

# SCHWANENSTADT SECONDARY SCHOOL

The school was built in 1972/73 and was renovated in 2007. The main targets of the renovation were the attainment of the passive house standard after the renovation, the renovation with a "holistic" approach, the use of ecological building materials and renewable energy sources as well as the improvement of the user comfort and the indoor air quality.

The building envelope was highly insulated, including also new developed prefabricated timber facade elements, and a mechanical ventilation system was installed.

The daylight use was optimized and an external solar shading system was installed.





# RENEW SCHOOL

## GENERAL INFORMATION

Location:	Schwanenstadt, Austria
Project type:	Renovation
Net cost:	954 €/m <sup>2</sup> (gross floor area)
Main contractor:	NEUE HEIMAT Oberösterreich Gemeinnützige Wohnungs- und SiedlungsgesmbH
Architect:	Heinz Plöderl, Pauat Architekten
Building owner:	Municipality of Schwanenstadt
Gross floor area:	6 835 m <sup>2</sup>
Number of storeys:	4 building parts: 1st and 2nd part 3 floors, 3rd part 2 floors, 4th part gym
Construction time:	2007

## COOPERATION MODEL

Extra budget was received for calculations, planning and quality assurance through an national research project. Subsidies were also received from the regional government.

## TECHNICAL SOLUTIONS AT A GLANCE

- Passive house standard
- Biomass (pellets) and PV
- Decentralized mechanical ventilation (for each single classroom) with heat recovery
- Focus on the improvement of indoor air quality

## DESCRIPTION OF CONSTRUCTION

Thermal renovation of the outside walls with prefabricated wooden facade modules. Triple-glazed windows with a total u-value of 0,8 W/m<sup>2</sup>K integrated in the facade modules. Thermal insulation of the ceiling, including a new timber construction.

Opening of interior areas to increase the use of daylight and installation of exterior shading to control the overheating in summer.







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## ENERGY DATA / SUPPLY

The heating demand before retrofit was 145 kWh/m<sup>2</sup>GFAa, and after the renovation the heating demand was reduced to 15 kWh/m<sup>2</sup>GFAa, which is a 90 % reduction.

The measured final energy demand after retrofit is 44 kWh/m<sup>2</sup>GFAa.

The energy supply is based on wood pellet complemented by electricity and PV.

## VENTILATION AND INDOOR ENVIRONMENT QUALITY

A decentralized mechanical ventilation (for each single classroom) with 80 - 90 % heat recovery is installed.

The volume flow rate of the decentralized mechanical ventilation system is about 100 - 500 m<sup>3</sup>/h per classroom.

For larger rooms bigger ventilation units with a higher flow rate were chosen, for smaller rooms also smaller ventilation units were selected.

The Specific Fan Power of the installed units is about 0,5 Wh/m<sup>3</sup>.

Integration of ducts into new facade design (ventilation grilles)

## LESSONS LEARNED

In general the user's have given good feedback on the retrofitted school, but some points can be optimized:

- time management (the renovation works could not be finished during the school vacations - improvement of coordination of school periods and renovation works necessary)
- room temperatures (partially too high)
- noise from ventilation system and adjacent rooms

Early communication with users avoids later disaccord.



Picture1  
Schwanenstadt before retrofit

Picture 2  
Mounting of the facades

Picture 3  
Schwanenstadt after retrofit

## THE RENEW SCHOOL PROJECT WILL DISPLAY 18 RENOVATED OR NEW SCHOOL BUILDINGS ALL OVER EUROPE

The RENEW SCHOOL project aims at retrofitting a large number of school buildings to Nearly Zero Energy Building (nZEB) standard. The project will promote and increase high-energy performance and prefabricated timber-based renovation of school buildings in Europe.

The project assists municipalities, school owners/-financiers and companies with appropriate tools and solutions and offers exchange possibilities for them.

Integrated and multifunctional solutions are based on:

- Timber prefabrication (with integrated facilities)
- Ventilation (indoor air quality)
- Intelligent daylight / shading (control)
- Renewables (on-site or nearby)

The project has chosen 18 frontrunner buildings, presenting them to municipalities, school owners, companies and users as good examples and solutions for the renovation of existing school buildings to fully nZEB standard.



1. Romsdal Secondary School
2. Søreide Primary School
3. Risør Technical College
4. Baksippans Preschool
5. School CVO Heusden-Zolder
6. Detmold Vocational College
7. Gymnasium Reutershagen
8. Schwanenstadt
9. Rainbach
10. Neumarkt
11. St. Leonard
12. Tišina kindergarten
13. Lavrica kindergarten
14. Kekec kindergarten
15. Storžek kindergarten
16. Siemianowice
17. Vibeengen
18. Capriva del Friuli kindergarten

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