

Forum Chriesbach

A New Building for Aquatic Research

Eawag, the nationally and internationally active aquatic research institute, is committed to the responsible management of water and other vital resources. Its new Forum Chriesbach building is the embodiment of its own sustainability principles. Consuming four times less energy than a minimal-specification building, it functions without conventional heating and cooling systems (HVAC). The innovative sanitary system – NoMix toilets with urine separation and rainwater flush – serves not only as a tangible feature for environmental protection but is also used in current research.



Forum Chriesbach – Sustainability in Public Buildings

Inaugurated in September 2006 as the new head office of the Dübendorf-based aquatic research institute Eawag, Forum Chriesbach is setting new standards. The owners' challenging specifications, an innovative architectural and technical concept, the expert planning and project management as well as skilled workmanship contributed to realising this exemplary research and administration building. Synthesis of functionality, aesthetics, structural quality and an insistence on the application of sustainable building criteria required close collaboration between the owners Eawag, Empa and BaFA, the general planner Bob Gysin + Partner BGP, architects and the main contractor Implenia Generalunternehmung AG.

Forum Chriesbach's outstanding features include, ► the façade of blue glass panels that block the sun's rays in summer and let them through in winter, ► a highly insulating structural cladding and a ventilation system, which renders heating and active cooling all but superfluous, ► a photovoltaic system, which covers one third of the building's electricity requirements (excluding the server), ► a glass-roofed atrium to bring light into the building and to provide night-cooling during summer, ► an extensively greened roof, which retains and harvests rainwater, ► rainwater-flushed NoMix toilets with separate collection of urine, ► the use of environmentally compatible materials and ► the aQa staff canteen – a Goût Mieux restaurant – with its attractive selection of organic menus.

Everyone involved in has had to push today's technology to its absolute limits. As a result, not just the individual features are cutting-edge but above all the optimum interplay of all aspects of this remarkable building.



A Challenging Specification

Aside from fulfilling the functional, financial and aesthetic requirements, Eawag and Empa insisted that their commitment to sustainability should be realised in an exemplary and progressive form. The structural and technical measures had to be innovative and indeed exceed current technological standards. Specifically, this meant:

- ▶ Conservation of resources (energy, materials, land, finances).
- ▶ It had to be a “zero-energy development” in terms of energy consumption.
- ▶ At least $\frac{1}{3}$ of the electricity requirements had to be covered by the building’s own photovoltaic system.
- ▶ Integration of urine separation and rainwater use.
- ▶ The cost/benefit ratio had to be heavily weighted.

Chronology

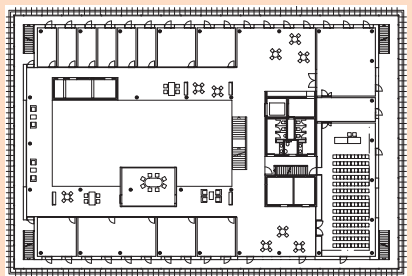
- 2001** Eawag and Empa development planning. Specification of requirements with regard to sustainability.
- 2002** June – Project tender issued for Forum Chriesbach.
- 2002** September – Project bids tendered (6 projects).
- 2003** January – Revised bids tendered (2 projects).
- 2003** January – “Vision” project by Bob Gysin + Partner BGP selected.
- 2003** December – Parliamentary approval received, which includes the allocation of CHF 32.72 million for the new Forum Chriesbach building.
- 2004** April – Zschokke Generalunternehmung AG appointed as main contractor.
- 2004** July – Excavation begins.
- 2004** October – Laying the foundation stone.
- 2005** June – Structure erected.
- 2006** June – Handover of keys and occupancy.
- 2006** September – Opening ceremony.



Architecture and Allocation of Space

The building is a compact entity with an atrium, which lets daylight into the building and at the same time serves to cool down the building on summer nights. The reinforced concrete frame construction works as a heat and cold storage unit, while the clay and gypsum walls regulate air humidity. The escape balconies, accessible from all offices, support the striking blue glass panels, which are sunlight-controlled and – depending on the season – either provide shade or let the light in. The rooms are distributed in a U-shape around the 5-storey atrium: a true spatial experience with its suspended meeting boxes and open staircases.

The reception and exhibition area in the atrium can also be used for major events. A model of the water molecule with image projection facility is the eye-catching design feature in the reception area. In addition to providing office space for 150 employees, the floor plan includes 1 lecture hall for 80–140 people, 2 seminar rooms for 30–40 people each, 7 meeting rooms accommodating a total of 106, contact areas on 4 floors with desks and seating areas, a joint library for Eawag and Empa, a staff canteen as well as adjoining rooms and technical areas. Forum Chriesbach has a cubic capacity of 38,615 m³, a floor area of 8,533 m² and an energy reference area of 11,170 m².

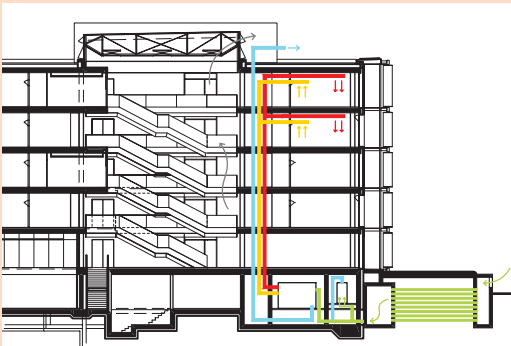


Ambient Climate

Forum Chriesbach is neither heated nor actively cooled by conventional means. It is well insulated and has a smart ventilation system.

Ventilation in work areas is continuous and centrally controlled. Fresh air streams in through the thermal register into the ventilation units and is then distributed via air uptakes to the individual floors and work areas. The exhaust air is discharged through the roof: in summer directly from the offices and in winter via heat exchangers. The fresh air intake is heated in winter using the thermal register unit (80 tubes each 20 m in length), the heat recovered from the exhaust air and the warm air from the server room. On cold days, one can source more heat from the hot water tank.

The atrium serves as a buffer zone and is not actively ventilated. However, on hot summer days, it serves as a flue for automatic night cooling. As soon as the external night-time temperature drops below room temperature, the hinged windows in the offices and atrium roof open up.





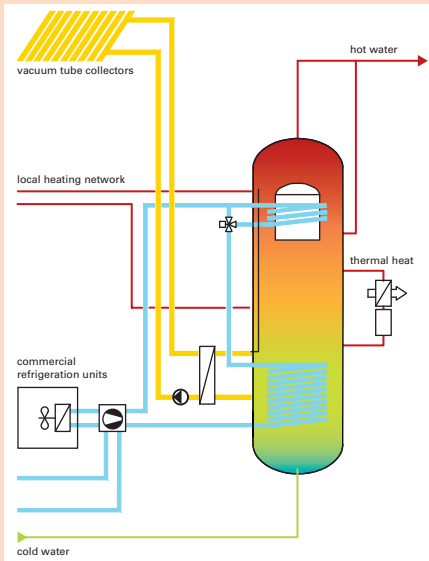


Energy

The heat generated by individuals, office equipment, lighting and natural sunlight is usually sufficient to retain a pleasant ambient temperature. This is at a Qh heat energy requirement of 14 kWh/m²·a energy-referenced area per year.

The hot water tank (12 m³) is heated up by solar collectors, waste heat from refrigeration equipment in the kitchen and (at very low ambient temperatures) from the local Empa-Eawag heating network. The vacuum tube collector system has a surface area of 50 m² and provides 24,000 kWh of thermal heat per year.

To cover one third of the building's electricity consumption of 219,000 kWh/a (without servers), 459 m² of solar cells with a capacity of 77 kWp are installed around the edge of the roof.

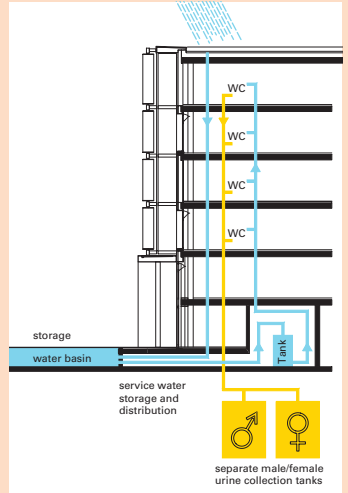


Water

Drinking water is only used for meal preparation in the staff canteen, for the water fountains located around the floors and for washbasins. Rainwater is harvested on the roof, stored in the open water garden (80 m³) in front of the staff canteen and fed by separate plumbing to the toilets for flushing.

Urine is piped separately from the waterless urinals and NoMix toilets, collected in tanks and used for research purposes.

On parking lots and access roads where rainfall cannot drain into the ground, it is collected in an open channel and fed into a drainage area.



Materials

In the choice of materials, major importance was attached to conserving resources, environmental and health factors and to the welfare of the employees. For example, recycled concrete is used for the ceilings, the floors are laid with xylolite and most of the walls are of timber construction. The dividing clay walls between offices are environmentally friendly and work to regulate humidity. Eawag will be monitoring individual aspects of the building as part of its own research, such as the quality of its very own roof water.

An important criterion for environmental impact assessment is the grey energy* incorporated in the materials and products used. A report was compiled covering all the materials used for Forum Chriesbach. It shows that the energy contained in the construction of 43,201 GJ over a mean service life of 37.6 years accounts for around half of the energy demand.

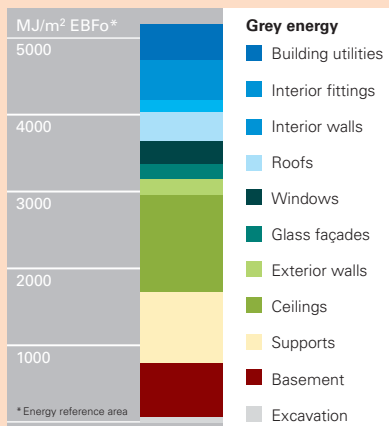
* "Grey energy" is the amount of energy used for the manufacture, transport, storage and disposal of a product (as opposed to direct energy consumption required to run the building).



Exterior wall element:

Width = 138 cm, thickness 450 mm, $U < 0,12 \text{ W/m}^2 \text{ K}$

- ▶ internal acoustic panel, grooved 16 mm
- ▶ coarse OSB particle board 15 mm
- ▶ post-and-beam construction, insulated 120 mm
- ▶ F30 vapour permeable board 15 mm
- ▶ heat-insulated cross-lathing 180 mm
- ▶ windproofing membrane
- ▶ vertical lathing 40x60 mm 40 mm
- ▶ horizontal lathing 40x60 mm 40 mm
- ▶ Stamisol façade membrane
- ▶ Eternit Pelicolor parallel cladding 8 mm



Surroundings

Landscape design in harmony with nature incorporates the Chriesbach stream flowing through Eawag's premises. This canalised section of the watercourse is to be re-naturalised to serve simultaneously as a demonstration, research and educational site for Eawag.

The laboratory and another office complex of Eawag are located north of the Chriesbach. The new building is directly accessed from these buildings by a footbridge and covered walkway.

West of Forum Chriesbach is the new Eawag/Empa children's pavilion, a day care center for children of employees at both research institutions.



Eawag

Water is essential to life and key to progress and prosperity. However, water is a limited resource worldwide: Many regions face severe shortages and the quality of water varies greatly around the world. Eawag, an internationally renowned Swiss federal research institute, is committed to reconciling the social economic and ecological interests of water and aquatic ecosystems. It thus acts as an important link between basic research and practical application. About 400 associates are employed by Eawag in Dübendorf (near Zurich) and Kastanienbaum (near Lucerne). Eawag was founded in 1936 at the ETH Zurich as a consulting centre for wastewater treatment.

Forum Chriesbach Owners

Eawag, Überlandstrasse 133, 8600 Dübendorf, www.eawag.ch

Empa, Überlandstrasse 129, 8600 Dübendorf, www.empa.ch

Forum Chriesbach Owners' Representative

BaFA Bauten Forschungsanstalten, Kriesbachstrasse 42, 8600 Dübendorf

General Planner/Architect

Bob Gysin + Partner BGP, ETH SIA BSA, Architekten, Ausstellungsstrasse 24, 8005 Zurich, www.bgp.ch

Main Contractor

Implenia Generalunternehmung AG (previously Zschokke Generalunternehmung AG), Industriestrasse 24, 8305 Dietlikon, www.implenia.com

Further Information

www.forumchriesbach.eawag.ch

Photos: Roger Frei, Zurich; Eawag, Dübendorf

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