

BOSNIA AND HERZEGOVINA BANJA LUKA DISTRICT HEATING PROJECT FEASIBILITY STUDY

EXECUTIVE SUMMARY

Banja Luka, 2017



European Bank
for Reconstruction and Development



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FEASIBILITY STUDY

- Executive Summary -

**Banja Luka District
Heating Project
Feasibility Study**

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Client

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1. INTRODUCTION

The City of Banja Luka is the political and administrative centre of Republic of Srpska (RS), located in the north-western part of Bosnia and Herzegovina (BiH). The city covers an area of 1,239 km² and has a population of 185,042 inhabitants, making it the second largest city in the country.

The district heating (DH) system in Banja Luka was established in 1970 and currently covers about one half of the urban area. The DH system is operated by Joint Stock Company "Toplana" Banja Luka (the Company) where the majority owner is the City of Banja Luka with 77 % of shares. The remaining 19 % is owned by the Company (own shares), and 4 % by other shareholders. The heat distribution network is divided into three major primary pipelines (Borik, Vrbas and Industrija) which deliver hot water to secondary network through 325 heat substations.

Prior to 2014, the DH system was based on heavy fuel oil (HFO) boilers with a total installed heat production capacity of 232 MW_t. Due to the high prices of HFO from 2012 to 2014, the Company experienced high financial losses and liquidity problems affecting all areas of operations and the quality of service. As a result, about 13 % of the customers disconnected from the DH system since 2011, which additionally burdened the financial performance of the Company. Furthermore, during 2014 and 2015 a considerable number of consumers have disconnected from the DH system due to their poor financial situation, according to the information provided by the Company. In addition, the DH system which uses HFO as fuel proved to be a major polluter in the city.

In an attempt to stabilize its operations as well as to address the pollution problem caused by HFO boilers, the Company decided to commence replacement of HFO by biomass based fuel. In 2014, the Company installed 3 biomass boilers at two locations in the city – "Starčevica" and "Kosmos" with a total installed heat production capacity of 16 MW_t. The lower and more stable price of the locally sourced biomass compared to the price of HFO had a positive impact on the financial performance of the Company and improved the level of service.

Based on the positive experience with biomass based boilers, the City of Banja Luka and the Company approached the European Bank for Reconstruction and Development (EBRD) with a request for financing additional biomass based boilers with an installed heat capacity of 36 MW. For this purpose, the Feasibility Study was prepared examining the technical and environmental conditions of the Company with the aim of analysing the best technological solutions for the Priority Investment Programme (PIP) estimated at 10.0 million EUR plus 5.0 million EUR grant, as well as its social and environmental impacts.

2. OVERALL STRATEGY FOR THE DH SECTOR IN BANJA LUKA

The Overall Strategy for the DH sector in Banja Luka covering the period of more than 15 years has been developed as a basis for the Long-term Investment Program (LTIP) covering the period of next 15 years and Priority Investment Programme (PIP) covering the period of next 3 years. The Overall Strategy addresses the key issues of the current DH system, and defines the means and actions for developing a functional, sustainable and profitable DH system in the City of Banja Luka. Biomass fuelled DH has proven to be the least cost heating solution for the City; however, the Company's overall operations and service level has to be substantially improved in order to gain competitiveness against alternative heating solutions.

Overall strategic objectives shall be the ones which will indicate best solutions possible for overcoming the DH system issues, its further development and are as follows:

- Reconnection of disconnected users;
- New tariff model adoption;
- Reduction of heat and water losses;
- Replacement of deteriorated primary and secondary pipeline network;
- Central heating plant equipment rehabilitation (investments in replacement of pumps driven by motors without frequency regulation, implementation of frequency regulated air fan operation, switching from medium to low voltage supply, future switching of Central heating plant boilers from HFO to biomass based fuel, etc.);
- Introduction of a new system for remote measurement, monitoring and control of complete DH system including heat generation plant, distribution network, energy consumption, heating substations and demand side measuring (SCADA system);
- Rehabilitation/modernization of existing equipment in heating substations (pumps with frequency regulated motor for optimal warm water flow, heat meters and control valves on primary network, taking into consideration future introduction of SCADA system);
- Heat meters on demand side required for implementation of a new billing system based on heat consumption, taking into consideration introduction of a SCADA system;
- DH network expansion possibility.

Considering the assumptions and estimations done at overall strategy regarding possible development of the future demand for a concept design of the future DH system is outlined.

In the long-term, the Company should switch to renewable energy sources such as biomass which is considered as the most acceptable energy source for the future operations. Due to the positive experience with implementation of two biomass based heating plants at Starčevica and Kosmos in the late 2014 and nearby Prijedor, the Company's intention is to introduce biomass based boiler also into the existing Central heating plant currently fired solely by HFO boilers. The Company is considering implementation of investment in three new biomass based heat only boilers (HOB) with total installed power of 36 MW_t (12 MW_t each), or an equivalent combined heat and power (CHP) based alternative in Central heating plant that would replace two of the existing boilers fired by HFO. The preliminary budget for the investment has been estimated to 10.0 million EUR plus 5.0 million EUR grant and will be financed by European Bank for Reconstruction and Development (EBRD). Furthermore, considering the network expansion a new proposed peripheral heating plant should be biomass based.

For economic and effective energy distribution within the DH system it is essential to enable a variable flow regime. Variable flow means less power consumption for distribution pumps and leads to better utilization of the temperature in the system as better heat transfer is achieved in the DH substations. Introduction of variable flow in the secondary system network will enable quick response to the changes in heat demand as well as balanced hydraulic pressure in the entire system and correct temperature, flow and pressure in relation to the heat demand, which brings to heating substation modernization. Given the overall technical condition of the existing DH substations, considerable investments are needed in this regard. Furthermore, by replacing the old pumps that operate on constant flow with variable motor driven pumps for optimal warm water flow and installation of heat meters and control valves on primary network of DH substations, taking into consideration future introduction of centralized acquisition system in form of SCADA (Supervisory Control and Data Acquisition) system, the Company will achieve full monitoring and management of supplied thermal energy through the DH substations. As a consequence, the district heating Company will benefit from reduced fuel demand and also prolonged lifetime of district heating pipeline network can be expected.

3. LONG-TERM INVESTMENT PROGRAM

The Long-term Investment Program (LTIP) examines different measures and technological solutions that could be implemented in a period of the following 15 years, with the aim of improving, rehabilitating and expanding the DH system in Banja Luka. The proposed measures in the LTIP cover all major components of the DH system, including energy generation, distribution network, heating substations, demand side management and expansion of the service area. The analysis included the comparison of the different heat-only and combined heat and power technologies in order to propose the optimum technical solution. In addition, the LTIP identified and proposed several demand side measures which should be implemented in order to achieve heat balancing in the network (optimal level of heat delivery in different parts of the network). The proposed measures include modernisation of heat substations which will also result in energy production savings, and improve network management and control.

The measures have been designed taking into account technical, financial, legal, environmental and social considerations, in order to secure environmentally, technically and financially sustainable DH operations in the City of Banja Luka and to improve service quality with the aim to enable the return of disconnected customers. The implementation of the proposed measures under PIP will inevitably lead to short-term environmental and social impacts related to the construction phase and generally associated with infrastructure projects of any type. The significance of such impacts during the replacement and reconstruction works has been assessed as minor. The benefits of the Project have mostly been assessed as long-term and major, and include positive impacts on air quality through reduction in air emissions, more efficient consumption of natural resources (fuel and water consumption), developed DH system with improved infrastructure, decreasing dependence on import of sources of energy and enabling localization of fuel supply chain by using locally available fuel (biomass), and overall increase in energy efficiency of the existing DH system. In terms of significance, positive impacts have been assessed as major environmental and social benefits.

Key measures that should be implemented under LTIP include:

- Dismantling of the existing circulation pump complete with supply and installation of a new frequency regulated pump and connection to the existing piping system. The investment is estimated at EUR 125,000. The electricity consumption is expected to decrease by 30% or 505 MWh on annual basis while the expected financial effects include reduction of electricity costs estimated at EUR 28,401 annually.
- Replacement of 800 m of existing primary network DN 200 connected to Kosmos heating plant. This shall as a result have a decrease of heat losses and water leakages and create a

possibility for expansion of the network which will be followed by installing a new biomass boiler. Costs of the above suggested improvements are estimated at EUR 550,000. Abovementioned improvement shall have an effect on reduction of water losses of approximately 5% which is around 9,300 m³ of water or around 485 MWh per year.

- Replacement of 3.1 km of primary distribution network of various pipe sizes due to its deterioration. Investment is estimated at EUR 1,417,300. This improvement shall have an effect on reduction of water losses of approximately 10% which is around 18,500 m³ of water or 970 MWh per year.
- Implementation of demand side measures including heating substations modernization, introduction of centralized acquisition system in form of SCADA system and consumption based billing system. The total investment is estimated at EUR 17,671,700, out of which EUR 3,771,255 should be invested by the Company and EUR 13,900,445 should be invested by customers. Based on inputs received from the Company, expected savings in electricity consumption could be around 30% of total currently installed circulation pumps consumption, which is estimated to total of 70,000 EUR. Taking into account current thermal energy consumption of 168,205 MWh with modernization of DH substations estimated savings are approximately 14% which on an annual basis amounts to 23,549 MWh. Furthermore, with introduction of SCADA system and connection of all DH substation to central acquisition system, additional savings on thermal energy consumption are estimated to approximately 5% which on an annual basis amounts to 8,410 MWh. Moreover, installation of heat meters, thermostatic valves and heat cost allocators should result in reduction of heat consumption of approximately 2.5% per year, which amounts to 4,205 MWh annually.
- Expansion of the service area for DH system. It is expected that DH system should be expended to Lazarevo neighbourhood which has a heat demand of 50.31 MW, Banja Luka City centre (7.5 MW), Rosulje neighbourhood (17.5 MW), part of Paprikovac neighbourhood (5.97 MW) gravitating to Rosulje neighbourhood, Paprikovac neighbourhood (11.48 MW) and Kočićev Vijenac neighbourhood (4.35 MW).

4. PRIORITY INVESTMENT PROGRAMME

Overall assessment of the Banja Luka DH system has revealed that the current status of many DH components is unfavourable which results in shortcomings in heating service provision quality. As a result of the inconsistencies in the quality of service (heat supply) the Company lost 13 % of the customers in the period 2011-2015. At the same time, Central heating plant using HFO as fuel remained the main source of pollution in the city of Banja Luka. The main goal of the Priority Investment Programme (PIP) is to create preconditions towards environmentally, technically and financially sustainable DH operation in the city of Banja Luka and to improve the quality of the service in order to ensure return of the lost customers. This is expected to be achieved through implementation of as many measures identified within LTIP as possible, which could be implemented in the 3-year period while taking into account projected budget of 10 million EUR and current conditions of the Company and the possibilities for financing priority measures. It is also expected that the Company will receive the grant financing in the amount of 5 million EUR for implementation of demand side measures.

In that respect, the main measures within the PIP include:

1. Installation of three 12 MW_t HOBs within the Central heating plant resulting in increased use of biomass as environmentally friendly, renewable, locally available and cheaper fuel;
2. Replacement of one main circulation pump, resulting in decreased consumption of electricity;
3. Heating substations modernisation, resulting in balancing of the system and decreased consumption of thermal energy.

Installation of three 12 MW_t HOBs within the Central heating plant

Several heat generation options have been compared in terms of number, type and capacity of boilers while taking into account projected budget of 10.0 million EUR plus 5.0 million EUR grant, investment costs, biomass demand, operation and maintenance costs and revenues that could be generated. In order to determine the most viable heat generation alternative to be installed within Central heating plant of Toplana A.D. Banja Luka, a simplified financial analysis was conducted for Heat only boilers (HOB) and Combined Heat and Power (CHP) technologies based on Steam Turbine Cycle (STC), Organic Rankine Cycle (ORC) and wood gasification. After performed financial analysis which considered projection of annual revenues, operating expenses and cash flow for period of 15 years, IRR and payback period, it has been recommended to install three HOBs with capacity of 12 MW_t each fuelled by wood chips (biomass). Three HOBs will be located in the biomass boiler house within the Central heating plant of Toplana A.D. Banja Luka with all necessary equipment for the fuel delivery, handling of the flue gases and ash handling system. Biomass storage unit with the capacity of 1,000 m³ will be built to cover daily needs for biomass supply.

Table 1: Summary of investment costs and estimated savings for HOBs

HOB 3 × 12 MW _t	UNIT	VALUE
INVESTMENT COST		
Boilers including flue gas cleaning, ash removal, electric and control systems	MEUR	9.3
Biomass dosing system complete with construction of one-day biomass storage area	MEUR	0.6
Reconstruction of piping to connect new boilers to the existing piping network	MEUR	0.4
Construction works including access roads, alteration of existing boiler house, platforms, stairs, etc.	MEUR	1.0
Dismantling of two existing HFO boilers	MEUR	0.4
Design, engineering, etc.	MEUR	0.5
Contingencies	MEUR	0.1
Total	MEUR	12.3
SAVINGS		
Fuel energy (reduction of HFO)	MWh/year	149,904
Fuel energy (reduction of HFO)	Thousand EUR	6,747.18
Biomass costs (negative saving)	MWh/year	176,358
Biomass costs (negative saving)	Thousand EUR	-5,255.47
Maintenance	Thousand EUR	-93.00
Staff	#	-5
Staff	Thousand EUR	-26.50
Electricity consumption	MWh/year	-2,761
Electricity consumption	Thousand EUR	-155.28
CO ₂ savings	Tonnes/year	
CO ₂ savings	Thousand EUR	
Total	Thousand EUR	1,216.93
RATE OF RETURN		
FIRR	%	42.4

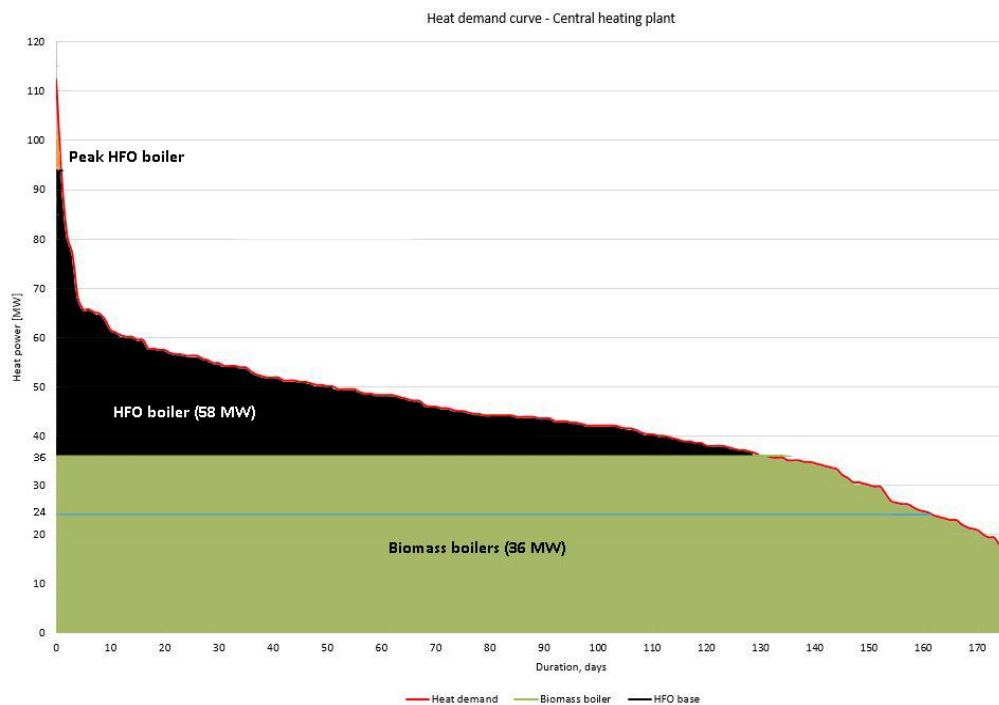


Figure 1: Heat demand curve with biomass and HFO boilers covering base loads

The installation of three additional HOBs within the Central heating plant is expected to have positive effects on financial operation of the Company in the amount of EUR 1,216,932 per year.

The HOBs are expected to start production of heat energy, meaning start of commissioning and delivery of heat to the DH network, in a period of 17 months, based on assumed time required for tendering and procurement procedures and implementation period, assessed as a result of discussions with equipment manufacturers and suppliers and based on the Consultant's experience.

Replacement of one circulation pump

All circulation pumps currently used by the Company are not frequency-regulated, meaning that they operate in full capacity even if the maximum flow in the system is not required. Purchase of one circulation pump with variable frequency regulation will enable regulation of pump capacities to provide necessary flow in the system, which would lead to the decrease in annual electricity consumption of pumps.

Taking into account relatively low investment costs of EUR 125,000 and relatively short time period for implementation of this measure, it is considered as priority measure to be implemented within the PIP. The following table provides overview of investments costs and expected savings after installation of main circulation pump with variable frequency regulation.

Table 2: Summary of investment costs and estimated savings for replacement of circulation pump

REPLACEMENT OF ONE CIRCULATION PUMP	UNIT	VALUE
INVESTMENT COST		
Replacement of one circulation pump	Thousand EUR	125.00
Total	Thousand EUR	125.00
SAVINGS		
Electricity consumption savings	MWh/year	505
Total	Thousand EUR	28.401

The installation of main circulation pump with variable frequency regulation is expected to be implemented in a period of 6 months, based on assumed time required for tendering and procurement procedures and implementation period, assessed as a result of discussions with equipment manufacturers and suppliers and based on the Consultant's experience.

Heating substation modernization

The existing heating substations and heating system are mainly managed manually by the means of periodical visits by the Company personnel. Nowadays this kind of management is not proper nor economically justified. Therefore, heating substations should be modernized. As many of the DH substations were already upgraded with the new type of heat exchangers, it would not be profitable to go into modernization of DH

substations with prefabricated DH substations skids, but to upgrade/modernize with most of existing equipment left intact.

Considering the project investment second scenario with partial modernisation of heating substations has been adopted within the PIP. Partial modernisation of heating substations includes improvements by means of introduction of flow control valves and heat meters on primary side of heat exchangers, installation of temperature transmitters, local control units and motor control stations to enable autonomous automatic operation.

The most important effects of implementation of this measure are reflected in creating possibilities for balancing of the system which means that each heating substation will be provided with proper temperature and required water flow at primary and secondary network and reduction of possibilities for overheating and/or underheating of buildings. The following table provides overview of investments costs and expected savings after partial modernization of DH substation.

Table 3: Summary of investment costs and estimated savings for heating substations modernization

HEATING SUBSTATIONS MODERNIZATION	UNIT	VALUE
INVESTMENT COST		
<i>Modernization of existing circulation pumps by the means of introduction of motor control station, to enable autonomous automatic operation</i>	<i>Thousand EUR</i>	<i>245</i>
<i>Flow control valves installation on primary side of the heat exchangers</i>	<i>Thousand EUR</i>	<i>778.05</i>
<i>Installation of heat meters at primary side of the heat exchangers</i>	<i>Thousand EUR</i>	<i>488.179</i>
<i>Installation of temperature transmitters at forward and return line on the secondary sides of heat exchangers, complete with pressure indicating transmitter and outdoor temperature transmitter</i>	<i>Thousand EUR</i>	<i>429.813</i>
<i>Installation of local control units enclosed in cabinets complete with terminating/converting equipment and local UPS units</i>	<i>Thousand EUR</i>	<i>1046.5</i>
Total	Thousand EUR	2,987.542
SAVINGS		
<i>Thermal energy production savings</i>	<i>MWh/year</i>	<i>12,615</i>
Total	Thousand EUR	567.801

Heating substation modernisation is expected to be implemented in a period of 15 months based on assumed time required for tendering, procurement procedures and implementation period. As it is the case for HOBs and installation of main circulation pump with variable frequency regulation, the minimum total amount of time required for conceptual design, preparation of tender documentation, implementation of tendering and procurement procedures is estimated to about 3 months.

5. BIOMASS SUPPLY

For the purpose of analysis of availability of sustainable biomass supplies after installing additional 3 biomass boilers within the Company's Central heating plant of total capacity of 36 MW, the analysis of available biomass in the Project area was conducted.

The potential biomass sources are private and public forests and wood processing industry. The total amount of available biomass in the Project area is estimated to 412,777 m³ per year, out of which 67.54% or 278,799 m³ from public and private forests and 32.46% or 133,978 m³ from wood processing industry. The aforementioned amount of biomass is enough to produce 1,238,331 loose m³ of wood chips. Taking into account that biomass demand for additional 3 biomass fired boilers would be 240,489 loose m³ per year, it was concluded that there is enough biomass in the Project area for sustainable supply of 3 biomass boilers to be installed in Company's Central heating plant.

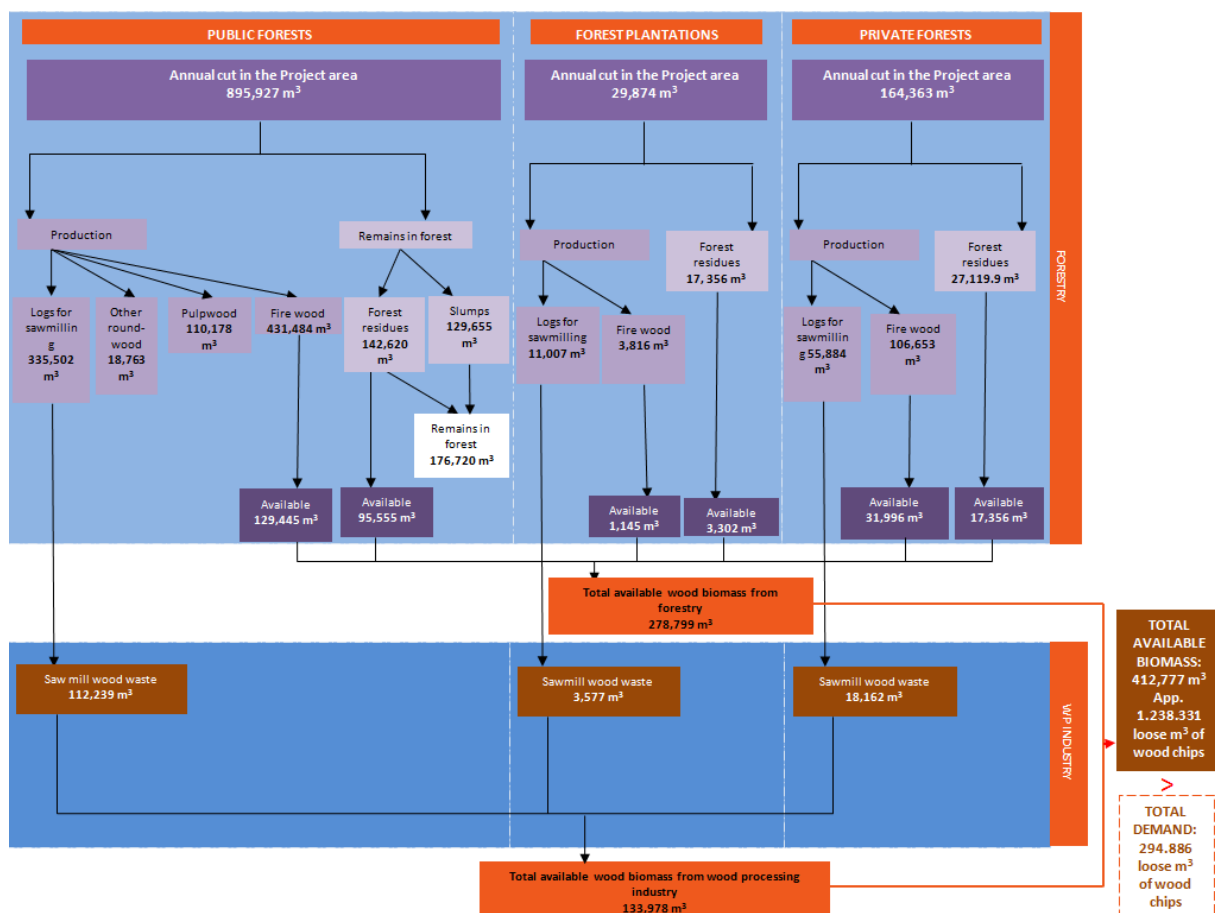


Figure 2: Overall presentation of available biomass (raw material for the production of wood chips) in the Project area

6. TARIFF SETTING POLICY

Analysis has shown that the current tariff system is not adequate for the financial stability of the Company and that tariff increases is necessary.

The Company has proposed new tariff system which discriminates business customers as the price for supply of heating energy is not equal to the price for residential customers, and thus is not in accordance with EU best practices. Also, it foresees the fixed fee that would be charged to the consumers which had disconnected from the DH system and are living or doing business in buildings connected to the DH system, since they are receiving a certain portion of heating energy from the surrounding flats. However, the current regulatory framework in RS does not regulate the issue of disconnected customers, as the *Law on Public Utilities*¹ stipulates that the fee for joint installations is paid by registered customers. This was the reason why a fixed fee for disconnected customers could not be charged by the DH Company in Doboj and was rejected by the Constitutional Court of RS.

It is recommended that the suggested tariff system should be adjusted so that the price for business customers is equal to the price paid by residential customers. Also, in order to introduce the payment of a fixed fee for consumers which had disconnected from the DH system and are living or doing business in buildings connected to the DH system, it is necessary to change the existing regulatory framework. It is recommended to make changes in the existing *Law on Public Utility Activities of RS*, and regulate the obligations of disconnected customers.

¹ Official Gazette of RS, No. 124/11

7. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

The City of Banja Luka and the Company have approached the European Bank for Reconstruction and Development (EBRD or the Bank) with a request to assess the possibility of financing of a priority investment plan involving:

1. Installation of three 12 MW heat only biomass boilers within the Central Heating Plant, resulting in increased use of biomass as environmentally friendly, renewable, locally available and cheaper fuel;
2. Replacement of one main circulation pump resulting in decreased consumption of electricity;
3. Modernisation of heating substations (the Project).

The environmental and social opportunities associated with the implementation of the Project include developed district heating system with improved existing infrastructure (more efficient and economically sound heat supply), enhancement of quality of life in area of Banja Luka by reducing the emission of air pollutants (SO₂, NO₂), reducing CO₂ emissions and climate change impacts, use of locally available fuel (biomass), thus decreasing dependence on import of sources of energy and enabling localization of fuel supply chain, and direct and indirect employment and service opportunities during the construction and operation/maintenance phase.

The Project has been categorised as a Category “B” project in accordance with the EBRD Environmental and Social Policy (ESP) (2014). The Project is not expected to have a perceptible impact on sensitive locations such as nature protected areas, critical habitats or other ecosystems or areas of archaeological or cultural significance. It is not expected to present a significant pressure on the environment, if implemented in accordance with national legal requirements, and best practices. Furthermore, the Project does not envisage land acquisition, resettlement, physical and economic displacement and relocation of residences or businesses.

Key Findings

The Company is compliant with EIA Directive 2014/52/EU amending the EIA Directive 2011/92/EU since it has obtained the necessary Environmental Permits.

The Company is not fully compliant with IED Directive² 2010/75/EU in terms of air emissions from the Central Heating Plant (existing heating power 232 MW). However, the Company will reduce the heating power

²Directive 2010/75/EU

from 232 MW to 210 MW which will lead to reduction of the air emissions. Also, the air emissions will be reduced due to substitution of HFO with biomass. Increase of energy efficiency is also expected. The project scenario will contribute to reduction of the total direct emissions of CO₂ by 3.1 times.

The Company is mainly compliant with RS requirements, such as the implementation of specific practices with the aim of pollution prevention in accordance with the *Law on Environmental Protection* and best practices, adequate management of waste in accordance with the *Law on Waste Management*, the implementation of occupational health and safety measures in line with the *Law on Safety at Work* or the proper regulation of employment related issues in accordance with the *Law on Labour*.

There are, however, several issues of non-compliance with national requirements: even though the Company has obtained the necessary Environmental Permits (required by the *Law on Environmental Protection and Regulation on Facilities subject to Obligatory Environmental Impact Assessment and Facilities Which May be Constructed and Operated Only with a Valid Environmental Permit*), it does not perform continuous monitoring of air emissions at the location of the Central Heating Plant in accordance with the valid Environmental Permit. The Company also does not possess the required concession for groundwater abstraction at three wells located in industrial area of the Central Heating Plant in line with the *Law on Concessions of RS*.

The implementation of the Environmental and Social Action Plan (ESAP) by the Company will enable full compliance with national, EU and EBRD requirements. The current status of compliance with EBRD PRs and the measures included in the ESAP to remedy non-compliance issues are summarized for each PR as follows:

- **PR 1 – Assessment and Management of Environmental and Social Impacts and Issues**

Environmental and social assessment (E&S) of the Project and its potential impacts, as well as the E&S audit of the Company's current operations have been carried out as part of this Assignment.

The Company lacks a formalized E&S Management System (ESMS); however, it has developed a set of internal regulations for managing human resources, occupational health and safety, fire protection, protection against disasters and accidents, and waste management.

The Company currently does not hold any ISO certificates, but plans to introduce the ISO 9001:2008 and 14001 standards in the next 2-3 years.

The Company has not established a Project Implementation Unit (PIU) yet.

As part of the ESAP requirements, the Company will develop and implement an ESMS, and an appropriate ESP for the ESMS. The PIU will be established and will be responsible for maintaining and implementing the ESMS and E&S Policy, monitoring the E&S performance of the Project,

and ensure comprehensive and clear reporting procedures between parties involved in this Project.

The Company will also require from the Contractors to prepare and implement a Construction Site Organization Plan (CSOP) and an Operation Environmental and Social Management Plan (OESMP) for the operational phase.

▪ **PR 2 – Labour and Working Conditions**

The Company fully complies with *Labour Law of RS*, which broadly conforms to PR 2 requirements. The Company's set of human resources policies, procedures and standards are in compliance with EBRD requirements. PR 2 requirements that are not covered by existing legislation are those in connection to requirements to monitor the performance of third party employers in relation to labour issues and management of grievances in relation to security personnel.

In order to achieve full compliance with the requirements of PR 2 and as included in the ESAP, the Company needs to:

- Require from the Contractors to apply the relevant requirements of PR2 through contractual agreements and periodically check the implementation of such requirements;
- Require from the Contractors to include in Construction Site Organization Plan provisions on grievance management for external stakeholders in accordance with PR2;
- Implement and regularly update the Stakeholder Engagement Plan (SEP), including the grievance mechanism, to respond to issues in relation to security personnel and take appropriate action to address them.

▪ **PR 3 – Resource Efficiency and Pollution Prevention and Control**

The Company has been making efforts to implement **resource efficiency** measures, such as:

- (i) Efforts to preserve water resources by controlling water losses;
- (ii) Reducing fuel consumption from approx. 22,000 tonnes of HFO to approx. 17,000 tonnes/year through implementation of low temperature heating, balancing the pressure in the network and changing pressure regulation stations, prevention of heat losses by insulating the heating equipment, boilers and pipes (pre-insulated pipes), ensuring adequate combustion of fuel through proper ratio of air quantity to fuel quantity by means of continuous regulation, operation of boilers managed by operator;
- (iii) Reusing spare parts, selling scrap metal parts and refilling of empty propane-butane cylinders, acetylene cylinders and oxygen cylinders.

Regarding **pollution prevention**, the Company implements the following measures for minimisation of air emissions:

- (i) Existing biomass heating plants have adequate measures for mitigation of air emissions (cyclone filter and electrostatic filter);
- (ii) Substitution of HFO with biomass;
- (iii) Measurements of air quality parameters and assessment of air quality at location of the Central Heating Plant;
- (iv) Regular periodical monitoring of air emissions at locations of the biomass heating plants Starčevica and Kočiće Vijeće/Kosmos;
- (v) Equipment used during operation of the district heating system and combustion of fuels have Use Permits;
- (vi) Overall regulatory compliance with national requirements and pertinent EU standards including applicable Best Available Techniques and Best Available Techniques Reference Documents³;
- (vii) Vehicles owned by the Company are subjected to regular technical inspection.

The Company does not perform continuous monitoring of **air emissions** at the location of the Central Heating Plant in accordance with the valid Environmental Permit and the *Regulation on Monitoring of Emissions of Pollutants into Air*, but conducts periodical monitoring at this location. The Company recently purchased a *Testo 350 Flue Gas Analyzer* with the aim to fulfil the requirement of this provision. It implements all other requirements regarding prevention of air emissions and control as specified in the Environmental Permits. The Company will reduce the heating power from 232 MW to 210 MW and still it will be obliged to conduct continuous monitoring of air emissions other than at least once a year in accordance with the mentioned *Regulation*.

The Company implements all the requirements defined by the existing water permits for three existing heating plants (installed oil separators, bunds places around above ground HFO reservoirs, water tight manipulative areas etc.), and conducts monitoring of **wastewater** quality.

The Company does not have the required concession for groundwater abstraction of around 40,000 m³/year (approx. 200 m³/daily at the location of the Central Heating Plant).

Waste generated at the Company is managed through contracts with authorized third parties.

The Company implements adequate **handling of hazardous substances** (HFO, petrol, diesel etc.), follows the written procedure for transfer of HFO from transporter vehicles to adequate above ground reservoirs and provides protective equipment for worker safety during necessary activities. HFO reservoirs have Use Permits. The Company does not use hazardous materials during its everyday operations.

According to the Guidance Note of the EBRD Greenhouse Gas Assessment Methodology, the Project falls under the obligatory **GHG assessment** according to EBRD's ESP (2014), and a GHG assessment has been carried out as part of this assignment. The project scenario will contribute to reduction of the total direct emissions of CO₂ by 3.1 times.

³European Commission, Best Available Techniques (BAT) Reference Document for Large Combustion Plants, Final Draft (June 2016)

▪ **PR 4 – Health and Safety**

The Company fully applies the requirements set out by RS legislation (*Law on Safety at Work, Law on Fire Protection, Law on Protection and Rescue in Emergency Situations*).

It has developed, adopted and implements a set of internal regulations (*Rulebook on Safety at Work, Rulebook on Fire Protection and Plan for Protection and Rescue from Natural Disasters and Other Accidents, and Act of Risk Assessment in the Workplace and in Working Environment*).

The Company's Officer for Environmental Management, OHS and Fire Protection is responsible for implementation of legal requirements related to health and safety.

In line with national legislation, Contractors are responsible for OHS of their workers through the development and implementation of the CSOP. The Company has developed a general *Construction Site Organization Study and OHS Plan*, which serves as a template for specific projects, and defines detailed OHS requirements and procedures. In addition, Contractors are required to develop and implement the OHS and Fire and Explosion Management Plan as part of the Construction Site Organization Plan to identify possible OHS risks and measures to avoid them.

In accordance with ESAP, the Company needs to:

- Ensure that CSOP includes an Occupational Safety Management Plan and Fire Fighting and Explosion Management Plan;
- Ensure that community H&S measures are defined within the CESMP.

▪ **PR 5 – Land Acquisition, Involuntary Resettlement and Economic Displacement**

The Project will not require any land acquisition, involuntary resettlement or economic displacement.

▪ **PR 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources**

The protected area "Univerzitetski Grad" Banja Luka is located at an approximate distance of 200 m to the area of the Central Heating Plant. The site is protected for its role in genetic diversity preservation since it is a botanical garden with autochthonous species. The Project, however, has no potential to affect the identified protected area.

The Project also does not include crop or livestock production, natural or plantation forestry, aquaculture or fisheries, and production of biomass for energy or biofuel production. The Project includes the use of biomass (wood chips and wood waste from wood processing industry and the alternative use of fire wood in amount of max. 10-20% of total projected amounts).

- **PR 7 – Indigenous Peoples**

Not applicable to the Project.

- **PR 8 – Cultural Heritage**

The Project area does not have any identified cultural and archaeological heritage sites in its close surroundings. The Project is not expected to have any impacts on cultural and historical heritage.

- **PR 9 – Financial Intermediaries**

Not applicable to the Project.

- **PR 10 – Information Disclosure and Stakeholder Engagement**

As a public enterprise, the Company is required to manage its information disclosure in line with the RS legislation. The Company uses a number of channels for communication with its customers and other stakeholders. There is, however, still scope for improving the communication and engagement with identified stakeholder groups. Therefore, a Stakeholder Engagement Plan (SEP), appropriate to the scope and impacts of the Project, has been prepared on the basis of EBRD requirements, where key stakeholders, topics and methods of communication/engagement have been identified.