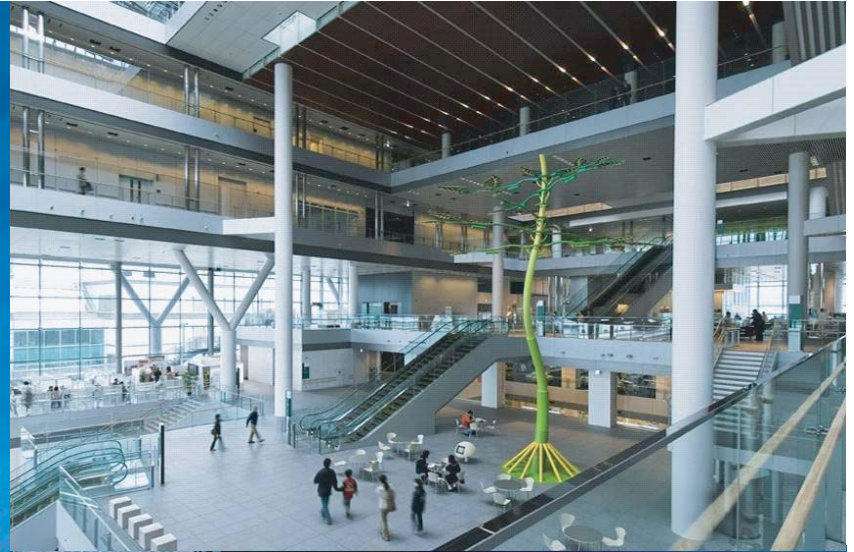


# Aiina center, Iwate



Site: Iwate, Japan  
 Client: Iwate prefecture  
 Architects, Engineers & Supervision:  
 Nihonsekkei Inc.,  
 K.SONE+Environmental Design Associates,  
 KUJI ARCHITECTS STUDIO  
 Field measurement: Tanabe Lab., Waseda University

Construction:  
 KAJIMA Corp. + Miyagi Construction Co., Ltd. + Ryowa Construction Co., Ltd. + Ishikawa Corp.,  
 Takasago Thermal Engineering Co., Ltd. + IWASUI Co.,Ltd.  
 + AquaClara TOHOKU,  
 Nishihara Co., Ltd. + Seifuku Co., Ltd. + Daido Co., Ltd.  
 YURTEC Co., Ltd. + Kowa Co., Ltd. + Nanbu Co., Ltd.  
 DAIKO Co., Ltd.

Site area: 9,000.00m2  
 Building area: 7,854.61m2  
 Total floor area: 45,874.84m2  
 Structure: Steel  
 Floor: 9 floors(ground)  
 + 1 floor(under ground)

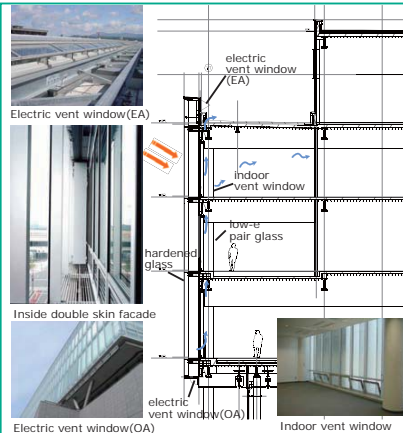
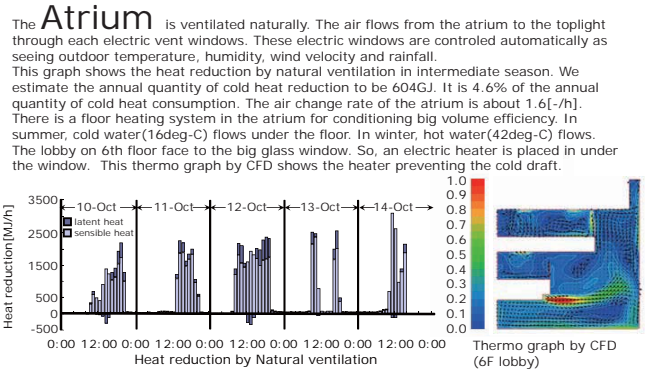
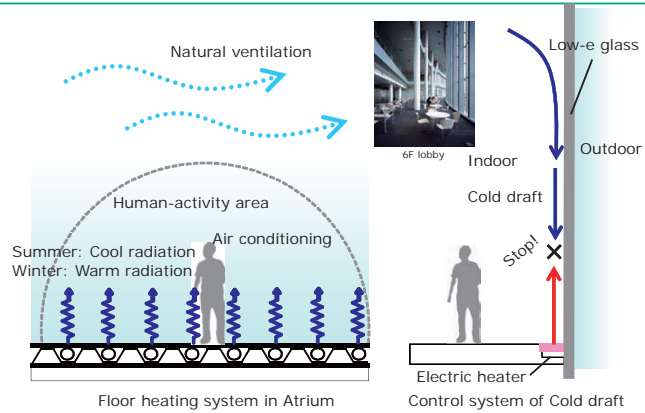
Aiina is a multi-use cultural activity center for a use of all citizens regardless of generation, location, or occupation in Iwate Prefecture. Aiina is designed as a center proceeding the exchange of cultural and business ideas, concepts and general communications for all residents of Iwate Prefecture.

N39° 41' E141° 09'

# aiina

## Approches for the Glass Architecture with an Atrium in the Cold Region from building services planning perspective

<h3>Atrium</h3>	Comfort → -Cold draft around the atrium is controlled by the electric heater under the window. -Daylight comes from the toplight of the atrium.	<h3>Double Skin Facade</h3>	Comfort → -The double skin facade vents the indoor air naturally. -The double skin facade maintains the indoor warmer than outdoor during winter.	<h3>Cool or Heat Trench</h3>	Anti-Frost → -The outdoor air intake has the air-conditioners for preventing the frost of louvers. -The exhaust heat is used for ventilation in the machine rooms.
	Energy Saving → -The atrium is designed for natural ventilation. -Just the scope of human activity is heated (or cooled) by the floor heating system.		Energy Saving → -The double skin facade makes the indoor perimeterless. -The double skin facade works as good insulation in winter. It works to exhaust heat in summer.		Energy Saving → -The outdoor air from the trench is pre-cooled or heated by geo-thermal and well water.



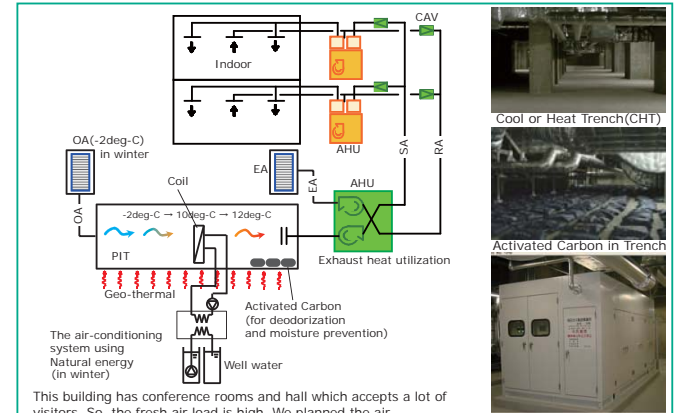
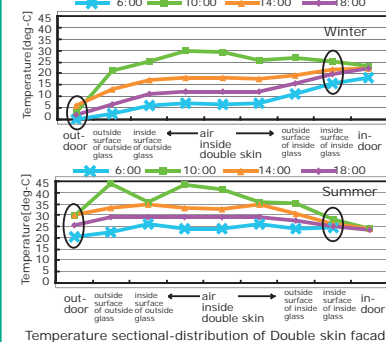
This building has a **Double Skin Facade** with vertical louvers. It makes rooms open and bright. In addition, it reduces heat load. The double skin facade composed with harden glasses, vertical louvers and low-e glasses. Air flows inside the double skin from the vent window under the 6th floor's eaves to the vent window above the roof floor.

**IN SUMMER**  
The electric vent windows exhaust solar heat absorbed into the louver of the double skin.

**IN SPRING, AUTUMN**  
The rooms can be ventilate naturally, as the indoor vent windows are open.

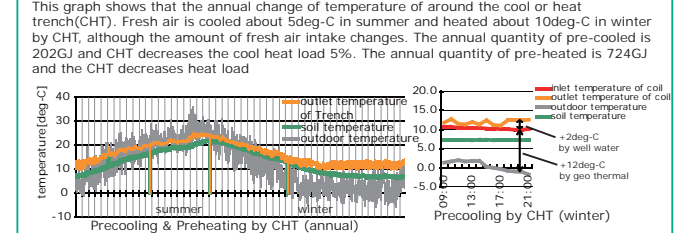
**IN WINTER**  
The double skin works as insulation. The air temperature inside the double skin is higher than the outdoor temperature.

The temperature of rooms is 5deg-C lower than the inside temperature of double skin during summer. As for winter, the temperature inside the double skin is 10deg-C higher than outdoor temperature. This shows that the double skin works as good insulation. We estimate the annual cold heat reduction to be 823GJ. It is 5.9% of the consumption. And heat reduction to be 881GJ. It is 6.7% of the consumption.

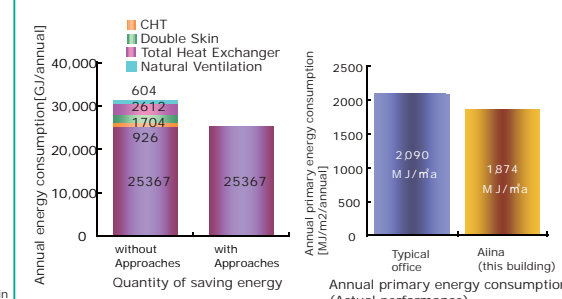
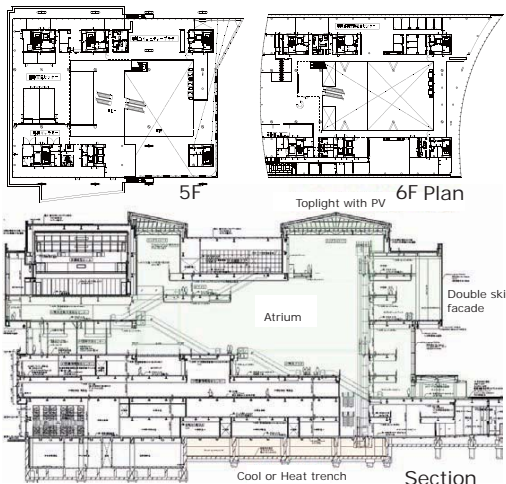


This building has conference rooms and hall which accepts a lot of visitors. So, the fresh air load is high. We planned the air conditioning system using Natural energy to decrease the fresh air load and prevent frost of outdoor air intakes and coils.

This building's pit is utilized as **Cool or Heat Trench (CHT)**. The fresh air is pre-heated(or cooled) through the trench by geo-thermal. After that, the fresh air is pre-heated(or cooled) by the well water and exhaust air. And machine rooms and pit is ventilated by exhaust air from rooms for preventing frost of pipes. These system decrease the heat load of this building.



Water Cooled Heat Pump for Snow Melting



It is 20% that the rate of the heat load reduction by CHT, double skin facade, total heat exchanger and natural ventilation compared to the typical building without these approaches. In the actual performance in 2006, the primary energy consumption of this building was 1,874[MJ/m2/annual].

We had a occupant questionnaire on the comfort sense and the thermal comfort.

