

**PREPARATION OF
PRE-FEASIBILITY STUDY FOR HEATING ON BIOMASS FOR
COMPLEX OF TWO STUDENT PAVILIONS
AND STUDENT RESTAURANT, BANJA LUKA**

TERMS OF REFERENCE

BOSNIA AND HERZEGOVINA/REPUBLIKA SRPSKA

ENERGY EFFICIENCY PROJECT

P143580-BA-BEEP-8906BA- RFP-IC-20-80-RS

1. BACKGROUND

Bosnia and Herzegovina is the Borrower, and Republic of Srpska, through a subsidiary agreement with the Borrower, has received financing from the World Bank toward the cost of Additional Financing for the Energy Efficiency Project (BEEP AF). 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 objective of the Energy Efficiency Project - Additional Financing corresponds to the goals underlined in the Law on Physical Planning and Construction of Republic of Srpska („Republic of Srpska Official Gazette“, editions 40/13, 106/15, 3/16 and 84/19) and the Law on Energy Efficiency of Republic of Srpska („Republic of Srpska Official Gazette“, edition 59/13).

The Energy Efficiency Project - Additional Financing will continue to support energy efficiency investments (“subprojects”) in schools, hospitals and clinic centres. A small number of other public facilities (e.g., elderly homes, orphanages, other administrative buildings) may also be included. The project will finance energy efficiency upgrades/renovations of buildings, as well as related technical consultancy services (e.g., energy audits, technical and social monitoring and evaluation, technical designs, supervision and subproject commissioning). The selection and implementation of subprojects will be conducted in three annual batches. It is estimated that up to 32 public buildings will be renovated in Republic of Srpska within 4 years of project implementation.

These investments will reduce the energy consumption of selected public buildings, and demonstrate the economic viability of energy efficiency improvements, including reduced recurring energy costs and associated public expenditures. In addition, the subprojects will generate demonstrable co-benefits, such as reduced CO₂ emissions and improved indoor comfort levels (e.g., improved indoor temperature, lighting, indoor air quality, overall indoor comfort). The result indicators against which the implementation progress of BEEP AF will be measured include: lifetime energy savings, lifetime fuel savings, greenhouse gas savings, increase in end-user satisfaction, number of buildings with EU-compliant energy certification, number of municipal energy managers trained, number of subprojects commissioned, number of direct project beneficiaries in gender-sensitive manner.

The Project Implementation Unit (PIU) within the Ministry of Spatial Planning, Civil Engineering and Ecology will be responsible for the preparation, coordination, management and implementation of the project, including procurement, contracting, and payments of all goods, works and services related to the project.

These Terms of Reference define the nature and scope of an assignment the preparation of Pre-feasibility study for heating on biomass at complex of student pavilions and student restaurant in Banja Luka.

The consultant will report to the PIU and will work closely with the BEEP project team within the Ministry of Spatial Planning, Civil Engineering and Ecology of Republika Srpska. The methodology requires a clear focus on the objective of improving overall energy utilization. This will be achieved through coordination with stakeholders, document review, facility inspection, utility analysis, economic analysis, data collection, desk research, interviews, meetings and report writing.

2. SCOPE OF SERVICES

The consultant selected for this assignment is expected to prepare a Pre-feasibility study for heating on biomass-based heating at the complex of student pavilions and student restaurant in Banja Luka. The analysis is intended to inform a pilot project for a public-private partnership in the building by determining the current energy performance of the buildings (student complex) to advice on cost effective energy efficiency measures to improve it, including in particular a new space heating system based on biomass for entire complex.

The consultants will be required to:

1. Interview Key Building Personnel

The discussion during this meeting will seek to establish operating characteristics of the buildings, energy system specifications, operating and maintenance procedures, preliminary areas of investigation, unusual operating constraints, and other concerns related to building operations. After the initial meeting, a tour of the building is arranged to observe the various operations first hand, focusing on the major energy consuming systems identified during the interview, including the architectural and heating systems.

2. Review documentation

All available building documentation will be reviewed with building representatives. This documentation should include all available architectural and engineering plans, building operation and maintenance procedures and logs, and utility bills for the previous three (3) years. It should be noted that the available plans should represent the "as-built" rather than the "design" conditions. In case the drawings do not correspond to the existing condition, the consultant will perform all the necessary measurements in order to obtain accurate data that will be used in the calculations.

3. Inspect Buildings

After a thorough review of the construction and operating documentation, the major energy consuming processes in the buildings are further investigated. The inspection shall focus on the following:

- General information about analyzed public building, including: name of the building, address of the building, number of employees, number of users, year of construction of each construction unit belonging to the analyzed building complex.
- Building equipment operation (including electrical and heating)
- Building envelope characteristics (including walls insulation, energy performance of windows, doors, roof): float area (m²) , Height of the building (m), Number of floors below ground and above ground, Types of material used for making the building envelope (exterior walls, ceilings and floors) and envelope area (m²), Information on whether there is thermal insulation on the envelope, and information on the type and thickness of insulation, Types of material used for making exterior joinery (windows and doors), type of glazing on the joinery, and the total area (m²) of all openings (windows) on the façade walls, Total surface of the heated part of the building, separately for each analyzed construction unit, Total volume of the heated part of the

building, separately for each analyzed construction unit, Height of rooms (floor to ceiling) in the heated part of the building.

- Ventilation equipment and systems.
- General characteristics of the power system.
- Heating system: general characteristics (fuel type, number of working units, performance coefficient, etc.). The overall goal of the auditor will be to identify:
 - Current heat energy demand
 - Current heat energy consumption
 - Status of the heat distribution system
 - Technical requirements for inter-connecting to additional sources of heat supply
- Annual level of currently required final energy consumption for heating in the building (in accordance with applicable standards), both separately for analyzed building
- Approximate energy category for buildings, based on the current situation
- Financial resources needed for the provision of heating in the analyzed buildings, based on their current needs.
- CO₂ emissions from heating, based on the current energy needs of the analyzed buildings and based on average consumption in last three years.

4. Analysis of utility bills

The consultant will conduct a detailed review of energy bills from the previous 36 months. This should include all purchased energy and fuel, including electricity, natural gas, coal, wood, etc. If possible, energy data will be obtained and reviewed prior to visiting the facility to insure that the site visit focuses on the most critical areas. Billing data reviewed includes energy usage and energy demand. The utility data is normalized for changes in climate and facility operation and used as a baseline to compute projected energy savings for evaluated energy efficiency measures (EEMs).

5. Prepare Calculations

The Consultant will prepare heating demand calculations, taking into account the U-value of all walls, windows, and building envelope components. Specifically, the consultant will calculate the heat losses for each building envelope components, heat losses due to infiltration and ventilation and the total heat losses of the building. The Consultant will calculate the then the gross energy needs of the buildings (necessary heat needed) along with the net heat demand (taking into account heat gains due to solar irradiation, lighting, appliances and human activities). The net heat demand of the building will be converted to the fuel consumption by including the efficiency of the heating system, regulation, piping and balancing losses. The Consultant will also calculate the heat losses through hygienic mandatory ventilation, and through air infiltration. Calculated heat demand shall be normalized to climate conditions and compared with the actual energy consumption (billed) for the last 3 years. The consultant will present the results in the form of comprehensive tables providing the final total energy necessary for heating the building and for domestic hot water.

6. Identify/Evaluate Feasible EEMs

A list of major EEMs is developed for each of the major energy consuming systems (i.e., envelope, Heating, Ventilation and Air Conditioning, and process).

The Consultant will make a new model simulation of the heat losses, energy needs and energy with the proposed EEM's for building component and for heating system.

7. Prepare Economic Analysis

Based on collected data, a list of priority interventions in energy efficiency and, where relevant, use of alternative sources of energy in the buildings will be developed. For each of the EEMs identified, the Consultant will calculate capital costs and operational expenditures, energy and cost savings, emission reductions as well as cost performance indicators, including simple payback, IRR, NPV etc. The consultant will specifically describe the use of alternative sources of energy and related investment needs (replacement of a boiler to biomass, solar heat collectors or heat pumps in case of demand of sanitary hot water etc.), including determination of the technical feasibility, cost effectiveness of such fuel switching and the impact on the overall energy costs of the building.

The consultant will also make a calculation of the simple payback period of the proposed scenarios comparing normative and actual baseline (i.e. real financial savings / based on the average of the accounts in the last 3 years, and based on the needed energy consumption).

The results of the findings and recommendations will be summarized in report. The report includes a description of the building and its operation, a discussion of all major energy consuming systems, a description of all recommended EEMs with related justification, including their specific energy impact, implementation costs, benefits and payback. The report shall incorporate a summary of all the activities, efforts and costs needed for achieving the expected improvement of the energy efficiency of the building.

The Consultants will need to provide all necessary tools required for executing the study measurements.

8. Prepare bill of quantities

Based on findings and recommendations, the consultant will prepare bill of quantities. This will include the following activities:

- Detailed description of each EE measure and physical characteristic of each component (for instance: rock wool density, lambda, size, thickness; cement-mortar; nails; finishing coat, rendering for external insulation);
- Warn the client about existing material identified as including asbestos, and recommend adapted works for removing it if it is necessary to do so in the framework of the present project.
- Bill of quantities for each measure will include and non-energy efficiency measures if they need to be done to preserve energy-efficient measures.

3. EXPECTED OUTPUTS

Corresponds to the scope of work, the consultants are expected to produce Pre-feasibility study for heating on biomass which consists of:

- a. Description of the existing condition of the buildings
- b. Energy and cost consumption survey for the last 3 years
- c. Overview of possible EE measures on buildings, described in detail
- d. Review of the 3 best case scenarios
- e. Overview of capital costs and operational expenditures, energy and cost savings, emission reductions as well as cost performance indicators, including simple payback, IRR, NPV etc..
- f. techno-economic analysis for three (3) scenarios
- f. Bill of quantities for each measure and for minimum three (3) scenarios.

4. LANGUAGE OF DOCUMENTS

Report should be prepared and submitted in Serbian.

5. EXPERIENCE AND QUALIFICATIONS OF THE CONSULTANT

Interested individual consultants must provide information indicating that they are qualified to perform the services by providing a reference list of similar assignments, a minimum of one (1) in the last five (5) years. The reference list should contain information about the clients, assignment descriptions, value of the contracts, and periods of execution supported, as available, by signed memorandums of satisfactory performance by the beneficiary during the assignment.

Interested candidates should possess:

- University graduate Mechanical Engineer, Master of Science or equivalent;
- At least ten (10) years of relevant professional experience in the field of this project;
- Professional experience in:
 - conducting detailed energy audits in the public building sector;
 - calculations of energy performance in the public building sector;
 - energy efficiency in the public building sector;
 - completed at least ten (10) main designs of new heating system on biomass;
 - completed at least ten (10) Energy Certificates report;
 - completed at least ten (10) Energy Audit reports, including a new heating system on biomass;
- Knowledge of the Republika Srpska Energy Efficiency standards and norms;
- Possession of an Engineer's license for preparation of technical documentation, part of the mechanical phase, the field of thermo-technics, heating, gas, ventilation, and air conditioning installation at the

facilities, issued by the Ministry of Physical Planning, Construction and Ecology of Republika Srpska,

- Possession of an Engineer's license for the energy audit of a building issued by the Ministry of physical planning, civil engineering, and ecology of Republika Srpska.

6. TIMETABLE

The Preparation of Pre-feasibility study for heating on biomass shall be submitted not later than 45 days following signature of contract.

7. SUPPORT FROM THE CLIENT

The Client will ensure to the Consultant full access to the site facilities as well to assist the Consultant in provision of contacts with local energy companies, municipal authorities and ministries.

8. TYPE OF REMUNERATION

The contract form will be prepared based on Lump sum payments.