



Municipality of Visoko (Bosnia & Herzegovina) *Case study concept notes*

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Problems in the heating sector







Micro location – Phase I



- 1. Secondary school "Hazim Šabanović"
- 2. Sports centre "Mladost"
- 3. Medical centre
- inadequate heating systems in these buildings
- huge losses
- high financial costs for heating
- 4. ~ 50 individual private houses
- 5. ~ 50 apartments in collective residential buildings







Micro location – Phase II







Secondary school "Hazim Šabanović"



Year of construction: 1983 Conditioned area: 5,047 m² Energy efficiency measures: PVC windows and doors, 10 cm EPS Fuel consumption: 50,000 m³ – natural gas Annual heating costs: 25,000 EUR





Secondary school "Hazim Šabanović"



- Energy efficiency rating: D (~180 kWh/m²)
- Current needs: 550 kW
- **Roof surface:** ≈ 3,000 m²









Sports centre "Mladost"



Year of construction: 1984

Conditioned area: 3,340 m²

Energy efficiency measures: none

Fuel consumption: 22,000 m³ of natural gas old boiler out of function

Building connected to Secondary school heating system, periodical use

Annual heating costs: 13,500 EUR (gas + electricity)



Average temperature < 5°C





OUT OF USE





Sports centre "Mladost"



- Energy performance certificate
- Energy efficiency rating: G (340 kWh/m²)
- Current needs: 900 kW
- Roof surface: $3,078 \text{ m}^2$

	Mjesto	Visoko							
	Vlasnik/Investitor/Korisnik	Općina Visoko							
ZA NOVE OBJEKTE	Izvođač								
ZA NOVE OBJEKTE	Godina izgradnje								
	$E_n = O_{H nd ref} / A_k$	kWh/m² a	PRORAČUN	ALTERNATIVNO					
			340						
	A+ ≤15								
E.	A ≤45								
BIBO	B ≤ 95								
UE O	C s								
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A NE	F								
AT Z/	G	>270	<						





Sports centre "Mladost"













Potential heating solutions



Solution 1: SOLAR/GEOTHERMAL COMBINED SYSTEM

Solution 2: WOODY BIOMASS

Solution 3: BIOGAS FROM WASTE Solution 4: WASTE HEAT FROM KAKANJ TPP





Potential heating solutions









PVGIS estimates of sun radiation



Important legal Important legal EUROPA > EC > JRC > DIR-C > RE > SOLAREC > PVGIS > Interactive maps > europe Contact Important legal				Month	H _d (kWh/m²)	H _m (kWh/m²)	T _{24h} (°C)	N _{DD}
e.g., "Ispra, Italy" or "45.256N, 16.9589E" Visoko, Bosnia and Herzegovina Search		cursor position: 43.996, 18.176 selected position: 43.995, 18.175	NEW: PVGIS 5 beta released. Read about it here and try it out!	Jan	1.67	51.8	1.5	467
			PV Estimation Monthly radiation Daily radiation Stand-alone PV	Feb	2.34	65.5	1.5	376
Latitude:	Longitude:	Go to lat/lon	Performance of Grid-connected PV	Mar	3.86	120.0	6.3	314
Map Satellite			Radiation database: Climate-SAF PVGIS V [What is this?]	Apr	4.67	140.0	11.2	127
		Ко	Installed peak PV power 1 kWp	May	5.23	162.0	15.1	40
			Estimated system losses [0;100] 14 %	Jun	5.93	178.0	19.1	16
			Fixed mounting options:	Jul	6.36	197.0	22.1	7
High School 🕤 Storska dvi ana Mladost		Slope [0:90] 28 ° Optimize slope	Aug	5.91	. 183.0	22.4	25	
	High School 🕤	Θ	Azimuth [-180;180] 40 ° 🗆 Also optimize azimuth	Sep	4.31	. 129.0	17.8	78
		(Azimuth angle from -180 to 180. East=-90, South=0)	Oct	3.20	99.2	12.0	214	
			Vertical axis Slope [0;90] 0 ° Optimize	Nov	1.88	56.4	8.2	373
			Inclined axis Slope [0;90] 0 • Optimize	Dec	1.28	39.6	2.4	538
			2-axis tracking	Yearly average	3.90	119.0	11.6	
			Horizon file Browse No file selected.	Total for year		1420		2575
food Restaurant aca Google	s Školski park Map data @	2017 Google Terms of Use	 + Output options Show graphs ✓ Show graphs ✓ Show horizon • Web page ○ Text file ○ PDF H_d: Average daily sum of global irration 					

Location: 43°59'41" North, 18°10'28" East

Elevation: 425 m a.s.l.

 h/m^2) H_m : Average sum of global irradiation (kWh/m²) T_{24h} : 24 hour average of temperature (°C) N_{DD}: Number of heating degree-days (-)





PVGIS estimates of sun radiation









Thanks for your attention!



