CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

Technical Assistance Response Plan
Terms of Reference

Country	Republic of Serbia
Request ID#	2016000064
Title	Incorporating innovative renewables and waste heat technologies in Belgrade's district heating (DH) system
NDE	Vladica Bozic Head of Section for Project Management and National Designated Entity Ministry of Environmental Protection 1, Omladinskih brigade street, 11000 Belgrade, Serbia vladica.bozic@ekologija.gov.rs
Proponent	The City of Belgrade

Summary of the CTCN technical assistance

In Serbia, improving energy efficiency in buildings and decarbonizing the heating and cooling sector are a national priority. Belgrade has the largest district heating system (DH) in Serbia, connecting 50% of households and is fueled on imported natural gas with very little renewables or waste heat. Energy security, high DH prices, air pollution and climate objectives is driving modernization and expansion of DH, which will significantly improve energy efficiency.

Enhancing renewable energy and waste heat to the DH system is a priority for the city of Belgrade, and must be developed as part of a holistic action plan for DH in the City. The integration of renewable and waste heat sources in a DH network requires of innovative technologies that have already been proofed in northern European countries but that have not been demonstrated yet in the Serbian district heating market. Demonstration of low-carbon technologies, such as solar thermal, geothermal and the use of low-grade waste heat, can attract third-party finance, transfer technical knowledge and help expand DH to new areas. Such demonstrations are highly replicable to the other 58 Serbian cities with DH and the wider region. Belgrade is a pilot city of the UN Environment-led District Energy in Cities Initiative (the "Initiative") and the city and Initiative are co-developing an action plan for district energy.

Over a 9 months implementation period the technical assistance will include the identification of renewable and waste heat sources; a capacity building module and a pre-feasibility study of two selected potential projects. The project will involve the Ministry of Environmental Protection, the DH Utility "Beogradske elektrane" and the City of Belgrade.

Agreement:

(If possible, please use electronic signatures in Microsoft Word file format)

National Designated Entity to the UNFCCC Technology Mechanism for which the Climate Technology Centre and Network is the operative arm

Name: Mr. Vladica Bozic
Title: Head of Section for Project Preparation
Date: 04.04.2019.
Signature:

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National Designated Entity to the UNFCCC Technology Mechanism (providing *pro bono* support)

Name: Mr. Min Pyo Kim

Title: Director

Date: 13/05/2019

Signature:

UNFCCC Climate Technology Centre and Network (CTCN)

Name: Jukka Uosukainen
Title: CTCN Director
Date:
Signature:

1. Background and context

In 2013 the emissions from the energy sector in Serbia amounted to 79.4% of total national GHG emissions[1]. The gross final energy consumption is expected to increase by 12.9% by 2020 compared to 2009, if no energy efficiency measures are applied[2]. The majority of this consumption is connected to the heating and cooling sector and is projected to increase to 45.5% in 2020. As such, improving energy efficiency and decarbonizing the heating and cooling sector is a national priority for Serbia. The current energy policy of Serbia focuses on increase of use of renewable energy sources through development and expansion of DH systems based on renewables and combined heat and power. Specific measures include small biomass boilers; increase in renewables such as biomass, geothermal and solar, etc.[3].

Belgrade's DH system is the largest in Serbia and one of the largest in Europe with a total length of 1,420 km and a capacity of over 2,800 MW, almost half the total DH capacity in the country. Utility "Beogradske elektrane" (BE) manages the DH system which supplies heat to approximately 50% of households in Belgrade, businesses and public buildings. The system's priority is to switch heat sources from almost exclusively imported natural gas (€130 mil/year) to a more diverse mix of fuels, including renewables and waste heat[4]. The City is co-developing an Action Plan with the Initiative to ensure modernization, interconnection and expansion of DH to receive new low-carbon heat sources, improve efficiency and lower prices. Demonstration projects for low-carbon DH sources attracting investment are a priority.

DH in 59 cities in Serbia has an aggregated heat production capacity of 6,700 MW[5]. However, there is very low penetration of renewables and waste heat. Cities need support and funding to identify, plan, assess feasibility, procure and attract 3rd-party financing for such projects in order to meet national energy policy ambitions on renewable DH. Demonstration projects in Belgrade could help accelerate the market for such technologies in Serbia.

So far several assessments were made on the opportunities of solar, geothermal and waste heat. Serbia has average energy value of global radiation of 1,200 kWh/m^2/year[6]. The territory of Belgrade has significant underground water archives with its temperature reaching up to 25°C. The initiative to connect waste heat from the TPP "Nikola Tesla" to the DH system in Belgrade has started in 1980s. However, due to lack of investments no feasibility study has been undertaken up to date.

In 2016, the City of Belgrade was selected as one of the four pilot cities of the global UNEP/GEF project 'Increasing Investments in District Energy Systems in Cities – a SE4All[7] Energy Efficiency Accelerator'. This project aims to assist developing countries and selected cities to accelerate their transition to lower-carbon and climate resilient societies through promoting modern District Energy

[1] First Biennial Update Report of the Republic of Serbia under the UNFCCC, 2016
[2] First Biennial Update Report of the Republic of Serbia under the UNFCCC, 2016
[3] Air Quality Plan for Belgrade Agglomeration, 2016
[4] Development Strategy of PUC "Beogradske elektrane" 2015-2025, 2017
[5] Air Quality Plan for Belgrade Agglomeration, 2016
[6] 1,000 kWh/m^2/year is the average for Denmark
[7] Sustainable Energy for All

Systems (DES). The project has four main components, including (1) Assessments and technical assistance for DES actions in cities ("Light touch"), (2) District Energy Demonstrations and city-wide plans ("Deep dive"), (3) Monitoring Framework and (4) Outreach, tools and training on DES Initiative. All except for the first component will be applied in the case of Belgrade. The envisaged outputs of these three components cover the following:

- Multi-stakeholder coordination framework: Support the establishment of a multi-stakeholder coordination group in Belgrade to provide input to assessments, policy design and strategy and to receive training;
- Thermographic imaging of the district heating network: In partnership with the Company, develop a detailed plan for the thermographic imaging of the City's existing district heating network;
- Deep assessment: Undertake a deep assessment of district energy in the City;
- Procurement Plan: Support the City to prepare a Procurement Plan for the demonstration project dependent on the chosen business model for the project;
- District Energy Action Plan: Building upon the existing DH Strategy and findings of the Deep Assessment, develop, in partnership with the City and the Company, develop a 10-20 year District Energy Action Plan;
- Tailored MRV framework: Provide technical support to tailor a Monitoring, Reporting and Verification (MRV) framework;
- Synthesis reports: Prepare synthesis reports with targeted policy and regulatory recommendations for the City, provincial and national officials;
- 'Train the trainers' modules: Develop 'train the trainer' modules which will build capacity in the relevant institutions in Serbia on specific training topics.

2. Problem statement

Multiple cities in Serbia face similar barriers to modernizing and expanding DH systems, which include lack of finance, institutional capacity, buildings' thermal insulation, holistic planning in cities, resource mapping of renewable potentials, renewables and waste heat demonstrations, technical expertise on renewables, PPPs and innovative business models.

In Belgrade, significant investment of €380 mil is needed for the next 25 years to modernize and expand the DH network, diversify fuel sources whilst reducing tariffs to remain competitive. The City has significant potential for DH connected solar, geothermal, biomass, and waste heat although these, except a small biomass project, have not been developed beyond the pre-feasibility stage due to a lack of finance for project feasibility, local technical expertise on renewables and long-term action plan for DH identifying specific technologies.

A full, independent feasibility study and procurement plan for a DH connected low-carbon heat source would transfer technical expertise, attract 3rd-party finance, demonstrate costs and viability for future projects and accelerate the technology in Belgrade and nationally. Inputs and review from the UN Environment-led DES Initiative and partners will ensure international best practices on technology, financing and project development are accounted for. The Action Plan for DH in Belgrade that is under-development will ensure scale-up of results in the city by identifying replicator projects to build on the demonstration over the next 15-20 years and increase technical potentials for low-carbon sources through modernization and interconnection.

This technical assistance builds on components 1 and 2 of the project 'Increasing Investments in District Energy Systems in Cities", adding the renewable and waste heat sources component which is not covered by the GEF project. This technical assistance shall thus help the city identify at least two potential projects of renewable and/or waste heat supply to the city's district heating network. The

pre-feasibility studies will provide enough techno-economic information to help select a "demonstration project". The following stand-alone investment-grade feasibility study will enable the City of Belgrade to enter detailed discussions with investors regarding implementation of identified technologies.

3. Logical Framework for the CTCN Technical Assistance:

(Guidance: Please note that multiple activities lead to one Output, and multiple Outputs lead to one Outcome. There can be several Outputs, but only one Outcome description capturing the CTCN technical assistance. Deliverables are the products or services to be delivered to the NDE/Proponent/CTCN based on the Activities and the Outputs.)

Implementation schedule (months)	1	2	3	4	5	6	7	8	9	10
	Nov	DEC	JAN	FEB	Mar	Apr	May	Jun	Jul	Aug
Objective: Support the City of Belgrade to deliver a renewable and/or low-carbon DH demonstration project to support scale-up in the City, nationally and regionally. **Outcome:** The City of Belgrade and local DH utility have the technical and institutional capacity and knowledge to develop and scale-up low-carbon DH solutions that attract finance and are aligned with a long-term Action Plan in the City.										
Mandatory CTCN Activities - A detailed work plan of all activities, deliveries, outputs, deadlines and responsible persons/organisations and detailed budget to implement the Response Plan. The detailed work plan and budget must be based directly on this Response Plan; - Based on the work plan, a monitoring and evaluation plan with specific, measurable, achievable, relevant, and time-bound indicators used to monitor and evaluate the timeliness and appropriateness of the implementation. The monitoring and evaluation plan should apply selected indicators from the Closure and Data Collection report template and enable the lead implementer to complete the CTCN Closure and Data collection report at the end of the assignment - A two-page CTCN Impact Description formulated in the beginning of the technical assistance and updated/revised once the technical assistance is fully delivered (a template will be provided); - A Closure and Data Collection report completed at the end of the technical assistance (a template will be provided).										
Mandatory Deliveries: - Detailed work plan - Monitoring and evaluation plan - CTCN Impact Description - Closure and Data Collection report	*									

Implementation schedule (months)	1	2	3	4	5	6	7	8	9	10
	Nov	DEC	JAN	FEB	Mar	Apr	May	Jun	Jul	Aug
Output 1: Project identification, potential analysis and early-stage feasibility										
Activity 1.1: Potentials study of renewables connected to DH - Building upon findings from the overall GEF project component 1 and 2, analyze in consultation with local stakeholders the techno-economic and environmental potential of five priority DH-connected technologies for supplying renewable energy (RE) in Belgrade over the next 10-15 years. This should include possible new network development that may or may not be interconnected into the City's main networks in the medium-term, and network expansion. - The study should be developed in close consultation to the ongoing development of an Action Plan for the district energy sector in Belgrade. The development of the Action Plan that is covered under the GEF project will include plans for network rehabilitation, building efficiency, network interconnection, metering, lowering of network temperature and new heat sources. - Focusing on the selected and prioritized technologies, provide an overview of international best practice and case studies. The overview and case studies must include: lessons learned, factors for successful projects, the need for supportive technologies (e.g. low heat networks, storage, metering, etc.), supportive policy and regulatory frameworks, technical capacity needed to develop and operate. - Develop, based on international best practice, a desk study to map out actions, studies, policies and regulation that can incentivize the further uptake of RE technologies and accelerate the market for specific DH-connected technologies supplying renewable energy in Belgrade and the country. The study should include: costed recommendations for additional resource analysis, mapping and technology demonstrations; recommendations on knowledge transfer and capacity building; and recommendations on innovative policies, regulations and business models that could unlock further the market (e.g. incentives, net metering, ESCOs, PPPs, building regulations etc.)										
Activity 1.2: Stakeholder consultation and geographical selection Building upon the findings of Activity 1.1; - Consult with local stakeholders and investors on the selection and prioritization of a specific renewable energy technology or hybrid of technologies, to be analyzed under										

Implementation schedule (months)	1	2	3	4	5	6	7	8	9	10
	Nov	DEC	JAN	FEB	Mar	Apr	May	Jun	Jul	Aug
Outputs 2. This selection should account for ability to deliver in a short time period (not more than five years), investor interest, long-term potential, replicability, environmental benefits and meeting city's affordability criteria. - Based upon the earlier potential study, analyze geographical areas in Belgrade with high potential for the chosen technology or hybrid technologies' solutions and select one geographical areas to be further analyzed under Output 2, in consultation with local stakeholder (NDE, City and BE).										
Deliverables for Output 1: - D1.1: Report with prioritized RE technologies, analysis of each technology and an assessment of financial, regulatory and technology drivers for enhancing RE integration in DH systems using international best practices and literature. - D1.2: Summary report of the stakeholder consultation on the selection of technology solution and geographical area for further analysis. The report should include all power point presentations, photos, etc. - D1.3: Analytical report on the identification and prioritization of geographical areas for RE integration into the DH system.							*			
Output 2: Development of a stand-alone investment-grade feasibility study of selected demonstration project										
Activity 2.1 Analysis of selected one technology and site Consulting the City and BE at each stage undertake the following analyses: - A technical analysis of the chosen site including: preliminary project designs, heating/cooling load/production/consumption curves, analysis of connections. This items includes also a geographical positioning and presentation of the sites on a city map. - Description of energy needs, total primary energy, primary energy for heating, primary energy for hot water, primary energy for electricity, energy losses in production chain (for heat and for electricity), energy losses in distribution chain (for heat and for electricity) and energy losses in consumption chain (for heat and for electricity). Sankey diagram for energy balance for every chain from primary energy to the final consumer. - Collection, compilation and analysis of heat production (and energy use), distribution and consumption pattern with respect to, daily, weekly, and seasonal load variations, and based										

Implementation schedule (months)	1	2	3	4	5	6	7	8	9	10
	Nov	DEC	JAN	FEB	Mar	Apr	May	Jun	Jul	Aug
on that preparation of annual load duration curve as well as provide information on any differences in the distribution of load compared to what is considered standard for DH. Description, analysis and visualization of base load and all other loads. - Tables and/or graphs showing daily and annual use profiles for each form of energy (e.g., electric/steam/hot water/chilled water). Review of recent and projected fuel composition, structure and bills, heat energy and electricity prices, description of the current and planned DH tariffs, subsidies, including price methodologies and regulatory national/local bodies. - A financial analysis of the chosen sites including: development of Base Case Financial Models (BCFM), CAPEX and OPEX evaluation, structuring of heating/cooling and hot water tariffs, payback periods, simple sensitivity and risk analysis, assessment of finance sources and site-specific business models. A regulatory/risk assessment analysis of the chosen sites including: project specific regulatory risks, risks and responsibilities of stakeholders, structuring analysis, potential business model designs and procurement										
Activity 2.2 Economical and Investment potential - Overview of the main revenues and expenses of the City with the analysis of the City's ability to provide a guarantee to the district heating company to secure future investments. - Financial analysis of current operations of the district heating company and historical (for at least the last 5 years). - Overview of new technological solution concept and its economics. - Engineering calculations - Assessment of the necessity for installing a metering system - Ensure that the recommended technological solution meets the operational and economic goals of the investor. - Detailed pricing of new technological system: CAPEX, OPEX, engineering, construction, commissioning, maintenance, etc. - Full financial analysis including payback, net present value, discounted cash flow, return on investment. - Life-cycle cost analysis of the investment. - Provide all the information needed to make a final investment decision. - Total project costs evaluation and substantiation. - Financing options and assumptions, Debt/equity ratio, Discount rate, Interest rate/Cost of debt, Tax rate.										

Implementation schedule (months)	1	2	3	4	5	6	7	8	9	10
	Nov	DEC	JAN	FEB	Mar	Apr	May	Jun	Jul	Aug
- Full sensitivity analysis (e.g. CAPEX/OPEX, fuel costs, electric rates, incentives etc.).										
Activity 2.3 Integration into long-term investment plan - Analyze the implications on the project of long-term development of BE's DH network including temperature lowering, interconnection, metering programmes, building efficiency policies, tariff changes and price fluctuations.										
Deliverables for Output 3: - D.2.1: Feasibility study and analytical assessment reports capturing technical analysis of selected site - D.2.2. Report with stand-alone investment-grade feasibility study from selected demonstration project; legislation, regulatory and institutional environment; Site visit and survey and; Data assessment and pre-design stage. - D.2.3. Long-term investment plan for the proposed RE integration										*

** As mandatory deliverables for all CTCN Response Plans, the Lead Implementer must produce the following: i) A detailed work plan of all activities, deliveries, outputs, deadlines and responsible persons/organizations and detailed budget to implement the Response Plan. The detailed work plan and budget must be based directly on this Response Plan; ii) A monitoring and evaluation plan with specific, measurable, achievable, relevant, and time-bound indicators used to monitor and evaluate the timeliness and appropriateness of the implementation; iii) A two-page CTCN Impact Description (a template will be provided). These deliverables must be included as initial items in the log frame.*

4. Resources required and itemized budget:

Please provide an indicative overview of the resources required and itemized budget required to implement the CTCN technical assistance, including for M&E-related activities, using the table below. Once the Response Plan is completed, a Response Implementation partner(s) will be selected by the Climate Technology Centre (CTC). A detailed activity-based budget for the CTCN assistance will be finalized by the CTCN and selected Implementer.

Activities and Outputs	**Input: Human Resources** (Title, role, estimated number of days)	**Input: Travel** (Purpose, national vs. international, number of days)	**Inputs: Meetings/events** (Meeting title, number of participants, number of days)	**Input: Equipment/Material** (Item, purpose, buy/rent, quantity)	**Estimated cost (USD)** Please accumulate the costing at Activity and Output level and provide an estimated costing range for the total Response Plan	
					Minimum	**Maximum**
Total for Mandatory CTCN Activities					**5,000**	
Output 1: Project identification, potential analysis and early-stage feasibility					**55,000**	
Output 2: Development of a stand-alone investment-grade feasibility study of selected demonstration project					**80,000**	
Estimated range of costing for the entire Response Plan					**140,000**	

5. Profile and experience of experts

Based on the required Human Resources identified in section 4 (Resources required and itemized budget) please provide a description of the required profile of all involved experts for the implementation of the CTCN Response Plan.

Experts required	Brief description of required profile
Junior project personnel	Junior personnel with minimum of 3 years of professional experience in DH-related projects with good research and writing skills.
Expert 1	Economist/financial expert with a university degree or equivalent qualification with minimum of 7 years of professional experience in socio-economic analysis development in regards to Balkan DH sector.
Expert 2	The technical expert(s) shall have a university degree or equivalent qualification with a minimum of 15 years of professional experience in the field of DH sector planning, design, implementation and operations, with special focus on renewable energy sources, with comprehensive experience of similar assignments in, as well as in institutional and commercial management of district heating companies.
Expert 3	Institutional/Legal expert with a university degree or equivalent qualification with minimum of 7 years of professional experience, with knowledge of country legislation and experience of similar assignments and relevant experience in the areas of natural monopolies regulation and knowledge of Serbian tariff legislation
Expert 4	Environmental specialist(s) with a university degree or equivalent qualification with minimum of 7 years of professional experience, with specific expertise in DH projects, with good knowledge and understanding of the international environmental requirements, demonstrated experience of previous work with IFIs and with utilities in the Balkans.
Expert 5	Gender expert with a university degree or equivalent qualification with minimum of 7 years of professional experience, with good grasp of DH sector and both international and Serbian national laws and regulations pertaining to gender mainstreaming.

6. Intended contribution to impact over time

In the medium term:

- Ensure the increased reliability of District Heating economy in whole District Heating chain from the heat production to the final consumption.
- Ensure continuity of operation of the DH system (reduce dependence on imported fuel)
- Reduce use of natural gas helping the City to reduce losses and retain revenue encouraging local economy development
- Replace up to 10% of the city's DH network and interconnect heat sources
- A demonstration project on the use of renewable energy sources for DH is developed
- The technical and institutional capacities of the City of Belgrade and BE are strengthened.
- Technical capacity leads to improved district heating service and energy prices ensuring for final consumers.
- Knowledge to develop and scale-up low-carbon DH solutions that attract finance is obtained
- Alignment of the designed alternative DH solutions with the City's long-term Action Plan

In the long run:

- Construction of a new technological system in the City
- Diversify energy sources (from natural gas to renewables) and development of co-generation facilities
- Reduce overall energy requirements, costs and GHG emissions of the DH system
- Encourage local heat markets and increase local wealth retention, jobs and financial stability of the DH system

7. Relevance to NDCs and other national priorities

The Intended Nationally Determined Contribution of Republic of Serbia has been submitted in June 2015, which states that in comparison to year 1990 the national GHG emission reduction should reach 9.8% by 2030. This project would contribute to the GHG emission reduction in 330,000 t CO_2 emissions annually only for implementation of the metering system, if heat cost allocators and heat meters are being installed. The total contribution is estimated to be much higher. Diversification of energy sources (from natural gas to biomass, solar, waste energy, hydropower and/or geothermal) and the development of co-generation DH facilities should lead to significant emission reductions. Mainstreaming of insulation techniques and the subsequent reduction of the building stock's energy usage should also lead to significant emission reductions.

This project is also in line with the First Biennial Update Report under the UNFCCC (February 2016), where in Part 6 on Mitigation measures to reduce GHG emissions in Chapter 6.1 Energy sector, measure NS-32 requires introduction of metering system and billing on the basis of measured consumption in DH systems in Serbia.

The National Renewable Energy Action Plan of Republic of Serbia (2013) in Chapter 1. Summary of National Renewable Energy Policy states several objectives related to achievement of the greater use renewable energy. The achievement of these objectives is envisaged through the following activities:

1) the construction of new facilities that meet the requirements in terms of energy efficiency and use of renewable energy;
2) energy rehabilitation of buildings and the introduction of renewable energy in the building sector (mainly in the public sector);
3) replacement of crude oil, coal and natural gas used for heating with biomass and other renewable energy sources;
4) the introduction of district heating systems based on the use of renewable energy sources and combined production of electricity and heat;

5) replace the use of electricity to produce hot water by solar energy and other renewable energy sources;
6) production of electricity from renewable energy sources;
7) the introduction of biofuels and other renewable energy sources in the transport sector;
8) the development of the distribution network for the connection of small electricity producers.

All the mentioned activities are envisaged to be tackled within this technical assistance.

8. Linkages to relevant parallel on-going activities:

The National Climate Change Strategy with action plan is currently being developed and it will provide a clear framework of activities against climate change between 2020 and 2030, as well as the framework for 2050.

Energy policy, as the key sector for GHG emission reduction is defined through several strategies. These strategies are also prioritizing issues that are tackled in this project and they include: Draft Energy Development Strategy (DEDS) until 2025 with projections to 2030 (2015) based on the annual energy balances, Second Energy Efficiency Action Plan of the Republic of Serbia for the period from 2013 to 2015 (2013), National Renewable Energy Action Plan of the Republic of Serbia (2013), Decree on Incentive Measures for Privileged Energy Producers – Decree on feed-in tariffs (2013). DEDS is analyzing the climate change issues, while the implementation of the remaining documents would have direct impact on reducing GHG emissions.

The Energy Development Strategy (EDS) of Belgrade has been drafted in 2008, while the implementation of the measures and achievement of its goals is being monitored. These include energy efficiency increase, increase in supply security, environmental protection, decrease of dependence on imported energy, increased investment in energy sector and reduction of required heat energy for heating buildings by 1% per year.

As one of the four pilot cities of the Initiative, the City of Belgrade will be vital to demonstrating best practice technology applications, policies and financing mechanisms to be replicated in the region. This technical assistance will be implemented hand in hand with the global GEF project. The Initiative has already begun work with international partners (State of Green, Danfoss and IFC) to identify key technical, regulatory and policy developments to be achieved in Belgrade. Furthermore, the City of Belgrade has recently joined the Building Efficiency Accelerator Partnership Platform, that will assists the City in improving the energy efficiency of buildings in their jurisdiction through multi-sectoral collaboration, which could help facilitate action on building efficiency policies and projects.

9. Anticipated follow up activities after this technical assistance is completed:

The results of the CTCN technical assistance will support the City of Belgrade to:

- Implement recommendations of the demonstration feasibility study with its investment plans, while enabling environment for private investors that is replicable in other cities in the country and region.
- Technical lessons from CTCN's work in Belgrade will be applied elsewhere in the country and region and policy and regulatory recommendations developed through the project to ensure replication potential in Serbia.
- 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.

10. Gender and co-benefits:

Imbedded in design of the activities:	The assistance is designed in a way to produce gender segregated data where possible (Activity 1.4), include both genders equally in consultation activities (Activity 2.3) and enable training and capacity building of both men and women (Activity 5.3). It is recognized the role of both women and men is equally significant and the assistance will not contribute to any gender discrimination and will seek to include both genders in all activities where possible.
Gender and co-benefits intended as result of the activities:	Taking into account that women and children receive more benefits on heating services than men as they spend more time in home in general, multiple co-benefits are expected from this assistance concerning gender, in particular (i) access to cleaner, safer and reliable heating system, (ii) reduced domestic chores related to space heating, and (iii) reduced incidence of carbon monoxide poisoning and accidental fire.

11. Main in-country stakeholders in implementation of the technical assistance activities:
Using the table below, please list and describe the role of in-country stakeholders, participants and beneficiaries who will be involved in or directly consulted during implementation of the assistance.

In country stakeholder	Role in implementation of the technical assistance
PUC Beogradske elektrane (BE)	Provide institutional capacity, technical knowledge, data and information.
City of Belgrade, Secretariat for Environmental Protection	Ensure compliance of the project activities with the city environment protection strategies and other related programs and plans regarding environmental protection and climate change. Ensure the involvement of all the relevant stakeholders to the process, including strengthening of an institutional framework.
City of Belgrade, Secretariat for Energy	Ensure compliance of the project activities with the city energy strategy. Ensure the involvement of all the relevant stakeholders to the process, including strengthening of an institutional framework.
Ministry of Environmental Protection	Serve as the National Designated Entity (NDE) and focal point for the CTCN. It will ensure that: • the project 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 point, private sector, civil society, and academia representatives are involved in the process.
Serbian Environmental Protection Agency	Support the project implementation in providing data on air quality in the City of Belgrade; participate in developing recommendations that will have an impact to reduction of air pollution from heating sources.
Ministry of Mining and Energy	Ensure compliance of the project activities with the

	energy efficiency strategy on the state level. Ensure the involvement of all the relevant stakeholders to the process, including strengthening of an institutional framework.
Secretariat for Communal and Housing Affairs	Ensure compliance of the project activities with the city energy efficiency strategy. Ensure the involvement of all the relevant stakeholders to the process, including strengthening of an institutional framework.
UN Environment and Relevant Regional and Country Offices (e.g. Belgrade, Vienna, and Regional Office for Europe)	Provides overall coordination between several actors, including the City of Belgrade, local deployment team, international partners from the District Energy in Cities Initiative and different local stakeholders Provides inputs and knowledge based on the work of the global Initiative, training possibilities and state of art tools and methods for tackling the issue of district energy in cities.
District Energy in Cities Initiative Expert Working Group	Expert group of consultants to the District Energy in Cities Initiative that are committed to helping Belgrade undertake a deep assessment, develop an Action Plan for the district energy sector, develop new renewable technologies, improve energy efficiency of the network and build local capacity.
District Energy in Cities Initiative National Expert for Serbia	Liaison with the City of Belgrade and the City Coordination group in order to ensure the day-to-day work is done in compliance with the DES methodology and targets.
City coordination group	Coordination group of local stakeholders set up by the Initiative and the city of Belgrade to ensure multi-stakeholder coordination in the development of district energy

12. SDG Contributions:

Instructions: Please complete the grey section below for a maximum of three SDGs that will be advanced through this TA. A complete list of SDGs and their targets is available here: https://sustainabledevelopment.un.org/partnership/register/.

Goal	Sustainable Development Goal	Direct contribution from CTCN TA (1 sentence for top 1-3 SDGs)
1	End poverty in all its forms everywhere	Improved energy access and creation of direct and indirect employment. Increase in disposable income of population connected to DH network.
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	
3	Ensure healthy lives and promote well-being for all at all ages	Improved quality of life through reliable and efficient DH system and building efficiency. Reducing risks of incidence of respiratory diseases.
4	Ensure inclusive and equitable quality education and promote life-long learning opportunities for	

Goal	Sustainable Development Goal	Direct contribution from CTCN TA (1 sentence for top 1-3 SDGs)
	all	
5	Achieve gender equality and empower all women and girls	
6	Ensure availability and sustainable management of water and sanitation for all	
7	Ensure access to affordable, reliable, sustainable, and modern energy for all (consider adding targets for 7)	
	7.1 - By 2030, ensure universal access to affordable, reliable and modern energy services	Improve renewable and clean energy access.
	7.2 - By 2030, increase substantially the share of renewable energy in the global energy mix	Increasing the share of renewable in total power generated.
	7.3 - By 2030, double the global rate of improvement in energy efficiency	Increase energy efficiency of the DH system and the building stock.
	7.a - By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	
	7.b - By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support	Expanding infrastructure and upgrade technology to improve modern energy systems.
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Creation of direct and indirect employment.
9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Increasing energy efficiency and cost-effectiveness of the City's DH system. Modernisation of DH network.
10	Reduce inequality within and among countries	
11	Make cities and human settlements inclusive, safe, resilient and sustainable	Improving resource efficiency, air quality, and access to safe and affordable energy.
12	Ensure sustainable consumption and production patterns	
13	Take urgent action to combat climate change and its impacts	
	13.1 - Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	Using more environmentally friendly energy sources for heating.
	13.2 - Integrate climate change measures into national policies, strategies and planning	Supporting low carbon development.
	13.3 - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	
	13.a - Implement the commitment undertaken by developed-country parties to the United Nations	

Goal	Sustainable Development Goal	Direct contribution from CTCN TA (1 sentence for top 1-3 SDGs)
	Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible	
	13.b - Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities	
14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	
15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	
17	Strengthen the means of implementation and revitalize the global partnership for sustainable development	Supporting the implementation of the global District Energy Systems Initiative.

13. Classification of technical assistance:

Please indicate primary type of technical assistance. Optional: If desired, indicate secondary type of technical assistance.

Please tick off the relevant boxes below	*Primary*	*Secondary*
☐1. Technology identification and prioritisation	☐	☒
☐2. Research and development of new climate technologies	☐	☐
☐3A. Feasibility studies for specific known climate technology options	☒	☐
☐3B. Piloting of known technologies in local conditions	☐	☐
☐4A. Law, policy and regulatory reform recommendations	☐	☐
☐4B. Sector specific roadmap or strategy design	☐	☐
☐5. Finance facilitation and market creation	☐	☒

Please note that all CTCN technical assistance contributes to strengthening the capacity of in country actors.

14. Monitoring and Evaluation process

Upon contracting of the implementing partners to implement this Response Plan, the lead implementer will produce a monitoring and evaluation plan for the technical assistance. The monitoring and evaluation plan must include specific, measurable, achievable, relevant, and time-bound indicators that will be used to monitor and evaluate the timeliness and appropriateness of the implementation. The CTCN Technology Manager responsible for the technical assistance will monitor the timeliness and appropriateness of the Response Plan implementation. Upon completion of all activities and outputs, evaluation forms will be completed by the (i) NDE about overall satisfaction level with the technical assistance service provided; (ii) the Lead Implementer about the knowledge and learning gained through delivery of technical assistance; and (iii) the CTCN Director about timeliness and appropriateness of the delivery of the activities and outputs.

The NDE and CTCN will monitor the progress of technical assistance activities by:

- Maintaining regular communication with the Response Implementer and the City Mayor's Office and Secretariat for Environmental Protection of the City of Belgrade as a Request Applicant;
- Verify Project progress against timeline and associated milestones.

The City Mayor's Office will coordinate activities between the response implementer and stakeholders involved. If necessary, the City Mayor's Office may suggest to the Response Implementer any adjustments and planning modification. Proposed adjustments and/or modification shall be previously agreed with the NDE and CTCN to be effective.