Technology and Product Development

Technical Development for Promoting Carbon Neutrality

Toho Gas Group contributes to achieving a sustainable society including carbon neutrality by developing technologies to address the diverse needs and challenges facing customer's lives, businesses, and local communities.

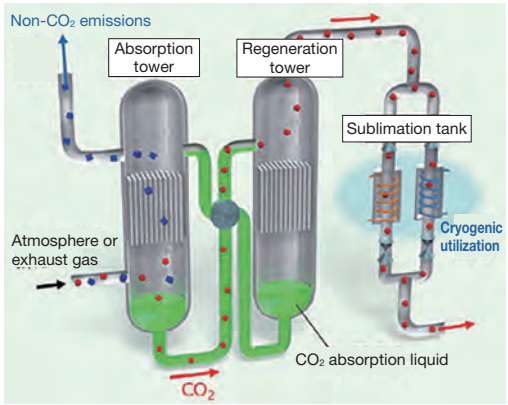
Development of technology to separate and capture CO_2 from the atmosphere using cold energy

We are working to develop CO_2 Direct Air Capture (DAC) technology as part of a moonshot project subsidized by the Japanese government aiming for widespread use of commercial-scale plants by 2050.

Cryo-DAC® technology utilizes unused cold energy from LNG to sublimate CO_2 (converting it into dry ice), thereby drastically reducing the thermal load required for CO_2 regeneration.

Development of technology to separate and capture CO_2 from exhaust gas using cold energy

The development goal of the government project subsidized by a Green Innovation Fund is to drastically reduce CO_2 capture costs, and we are working to meet that goal by developing technology known as Cryo-Capture® to separate and capture CO_2 from exhaust gas utilizing unused cold energy from LNG. This technology will be deployed at an LNG base in the pilot demonstration phase, which is expected to begin in FY2028. A series of carbon recycling tests will be performed, in which captured CO_2 is reacted with hydrogen produced through water electrolysis and other technology to produce e-methane at a methanation facility, which will then be used as a feedstock for city gas.



Development of CO_2 separation and capture technology using cold energy

Enhancing performance and lowering costs of separation and capture technology

We have built a demonstration facility consisting of membrane separation and physical adsorption methods within our Technical Research Institute, and we are using this facility to conduct performance evaluations of CO_2 concentrations, capture volume, energy consumption, and other characteristics, with the aim of improving performance and lowering costs.

CO_2 separation and capture demonstration facilities
(Membrane separation and physical adsorption methods)

- Search for new materials (membrane and adsorbents) that can achieve high CO_2 concentrations and large capture volumes, install them in demonstration facilities, evaluate the results, and make improvements
- Optimize using simulation technology

Development of hydrogen burners

We are also working to develop technologies using hydrogen as a fuel in industrial furnaces, which are essential for manufacture. To solve technical issues such as backfire and other combustion instabilities, increased NOx emissions, and hydrogen leakage, we are working to make improvements to city gas burners and evaluate solenoid valves, check valves, and other auxiliary equipment for use with hydrogen.

We have already successfully commercialized several hybrid burners for city gas and hydrogen, and plan to continue expanding our lineup in the future. We use test furnaces and customers' actual furnaces to evaluate the heating time, the impact on product quality, and other factors when using hydrogen.

City gas

Hydrogen

Demonstration of hydrogen co-combustion cogeneration system

We are developing city gas-hydrogen co-combustion engine technology to contribute to low-carbon and decarbonized electric power generation. Co-combustion tests using actual gas engines and simulation models will help solve issues during hydrogen co-combustion, such as controlling abnormal combustion and reducing NOx emissions, and we are promoting the future application of this technology to gas engine co-generation.

Technology and Product Development

Opened CaN-Lab information dissemination facility

We opened an information dissemination facility as part of our efforts to develop technology for achieving carbon neutrality.

The name “CaN-Lab” stands for “Carbon Neutral Laboratory” and also conveys the message of “can,” indicating possibility and capability.

By informing our industrial customers and local governments about our technology, we are working to make it possible to achieve carbon neutrality together.

CaN-Lab informationdissemination facility

Developing Products to Enrich Lives

Commercialization of Trans-Warming® L Mat for thermal protection

Toho Gas commercialized the Trans-Warming® L Mat, a thermal protection mat that uses latent heat storage material developed in-house to repeatedly store and dissipate heat. This foot warming mat uses a solar collector to store heat from sunlight, and then the metal strips built into the mat are warped to radiate the accumulated heat. The mat can retain heat all night long, making it ideal for thermal protection for outdoor activities or disaster preparedness.

Thermal protection mat (storing heat from sunlight)

Commercialization of a bathroom heater/dryer that inhibits mold growth

In an effort to find an effective means to inhibit mold growth in the home, we verified that the high-temperature, high-humidity environment of a mist sauna can inhibit mold, and we correlated the growth of mold in bathrooms with temperature, humidity, and exposure time. Using this knowledge, and together with Rinnai Corporation, we developed a mold-prevention technology (Mold Guard Mist) to inhibit the growth of mold in the bathroom by simply operating this function once every two weeks. We have successfully commercialized a bathroom heater/dryer with mist sauna that incorporates this function.

Business Support Using Technology Solutions

Business support services using chemical analysis technology

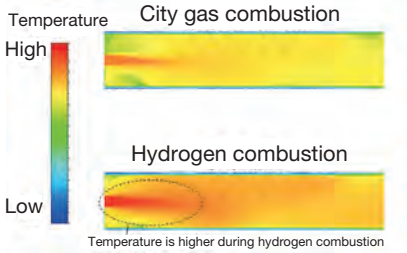
We utilize chemical analysis technology to ensure safe and stable supply of city gas and to develop technologies that contribute to carbon neutrality. We also offer analytical services using this technology to our customers.

As part of our efforts to increase the reliability of analysis of hydrogen gas produced in-house, we received ISO/IEC 17025 certification, the international standard for the ability to produce reliable measurement results.

Chemical analysis work

Business support services using simulation technology

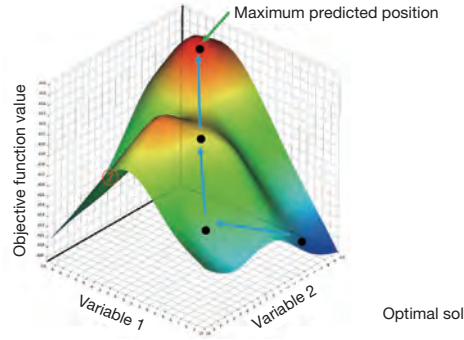
We use simulation technology to ensure safe and stable supply of city gas, to promote new business, and to support our customers’ efforts to achieve carbon neutrality. We conduct heating performance pre-evaluations and propose facility improvements when switching fuel from city gas to hydrogen in industrial furnaces, and we perform performance evaluations and improvements for city gas production and supply facilities.



Temperature distribution comparison during combustion of city gas and hydrogen

Business support services using digital technology

To provide new services to our customers and promote more efficient and sophisticated operations, we are working to utilize the latest data analysis technologies, including big data analysis of energy usage data and energy demand forecasting using machine learning. By fusing these digital technologies with our long-standing expertise in energy-related equipment, we are developing operation schedules for air conditioning units and power generation facilities that minimize CO_2 emissions to the lowest possible level.



Optimal solution mapping