



1. Project Data

Project ID P146194	Project Name Biomass District Heating	
Country Belarus	Practice Area(Lead) Energy & Extractives	
L/C/TF Number(s) IBRD-83510	Closing Date (Original) 31-Dec-2019	Total Project Cost (USD) 87,766,402.02
Bank Approval Date 31-Mar-2014	Closing Date (Actual) 30-Apr-2022	
	IBRD/IDA (USD)	Grants (USD)
Original Commitment	90,000,000.00	0.00
Revised Commitment	90,000,000.00	0.00
Actual	87,766,402.02	0.00

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2. Project Objectives and Components

a. Objectives

As per the Loan Agreement (LA) on page 5, the Project Development Objective (PDO) is “to scale up the efficient use of renewable biomass in heat and electricity generation in Selected Towns of the Borrower,” where “Borrower” is defined as the Republic of Belarus. The PDO statement in the Project Appraisal Document (PAD) on page 6 is same, except “in Belarus” was used instead of “of the Borrower” and was unchanged throughout project implementation.



To assess the project's efficacy, the PDO was not unpacked, because there were no specific PDO indicators related to scaling up each category of heat and electricity generation. Moreover, this review will not use a split assessment, despite multiple results frameworks. Instead, the project efficacy will be assessed against the results framework established during the October 2019 restructuring, based on OPCS guidelines indicating that when the project scope is expanded and become more ambitious, the operation can be assessed based on the more ambitious revised outcomes and outcome targets. (OPCS Guidelines, December 2021, paragraph 60).

b. Were the project objectives/key associated outcome targets revised during implementation?

Yes

Did the Board approve the revised objectives/key associated outcome targets?

Yes

Date of Board Approval

11-Oct-2019

c. Will a split evaluation be undertaken?

No

d. Components

Component 1: District Heating Energy Efficiency (US\$23.35 million at appraisal, actual of US\$17.34 million): Main activities that were to be funded were as follows: (i) the modernization and/or construction of heat substations by installing individual building-level heat substations with temperature controls, and (ii) the reconstruction and/or construction of district heating networks and upgrading of peak-load gas boilers.

Component 2: Biomass Heat Generation (US\$ 64.98 million, at appraisal, actual of US\$69.37 million). This component included investments in: (i) Biomass boilers and combined heat and power (CHP) plants, and (ii) Wood chipping equipment and biomass storage facilities.

Component 3: Technical Assistance (US\$1.45 million, at appraisal, actual of US\$0.84 million). This component financed capacity building for the participating district heating (DH) utilities and implementation support to the Project Management Unit (PMU), including the following: (i) Improvement of existing social accountability mechanisms, (ii) Support for a shift to energy-content-based biomass pricing, and (iii) Other project implementation support.

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost: Actual project cost amounted to US\$87.7 million, or 97.52 percent of approved amount.

Project Financing: The project was financed by an IBRD loan in the amount of US\$90.0 million.



Project Financing: The project was financed by an International Bank for Reconstruction and Development (IBRD) loan in the amount of US\$90.0 million. At project's closure, an undisbursed balance of US\$2,233,597.98 was cancelled.

Borrower Contribution: No borrower contribution was identified at appraisal, and none occurred during implementation.

Dates: The project was approved on March 1, 2014, and became effective on July 31, 2014, and closed on April 30, 2022, 28 months after the original closing date of December 31, 2019.

Restructurings: The project was restructured four times as follows, but the second one was cancelled upon the government's request:

(i) On February 14, 2018, to reallocate and utilize loan savings to finance additional sites and update a results indicator. The large savings arose from (a) good competition among local and international bidders for all contracts resulting in lower offers, (b) a downturn economic conjecture whereby local companies were eagerly competing for the few projects externally funded, and (c) an appreciation of the US\$ against the Belarusian Ruble (BYR).

(ii) On September 25, 2018, to add a new subcomponent under Part III to provide technical assistance for scaling up wood biomass-based heating and improving heating energy efficiency in selected towns. However, the restructuring was cancelled upon the request of the government in April 2019. The government decided to finance these activities with other sources of funds.

(iii) On October 11, 2019, (a) to extend the loan closing date by 22 months to October 31, 2021 to allow time to complete the additional works and to compensate for the delays caused by irregularities in some procurement transactions investigated by Integrity Vice Presidency of the World Bank and the COVID pandemic; (b) to add two new sites (Stolin and Kamenets); and (c) to expand the scope of work by adding heat network and individual heat substations for two existing sites (Buda Koshelevo and Cherikov).

(iv) On October 29, 2021, a level 2 restructuring was completed to extend the closing date by six months from October 31, 2021, to April 30, 2022. The Bank team agreed with the time extension of about five months to allow a contractor to catch up with delays and complete the works necessary for a biomass boiler plant to be operational and cover the heat demand of the district of Baranovichi city in a sustainable manner.

3. Relevance of Objectives

Rationale

The Project was relevant to the Country Partnership Framework (CPF) for Fiscal Years 18-22, with regard to the focus area 3: "Improving contribution of infrastructure to climate change management, economic growth and human development". The Project directly contributed to CPF Objective 3A: "Enhanced climate change management" thanks to energy savings and switching from fossil fuels to lower-carbon biomass fuel. Through these activities the Project also remained relevant to Belarus' efforts to comply with greenhouse gas (GHG) emission reduction goals and to meet its Nationally Determined Contributions under the Paris



Agreement. The Project was also relevant to all the aspects of CPF Objective 3C: “Enhanced efficiency, security, and quality of energy utility provision”. The Project intended to enhance efficiency and quality of District Heating (DH) provision thanks to improved generation efficiency, reduced transmission and distribution losses and better regulation of heat supply at the building level. It was also expected to improve security of DH supply thanks to the reduced dependence on expensive imported fuels and enhanced reliability of the participating DH systems.

However, the ICR did not indicate that the PDOs were in line with Borrower's priorities and short-term plans, nor did it indicate to which extent both the World Bank and the Borrower had done the groundwork for swift implementation of the project.

Rating

Substantial

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To scale up the efficient use of renewable biomass in heat and electricity generation in selected towns in Belarus

Rationale

Theory of change: As the PAD did not develop a theory of change, the ICR recreated one which is detailed hereafter. Key expected outcomes included the following: (i) an increase in the projected lifetime energy savings, (ii) an increase in the heat and electricity generated from renewable biomass, (iii) a pick-up in the average cost-recovery rate for residential district heating; (iv) an increase in the projected lifetime reduction in CO₂ emissions, and (v) an increase in the number of direct project beneficiaries. The key expected output was the volume of generation capacity of renewable energy constructed using the project resources. Key activities funded by the project consisted of funding (i) the modernization and/or construction of heat substations and the reconstruction and/or construction of district heating networks and upgrading of peak-load gas boilers, (ii) investments in biomass boilers and Combined Heat and Power (CHP) plants, and (iii) wood chipping equipment and biomass storage facilities.

Overall, the theory of change was generally sound, as there was a logical link between the project's activities, outputs and outcomes.

Outputs:

- 179.4 MW of biomass boilers capacity was installed, exceeding the target of 106 MW, and a baseline of zero.
- 106 Individual Building-level Substations and Central Heating Substations (CHS) were constructed, with not target, and no baseline.



- 29 km of Heating Networks (two-pipe) were installed, with 8 km constructed, and 21 km replaced, with no target and no baseline.
- Biomass fuel storage facilities were constructed and wood chipping machines for biomass fuel supply were installed, with no target and no baseline.
- International procurement practices of bidding and contracting, as well as Financial Management (FM) and disbursement methods were strengthened.
- Improved social accountability mechanisms that provide key information on government programs communicate with end-users of DH services and collect customer feedback and grievance on all aspects of service delivery.

Outcomes:

- The target for the projected lifetime energy savings was exceeded by 10 percent, reaching 2,111,416 megawatt hour (MWh) against a revised target of 1,916,500 MWh, and a baseline of zero.
- The target for the heat and electricity generated from renewable biomass was partially achieved (85 percent), reaching 13,500,465 MWh against a revised target of 15,816,000 MWh, and a forecast of 14,832,644 in 2025 (94 percent of target), and a baseline of zero.
- The target for the projected lifetime reduction in CO2 emissions was partially achieved (85.4 percent), reaching 3,081,517 metric ton against a revised target of 3,607,600 metric ton, and a baseline of zero.
- The target for the average cost-recovery rate for residential district heating was partially achieved, reaching 25 percent, against a revised target of 35 percent, and a baseline of 15 percent, an original target of 80 percent. The difference between the costs and the tariffs is covered by subsidies, and heat supply represents only a part of the utilities' business (they also deal with water supply, waste management and other utility services).
- The target for the direct project beneficiaries was exceeded by 45 percent, reaching 170,220.00 against a revised target of 117,380.00, of which 50 percent were female, and a baseline of zero.

Rating

Substantial

OVERALL EFFICACY

Rationale

The project successfully installed heat and electricity generation facilities using biomass, which replaced old systems using natural gas. The new systems and the use of biomass improved the efficiency of heat and electricity generation as evidenced by the expected lifetime energy savings higher than the target. This resulted in a substantial expected reduction in the GHG emissions, too, but lower than the target. As counterfactual, if the combined heat and power plants were not constructed under the project, the old district heating systems would continue to produce only heat without any power generation resulting in significant energy inefficiencies. However, the production of heat and power generation were lower than expected as



fewer new residential units were built in the project areas. Overall, the project's efficacy in achieving the project objective is rated as substantial.

Overall Efficacy Rating

Substantial

5. Efficiency

Using the appraisal methodology, the ICR updated the economic analysis of the project and found that the Economic Internal Rate of Return (EIRR) and the Economic Net Present Value (ENPV) numbers were higher than the estimates calculated at appraisal. The updated ENPV was estimated at US\$293.9 million under international gas price, in comparison to the ENPV at appraisal of US\$42.4 million. The increase was mainly from the fact the project financed more subprojects than those that were initially planned due to cost savings during implementation (ICR, p.19). The updated analysis at the ICR stage found that the post-completion EIRR was 31.0 percent based on the international gas prices in comparison to the weighted average EIRR estimated at 18.3 percent at appraisal (with individual EIRRs for the subprojects ranging from 12.4 percent to 24.5 percent at appraisal). However, based on the Belarus-Russia contractual natural gas price is, which is substantially lower than the international natural gas prices, the post-completion EIRR drops to 17.4 percent and the ENPV to US\$98.9 million (The ICR does not report post-completion EIRRs for subprojects). This review takes the post-completion EIRR as a range from 17.4 percent to 31.0 percent.

Implementation Efficiency

The majority of the initial thirteen activities were completed within or below the original cost estimate. Significant cost savings arose from simple and straightforward design, good competition between local and international bidders, and favorable exchange rate changes. Regarding project duration, eleven of the originally planned thirteen subprojects were completed prior to the original scheduled closing date. The project was closed 28 months after the original term due to (i) the need to allow more time to complete the additional subprojects added from cost savings realized under the original project, and (ii) irregularities in some procurement transactions investigated by Integrity Vice Presidency of the World Bank, and (iii) the delays triggered by the COVID pandemic. Moreover, there were delays resulting from shortcomings in some district utilities' capacities, and from missing environmental impact assessment that resulted in rebidding, and procurement, monitoring and reporting issues as well (ICR, paragraph 71 on page 24). In conclusion, the Bank team handled well the above challenges, including the consequences of fraud cases, the COVID 19, and the Russian invasion of Ukraine which are discussed under the Bank supervision section.

Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:



	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	18.30	0 <input checked="" type="checkbox"/> Not Applicable
ICR Estimate	✓	17.40	0 <input checked="" type="checkbox"/> Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

Each of the relevance of PDOs, the efficacy and the efficiency of project implementation is rated Substantial, resulting in an overall Satisfactory rating of the project outcome.

a. Outcome Rating

Satisfactory

7. Risk to Development Outcome

The ICR (para 98) has assessed the risk to development outcome to be low based on the following factors: (i) the Government of Belarus has demonstrated its commitment towards increasing the efficient use of sustainable biomass energy in district heating sector further; (ii) the capacity of the PMU has significantly improved, and (iii) the commitment of local utilities to continue using renewable biomass in their DH system remains strong. A follow-on project -The Sustainable Energy Scale Up Project (P165651) - is expected to continue assisting Belarus towards meeting the development outcomes (before its suspension). The risk to development outcome could increase should the Belarus counterparts reduce their level of commitment, as a fall-out of the on-going war in Ukraine.

8. Assessment of Bank Performance

a. Quality-at-Entry

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The project was strategically relevant and well prepared and underpinned by Bank analytical support. The PDOs were relevant to Belarus' long-term goals, and the used approach in the selection of project activities matched the country priorities. The project aimed to address challenges of the Belarusian district heating sector, drawing from lessons learned from the Bank's experience in implementing similar projects in Belarus and in other countries. The Government demonstrated its commitment to the project by adopting several national programs for energy efficiency and use of



local fuels ahead of project approval. Finally, the project design was informed by insights from the analytical work from the Bank's Energy Sector Management Assistance Program (ESMAP).

The project design was results driven. The selection of PDO level and intermediate level indicators was an integral part of the design process. Their selection aimed to facilitate the project's achievement of its objectives and the adopted indicators had positive implications for supervision and performance assessment.

Implementation arrangements were generally adequate, but there were also weaknesses. The project design benefitted from achievements in earlier projects in the area of fiduciary (finance, procurement), legal and safeguards matters. Moreover, the Project Management Unit (PMU) had about 15 years of experience in implementing World Bank projects, and was staffed with qualified professionals, who had strong operational capacity and were familiar with the Bank's policies and procedures.

Quality-at-Entry Rating Satisfactory

b. Quality of supervision

Aide-memoires and ISRs were candid and had good quality. Aide-memoires were prepared after each supervision mission and were well detailed and offered a candid assessment of issues and progress. Supervision missions covered also safeguards and fiduciary matters which were regularly monitored.

Continuity in the project oversight facilitated the tracking of project progress. The continuity of the project leadership was observed with three TTLs over eight years of implementation, and transition was smooth as there was no transition delay between two TTLs under this project. Finally, the last TTL was based in the country office and had been with the project since appraisal, and this contributed to the adequate supervision and smooth implementation of the project.

The Mid-Term Review (MTR) charted the course toward project completion. The 2017 MTR mission confirmed that the PDO were still relevant, and that progress toward achieving the PDO was satisfactory. The MTR mission identified restructuring needs to utilize US\$26.3 million of loan savings following a competitive bidding process and the significant devaluation of the national currency. The project was restructured in 2018 in order to expand the scope, and this helped to substantially maximize the development impact of the project. Also, the results framework was revised and monitored regularly by the Bank team.

The Bank team successfully handled implementation challenges. The three incidents which affected the project implementation entailed (i) fraud cases, (ii) the COVID-19 pandemic, and (iii) the Russian invasion of Ukraine. While the fraud and corruption risk were estimated to be low, a case of contractors' misconduct was investigated by the Integrity Vice Presidency. A local company was awarded two contracts, and after the completion of an INT investigation, both contracts were terminated in May 2017, and direct contracts were signed with new service providers. Moreover, the Russian invasion of Ukraine resulted in sanctions against Russia and Belarus, but impact was limited as material delivery was



almost completed. Finally, supervision efforts became challenging in early 2020 given the safety guidelines and restrictions related to the global COVID-19 pandemic, which resulted in Bank supervision missions being carried out in a virtual setting. Despite all the above implementation challenges, the Bank team processed new biddings for the fraudulent operations, extended the project closing date, used virtual supervision and delivered key project activities.

Quality of Supervision Rating

Satisfactory

Overall Bank Performance Rating

Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

There was a congruence between the theory of change and the results framework. The recreated theory of change showed how the project activities contributed to outcomes and PDO, and PDO indicators aimed to capture and measure that contribution. Intermediate indicators were used to track continuous progress towards achieving the PDO. For instance, the number of contracts competitively awarded, and the construction progress were tracked on-site through regular site supervision conducted by the site owners and the PMU.

PDO indicators were specific, measurable and achievable, but there were shortcomings in measuring the project outputs. The main three PDO indicators measuring energy savings, heat and electricity generated from biomass, and greenhouse gas (GHG) emission reduction were adequately identified to monitor progress toward the PDO. These indicators had baselines at project approval, as well as intermediate and final targets. However, the results framework did not include indicators to measure some of the project outputs because site-specific designs were not completed at the time of project appraisal, such as the number of individual-level substations and central heating substations, length of heating networks, and number of biomass fuel storage facilities and wood chipping machines.

M&E arrangements were adequate. The PMU was responsible for data collection, analysis and reporting project progress to the Bank. The M&E instruments included the following elements: (a) biannual progress reports, (b) a midterm review of implementation and outcome progress (c) Bank team supervision visits to sites, and (d) annual financial audits.

b. M&E Implementation

Implementation Status and Results Reports (ISRs) were the key instrument to report to stakeholders on progress toward the PDOs. The ISRs were concise documents which provided pertinent information needed to track the project progress. The Bank team conducted regular missions, updated the progress in achieving results and reported the progress in the biannual ISRs. Normal review procedures for procurement, FM reports, and independent audits also were carried



out. However, field supervision missions could not happen because of fraud and force majeure situations.

The M&E quality relied on good collaboration between the Bank team and the PMU. Several discussions and technical support from the Bank team enabled the PMU and the site owners to analyze data in a methodological manner and provide reliable data on results indicators. The PMU carefully checked the data from the participating district heat utilities before consolidation and sharing with stakeholders.

PDO indicators were adequately updated when the project scope expanded, but shortcomings in measuring some project outputs were not addressed. The project scope expanded after the addition of seven sites to utilize loan savings. Disaggregated data for these three indicators were collected for each of the boiler plants built under the expanded project scope. However, the shortcomings in the results framework in measuring some of the project outputs after the completion of site-specific designs were not addressed (see M&E Design above).

c. M&E Utilization

The PMU, the participating utilities and the World Bank team used the indicators to monitor physical progress and make appropriate adjustments to the initial plans. For instance, M&E reports triggered restructurings as discussed in previous sections of this review. Finally, the results achieved helped nurture the dialogue between the Government of Belarus and the World Bank and created momentum for subsequent interventions in the field of energy efficiency for heating and power, such as the Sustainable Energy Scaling Up Project approved in 2019.

Overall, while there were some moderate shortcomings in the M&E design and implementation, the M&E system was sufficient to assess the achievement of the project objectives and test the links in the results chain. The quality of M&E is rated Substantial.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

The project was classified as a Category B operation and two safeguard policies were triggered, namely Environmental Assessment OP/BP 4.01 and Involuntary Settlement OP/BP 4.12. The PMU prepared Environmental and Social Management Framework and site-specific Environmental and Social Management Plans (ESMPs) during implementation, and the ESMPs have been publicly disclosed.

The Project was implemented in compliance with the site specific ESMPs and had no outstanding environmental issues. Furthermore, during its implementation, no occupational health and safety incidents



and accidents were reported, and no complaints on adverse environmental impacts had been received from the local population or from the state inspection bodies.

Both the PMU and district heating utilities demonstrated good knowledge of social impact and risk management tasks of the project. Social accountability mechanisms were well established and improved during project implementation to enable citizens to lodge grievances, receive redress, and oversee the provision of public services

The Project maintained a Grievance Redress Mechanism (GRM) through the implementation period to deal with the complaints related to DH investment activities under the Project. However, the PMU did receive any grievances or complaints. Overall, the Project complied with the World Bank' social safeguards requirements and produced positive social impacts by providing improved and reliable heating systems to customers. Also, during implementation of investment activities at sub-project sites, there was no land acquisition, physical displacement, or any issue with squatters.

b. Fiduciary Compliance

Procurement

While the ICR did not discuss procurement issues, the TTL provided the following summarized information upon request. The procurement capacity and qualifications of the PMU were consistently rated as adequate in ISRs, while the Project Procurement Risk was assessed as "Moderate". The project experienced some delays at procurement and contracts implementation stages; however, these did not significantly affect achievement of PDO.

Financial management

Compliance with the Project FM covenants, and arrangements have always been assessed as Satisfactory, and FM risk remained either Moderate or Low throughout the period of project implementation. Interim Financial Reports were submitted in a timely manner and were confirmed to be of acceptable quality. All annual audits of project financial statements were carried out by private auditors and were acceptable to the World Bank. Two outstanding audit reports (one for calendar year 2021 and the other from January 2022 to the end of the Project) are still pending, mainly due the COVID-19, and the Russian invasion of Ukraine, which disturbed international travel to and from Belarus. Auditors have issued unqualified audit opinions and did not note any significant internal control issues.

c. Unintended impacts (Positive or Negative)

Due to fuel replacement from natural gas that produces minimal amounts of pollutants, such as carbon monoxide and nitrogen dioxide, and virtually no sulfur dioxide and particulate matter, the use of biomass fuel resulted in some increase in local pollutant emission. However, the total emissions of local pollutants do not exceed the national regulatory limits established for heat production.



d. Other

The Project contributed to improving security of energy supply because it replaced imported natural gas by local renewable biomass. This contributed to reducing import dependence and the risks of supply disruptions which can be caused by any external factors (ICR paragraph 11 on page 11 and paragraph 5 of Annex 6 on page 62).

Through technical assistance, the Project enhanced policy dialogue on the transition to energy-content-based biomass pricing. A comprehensive analysis was conducted to assess the legislation and the practices of trading biomass fuel for heat and power generation plants in Belarus and in leading European countries. The assessment included recommendations to introduce a system of trade settlements based on biomass moisture and energy content (ICR, paragraphs 57-66).

The project also provided technical assistance for the improvement of existing social accountability mechanisms. As a result, provision of key information on government programs, communication with end-users of DH services, collection of customer feedback and grievance on all aspects of service delivery, and inclusion of the public to the decision-making process has improved (ICR, paragraph 58).

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Satisfactory	
Bank Performance	Satisfactory	Satisfactory	
Quality of M&E	Substantial	Substantial	
Quality of ICR	---	Substantial	

12. Lessons

The ICR identified several lessons and recommendations, but this review has retained two of them, which are rephased below:

(i) Fuel switching from gas and oil to wood biomass is highly sustainable and economically sound. This project was transformational as it financed primarily fuel switching from gas and oil to sustainable wood biomass. Moreover, biomass-fired district heating not only creates markets for wood resources, but also increases the market price of biomass due to growing demand. From the country’s perspective, this is positive for local economic development, job creation and fiscal revenues. TA to the government and the regulator to create an attractive legal, regulatory, and institutional environment for biomass trading could significantly help the scale up of biomass-fired heat and power generation.

(ii) Political economy factors can hinder improvement in financial viability and need to be addressed during policy dialogue among key stakeholders. The project impact on the financial



health of DH companies has been smaller than expected. The average cost recovery rate increased from 15% to 25% instead of the target 80%. The Government willingness to move the heating sector towards cost-recovery has been slow, and the heat tariffs were not raised as quickly as expected for political reasons. The difference between the costs and the tariffs is covered by subsidies, and heat supply represents only a part of the utilities' business. Heat tariff reforms could have been more successful if a broad communication campaign and dialogue at different policy-making levels were organized, but this was not part of the project.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

Overall, the ICR is well-written, evidence-based and internally consistent. It provides a detailed narrative of the country context, the project design and the recreated theory of change, as well as its implementation and achieved results. More specifically, the tables page 46-49 provides key information of generated outputs, and the Annex 1 on Results Framework and Key Outputs are testimony of the achieved results. The results orientation and the quality of analysis were generally of good quality (ICR, page 14-17). There were moderate shortcomings as follows: (i) the absence of an assessment of a key implementation function-procurement, and (ii) there was room for concision in drafting the ICR, as the document is almost the double of the recommended length. In all, the quality of the ICR is rated Substantial.

a. Quality of ICR Rating Substantial