

VIRU ENERGIAAUDIT

Kohtla-Järve school building SPORDI 2



Igor Britikovski
23.05.2012

The building was designed in 1938
and built in 1940



Main entrance



Façade of the school's sport hall



End wall of the sport hall



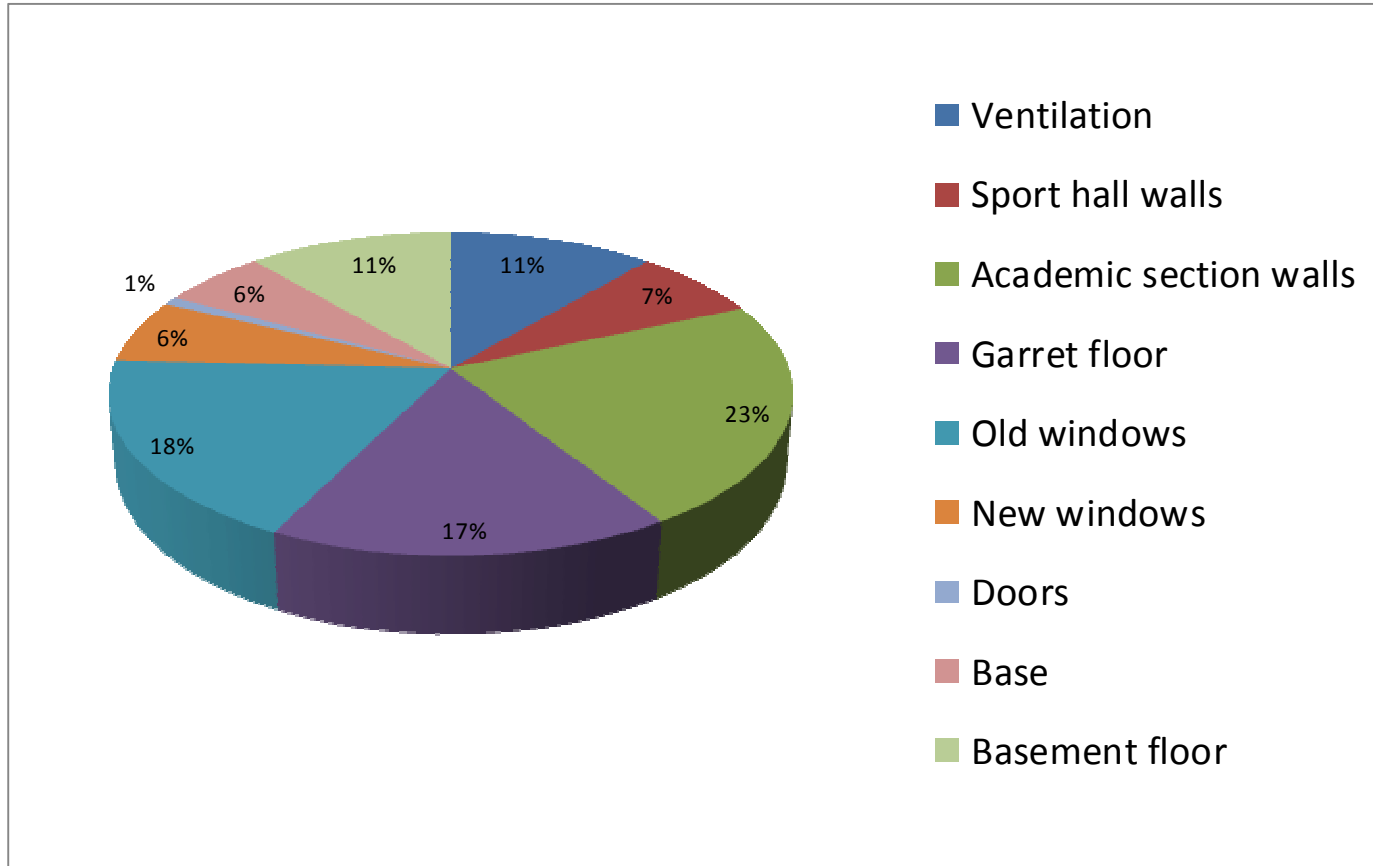
Objectives of energy audit

- The audit was performed in January 2012
- Energy audit aimed to determine the amount of energy required for maintenance of the building.
- Determine the distribution of heat loss through the building structure as well as through ventilation. Water heating is not implemented.
- Evaluate the technical condition of existing systems of ventilation, heating, and electricity supply.
- Energy audit resulted in 5 energy saving packages.

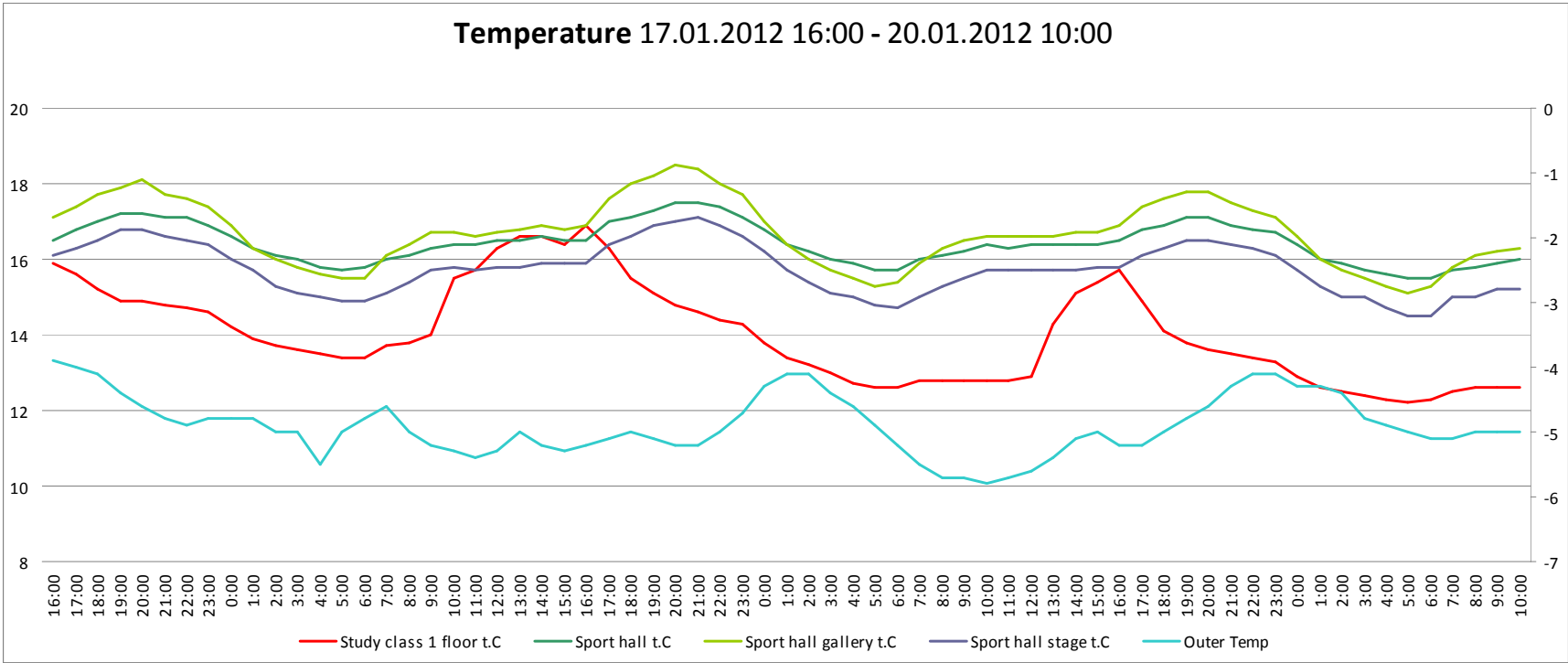
Distribution of heat loss in the building

- Average heat consumption of the building is 356 MWh per year or 101 kWh/m²a
- Heat loss through garret floor - 60 MWh per year (17%)
- Heat loss through walls and base - 129 MWh per year (36%)
- Heat loss through doors - 3 MWh per year (1%)
- Heat loss through windows - 90 MWh per year (24%)
- Heat loss through underground section - 41 MWh per year (11%)
- Energy loss through ventilation - 41 Mwh per year (11%)
- Heat is supplied through municipal central heating system

Distribution of heat consumption



Temperature parameters were measured in the course of one week.



	2009	2010	2011	Average	Units
Consumption of thermal energy	122,8	83,2	97,1	101	kWh/m ² ·a

Building's outer walls are deteriorating
(as a result of moisture permeation)





Significant damage to plasterwork
is visible on the outer walls.

There is no electric heating of drainage gutters.



Moisture leaking through defective roofing combined with insufficient ventilation causes mould and structure disintegration



The garret is unprotected from precipitation due to missing windows.



The roofing surface is not moisture-resistant.
The apex is partially missing.



The effects of flooding in the basement ~75cm from the floor



Natural ventilation grating with a large sectional area (covered in dust and dirt)



Old grating along channels of natural ventilation



Some of the gratings are partially covered



Old windows with wooden frames



Some windows are broken



In some instances, old windows have been replaced with new insulating glass units



And, in some instances
– with wooden units



The building's heating system has been partially remodelled



Some old iron radiators are still in place



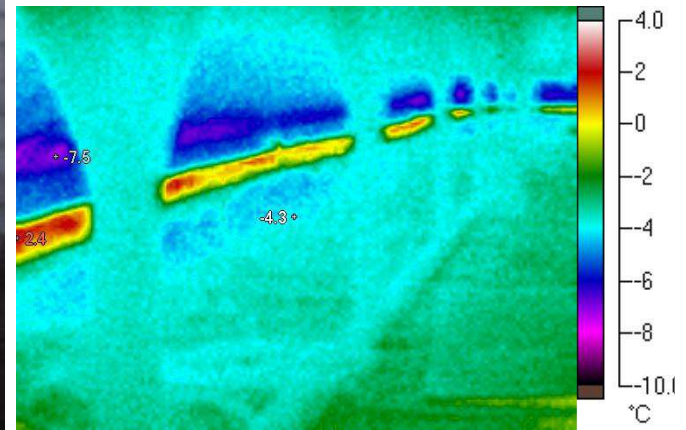
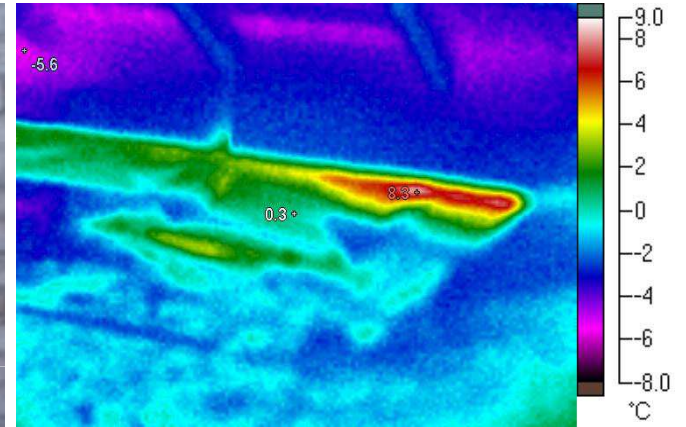
as well as old panel radiators



Some of the radiators are covered with decorative grating, which leads to lower heating efficiency.



The main heating line in the garret.
Insulation is worn out or missing.



Heating assembly with a dependent connection to the central heating plant



Old-fashioned heat exchanger for hot water (out of service)



The building's electricity supply system has not been fully remodelled



Some of the instruments and registers
have been replaced



Summary

- The microclimate in the building does not meet the modern requirements (low temperatures and insufficient air exchange). There is no potential to reduce energy consumption through low-cost measures (tuning, optimization of consumption)
- The building structures require urgent renovation (roofing, drainage system, outer walls)
- In the course of renovation works, primary attention should be directed at requirements for preserving the historic appearance of the building and creating a proper internal microclimate.
- The payback period of the renovation measures is very long (over 50 years). The reason is very low current consumption. Comparison should be drawn with the amount of energy needed to provide a normal microclimate in the building (currently, both the heating and the air exchange are insufficient)

Limitations when choosing energy saving measures

- The building is a protected heritage site and any renovation must take into account the need for preservation of its historic appearance
- Use of traditional insulation materials (silicate cotton, plastic foam) to insulate the walls is not possible without changing the appearance of the façade, but it is possible to use materials or additives that will allow to improve thermal resistance of visible structures without affecting their appearance
- The costs of replacing windows and doors are high; it is only possible on the condition that the new windows and doors will correspond to the status of the building (estimated cost 170 000 - 200 000 EUR).
- When designing the new systems of heating and ventilation, the heritage status of the building (internal architecture) must be taken into account

Thank you!
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