



BUILDING GOOD PRACTICE

General Secondary School Complex No 3 – Sosnowiec, Upper Silesia

GENERAL INFORMATIONS	
Name of the public building renovation:	General Secondary School Complex No 3 in Sosnowiec
Index of Building Good Practice (ex. BGP n°1 – IT)	BGP n°2 – PL
Sub-group	schools
Description	<div data-bbox="343 734 564 1061" data-label="Text"> <p>Photo</p> </div> <div data-bbox="580 734 986 1030" data-label="Image">  </div>
Address	113 Piłsudskiego Str.; 41-200 Sosnowiec
Public sector contractor	Municipality of Sosnowiec - city with county rights
Architect	1. Regional Ecological Development Fund, Ltd. 57 Legionów Street; 43-300 Bielsko-Biała.
Engineering consulting	2. Construction part: „MABUD” Design Studio Danuta and Marian Mazgaj; 44-121 Gliwice 93/12 Kozielska Street. 3. Installation part: „UTEX” Co. 44-105 Gliwice, 27 Strzeleckiego Street.
Building Characteristics (surface, number of users, orientation etc.)	<ul style="list-style-type: none"> – floorage: 8.831 m²; – the heated surface volume: 33.537 m³; – number of users: 1.100; <p>Detached building with gym and swimming pool.</p>
Date of construction	1980-1982
Legal aspects (e.g.: protected property)	The construction work on this project was conducted upon building permit issued by Department of Architecture and Construction Administration of the City Hall in Sosnowiec, under constant supervision of the construction manager and inspector

		for construction supervision as well as installation supervision.
	Date of renovation	2010-2011
	Nature of the work (short description)	<ol style="list-style-type: none"> 1. The insulation of exterior walls and flat roof; 2. Total replacement of windows and external doors, along with partial wall up; 3. Full modernization of heating system; 4. Full modernization of hot water and pool water heating system; 5. Full modernization of the mechanical ventilation system with heat recuperator.
	Budget and source of financment	<p>Total cost: 4.758.006,88 PLN (1€ - approx. 4,3 PLN, it is: 1 106 513 €) including:</p> <ul style="list-style-type: none"> – municipality own funds 1.734.434,88 PLN (403 357 €), – Voivodship Fund for Environmental Protection and Water Management funds (grant) 363.474,00 PLN (84 529 €), – Voivodship Fund for Environmental Protection and Water Management funds (loan) 2.660.098,00 PLN (618 627 €).
AVAILABLE RESULTS		
What were the big problems (in terms of energy efficiency) to tackle?		<ol style="list-style-type: none"> 1. The insulation properties of external partitions were regulated by obligatory requirements concerning public buildings (Appendix No 2, The Decree of Infrastructure Minister dated 12 April 2002); 2. Due to the project size and long term of realization the schedule of construction work had to be fitted into teaching schedule of the school.
Has this building been already analysed and certified?		The energy audit in 2005 – conducted by a private company («SUN» Jerzy Piszczek; 8/18. B. Chrobrego Street; 42-500 Będzin).
What are the key innovative energy efficiency measures undertaken through the renovation?		<p>The energy audit suggested the following methods of improvements of energy efficiency:</p> <ol style="list-style-type: none"> 1. decrease of heat consumption through improvement of thermal properties of external partitions (walls, windows, door); 2. increase of heat system function through the replacement of overused devices for high efficiency units; 3. replacement of old energy-consuming electric motors and energy-driven units for new ones. It concerns the circulating water pump in heat installation but also pool water and vent system; 4. implementation of monitor and report system concerning the energy consumption – heat, electric energy and water.
What are the measurable		The project foresaw that the introduction of changes would cause:

<p>improvements in terms of energy efficiency (kWh saved)?</p>	<ul style="list-style-type: none"> - reduction of the surface rate of heat consumption for building heating of 72,7% (up to 76,9 [kWh/m²*K]), - reduction of heat consumption of 50% (about 1.108 [MWh/a]) - reduction of heat power demand of 50% (about 720 [kW]), - reaching the degree of heat recovery in mechanical ventilation up to 60-75 %, - heating efficiency gain of 0,895 (of 43%).
<p>Ecological Effect</p>	<p>As a result of the project the emission of gases and dust decreases by 61,98%, including :</p> <ul style="list-style-type: none"> - dust by 3,398 [Mg/a], - CO₂ by 1042,140 [Mg/a], - CO by 2,369 [Mg/a], - SO₂ by 4,553 [Mg/a], - NO_x by 1,162 [Mg/a], - B-a-P by 0,116 [Mg/a].
<p>ENERGY EFFICIENT MEASURES</p>	
<p>Energy efficient measures of the building envelope</p>	<ol style="list-style-type: none"> 1. Exterior walls insulation with polystyrene foam 14 cm thick, which reduced the overall heat-transfer coefficient up to 0,205-0,252 [W/m²*K]; 2. Insulation of flat roof with mineral wool with a thickness of 15-30 cm, which reduced the overall heat-transfer coefficient up to 196-0,231 [W/m²*K]; 3. Installation of windows with low heat - transfer coefficient - 1,3 [W/m²*K]; 4. Installation of exterior doors with a reduced heat- transfer coefficient - 2,0 [W/m²*K].
<p>Energy efficient measures of the heating system</p>	<ol style="list-style-type: none"> 1. Replacement of heat exchangers; 2. Replacement of hot water storage tanks; 3. Replacement of heat radiators and installation of thermostatic valves; 4. Modernization of water heating system including hot and cold water circulation; 5. Replacement of mechanical ventilation system and installation of new air-handling unit with heat recovery system.
<p>Energy efficient measures of</p>	<ol style="list-style-type: none"> 1. Assembly of heat consumption and regulation system in heating

<p>monitoring energy</p>	<p>system;</p> <ol style="list-style-type: none"> 2. Assembly of heat consumption and regulation system in hot water system; 3. Assembly of heat consumption and regulation system in pool water system; 4. Assembly of weather compensator; 5. Measurement of hot water consumption. 
<p>Energy efficient measures regarding behaviour</p>	<p>The training of service and maintenance staff of energy devices on energy-saving, cost-free and low-cost activities in building maintenance (planning to decrease power temperatures, zone temperature regulation and individual selection of temperature in each zone of the building and switching off unnecessary receivers).</p>
<p>Others?</p>	<p>Do not appear.</p>
<p>SUSTAINABILITY OF THE RENOVATION</p>	
<p>Design and choice of sustainable materials?</p>	<ol style="list-style-type: none"> 1. In order to assure the stability of the building the variety of maintenance works that are not directly connected with energetic efficiency were conducted : <ul style="list-style-type: none"> – the repair of roofing, – the repair of chimneys, – the exchange of gutters and spouts, – the removal of several trees threatening the school building, – the repair of stairs and sidewalks along buildings and sidewalks, construction of handicapped facilities. 2. All materials used during construction work were certified, had appropriate technical approval and fulfilled the national and EU

	standards, ensuring sustainability and high use values (the requirements were included into the specification of essential terms).
Sustainable building site management? (sorting waste, water...)	<ol style="list-style-type: none"> 1. The specification of essential terms and the contract did not obliged the contractor to sort and register waste during the repair of the object. 2. Maintenance inspections of technical conditions according to the warranty provided by the contractor, in terms of the provisions of technical use of internal installations. It also includes warranty services of installed devices. 3. Annual reporting on the energy consumption and the evaluation of technical condition of the installation (regulated by internal provisions of The City Hall Office- the owner of buildings).
Application of a valuation method (BREAM? HQE? Others?)	By the end of 2012 the energy performance characteristics, accordingly to methodology described in the appropriate national decree (it is: Decree of the Minister of Infrastructure dated 6th of November 2008).
BUILDING MAINTENANCE: life of the building after the renovation	
Is the building object of an energy monitoring? Is there a responsible manager?	<p>Now:</p> <ol style="list-style-type: none"> 1. Municipal Energy Team; 2. Maintenance men – school workers. <p>Target:</p> <ol style="list-style-type: none"> 1. Municipal Energy Team 2. The subject appointed during Tender Procedure who would be responsible for energy management in 80 educational institutions, incl. described building.
Who is in charge of the maintenance of the heating system of the building?	Trained maintenance men – school workers.
Who is in charge of the day to day energy management?	Municipal Energy Team of The City Hall in Sosnowiec.
Are there some specific measures to raise energy awareness and to implicate users in energy efficiency?	So far no specific measures were taken in order to raise energy awareness increase.
TRANSFERABILITY	
Transferable aspects	Transferability of planning (forming a partnership, choosing

<p>according to the partner in charge of this example of good practice</p>	<p>priorities, setting up a renovation building teams, etc.)?</p> <ol style="list-style-type: none"> 1. The elaboration of full energy audit including all variants of the improvement of the energy efficiency of the object. It is crucial to prepare the energy performance certificate for the chosen variant. 2. The final design of building modernization should include all of the solutions seized in the energy audit and any possible deviations or improvements should be consulted with the author of the energy audit. 3. The project should contain the waste management during the project, especially the disposal of waste being subject to utilisation. 4. If the period of time between the date of audit preparation and the decision of modernisation process is quite long the necessity to update the audit and the project ought to be considered. <hr/> <p>Transferability of the process of renovation (management structure, monitoring system, implication of end users, participation, etc.)?</p> <ol style="list-style-type: none"> 1. The supervision of construction and installation works in compliance with the project accordingly to used technology and diligence of performed work. 2. The control of used materials regarding requirements of the project and necessary certificates. 3. The supervision of installation and control of used machinery, measuring equipment and automated technology elements. <hr/> <p>Transferability of results (good solutions, adaptability, change of behaviour, etc.)?</p> <ol style="list-style-type: none"> 1. The supervision over all functioning devices which operation has an impact on the efficiency of individual components. 2. The reporting of energy use for the evaluation of the effectiveness of introduced changes. 3. The energy tests run in order to determine the actual energy performance and search for the methods of its improvement.
<p>Transferable aspects according to all the partners of Serpente project</p>	<p>The other partners will analyse and validate these good practices. During the process of validation the partners will take on the role of auditors because they will assess and improve the effectiveness and portability of good practices in their context.</p> <ol style="list-style-type: none"> 1. The method of preparation and performance of the object modernization. 2. Technical solutions, which have a significant impact on building energy efficiency. 3. Energy management system in the object and the method of its

	<p>introduction.</p> <p>4. System solution for energy management in all municipal buildings in the city of Sosnowiec. Organizational solutions for energy management in the buildings.</p> <p>The validation process will promote a systemic approach in local competent public administrations. Moreover, this process of selection and validation is a peer review and entails the mutual role of experts and auditors depending on typology of buildings and partner's expertise.</p>
SOURCES	
Publications	New Energy No 20(20)/2011: Andrzej Małkiewicz, Agnieszka Rauk. „Energy Test as method to reduce heat energy consumption in municipal buildings”.
Website	
Interviews	Western Daily No 45, 2011-11-10 „Sosnowiec Office accept the cheapest electric current”