solarCity Linz-Pichling – Sustainable City Development

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Client: Bauträger BA/CA Leasing, Vienna, A
Design: Architekten Loudon & Habeler, Vienna, A, Univ. Prof. Arch. Mag. arch. Michael Loudon, Arch. Mag. arch. Josef Habeler
Design of outdoor areas: Atelier Dreiseitl, Überlingen, D
Completion: 1st building phase: 2003, 2nd building phase: 2007
Usable floor area: elementary school: 3,464 m², daycare: 719 m², secondary school: 6,844 m²
Energy demand: 34 kWh/(m²a)

Urban planning concept

This project develops the system of building in rows in the solarCity Linz-Pichling as conceived by Professor Roland Rainer. The reposeful two-story building is situated at right angles to the neighboring residential development and its 112.40 x 23.00 meter floor area encompasses a twelve-class elementary school with a single gymnasium hall as well as an eight-group daycare facility.
The single gymnasium hall lies to the west of the building and is connected underground with the main building. By positioning the gym hall separately from the main building a forecourt is created that can be used during school recesses. A large continuous green area has been preserved in the eastern part of the site and leads into the natural landscape along the Mühlbach stream.At present a 24-class general secondary school is being constructed on the same site, with a triple gymnasium hall and outdoor playing fields.

Building concept

The building itself is accessed through a central hall. From this hall, the elementary school and the daycare facility are accessed through entrances on the east and west sides respectively. A two-story top-lit circulation hall extends through the entire building, so that the classrooms and group rooms obtain additional light from inside through high-level glazing in the walls.The daycare facility, which is at ground floor level, is accessed from the central hall. The daycare groups are located on the east side of the building; the group rooms can be

subdivided into play and learning areas. The window parapets are low, in order to optimize the quality of the light in the rooms. The circulation hall that extends along the entire length of the daycare facility offers sufficient space for movement and is lit through generously sized roof lanterns. The west wing contains the rooms for the daycare administrative staff and the teachers, a dining room and a training kitchen with service spaces as well as a crafts room and an exercise room. Two cores containing sanitary facilities, one for men and one for women, are located on the west side of the circulation hall. The access to the outdoor areas of the daycare facility is at the north end of this hall.
The elementary school is on the upper story and is reached by the stairs or by the elevator in the central hall. Most of the main classrooms are located on the east side of the building; special classrooms, service rooms, a central cloakroom as well as the administration office and the staff rooms are on the west side.The corridor areas in the central top-lit hall offer sufficient space for movement and can also be used by the classes on the upper story as a recess area. The gym and the changing rooms are in the basement and can be reached from staircase one. The secondary school is housed in the southern extension of the building. The rooms for special teaching are located in a transverse wing that is connected with the secondary school underground. The triple gymnasium is also connected underground with the main building, and lies between the existing gym hall of the elementary school and the transverse wing.

Construction

The load bearing structure of the building is made of reinforced concrete; the columns are arranged on a 7.20 x 3.00 meter grid. The facade consists of bands of glazing (wood and aluminum window frames) and glass-clad, rear-ventilated parapets. Sun protection louvers are mounted in front of the long facades; they can be adjusted to achieve maximum utilization of passive solar energy. Inside the building, plasterboard walls are used, along with suspended ceilings that help to reduce noise levels, for example in the circulation hall.

Energy concept

The important criterion of the energy concept is the avoidance of energy losses. Energy losses due to transmission are minimized by using large amounts of insulation in the external parts of the building and by keeping the shell of the building as compact as possible. Intake air is preheated (or in summer pre-cooled) by ground heat exchangers, thus reducing energy losses resulting from ventilation. Heat is recovered from the exhaust air. Additionally, passive solar energy gains are used to reduce the amount of heating energy required. Natural light is directed as required by external reflectors/louvers which also provide protection from the summer sun. Energy-saving, psychologically effective natural ventilation that can be manually regulated is provided by special window vents.

Ventilation concept

To recover heat from exhaust air, an airtight building shell is required. Since during the transitional periods of the year and in summer it is essential, from both a psychological and an economic viewpoint, to be able to open the windows, a compatible natural and mechanically supported ventilation concept was worked out.

Window ventilation:

Window ventilation is by means of window vents, 35 cm wide by 120 cm tall, that can be adjusted in small increments. They permit basic ventilation when and as required and offer a particularly economical form of permanent (night time) ventilation.

Mechanical support ventilation

The mechanical ventilation ensures the supply of fresh air during the heating season as well as during hot periods by means of preheated or (in summer) pre-cooled outside air, which is conditioned by ground heat exchangers. This conditioning can effectively change both the temperature as well as the absolute humidity of the air.

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