



# ENERGY CERTIFICATION AND AUDIT

NESICA

New Energy Solutions in Carpathian area

# ENERGY CERTIFICATION AND AUDIT

---

## Difference: energy certificate - energy audit



### ENERGY CERTIFICATE

The energy certificate is a proof of the qualitative energy properties of the building. Specifies how energy efficient the object is. The energy certificate is valid for 10 years. If a significant renovation of the building or energy systems is carried out, it is necessary to prepare a new certificate.

It defines:

- Expected consumption of the building
- Classification into energy efficiency classes

It is needed to:

- Building approval
- It is handed over when the building is sold or rented

### ENERGY AUDIT

An energy audit is an elaborated instruction for a specific object or company. Identifies the real state and weaknesses in energy management. The output of the audit is a proposal for effective measures to ensure savings.

The audit assesses the current situation and proposes measures :

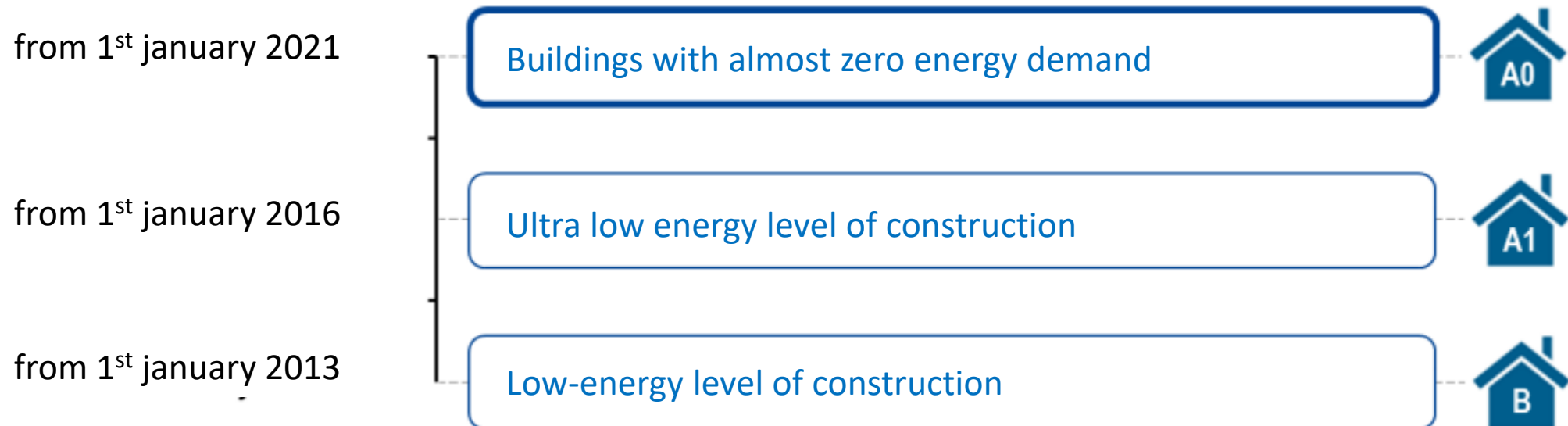
- Finding effective savings
- Reducing energy intensity
- Quantification of investment costs
- Quantification of economic benefit
- Calculation of return on investment
- Developed in alternatives

# ENERGY CERTIFICATION AND AUDIT

---

## Energy certification - Slovakia

Required levels of building construction since 2013



# ENERGY CERTIFICATION AND AUDIT

---

## Energy certification - Slovakia

Methods of evaluating the energy performance of a building



### **Project evaluation**

In the project phase for a building permit



### **Normalized evaluation**

In the phase of the finished object during building approval



### **Operational evaluation**

In the operation phase of the finished object

# ENERGY CERTIFICATION AND AUDIT

## Energy certification - Slovakia

Places of energy consumption in the building



Heating



Hot water preparation



Cooling and ventilation



Lighting

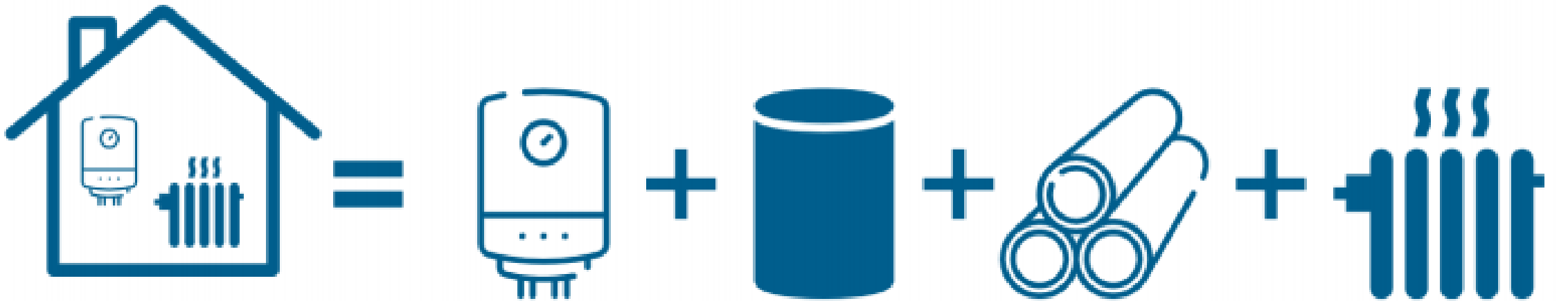
1	FAMILY HOUSES				
2	APARTMENT BUILDINGS				
3	ADMINISTRATION				
4	SCHOOL				
5	HOSPITALS				
6	HOTELS AND RESTAURANTS				
7	BUILDINGS FOR SPORT				
8	COMMERCE				

# ENERGY CERTIFICATION AND AUDIT

---

## Energy certification - Slovakia

Place of energy consumption - **HEATING**



HEATING SYSTEM

Heat source

Accumulation tank

Piping

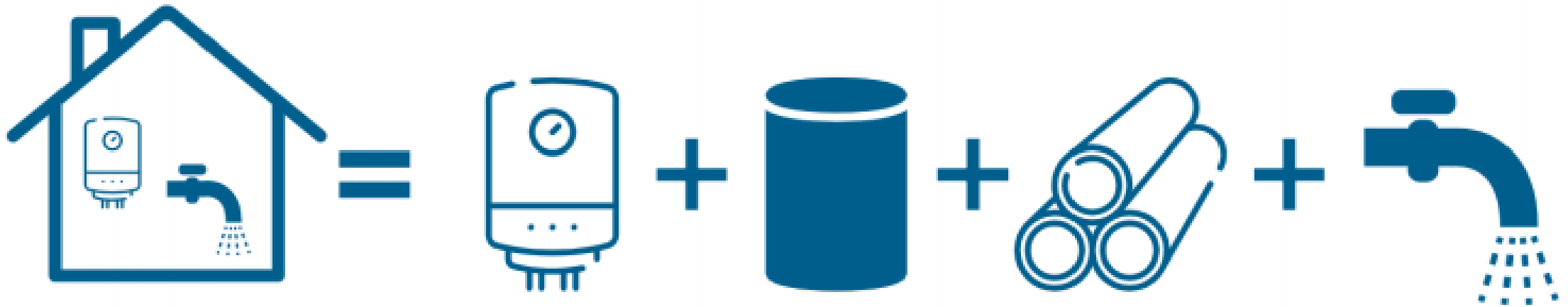
Heating surfaces

# ENERGY CERTIFICATION AND AUDIT

---

## Energy certification - Slovakia

Place of energy consumption – **HOT WATER PREPARATION**



**SYSTEM OF HOT  
WATER PREPARATION**

**Heat source**

**Accumulation tank**

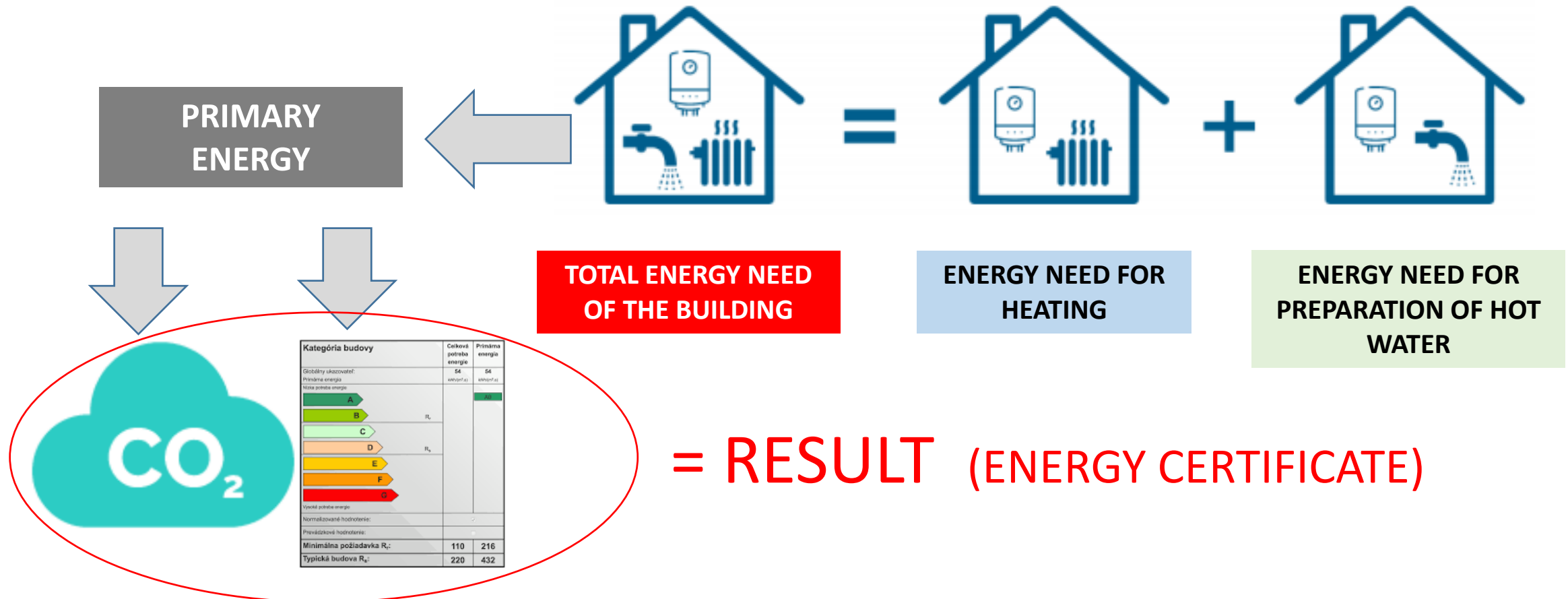
**Piping**

**Consumption**

# ENERGY CERTIFICATION AND AUDIT

## Energy certification - Slovakia

Total energy demand of the building -> primary energy -> certificate





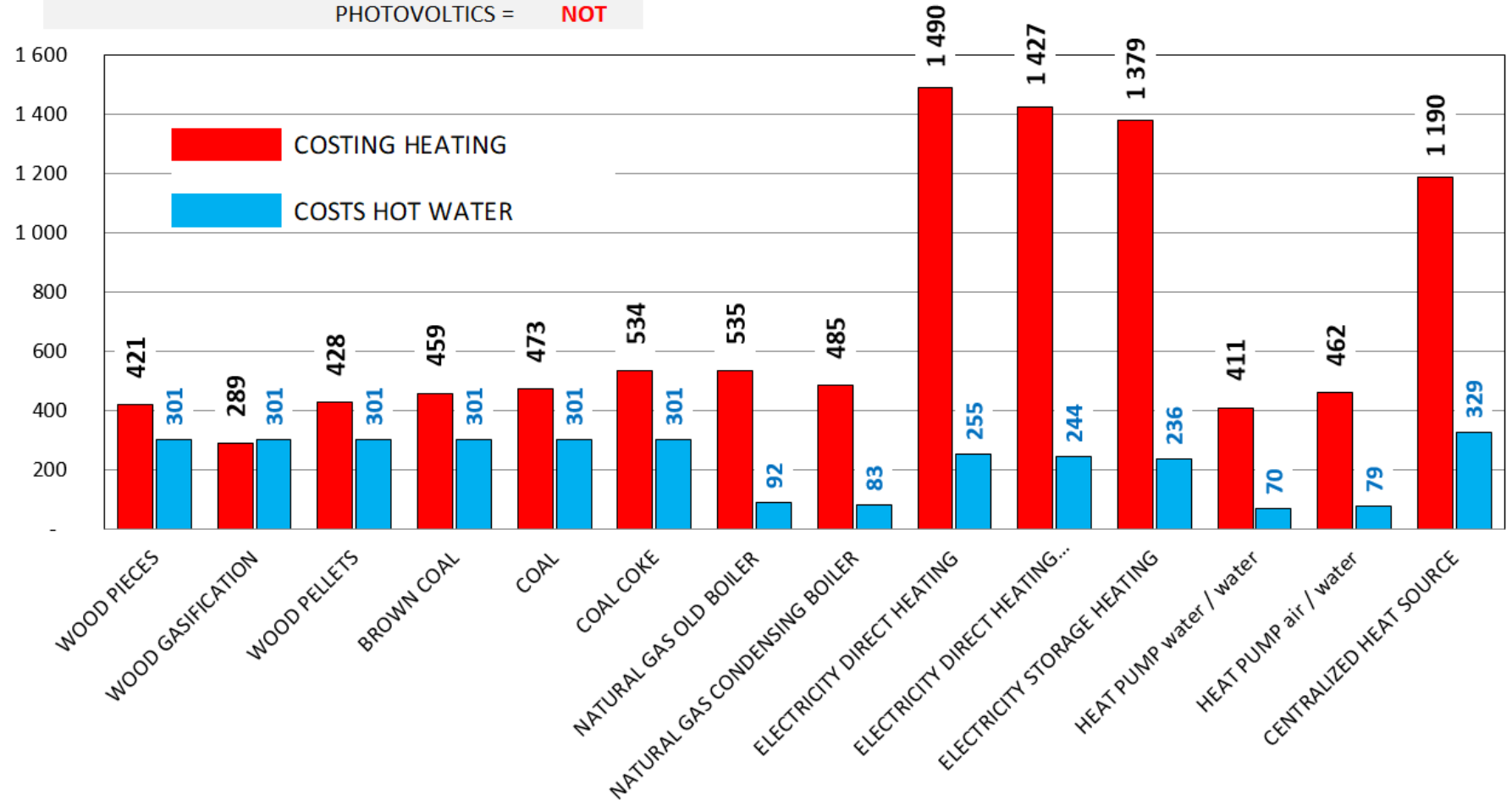
# ENERGY CERTIFICATION AND AUDIT

Kategória budovy	Celková potreba energie	Prírodná energia
Globálny ukazovateľ: Prírodná energia	54 kWh/m <sup>2</sup> .a	54 kWh/m <sup>2</sup> .a
Nízka potreba energie		301
A		
B	R <sub>s</sub>	
C		
D	R <sub>s</sub>	
E		
F		
G		
Výsledok potreby energie		
Normalizované hodnotenie:		
Prievádzkové hodnotenie:		
Minimálna požiadavka R <sub>s</sub> :	110	216
Typická budova R <sub>s</sub> :	220	432

## COMPARISON OF ANNUAL HEATING COSTS OF A FAMILY HOUSE BY TYPE OF FUEL FOR 2021 in €

RECOVERY = **YES**  
PHOTOVOLTICS = **NOT**

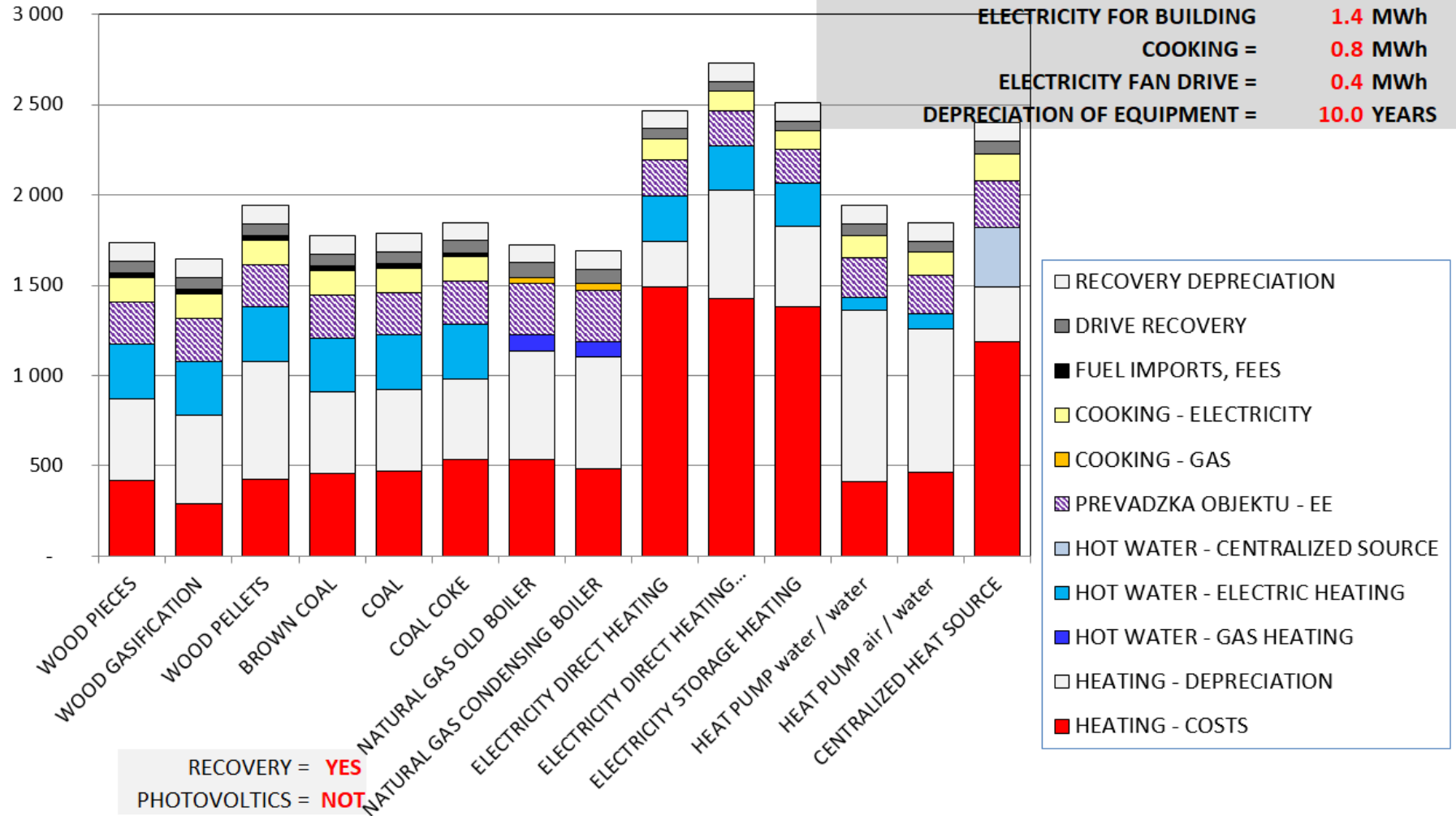
SOURCE PERFORMANCE = **8.00 kW**  
HEATING HEAT = **10.41 MWh/rok**  
HOT WATER HEAT = **1.78 MWh/rok**



# ENERGY CERTIFICATION AND AUDIT

Kategória budovy	Celková potreba energie	Prírodná energia
Globálny ukazovateľ: Prírodná energia	54 kWh/m <sup>2</sup> .a	54 kWh/m <sup>2</sup> .a
Nízka potreba energie		200
A		
B	R <sub>n</sub>	
C		
D	R <sub>n</sub>	
E		
F		
G		
Výsoká potreba energie		
Normalizované hodnotenie:		
Prévádzková hodnotenie:		
Minimálna požiadavka R <sub>n</sub> :	110	216
Typická budova R <sub>n</sub> :	220	432

## TOTAL ANNUAL ENERGY COSTS OF A FAMILY HOUSE FOR 2021 in €



# ENERGY CERTIFICATION AND AUDIT

Kategória budovy	Celková potreba energie	Prírodná energia
Globálny ukazovateľ: Prírodná energia	54 kWh/m <sup>2</sup> a	54 kWh/m <sup>2</sup> a
Nízka potreba energie		20
A		
B	R <sub>n</sub>	
C		
D	R <sub>s</sub>	
E		
F		
G		
Vysoká potreba energie		
Normalizované hodnotenie:		
Prévádzkové hodnotenie:		
Minimálna požiadavka R <sub>n</sub> :	110	216
Typická budova R <sub>n</sub> :	220	432

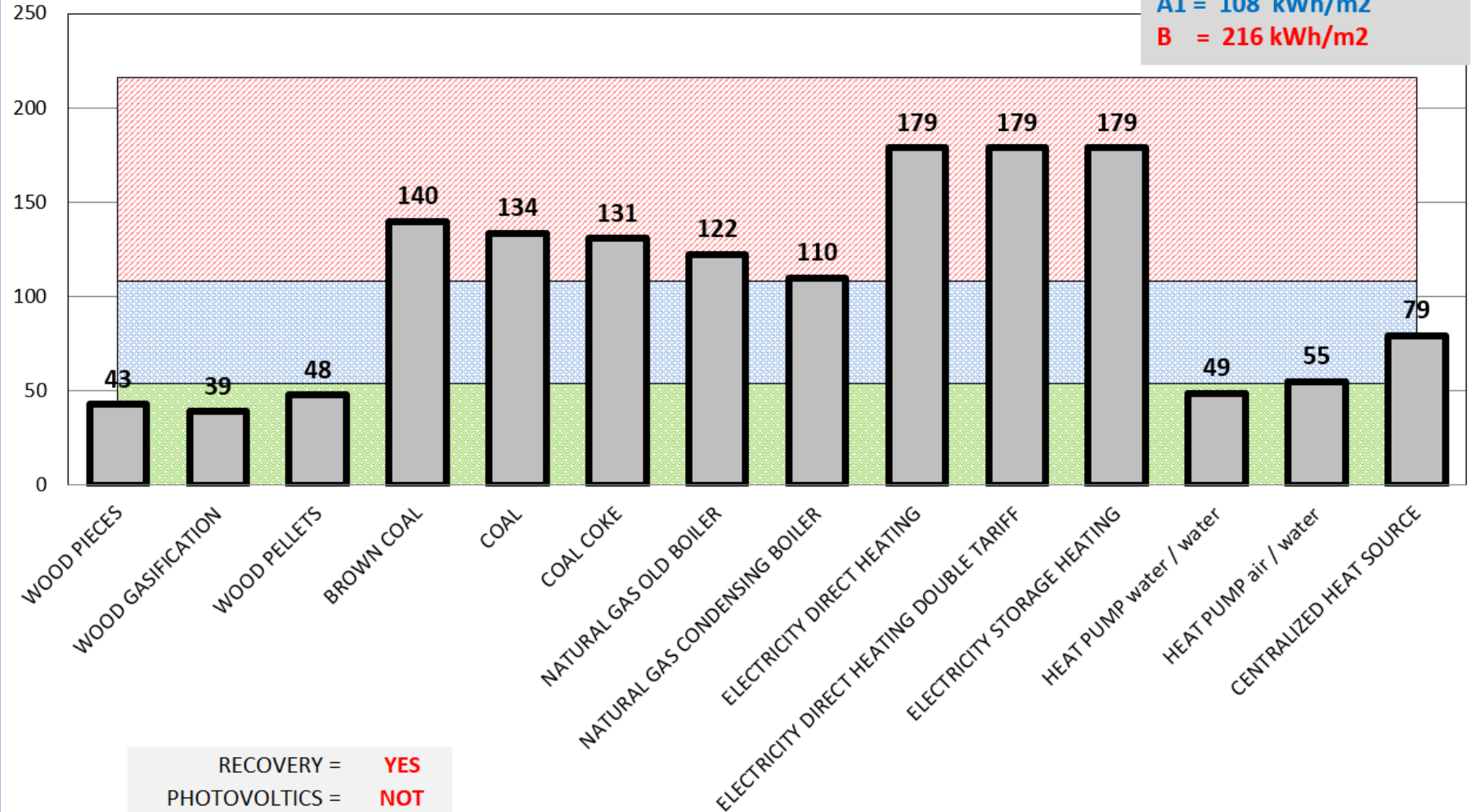
**CLASSIFICATION OF A FAMILY HOUSE ACCORDING TO THE ENERGY CERTIFICATE (FUEL TYPE TAKEN INTO ACCOUNT - PRIMARY ENERGY) FOR 2021**

UPPER CLASS LIMITS

A0 = 54 kW/m<sup>2</sup>

A1 = 108 kWh/m<sup>2</sup>

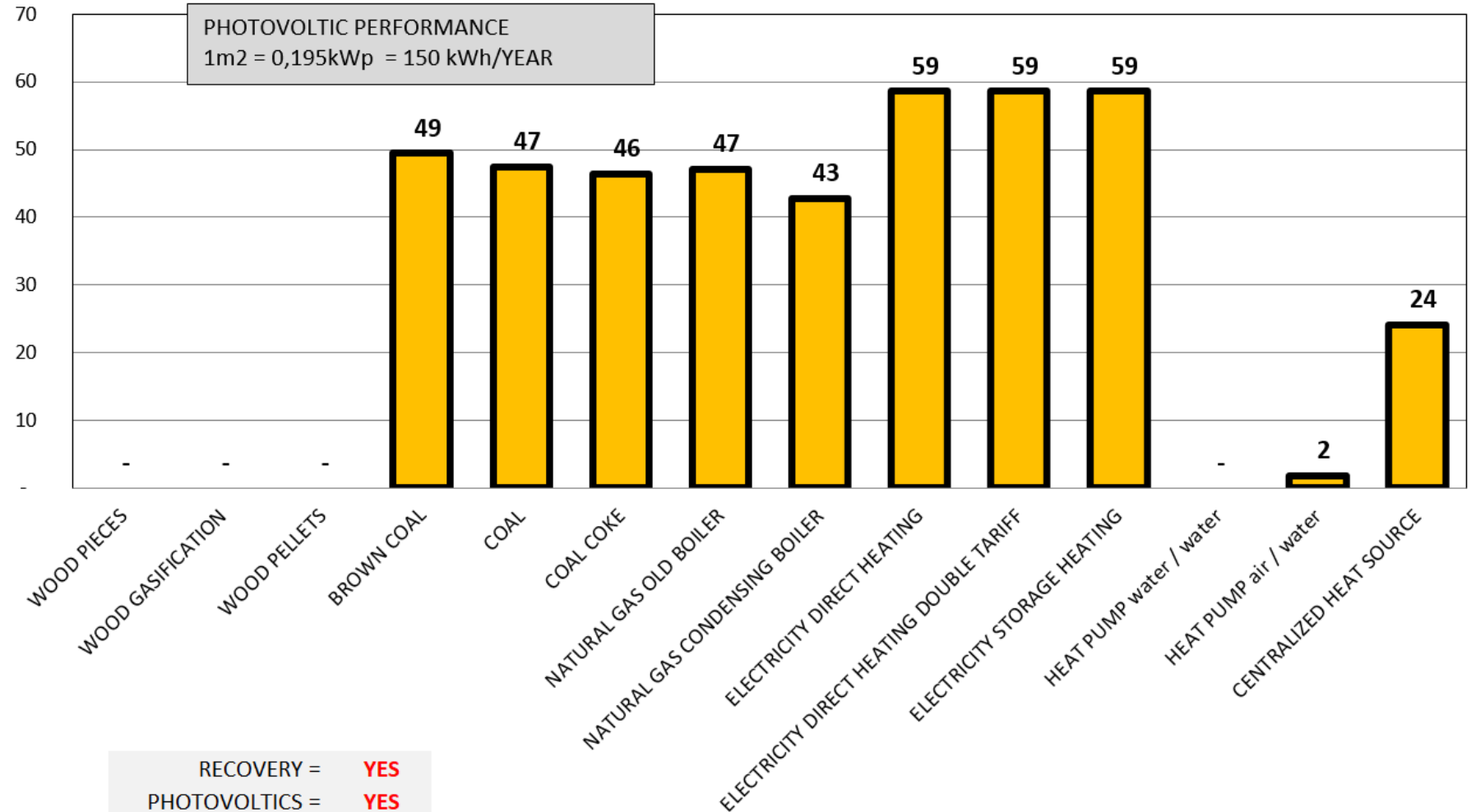
B = 216 kWh/m<sup>2</sup>



# ENERGY CERTIFICATION AND AUDIT

Kategória budovy	Celková potreba energie	Prímäna energia
Globálny ukazovateľ:	54	54
Prímäna energia	kWh/(m <sup>2</sup> .a)	kWh/(m <sup>2</sup> .a)
Nízka potreba energie		50
A	R <sub>1</sub>	
B		
C		
D	R <sub>2</sub>	
E		
F		
G		
Vysoká potreba energie		
Normalizované hodnotenie:		
Prevaládzkové hodnotenie:		
Minimálna požiadavka R <sub>1</sub> :	110	216
Typická budova R <sub>2</sub> :	220	432

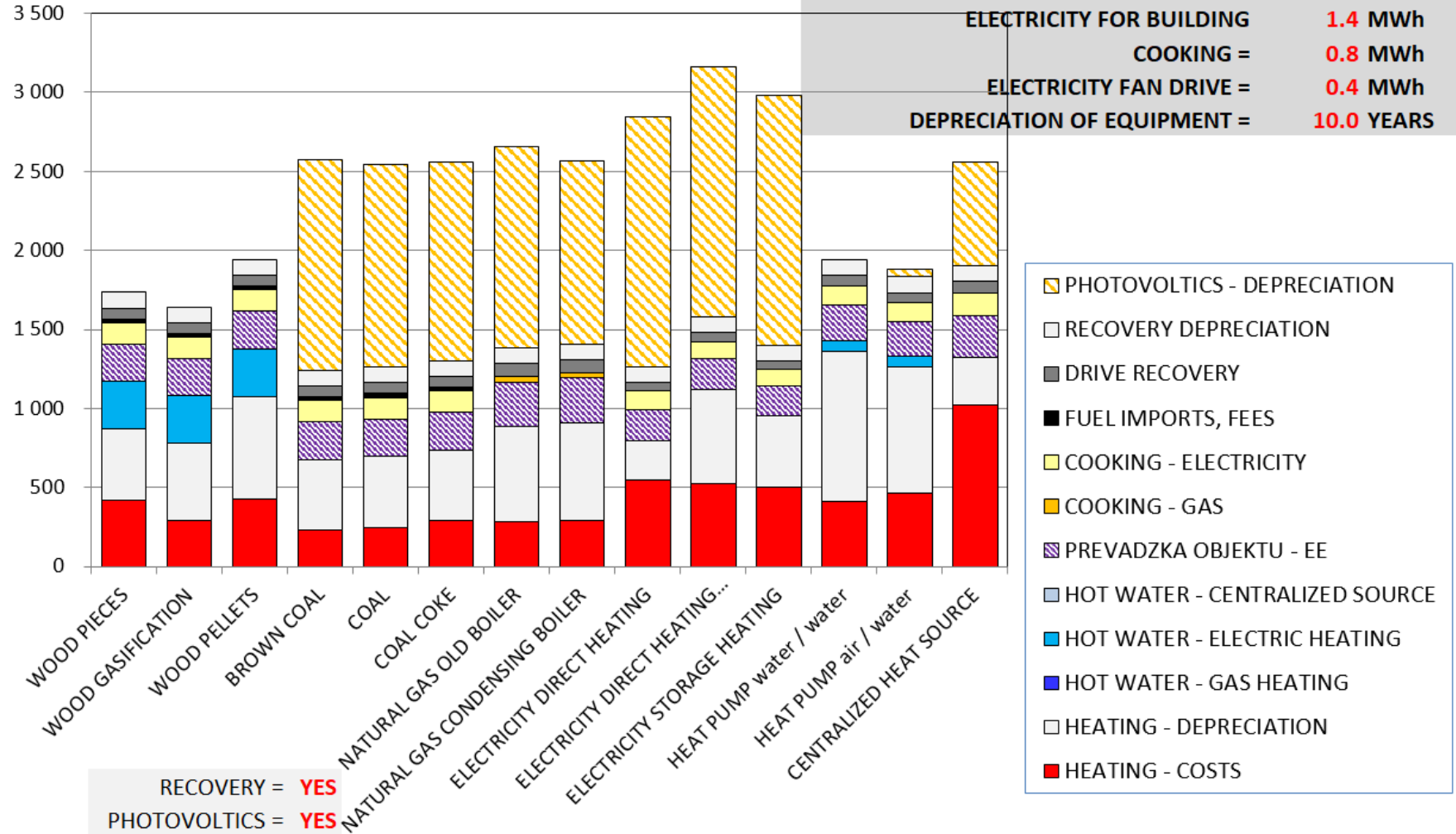
**PHOTOVOLTIC PANEL AREA REQUIRED (m<sup>2</sup>) TO ACHIEVE A0 OF A FAMILY HOUSE BY TYPE OF FUEL FOR 2021 in €**



# ENERGY CERTIFICATION AND AUDIT

Kategória budovy	Celková potreba energie	Prímäna energia
Globálny ukazovateľ:	54	54
Prímäna energia	kWh/m <sup>2</sup> .a	kWh/m <sup>2</sup> .a
Nízka potreba energie		20
A	R <sub>1</sub>	
B		
C	R <sub>2</sub>	
D		
E		
F		
G		
Vysoká potreba energie		
Normalizované hodnotenie:		
Prevádzkové hodnotenie:		
Minimálna požiadavka R <sub>1</sub> :	110	216
Typická budova R <sub>2</sub> :	220	432

## TOTAL ANNUAL ENERGY COSTS OF A FAMILY HOUSE FOR 2021 in €





# ENERGY CERTIFICATION AND AUDIT

Kategória budovy	Celková potreba energie	Primárna energia
Globálny ukazovateľ:	54	54
Primárna energia	kWh/m <sup>2</sup> .a	kWh/m <sup>2</sup> .a
Nízka potreba energie		50
A	R <sub>1</sub>	
B		
C	R <sub>2</sub>	
D		
E		
F		
G		
Vysoká potreba energie		
Normalizované hodnotenie:		
Prevažujúce hodnotenie:		
Minimálna požiadavka R <sub>1</sub> :	110	216
Typická budova R <sub>2</sub> :	220	432

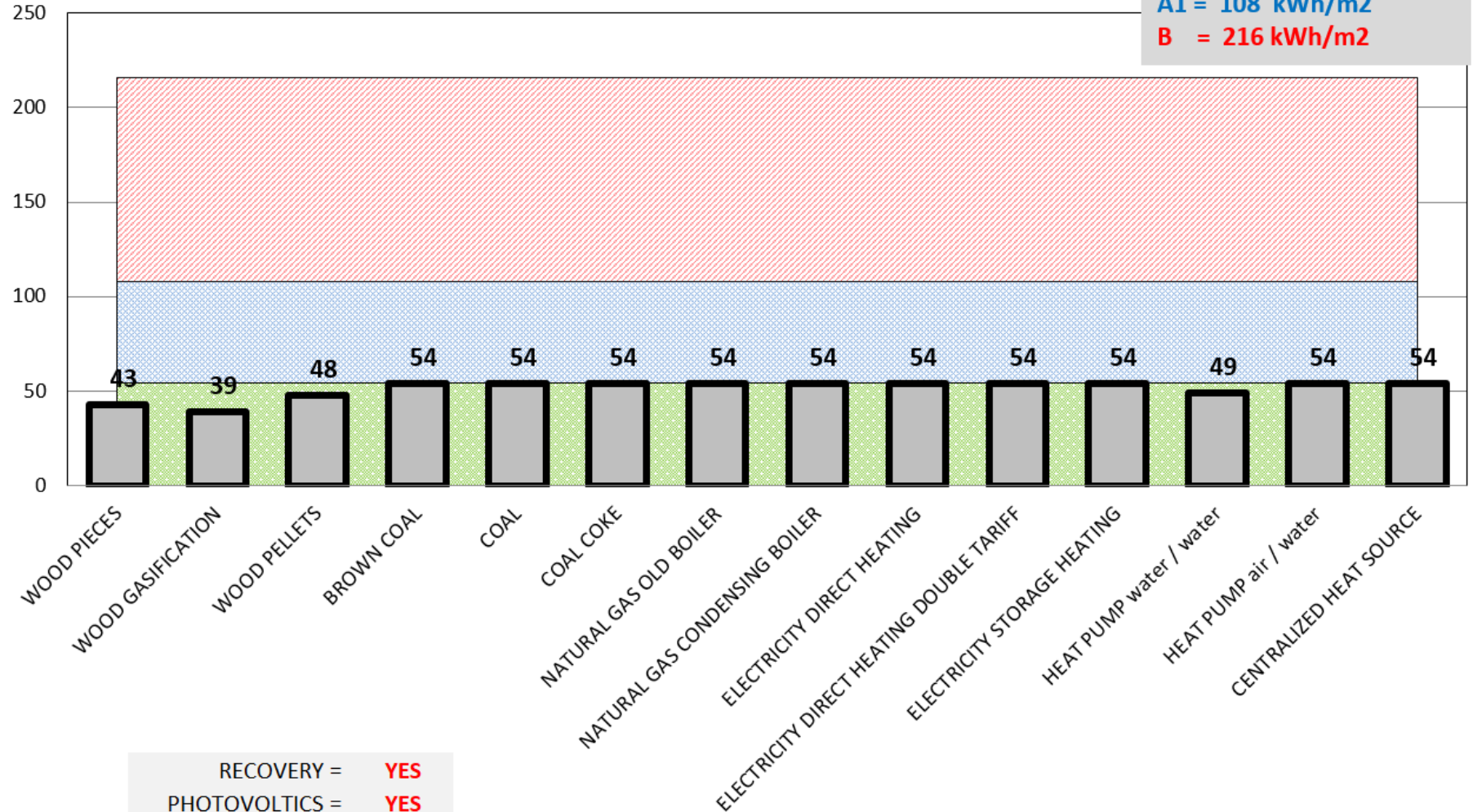
**CLASSIFICATION OF A FAMILY HOUSE ACCORDING TO THE ENERGY CERTIFICATE (FUEL TYPE TAKEN INTO ACCOUNT - PRIMARY ENERGY) FOR 2021**

UPPER CLASS LIMITS

A0 = 54 kWh/m<sup>2</sup>

A1 = 108 kWh/m<sup>2</sup>

B = 216 kWh/m<sup>2</sup>



# ENERGY CERTIFICATION AND AUDIT

---

## Energy AUDIT

Places of energy consumption in the building



Insulation



Heating



Preparation of hot  
water



Cooling and  
ventilation



Lighting

All points of consumption are evaluated

Draw up a list of effective measures to enhance energy efficiency

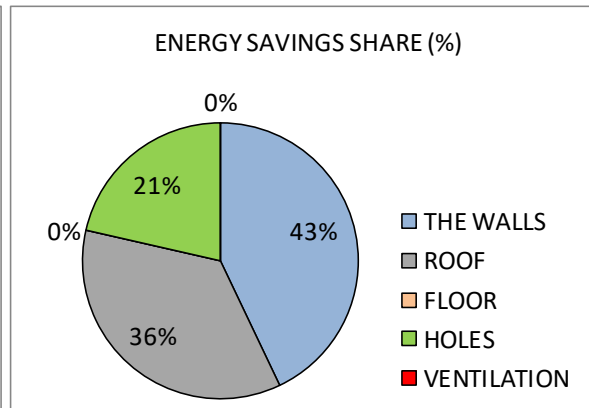
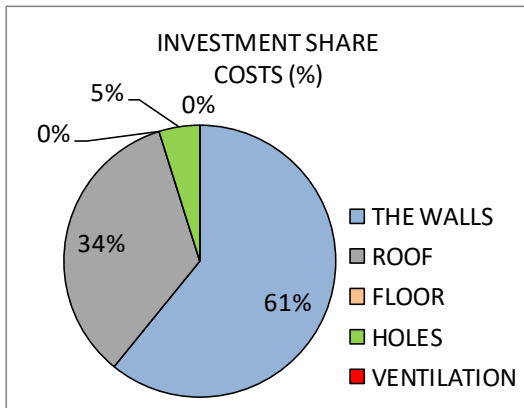
# ENERGY CERTIFICATION AND AUDIT

## Energy AUDIT



- All points of consumption are evaluated
- Draw up a list of effective measures to enhance energy efficiency

### Building adjustments



01 PROPOSED MEASURES - BUILDING ADJUSTMENTS		RECOMMENDATION
Investment cost of implementing the measure excluding VAT	( € )	173 498.70
Annual energy savings	(kWh/year)	67 479.59
Annual energy savings	( % )	47.61%
Annual energy cost savings	( € )	3 809.52
Life of the measure	( years )	30.00
Easy payback period	( years )	45.5

PERIPHERAL WALLS INSULATION		YES
Investment cost of implementing the measure excluding VAT	( € )	105 587.85
Annual energy savings	(kWh/year)	28 965.92
Annual energy savings	( % )	86.7%
Annual energy cost savings	( € )	1 635.25
Easy payback period	( years )	64.57

ROOF INSULATION		YES
Investment cost of implementing the measure excluding VAT	( € )	59 500.00
Annual energy savings	(kWh/year)	24 052.49
Annual energy savings	( % )	105.5%
Annual energy cost savings	( € )	1 357.87
Easy payback period	( years )	43.82

FLOOR INSULATION		NO
Investment cost of implementing the measure excluding VAT	( € )	41 350.00
Annual energy savings	(kWh/year)	0.00
Annual energy savings	( % )	0.0%
Annual energy cost savings	( € )	0.00
Easy payback period	( years )	-

HOLES REPLACEMENT		YES
Investment cost of implementing the measure excluding VAT	( € )	8 410.85
Annual energy savings	(kWh/year)	14 461.19
Annual energy savings	( % )	64.2%
Annual energy cost savings	( € )	816.40
Easy payback period	( years )	10.30

WINDOW VENTILATION		NO
Investment cost of implementing the measure excluding VAT	( € )	0.00
Annual energy savings	(kWh/year)	0.00
Annual energy savings	( % )	0.0%
Annual energy cost savings	( € )	0.00
Easy payback period	( years )	-



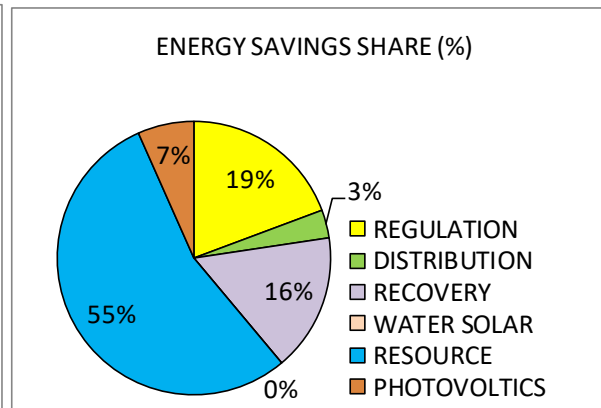
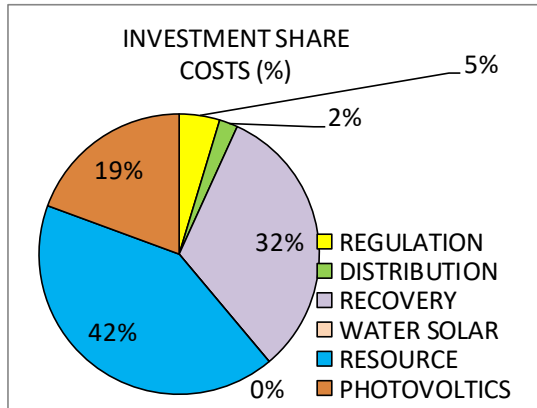
# ENERGY CERTIFICATION AND AUDIT

## Energy AUDIT



### Heating

- All points of consumption are evaluated
- Draw up a list of effective measures to enhance energy efficiency



O3 PROPOSED MEASURES - HEATING		RECOMMENDATION
Investment cost of implementing the measure excluding VAT	( € )	74 789.00
Annual energy savings	(kWh/year)	105 863.86
Annual energy savings	( % )	75.93%
Annual energy cost savings	( € )	3 141.69
Life of the measure	( years )	30.00
Easy payback period	( years )	23.81

HYDRAULIC REGULATION		YES
Investment cost of implementing the measure excluding VAT	( € )	3 500.00
Annual energy savings	(kWh/year)	21 765.87
Annual energy savings	( % )	20.4%
Annual energy cost savings	( € )	1 228.78
Easy payback period	( years )	2.85

RECONSTRUCTION OF DISTRIBUTION		YES
Investment cost of implementing the measure excluding VAT	( € )	1 589.00
Annual energy savings	(kWh/year)	3 740.92
Annual energy savings	( % )	3.9%
Annual energy cost savings	( € )	211.19
Easy payback period	( years )	7.52

RECOVERY		YES
Investment cost of implementing the measure excluding VAT	( € )	24 000.00
Annual energy savings	(kWh/year)	18 345.76
Annual energy savings	( % )	19.8%
Annual energy cost savings	( € )	1 035.70
Easy payback period	( years )	23.17

SOLAR HOT WATER		NO
Investment cost of implementing the measure excluding VAT	( € )	0.00
Annual energy savings	(kWh/year)	0.00
Annual energy savings	( % )	0.0%
Annual energy cost savings	( € )	0.00
Easy payback period	( years )	0.00

RESOURCE REPLACEMENT		YES
Investment cost of implementing the measure excluding VAT	( € )	31 200.00
Annual energy savings	(kWh/year)	61 353.60
Annual energy savings	( % )	71.9%
Annual energy cost savings	( € )	548.74
Easy payback period	( years )	56.86

EQUIPMENT DRIVE		YES
Investment cost of implementing the measure excluding VAT	( € )	0.00
Annual energy savings	(kWh/year)	-6 842.29
Annual energy savings	( % )	-20.0%
Annual energy cost savings	( € )	-386.28
Easy payback period	( years )	0.00

PHOTOVOLTICS		YES
Investment cost of implementing the measure excluding VAT	( € )	14 500.00
Annual energy savings	(kWh/year)	7 500.00
Annual energy savings	( % )	18.3%
Annual energy cost savings	( € )	1 337.39
Easy payback period	( years )	10.84

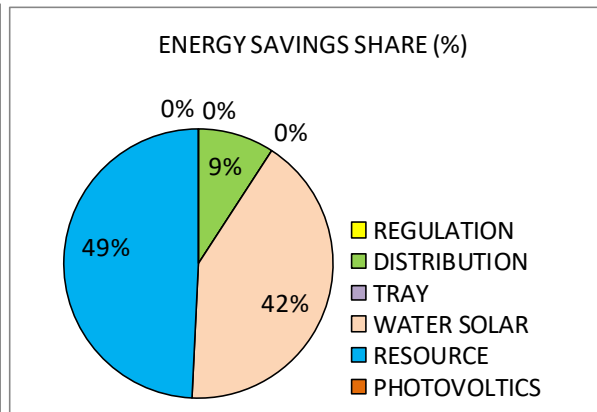
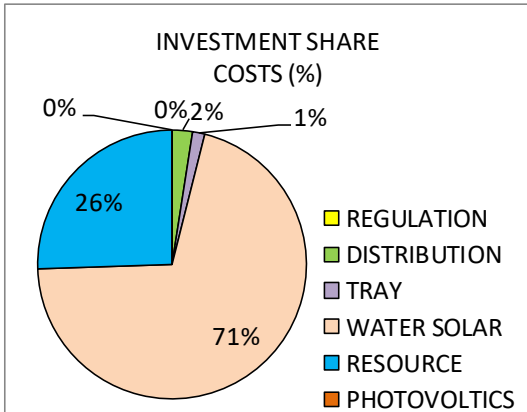
# ENERGY CERTIFICATION AND AUDIT

## Energy AUDIT



- All points of consumption are evaluated
- Draw up a list of effective measures to enhance energy efficiency

### Hot water



O4 PROPOSED MEASURE - HOT WATER		RECOMMENDATION
Investment cost of implementing the measure excluding VAT	( € )	81 500.00
Annual energy savings	( kWh/rok )	74 538.68
Annual energy savings	( % )	83.63%
Annual energy cost savings	( € )	2 464.25
Life of the measure	( roky )	30.00
Easy payback period	( roky )	33.07

HYDRAULIC REGULATION		NO
Investment cost of implementing the measure excluding VAT	( € )	850.00
Annual energy savings	( kWh/rok )	1 410.21
Annual energy savings	( % )	2.50%
Annual energy cost savings	( € )	79.61
Easy payback period	( roky )	10.68

RECONSTRUCTION OF DISTRIBUTION		YES
Investment cost of implementing the measure excluding VAT	( € )	2 000.00
Annual energy savings	( kWh/rok )	6 835.49
Annual energy savings	( % )	8.40%
Annual energy cost savings	( € )	385.89
Easy payback period	( roky )	5.18

TRAY		YES
Investment cost of implementing the measure excluding VAT	( € )	1 200.00
Annual energy savings	( kWh/rok )	0.00
Annual energy savings	( % )	0.00%
Annual energy cost savings	( € )	0.00
Easy payback period	( roky )	0.00

HOT WATER SOLAR		YES
Investment cost of implementing the measure excluding VAT	( € )	57 500.00
Annual energy savings	( kWh/rok )	31 000.00
Annual energy savings	( % )	41.1%
Annual energy cost savings	( € )	1 750.09
Easy payback period	( roky )	32.86

RESOURCE REPLACEMENT		YES
Investment cost of implementing the measure excluding VAT	( € )	20 800.00
Annual energy savings	( kWh/rok )	36 703.19
Annual energy savings	( % )	71.9%
Annual energy cost savings	( € )	328.27
Easy payback period	( roky )	63.36

EQUIPMENT DRIVE		NO
Investment cost of implementing the measure excluding VAT	( € )	0.00
Annual energy savings	( kWh/rok )	0.00
Annual energy savings	( % )	0.0%
Annual energy cost savings	( € )	0.00
Easy payback period	( roky )	0.00

PHOTOVOLTICS		NO
Investment cost of implementing the measure excluding VAT	( € )	0.00
Annual energy savings	( kWh/rok )	0.00
Annual energy savings	( % )	0.0%
Annual energy cost savings	( € )	0.00
Easy payback period	( roky )	0.00

# ENERGY CERTIFICATION AND AUDIT

## Energy AUDIT



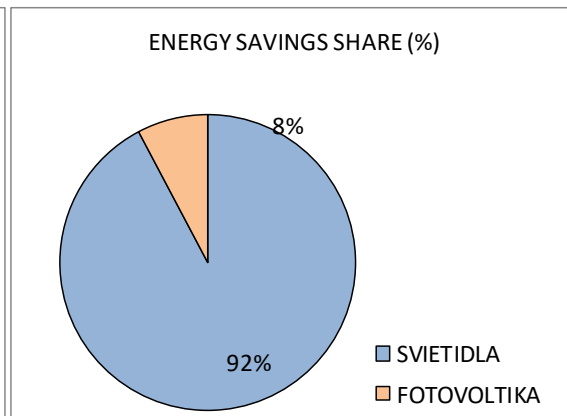
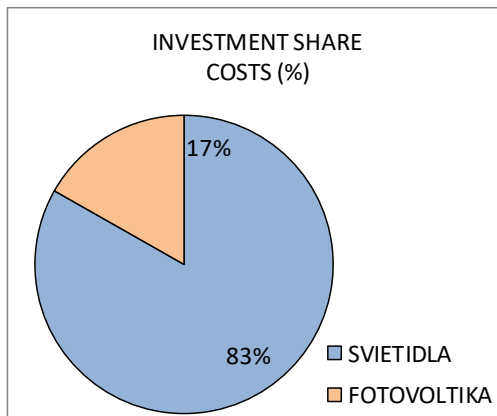
### Lighting

- All points of consumption are evaluated
- Draw up a list of effective measures to enhance energy efficiency

O2 PROPOSED MEASURE - LIGHTING		RECOMMENDATION
Investment cost of implementing the measure excluding VAT	( € )	34 557.17
Annual energy savings	(kWh/rok)	38 761.41
Annual energy savings	( % )	76.18%
Annual energy cost savings	( € )	6 911.89
Life of the measure	( roky )	15.00
Easy payback period	( roky )	5.00

LAMP REPLACEMENT		YES
Investment cost of implementing the measure excluding VAT	( € )	28 757.17
Annual energy savings	(kWh/rok)	35 761.41
Annual energy savings	( % )	70.29%
Annual energy cost savings	( € )	6 376.94
Easy payback period	( roky )	4.51

PHOTOVOLTICS		YES
Investment cost of implementing the measure excluding VAT	( € )	5 800.00
Annual energy savings	(kWh/rok)	3 000.00
Annual energy savings	( % )	19.85%
Annual energy cost savings	( € )	534.96
Easy payback period	( roky )	10.84



# ENERGY CERTIFICATION AND AUDIT

## Energy AUDIT

Measure	Energy saving (kWh/year)	Energy cost savings (€/year)	Investment costs excluding VAT (€)
O 1 = Comprehensive renovation of the building's exterior	67 480	3 810	173 499
O 2 = Installation of more energy efficient lighting fixtures	38 761	6 912	34 557
O 3 = Modernization of the heating system	105 864	3 142	74 789
O 4 = Modernization of the hot water preparation system	74 539	2 464	81 500
O 5 = Energy management of the area	-	-	
In sum	286 644	16 327	364 345

Investment cost for the implementation of the measure excluding VAT (€)	364 344.87
Annual energy savings (kWh / year)	286 643.54
Annual energy savings (%)	75.97%
Annual energy cost savings (€)	16 327.36
Life of the measure (years)	25.00
Simple payback period (years)	22.31

= RESULT  
(ENERGY AUDIT)