



A structural education

School budgets are in the firing line, but an upfront investment in more eco-friendly institutions could yield savings in the long run

Words: Frances Power in Vorarlberg

The architecture in Vorarlberg, Austria's westernmost province, is as impressive as the scenery.

Bordering Switzerland, Germany and Liechtenstein, the area has an international flavour, and its regions are no exception. The building has countless fine examples of so-called 'passive' buildings, which require much less energy than conventional buildings, cause little or no pollution and are constructed using sustainable materials such as wood.

Passive buildings are roughly 30 per cent more expensive to construct than conventional buildings, but are so much cheaper to heat and cool that they soon repay the extra initial outlay. So could Ireland apply passive principles to the construction or retrofitting of buildings – particularly schools, hospitals and civic buildings?

In Ireland adopted a programme of retrofitting these buildings, the benefits could be enormous. An initiative to create passive buildings would create jobs, stimulate construction, enhance user comfort and reduce carbon emissions. The schools and hospitals of the future could be better, greener and more pleasant.

The Hauptschule Klaus in Vorarlberg was the first passive school to be built in Austria, and the L-shaped construction is a simple, but effective, structure.

Its wooden elements, subtle design and compact volume minimise building costs and maximised energy efficiency. The silver fibre interior feels spacious and warm, while the red floor of the wide hallway and the bright surfaces throughout make full use of natural light. Students walk along a hallway with picture-framed views of the mountains and woods.

The facade features a perforated copper profile in front of the large glazed space that is the school hall, offering shade. By night, the hall is illuminated, showcasing it as a multi-functional space. The library, which the school shares with three other municipalities, is above the entrance.

The building skin is well-insulated and airtight; the windows are triple-glazed and set back from the frame to shade. The hall and library have under-floor heating, while a central generating unit heats the classrooms. A heat exchanger recovers 85 per cent of the heat from exhaust air.

In winter and summer, the incoming air is preheated or pre-



Top: Hauptschule Klaus in Vorarlberg. Above: inside the school. Below: the school's assembly hall and library



cooled by 27 large pipes installed in three liners in a wall below the hall. When the air temperature reaches 18 degrees, a bypass system supplies air directly to the building's interior, while automated blinds provide solar shading in the classrooms.

The energy the school requires for heating and cooling is 75 per cent less than what was needed by the building it replaced. Photovoltaic collectors on the roof of the library generate electricity, rainwater supplies the fire sprinkler system.

The building employs congenial materials, and a lot of porters, thoughtful design. It induces a sense of wellbeing in the children and teachers; the latter attribute improvements in their pupils' concentration levels to the quality of the air in the building.

This is a building that feels good to be in. In the soft texture of its interior, extensive glazing and clean lines, it does not have the sense of coldness of some minimalist buildings. Instead it promotes a feeling of joy and wonder, and is a great example of a building planned and designed by someone whose primary concern was the wellbeing of the users of the building.

In the town of Wolfurt in Vorarlberg, the Mahle School is a retrofitted passive building where the external envelope has been completely replaced with red cedar, with small sections of timbers overlapping as they do on traditional buildings in the region.

During the retrofitting process, the existing external envelope, roof and floor were insulated, the windows triple-glazed and automated blinds installed to reduce glare. The extensive arrays of solar panels on

the building's southern elevation and photovoltaic cells on its roof provide passive energy.

In the 20 years since Professor Wilfried Feist of the University of Innsbruck began exploring the concept, some critics have dismissed passive buildings as energy-saving structures without any aesthetic appeal.

In response, the Passivhaus Institut began awarding prizes for passive buildings of architectural merit. The Saint Gerold Municipal Centre outside Bregenz, the provincial capital, was the co-winner of a prize this year. It stands just outside an Alpine village, overlooking a forest park in an area of outstanding beauty.

Directly facing the buildings it replaced, the centre is multi-functional, with a kindergarten, civic office, a shop and community centre. Outside it are charging points where drivers can power up electric cars.

The centre is constructed from locally-sourced silver fir. Local craft workers created the internal joinery, which includes the world's first wooden elevator shaft. The building employs a highly energy-efficient heat pump and heat recovery system and, in time, the local authorities hope to build a hydro-electric power plant to heat it and other buildings in the village.

In the kindergarten, automated blinds offer protection against glaring sunlight. Through the triple-glazed windows you see the snow that lingers on distant peaks.

The interior is entirely made of untreated silver fir – a soft, tactile material the children love to touch. Children take their first steps, learn and even celebrate their birthdays here. They grow up enjoying stunning views over the valley, breathing fresh Alpine air.

Near by, the small mountain town of Langenegg has just won the European Village Renewal Award 2009. The award encourages initiative and citizen participation in village development. In ten years, Langenegg has achieved full employment by embarking on a programme of passive construction controls the heating of all buildings, its motto is 'Environmental Improvement, it is motivation and Live Energy Wise'.



The Saint Gerold Municipal Centre near Bregenz



Above and below: the kindergarten in Langenegg



According to energy officer Maria Nussbaumert, the town's fortunes changed when the time came to refurbish the local government offices, which date back to 1890. Langenegg opted for passive over traditional construction, despite the initial extra costs.

State grants helped with the refurbishment of the government offices, while the energy savings achieved through insulation and new windows will cover the cost of completing the works within seven years.

The refurbishment inspired similar projects. A new kindergarten, a cafe, offices, a community centre and village shop were all built to passive standards. For heating, all buildings use biomass, in this case wood cubes. A central computer controls the heating of all buildings in the village. The kindergarten was

constructed between December 2003 and September 2004 after six months of planning. Everything in this attractive building was commissioned, and also featured untreated silver fir.

Vorarlberg provides plenty of food for thought for those planning Ireland's architectural future; through marrying ecological principles with a strong emphasis on aesthetics, its buildings are changing architectural thinking in Austria and beyond.

Frances Power is managing director of FPA Architects in Dublin, www.fpa.ie. Her trip to Austria was supported by the Concor Sustainable Development Media Fund (www.concord.ie) and assisted by the Austrian Trade Commission in Dublin (www.austriainireland.com/austria).