Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 11-Feb-2020 | Report No: PIDC28199

BASIC INFORMATION

A. Basic Project Data

Country	Project ID	Parent Project ID (if any)	Project Name
Moldova	P172668		Second District Heating Efficiency Improvement Project (P172668)
Region	**Estimated Appraisal Date**	**Estimated Board Date**	**Practice Area (Lead)**
EUROPE AND CENTRAL ASIA	Apr 13, 2020	Jun 26, 2020	Energy & Extractives
Financing Instrument	**Borrower(s)**	**Implementing Agency**	
Investment Project Financing	Ministry of Finance	Termoelectrica	

Proposed Development Objective(s)

The Development Objective of the Project is to increase the efficiency of the District Heating system in Chisinau .

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	100.00
Total Financing	100.00
of which IBRD/IDA	100.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	60.00
International Development Association (IDA)	40.00
IDA Credit	40.00

Environmental and Social Risk Classification	Concept Review Decision
Moderate	Track II-The review did authorize the preparation to

	continue

Other Decision (as needed)

B. Introduction and Context

Country Context

1. **Since the early 2000s Moldova has made significant progress in achieving inclusive growth, averaging 5 percent annually, and reducing poverty, which declined from 26 percent in 2007 to 9.6 percent in 2015.** Despite heightened political instability, in the first half of 2019 the economy grew by 5.2 percent after a 4 percent growth rate in 2018. The growth was due to strong investments and robust private consumption driven by remittances, pre-election tax cuts and increase in wages and public transfers.

2. **Growth is expected to remain robust at around 3.6 percent on average by 2021, but with significant domestic and external downside risks.** In the medium term, the solid but declining remittances, together with private wage growth will sustain private consumption which will remain a key driver of growth**.** Against the background of lower remittances, projected weaker foreign and domestic demand, economic growth is expected to decelerate below historical values in 2019-2021. Expansionary fiscal policy measures adopted in 2018 - tax cuts, an increase in wages and public transfers - and constantly increasing financial intermediation activity underpinned growth in 2019. At the same time, lower growth in remittances and higher inflation eroding disposable incomes is expected to contribute to deceleration of economic growth.

3. **With declining productivity levels, lower external financing and existing structural deficiencies, Moldova remains highly vulnerable to shocks.** Moldova is vulnerable to changes in external demand and climate shocks due to its small size, open economy, and reliance on agriculture. It is also at risk because of high external debt and a legacy of political instability. Emigration of the working-age population and an annual population decline of around 1½ percent add to the country's economic, fiscal, and social fragility. Political uncertainty and vested interests undermine the reform agenda and the investment process. The large share of the state in the economy, coupled with weak institutions and governance challenges, including in the financial sector, pose additional risks. Extreme weather may affect agricultural output, impacting overall growth and poverty.

4. **Improving energy efficiency and ensuring energy supply security are critical factors in enhancing Moldova's economic competitiveness and key elements in fighting poverty according to the National Development Strategy. .** The average temperature in Moldova's capital, Chisinau, is minus 5 degrees Celsius in January and February. According to a World Bank analysis, on a typical winter, during the January–March period, the median Moldovan household devotes a fifth of its expenditures to energy services and products, mostly to stay warm. This share is higher for poorer households: the poorest quintile of Moldovan households spends over 20% of their income on energy on an annual basis. Inefficient energy use in Moldova is leading to higher energy costs for industries and residents, with a negative impact on growth and competitiveness. Despite the fact that energy intensity was almost halved since 1990 due to the decline of industry, Moldova remains one of the most energy intensive economies in the region.

Sectoral and Institutional Context

5. The DH Sector in Moldovan capital – the city of Chisinau is dominated by Termoelectrica. Since 1990, the district heating system in Chisinau was managed by the municipally owned DH company "Termocom" (TC). TC owned and operated a pipeline network of 711 km serving a population of more than 500,000 or about 62 percent of Chisinau Municipality's residents (including suburbs), for whom the DH system was the least cost option for heating. Since 2001 TC had been financially in default and under legal bankruptcy proceedings. Due to the below cost-recovery level heating tariffs imposed by the municipality, TC had been able to continue its operations by accumulating arrears to CHP-1 and CHP-2, its main suppliers of heat. After the bankruptcy procedure legally ended in 2013, TC entered the liquidation procedure in February 2014. In 2015 TC was declared bankrupt and the GoM established a new company – "Termoelectrica" (TE), which replaced TC as the main operator of DH assets and provider of DH services in the city of Chisinau. TE was created through a merger of CHP-1 and CHP-2 (heat and electricity generators), and the purchase of TC's functional assets. Currently TE is a main producer of electricity in cogeneration mode in Moldova, producer and supplier of heat in Chisinau and its suburbs. It currently provides heating services to over 7,000 buildings, including more than 200,000 housing units and delivers to the national grid about 20% of the country's total electricity consumption. CHP-2 (renamed Source 1) remains the main source of DH and power production of TE, providing heat energy to the entire city. TE also operates heat-only boiler (HOB) plants, HOB South, HOB West, and 19 small HOB plants located in the suburbs.

6. For several decades situation in the district heating sector in Chisinau has been deteriorating. The heat in Chisinau is mostly produced by two Combined Heat and Power Plants (CHPs) which both CHPs fall short of modern efficiency standards, especially Source 2 (formerly CHP-1) which was commissioned in the 1950's. In comparison, Source 1 (formerly CHP-2) which was built in the mid-1970s operates at a much higher level of efficiency, while remaining well below modern efficiency standards. Operating without substantial rehabilitation or retrofit since their construction, the two CHPs have suffered from a gradual decline in efficiency, maximum output and reliability. The poor quality of DH services until 2016 has led to significant disconnections from the centralized DH system by the wealthy residents of Chisinau, who could afford installation of individual gas boilers in their own apartments. The rate of disconnections was so high that the viability of DH services was under threat. Such a perspective was however not acceptable, since about 40% of consumers of DH services, or about 160,000 residents could have been left with no alternative for heating. This was not only increasing energy insecurity and affecting sustainability of the DH system in the capital, but also had a strong negative impact on the welfare of the vulnerable population in Moldova.

7. **Since 2009 with the assistance from the World Bank (WB) Moldova has embarked on a comprehensive institutional, corporate and financial restructuring of the DH sector in Chisinau.** In 2014 the Bank approved District Heating Efficiency Improvement Project (DHEIP) (P132443) in the amount of US$ 40.5 million with the objective of contributing to improved operational efficiency and financial viability of the new district heating company and improving quality and reliability of heating services delivered to the population in Chisinau. The DHEIP became effective on August 14, 2015 and since has been supporting "no regret" emergency investments, largely, on the demand side. The Project, in particular, supports: (a) modernization of largest pumping stations to reduce electricity consumption and provide for efficient variable flow operation mode of the DH system; (b) rehabilitation of selected segments of the distribution network to ensure continued secure DH service and reduction of losses of heat and hot water; (c) replacement of old and inefficient central heat substations (CHS) with modern fully-automated individual building level heat substations (IHS) for more efficient and secure heat supply to end-users; and (d) reconnection of selected public institutions, which were earlier disconnected from DH system.

8. **The DHEIP, while still under implementation, has already achieved remarkable progress**. In particular, the Project allowed to halt and reverse a downward spiral for DH services in Chisinau and is providing sufficient funds for maintenance and investments, the lack of which was causing poor quality of service. In the context of a very effective

restructuring of DH services in Chisinau under the leadership of the management of the newly created TE, DHEIP's implementation started rapidly and showed quick results. More than 80% of project funds were disbursed during the first three years of implementation. A new pumping station and main pipeline were constructed and other three major pumping stations (out of 17 in total) were rehabilitated up to the best modern standards allowing TE to optimize the heat supply to its consumers. Important segments of the main network were rehabilitated, and about 400 Individual Heat Substations were or are to be installed improving the heat and domestic hot water supply to end users. Success achieved in recovery process also includes completed corporate restructuring and optimization (with creation of single operator TE), major staff downsizing, reduction of thermal losses and electricity consumption (with DHEIP-financed investments), improvements in service and client-orientation (resulting in reconnections and increase in volumes of sales), return to operating profitability (thanks to overhaul of tariff methodology but with need for tariff increase moderated by increase in volume). Currently, with half a year to the Project's Closing Date, all priority investments have been completed and disbursement have reached 98%.

9. **The ongoing DHEIP revealed a significant need in investments on the supply side infrastructure, which is approaching the end of its operational life and may pose a threat to uninterrupted heat supply in Chisinau.** In 2018 the Bank responded to a request from the Government of Moldova and launched a study on the optimization of Chisinau DH system and fuel supply options. The Study on Optimization of Chisinau DH System and Fuel Supply Options (hereinafter the DH Optimization Study) was supported by a grant from the Swedish International Development Cooperation Agency (SIDA) in the amount of US$235,000 provided through ESMAP. The Study's objective was to help TE and the GoM to identify the optimal energy model for short- to longer-term development of Chisinau DH and a supporting investment plan, to further improve TE's operational efficiency and financial viability.

10. The final findings and recommendations of the DH Optimization Study were presented during a workshop in Chisinau on October 10, 2019. The study recommended the optimal development strategy for the Chisinau DH sector, supported by an energy model, as well as a technical-economic model, which served as basis for a short- mid-, and long-term investment plan until the year 2035. The findings were received well by TE and GoM, as well as by the development partners. In addition, the Study served as a basis for TE to identify a new DH investment program to increase the efficiency and reliability of DH generation facilities. Following a presentation to the GoM by the team in August 2019, the GoM submitted to the Bank on September 23, 2019 a letter requesting funding support for a new DH operation in a total amount of US$100 million.

Relationship to CPF

11. **The proposed Project would help achieve the strategic objectives of the Country Partnership Framework for Moldova (CPF, FY 2018-21).** By financing rehabilitation of the DH infrastructure in Chisinau, the proposed Project will contribute to achieving the CPF Focus Area 2 (Service Governance), namely, to improving efficiency, quality and inclusive access to public services. By increasing heat and electricity production in cogeneration mode and reducing heat production in HOBs, the Project will contribute to making heat energy more affordable and available to a wider consumer base. The proposed Project is integrated into and complements current Bank support to the Chisinau DH sector such as the DHEIP (P132443) and several technical assistance interventions, including the latest Optimization of Chisinau DH System and Fuel Supply Options Study (P167676).

12. The proposed project would support the Bank's twin goals and UN Sustainable Development Goals (SDG). By supporting higher quality and more efficient DH in Chisinau, the Project also supports the World Bank's twin goals of reducing poverty and increasing shared prosperity. Providing reliable, efficient, and environmentally friendly heating services will have a larger impact on the most vulnerable households in the city since they are often dependent on inadequate or expensive sources of heating (such as coal and firewood stoves) during cold months. The Project would be minimizing negative health impact caused by inefficient and dirty heating devices and indoor and outdoor air pollution.

The Project will benefit women, who work or stay at home more often than men, as well as children and other people who use public facilities such as kindergartens, schools and other educational institutions, as well as health and elderly care institutions.

C. Proposed Development Objective(s)

The Development Objective of the Project is to increase the efficiency and reliability of heat and power production in the Chisinau District Heating system.

Key Results (From PCN)

Progress towards achieving the PDO will be measured by the following indicators

- Projected lifetime energy savings due to investments financed under the project (megawatt-hours [MWh])
- Generation Capacity constructed (MWe)
- Net electricity production increase (MWh)
- Heat production in CHP mode (Gcal/h)

D. Concept Description

1. Background

13. **The DH system in the Moldovan capital consists of four main production plants supplying heat to the DH network in Chisinau: CHP Source 1 and CHP Source 2 producing heat and electricity in combined cycle mode, and HOB West and HOB South producing heat with direct gas firing.** CHP Source 1 is the largest and the main source of district heating for the city of Chisinau that produces the base load during the heating season. The minimum boiler output of one unit is 200 t/h steam leading to around 70 – 80 Gcal/h district heat production capacity, while typical summer load is around 30 – 40 Gcal/h. Therefore, in summer CHP Source 1 should be operated in condensing mode (i.e. part of the heat produced must be evacuated in the cooling towers and therefore lost in open air), which is uneconomic and could generate about US$1 million of losses annually. For this reason, CHP Source 2 has been kept operational[1] and is being operated in summer to produce district heat for domestic hot water heating. During heating seasons the areas of HOB West and HOB South are isolated and the plants produce all the heat to their areas, whereas in summer the shut-off valves are opened, HOB West and HOB South shut down and heat for domestic hot water purposes is produced with CHP Source 2 and/or CHP Source 1. In the beginning of the heating season in autumn a small portion of heat can be delivered to HOB West area from the CHP Source 1/CHP Source 2 area and HOB West can be operated in parallel.

14. **The Optimization Study revealed the need for a major overhaul/retrofit of Units 2 and 3 over the next few years.** These are critical investments necessary to maintain normal operation of Chisinau DH system. The CHP Source 1 consists of three cogeneration units and two operational peak/reserve hot-water-boilers. The steam turbines at CHP Source 1 are approaching the end of their prescribed operation lifetime (220 000 hours) with turbine 1 stopped in April 2019, turbines 2 and 3 expected to approach the end of their operation lifetime in 2021 and 2023 respectively. The Optimization Study identified the need for a major overhaul for the steam boilers (including replacement of worn out heat transfer surfaces, burners) and associated equipment. The turbine 1 also requires retrofitting, however, TE is currently financing retrofitting works out of its own funds. CHP Source 2 was built in the 1950's, is approaching the end of its operational lifetime and is

[1] It was agreed in the DHEIP that CHP Source 2 (formerly CHP-1) will be shut down at the end of 2016 heating season, which was formally executed on March 30, 2016.

scheduled for closure. Source 2 offers very low power generation efficiency but is still being operated during summer months to cover a level of heat demand which is too low to justify running one of the source 1 unit (at the minimum level of power generation of a source 1 unit, most of the heat produced would be in excess of DH summer demand), or occasionally as backup during winter. While both HOB West and HOB South do not require substantial replacement of equipment over the next 10-year period, the Optimization Study, however, pointed out to the opportunities for installation of new high efficiency gas engine (GE) cogeneration units. This would allow to partially replace heat-only operation during winter and to cover the summer heat load with efficient cogeneration units.

2. Description

15. Based on the above, the proposed Project is suggested to finance the following activities grouped into three components:

Component 1. Optimization of Heat and Electricity Generation (US$91 million)

This component will finance modernization of CHP Source-1 and installation of gas engines, including electrical connections, installation of a new Management Information System and Hydraulic Management System to increase and optimize the efficiency of heat and electricity production by Termoelectrica, and technical supervision for sub-component 1.2. The Component will consist of five subcomponents:

1.1. *Modernization of Generation at CHP Source-1 (US$16.2 million),* financing: (i) Reconstruction of Unit 2 (US$12 million), which will include reconstruction of steam turbine high-pressure equipment to extend its operational lifetime, retrofit of low-pressure equipment to increase electricity production capacity, power generator diagnosis, retrofit and modernization of vibration control module, replacement of turbine supporting equipment, replacement of heat boiler burners and other equipment to increase boiler's efficiency, and installation of automated control module for capacity regulation and burning and (ii) major overhaul of turbine and replacement of boiler heat surface at Unit 3 (US$4.2 million), which will include major overhaul of steam turbine high-pressure equipment to extend its operational lifetime, and replacement of steam boiler' economizer.

1.2. *Increasing Efficient Cogeneration (US$70 million).* This sub-component will finance the installation of (i) efficient cogeneration modular units (gas engines) at HOB West and CHP Source-3 [*a new dedicated facility within the area of Source-3*[1]] (US$63.7 million); and (ii) installation of power transformers and power facility/switch gear ID-110 kV (US$6.3 million). This will include construction of new light facilities (sandwich panels) to accommodate gas engines and their installation, installation of power transformers and switch gears for connection to urban grid at HOB-West and installation of switch gears at Source-3. The final heat and power generation capacity and number of GE units will be determined at a later stage of the Project preparation [after international competitive bidding].

1.3. Development and installation of a modern comprehensive Management Information System (*Business and Operational Planning Management System*) for Termoelectrica to improve its operational planning and control capabilities (US$3 million);

1.4. Development and installation of a modern interactive Hydraulic Management System (US$0.3 million)

1.5. Technical Supervision for sub-component 1.2 (US$1.5 million).

[1] Located within the yeard of CHP Source 2.

The final heat and power generation capacity and number of GE units will be determined at a later stage of the Project preparation [after international competitive bidding].

Component 2. Pilot Energy Efficiency Investments (US$7 million).

This component will finance pilot energy efficiency investments by TE in the public and residential buildings that benefitted from installation of IHSs under the DHEIP and TE's own investments such as replacement of in-house heating distribution pipes, installation of new piping for DHW in the buildings which currently don't have the service (only about 50% of DH consumers have both heating and DHW provided by TE via DH system), and pilot investments in switching from vertical to horizontal internal distribution. Such investments would maximize the energy efficiency outcomes of DHEIP investments

Component 3. Project Management and Technical Assistance (US$2 million) will consist of two subcomponents**:**

This sub-component will finance consultancy support for project implementation and supervision (US$2 million), including fiduciary, safeguards, and project monitoring and reporting through the existing Moldovan Energy Project Implementation Unit (MEPIU), as well as entities' and Project's audits.

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

Summary of Screening of Environmental and Social Risks and Impacts

16. **Environmental and social. Moderate**. While the project will generate mostly positive social, economic, and environmental benefits, it might also cause some environmental risks related to soil removal and destruction, air pollution, construction and solid wastes, dust, noise, occupational health and safety risks, and traffic disruptions during construction works. As per the initial screening, no additional land required for construction/reconstruction of infrastructure proposed under the component 1 (Optimization of Heat and Electricity Generation**)**. All the civil works confined to the land plots currently used by TE. However, there might be construction induced social impacts to the residences and business premises during the construction period. Respectively, most of World Bank Environmental and Social Standards (ESSs) are relevant to this Project. To address potential risks and impacts, considering requirements of the National environmental and social regulatory framework and of the WB ESSs, the borrower will prepare a series of documents: (a) Environmental and Social Impacts Assessment (ESIA) and ESMPs; (b) Labor Management Procedure (LMP); (c) Stakeholder Engagement Plan, - these documents will be disclosed and consulted with all interested parties. The main responsibilities in terms of ESSs and management plans implementation will be with the Project Implementation Unit which is currently implementing DHEIP. The PIU is staffed with well qualified environmental and social specialists which will ensure safeguards compliance during the project implementation. The World Bank will provide additional training and technical backstopping support with regards to new requirements of the ESSs before and during project implementation if necessary. The ESS documents will specify necessary capacity building activities for effective implementation of new ESS under the project.

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