



Eco-School project: adsorption chiller reduces energy consumption by 42%

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As the only foreign media to attend a recent public lecture on the potential of solar thermal cooling and heating in Japan R718.com reports on a novel solar thermal driven system in full operation. The demonstrated installation centres around Mayekawa's AdRef-Noa L adsorption chiller, and is capable of 73% energy savings.

On Friday August 3rd at the premises of Waseda Setsuryou Junior High School (WSJHS) in Ibaraki, Osaka prefecture around 60 people attended a public lecture focusing on solar thermal energy utilization, during which a solar thermal cooling and heating system installation was introduced and demonstrated. The installed system, designed by Mayekawa and constructed by Taisei, consists of Mayekawa's novel adsorption chiller, solar thermal panels made by Terada Iron Works, radiation panels from PS and a dehumidifier delivered by Sinko.



Solar thermal heating and cooling system saves 14,500 kWh per year

The heart of the system, which has been in operation since July 2012, is the AdRef-Noa L adsorption chiller with a cooling capacity of 80 kW. The chiller uses water as a refrigerant and zeolite as an adsorbent, producing chilled water in the 12 – 20°C temperature range, driven by intake water between 50 – 60°C. The demonstrated system operates with a 58°C hot water intake and produces chilled water at 16°C, used for cooling six classrooms equipped with radiation panels.

According to Mayekawa the installation cost is 2 – 3 times higher when compared to a conventional electric chiller unit. However, the installed system reduces electricity consumption by 42% (from 31.4 kW to 18.3 kW) in cooling mode and by 73% (from 22.5 kW to 5.9 kW) in heating mode. When considering the WSJHS heating and cooling needs (approximately 900 hours of cooling and 600 hours of heating per year) the resulting reduction of electricity consumption is 21,750 kWh. This reduction is however influenced by weather conditions and usually decreases by approximately 1/3 to realistic electricity savings of 14,500 kWh per year.

Although details are not available, according to Mayekawa, a similar installation is planned for an office building. The goal for next year is to install approximately 10 sets of adsorption chillers driven by solar thermal energy.

Real time performance demonstration

A total of 244 m² of solar thermal concentration panels was installed to run the adsorption chiller in the summer period and to provide heating in winter. At the time of the demonstration (a hot sunny day around 3pm) the amount of solar radiation was 0.709 kW/m². According to Terada Iron Works, the installed panels have a stable efficiency at a wide range of temperatures, in contrast to photovoltaic panels, which have significant efficiency degradation at high temperatures.

During the demonstration the temperatures in Ibaraki reached 34°C in the shade, but the interior of the classrooms equipped with radiation panels and cooled with chilled water from the adsorption chiller provided very pleasant environment. All actual temperatures in the system (solar thermal panels, hot water tank, chilled water tank, radiation panels, etc.) are displayed in real time on a control unit monitor.

R718.com closely followed the demonstration of the adsorption technology and below provides an exclusive photo gallery of the installation including the real time monitoring data.

Eco-School demonstrates Japan's commitment to renewable energy

The Eco-School is a three A's concept, promoting the utilisation of renewable energy and educating students about low-carbon, environmentally friendly solutions:

- "Adapt": the first step in this concept is aims at the utilisation of solar thermal energy and hydropower generation in selected schools.
- "Advance": the Second step plans to combine photovoltaic and wind power generation installations.
- "Abroad": the third step explores the possibilities of geothermal energy.

The significance of the Eco-School project public lecture was underlined by a visit of Mr. Tomohito Ihara, member of the Japanese Cabinet Secretariat, National Strategy section. Mr. Ihara gave a presentation on the national energy strategy and its current revision, which reflects Japan's post-Fukushima situation. Within this strategy all three nuclear power generation scenarios (from 0% – 25% share in the national energy mix) rely on rapid growth of the renewable energy sources (from present 10% to 25 – 35% in 2030).

The collaboration between several Japanese manufacturers demonstrated in the Eco-School project is likely to represent the start of many such projects, where industry leaders work together to deliver renewable energy powered, environmentally friendly technology to domestic and international markets.



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