

**Commercialization of the heat protective outdoor distribution board COOL Distribution Board and its first application decided**  
**SPACECOOL, a zero-power radiative sky cooling material, contributes to energy conservation.**

August 4, 2022  
Seiritsu Industry Co.,Ltd  
SPACECOOL Inc.  
Takenaka Corporation  
Osaka Gas Co., Ltd.

Seiritsu Industry Co.,Ltd (hereinafter, "Seiritsu Industry"), SPACECOOL Inc. (hereinafter, "SPACECOOL"), Takenaka Corporation (hereinafter, "Takenaka") and Osaka Gas Co., Ltd. (hereinafter "Osaka Gas") have decided to commercialize the heat protective outdoor distribution board COOL Distribution Board, which suppresses temperature rise inside the board by attaching the zero-power radiative sky cooling material SPACECOOL to the surfaces of the board. Also, it has been decided that the COOL Distribution Board will be used at a new building under construction by Takenaka as the product's first application project. In the future, we will pave the way for wider use of it as a measure for energy conservation and heat protection.

The radiative sky cooling material SPACECOOL, developed by Osaka Gas, is designed to cool down in direct sunlight to a lower temperature than the ambient temperature without using energy by reflecting sunlight and allowing heat to escape to space by the principle of radiative cooling.\*<sup>1</sup> The COOL Distribution Board is a heat protective outdoor distribution board that has the cooling material formed into a film attached to its surfaces. Suppressing temperature rise in the board, it is expected to extend the service life of electronic devices and reduce the power consumed by air conditioners used to cool them, thereby providing energy conservation benefits.

A distribution board is a device that distributes power to various circuits; at the same time, it contains a ground-fault circuit breaker and other components to serve as a safety device for the safe use of electricity.

Electronic devices contained in distribution boards are sensitive to heat. High temperatures inside the board can affect their functionality and service life. For this reason, conventional outdoor distribution boards take measures such as using cooling equipment in the board to prevent the temperature inside the board from exceeding a certain level.

In recent years, the risk of failure of outdoor equipment has increased due to the effects of global warming, and heat protection measures are called for more than ever.

The four companies began to verify the effects of the COOL Distribution Board in August 2021 through a demonstration experiment.\*<sup>2</sup> The experiment has proven that SPACECOOL attached to the surfaces of the board is effective in lowering the temperature inside the board by up to about 10 degrees.\*<sup>3</sup>

The four companies have decided to commercialize the COOL Distribution Board. Seiritsu Industry will manufacture and sell it as an outdoor distribution board for a wide range of customers in the commercial and industrial sectors. Moreover, Takenaka aims for wider use of the COOL Distribution Board with the facilities it constructs. Furthermore, with the aim of furthering energy conservation and peak shaving\*<sup>4</sup>, it

will also consider deploying SPACECOOL products in applications other than distribution boards jointly with SPACECOOL.

The four companies will help build a sustainable, low-carbon society through the spread of the COOL Distribution Board.

- \*1: This has been achieved by using Osaka Gas's proprietary optical control technology to develop a material design that reduces the solar heat input and increases heat dissipation through thermal radiation (a phenomenon in which the heat of a heated object is transferred as electromagnetic waves). By controlling the wavelength of thermal radiation to 8–13 μm, at which the atmospheric transmittance is high, thermal radiation is not absorbed by the atmosphere and is dissipated into space, which has a temperature of –270°C.
- \*2: Announced on August 26, 2021. “Demonstration Test Using SPACECOOL® Radiative Sky Cooling Material Begins at Yumeshima Expo Venue—Evaluating Energy Efficiency, Comfort, Etc. in Collaboration with Various Companies—” (<https://www.spacecool.jp/en/news/demonstration-test-using-spacecool-radiative-sky-cooling-material-begins-at-yumeshima-expo-venue-evaluating-energy-efficiency-comfort-etc-in-collaboration-with-various-companies/>)
- \*3: The temperature was measured at Osaka Gas Energy Technology Laboratories in Konohana-ku, Osaka. Distribution boards with SPACECOOL attached to the surface were compared with those without it with respect to the temperature inside the board. The measurement results revealed a maximum temperature difference of about 10°C.
- \*4: Peak shaving refers to reducing electricity usage during peak hours.

## 1. Heat protective outdoor distribution board COOL Distribution Board

The COOL Distribution Board is a distribution board that suppresses the temperature rise inside the board by using the radiative sky cooling material SPACECOOL®. The demonstration test showed the temperature inside the board to be lower than that in conventional boards by a maximum of about 10°C. It helps build a sustainable society by extending the service life of the board while reducing the power consumed by the board.



### Three features of COOL Distribution Board



#### Long service life

Prevents heat damage to internal equipment for reduced maintenance costs



#### Reduced power consumption

Reduced maintenance work and costs for cooling equipment



#### Space saving

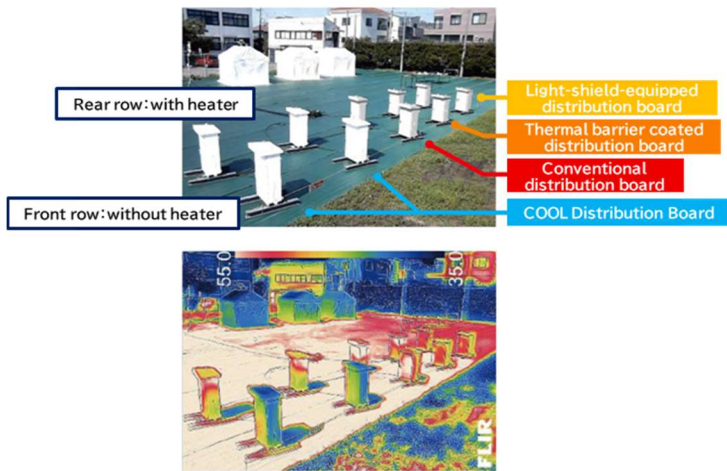
Requires no cooling equipment and provides more space in the board

## 2. Effectiveness in suppressing temperature rise inside the COOL Distribution Board

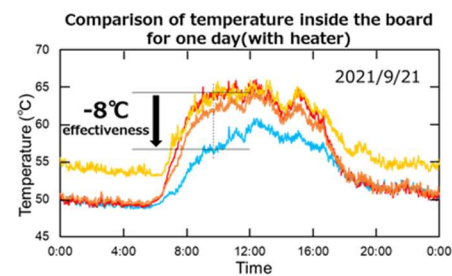
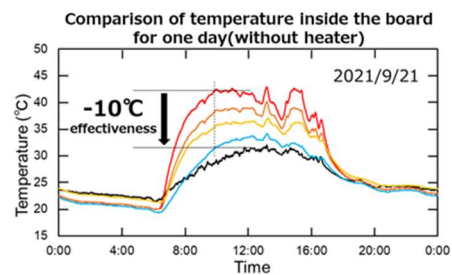
In a demonstration test, rows of COOL Distribution Boards, conventional distribution boards, thermal barrier coated distribution boards, and light-shield-equipped distribution boards were installed outdoors, and the temperature inside each board was measured. A total of 10 units were lined up and compared. One row consisted of five distribution boards equipped with a heater simulating the presence of electronic devices with exothermic bodies in the board; the other consisted of five distribution boards without a heater (each row comprising two COOL Distribution Boards and one each from the other types of distribution boards).

The results of the demonstration test on the distribution boards without a heater inside revealed the effectiveness of the COOL distribution board in suppressing temperature rise by a maximum of about 10°C compared with the conventional distribution boards. The distribution boards with an internal heater were observed to demonstrate the effectiveness of the COOL distribution board up to about 8°C. In comparison with the distribution boards provided with common heat mitigation measures, such as a thermal barrier coating and light shield, the COOL Distribution Board proved itself to be more effective in suppressing temperature rise.

Distribution boards occasionally contain inverters, storage batteries, and power conditioners. These electronic devices deteriorate generally faster with increasing operating ambient temperature. For example, capacitors installed in various electronic devices are known to deteriorate twice as fast when the operating temperature increases by 10°C (Arrhenius equation: reaction rate doubles for every 10°C increase). Thus, the application of the radiative sky cooling material to outdoor distribution boards is expected to lead to longer life and improved reliability (reduced failure rate) of electronic devices inside the board.



A view of the demonstration experiment and its thermogram



— Outside temperature — COOL Distribution Board — Conventional distribution board  
 — Thermal barrier coated distribution board — Light-shield-equipped distribution board

## 3. Company Profiles

### ■ Seiritsu Industry Co.,Ltd

Founded	August 1973
Representative	Toru Ueki, President and Representative Director
Head Office	4-7-45 Kamishogakuji, Hirano-ku, Osaka
Main business	Manufacture, sale and on-site installation of distribution boards and central monitoring systems, etc.

■ SPACECOOL Inc.

Founded	April 2021
Representative	Takayuki Hoshuyama, CEO
Head Office	In ARCH, 4F, Toranomom Hills Business Tower, 1-17-1 Toranomom, Minato-ku, Tokyo
Main business	Sales and consultation services related to energy conservation; sales and consultation services of products to improve the environment

■ Takenaka Corporation

Founded	1899
Representative	Masato Sasaki, President
Head Office	4-1-13 Hommachi, Chuo-ku, Osaka
Main business	Contracting, designing and supervision of construction work, civil engineering work, etc.

■ Osaka Gas Co., Ltd.

Founded	April 1897
Representative	Masataka Fujiwara, Representative Director and President
Head Office	4-1-2 Hiranomachi, Chuo-ku, Osaka, Japan
Main business	Production and sale of gas; generation and sale of electricity, etc.