June 22, 2010

Commercial Solar Air Conditioning System on Sale

One-stop Shopping from System Orders through Energy Services

Tokyo Gas Co., Ltd.
Energy Advance Co., Ltd.

Tokyo Gas Co., Ltd. (President: Tsuyoshi Okamoto; hereafter "Tokyo Gas") and its wholly owned subsidiary Energy Advance Co., Ltd. (President: Sentaro Miura; hereafter "ENAC") will begin sales of a solar cooling system – a commercial air conditioning system which makes use of solar heat – to office buildings, schools, hospitals and other commercial customers within the Tokyo Gas service area from this August.

The solar cooling system passes the solar heat gathered in heat collectors through a solar absorption chiller heater[*1] specially designed to utilize solar heat to deliver cool air in the summer and hot air in the winter.

Tokyo Gas and ENAC have developed this original solar cooling system which features the solar absorption chiller heater, a specially built control panel, and vacuum glass tube heat collectors which efficiently collect high-temperature solar heat. The system does not include any heat storage tanks, which cause dissipation heat loss. This solar cooling system can cover approximately 20% of the energy required for air conditioning. It reduces annual primary energy consumption on air conditioning by approximately 24% and cuts CO2 emissions by about 21% (about 34 tons)[*2] compared with conventional gas air conditioning systems that do not incorporate solar heat, in the case of a 3-4 story building with a total floor space of 4,000m^2. Tokyo Gas and ENAC will conduct turnkey sales including system design, construction and maintenance services to accelerate the wider adoption of this solar cooling system, and have reduced installation and construction costs through standardized design, construction and control methods, beginning with model selection. ENAC will also offer the option of energy services that require no initial investment by the customer. Under this format, ENAC will retain ownership of the facilities and receive energy service fees from the customer. ENAC will begin providing energy service business estimates from this August, and system order estimates from this October.

Tokyo Gas and ENAC are contributing to the realization of a low-carbon society by providing one-stop shopping for solar cooling systems to customers who have great concern for the environment.

*1. The solar absorption chiller heater models were developed by the three manufacturers Kawasaki Thermal Engineering Co., Ltd., Sanyo Electric Co., Ltd. and Hitachi Appliances, Inc. together with the three city gas companies Tokyo Gas Co., Ltd., Osaka Gas Co., Ltd. and Toho Gas Ltd.

*2. Trial calculations for a 4,000m^2 tenant building using the solar absorption chiller with a 240m^2 solar heat collector, versus a conventional gas absorption chiller (COP 1.0, higher heating value standard). The actual energy conservation and CO2 emissions reductions may vary depending on the area of the solar heat collector and the customer air conditioning load.

[Reference]

1. Solar Cooling System Introduction Background

Residential and commercial final energy consumption is on the rise, despite strong demands for reductions in CO2 emissions to counter global warming. There are high expectations for the establishment and spread of technologies for the use of renewable energies in residential and commercial buildings, as one countermeasure.

Tokyo Gas developed the solar absorption chiller heater and dedicated solar cooling system control panel based on the results of the solar cooling system demonstration project which the Company conducted at the Nakahara Building and the Kumagaya Building in 2009. Tokyo Gas also selected the optimal heat collectors, pumps and other ancillary equipment, designed the system using these components, and independently developed construction and maintenance methods.

2. System Characteristics

(1) Solar Absorption Chiller

The system incorporates a solar absorption chiller specially designed to efficiently utilize solar heat for air cooling. The solar absorption chiller is expected to increase the use of heat during air cooling by 5% to 10% compared with generic systems*[3] which use waste heat from cogeneration systems.

(2) High-efficiency Vacuum Glass Tube Heat Collectors

When solar absorption chillers use solar heat for air cooling, the temperature of the solar hot water must be higher than that when solar hot water is used for residential and commercial hot water supply. Tokyo Gas and ENAC focused on vacuum glass tube heat collectors which can efficiently produce high temperature hot water, and adopted heat collectors using German technologies that have been proven in Europe and are both efficient and cost-effective. These heat collectors have an efficiency of 53%[*4] which is at the top global level.[*5]

(3) Solar Cooling System Control Panel for Energy Conservation

Tokyo Gas developed a dedicated control panel for the solar cooling system. This control panel monitors the sunlight and solar absorption chiller heater conditions, and realizes reductions in conveyance power through a control method which only operates the heat collection pump when the temperature is sufficient for use by the solar absorption chiller heater. The control panel can control not only air conditioning, but also diverse other functions including hot water supply and the combination of solar heat with the use of waste heat from cogeneration systems.

(4) Engineering Technologies for System Optimization

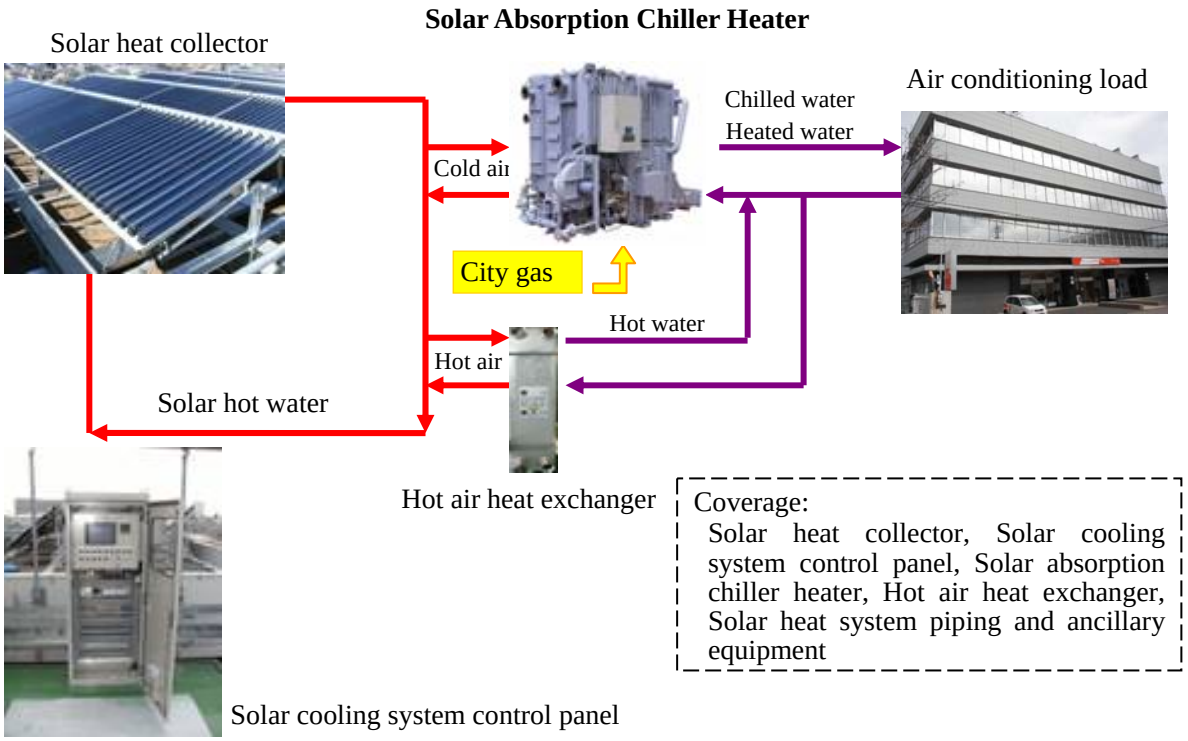
The following engineering technologies are applied to maximize the use of solar heat.

1) The system utilizes collected heat all through the year, and does not incorporate any heat storage tanks, which cause dissipation heat loss.
2) The optimal heat collector installation methods (inclination angle, alignment, etc.) have been selected considering heat collection performance and installation costs.
3) The solar hot water flow volume and number of connections to the heat collectors have been optimized based on piping construction costs, heat collector internal pressure loss, the differential from the temperature that can be used in the solar absorption chiller heater, and other conditions.

4) The piping circuit has been constructed to ensure uniform flow of solar hot water to all the heat collectors.
5) Long-term stable system operations have been ensured by preventing erosion through the use of a closed circuit for the piping system which circulates between the heat collectors and the solar absorption chiller heater.

*5. Commercial systems using gas absorption chiller heaters designed for the use of cogeneration system waste heat.
*6. With 1000W/m^2 of sunlight, a hot water temperature of 75ºC, and an ambient air temperature of 30ºC, according to the manufacturer.
*7. Tokyo Gas survey

3. Solar Cooling System Structural Diagram and Sample Photographs



Tokyo Gas Nakahara Building (solar cooling system demonstration plant)