THE PROJECT IN REAL CONTEXT
STRUCTURE SYSTEM

Cistern and Foundation Structure
1500 mm Thick Reinforced Concrete Retaining Wall

Major Frame Structure
600*600 mm Reinforced Concrete Columns
800*400 mm Reinforced Concrete Beams

Floor Structure
255mm Cast-in-situ concrete slab

Steel Attached Structure
260mm HEB 200 Steel Beams
180*180 mm Steel Columns
Ventilation

SUSTAINABILITY

Ventilation

SUMMER: THERMAL LABYRINTH + GROUND WATER ENERGY + ACTIVE SLAB

Thermal Labyrinth: The air is pre-cooled to lower the temperature by approximately 7°C.

Ground water energy: The foundation slab drainage under-layer is equipped with pipes connected to ground water wells. This energy is used for cooling the concrete.

Crew Activation of the slabs

WINTER: THERMAL LABYRINTH + COMBINED HEAT + SOLAR RADIATION

Thermal Labyrinth: The air is pre-heated to raise the temperature by approximately 10°C.

Combined Heat: A CHP plant is used to produce electricity and heat.

Solar Radiation: In winter, sun radiations (corporate with fluid facade's system) enter the building in order to provide free heating.

Energy Adjustment Fluide Facade

Summer Operation:
The fluid facade utilizes a magnetic colored panel to absorb the heat of the direct sunlight, cooling down the temperature of the interior.

Winter Operation:
The outside layer of fluid facade de-colors water. The direct sunlight warms up the water inside the facade and energy absorbed by the water can be used for floor heating.
Summer case, day
• The outer fluid (Fluid 1) is darkened to minimize solar gains, yet visual transmittance is still possible
• Solar heat gains in the outer fluid can be used elsewhere in the building
• The inner fluid (Fluid 2) is circulated with cold water and operates as a cooling panel

Summer case, night
• The outer fluid (Fluid 1) is darkened
• Circulating warm water in the outer fluid layer allows dissipating surplus heat collected and stored in the building during the day by radiative heat transfer
• The inner fluid (Fluid 2) can be used as a cooling panel by circulating cold water if required

Spring / Fall
• The outer fluid (Fluid 1) is slightly darkened, depending on demand
• Solar irradiation is accepted in the interior space if a heating demand exists, but transmittance is reduced if overheating is expected
• The inner fluid (Fluid 2) can be operated as a heating or cooling panel if required

Winter case
• Typically, the outer fluid is not darkened to allow optimal interior daylight quality
• Interior heat gains reduce the heating demand
• The inner fluid (Fluid 2) is circulated with hot water and operates as a heating panel

DETAILS THEORY OF FLUID FACADE

Source: www.fluidglas.eu

Preliminary tests using a colorant to vary the absorptivity. Total duration 15 s each. Top: low concentration of colorant. Bottom: high concentration of colorant. Note that the used camera automatically adjusted the brightness leading to an overexposure of image area around the façade element.
BORDER MARKET UNDER CANOPY

BORDER WATER PLAYING

BORDER CROSSING

VIEWING WATER VALLEY ON BORDER BRIDGE