BOSNIA AND HERZEGOVINA
FEDERATION OF BOSNIA AND HERZEGOVINA
ADDITIONAL FINANCING FOR ENERGY EFFICIENCY PROJECT–ID P165405

TERMS OF REFERENCE FOR CONSULTANCY SERVICES

PREPARATION OF DETAILED ENERGY AUDITS
Ref. No. BEEPAF-P165405-CQ-02-CS-21-FBIH

1. Background:

The Government of Bosnia and Herzegovina (BH) has recognized the importance of energy efficiency to support sustainable economic growth and move towards EU accession and has received the financing for the Additional Financing for the Bosnia and Herzegovina Energy Efficiency Project (AF) from the International Bank for Reconstruction and Development (IBRD) credit funds. The project development objective is to demonstrate the benefits of energy efficiency improvements in public sector buildings and support the development of scalable energy efficiency financing models.

The project will be supported by a US$32 million IBRD/IDA credit funds for BH, which is made available to the two entities (US$ 19.23 million allocated to the Federation of Bosnia and Herzegovina (FBH). The project will consist of three components implemented separately in each entity:

Component 1: Energy efficiency investments in public facilities

Component 2: Support for the development of scalable financing mechanisms and capacity building

Component 3: Project Management

The project implementation unit (PIU) established within the Federal Ministry of Physical Planning (FMPP) will be responsible for the preparation, coordination, management and implementation of the project in the Federation of Bosnia and Herzegovina, including procurement, contracting, and payments of all goods, works and services related to the project.

This Terms of Reference (ToR) define the nature and detailed scope of an assignment to prepare Detailed Energy Audit.

2. Objectives

For the preparation and implementation of energy efficiency investments in public buildings (financed under Component 1 outlined above), the PIU on behalf of the FMPP ('the client') intends to hire a Consultant Company ('the consultant') who will prepare Detailed Energy Audits for 56 public buildings. The list of 56 buildings is provided in Annex 1.

Detailed Energy Audits will be performed from the annual list prepared by the PIU.
The Consultant(s) will refer to PIU for all issues that could appear in the execution of the task, and for decisions that would have to be made in reference to the present contract. The Federal Ministry of Physical Planning (FMPP) will be considered as the Client, even if some actions

and/or decisions will have to be coordinated with the relevant Ministries and with the local administration, schools, Hospitals, Cantons and Municipalities.

3. Description and Scope of Services:

3.1 GENERAL DEFINITION OF SERVICES

The services will be performed for the public buildings listed in Annex 1 of this ToR. The services to be provided by the Consultant are described in detail in section 3.2.

3.2 DETAILED SCOPE OF WORK

Detailed Energy Audit

Based on Regulation of Performing Energy Audit and Issuing Energy certification (Official Gazette Federation of B&H N^0 87/18), Detailed energy audit includes detailed energy analysis of all construction and technical systems in the building. For existing buildings, depending on the use, the energy costs through optimal 36 months are analyzed in order to model the energy consumption and estimate the energy needs in the building. The analysis, as appropriate, is completed with the necessary measurements of electric energy consumption estimates of heat losses through construction elements: external walls, roof, selling, floors, doors and windows, ventilation losses of the building, etc. which is important to determine the energy losses in the individual systems. The collected data is processed and the energy characteristics of the analyzed building are calculated. Proposed measures to increase energy efficiency must be classified into categories according to the energy, economic and environmental contribution, and if necessary, recommend detailed measurements of energy consumption.

Stages of a detailed energy audit are:

- Meet and talk with key people in the building - the manager and the users / owners
- Review of existing project documentation, if available
- Review and analyze the accounts with data on thermal and electric energy consumption and water for optimal 36 months (required only for public buildings)
- Develop the detailed energy audit of the building and the implementation of necessary consumption measurements, after identifying key gaps.
- Carry out the necessary measurements (Thermal imaging, flue gas analysis, measuring the level of lighting, electrical measurements, etc.)
- Revisit the conversation with key people in the building
- Analysis and processing of collected data
- Based od Rolebook of Minimun Energy performance Requirements (Official Gazette of Federation of B&H N^0 81/19) and Its Annesses(Official Gazette of Federation of B&H N0 85/19), identification of measures to improve energy characteristics of the building and increase energy efficiency (three scenarios) with an imperative to implement substantial measures.
- The energy, economic and environmental evaluation of the proposed measures
- Preparation of the report with conclusions and recommendations, as well as presentations to key people
- Brief table rview of basic informations: measures to be implemented, index of savings, payback period, number of users, heated area, construction period, fuel before and after retofitting ...

4. Output/Deliverables:

The deliverables consist of Detailed Energy Audit Report and Summary of Detailed Energy Audit Report for 56 public buildings. The list of 56 buildings is provided in Annex 1.

Detailed Energy Audit Report for each building shall be submitted on-line into the Register of Energy Certificates in Federal Ministry of Physical Planning (REC), three (3) hard copies and one (1) electronic copy (PDF) and Excel or other format for calculations. This document prepared by the Consultant should be in local language. A Detailed Energy Audit study should have a structure specified in the Annex 2 in line with THE GUIDELINES FOR EXECUTING ENERGY REVIEWS FOR NEW AND EXISTING OBJECTS WITH A SIMPLE AND COMPLEX TECHNICAL SYSTEM // Sarajevo, august 2009. year approved by the Federal ministry of regional planning.
NOTE: The contents of the DEA must be sorted according to Annex 2.

Summary of Detailed Energy Audit Report for each building shall be submitted in three (3) hard copies and one (1) electronic copy (PDF) and Excel or other format for calculations. This document prepared by the Consultant should be in English. A Summary of Detailed Energy Audit Study should have a same structure as Detailed Energy Audit Study but limited to 10 pages and also in the Excel form specified in the Annex 3.

5. Description of potential energy efficiency measures

The investment could include but not be limited to the following energy efficiency measures:

5.1. Retrofitting of windows

The type of reconstruction will be selected from the following options:

- Full replacement of windows with no reduction of glazing area (optimization of windows opening systems, technical specification of glass package, window frame material)
- Window repair and fitting of mountings

Window replacement with eventual reduction of glazing area whenever the lighting level remains in compliance with the standards, for instance in the corridors of a school

5.2. Roof insulation and renovation

The reconstruction types will be selected from the following options:

- Full/Partial replacement of roofing, with insulation preserving the existing structure (mandatory replacement of roof covering such as asbestos-cement for safety reasons)
- Repair and insulation of a pitched/flat roof
- Replacement and insulation of a pitched roof
- Other options of reconstruction.

5.3. Wall insulation

The insulation types will be selected from the following options:

- Outside insulation with a normalized technology including a good glue mortar quality, insulation material, an external coating of glue mortar with mesh, a finishing coat and plastering
- Eventually, other options of insulation from outside and/or inside.

5.4. Thermostatic and balancing valves

Installation of thermostatic radiator valves and balancing valves on the risers in order to improve the radiator and network efficiency as a complement to the temperature control that will be installed in the new substations. Local temperature control shall be implemented consistently by use of TRVs in case building envelope EE measures are applied, particularly when windows are replaced; as a rule, prior to the installation of TRVs radiators should be cleaned (washed) while all radiators fittings should also be replaced.

5.5 Automatic central heating control

Automatic central heating control as low cost EE investment should be properly addressed and applied consistently regardless of the heat source and fuel used. This measure should also include installation of balancing valves and conducting heating installation hydraulic balancing. This is obligatory measure to be propose/applied.

5.5. Heat substation

Technical specifications for the parts of the substations that are to be replaced or modernized with the aim of controlling automatically the water temperature according to the outside air temperature, and/or implementing variable speed pump if cost effective. This is obligatory measure to be propose/applied.

5.6. Reconstruction of boiler houses (including fuel conversion of boilers)

The measure could be a suggestion for total or partial boiler replacement including a fuel switch for the boiler.
The measure could include works both for dismantling the old equipment and for supplying and installing a new one. Economic comparison between all options (retrofit, replacement, change of fuel use of biomass) will be provided.

5.7. Rehabilitation of lighting systems

The measures could be to change or improve the lighting system in the room and in the buildings As a rule, in the schools the rehabilitation of lighting will include the full replacement of existing lighting by efficient luminaries and bulbs to ensure adequate and proper lighting in the classroom, and to improve the learning environment. Economic comparison between options proposed, in particular when the new efficient lighting implies the retrofitting of the electrical network and cabinets. This measure should not only focus on replacement of incandescent bulbs with LED bulbs (CFLs should not be used) but also to replacement of fluorescent tubes with LED tubes with or without replacement of all luminaries;

5.8. Potential Limited Ancillary Measures

Limited additional funding (up to 10 percent of total investment costs per building) may be provided to finance 'ancillary measures' (i.e., energy efficiency measures with longer payback periods or other measures) to ensure reasonably full renovation or longevity of the investment (e.g., replacement of old gutters and down spouts to ensure that building envelops do not get damaged by water).

6. Time Schedule

The time schedule for the Consultant(s) is as follows:

The deliverables shall be submitted not later than 120 calendar days following signature of contract.

7. Qualification requirements and basis for evaluation

The Consultant should be a consulting firm with the relevant project experience - specialized knowledge in the field of energy efficiency in the building sector. Experience in implementing similar programs / projects / consultancy services in the field of energy efficiency in the building sector in the Federation of Bosnia and Herzegovina as well as previous experience in implementing energy audits confirmed through references and / or contracts for at least fifteen (15) detailed energy audits in public buildings in the past three (3) years (references must be submitted to prove the details of the contract with the investor, proof of the value of the project , etc.).

Interested consultants must provide information indicating that they are qualified to perform the services by fulfilling following requirements:

- Company information: name, registration, address, telephone number, facsimile number, year of establishment, contact person for the project, fields of expertise;
- Hold a license from Federal Ministry of Physical Planning for energy audit and certification of buildings for complex building systems in FB&H, or if not available will be obtained within 30 days as condition to sign the contract. Such consultant shall provide a confirmation along with the EOI that he will secure the license in case he is selected to submit technical/ financial proposals
- Details of experience in minimum fifteen (15) similar assignments undertaken in last three (3) years including value of consulting services and value of works, location, name of the Client, type of services provided, contract period of execution.
- The Consultant will justify its capabilities through engagement of professional staff for the execution of project activities in defined timeframes, including all the necessary specialist engineers. For this purpose, the consultant will submit a CV of engineers who will work on the project. Work should be done by a consulting firm consisting of experts who have the following skills and credentials:

- Key personnel
  - At least six (6) university graduate mechanical engeneers', with minimum five (5) years' experience

- At least nine (9) additional staff members, from which two (2) should be economist that will be engaged to this project and another seven (7) (e.g. architect, civil engineers, electro engineers etc.), with minimum three (3) years' experience
- Engineers have to have proof that they have passed examination in detailed energy auditing and certification and minimum of two years of consultancy experience in the field of energy efficiency,

- If the case may be, form of association (sub-contractor or joint venture up to three members) for the execution of the contract and identification of the leading company. In the case of joint venture all members shall be jointly and severally liable for the entire assignment. Same information, including licences, must be submitted for the leading company and the associate companies;

Annex 1 - The list of buildings with details

No. #	Building Name	Canton	City	Address	Name and Position of the Contact Person	Phone Number	Heated area m2
1	Federalni zavod za agropedologiju 1	KS	Sarajevo	Dolina 6,71 000 Sarajevo	Adnan Išerić	033-268-262 Adnan.Iseric@fzap.gov.ba	350
2	Federalno ministarstvo raseljenih osoba i izbjeglica Federacije BiH (Sarajevo-Centar, Terezije 56)	KS	Sarajevo	Terezije 56, 71 000 Sarajevo	Denis Musić	Tel.: +387 33/215-084 Mob.:+387 61/137-210 Email: denis.music@fmroi.gov.ba	410
3	FMF KPU Sarajevo- porezna ispostava Novo Sarajevo	KS	Sarajevo	Envera Šehovića 2, 71 000 Sarajevo	Anesa Fukarić–Šefica Porezne ispostave	Tel.: +387 (0)33 653-771 Fax: 640-780 anesa.fukaric@fpu.gov.ba	427
4	FMUP - sjedište, FUP - sjedište, Zavod za zdravstvenu zaštitu zaposlenika MUP KS (Mehmeda Spahe 7, Sarajevo)	KS	Sarajevo	Mehmeda Spahe 7, 71 000 Sarajevo	Nijaz Džaferović- Odsjek za materijalne poslove FMUP	Nijaz.Dzaferovic@fmup.gov.ba	Cca 12.500
5	FMUP- Federalna uprava policije, Policijska akademija, objekat E	KS	Sarajevo	Dobojska 32, 71 000 Sarajevo	Meho Husejnović, šef Odsjeka za održavanje i usluge	Emir Muminović 033-280-025	1.559,96
6	FMUP- Federalna uprava policije, Policijska akademija, Paviljon B	KS	Sarajevo	Dobojska 32, 71 000 Sarajevo	-II-	-II-	1650
7	FMUP- Federalna uprava policije, Policijska akademija, Paviljon D	KS	Sarajevo	Dobojska 32, 71 000 Sarajevo	-II-	-II-	790

8	FMUP- Federalna uprava policije, Policijska akademija, Paviljon C	KS	Sarajevo	Dobojska 32, 71 000 Sarajevo	-II-	-II-	850
9	FMUP- Federalna uprava policije, Policijska akademija, Centar za forenzička ispitivanja	KS	Sarajevo	Dobojska 32, 71 000 Sarajevo	-II-	-II-	2.500
10	FMUP- Federalna uprava policije, Policijska akademija, Paviljon H	KS	Sarajevo	Dobojska 32, 71 000 Sarajevo	-II-	-II-	498,10
11	FMUP- Federalna uprava policije, Policijska akademija, Paviljon G	KS	Sarajevo	Dobojska 32, 71 000 Sarajevo	-II-	-II-	350
12	Federalni zavod za statistiku	KS	Sarajevo	Zelenih beretki 26, 71 000 Sarajevo	Sanela Čengić Pomoćnik direktora	Tel: +387 (33) 407-004 Fax: +387 (33) 226 151 sanela.cengic@fzs.ba	1.200
13	Zavod za javno zdravstvo FBiH - Centar za zaštitu od zračenja	KS	Sarajevo	Tahtali sokak 17, 71 000 Sarajevo	Alfred Vidić	Tel. +38733268280 Mob. +38761485991 Fax. +38733564602 e-mail: a.vidic@zzjzfbih.ba czrcn1@zzjzfbih.ba	489,88
14	Federalni zavod za geologiju	KS	Sarajevo	Ustanička 11 Ilidža-Sarajevo	Senad Zolj	Senad.Zolj@fzzg.gov.ba	713
15	Federalni agromediteranski zavod, Laboratorij za zdravstvenu ispravnost namirnica Buna	HNŽ/K	Mostar	Buna b.b. 82202 Mostar	Nino Rotim Marija Miletić	tel.: + 387 36 33 50 50 marija.miletic@faz.gov.ba ured@faz.gov.ba	383
16	Ured za reviziju institucija u FBiH, Finansijsko informatička	HNŽ/K	Mostar	Dubrovačka b.b. 88 000 Mostar	-	ruzica.bioksic@fpu.gov.ba hrvoje.kristo@fpu.gov.ba info@fia.ba.	1161

	agencija FIA, PU - KPU Mostar - PI Grada Mostara						
17	Federalni hidrometeorološki zavod, mjerna stanica Mostar	HNŽ/K	Mostar	Kneza Trpimira 2, 88 000 Mostar	Almir Bijedic Direktor FHMZ	almir.bijedic@fhmzbih.gov.ba	570
18	Federalni agromediteranski zavod- uprava	HNŽ/K	Mostar	Biskupa Ćule 10, 88 000 Mostar	Nino Rotim Marija Miletić	tel.: + 387 36 33 50 50 marija.miletic@faz.gov.ba ured@faz.gov.ba	432
19	Federalni agromediteranski zavod- Agrokemijski i fitosanitarni laboratorij	HNŽ/K	Mostar	Biskupa Ćule 10, 88 000 Mostar	Nino Rotim Marija Miletić	tel.: + 387 36 33 50 50 marija.miletic@faz.gov.ba ured@faz.gov.ba	340
20	KPU Tuzla- porezna ispostava Lukavac (Lukavac, Trg slobode bb)	TK	Lukavac	Trg slobode b.b. 75 300 Lukavac	Elvir Dedić- seš ispostave	elvir.dedic@fpu.gov.ba Tel.: 035/366-877	458,2
21	Federalni hidrometeorološki zavod, Depadans 1 i Hidrologija	KS	Sarajevo	Baradakčije 12, 71 000 Sarajevo	Almir Bijedic Direktor FHMZ	almir.bijedic@fhmzbih.gov.ba	265
22	Federalni hidrometeorološki zavod, Depadans 2 meteorologija	KS	Sarajevo	Baradakčije 12, 71 000 Sarajevo	Almir Bijedic Direktor FHMZ	almir.bijedic@fhmzbih.gov.ba	168
23	Dom policije	KS	Sarajevo	Tina Ujevića 1 Sarajevo	Meho Husejnović, šef Odsjeka za održavanje i usluge	meho.husejnovic@fup.gov.ba	3030
24	Zgrada Vlade Federacije Bosne i Hercegovine u Sarajevu	KS	Sarajevo	Hamdije Čemerlića 2, 71 000 Sarajevo	Jelena Dreca-Služba za zajedničke poslove organa i tijela FBIH	jelena.dreca@szpfbih.gov.ba 033-211-534	24.600,55
25	Federalno ministarstvo kulture i sporta - (korisnici: FM obrazovanja i nauke, Fondacija za kinematografiju, Fondacija za muzičke, scenske i likovne umjetnosti, Fondacija za izdavaštvo, Fondacija za bibliotečke djelatnosti, Odjek -	KS	Sarajevo	Obala Maka Dizdara 2, 71 000 Sarajevo	Jelena Dreca-Služba za zajedničke poslove organa i tijela FBIH	jelena.dreca@szpfbih.gov.ba 033-211-534	1.748,20

	Revija za umjetnost, nauku i društvena pitanja i Zavod za zaštitu spomenika)						
26	Porezna uprava FBiH	KS	Sarajevo	Husrefa Redžića 4, 71 000 Sarajevo	Jelena Dreca-Služba za zajedničke poslove organa i tijela FBIH	jelena.dreca@szpfbih.gov.ba 033-211-534	3.413,27
27	Poslovni objekat - Banovinska bb, Stolac	HNŽ/K	Mostar	Banovinska bb, 88 360 Stolac	Jelena Dreca-Služba za zajedničke poslove organa i tijela FBIH	jelena.dreca@szpfbih.gov.ba 033-211-534	410,13
28	JU Osnovnaškola „Pazar“ Tuzla	TK	Tuzla	Pazar 1, 75 000 Tuzla	Emina Halilčević	035/362-980	1997
29	JU Osnovnaškola Lukavac Grad Lukavac	TK	Lukavac	Derviš Sušić bb, 75 300 Lukavac	Amra Bektić	035/554-199	3169,43
30	JU Druga osnovnaškolaŽivinice	TK	Živinice	Druga ulica 46,75 270 Živinice	Mirela Salkić	035/775-045	2248
31	JU Srednjaekonomsko – trgovinska škola Tuzla	TK	Tuzla	Muhameda Hevajije Uskufija 3, 75 000 Tuzla	Edis Hodžić	035/252-340	4080
32	Zgrada Vlade Tuzlanskogkantona - bivša SODASO zgrada	TK	Tuzla	Slatina broj 2, 75 000 Tuzla	Zdenka Marjanović Samir Bilajac	061437621 061146586	2886
33	Grad Mostar, Vatrogasna služba objekt 1. i objekt 2.	HNK/Ž	Mostar	(1) ul. Kneza Višeslava 75. (2) ul. Sjeverni logor bb.	Petar Jurić Darko Knezović	063 311 375 063 318 101	(1) 1.153 (2) 4.708
34	Grad Mostar, Služba za katastar,	HNK/Ž	Mostar	ul. Bulevar narodne revolucije bb.	Sanja Hrvić Đuliman Darko Knezović	061 175 339 063 318 101	335
35	Grad Mostar, dječiji vrtić Cernica,	HNK/Ž	Mostar	ul. Rade Bitange bb.	Đenana Šegetalo Darko Knezović	O63 850 195 063 318 101	780

36	Grad Mostar, dječji vrtić Mrvica,	HNK/Ž	Mostar	ul. Hrvatske mladeži bb.	Danijela Kegelj Darko Knezović	063 337 531 063 318 101	446
37	Grad Mostar, Ambulanta Ilići,	HNK/Ž	Mostar	ul. Ilići bb.	Miroslav Ivanković	063 898 908	234
38	Grad Mostar, MC Pavaroti,	HNK/Ž	Mostar	ul. Maršala Tita bb.	Tajma Guzin Darko Knezović	061 528 988	1.500
39	Dom zdravlja Ljubuški	ŽZH	Ljubuški	dr.Ante Vukšića 3	Dr. Ivan Landeka	063 436 201	1.800,00
40	Crveni križ Ljubuški	ŽZH	Ljubuški	Dobrovoljnih darivatelja krvi 5	Viktor Grbavac	063 717 888	200,00
41	Osnovna škola Marka Marulića Ljubuški	ŽZH	Ljubuški	Hrvatskih branitelja 31	Davorin Medić	063 324 056	3.200,00
42	Škola (Osnovna škola Kočerin, Područna škola Privalj)	ŽZH	Široki Brijeg	Fra Didaka Buntića 11	Boro Đolo	039/702-807 063/329-769	380
43	Zgrada Ekonomskog fakulteta Univerziteta u Sarajevu	KS	Sarajevo	Skenderija br. 35	Senada Laličić	+387 33 275-945	2,400.00
44	Zgrada Suda Široki Brijeg	ŽZH	Široki Brijeg	Pobijenih franjevaca br.1	Predrag Naletilić	063/958-521	3.185
45	Zgrada radio Posušja	ŽZH	Posušje	Kraljice Jelena br.2	Kristina Milas	063/435-732	210
46	Upravno-administrativni centar Grude	ŽZH	Grude	Trg Hrvatskih velikana	Ante Bušić	063/192-602	4.850
47	Federalna uprava civilne zaštite	KS	Sarajevo	Vitomira Lukića 10	Murat Baručija	Murat.Barucija@fucz.gov.ba	1.805,22
48	KPU Sarajevo-Porezna ispostava Stari Grad	KS	Sarajevo	Sime Milutinovića Sarajlije 2	Alija Subašić	alija.subasic@fpu.gov.ba	426,96

49	„Prva osnovna škola“ Maglaj, PŠ „Ravna“	ZDK	Maglaj	Ravne bb Maglaj	Mirnesa Kolonić	061 363 474	150
50	OŠ „Maglaj“ PŠ „Tujnica“	ZDK	Maglaj	Tujnica bb Maglaj	Jasna Brka	061 756 199	683
51	OŠ „Ahmed Muradbegovi“ć PŠ „Lokvine“	ZDK	Zenica	Josipa Dakića br 94 Lokvine Zenica	Mirnes Fazlić	061 788 817	1200
52	OŠ „Vladimir Nazor“ PŠ „Luke“	ZDK	Zenica	Luke bb Zenica	Mirnes Varupa	062 617 978	400
53	OŠ „Abdulvehab Ilhamija“ Željezno Polje PŠ „Biljevina“	ZDK	Žepče	Biljevina bb, Željezno Polje Žepče	Adin Mujić	061 837 861	200
54	OŠ „Džemal Bijedić“ PŠ „Piljužić“	ZDK	Tešanj	Piljužići 120, Jelah Tešanj	Fahra Crnkić	062 042 277	500
55	JU Zavod Pazarić upravna zgrada	KS	Pazarić	Resnik bb	Darjan Ćerimagić	062/423-664	1157,28
56	Veterinarski zavod	HNŽ/K	Mostar	Rodoč bb	Mate Bandur	063 347 560	510

Annex 2 - Detailed Energy Audit study structure

1.INTRODUCTION

1.1 The purpose and objective of conducting an energy audit
1.2 Brief description of the client
1.3 Brief description of the location, use of the building and date of construction/reconstruction of building
1.4 Type of building and purpose
1.5 Brief description of the energy system
1.6 Brief description of the characteristic energy subsystems
1.7 Brief description of the comforts of staying in the building

2. ANALYSIS OF THE CURRENT STATE OF THE BUILDING; ENERGY CHARACTERISTICS OF THE BUILDING AND THERMO - TECHNICAL SYSTEMS

2.1 . Analysis of the thermal characteristics of the building envelope
2.2 . Analysis of the energy characteristics of the heating area
2.3 . Analysis of the energy characteristics of the cooling space system
2.4 . Analysis of the energy characteristics of ventilation and air-conditioning system
2.5 . Analysis of the energy properties of the preparation of domestic hot water system
2.6 . Analysis of the energy properties of the electric energy consumption system - electrical , lighting , appliances and other loads
2.7 . Analysis of the energy characteristics of specific subsystems (kitchen , laundry , etc.)
2.8 . Analysis of domestic water consumption
2.9. Analysis of the regulation and management system
2.10. Analysis of the energy properties of the system to produce thermal and electric energy from renewable energy sources (if they exist on the site)

3 ANALYSIS OF CONSUMPTION AND COST FOR ENERGY AND WATER

3.1 . Analysis of energy sources consumption
3.2 . Analysis of energy consumption
3.3 . Analysis of indicators of energy consumption and costs for energy and water (for minimum three years before energy audit)

4 CALCULATION OF THERMAL NEEDS OF THE BUILDING

4.1 . Calculation of thermal losses of the building
4.2 . Calculation of the needed thermal energy for a building

5 ANALYSIS AND SELECTION OF POSSIBLE MEASURES TO IMPROVE ENERGY CHARACTERISTICS OF BUILDINGS

5.1 . Review of the proposed measures to increase energy efficiency in the building (three scenarios)
5.2 . Description and analysis of the savings of proposed measures to increase energy efficiency in the building
5.3 . Scenarios of implementation of the proposed measures of energy efficiency

5.4 . Review optimal scenario of implementation of proposed measures

6. FINANCIAL ANALYSIS OF OPTIMAL SCENARIO INVESTEMENT

6.1 . Review the investment costs of the optimal scenario

6.2 . Financial analysis of the optimal scenario

7 COMPARATIVE ANALYSIS OF RELEVANT INDICATORS OF ELECTRIC CONSUMPTION AND THERMAL NEEDS OF THE BUILDING

7.1 . Indicators of energy consumption and thermal needs for the current state

7.2 . Indicators of energy consumption and thermal needs after the implementation of EE measures according to the optimal scenario

7.3 . Comparative analysis of indicators of energy consumption and thermal needs of the current situation and after the implementation of the optimal scenario

8. CLASSIFICATION OF BUILDING IN THE ENERGY CLASS ACCORDING TO THE REGULATION OF PERFORMING ENERGY AUDIT AND ISSUING ENERGY CERTIFICATES

9. FINAL REPORT ON ENERGY AUDIT WITH CONCLUSIONS AND RECOMENDATIONS

10. DIGITAL - FINAL REPORT OF ENERGY AUDIT – ANNEX 5 OF REGULATION, ON-LINE INPUT IN REGISTER OF ENERGY CERTFIFICATES IN FEDERAL MINISTRY OF PHYSICAL PLANNING

Annex 3 Summary of Detailed Energy Audit Report – Excel Form (SAMPLE)

No.	Object Name	Location	Canton	Area (m2)	Fuel (before)	Fuel (after)	Current Fuel Costs (BAM)
1	Elementary School Ivana fra Frane Jukica Sivsa	Usora	ZENICA DOBOJ	488	LFO	BIOMASS	25.997

Energy Consumption Before (kWh/year)	Investment with VAT (BAM)	Energy Savings (Fuel) (kWh/year)	Saving per 1 inv BAM (kWh/BAM)	Energy Savings (Money) (BAM/year)	Simple Pay Back Period (years)	Energy Consumption After (kWh/year)	EE measures
185.492	37.560	123.517	2,96	28.266	1,3	37.312	Optimal Scenario (3): 1. Biomass boiler installation; 2. Facade thermal insultaion; 3. Attic floor thermal insulation; 4. Incandescent light bulbs replacement; 5. Motion sensor installation; 6. Daylight sensor installation.

Number of users	Share female users	Indoor temperature	Baseline heating consumption (**QHnd**)	Baseline electricity consumption	Baseline energy consumption total	Heating system efficiency coefficient before	Energy class BEFORE	EE measures	Non-EE measures	Total investments (EE+non EE) (source DEA)
	%	(C)	kWh/a	kWh/a	kWh/a	%		€	€	€

Energy consumption after retrofit (planned) (QHnd)	Electricity consumption after retrofit (planned)	Fuel for heating (After)	Heating system efficiency coefficient after	Thermal energy savings	Total energy savings (Thermal and electrical)	Energy class AFTER	Cash savings	CO2 savings

kWh/a	kWh/a	Type	%	(kWh/a)	kWh/a		€/a	metric ton (CO2/a)