octopus in UK to invest in multiple operational offshore wind power assets in Europe. Octopus is a rapidly growing company with a leading customer base in the UK, driven by its innovative digital technology, and it has also made significant investments in renewable energy assets exceeding 3 million kilowatts. Tokyo Gas aims to learn from Octopus Energy's successful business model at various levels through our alliance, while striving to be at the forefront in Japan by building a unique value chain by leveraging digital platform services.

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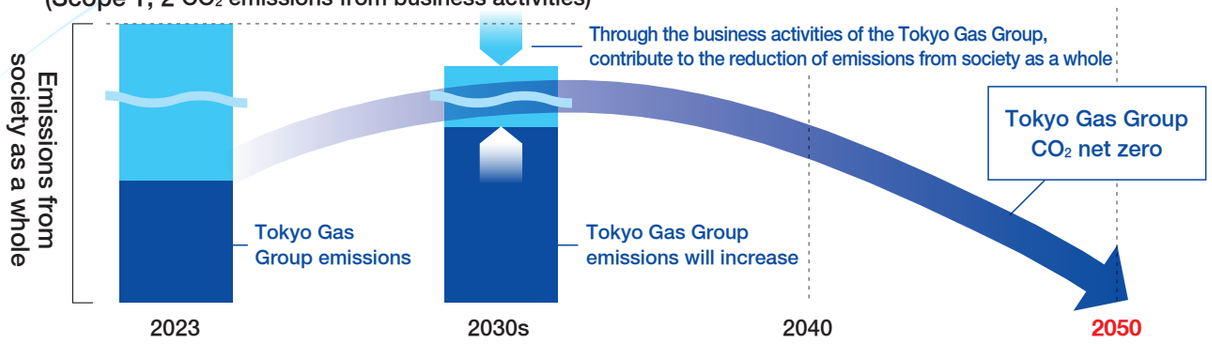
To achieve a responsible transition towards the 2030s

Increase to Decrease

Towards the 2030s, we will thoroughly shift to and make advanced use of low-carbon natural gas as a way to achieve a responsible transition.
In specific terms, we promote the introduction of latest, high-efficiency LNG thermal power generation and the switch to natural gas, which is lower in carbon compared to other fossil fuels. By advancing sophisticated use of natural gas, we will reduce CO_2 emissions at our customers' sites. As a result, while the CO_2 emissions from the Tokyo Gas Group's business activities will increase (Scope 1, 2), we will contribute to a reduction in CO_2 emissions at customer sites, and, by extension, society as a whole.

Relation between the emissions from the Tokyo Gas Group and society as a whole (Scope 1, 2 CO_2 emissions from business activities)



Toward net-zero CO_2 from our activities

As one of the efforts to minimize the increase in CO_2 emissions, we aim to achieve net-zero CO_2 emissions from our own activities, including our office buildings, city gas production facilities, city gas supply facilities, and company vehicles, by the FY2030. In the FY2023, we have achieved a 31% reduction in net CO_2 emissions from our own activities compared to the FY2020.


Hitachi LNG terminal

Implementation status of initiatives for net-zero CO_2 from our activities (as of August 2024)

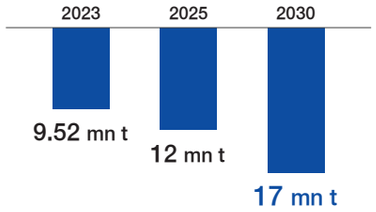
Buildings, etc. we use		City gas manufacturing facilities	Company vehicles
Tokyo Gas Head Office	Other buildings we use	Hitachi LNG Terminal & Ogishima LNG Terminal	Some of Tokyo Gas Network Co., Ltd. and Sodegaura LNG Terminal's corporate vehicles
●100% offsetting of CO_2 emissions of electricity powering the head office through the use of non-fossil fuel certificates (electricity), carbon-neutral city gas (gas), and J-Credits (heat supply from district heating and cooling services) ●Receiving electricity through off-site corporate PPA	Offsetting of CO_2 emissions of electricity powering some of the buildings owned by Tokyo Gas Real Estate Co., Ltd. through the use of non-fossil fuel certificates (electricity)	Offsetting of CO_2 emissions of electricity powering the terminals through the use of non-fossil fuel certificates (grid power only)	Introduction of EV chargers and charge management system using Charge Planner, a service supporting the adoption of EVs by corporations and local governments

Initiatives for net-zero CO_2 from our activities
https://www.tokyo-gas.co.jp/sustainability/activities/inhouseemissions.html?wovn=en

Contributing to overall CO_2 reductions from society

Given the difficulty in working out the level of contribution of the Tokyo Gas Group toward decarbonization by looking only at CO_2 emission reductions in our business activities, we utilize 'CO_2 reduction contribution' as an indicator for our contribution to reducing the CO_2 emissions from society as a whole.
We measure our contribution to CO_2 emission reductions across society as a whole through the effects of fuel switching to low-carbon natural gas compared to other fossil fuels, the introduction of high-efficiency equipment, and the adoption of renewable energy.
We have set a target of 17 million tons of CO_2 reduction contribution by 2030 across our global business activities and are actively working towards this goal.

CO_2 reduction contribution results/ targets in the transition period (vs. FY2013)



Breakdown of the 17 mn ton target for 2030

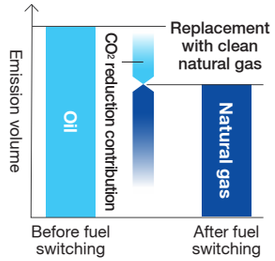
Category		Main actions
Low carbonization field 65%	25%	Fuel switching
	15%	High-efficiency equipment, etc.
	25%	Introduction of high-efficiency LNG-fired power generation
Decarbonization field 35%	15%	Introduction of renewable energy/new energy, etc.
	20%	Utilization of nonfossil fuel certificates, etc.

* We have taken advice from a third party in the form of DNV BUSINESS ASSURANCE JAPAN K.K. in order to increase reliability and transparency in our calculation of emission reduction contributions.

Concept and calculation method of reduction contribution

■CO_2 emissions of society as a whole ■CO_2 emissions by the Tokyo Gas Group

Fuel switching | Low carbonization field

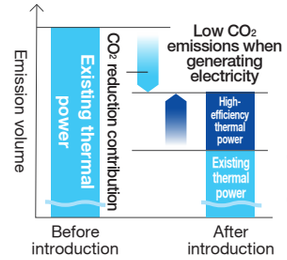


Perspective on reduction effects
Reduce CO_2 emissions by shutting down facilities that use coal and oil and replacing them with facilities that use natural gas and emit relatively low CO_2

Calculation method
Development volume × CO_2 emission factor difference

Baseline
Fuel before conversion such as heavy oil

Introduction of high-efficiency LNG-fired power generation | Low carbonization field

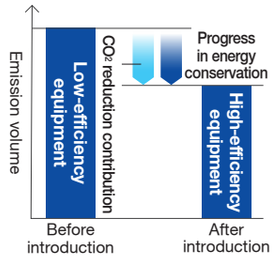


Perspective on reduction effects
Reduce CO_2 emissions by increasing the amount of power generated by high-efficiency LNG-fired power plants and reducing the amount of power generated by existing thermal power plants that emit relatively large amounts of CO_2

Calculation method
Power generation × difference in CO_2 emission factor from thermal power average

Baseline
Average thermal power generation

High-efficiency equipment | Low carbonization field

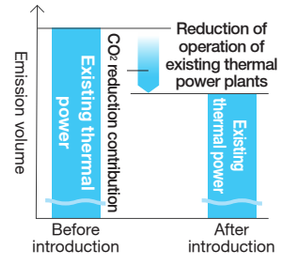


Perspective on reduction effects
Reduce CO_2 emissions by upgrading low-efficiency natural gas equipment to high-efficiency equipment

Calculation method
Number of units introduced x reduction per unit

Baseline
Conventional-performance gas appliances

Expanded introduction of renewable energy | Decarbonization field



Perspective on reduction effects
Reduce CO_2 emissions by increasing the amount of power generated by renewable energy that does not emit CO_2 and reducing the amount of power generated existing thermal power plants

Calculation method
Power generation x thermal power average coefficient

Baseline
Average thermal power generation

*The Tokyo Gas Group's CO_2 emissions remain unchanged

Example of the introduction of high-efficiency equipment: ENE-FARM

Example of the introduction of renewable energy: Ichikai Solar Power Plant