CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

CTCN Technical Assistance
Request Submission Form

Please fill in the form in the grey spaces, by following the instructions in italic.

Requesting country:	*Bosnia and Herzegovina (BiH)*

Request title:	*Rehabilitation and Modernizationof the district heating (DH) system in the City of Banja Luka – focus on energy efficiency.*

Contact information:

{Please fill in the table below with the requested information. The request proponent is the organization that the request originates from, if different from the National Designated Entity (NDE).}

	National Designated Entity	**Request Applicant**
Contact person:	*Goran Trbic*	Nevena Predojevic
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Technology Needs Assessment (TNA):

{Select one of the three boxes below:}

☐ *The requesting country has conducted a TNA in .... (please insert date of TNA completion)*

☒ *The requesting country is currently conducting a TNA*

☐ *The requesting country has never conducted a TNA*

{If the requesting country has completed a TNA, please indicate what climate technology priority this request directly relates to. Please indicate reference in TNA/TAP/Project Ideas.}

BiH TNA is being developed at the moment but the first draft is expected only in late 2015 while the completed document will be announced in mid-2016. An expert team of 22 works on initial assessments now and DH will be included in the TNA.

CTCN Request Incubator Programme:

{Please indicate if this request was developed with support from the Request Incubator Programme:}

☐ *Yes*

☒ *No*

Geographical focus:

{Select below the most relevant geographical level for this request:}

☐ *Community-based*
☒ *Sub-national/City*
☐ *National*
☐ *Multi-country*

{If the request is related to the sub-national or multi-country level, please indicate here the areas concerned (provinces, states, countries, regions, etc.)}

City of Banja Luka.

Theme:

{Select below the most relevant theme(s) for this request:}

☐ *Adaptation to climate change*
☒ *Mitigation of climate change*
☐ *Combination of adaptation and mitigation to climate change*

Sectors:

{Please indicate here the main sectors related to the request. e.g. energy, industry, transport, waste, agriculture/fisheries, forestry, water, ecosystem/biodiversity, coastal zones, health, education, infrastructure/human settlement, tourism, businesses, early warning/disaster reduction, institutional design and mandates, cross-sectorial}

Energy(-efficiency of a municipal district heating system).

Problem statement *(up to one page):*

{Please describe here the difficulties and specific gaps of the country in relation to climate change, for which the country is seeking support from the CTCN. Please only provide information directly relevant to this request, and that justifies the need for CTCN technical assistance.}

Banja Luka is the second largest DH system in BiH. It experiences significant energy losses during transmission and end-use, thereby incurring major, avoidable costs to the City and the DH Company, while also producing unnecessarily high amounts of GHG emissions.

Modernising the district heating network would reduce fuel consumption by 27%, approximately – 4,500 tons of crude oil which corresponds to 50,293.88 MWh of thermal energy - reducing emissions by 20,000tCO_2 annually and saving the municipality 4.5 million euros per year.In addition, through insulation of existing buildings is possible to achieve savings of energy consumption of 36,000 MWh and emission reduction of 14,400 tCO_2. Without this necessary modernisation, the municipality is unlikely to be able to fully provide heat in the heating season 2015/2016 meaning a third of Banja Luca could be under-heated and consumers will disconnect worsening the business model of the district heating utility and potentially leading to it closing down. Developing the district heating system to be fully renewable has the potential to save over 80,000tCO_2 per year and would mean at least 1/3 of Banja Luca would receive renewable heat.

Substantial heat and water losses throughout the DH network (requiring the replacement of water 35 times per year) outline the need for continual maintenance, while as much as 10% of the DH network (approx. 15 km) is obsolete and needs to be replaced in its entirety. The average age ofheat boilers in the DH system is close to 35 years old, and being close to the end of their operating lifetime, these systems are prone to energy losses of as high as 60%. In addition, the energy efficiency of the buildings that the system supplies is also sub-standard. This is underlined by the fact that the majority of these buildings lack heat meters and adequate insulation (only 15% of total household consumers have calorimeters). It is estimated that as much as 40% of total heat energy supplied is lost as a result of the poor insulation in Banja Luka's building stock.

Furthermore, Banja Luka's DH system is over-reliant on a single energy source: crude oil.The procurement of crude oil is a major contributor to the municipality's accumulating financial debt.Financial losses for 2014 were approximately 10 million KM (5 million euros) asrevenue was only 25 million KM compared to costs of 35 million KM (20 million KM crude oil, 3 million KM salaries, 3 million KM system maintenance, 2 million KM overheads, 8 million KM loan repayments).

In fact, most of BiH's DH generation plants use crude oil (mazut) and coal, while their access to the natural gas network remains extremely limited. Cheaper and more locally produced energy sources, such as biomass and geothermal energy, remain vastly underexploited – in part because markets for these energy sources arelargely unregulated both at the national and the entity levels (BiH entities are: Republika Srpska and the Federation of BiH).Infrastructural projects for fuel conversion/diversification therefore remain largely reliant on international aid.

On the policy level, DH legislation in BiH is still in the process of development and comprehensive DH sector strategies, monitoring and compliance mechanisms (e.g. metering of consumption) are lacking at both national and the entity levels. The existing legal framework relies predominantly on regulations concerning public companies and municipal/cantonal decisions that regulate the operations of DH companies. However, the activities related to DH operations are to a great extent affected by entity legislation for environmental protection, energy efficiency improvement and use of renewable energy sources.

Cantons and municipalities in the Federation of BiH, and municipalities in the Republika Srpska are the main responsible authority for the DH sector in the Country. However, the substantial heat and water loses areexperienced by virtually all of the country's DH companies – mostof which operate with significant annual financial losses, which make this an area of strategic importance at the national level in supporting a coherent devolved framework within which the local governments operate.

Tariff collection and regulatory activities are fragmented into cantonal and/or municipal by-laws and procedures, many of which lack specific provisions on (heat) energy efficiency, creating an unclear operational framework for the DH sector as a whole. The existing tariff system also does not cover the operational costs of DH companies and has not been modified over the last several years, thereby limiting investments into DH network reconstruction.

Past and ongoing efforts *(up to half a page):*

{Please describe here past and on-going processes, projects and initiatives implemented in the country to tackle the difficulties and gaps explained above. Explain why CTCN technical assistance is needed to complement these efforts, and how the assistance can link or build on this previous work.}

The country lacks anenergy strategy, DH sector strategy and legislation regulating thefundamentals of theDH sector. CTCN technical assistance activities are required to provide input to ongoing DH

legislation in BiH which is still in the process of development, and to shape comprehensive DH sector strategies, monitoring and compliance mechanisms (e.g. metering of consumption) which are lacking at both national and the entity levels.

In recent years, entities adopted a set of laws in the energy sector, however DH operations remain insufficiently regulated. All DH companies are functioning under the Law on Public Utilities from 2011. City of Banja Luka has two Decisions regarding District Heating: Decision of General condition for heat delivery and Decision of Technical condition for heat delivery, both since 2013.

Inrecent years DH operations were not under the focus of the entity governments, due to the fact that the responsibility for regulation of DH operations lies primarily with municipal and cantonal governments, which are the main responsible authorities for the DH sector. As such Banja Luka both owns and regulates the DH system in the city and sets heat tariffs that are not cost-reflective, thus subsidizing heat at the expense of the municipal budget.

As well as providing technical assistance the CTCN assistance and parallel efforts by the District Energy in Cities Initiative *will help the city identify socio-economic consequences of updating the tariff methodology to be more reflective of actual costs without detrimentally impacting those in fuel poverty. The ongoing TNA work should being undertaken by UNDP will inform this activities.*

Several feasibility studies for municipal DH have been drafted in recent years in the country, predominantly focusing on possibilities for fuel conversion from mazut (fuel oil) to biomass/wood chips. Although DH enterprises in the country, including the DH company in the City of Banja Luka, have prepared investment plans, these investment plans limited to identifying reconstruction costs for boiler houses and piping. The DH enterprises, including the DH company in Banja Luka, lack comprehensive feasibility studies taking into consideration cost benefit analysis options of economic, social and environmental impacts.

Assistance requested *(up to one page):*

{Please describe here the scope and nature of the technical assistance requested from the CTCN and how this could help address the problem stated above and add value vis-à-vis the past and on-going efforts. Please note that the CTCN facilitates technical assistance and is not a project financing mechanism.}

The City of Banja Luka is requesting the technical assistance of the CTCN in order toprepare a comprehensive Feasibility Study for rehabilitatingand modernizingits district heating.Banja Luka'spublicly owned DH operator "TOPLANA a.d. Banja Luka"(City of Banja Luka owns 95,57 % of shares)has identified the need for investments of approximately €40 million for the reconstruction of the city's DH network. The operator has also identified the need for fuel substitution and is considering conversion to biomass or alternative cheaper energy sources (away from mazut/crude oil) for various parts of its operations.

The CTCN technical assistance and parallel work of the District Energy in Cities Initiative will deliver an actionable feasibility study with associated investment and policy development plan that will ensure investment is a) attracted from the private sector or other actors where required, b) does not deliver a technical solution without the policy framework that will ensure long-term sustainability of the DH system's business plan (e.g. building efficiency policies or tariff regulation). The CTCN can use the standardized feasibility methodology and other modelling tools produced by the technical taskforce of the District Energy in Cities, comprised of experts from organisations such as the World Bank Group, Danfoss, Veolia, Cofely Reseaux, Euroheat and Power, London, UK, Lund University etc.)

Further, the District Energy in Cities Initiative has already begun work in partnership with international

partners such as the IFC to identify key technical, regulatory and policy developments that could be achieved in Banja Luka and has gained support from the city and country for national and local technical and policy recommendations.

Due to the urgency of the situation in Banja Luka, with an estimated financial loss of 3 million euros projected for heating season 2015/16,the Feasibility Study must provide short-term recommendations by September 2015 (in an interim report) in order for specific investments to be made before the heating season 2015/16. The Feasibility Study will then be able to fully develop medium/long-term recommendations after September 2015, with delivery of the full Feasibility Study by January 2016 which will consist of a viable Investment Plan and recommendations of policy/regulatory developments. The short-term investmentswill be financed by the municipality if they can avoid some of the 3 million euro projected losses and begin development of the system towards medium/long-term recommendations.

The short-term recommendations could include: specific high-priority pipe replacement, meters in houses and fuel switching. The Feasibility Study will then be further developed to identify and assess medium and long-term investment and policy/regulatory recommendations that will attract much needed private sector investment to the city's DH system.The short-term recommendations must be in-line with planned recommendations for the medium/long-term, for example recommending limited fuel switching to biomass for heating season 2015/16 must be because biomass switching is likely to be a recommendation for the medium/long-term.

The Feasibility Study will target a reduction of energy costs, heat losses, improved building efficiency (insulation and heat meters), fuel switching to environmentally friendly sources,and other operational improvements. The specific objectives of the Feasibility Study are to:

- Assess and evaluate existing investment plans and feasibility studies prioritizing network reconstruction options based on a Cost Benefit Analysis.
- Analyse existing fuel supply and fuel reduction options including insulation of heated spaces and improved metering.
- Assess potential of alternative cheaper energy sources to crude oil (including biomass and geothermal) and carry out technical and financial feasibility of fuel switching to inform short, medium and long-term investments and policy developments. This should include a resource assessment of locally sourced biomass.
- Undertake a comprehensive environmental analysis of proposed investments including resulting reductions in CO_2emissions and improved air quality.
- Recommend short, medium and long-term investments in the network, heat generation facilities, buildings and operations.
- Recommend realistic policy/regulatory changes in order to attract private sector investment in the city including analysis of a tariff systemencouraging user connection and energy efficiency and that demonstrates cost-recovery to the operator (potentially with more transparent municipal subsidies for fuel-poor).

The value added of this approach is that it will be a holistic assessment of the DH system, building on previous studies and work, that will justify short-term investments as part of a longer-term strategy for the city (i.e. not just delivering 'quick-fixes') and will provide the much needed policy and regulatory analysis that will ultimately enable private sector investment. This Feasibility Study will crucially be seen as an independent assessment that will justify expenditure and will be complementary and critical to the ongoing parallel work of the District Energy in Cities Initiative. The Initiative's work will include: building local government capacity for supporting long-term development of modern district energy, ensuring local-stakeholder coordination, training in energy masterplanning (i.e. incorporating consideration of DH in planning system), training in procurement and enabling private sector

investment, and seeking international finance for the DH system.

Expected benefits *(up to half a page):*

{Please outline here the medium and long-term impacts that will result from the CTCN technical assistance, including how the assistance will contribute to mitigate and/or adapt to climate change.}

In the medium term, CTCN'sassistance will contribute to the following:

- Ensure the continuation of Banja Luka's DH system, a system which provides the city with the highest potential for energy efficiency improvements and renewable heating and will be critical to the city's continued efforts to reduce fuel poverty.
- Reduction in the use and procurement cost of crude oil for Banja Luka's DH system helping the city reduce losses and retaining wealth in the local economy encouraging local job development.
- The replacement of 10% of the city's DH distributional network.
- The mainstreaming of insulation techniques and the subsequent reduction (estimated at up to 40%) of the building stock's energy usage
- The development of a new energy tariff system at municipal level to improve efficiency, protect fuel poor and ensure business model is sustainable and attractive to the private sector.
- Subject to feasibility results (i.e. business plan) and thus availability of funds, the installation of heat meters in residential and commercial buildings.
- Reduce fuel consumption by up to 27% in the medium-term saving 4.5 million euros a year in crude oil expenditure and saving 20,000tCO_2 annually.

In the long term, CTCN's assistance will contribute to the following:

- Diversification of energy sources (from crude oil to biomass and/or geothermal)and the development of co-generation DH plantsleading to emission reductions of up to 80,000tCO_2 per year.
- A reduction in overall energy requirements and associated GHG emissions stemming from the city's space and water heating operations.
- The establishment of Banja Luka as a forerunner for further DH energy efficiency initiatives across BiH.
- Decoupling of local heat market from international fossil fuel markets increasing local wealth retention, jobs and the financial stability of the DH system.

Post-technical assistance plans *(up to half a page):*

{Please describe here how the results of the CTCN technical assistance will be concretely used by the applicant and national stakeholders, to pursue their efforts of resolving the problems stated above after the completion of the CTCN intervention (list specific follow-up actions that will be undertaken).}

The City of Banja Luka and the DH Company will follow up on the results of the CTCN technical assistance as follows:

- The DH Company will significantly increase the energy efficiency and cost-effectiveness of its operations by implementing the recommendations of the Feasibility Study in the short and medium/long term. This will specifically include dramatically reducing water and heat losses in the network, developing building efficiency measures complementary to DH development, ensuring metering of consumers is optimal for energy conservation and switching from crude oil to cheaper and lower carbon alternatives such as biomass or geothermal.

- The DH company will implement a new tariff system which will ensure economically and financially sustainable heat supply to consumersand help attract private investment in the DH system.

- Working with the Feasibility Study recommendations and the ongoing work of the District Energy in Cities Initiative to develop an enabling environment for private investors that is replicable in other cities in the country and region.

- Where possible, technical lessons from CTCN's work in Banja Luka will be applied elsewhere in the country and region and policy and regulatory recommendations developed through the project and the Feasibility Study applied elsewhere in the country. This is a specific request of the country's Ministry of Energy which has identified significant replication potential in BiH.

- Begin process of attracting private sector investment in the city which has been identified as crucial to the longevity of the DH system. Transfer lessons learned from this to other cities in the country and region that require private sector investment and expertise.

Key stakeholders:

{Please list in the table below the main stakeholders who will be involved in the implementation of the requested CTCN technical assistance, and what their role will be in supporting the assistance (for example, government agencies and ministries, academic institutions and universities, private sector, community organizations, civil society, etc.). Please indicate what organization(s) will be the main/lead counterpart(s) of CTCN experts at national level, in addition to the NDE.}

Stakeholder	Role to support the implementation of the assistance
A.D Banja Luka (publicly owned DH operator in Banja Luka)	Provide for institutional capacity,technical knowledge, data and information.
Mayor's Office of Banja Luka	Support in the development of the municipal district heat plan, as part of the municipal energy strategy.Ensure the involvement of all the relevant stakeholders to the process, including strengthening of an institutional framework.
University of Banja Luka, Faculty of Sciences	Serve as the National Designated Entity (NDE) and focal point for the CTCN. It will ensure that: ▪ the request reflects national circumstances and priorities; manage the national CTCN technical assistance request; ▪ support provided by CTCN is coordinated with other processes that address climate change at national level; ▪ relevant ministries, UNFCCC focal points, private sector, civil society, and academia representatives are involved in the process.
UNEPRelevant Regional and Country Offices (e.g. Bosnia and Herzegovina, Vienna, and Regional Office of Europe).	Provide information andliaise with global network of expertise and partners from the District Energy in Cities Initiative.

Alignment with national priorities *(up to half a page):*

{Please demonstrate here that the technical assistance requested is consistent with documented national priorities (examples of relevant national priorities include: national development plans,

poverty reduction plans, technology needs assessments (TNAs), LEDS, NAMAs, TAPs, NAPs, sectorial strategies and plans, etc.). For each document mentioned, please indicate where the priorities specifically relevant to this request can be found (chapter, page number, etc.).}

National priorities and strategies relevant to this project include:

1. **The Second National Communication of Bosnia and Herzegovina under the UNFCCC (June 2013).** [Source: http://unfccc.int/resource/docs/natc/bihnc2.pdf].

Chapter 1.5.2. Energy sector analysis (pg. 13-27) states that:

- The energy sector is responsible for more than 70% of total CO_2 emissions in BiH. Therefore, this sector has the greatest potential for GHG emissions reduction and climate change mitigation.
- BiH energy efficiency in generation, distribution and end use, is low compared to developed economies. Energy production in BiH is based on technologies developed some thirty years ago, when a number of blocks in its thermal power plants were constructed. New technologies should be introduced whenever possible, making a strong case for construction of new plants and major refurbishments of existing facilities.
- Renewable energy sources (except for existing hydropower capacity), at the current level of development and at the current share in the overall energy consumption, can only complement, rather than replace major plants. However, due to their low environmental impact, these technologies are developing rapidly.

Chapter 4.2.1. District Heating Sector Overview (pg. 118) states that:

- In the majority of BiH's DH companies, heating plants and accompanying equipment are predominantly 25 to 30 years old. In Banja Luka (the second biggest DH system in BiH) the average age of boilers is close to 35 years old, and they will soon reach the end of their expected operating lifetime. This places the modernization of Banja Luka's DH system among some of the major national priorities.

Chapter 4.2.3. Measures for reduction of GHG emissions from the DH sector (pg.121) states that:

- Measures and priority actions stipulated in order to reduce CO_2 emissions from the DH sector in BiH in 2010-2025 include the following: increasing the capacity of the existing DH system; improving the efficiency of the systems by optimizing their operations; and expanding networks for heating more remote/distant neighborhoods.
- Measures to improve district heating network infrastrcuture include pipeline repairs and replacement of old distribution networks in critical areas with insulated pipes; as well as reconstruction of steam pipes and heat and hot water pipelines.

2. Energy strategy of Republic of Srpska up to 2030 (http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mper/Documents/energy%20strategy%20of%20republic%20of%20srpska%20up%20to%202030.pdf) Chapter 11. DISTRICT HEATING SECTOR (pg. 43-44) states: The operation of district heating sector will be normatively regulated in order to achieve economically sustainable position and financial stability of companies for toplification. In particular, following issues will be regulated: general conditions of production, transmission, distribution and supply of heat energy, "procurement of energy sources, planning and management of energy balances and security of supply of heat energy, "the

introduction of measurement, control, management and charging of heat energy according to the actual consumption of individual consumer (leaving flat-rate calculation), which will stimulate increase of energy efficiency on the side of

3. **2008 BiH Energy Sector Study: Module 9, City District Heating**
[Source: https://www.energy-community.org/pls/portal/docs/316178.PDF]

- On pg. 34 the document states that the current legal regulation in the DH field is undeveloped. It provides an overview of the relevant EU regulatory framework, and in particular of the DHlegislation framework in Croatia, as an example of how the development of DH legislation in BiH could proceed.

4. **UNFCCC Technology Needs Assessment (TNA) for Bosnia and Herzegovina**

- BiH is yet to submit the first round of its TNA, which is currently being developed under the guidance of the United Nations Development Programme (UNDP)country office.

Development of the request *(up to half a page):*

{Please explain here how the request was developed at the national level and the process used by the NDE to approve the request before submitting it (who initiated the process, who were the stakeholders involved and what were their roles, and describe any consultations or other meetings that took place to develop and select this request, etc.)}

A delegation from the city of Banja Luka participated in a joint UNEP-IFC workshop, "Private Sector Participation in District Heating," in Tallin Estonia,on April 27 2015– where they heard about the CTCN and the DES Initiative and met with the UNEP delegation to discuss the opportunities. Several meetings follow-up meetings were held between the city, UNEP (DTIE, Regional and Country offices). BiH sent a delegation to UNEP Paris on Thursday May 21, 2015 organised by the UNEP Country office, where the CTCN team presented the opportunities offered by CTCN to access technical assistance of the highest quality and to remove barriers to technical transfer. Thereafter the City of Banja Luka was in touch with the Country NDE to discuss the proposal.

Expected timeframe:

{Please propose here a duration period for the assistance requested.}

Assistance is requested for a period of 6-8 months.

Background documents:

{Please list here relevant documents that will help the CTCN understand the context of the request and national priorities. For each document, provide web links if available, to attach to the submission form while submitting the request. Please note that all documents listed/provided should be mentioned in this request in the relevant question(s), and that their linkages with the request should be clearly indicated.}

1. Mission Report on District Heating (Tallin, Estonia).
2. The Technology Needs Assessment for Bosnia and Herzegovina (September 2015).
3. 2008 BiH Energy Sector Study: Module 9, City District Heating.
4. Second national communication of Bosnia and Herzegovina under the UNFCCC (June 2013).

5. EBRD funding (loan) and Swedish International Development Coopertation Agency (grant) for the **construction** of the biomass plant (December 2014)
http://www.endswasteandbioenergy.com/article/1322124/bosnia-tender-issued-banja-luka-biomass-project

Monitoring and impact of the assistance:

{Read carefully and tick the boxes below.}

☒ By signing this request, I affirm that processes are in place in the country to monitor and evaluate the assistance provided by the CTCN. I understand that these processes will be explicitly identified in the Response Plan in collaboration with the CTC, and that they will be used in the country to monitor the implementation of the CTCN assistance.

☒ I understand that, after the completion of the requested assistance, I shall support CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

Signature:

NDE name: *Goran Trbic*

Date: 19.08.2015.

Signature:

THE COMPLETED FORM SHALL BE SENT TO THE CTCN@UNEP.ORG

Need help? The CTCN team is available to answer questions and guide you through the process of submitting a request. The CTCN team welcomes suggestions to improve this form.

>>> Contact the CTCN team at ctcn@unep.org