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Report No: PAD5328

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT PAPER

ON A

PROPOSED ADDITIONAL LOAN

IN THE AMOUNT OF EUR 92 MILLION
(US$99.9 MILLION EQUIVALENT)

TO

ROMANIA

FOR THE

ROMANIA STRENGTHENING DISASTER RISK MANAGEMENT PROJECT

May 1, 2023

Urban, Resilience, And Land Global Practice
Europe And Central Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective March 31, 2023)

Currency Unit	=	Romanian Leu (RON)
EUR 1	=	RON 4.94
EUR 1	=	US$ 1.08
US$ 1	=	EUR 0.92

FISCAL YEAR
January 1 - December 31

Regional Vice President:	Antonella Bassani
Country Director:	Gallina Andronova Vincelette
Regional Director:	Sameh Naguib Wahba Tadros
Practice Manager:	Christoph Pusch
Task Team Leader(s):	Marcel Ionescu-Heroiu, Alexandra Calin

ABBREVIATIONS AND ACRONYMS

ADM	Accountability and Decision Making
AF	Additional Financing
AM	Accountability Mechanism
BCR	Benefit-Cost Ratio
Cat DDO	Catastrophe-Deferred Drawdown Option
CBA	Cost-Benefit Analysis
CERC	Contingent Emergency Response Component
CIES	County Inspectorates for Emergency Situations
CPF	Country Partnership Framework
DES	Department of Emergency Situations
DFIL	Disbursement and Financial Information Letter
DO	Development Objectives
DRM	Disaster Risk Management
EE	Energy Efficiency
EPA	Effective Projected Area
EQ	Earthquake
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
EU	European Union
FEMA	Federal Emergency Management Agency
FF	Flexible floors
FM	Financial Management
FY	Fiscal Year
GDP	Gross domestic product
GIES	General Inspectorate for Emergency Situations
GRS	Grievance Redress Service
HAZUS-MH MR4	Hazards U.S Multi-Hazard Maintenance Release 4.0
HQ	Headquarters
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IFRs	Interim Unaudited Financial Reports
IP	Implementation Progress
IPF	Investment Project Financing
IRR	Internal Rate of Return
ISU	Inspectorate for Emergency Situations
M	Moderate
M&E	Monitoring and Evaluation
MoC	Ministry of Culture
MoIA	Ministry of Internal Affairs
MoF	Ministry of Finance
MRP	Mean Return Period

MS	Moderately Satisfactory
MTR	Mid-term Review
MU	Moderately Unsatisfactory
NCSES	National Committee for Special Emergency Situations
NDC	Nationally Determined Contribution
NIS	National Institute for Statistics
NPV	Net Present Value
NZEB	Nearly Zero-Energy Building
OHS	Occupational Health and Safety
OP/BP	Operational Policy / Bank Policy
PCU	Project Coordination Unit
PDO	Project Development Objective
PGA	Peak Ground Acceleration
PIU	Project Implementation Unit
PM	Project Manager
PMU	Project Management Unit
POM	Project Operations Manual
PP	Procurement Plan
PPP	Purchasing power parity
PPSD	Project Procurement Strategy for Development
PS	Procurement Specialist
RC	Reinforced concrete
RE	Renewable Energy
RF	Rigid floors
RM	Reinforced masonry
RO-RISK	Romania Risk Assessment
S	Satisfactory
SDRM	Strengthening Disaster Risk Management
SMURD	Serviciul Mobil de Urgență (Emergency Rescue Service)
SoP	Series of Projects
SORT	Systematic Operations Risk-Rating Tool
STEP	Systematic Tracking of Exchanges in Procurement
SYNER-G	Systemic Seismic Vulnerability and Risk Analysis for Buildings, Lifeline Network and Infrastructures Safety Gain
ToR	Terms of reference
URM	Unreinforced masonry
UTCB	Universitatea Tehnica de Constructii Bucuresti (*Technical University of Civil Engineering of Bucharest*)
VSL	Value of a statistical life
WB	World Bank

Romania

Additional Financing - Romania Strengthening Disaster Risk Management Project

TABLE OF CONTENTS

BASIC INFORMATION – PARENT (Strengthening Disaster Risk Management Project - P166302)

Country	Product Line	Team Leader(s)		
Romania	IBRD/IDA	Alanna Leigh Simpson		
Project ID	Financing Instrument	Resp CC	Req CC	Practice Area (Lead)
P166302	Investment Project Financing	SCAUR (9350)	ECCEU (7002)	Urban, Resilience and Land

Implementing Agency: Ministry of Internal Affairs - DES and GIES

Is this a regionally tagged project?
No

Bank/IFC Collaboration
No

Approval Date	Closing Date	Expected Guarantee Expiration Date	Original Environmental Assessment Category	Current EA Category
24-Jul-2018	30-Nov-2025		Partial Assessment (B)	Partial Assessment (B)

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach [MPA]	[ ] Contingent Emergency Response Component (CERC)
[✓] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Performance-Based Conditions (PBCs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a Non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made disaster
[ ] Alternate Procurement Arrangements (APA)	[ ] Hands-on Expanded Implementation Support (HEIS)

Development Objective(s)

The objective of the Project is to enhance the resilience of critical disaster and emergency response infrastructure and to strengthen the Borrower's institutional capacities in disaster risk reduction and climate change adaptation.

Ratings (from Parent ISR)

	Implementation					Latest ISR
	07-Jan-2021	13-Jul-2021	20-Jan-2022	25-Jul-2022	06-Sep-2022	22-Feb-2023
Progress towards achievement of PDO	S	S	MS	MS	MS	MS
Overall Implementation Progress (IP)	MS	MS	MU	MU	MS	MS
Overall Safeguards Rating	S	S	S	S	S	S
Overall Risk	M	M	M	M	M	M
Financial Management	S	S	S	S	S	S
Project Management	S	S	MS	MS	MS	S
Procurement	S	S	MS	S	S	S
Monitoring and Evaluation	S	S	S	S	S	S

BASIC INFORMATION – ADDITIONAL FINANCING (Additional Financing - Romania Strengthening Disaster Risk Management Project - P180531)

Project ID	Project Name	Additional Financing Type	Urgent Need or Capacity Constraints
P180531	Additional Financing - Romania Strengthening	Cost Overrun/Financing Gap	No

	Disaster Risk Management Project		
Financing instrument Investment Project Financing	Product line IBRD/IDA	Approval Date 23-May-2023	
Projected Date of Full Disbursement 31-Oct-2027	Bank/IFC Collaboration No		
Is this a regionally tagged project? No			

Financing & Implementation Modalities

[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Performance-Based Conditions (PBCs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a Non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made disaster
[ ] Alternate Procurement Arrangements (APA)	[ ] Hands-on Expanded Implementation Support (HEIS)
[✓] Contingent Emergency Response Component (CERC)	

Disbursement Summary (from Parent ISR)

Source of Funds	Net Commitments	Total Disbursed	Remaining Balance	Disbursed
IBRD	60.48	11.55	47.30	20 %
IDA				%
Grants				%

PROJECT FINANCING DATA – ADDITIONAL FINANCING (Additional Financing - Romania Strengthening Disaster Risk Management Project - P180531)

FINANCING DATA (US$, Millions)

SUMMARY (Total Financing)

	Current Financing	Proposed Additional Financing	Total Proposed Financing
Total Project Cost	60.48	99.90	160.38
Total Financing	60.48	99.90	160.38
of which IBRD/IDA	60.48	99.90	160.38
Financing Gap	0.00	0.00	0.00

DETAILS - Additional Financing

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	99.90

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any other Policy waiver(s)?

[ ] Yes [✓] No

INSTITUTIONAL DATA

Practice Area (Lead)

Urban, Resilience and Land

Contributing Practice Areas

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

PROJECT TEAM

Bank Staff

Name	Role	Specialization	Unit
Marcel Ionescu-Heroiu	Team Leader (ADM Responsible)		SCAUR
Alexandra Calin	Team Leader		SCAUR
Elena Corman	Procurement Specialist (ADM Responsible)		EECRU
Anneliese Viorela Voinea	Financial Management Specialist (ADM Responsible)		EECG2
Adrian Laurentiu Mihailescu	Environmental Specialist (ADM Responsible)		SCAEN
Chifundo Patience Chilera	Social Specialist (ADM Responsible)		SCASO
Alanna Leigh Simpson	Team Member		SCAUR
Ana Maria Luchian	Procurement Team		ECCMD
Anda Georgiana Anica	Team Member		SCAUR
Andrei Zambor	Team Member		ECCRO
Andrianirina Michel Eric Ranjeva	Team Member		WFACS
Flaviu Petean	Social Specialist		SCASO
Giovanni Bo	Team Member	Lawyer	LEGLE
Guillermo A. Siercke	Team Member		SCAUR
Jae Kyun Kim	Team Member		GTFS2
Marina Mijatovic	Team Member		WFACS
Matei Teodor Sumbasacu	Team Member		SCAUR
Oana Maria Caraba	Team Member		ECCRO
Tatyana Shadrunova	Team Member		SCAUR
Valentin Onofriciuc	Team Member		ECCRO

Extended Team

Name	Title	Organization	Location

I. BACKGROUND AND RATIONALE FOR ADDITIONAL FINANCING

A. Introduction and Context

1. **Romania has advanced its income convergence with the EU in the last two decades, but remains among the poorest countries in Europe**. Romania's EU membership has triggered a positive socioeconomic transformation, with significant growth over the past decades. Being increasingly driven by consumption, this growth, however, has been one of the most volatile in the EU, affected by regional and global shocks. Romania continues to struggle with demographic challenges due to an aging population and significant outmigration, and to face widening macroeconomic imbalances. While economic growth has translated into poverty reduction, Romania still has the highest poverty rate in the EU. Furthermore, the growth has not been inclusive, as a large share of Romanians in the bottom 40 percent of income distribution continues to overwhelmingly concentrate in low-productivity subsistence agriculture.

2. **Romania's growth prospects have been affected by external shocks, and remain dependent on effective absorption of EU funds.** Scarring from COVID-19, and Russia's invasion of Ukraine, resulted in high inflation (16.8 percent in November 2022), uncertainty, and disruptions to supply chains, impacting short-term growth prospects. While Romania benefits from significant EU resources under the Resilience and Recovery Facility (set up in response to the COVID-19 pandemic), Romania's capacity to absorb EU funds remains critical to a sustainable recovery process. The sizable funds should help alleviate some of the fiscal pressures resulting from Russia's invasion of Ukraine and heightened energy and food prices.

3. **Romania is prone to a range of geophysical and climate change-induced disasters, epidemics/pandemics, and technological accidents.** 101 catastrophic events were recorded in the country between 1900 and 2021—including 53 floods, 11 earthquakes, 20 extreme temperature events, 11 storms, and two major droughts—affecting over 2 million people and causing nearly 5,000 deaths and more than US$17.2 billion in losses and damages[1]. Notably, Romania is among the EU countries at highest risk of earthquakes and floods from fluvial and surface water.

4. **More than 75 percent of the country's population lives in areas susceptible to earthquakes, with Bucharest widely regarded as the most seismically risky city in Europe**. In 1977, a Mw 7.4 earthquake caused more than 1,500 fatalities and left 11,321 injured. As many as 156,000 residential apartments collapsed or were severely damaged, and more than 2,274 schools and 459 hospitals were severely damaged. Disaster impacts are also increasing due both to the concentration of exposed people and economic assets and to climate change. Forest fires, droughts, landslides, strong winds, and extreme heat also pose significant threats, and climate change is likely to considerably increase the occurrence and severity of weather-related disasters. It is important to recognize that in addition to damaging assets, disasters affect people's well-being, pushing families into poverty[2] .

5. **Climate change-induced precipitation variability is causing more severe flood and drought events, exacerbating water security challenges.** Romania's water sector faces significant obstacles in ensuring safe water supply for consumption, agriculture, and energy production, as well as protecting society, the economy, and the environment from flooding. Water security is already under threat in the current climate.

[1] World Bank 2018. Romania SCD, EM-DAT. 1900–2019. "Global Occurrences from Natural Disasters." EM-DAT: The Emergency Events Database, Université Catholique de Louvain–CRED (EM-DAT, CRED / UCLouvain), D. Guha-Sapir. Brussels, Belgium.

[2] World Bank. 2021. Overlooked: Re-examining the Impact of Disasters and Climate Shocks on Poverty in the Europe and Central Asia Region. Washington, DC: World Bank.

Existing water infrastructure assets, including numerous reservoirs and flood defenses, exhibit significant deficiencies and may fail under the strain of a changing climate. Both infrastructure and institutions responsible for managing water resources, particularly water-related risks, require immediate modernization and reinforcement.[3]

6. **Climate change causes temperatures in the main cities of Romania to increase with average values often reaching 1.5-3.0°C during the day and 1.0-1.5°C at night in July**[4]. The Urban Heat Island (UHI) effect is significant with higher intensity during the day than at night. There is a direct relationship between the heat island, thermal risk, and city size with the thermal risk concentrated in city centers and densely populated areas. Local authorities in large cities should consider measures to mitigate the UHI effect. Urban heat island effects are particularly noticeable in cities like Bucharest and Cluj, where urban areas are substantially warmer than their rural counterparts. Both cities have seen temperature increases of more than 2°C compared to pre-industrial levels.

7. **Over the next years, Romania's socio-economic development will depend on the country's ability to manage risks that could aggravate existing inequalities and constraints, while also finding ways to ensure sustainable growth**. In addition to the two ongoing external shocks, such as Russia's invasion of Ukraine and the long-lasting impacts of the COVID-19 pandemic, there are several areas (e.g., exposure to extreme events) that require immediate intervention to protect the most vulnerable. Romania will also need to utilize the opportunity to invest in and, thus, contribute to the EU-wide green and digital transition agenda, which has the potential to increase productivity and environmental sustainability.

8. **COVID-19,** Russia's invasion of Ukraine**, and new legislation (e.g., on energy efficiency standards for new buildings) have contributed to a rapid increase of construction costs.** Physical and logistical disruptions in the global supply chain from the pandemic, coupled with Russia's invasion of Ukraine, have resulted in rising energy and commodity prices, prolonged delivery time, and high production costs for manufacturers (across the world and at the regional and national level). That led to a rapid increase in construction costs. Official data from the National Institute of Statistics indicate that construction costs in Romania have grown by over 80 percent from the original Project (Romania Strengthening Disaster Risk Management Project, P166302) effectiveness in December 2018. In addition, since then, the country introduced more stringent construction regulations and updated energy efficiency standards for new buildings which require more complex and costly technical solutions.

9. **The overall increase in construction costs makes it more challenging to undertake critical public investments and limits the scale of interventions that can be made from the State Budget or EU funds.** The situation is doubly problematic for the General Inspectorate of Emergency Situations (GIES), as, even though structural strengthening works have become eligible for EU funding for some public buildings, such as schools and hospitals, for the 2021-2027 Programming Period, GIES cannot access any EU funds for structural strengthening and/or rehabilitation works, and the State Budget resources for such interventions are very limited. In a context where an extreme event could occur any day and considering that the GIES infrastructure is essential in dealing with extreme events, it is critical to mobilize resources to enable retrofitting or reconstruction of GIES buildings. The absence of operational GIES infrastructure may lead to a more dramatic impact of extreme events, as it will weaken vital response capacity. For example, in the recent earthquake in Türkiye in February 2023, several first responders' buildings, like the ones in Hatay, collapsed or suffered

[3] World Bank 2023. Romania SCD Update
[4] Sorin Cheval and Alexandru Dumitrescu. 2020. Urban heat island and thermal risk in cities of Romania

damage, reducing the local response capacity.[5]

10. **The country's overall firefighting and emergency response capacity is considered good; however, the ability to proactively prepare for and prevent extreme events needs to be improved.** Romania is frequently referred to as an example of the organization and performance of the GIES, with Romanian emergency response services deployed within 24 hours to Türkiye after the February 6, 2023 earthquakes. There have also been significant investments in firefighting and emergency response equipment in recent years, both from EU funds under the 2014-20 programming period and the State Budget. However, while response capacity is considered good, the ability of the country to proactively prepare for and prevent extreme events must be improved, with investments in strengthened and modern response buildings as a critical first step.

B. Project Status

11. **This Project Paper seeks the approval of the World Bank (WB) Board of Executive Directors for an Additional Financing (AF) in the amount of EUR 92 million (US$99.9 million equivalent) to the Romania Strengthening Disaster Risk Management (SDRM) Project (P166302).** The proposed AF is needed to close the financing gap within the existing Project scope. The closing date for the original SDRM loan will remain November 30, 2025, while the closing date of the Additional Financing Loan will be June 30, 2027, to allow for the completion of the AF-financed activities. The AF will also introduce a zero-amount Contingent Emergency Response Component (CERC) to the Project, given the country's vulnerability to disasters. As part of the processing of the AF, the original Loan Agreement will also be amended to ensure the needed flexibility allowing for the use of the original Loan proceeds to finance contracts procured not only under the version of the Procurement Regulations dated July 2016, revised November 2017 (i.e., the one which was in force at the time of original Project approval and referred to in the original Loan Agreement), but also under the current version of the Procurement Regulations dated November 2020 which would apply to the AF loan. Specifically, all procurements initiated after the AF Effectiveness Date will be carried out in compliance with the Procurement Regulations dated November 2020 applicable under the AF.

12. **The parent SDRM loan of EUR 50 million (US$60.48 million equivalent) was approved by the WB Board on July 24, 2018 and declared effective on December 20, 2018, in response to Romania's need to enhance the country's physical, social and financial resilience to climate and disaster risks.** The SDRM Project Development Objective (PDO) is to enhance the resilience of critical disaster and emergency response infrastructure and to strengthen the Borrower's institutional capacities in disaster risk reduction and climate change adaptation. The SDRM Project includes three components: Component 1: Improving Seismic Resilience of Disaster and Emergency Response Infrastructure; Component 2: Enhancing Institutional Capacity for Risk Reduction Investment Planning; and Component 3: Project Management. Through these components (see summarized description in Box 1), the Project addresses climate resilience and adaptation needs by:

    - Investing in disaster risk reduction, energy efficiency, including use of renewable energy, in public buildings with critical functions before, during and post-disaster;
    - Accelerating policy reforms and strengthening institutions for disaster and climate resilience;
    - Increasing public awareness on disaster and climate risks.

[5] https://reliefweb.int/report/turkiye/turkey-earthquake-emergency-situation-report-09022023

Box 1: Romania Strengthening Disaster Risk Management Project's Description Summary

Component 1: Improving Seismic Resilience of Disaster and Emergency Response Infrastructure (EUR 43.5 million). Activities supported under this component aim at improving the seismic safety and disaster resilience of critical disaster and emergency response buildings through investments in building infrastructure, structural strengthening, and modernization as well as energy efficiency and renewable energy improvements, that align with European Union and Romanian regulations and that will contribute to operational savings and Romania's Nationally Determined Contribution (NDC) commitments. In addition, all building renovations will achieve universal access and ensure equal access for men and women by the addition of gender-appropriate facilities. While the subset of the Project buildings does not cover all public buildings in Romania which are at risk from collapse or serious damage, the Project aims to develop the systems, frameworks and data for an eventual larger-scale risk reduction program and will also showcase the benefit of this approach for short-term gain, such as amenity and EE improvements, as well as for long-term risk reduction and climate adaptation. The following activities are included:

- Structural retrofitting, functional upgrading, and energy efficiency and renewable energy investments including the financing of (i) preparation, review and analysis of the Technical Surveys, Energy Efficiency Audits, Feasibility Studies and Technical Designs, (ii) civil works for retrofitting or reconstruction of priority facilities and (iii) supervision of construction works; and
- Non-structural activities through financing: (i) organizing informational meetings targeting staff and surrounding communities on the long-term benefits of resilient buildings; (ii) disaster and climate risk awareness meetings; and (iii) public awareness campaigns supported by various communications tools, including billboards, posters, brochures, and social media

Component 2: Enhancing Institutional Capacity for Risk Reduction Investment Planning (EUR 4.15 million). Activities supported under this component aim at enhancing institutional capacity to accelerate risk reduction through an improved understanding of disaster and climate risks in Romania, with a focus on developing risk reduction programs and investment strategies to guide future risk reduction investments. The activities under this component support:

- Enhancing RO-RISK (disaster risk assessments) for risk reduction planning;
- Risk reduction investment plan for emergency and disaster response facilities; and
- Public awareness to reduce disaster and climate risks including national communication campaigns and workshops;

Component 3: Project Management (EUR 2.35 million). This component supports strengthening Ministry of Internal Affairs (MoIA)/Department of Emergency Situations (DES)/General Inspectorate for Emergency Situations (GIES) capacity in operations management and staff capacity for the entire program through investing in hiring experts and/or consultants in procurement, financial management (FM), disbursement, monitoring and evaluation (M&E), and environmental and social safeguards.

13. **The SDRM Project is making steady progress, despite initial implementation challenges, as confirmed by the Bank Mid-term review (MTR) conducted in May 2022**. While the SDRM was rated Satisfactory and Moderately Satisfactory on the achievement of Development Objectives (DO) since its approval, the rating for implementation Progress (IP) was downgraded to Moderately Unsatisfactory (MU) between January – September 2022, due to accumulated implementation delays caused by a lengthy effectiveness approval period, the COVID-19 pandemic impact, significant time needed to increase Project Implementation Unit (PIU) capacity, and volatile construction prices requiring additional governmental approvals on the costs of civil works. Proactivity actions set at the beginning of 2022 were met; the PIU capacity strengthened; and since September 2022, the DO achievement and IP are both rated Moderately Satisfactory. The progress under each of SDRM components is also rated Satisfactory.

14. **The Project disbursement rate is steadily increasing, in line with the implementation progress achieved**. As of April 30, 20 percent of the SDRM loan was disbursed. With 45 percent of the loan already committed and 80 percent to be committed by June 2023, disbursements are expected to continue to increase monthly and reach 26 percent before June 2023, and 40 percent before November 2023, following the implementation of the works contracts. The implementation status under each SDRM component, along with the proposed AF contributions under the Project components, is summarized below.

15. **Component 1: Improving Seismic Resilience of Disaster and Emergency Response Infrastructure (EUR 43.5 million).** The first five buildings under Batch I are already under construction, and the first fire station (Mizil) was opened ahead of schedule in February 2023. Technical designs for the remaining buildings (Batch II)

under the current financing envelope will be finalized between March and May 2023, with all works contracts expected to be signed by September 2023 at the latest. At the same time, May 2022 WB MTR concluded that the available Project budget would allow for covering only 10 of the originally planned 35 buildings. This is due to three factors: i) the rapid cost increase in labor and construction materials in Romania and globally in the last 24 months; ii) completed engineering analysis that revealed that the majority of the Project buildings are in a worse state than originally anticipated, and therefore the most effective technical and economic solution is to demolish and reconstruct them, rather than retrofit; and iii) increased energy efficiency and renewable energy standards that have been applied to the Project buildings to reduce energy use and greenhouse gas (GHG) emissions.

16. Most of targeted Project buildings are old, with many constructed over 50-100 years ago. These buildings have poor energy efficiency performance and are unequipped for the increasing impacts of climate change, including increased frequency and intensity of hydrometeorological disasters. Reconstructing and modernizing these buildings will reduce their energy consumption and GHG emissions by 65 percent, from 9.78 GWh/year to 3.42 GWh/year – with total cost savings of over EUR 1.5 million, at current energy prices. The reconstructed buildings will need to conform with Law 10/2020 on Energy Efficiency in Buildings, which requires all buildings that receive construction permits after December 31, 2020, to meet Nearly Zero-Energy Building (NZEB) standards, with clear indications on the type of energy efficiency and renewable energy interventions that must be taken into consideration, with the first batch of buildings including solar panels and heat pumps. An 11-month extension of the original Project closing date from December 31, 2024, to November 30, 2025, was processed in January 2023 to allow the completion of works for Batch 1 and 2 buildings. The proposed AF will allow covering the financing gap to finalize at least 28 investment objects under SDRM and enable the Project to reach its PDO[6]. The closing date for the AF Loan will be June 30, 2027, to secure sufficient time to complete all AF-supported activities.

17. **Component 2: Enhancing Institutional Capacity for Risk Reduction Investment Planning (EUR 4.15 million).** The component is advancing the following activities:
    a. Damage and Loss Assessment Methodology: This activity is developing a unified methodology for the assessment of damages and losses caused by disaster and climate risks, such as floods, droughts, earthquakes, landslides, forest fires, as well as other hazards that may impact Romania (first phase) and implementation of the associated IT system (second phase). The contract for the first phase is ongoing, and the final version of the methodology is expected to be ready in May 2023. Procurement under the second phase (i.e., IT system for the damage and loss methodology) is expected to be financed under the original Project.

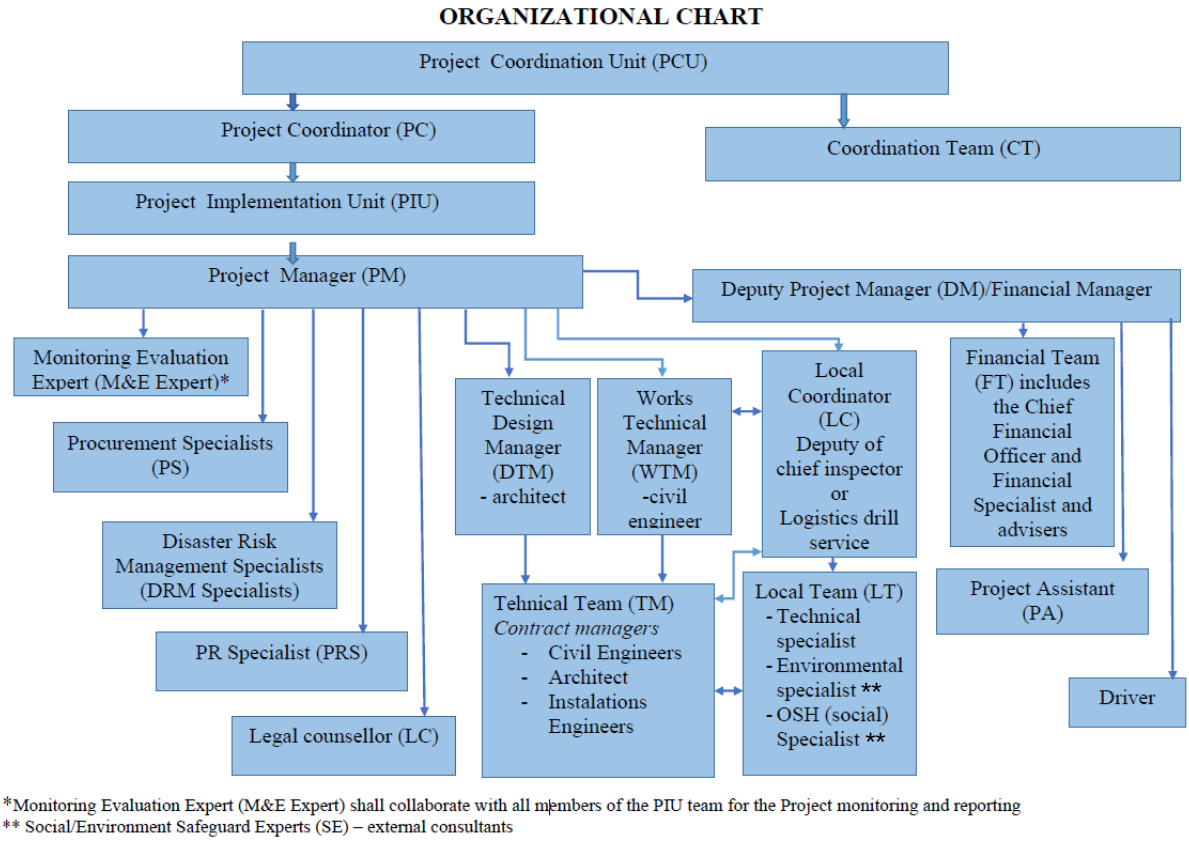
    b. Public Awareness campaigns on TV, radio, and social media: The first public awareness campaign was completed in November 2021 and supported a range of media campaigns, public awareness, and social media activities using various communication methods (TV spots, radio, social media, etc.). This campaign consisted of broadcasting video contents on national TV channels (13 spots in total) and audio content on national radio channels (13 spots in total). The focus has been on awareness and preparedness to extreme events.

[6] A total of 35 buildings can be finalized with the allocated funds, and the cost break-down is presented in paragraph 53 below. However, there is a risk that inflation and potential continued increase in construction costs will limit the number of buildings that can be retrofitted or reconstructed. Annex 1, Section D, includes a number of scenarios on how the rising inflation and continued increase in construction costs could affect project objectives. Therefore, while it is hoped that all 35 buildings included in the Project will be completed, the target was set conservatively at 28, to account for inherent risks, and in accordance with the experts' recommendations.

c. Behavioral change of the general public to enhance preparedness for geophysical and climate change-induced disasters: this activity consists of quantitative and qualitative research to understand the main social factors related to public awareness of disaster risk management. This activity was completed in May 2022 and informs the design of the second public awareness campaign planned for 2024, with a focus on promoting both adaptation and mitigation measures to geophysical and climate change-induced disasters, which aims at effectively changing the behavior of the general public toward increased disaster prevention and preparedness.
d. Risk Assessment: This activity will include a study on multi-risk and multi-hazard modeling and assessment. It will focus on the development of 6 multi-risk and multi-hazard scenarios, including climate change. Terms of Reference (TORs) for this activity are under preparation, to be launched in 2024.

18. **Component 3: Project Management (EUR 2.35 million).** PIU capacity limitations were one of the early challenges experienced by the Project. Since then, this capacity has been increased and extended under the revised PIU organization chart (Figure 1.), and the component is now progressing well. As agreed at the May 2022 MTR, the PIU now includes 26 GIES staff and 16 external consultants, including seven new hires: an Architect, Civil Engineer, Financial Specialist (with experience in contract management and technical design), Monitoring and Evaluation (M&E) Specialist, Assistant Manager, Environmental Safeguards Specialist (full-time), and Social Safeguards Specialist (individual consultants) out of which, five staff being recently onboarded in November and December 2022. The PIU also benefits from support in regional and local Inspectorates for Emergency Situations to supervise construction works and ensure adherence to the Environment and Social Management Plans and Occupational Health and Safety (OHS). The PIU is fully committed to the Project and has been responsive to the Bank's guidance and advice on OHS and all recommended measures (such as provisions for workers in extreme summer heat) were communicated to contractors, and were followed-up on, with further supervision from the PIU.

Figure 1: Revised PIU Organization Chart agreed at the MTR



*Monitoring Evaluation Expert (M&E Expert) shall collaborate with all members of the PIU team for the Project monitoring and reporting
** Social/Environment Safeguard Experts (SE) – external consultants

19. **The Project has been compliant with the SDRM loan covenants**, including audit and financial management reporting requirements. The latest ratings as of February 2023 for Financial Management, Procurement and Monitoring and Evaluation are Satisfactory. The Project is also in compliance with the Bank's social and environmental safeguard policies. All planned activities which are expected to be financed under the Project are subject to World Bank safeguards requirements and are in line with the Environmental and Social Management Framework (ESMF).

C. Rationale for Additional Financing

20. **The proposed EUR 92 million AF loan will cover the financing gap to complete all activities under the original Project, in order to achieve the PDO on enhanced resilience of critical disaster and emergency response infrastructure and strengthened Borrower's institutional capacities in disaster risk reduction and climate change adaptation.** The WB MTR mission in May 2022 concluded that the available Project budget under Component 1 would allow for covering only 10 buildings of the initial investment objectives of 35 buildings[7] and recommended considering an AF that could address this identified financing gap. The actual financing gap derives from:

i. *Significant increase of the national and global prices for construction materials and labor.* Since the Project was developed, there has been a significant cost increase for construction materials and labor

[7] During Negotiations, it was decided to set the PDO target conservatively at 28 buildings, to account for inherent risks of continued increase in inflation and construction costs. If inflation and construction costs remain at current levels, all 35 buildings will be completed.

costs in Romania and globally. According to the Romanian National Institute of Statistics, as of August 2022, the local construction unitary cost has increased by 80 percent on average compared to the unitary cost at Project appraisal.

ii. *Engineering assessments of the buildings revealing that the structural deficiencies in the buildings are greater than initially appraised*. That led to an increase in the percentage of buildings that needed reconstruction rather than consolidation works - 2/3 of the buildings require reconstruction compared to 1/3 as originally envisaged.

iii. *Enhanced EE and RE measures in investments*. An enhanced commitment to improve the energy efficiency and use of renewable energy has increased construction costs. However, these critical EE and RE measures enable the Project to significantly improve the energy performance of the Project buildings, with estimated energy savings of 65 percent from current levels, estimated costs savings of over EUR 1.5 million at current energy prices, and annual CO2 reduction of over 1,200 tons.

iv. *Increased capacity costs related to Project Management.* Given the recently approved extension of the original Loan Agreement closing date from December 31, 2024 to November 30, 2025 and the proposed AF loan closing date of June 30, 2027, the Project will require additional funds to manage the project and increase capacity for the AF implementation until June 30, 2027.

21. **Without the AF, the Project would need to be restructured to reduce the number of buildings covered by the Project to 10, resulting in compromised emergency and disaster response capacity in Romania.** Around 2.4 million residents are serviced by the 25 buildings included in the AF[8]. These 25 remaining buildings now have formal engineering assessments stating that the buildings are expected to sustain severe damage (and become unfunctional) and could potentially completely collapse in an earthquake, seriously risking the lives of first responders and reducing Romania's emergency response capacity[9]. These buildings are also vulnerable to damage from storm and water ingress due to poor roof quality and provide inadequate shelter for emergency response staff during extreme heat and cold events. This aging infrastructure and climate change increases the potential risk and damages from flooding and seismic events. The issue is further compounded, as earthquakes are also often accompanied by fires, with significant implications to lives and assets if the fire emergency response is weakened. The Government has no other sources of financing to cover the civil works, and this type of investment has historically not been eligible for EU financing. Given the potential further increase of construction costs, the option of mobilizing in-kind resources from the State Budget will be considered to cover for any additional financing gap beyond the proposed AF loan.

22. **In this context, the AF is needed to enable the construction of the remaining 25 buildings under the Project in the extended implementation time[10]**. All these 25 buildings have their technical and engineering reports (technical expertise) finalized. The technical designs for the construction will be prepared under the original Loan, and their preparation will commence as soon as the Bank Board approves the AF[11]. That would allow for some of the designs to be finalized between the AF approval and effectiveness period, so that the civil

[8] The PDO target was set at 28 total buildings (i.e. 18 additional buildings under the AF), to account for inherent risks in the increase of inflation and construction costs (Annex 1, Section D, includes a more detailed analysis on how potential increases in inflation and construction costs could affect project objectives).

[9] https://reliefweb.int/report/turkiye/turkey-earthquake-emergency-situation-report-09022023

[10] See Footnote 8.

[11] In accordance with the Romanian Public Finance Law, Article 43, paragraph (9), projects financed from external funds can have technical/economic documentation prepared and approved, even in the absence of secured financing. The PMU also committed to make the proper arrangements with the leadership of the MoIA, as in the past it has been difficult to secure financing for technical/economic documentation without a formally approved program.

works would start as soon as the AF is declared effective. The AF Loan effectiveness is expected around December 2023, given typical government processes. Therefore, it is envisaged that the AF would be implemented within three years of its effectiveness. The PIU capacity will continue to be strengthened to allow timely implementation of AF-supported activities.

23. **The same Safeguards Policies which are guiding the implementation of the original Loan will apply for this AF, as the additional funding is due to a financing gap/cost overrun**, thereby meeting the eligibility criteria for the AF for Investment Project Financing (IPF). In the unlikely situation that Project activities to be undertaken would trigger new safeguard policies, new instruments will be prepared, consulted, and disclosed in accordance with the Bank's environmental and social safeguards policies.

24. **The proposed AF is aligned with the ongoing government programs.** The AF contributes directly to the Government's objective of strengthening the institutional capacity and preparedness to manage disasters as well as the objectives of the National Seismic Risk Reduction Strategy approved on December 13, 2022, which promotes energy efficiency and seismic resilience integrated interventions in public and private buildings stock. Furthermore, the upcoming National Disaster Risk Reduction Strategy 2023–2035, which is expected to be approved in 2023 provides the framework for investments in disaster and climate resilience measures. This will ensure that the Project, including the proposed AF, will continue to receive high political support in view of the investments in the critical infrastructure for disaster risk management.

25. **The proposed AF is also consistent with the World Bank FY19-23 Country Partnership Framework (CPF) for Romania[12] and its Performance and Learning Review dated June 23, 2021 (Report No. 160350-RO), and will support overall climate change mitigation and adaptation efforts.** The AF complies with the overarching goal of the CPF of building institutions and contributes to Focus Area III on "Building Resilience to Shocks", by supporting interventions in the Disaster Risk Management (DRM) sector. Given geophysical and climate change risks, including extreme weather events, which impact Romania[13], as noted in Figure 2 and Figure 3 below, integrated energy efficient, seismic resilient, and inclusive investments in critical infrastructure included under the AF will strengthen Romania`s capacity to prepare for, and respond and recover after, different type of shocks, including those driven by climate change. The AF is aligned with the Global Crisis Response Framework Paper (GCRF) which outlines the WBG response to the ongoing crisis to support medium- to long-term development needs. The proposed AF contributes to Pillar 3 of the GCRF on Strengthening Resilience through sub-component 3.2. Disaster Risk Management, and to Pillar 4 through sub-component 4.2. on Resilient Reconstruction.

[12] WB Report No. 126154-RO; Board discussion on June 19, 2018

[13] https://climateknowledgeportal.worldbank.org/country/romania

Figure 2. Number of people affected by key hazards, between 1980 -2020, in Romania

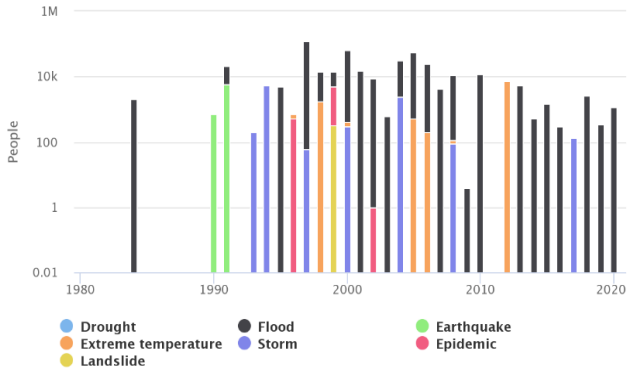
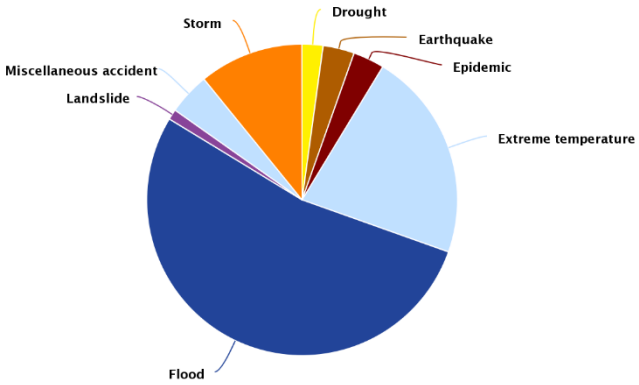


Figure 3. Romania Average Annual Hazard Occurrence for 1980 -2020



Source: World Bank Climate Change Knowledge Portal, https://climateknowledgeportal.worldbank.org/country/romania

II. DESCRIPTION OF ADDITIONAL FINANCING

26. **The AF is in line with the existing PDO, and the components included in the original Project's design.** The PDO will remain unchanged, and the proposed AF will close financing gaps identified under Components 1 and 3. The AF is also introducing a zero-amount CERC component given the country's vulnerability to disasters. Some of the activities under Component 2, that have not been started yet, will now be financed under the AF.

Table 1: Summary of Total Project Costs*

Component Name	Current Cost (EUR, millions)	Proposed Cost (EUR, millions)	Total Cost (EUR, millions)
1. Improving Seismic Resilience of Disaster and Emergency Response Infrastructure	47.10	86.15	133.25
2. Enhancing Institutional Capacity for Risk Reduction Investment Planning	0.55	3.6	4.15
3. Project Management	2.35	2.25	4.60
4. CERC	N/A	0	0
TOTAL	**50.00**	**92.00**	**142.00**

*NB: Project financing is in EUR. Any change in associated USD equivalents reflects exchange rate fluctuations.

27. **Component 1. Improving Seismic Resilience of Disaster and Emergency Response Infrastructure (EUR 86.15 million).** Under Component 1, the AF-supported activities will include (i) technical designs and civil works for the remaining 25 buildings[14]; and (ii) cover overrun costs for the 10 buildings in progress.

    a. **Civil works for the remaining 25 buildings**[15] The technical surveys for these buildings were completed,

[14] The current budget allocation allows for all 35 buildings in the project to be finalized. However, expert review recommended to complete an analysis of how the potential continued increase in inflation and construction costs could affect project objectives. Based on this analysis, available in Annex 1, Section D, the PDO target is set conservatively at 28 buildings. The aim, however, is to retrofit/reconstruct all 35 buildings included in the project if the budget allows.

[15] Ibid.

and the activities include site supervision, and retrofitting or reconstruction civil works. The PIU re-estimated costs for each investment objective are based on technical surveys that were carried out in 2021. The surveys proposed 11 buildings (decreased from the original 25) to be retrofitted and 21 buildings (increased from the original 10) to be demolished and reconstructed because of their high structural vulnerability, and this revision significantly increased the associated costs per site. Also, all buildings will need to meet NZEB requirements.

b. **Covering overrun costs for 10 buildings in progress.** According to the revised projections, the available funds under Component 1 (EUR 43.5 million) can cover the design and works for only 10 buildings. Technical designs have been completed and the civil works started in five Project sites (Carei, Mizil, Tecuci, Obor, Calarasi) as the first batch. Technical design contracts for five additional sites (Batch II - Vaslui, Focsani, Botosani, Slobozia, Pitesti) were signed with works scheduled to commence in September 2023.

28. **Component 2. Enhancing Institutional Capacity for Risk Reduction Investment Planning (EUR 3.60 million)** Some of the activities under this Component are at risk of not being completed during the original Project implementation timeline. Consequently, the decision was to utilize the available noncommitted funds under Component 2 of the original SDRM loan for financing civil works under Component 1, while the proposed AF will comprehensively cover the following activities envisaged under Component 2:
    a. *Improving and updating the Ro-Risk platform through preparation and use of higher resolution data, improved vulnerability modeling and developing more robust data on the financial and economic impacts of disasters;*
    b. *Develop a package of evidence-based priority investments to enhance the resilience of emergency and disaster response facilities under GIES; and*
    c. *Conducting national workshops, training, and public awareness campaign for disaster risk management in Romania*.

29. **Component 3. Project Management (EUR 2.25 million).** The additional Project management cost will cover operational costs and will ensure that the capacity of the PIU is maintained and further strengthened during the extended implementation period.

30. **Component 4. Contingent Emergency Response Component (EUR 0 million).** Given Romania`s exposure to geophysical and climate change-induced disasters, a Contingent Emergency Response Component (CERC) is introduced under the AF. The CERC is an *ex-ante* mechanism available to the Government for rapid access to financing to respond to an eligible crisis or emergency. The Borrower may request the Bank for a rapid re-allocation of project funds to support an eligible crisis or emergency, namely an event that has caused, or is likely to imminently cause, a major adverse economic and/or social impact, associated with a natural or man-made disaster (e.g., serious storms, floods, earthquakes, droughts, disease outbreaks). Possible response, repair and rehabilitation investments under CERC would consider mitigation and adaptation measures. This component would draw from the uncommitted loan resources from other Project components to cover emergency expenditures. There is flexibility in establishing the level of evidence needed to activate CERC, including but not limited to issuances, such as an issuance by the National Committee for Special Emergency Situations (NCSES) in accordance with Emergency Ordinance No. 21/2004, as subsequently amended, that mobilizes financial and/or other resources for emergency response.[16] It is important to note that the decision to trigger the CERC, in case of an emergency, rests fully

[16] The key legislation regulating the management of emergency situations includes the following: Government Emergency Ordinance No. 21/2004 on the National Emergency Situations Management System (Sistemul Național de Management al Situațiilor de Urgență),

with the Borrower, with no obligation to do so. Thus, the CERC does not create any obligations, apart from the need to prepare a CERC Manual and an Emergency Action Plan in form and substance acceptable to the Bank (disbursement conditions), and offers rapid access to resources in case of an emergency.

31. **Institutional and Implementation Arrangements.** Implementation arrangements will remain unchanged**.** However, the PIU will be further strengthened by hiring additional PIU staff and bringing in external resources, building on positive experience with the recruitment of consultants, to manage the increased workload under the original loan and the proposed AF, and, in particular, the procurement and implementation of civil works. To ensure fast implementation of the AF, a few measures are planned, including: i) introducing a dated covenant in the Loan Agreement to ensure the signing of 18 technical designs contracts before the end of the calendar year (December 31, 2023); ii) using model designs for some of the 25 buildings (e.g. the design for the Mizil building, from Batch 1 under the Original loan, will be used for 7 buildings covered from the AF); iii) buildings will be organized in geographic lots, to enable companies that will win bids for construction works to focus on several buildings in parallel; iv) arrangements will be made for the timely issuance of construction permits and for adequate site supervision capacity. The existing POM will be updated to reflect the AF. Update of the existing POM, satisfactory to the Bank, would be made as the AF effectiveness condition.

32. **Changes to the Results Framework.** The results framework remains almost the same with slight changes. While the PDO indicators remain the same, the target dates will be adjusted to reflect the extended closing date. For intermediate indicators the end target dates will also be also adjusted. Finally, the target value on the total number of the Project buildings will be updated to 28 and intermediate results indicators will also be aligned accordingly. Please see Results Framework for details.

33. **Changes in the closing date.** Based on the implementation plan prepared, the AF will need 4 years to complete all the AF loan-supported activities. Therefore, the AF Loan closing date will be June 30, 2027.

III. KEY RISKS

34. **The residual overall risk rating of the Project will continue to be Moderate**.

Systematic Operations Risk-Rating Tool (SORT)	
Risk Category	**Rating**
1. Political and Governance	Moderate
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Low
4. Technical Design of Project	Low
5. Institutional Capacity for Implementation and Sustainability	Moderate
6. Fiduciary	Moderate
7. Environment and Social	Moderate
8. Stakeholders	Low
OVERALL	**Moderate**

35. **Residual Political and Governance risk - Moderate**. In recent years political volatility continued to be high,

as subsequently amended; and Government Decision No. 557/2016 regarding the management of all types of risk, along with its secondary legislation, Government Decision No. 94/2014 on certain measures for emergency situation management. According to Government Decision No. 94/2014, the NCSES is responsible for issuing decisions on actions that should be taken to respond to the emergency situations generated by the existing risks. It is envisaged that the legal evidence for the trigger will be a decision of the NCSES (referred to in Romania as a "HOTĂRÂRE"), which is signed by the president of the NCSES (currently minister of internal affairs).

but a large political coalition was formed in 2021, and it is expected to remain stable until the elections in 2024. The Government has also demonstrated a commitment to advance key reforms, such as the National Strategy for Seismic Risk Reduction, and institutional building for disaster risk management – including those supported under this operation. While changes within the Government are to be expected, the PIU under GIES and the Project Coordination Unit under the Department of Emergency Situations mitigates the risks associated with the continued volatility through continuous information and proactive communication with all stakeholders on the Project implementation status.

36. **Residual Macroeconomic risk - Moderate.** One of the key risks for the project is the narrow fiscal space that Romania will have in the next couple of years, given the pressure on the budget deficit. An expected slowdown in economic growth and/or additional public spending increases would reduce the fiscal space available for capital expenditures. Furthermore, the impact of the Russia's Invasion of Ukraine with rising energy prices, and high inflation rate may lead to further price increases. To mitigate this risk, the PIU will continuously engage with leadership, to ensure political support for the project. Inflation risk will be mitigated by including the price adjustment clause in contract, by trying to secure potential in-kind contributions from the State Budget, and by putting measures in place to advance implementation and minimize delays.

37. **Residual Institutional Capacity for Implementation and Sustainability risk - Moderate.** Staff in the Department for Emergency Situations and General Inspectorate for Emergency Situations have now acquired significant experience on implementing a WB Project using WB procurement and safeguards procedures. The capacity was also strengthened, and the PIU has now experience in the retrofitting or reconstruction of buildings within GIES. However, this capacity needs to be maintained and further strengthened to be able to implement the AF in four years. Additional allocations will be made for Component 3 on Project Management, to ensure the PIU is properly staffed to deal with multiple works contracts implemented in parallel.

38. **Residual Fiduciary risk – Moderate.** The procurement and financial management performance have improved significantly over the implementation period and the residual fiduciary risk was downgraded from substantial to moderate for the original Project. The PIU has recruited FM and procurement staff with relevant experience in implementing WB Projects and will need to continue to strengthen these functions for the AF to be implemented within four years. Consequently, continued support will be offered to the FM team of the PIU, and knowledge exchanges will be facilitated with performing FM teams from other PIUs in Romania.

39. **Environment and Social – Moderate.** E&S risks for the AF are associated with civil works and relocation of staff during interventions and limited to the scope and nature of civil works required to retrofit and reconstruct the buildings. These risks are foreseeable, temporary and can be mitigated. The risks include discomfort in terms of noise and dust pollution for neighboring properties and interruptions in utilities for neighboring properties during demolition or at the time of connecting the new buildings to gas, water, sewerage, and electricity. Other potential risks are damages to private properties in the event of accidents during demolition works as well as occupational health and safety risks for construction workers and staff at the sub-project sites. There is also potential traffic disruption and road accident risks during transportation of demolition waste and building materials. During relocation of staff to temporary facilities while works are in progress, the project will ensure that that relocation facilities are appropriate, and emergency response services are not disrupted due to the relocation. The current PIU has experience of developing and implementing safeguards instruments as well as conducting consultations with potentially

affected parties under the original Project, which will be useful in identifying and implementing appropriate risks and mitigation measures.

40. **A *grievance redress mechanism*** is established and functional under the original Project and will extend to this AF to ensure that project affected persons have an effective avenue to provide feedback or lodge a complaint related to project activities.

IV. APPRAISAL SUMMARY

D. Economic and Financial Analysis

41. The economic analysis done for the original Project in 2018 is updated for 25 identified priority buildings provided by MoIA through DES/GIES. The updated analysis assumes a 4-year investment/implementation period corresponding to approximately 35,000 m^2 of floor space, providing protection to more than 900 building occupants, and ensuring that 2.4 million residents have continued emergency response during an earthquake or other disaster.

42. The Cost-Benefit Analysis accounts for avoided losses, which are expected to constitute the major portion of the benefits incurred directly from project implementation. A World Bank Policy Paper (Charles Kenny, Why Do People Die in Earthquakes?, The World Bank (WSP 4823)) states that calculation of the benefits and costs of risk reduction projects (retrofitting and reconstruction of critical public facilities) involves estimates and assumptions covering the following key variables: (i) the strengthening/retrofit costs; (ii) the building replacement costs; (iii) the risk of a natural disaster (and of the scale of that disaster); (iv) the risk of damage if a natural disaster does occur; (v) the cost of that damage in both financial and human terms (i.e., life losses, casualties, amount of damage and service interruption for public facilities); and (vi) the discount rate.

43. The CBA is based on a probabilistic seismic hazard analysis which assumes two scenario earthquakes occurring at the sites of the Project: (i) scenario 1 with peak ground accelerations (PGA) values with 39 percent probability of exceedance in 50 years, and with 100 years mean return period (MRP), and corresponding earthquake with a magnitude of approximately 7.5; and (ii) scenario 2 with PGA values with 10 percent of probability of exceedance in 50 years, and with 475 years MRP, and corresponding earthquake with a magnitude of approximately 8.0.

44. **Avoided Fatalities**. The daytime occupants are close to 1,000 in 25 identified buildings out of which 800 to 2,700 lives are estimated to be saved due to earthquake-resistant emergency response buildings and fully functional emergency response services that can undertake rescue in the surrounding areas in the event of a disaster. With a value of a statistical life (VSL) estimated at EUR963,609, the total value of the avoided fatalities would range from EUR 715 million to 2,483 million.

45. **Avoided Direct Damage**. Avoided direct damage is expressed as the total cost for repairing or replacing “as new” the 25 GIES buildings damaged by a scenario earthquake, and it is calculated as the difference between the total cost for repairing or replacing “as new” of the 25 GIES buildings – determined considering their current condition (no Component 1 of the IPF) and after the implementation of Component 1 of the IPF. The total avoided direct damage ranges from EUR 5 million to 12 million.

46. **Avoided content losses**. Building content is defined as equipment, tools, furniture, computers, and other supplies that is not integral with the structure. The avoided content losses to GIES buildings are expressed as the cost of contents damage to the 25 GIES buildings damaged by scenario earthquakes, and it is calculated as the difference between the cost of contents damage considering the current condition of the GIES building (no Component 1 of the Project) and the cost of contents damage considering the retrofitted

condition of the GIES building, after the implementation of Component 1 of the Project. According to the analysis, the total avoided content losses is estimated from EUR 0.4 to 0.9 million.

47. **Avoided direct damage in the areas served by 25 buildings because of the suppression of fire spreading**. This assumes that surrounding buildings are on fire either when the DES/GIES buildings are not operational or fully operational. Depending on the scenario, the value of avoided direct losses in the served buildings is estimated from EUR 11 to 19 million.

48. **Avoided fatalities in buildings located in the areas served by GIES buildings because of the suppression of fire spreading**. If the VSL is applied to those occupying the buildings in the areas served by the 25 buildings, the total value of avoided fatalities would be from EUR 213 million to 718 million.

49. **Energy and cost savings**. Proposed interventions are estimated to help reduce energy use in the buildings by 65 percent, from 9.78 GWh/year to 3.42 GWh/year. This would translate into annual cost savings of over EUR 1.5 million for all of the 25 buildings, and into a reduction of CO2 emissions of over 1,200 tons per year.

50. **Impact of rise in construction costs**. Given the significant likelihood of continued increase in construction costs, several scenarios have been prepared to estimate how these costs could evolve. Using official numbers from the National Institute of Statistics, and extrapolating these numbers into the future, it was estimated that construction costs could increase, from the now estimated EUR 80 million to between EUR 108-115 million, which would limit the number of buildings that can be retrofitted/reconstructed. Annex 1, Section D, includes a more detailed discussion on different cost increase scenarios.

51. **Summary**. At full development and over the 20-year planning horizon, the Project yields an IRR of 10.4 percent, with Benefit-Cost ratio of 1.41 for the first earthquake scenario considered, and an IRR of 5.3 percent, with Benefit-Cost ratio of 1.02 for the second earthquake scenario evaluated. These results represent an acceptable investment prospect. It is also noteworthy that the project's efficiency parameters in both earthquake scenarios are highly sensitive to the VSL estimate and the number of lives saved, which play a vital role in rendering the project feasible in economic terms.

Table 2. Main indicators of CBA for scenario earthquakes 1 and 2

Scenario earthquake	BCR	NPV (Euro)	IRR (%)	Payback Period (Years)
1	1.41	29,212,854	10.4	13
2	1.02	1,401,136	5.3	20

The cost-benefit analysis for energy efficiency considers the discounted cost (investment value of Component 1 of Project) and the discounted benefit (cost of energy saved). The undiscounted value of the cost is EUR 9.78 million, whereas the undiscounted value of benefits amounts to 1.50 million per year. Applying a discount rate of 5 percent for a planning horizon of 20 years, one obtains the discounted values of cost and benefit amounting of EUR 8.69 million, respectively EUR 15.35 million. The main indicators of the CBA for energy efficiency measures are reported in the Table 3. below. Annex 1, Section C, includes a more detailed analysis on this subject.

Table 3. Main indicators of CBA for energy efficiency measures

BCR	NPV (Euro)	IRR (%)	Payback Period (Years)
1.77	6,663,056	13.8	11

E. Technical

52. **The technical surveys carried out in 2021 identified that 11 buildings should be retrofitted, and 21 buildings need to be demolished and reconstructed because of their structural vulnerability**. Consequently, at the time of the MTR, the ratio of retrofitting vs reconstruction has inverted and the associated costs per site increased significantly. The revised intervention costs of the 25 target buildings range from EUR 0.8 to 8 million depending on the intervention type (retrofitting, reconstruction) and building built-up area, and including measures for RE and EE. Initial cost estimates at the time of the original Project appraisal were within a range of EUR 0.4 to 3.8 million. The difference in cost is on the one hand explained by global dynamics such as COVID-19 and Russia's invasion of Ukraine, with the Romanian National Institute of Statistics indicating that construction prices have increased by over 80 percent since the Effectiveness of the original Project to the present day. Moreover, new legislation that requires higher energy efficiency standards for new buildings, imposes technical solutions that are more complex and costly.

53. Technical surveys were already completed for the 25 target buildings in the AF, in addition to the 10 buildings covered by the original Project, and each planned intervention will include: i) site supervision; and (ii) retrofitting/reconstruction works (see Table 4 below).

54. Out of the original 35 buildings, three were excluded from the list, and three new buildings have been identified[17] (Dămăroaia, CIES București-Ilfov, Firefighters' Training Center, Mediaș, CIES Sibiu) for: (i) firefighting HQ & Detachment; (ii) Firefighting Detachment (5 garages); and (iii) Firefighting Station (2 garages).

[17] Buildings were determined to be ineligible for Project financing as the structural risks in these buildings was not high according to engineering assessments undertaken under the original Project.

Table 4: Project Costs – Component 1 (as of November 2022)

No.	Investment Objective	Renovation Type	Area (m2)	Revised Cost Estimates (EUR)
#11	Vitan, CIES București-Ilfov	Demolition & new building	1,620	3,647,242
#12	Câmpulung Muscel, CIES Argeș	Demolition & new building	1,620	3,647,242
#13	Bradu, CIES Argeș	Demolition & new building	1,620	3,647,242
#14	Moldova Nouă, CIES Caraș-Severin	Demolition & new building	1,620	3,647,242
#15	Zimnicea, CIES Teleorman	Demolition & new building	1,620	3,647,242
#16	Băilești, CIES Dolj	Demolition & new building	1,620	3,647,242
#17	Salonta, CIES Bihor	Demolition & new building	1,620	3,647,242
#18	Adjud, CIES Vrancea	Demolition & new building	550	955,230
#19	MU 0543 Tecuci, CIES Galati	Demolition & new building	550	955,230
#20	Berești, CIES Galati	Demolition & new building	550	1,238,261
#21	Mangalia, CIES Constanța	Demolition & new building	550	1,238,261
#22	Ineu, CIES Arad	Demolition & new building	550	1,238,261
#23	GIES Logistics Office	Demolition & new building	574	996,913
#24	GIES Second Headquarters	Demolition & new building	1,664	2,890,005
#25	Râmnicu Sărat, CIES Buzau	Retrofitting & modernizing	1,044	2,014,667
#26	Tg. Secuiesc, CIES Covasna	Retrofitting & modernizing	978	2,630,786
#27	Bod, CIES Brașov	Retrofitting & modernizing	1,468	2,549,596
#28	Făgăraș, CIES Brașov	Retrofitting & modernizing	1,658	4,459,962
#29	Port, CIES Constanța	Retrofitting & modernizing	1,675	2,909,109
#30	Toplița, CIES Harghita	Retrofitting & modernizing	2,900	7,800,899
#31	Turda, CIES Cluj	Retrofitting & modernizing	1,936	5,207,773
#32	Aiud, CIES Alba	Retrofitting & modernizing	1,282	3,448,535
#33	Firefighting HQ & Detachment	Retrofitting & modernizing	3,500	9,414,878
#34	Firefighting Detachment (5 garages)	Demolition & new building	1,620	3,647,242
#35	Firefighting Station (2 garages)	Demolition & new building	550	1,238,261
TOTAL				**80,364,566**

55. The WB team and MoIA have reaffirmed that when defining each building's need for upgrading according to normative documents, the DES and GIES should also consider the building's future functionality requirements, including full operational capacity in case of earthquake, improved energy performance, as well as electrical, mechanical systems, gender aspects and meeting requirements for females, access for disabled people, environmental and social safeguards, and so on.

F. Financial Management

56. **Overview and risk analysis.** The AF will follow the same FM arrangements as the original Project in terms of staffing, budgeting, flow of funds, accounting and reporting, internal controls, and external audit, as detailed below. Project FM arrangements will continue to substantially rely on various robust elements of the country's public FM systems and structures. The Project has satisfactory FM arrangements and is up to date in terms of financial reporting and auditing requirements. The main FM risks pertaining to the AF relate to: (i) insufficient and/or untimely allocations secured in the State Budget to contract and pre-finance project eligible expenditures; and (ii) risk to double-finance the same expenditure or to pay project expenses

from a different source than the one intended. As the GIES-PIU has instituted FM arrangements to prevent the above-mentioned risks and these will be further consolidated, the FM residual risk is assessed as moderate.

57. **Staffing.** The PIU is experienced with the procedures applicable to WB-financed projects, including fiduciary requirements and the national public financial management regulations. The PIU currently has a Finance Manager and a Finance Specialist in charge of the financial, accounting and disbursement activities under the project which work closely with other finance staff in GIES to ensure project transactions are properly budgeted and accounted for.

58. **Budgeting and planning.** The PIU prepares comprehensive forecasts for project components in line with the Procurement Plan and implementation plans. The PIU will continue to exercise proactive and close monitoring of the project activities and budgetary allocations and liaise with the relevant stakeholders to secure appropriate budgetary resources and duly address any financing gaps.

59. **Flow of funds and disbursement.** The envisaged eligible expenses under the AF relate to works, goods, non-consulting services, consulting services, operational costs, and training under the project. All eligible expenditures will be entirely financed by IBRD. The AF will finance activities under Components 1, 2, and 3 of the Project, both new contracts to be concluded under this AF loan, but also contracts signed under the original loan that may be carried forward partially for funding under the AF Loan. When expenditures are to be financed by both the original loan and the AF loan, the original loan would be exhausted first. The applicable disbursement method will remain reimbursement, as the default mechanism for IBRD-financed projects in Romania is to fully pre-finance eligible expenditures from the State Budget. There will be no Designated Account and the project proceeds will be channeled through the existing Treasury system and classifications. Based on the documents received from the PIU, the Ministry of Finance (MoF) will claim periodic reimbursements from the Bank. Eligible expenditures will be documented through Statements of Expenditures. Disbursed funds would flow to the MoF's Euro account opened with the National Bank of Romania. The detailed arrangements pertaining to withdrawal of the AF loan proceeds will be set out in the Disbursement and Financial information Letter (DFIL).

60. **Accounting.** The PIU uses a reliable accounting software which complies with the national accounting and reporting regulations. Project records are booked in the system on accrual basis using the existing chart of accounts. The system will accommodate the records of the AF to the same level of details as for the ongoing Loan so that transactions could be easily identified under each source of financing. A separate cost center will be opened for the AF and analytical records will be maintained under each loan.

61. **Internal controls.** A reliable system of internal controls was instituted for project implementation and will apply to the AF as well. The POM will be updated with information pertaining to the AF loan, including controls in place to ensure proper use of funds and recording of transactions under each source of financing.

62. **Financial reporting and audits.** The FM requirements to be included in the DFIL refer to: (a) semi-annual Project interim unaudited financial reports (IFRs), in an acceptable form and substance, will be submitted to the WB no later than 45 days after the end of each reporting period; and (b) annual Project financial statements will be audited by independent auditors acceptable to the WB based on pre-agreed terms of reference; the audited financial statements will be submitted to the WB no later than six months after the end of the fiscal year and made publicly available in a manner acceptable to the WB. The Project financial reports and statements will present all project sources and operations financed by the original and AF loans, with clear identification of activities falling under each source of financing. The agreed formats of the IFRs and audit terms of reference will be attached to the updated POM.

G. Procurement

63. **Applicable procurement procedures:**

While Procurement under the AF will be carried out in accordance with the *World Bank Procurement Regulations for IPF Borrowers: Procurement in Investment Project Financing of Goods, Works, Non-Consulting and Consulting Services* (Fourth Edition, issued in November 2020) and with the latest "Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants", flexibility will be introduced to allow for the use of the proceeds of the original Loan to finance contracts procured not only under the Procurement Regulations dated July 2016, revised November 2017, but also under the current Procurement Regulations dated November 2020. The cut-off date will be the effective date of the AF Loan Agreement. Following this date, it will be possible to use the available proceeds of the original Loan to finance eligible expenditures for which procurement process is initiated after the effective date of the AF Loan Agreement in accordance with the Procurement Regulations dated November 2020 that apply to the AF. This requires an amendment to the Loan Agreement for the original Loan which is processed as part of this AF package.

64. **Procurement implementation arrangements.** The existing arrangements will remain unchanged. The PIU has extensive experience with the implementation of WB–funded projects based on Procurement Regulations. The PIU currently employs two procurement specialists as external consultants. Both specialists have extensive experience with Bank procurement procedures and with activities similar to those planned to be financed under the AF.

65. **Capacity assessment.** An assessment of the capacity of the PIU to implement procurement was carried out by the WB team. The WB team assessed the risks that could negatively affect the ability of the GIES, through the PIU, to carry out procurement processes. In view of the nature of this AF which will be used to finance the contracts planned under the original project for which there is insufficient funding and given the positive experience of the PIU with similar contracts, no major risks have been identified except for the continuously increasing costs in construction. Given the risks identified and the results of the assessment, residual procurement risk is assessed as *Moderate*.

66. **The following measures are being put in place to mitigate the risks for procurement:** (i) the PIU will employ technical experts to further strengthen the capacities of the PIU; (ii) PIU will ensure that cost estimates will be updated prior to launching any tenders; (iii) the price adjustment clause will be included in contracts, to mitigate the potential continued increase in construction prices; and (iv) PIU will closely follow-up and monitor the implementation of contracts by establishing a proper contract administration mechanism (regular inspections/meetings). Procurement capacity may be strengthened, as needed, taking into account the increased workload during Project implementation.

67. **Project Procurement Strategy for Development (PPSD).** A PPSD has been developed under the original Project and it has been recently modified to cover the scope of the AF. There are no major changes in the procurement approach for the contracts planned to be financed under AF. The updated PPSD has been agreed with the Bank and will be uploaded in the Systematic Tracking of Exchanges in Procurement (STEP).

68. **Procurement plan.** The PIU developed a Procurement Plan (PP) under the original Project which has been updated to reflect modified technical parameters (e.g. technical design model from the original Project – Mizil will now be used for 7 buildings covered under AF). Any updates to the PP will be subject to the WB's prior review. The PIU has been using STEP under the original Project and will upload the PP for AF in the system. All the procurement activities under the AF will be entered, tracked, and monitored online through

the STEP. Once approved by the WB, the PP will be published on the WB's website.

69. **Procurement prior review thresholds.** The procurement prior review thresholds were set by the WB based on the Project's procurement risk level. All contracts at or above the set thresholds are subject to international advertising and the use of the WB's Standard Procurement Documents. The thresholds will be specified in the PP. Use of certain procurement approaches—specifically best and final offer, procurement processes involving contract negotiations, competitive dialogue, and sustainable procurement—are not foreseen under the Project but these approaches will be subject to the WB's procurement prior review, irrespective of the contract value, if the decision is taken during Project implementation to apply them.

70. **Record keeping.** All documentation for each procurement will be retained by the PIU according to the requirements of the Legal Agreement. Upon request, the PIU will furnish such documentation for examination by the WB or its consultants/auditors. Procurement documents subject to post review will be furnished to the WB upon request.

71. **WB's procurement oversight.** The WB will exercise its procurement oversight through a risk-based approach comprising prior and post review and independent procurement reviews, as appropriate. Procurement supervision visits will be carried out at least once per year. These will include special procurement supervision for post review on procurement processes undertaken by the PIU, with the goal of determining whether they comply with the requirements of the Legal Agreement. The post review will be conducted with an initial sampling rate of 10 percent of contracts, though this could be adjusted periodically during Project implementation based on the Project's performance.

H. Environment and Social (including Safeguards)

72. The AF will not finance any activities with significant or irreversible environmental impacts and triggers OP 4.01 with classification as Environmental Category "B". The main Project interventions refer to the rehabilitation and new construction of GIES buildings throughout the country. While the environmental and social impacts of the Project will be largely positive by reducing the risk of damage and collapse of the selected buildings as a result of earthquakes, some adverse impacts may be generated from construction activities, and these may include: increased pollution due to construction waste, generation of dust, noise, and vibration due to the movement of construction vehicles and machinery; risks due to improper disposal of construction waste, or minor operational or accidental spills of fuel and lubricants from the construction machinery; improper reinstatement of construction sites upon completion of works. All these potential environmental impacts are readily identifiable, small in scale, and minimal in impact and can be effectively prevented, minimized, or mitigated by including into the work contracts specific measures to be taken by contractors under close supervision of compliance by GIES PIU.

73. Effective measures have been put in place under the Project to address and closely monitor the safeguards issues. An Environmental and Social Management Framework (ESMF) for the project consistent with Environmental Assessment (EA) requirements for both Romania and the World Bank was prepared by GIES and found satisfactory by the World Bank. The original Project's ESMF has been discussed at the public consultations meeting, posted on the MoIA's website, distributed to the GIES local units involved in the project and disclosed to the Bank's website. Relevant aspects were incorporated into the POM. Site-specific Environmental and Social Management Plans (ESMPs), based on the ESMF, will be prepared for each site where construction works will be implemented. Issues to be addressed through this ESMF and ESMPs instruments include proper waste management and disposal of construction debris (including asbestos), proper waste water treatment; heating and fuel system assembly, dust and noise control, sensitivity of

designs to cultural settings, and cultural heritage/chance finds procedures. In practice, these issues will be addressed through a series of local permits detailed in the environmental framework review, through contractor site supervisor oversight, through the local municipality requirements, and through the unit (GIES-PIU) in the MoIA responsible for the buildings rehabilitation.

74. During the Project implementation, GIES-PIU will have overall supervision responsibility for ensuring that the measures indicated in the ESMF/ESMPs are being properly performed. GIES-PIU in collaboration with its local branches and the Romanian local Environmental Protection Agencies will perform the environmental monitoring during both, construction and operation phases, as specified in the monitoring plan of the ESMPs. Appropriate training on Bank safeguards will be provided to local officials, contractors and community representatives.

75. GIES PIU will use the experience gathered in the original Project in the field of preparing and monitoring implementation of site specific ESMPs.

I. Other Safeguard Policies

76. The AF project also triggers OP/BP 4.11, same as for the original Project, Physical Cultural Resources to include procedures and responsibilities for managing works in culturally and historically significant areas and accidentally discovered or chance find cultural artifacts to ensure that Cultural Heritage assets will not be adversely affected by World Bank-financed projects. The ESMF includes requirements for the borrower and contractors, as will be reflected in the site-specific ESMPs and the POM. These refer to specific measures necessary to be taken for complying with Romanian laws and procedures related to the physical cultural resources, and with the World Bank's requirements for managing impacts on cultural property.

77. Romania has a well-developed cultural heritage protection system with responsibility for monitoring and enforcement vested in the Ministry of Culture (MoC). Law (No. 422 of 2001) governs the protection of historical monuments, setting forth departmental roles and responsibilities. The Ministry/Regional Directorates of Historic Monuments must approve all technical documentation for buildings that are officially listed or located in cultural protected areas and can call specialists as members of a Consultative Board, as needed. Designers, contractors and site supervision engineers working on an investment project that involves an historic monument must be pre-certified and listed by the MoC.

78. If any cultural assets are found during construction (excavation) works ("chance finds"), the measures outlined in the Law 422/2001 will be undertaken, including the setting up of a protection zone in compliance with the Law 422/2001, reporting to the local offices of MoC, and obtaining a special permit for the execution of works in connection with the found cultural assets.

J. Corporate Commitments

79. **Gender.** Around 10 percent of the existing 900 employees in the selected buildings are women, either employees or volunteers on the ambulance services. On February 14, 2023, consultations were held with a focus group of 15 women working in these buildings, to better understand their challenges and needs in relation to the PDO. Overall, the consultation confirmed the continued need for the technical designs of the investments to consider gender-sensitivity including designated facilities such as bathrooms and showers, changing rooms and dormitory spaces as well as sanitary facilities which are noted by the participants to be lacking. Participants also voiced the need to increase career development opportunities for women in GEIS as well as the need to strengthen communication about women's crucial role in emergency response as their work remains invisible and unrecognized by the public. Designs for upgrades and new construction will

carefully consider the changing demographic within GIES. The Project aims to collect gender-disaggregated beneficiary data, as during implementation gender-specific interventions may arise, depending on the needs.

80. There is an opportunity to include a Gender dimension in the Public Awareness campaign that will be prepared and covered from the AF. The Project will ensure women representation in media content production associated with the public awareness campaign that will be implemented under the AF. Content production (social media, TV and radio spots, brochures) will include 50 percent female representation in the selection of characters, voice over, selected pictures, narratives, etc. and will address gender specific challenges in Disaster risk preparedness. The behavioral change research carried by the Parent Project in 2022, aimed at better understanding disaster preparedness at the level of the national population indicated that women are considerably less prepared to respond to an emergency situation (e.g., out of the persons that don't know how to use a fire extinguisher, the number of women is four times higher than the number of men; women are less likely to know details about the emergency alarming system, emergency meeting point). The results of the research coupled with increased representation of women in content production is likely to increase awareness at the level of the female population.

81. **Climate Co-benefits**. The increased incidence of natural disasters, coupled with the projected climate outlook for Romania, highlights the continued need to enhance the country's physical, social, and financial resilience to climate and disaster risks. This need is to be met through a comprehensive disaster and climate resilience program in Romania that combines several approaches: a) prioritizing urgent investments in risk reduction, preparedness and response, particularly in public buildings with critical functions before, during and post-disaster, b) accelerating policy reforms aimed at building disaster and climate resilience; and c) providing access to predictable post-disaster financing and enhancing the Government's capacity to manage the fiscal impacts of natural disasters. Annex 1 includes the summary results of a detailed cost-benefit analysis of the Project's impact to climate co-benefits. Thus, applying a discount rate of 5 percent for a planning horizon of 20 years, the discounted values of cost and benefit amount to EUR 8.69 million and EUR 15.35 million, respectively.

82. Through the AF, the Project will continue to support the progress on approach a) above, as started by the original Project, and contribute to climate change mitigation and adaptation, as it was committed under the original Project. Each investment under the AF will be designed considering anticipated vulnerabilities posed by climate change ensuring that these critical buildings are fully operational before, during, and after of all types of occurred disasters – earthquakes, floods, storms, extreme weather, extreme heat and cold and so forth – by considering the resilience of critical systems such as energy, water, and communications. Most of the buildings financed from the AF are in areas with higher than national average precipitations, and around half of the buildings are in areas with higher than national average annual temperatures. All AF-financed buildings will also receive energy efficiency improvements, using renewable energy that aligns with EU and Romanian regulations and that contribute to Romania's NDC commitments. According to Law 10/2020, all buildings that receive construction permits after December 31, 2020, have to implement NZEB standards, with clear guideline on energy efficiency interventions to be adopted. It is expected that energy savings for the 25 buildings financed from the AF will be 65 percent from current levels, and CO2 emissions will be reduced by over 1,200 tons per year.

83. The AF will also continue to support the elevation and prominence of the disaster risk management within the government and society of Romania. As it was underlined in the Project Appraisal Document for the original Project, the focus on accelerating resilience through concrete risk reductions in this operation is expected to provide a model for other EU countries and ongoing reforms. Furthermore, the AF will continue

to focus on strongly on developing institutional capacity for disaster risk reduction in GIES, DES and MoIA and through the delivery of visible actions will enable the Project to serve as a model for other government institutions in Romania who also need to reduce climate and disaster risk in their own sectors. The AF will allow the SDRM to provide continuing support for the government to better harness the substantial technical capacity in academic and private institutions for risk assessment and risk reduction in Romania. Moreover, by ensuring that emergency facilities are resilient, the AF will allow for continued improving the government capacity to respond effectively to disasters.

84. The AF loan-financed activities Project continue to be aligned with the Romania CPF focus on improving preparedness to natural disasters and strengthen adaptation to climate change through its focus on disaster-resilient, climate resilient, and energy-efficient public buildings.

85. **Citizen Engagement**. The Borrower updated and disclosed on April 26, 2023 the ESMF developed for the original Project, to reflect the details of the AF operation. The current PIU has gained the needed experience of developing and implementing safeguards instruments as well as conducting consultations with potentially affected parties, through the original Project. The Bank team has provided the PIU, including their Environment and Social specialists as well as their field officers who supervise the works, with training and collaborative technical working sessions to enhance their capacity to develop and monitor instruments such as ESMPs, conduct public consultations and ensure that OHS measures are followed by the contractors as per the Bank Policies and in line with national legislation. Key stakeholders include emergency response staff working in the selected buildings, neighboring properties, local communities and authorities, users of the future buildings, including persons with disabilities, women and other vulnerable categories. Each sub-project will develop a site-specific ESMP that is disclosed and consulted with stakeholders and potentially affected persons and reflects their feedback. Low attendance in the public consultation process observed under the original Project has been addressed by introducing face-to-face consultations, direct meetings and diverse channels to reach the interested stakeholders.

V. WORLD BANK GRIEVANCE REDRESS

86. **Grievance Redress.** Communities and individuals who believe that they are adversely affected by a project supported by the World Bank may submit complaints to existing project-level grievance mechanisms or the Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the Bank's independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted to the AM at any time after concerns have been brought directly to the attention of Bank Management and after Management has been given an opportunity to respond. For information on how to submit complaints to the Bank's Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the Bank's Accountability Mechanism, please visit https://accountability.worldbank.org

VI. SUMMARY TABLE OF CHANGES

	Changed	Not Changed
Results Framework	✓	
Components and Cost	✓	
Procurement	✓	
Implementing Agency		✓
Project's Development Objectives		✓
Loan Closing Date(s)		✓
Cancellations Proposed		✓
Reallocation between Disbursement Categories		✓
Disbursements Arrangements		✓
Safeguard Policies Triggered		✓
EA category		✓
Legal Covenants		✓
Institutional Arrangements		✓
Financial Management		✓
APA Reliance		✓

VII. DETAILED CHANGE(S)

COMPONENTS

Current Component Name	Current Cost (US$, millions)	Action	Proposed Component Name	Proposed Cost (US$, millions)
Improving Resilience of Disaster and Emergency Response Infrastructure	52.62	Revised	Improving Resilience of Disaster and Emergency Response Infrastructure	150.50
Enhancing Institutional Capacity for Risk Reduction Investment Planning	5.02	Revised	Enhancing Institutional Capacity for Risk Reduction Investment	4.60

			Planning	
Project Management	2.84	Revised	Project Management	5.28
	0.00	New	CERC	0.00
TOTAL	**60.48**			**160.38**

Expected Disbursements (in US$)

Fiscal Year	Annual	Cumulative
2018	0.00	0.00
2019	1,720,777.50	1,720,777.50
2020	211,190.88	1,931,968.38
2021	4,492,303.20	6,424,271.58
2022	2,457,078.89	8,881,350.47
2023	8,883,570.35	17,764,920.82
2024	23,998,269.73	41,763,190.55
2025	31,906,314.73	73,669,505.28
2026	38,317,379.22	111,986,884.50
2027	42,493,341.06	154,480,225.56
2028	5,899,774.44	160,380,000.00

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Latest ISR Rating	Current Rating
Political and Governance	Moderate	Moderate
Macroeconomic	Moderate	Moderate
Sector Strategies and Policies	Low	Low
Technical Design of Project or Program	Low	Low
Institutional Capacity for Implementation and Sustainability	Moderate	Moderate
Fiduciary	Moderate	Moderate
Environment and Social	Moderate	Moderate

Stakeholders	Low	Low
Other		Low
Overall	Moderate	Moderate

LEGAL COVENANTS – Additional Financing - Romania Strengthening Disaster Risk Management Project (P180531)

Sections and Description
By no later than December 31, 2023, the Borrower, through GIES, shall contract in a manner satisfactory to the Bank with firms to carry out the technical designs for the eighteen priority buildings identified by GIES.

Conditions

Type	Financing source	Description
Effectiveness	IBRD/IDA	The Borrower through MOIA and GIES, has adopted amendments to the POM in accordance with the terms and conditions of this Agreement and in a manner satisfactory to the Bank.

VIII. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: Romania

Additional Financing - Romania Strengthening Disaster Risk Management Project

Project Development Objective(s)

The objective of the Project is to enhance the resilience of critical disaster and emergency response infrastructure and to strengthen the Borrower's institutional capacities in disaster risk reduction and climate change adaptation.

Project Development Objective Indicators by Objectives/ Outcomes

Indicator Name	PBC	Baseline	Intermediate Targets			End Target
			1	2	3	
Enhance the resilience of critical disaster and emergency response facilities						
Number of disaster and emergency response facilities that are upgraded to be resilient (Number)		0.00	0.00	5.00	13.00	28.00
Action: This indicator has been Revised	***Rationale:*** ***Adjusted to the new Closing date of the AF and total value increased from 26 to 28 buildings.***					
Number of rescue personnel, emergency and disaster management staff, volunteers and administrative staff with access to disaster resilient buildings (Number)		0.00	0.00	600.00	900.00	1,000.00

Indicator Name	PBC	Baseline	Intermediate Targets			End Target
			1	2	3	
Action: This indicator has been Revised	***Rationale:*** ***Adjusted to the new Closing date of the AF.***					
Number of project beneficiaries in areas covered by resilient emergency and disaster response facilities (Number (Thousand))		0.00	0.00	500.00	2,000.00	3,000.00
Action: This indicator has been Revised	***Rationale:*** ***Adjusted to the new Closing date of the AF.***					
Strengthen institutional capacities in investment planning for disaster risk reduction						
Enhanced Ro-Risk assessment supports enhanced risk reduction planning in other ministries (Text)		Ro-Risk Assessment (2018 version)				Ro-Risk data is being used by at least two ministries for disaster risk management decision making.
MOIA, through DES and GIES, has strengthened institutional capacity for risk reduction investment planning (Text)		GIES has started a process to collect data on vulnerable buildings and has a prioritization method for assessing which buildings should be strengthened for greater resilience.				GIES is systematically collecting data on emergency and disaster response assets and their potential vulnerability to disasters, and has developed a plan for future resilience actions.

Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	Intermediate Targets					End Target
			1	2	3	4	5	
C1.Improving resilience of Disaster and Emergency Response Facilities								
Number of technical designs completed (Number)		0.00		10.00	18.00			28.00
Action: This indicator has been Revised	***Rationale:*** ***Adjusted to the new Closing date of the AF, and number of technical designs increased from 26 to 28.***							
Number of newly constructed emergency and response buildings with resilient structures and systems (Number)		0.00	0.00			7.00	18.00	20.00
Action: This indicator has been Revised	***Rationale:*** ***Adjusted to the new Closing date of the AF.***							
Number of emergency and response buildings retrofitted to improve structural resilience (Number)		0.00	0.00	0.00	3.00	5.00		8.00
Action: This indicator has been Revised	***Rationale:*** ***Adjusted to the new Closing date of the AF.***							
Number of communities reached out to via informative meetings and trainings (Number)		0.00	0.00	0.00	5.00	10.00	15.00	20.00

Indicator Name	PBC	Baseline	Intermediate Targets					End Target
			1	2	3	4	5	
Action: This indicator has been Revised	***Rationale:*** ***Adjusted to the new Closing date of the AF.***							
Number of direct project beneficiaries (Number)		0.00	0.00	300.00	600.00	600.00	1,000.00	1,000.00
Action: This indicator has been Revised	***Rationale:*** ***Adjusted to the new Closing date of the AF.***							
Female Project Beneficiaries (Number)		0.00	0.00	100.00	200.00			300.00
Action: This indicator has been Revised								
C2. Enhancing Institutional Capacity for Risk Reduction Investment Planning								
Number of reports on the impacts of disasters and climate change in Romania (Number)		0.00	0.00	1.00	2.00		3.00	3.00
Action: This indicator has been Revised	***Rationale:*** ***Timeline extended to align with the closing date.***							
Public Awareness Campaigns (Number)		0.00	3.00	7.00	18.00			28.00
Action: This indicator has been Revised	***Rationale:*** ***Timeline extended to align with the closing date.***							
Media content representing women in Public Awareness Campaign materials		0.00						50.00

Indicator Name	PBC	Baseline	Intermediate Targets					End Target
			1	2	3	4	5	
(content analysis) (Percentage)								
Action: This indicator is New	***Rationale:*** ***There is an opportunity to include a Gender dimension in the Public Awareness campaign that will be prepared and covered from the AF. The Project will ensure women representation in media content production associated with the public awareness campaign that will be implemented under the AF. Content production (social media, TV and radio spots, brochures) will include 50 percent female representation in the selection of characters, voice over, selected pictures, narratives, etc. and will address gender specific challenges in Disaster risk preparedness. Increased representation of women in content production is likely to increase awareness at the level of the female population.***							
C3. Project Management								
Institutional capacity in engineering, procurement and contract management is in place (Yes/No)		No	Yes	Yes	Yes	Yes	Yes	Yes
Action: This indicator has been Revised								
Percentage of grievances responded to in the stipulated time (Percentage)		0.00	100.00	100.00	100.00		100.00	100.00
Action: This indicator has been Revised								

Monitoring & Evaluation Plan: PDO Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Number of disaster and emergency response facilities that are upgraded to be resilient	Buildings are upgraded to [structural and service] standards for full operation in all types of disaster events, through stronger structures and more resilient communications, electricity, water and mechanical systems.	Progress towards this indicator will be monitored annually.	Progress reports that articulate the status of works on target buildings.	Procurement actions, disbursement data, photos of works, site visits to buildings under construction and where construction is completed, supervision reports etc.	GIES will be responsible for data collection and compilation of the progress reports. GIES will provide annual reporting on the status of this indicator. The World Bank team will undertake site visits during Implementation Support Missions during implementation.
Number of rescue personnel, emergency and disaster management staff, volunteers and administrative staff with access to disaster resilient buildings	Personnel in critical disaster and emergency response facilities occupy structurally strengthened buildings with resilient access to water, communication, electrical systems in the event of any type of disaster (earthquake, storm, flood, drought, landslide, extreme heat/cold etc).	Progress towards this indicator will be monitored annually.	Baseline was determined through data collection at each facility during project preparation. Progress reports that articulate the status of works on target buildings will enable the	Procurement actions, disbursement data, photos of works, site visits to buildings under construction and where construction is completed, supervision reports etc. Data sheets on the number of people (staff, rescue personnel, volunteers, etcs) using the buildings, pre- and post- building improvements.	GIES will be responsible for data collection and compilation of the progress reports. GIES will provide annual reporting on the status of this indicator. The World Bank team will undertake site visits during Implementation Support Missions during implementation.

			calculation of the number of people now occupying safe and resilient facilities.		
Number of project beneficiaries in areas covered by resilient emergency and disaster response facilities	This refers to the number of people who benefit from fully functional and uninterrupted emergency and response facility that could continue to provide rescue, coordination, fire fighting services in the aftermath of earthquake, storm, flood, landslide, extreme heat and cold and so forth. The numbers refer to the communities usually serviced by the facility, and does not include the expanded service area that might be required in the event of a large disaster.	Progress towards this indicator will be monitored annually.	Baseline is determined by people within the service area of a resilient fire and rescue facility or command center, using readily available data on population. Procurement actions, disbursement data, photos of works, site visits to buildings under construction and where	Review of progress reports.	GIES will be responsible for data collection and compilation of the progress reports. GIES will provide annual reporting on the status of this indicator. The World Bank team will undertake site visits during Implementation Support Missions during implementation.

			construction is completed, supervision reports etc, will be used to establish when a new resilient facility is established.		
Enhanced Ro-Risk assessment supports enhanced risk reduction planning in other ministries	The Romanian Risk Assessment (Ro-Risk) provides fundamental data and information on the risks from natural hazards and climate change to different sectors and locations in Romania. Increasing the resolution of the data in Ro-Risk and its accuracy will support other ministries to plan risk reduction plans for their sector.	Progress towards this indicator will be monitored annually.	Terms of Reference for new analysis, meeting minutes of expert working groups, meeting minutes of National Platform for Disaster Risk Reduction, new analysis, new Ro-Risk report, and new data and information uploaded to Ro-Risk	Reports and information provided by GIES.	GIES will be responsible for data collection and compilation of the progress reports. GIES will provide annual reporting on the status of this indicator.

			platform.		
MOIA, through DES and GIES, has strengthened institutional capacity for risk reduction investment planning	GIES has institutional capacity in place to collect data on existing emergency and disaster response assets, assess their risk of damage from disaster, and prioritize future actions to reduce these risks through forward looking investment plans.	Progress towards this indicator will be monitored annually.	Data sheets and reports	Reports from GIES.	GIES will be responsible for data collection and compilation of the progress reports.

Monitoring & Evaluation Plan: Intermediate Results Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Number of technical designs completed	This indicator follows the number of retrofitting or reconstruction designs completed for the disaster and emergency response facilities.	This indicator will be monitored bi-annually.	Technical surveys, request for proposals for selection of consultants to prepare the designs and actual technical designs.	Collation of data mentioned above.	GIES will be responsible for data collection. GIES will communicate this through bi-annual progress reports and annual reports.
Number of newly constructed emergency and response buildings with resilient	Where technical survey's determine that its	Progress towards	Technical surveys, site	Collation of data and information from	GIES will be responsible for data collection and

structures and systems	technically and financially unfeasible to retrofit emergency response facilities, new buildings will be constructed on the existing facility site.	this indicator will be monitored bi-annually.	visit reports, procurement actions, disbursement data, photos of works, site visit reports, supervision reports, progress reports,and where construction is completed documentation of the final building etc.	reports, procurement actions etc.	compilation of the progress reports. GIES will provide annual reporting on the status of this indicator. The World Bank team will undertake site visits during Implementation Support Missions during implementation.
Number of emergency and response buildings retrofitted to improve structural resilience	These are buildings for which retrofitting is technically and financially feasible and where it makes the most sense for the government, direct beneficiaries and serviced community.	Progress towards this indicator will be monitored annually.	Technical surveys, site visit reports, procurement actions, disbursement data, photos of works, site visit reports, supervision reports, progress reports, and where	Collation of the data mentioned above	GIES will be responsible for data collection and compilation of the progress reports. GIES will provide annual reporting on the status of this indicator. The World Bank team will undertake site visits during Implementation Support Missions during implementation

			construction is completed documentation of the final building etc.		
Number of communities reached out to via informative meetings and trainings	Communities who are in the vicinity of, or serviced by, emergency response facilities that are under this project will receive information on disasters and the Project interventions through meetings, communication campaigns and training events.	Progress towards this indicator will be monitored bi-annually.	Communication materials, notice of meetings, meeting attendee lists, meeting minutes, progress reports	Collection of information by GIES	GIES will be responsible for data collection and compilation of the progress reports. GIES will provide annual reporting on the status of this indicator.
Number of direct project beneficiaries	Direct project beneficiaries include professional and volunteer rescue personnel, administrative staff, emergency and disaster coordinators and visitors to the buildings (for training, awareness etc).	Progress towards this indicator will be monitored bi-annually.	Progress reports on the completion of buildings targeted under this project and data sheets articulating the number of personnel occupying buildings. Baseline collected	Progress reports.	GIES will be responsible for data collection and compilation of the progress reports. GIES will provide annual reporting on the status of this indicator. The World Bank team will undertake site visits during Implementation Sup port Missions during implementation.

			during project preparation.		
Female Project Beneficiaries	Direct female project beneficiaries include profession and volunteer rescue personnel, administrative staff, emergency and disaster coordinators and visitors to the buildings (for training, awareness etc). Under this Project, female project beneficiaries will have access to dedicated female facilities such as bathrooms.	Progress towards this indicator will be monitored annually.	Reports on completed buildings including data on the number of new facilities for women (such as bathrooms) and the number of female rescue personnel, administration staff, volunteers and so forth. Baseline data was collected during project preparation.	Reviewing project reports and building data sheets.	GIES will be responsible for data collection and compilation of the progress reports. GIES will provide annual reporting on the status of this indicator.
Number of reports on the impacts of disasters and climate change in Romania	Under this project, new disaster and climate assessments will be developed and completed in Romania. The data and information produced will	Progress towards this indicator will be monitored	TORs, expert working group meetings, new data on disaster risks, reports and	Reports.	GIES will be responsible for data collection and compilation of the progress reports. GIES will provide annual reporting on the status

	be shared on the government information platforms with other ministries and the public, and will also inform investment strategies for risk reduction.	bi-annually.	completed assessments.		of this indicator.
Public Awareness Campaigns	Number of national awareness campaigns and workshops	Annual reporting.	Reports, meeting invitations and minutes, awareness campaigns.	Information collected by GIES	GIES will be responsible for data collection.
Media content representing women in Public Awareness Campaign materials (content analysis)	Ensure women's representation in media content production associated with the public awareness campaigns that will be implemented under the AF. Content production (social media, TV and radio spots, brochures) will include 50% female representation in the selection of characters, voice-over, selected pictures, narratives, etc.				
Institutional capacity in engineering, procurement and contract management is in place	This refers to sufficient implementation capacity within the PCU established under DES and the PIU	Monthly for Year 1, then quarterly	Reports, organizational charts and TORs		GIES will be responsible for data collection and compilation of the progress

	under GIES, including hiring of experts consultants as needed to fill identified gaps	for Year 2 and then bi-annually for remainder of Project.			reports. GIES will provide annual reporting on the status of this indicator. The World Bank team will undertake site visits during Implementation Support Missions during implementation.
Percentage of grievances responded to in the stipulated time	This indicator is to ensure that an appropriate grievance redress system is in place within the first 3 months of the project effectiveness.	Quarterly for Year 1, and then Bi-annually	Reports from GRM		GIES will be responsible for data collection.

ANNEX 1: ECONOMIC ANALYSIS

A. General Information. Approach and Methodology

1. The MoIA, through DES/GIES, provided a list of 25 buildings to be considered for additional financing (AF) in this project. DES/GIES filled in the data sheets for all the 25 buildings listed, including an update of the values of investment needed for each building.

2. The approach proposed for CBA consists in the following main steps:

   a. Consider the area served by the emergency units sheltered in the 25 buildings listed by DES/GIES.
   b. Within the served area, identify the census units (local administrative units).
   c. Within each census unit, identify the population and the buildings.
   d. Identify scenario earthquakes with 39% exceedance probability, respectively 10 percent exceedance probability in 50 years. The scenario earthquakes will be defined in terms of ground motion parameters. The ground motion parameter to define the seismic hazard is the peak ground acceleration (PGA).
   e. Run probabilistic seismic hazard analyses to obtain the PGA values with 39 percent exceedance probability, respectively 10 percent exceedance probability in 50 years, at the sites of the 25 buildings, as well as within the census units of the served areas.
   f. Use the relevant information from the data sheets for all the 25 buildings to assign typologies. For the identified building typologies, decide and use fragility curves to obtain information on losses for each of the 25 buildings and in each census units of the served areas.
   g. Calculate the number of injured persons in each building and census unit.
   h. Use the approach of Coburn and Spence (Coburn, A., Spence, R., 2002. Earthquake Protection. Second Edition, John Wiley and Sons Ltd., Chichester, England) to determine the number of trapped survivors in collapsed buildings that subsequently die in two cases: (1) DES/GIES buildings not operational (no Component 1 of the IPF - AF) and (2) DES/GIES buildings fully operational (with Component 1 of the IPF - AF).
   i. Take the difference between the number of trapped survivors in collapsed buildings that subsequently die in case 1 and case 2.
   j. Calculate the value of a statistical life (VSL). For getting the VSL in Romania, apply the procedure based on GDP per capita ratio (Romania to USA) and an income elasticity rate of 1.5
   k. Multiply the difference obtained in step (i) with VSL from step (j) and obtain the benefit of human lives saved.
   l. For the 25 buildings listed by DES/GIES, obtain the expected direct losses (amount and value of damage) in two cases: (1) DES/GIES buildings not retrofitted (no Component 1 of the IPF - AF) and (2) DES/GIES buildings retrofitted to be fully operational after the design earthquake (with Component 1 of the IPF-AF).
   m. Take the difference between the values of the expected direct losses in case 1 and case 2 from step (l) and obtained the benefit of direct losses avoided.
   n. For the 25 buildings listed by DES/GIES, obtain the building content losses (amount and value of damage) in two cases: (1) DES/GIES buildings not retrofitted (no Component 1 of the IPF-AF) and (2) DES/GIES buildings retrofitted to be fully operational after the design earthquake (with Component 1 of the IPF-AF).
   o. Take the difference between the values of losses in case 1 and case 2 from step (n) and obtained the benefit of building content losses avoided.

p. Obtain the number of buildings fully burnt by the fires following earthquake in two cases: 1) DES/GIES buildings not operational (no Component 1 of the IPF-AF) and (2) DES/GIES buildings fully operational (with Component 1 of the IPF-AF).
q. Take the difference between the total replacement costs of fully burnt buildings in case 1) and case 2) and obtain the value of avoided direct losses because of the suppression of fire spreading.
r. Evaluate the number of residents living in buildings fully burnt by the fires following earthquakes in two cases: (1) DES/GIES buildings not operational (no Component 1 of the IPF-AF) and (2) DES/GIES buildings fully operational (with Component 1 of the IPF-AF).
s. Take the difference between the number of residents living in buildings fully burnt by the fires following earthquakes in case 1 and case 2.
t. Multiply the difference obtained in step (s) with VSL from step (j) and obtain the benefit of saved human lives because of the suppression of fire spreading.
u. Add the benefits obtained in steps (k), (m), (o), (q) and (t) and obtain the aggregated benefit.
v. The cost is represented by the value of Component 1 of the IPF-AF.
w. Obtain the discount rate by applying the Ramsey formula with the following components: utility discount rate as zero, elasticity as 1 and the real consumption growth as ~4.9 percent. These values yield an assumed social discount rate of 5 percent.
x. Discount the costs (obtained in step v) and benefits (obtained in step u) over the period of the planning horizon of 20 years.
y. Obtain the Internal Return Rate (IRR), Net Present Value (NPV), Benefit-Cost Ratio (BCR).

3. **Avoided losses** are identified as the main benefit from risk reduction and disaster mitigation projects. The avoided losses are expected to constitute the major portion of the benefits incurred directly from project implementation. Moreover, the avoided life losses represent the overwhelming share of the expected benefits of the project implementation.

4. A World Bank Policy Paper (Charles Kenny, Why Do People Die in Earthquakes?, The World Bank (WSP 4823)) states that calculation of the benefits and costs of risk reduction projects (retrofitting and reconstruction of critical public facilities) involves estimates and assumptions covering the following key variables:
   a. the strengthening/retrofit costs,
   b. the building replacement costs,
   c. the risk of a natural disaster (and of the scale of that disaster),
   d. the risk of damage if a natural disaster does occur,
   e. the cost of that damage in both financial and human terms (i.e., life losses, casualties, amount of damage and service interruption for public facilities) and
   f. the discount rate.

   Table 1 shows the assumptions, the parameters characterizing the key variables, as well as their values used in the CBA and the main results of Cost-Benefit Analysis (CBA).

Table 1. Parameters used for Cost-Benefit Analysis (updated on December 2, 2022)

Description	Units	Cases	
		1) Without Project	2) With Project
EQ Hazard, Peak ground acceleration	cm/s^2	Defined in Table 2 for all the sites of the Project	

Exceedance Probability of EQ Hazard	percent in 50 years	39% in 50 years – Scenario 1 10% in 50 years – Scenario 2	
Project Investment for construction works	Euro Million	0	80.36
Number of staff (day time)	Persons	929	
Number of permanent staff	Persons	676	
Total area of GIES buildings	m^2	34,939	
Number of GIES equipments	Piece	52	
Value of GIES buildings and equipments	Euro Million	27.95 (buildings) + 3.08 (equipments) = 31.03 (total)	
Value of a Statistical Life (VSL)	Euro*	915,429	
Number of persons in the areas served by GIES buildings	Persons	2,359,412	
Avoided direct losses to GIES buildings	Euro Million	0	5.08 – Scenario 1 12.36 – Scenario 2
Avoided content losses to GIES buildings	Euro Million	0	0.44 – Scenario 1 0.90 – Scenario 2
Avoided direct losses to buildings located in the areas served by GIES buildings because of the suppression of fire spreading	Euro Million	0	10.83 – Scenario 1 18.79 – Scenario 2
Avoided fatalities in collapsed buildings	Persons	0	782 – Scenario 1 2,712 – Scenario 2
Value of avoided fatalities in collapsed buildings	Euro Million	0	715.87 – Scenario 1 2,482.64 – Scenario 2
Avoided fatalities in buildings located in the areas served by GIES buildings because of the suppression of fire spreading	Persons	0	233 – Scenario 1 785 – Scenario 2
Value of avoided fatalities in buildings located in the areas served by GIES buildings because of the suppression of fire spreading	Euro Million	0	213.18 – Scenario 1 718.44 – Scenario 2
Aggregated value of avoided losses	Euro Million	0	945.39 – Scenario 1 3,233.00 – Scenario 2
Implementation period of the investment project for construction works	years	N/A	3
Planning Horizon	years	N/A	20
Discount Rate	percent	N/A	5.0
Benefit -Cost Ratio (BCR)	-	N/A	1.41 – Scenario 1 1.02 – Scenario 2
Net Present Value (NPV)	Euro Million	N/A	29.21 – Scenario 1 1.40 – Scenario 2
Internal Return Rate (IRR)	percent	N/A	10.4 – Scenario 1 5.3 – Scenario 2
Payback Period	years	N/A	13 – Scenario 1 20 – Scenario 2

(*) The exchange rate US$ to Euro, as of December 9th, 2022, is 1 US$ = 0.95 Euro

B. Results of Cost-Benefit Analysis

5. **Cost-Benefit Analysis.** The CBA considers the discounted cost (investment value of Component 1 of IPF) and the discounted benefit (avoided losses due to Component 1 of IPF). The undiscounted value of the cost is 80.36 million Euro, whereas the undiscounted value of benefits amounts at 945.39 million Euro for scenario

earthquake 1, respectively EUR 3,233.00 million for scenario earthquake 2. Applying a discount rate of 5 percent for a planning horizon of 20 years, one obtains for the scenario earthquake 1 the discounted values of cost and benefit amounting at EUR 71.21 million, respectively EUR 100.43 million. For scenario earthquake 2, the discounted values of cost and benefit are EUR 71.21 million, respectively EUR 72.61 million.

The values of Benefit-Cost Ratio (BCR), Net Present Value (NPV), Internal Return Rate (IRR) and Payback Period are reported in Table 2 for both scenario earthquakes.

Table 2. Main indicators of CBA for scenario earthquakes 1 and 2

Scenario earthquake	BCR	NPV (Euro)	IRR (%)	Payback Period (Years)
1	1.41	29,212,854	10.4	13
2	1.02	1,401,136	5.3	20

6. **Sensitivity Analysis.** If one considers the GDP per Capita adjusted for purchasing power available at https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD, the value for Romania for 2021 is 35,414 USD and for the US is 69,288 USD. As of December 9th, 2022, the exchange rate US$ to EUR is US$1 = EUR 0.95. Thus, the Value of a Statistical Life (VSL) in this case is EUR 3,367,251. Using the recalculated VSL and the results of the analysis in terms of avoided life losses already obtained, the main indicators of the CBA are reported in Table 3.

Table 3. Main indicators of CBA using VSL recalculated for GDP per capita, PPP for scenario earthquakes 1 and 2

Scenario earthquake	BCR	NPV (Euro)	IRR (%)	Payback Period (Years)
1	5.12	293,562,517	57.6	5
2	3.72	194,003,789	36.4	6

C. Impact of Energy Efficiency Measures

7. **The buildings of GIES have different occupancies**. The share of the heated (of administrative buildings) to non-heated areas (of logistic area) considered in the economic analysis is 70 percent to 30 percent. The buildings, situated in different climatic zones, are relatively old buildings, with no improvements of the building envelope or the building systems and services. For this reason, given the visual inspection of the buildings from photos provided by GIES, a mean value of 400 kWh/m^2/year has been considered as initial specific energy use for these buildings. For the evaluation of the benefits generated by the energy efficiency measures, the following improvements are considered: building envelope (walls, terrace, windows etc.) renovation, optimization of the interior buildings systems and replacement of the gas boiler with heat pumps (electrification process). From the building envelope improvement and optimization of building systems we may reach a 30 percent of energy use reduction, while the electrification process would lead to another 50% reduction.

8. **The total energy use reduction is estimated at 65 percent** (30 percent+50 percent of remaining 70 percent). Considering this value, the energy use economy is 6.36 GWh/year. The breakdown of the total economy is reported in Table 4.

Table 4. Saved energy by energy efficiency improvements

No.	Name of the building	Total area of building (m^2)	Initial energy consumption (kWh/year)	Final energy consumption (kWh/year)	Energy reduction (kWh/year)
1	ISUJ Vrancea, Pompieri Adjud	550	154000	53900	100100
2	U.M.0543 TECUCI	550	154000	53900	100100
3.1	ISUJ Galati, Beresti	280	78400	27440	50960
3.2	ISUJ Galati, Beresti	270	75600	26460	49140
4	ISUJ Buzau, Ramnicu Sarat	1044	292320	102312	190008
5	ISU Bucuresti Ilfov, Vitan	1620	453600	158760	294840
6	Baza pentru Logistică a IGSU	574	160720	56252	104468
7	Baza pentru Logistică a IGSU, Ceasornicului	1664	465920	163072	302848
8	ISUJ Arges, Campulung Muscel	1620	453600	158760	294840
9	ISUJ Argeş, Bradu	1620	453600	158760	294840
10	ISUJ Covasna, Tg. Secuiesc	978	273840	95844	177996
11	ISUJ Caras-Severin, Moldova Noua	1620	453600	158760	294840
12	ISUJ Brasov, Bod	1468	411040	143864	267176
13	ISUJ Brasov,Fagaras	1658	464240	162484	301756
14	ISUJ Teleorman, Zimnicea	1620	453600	158760	294840
15	ISUJ Constanta, Mangalia	550	154000	53900	100100
16	ISUJ Constanta, Port	1675	469000	164150	304850
17	ISUJ Dolj, Bailesti	1620	453600	158760	294840
18	ISUJ Harghita, Toplita	2900	812000	284200	527800
19	ISUJ Cluj, Turda	1936	542080	189728	352352
20	ISUJ Bihor, Salonta	1620	453600	158760	294840
21	ISUJ Arad, Ineu	550	154000	53900	100100
22	ISUJ Alba, Aiud	1282	358960	125636	233324
23	Sediul Inspectoratului pentru Situații de Urgență ”Cpt. Dumitru Croitoru” al județului Sibiu	3500	980000	343000	637000
24	Pavilion administrativ cu Garaj	1620	453600	158760	294840
25	Sediu Detașament de pompieri ”Slt.Fripis Marius Daniel” Constanța Oraș (48-48-07)	550	154000	53900	100100
	Grand total	**34,939**	**9.78 GWh/year**	**3.42 GWh/year**	**6.36 GWh/year**

9. Considering the current price of energy in Romania of 0.2362 EUR/kWh (*https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Electricity_price_statistics*), the total annual undiscounted benefit of energy saved is EUR 1,501,972. The cost-benefit analysis for energy efficiency considers the discounted cost (investment value of Component 1 of IPF) and the discounted benefit (cost of energy saved). The undiscounted value of the cost is EUR 9.78 million, whereas the undiscounted value of benefits amounts at 1.50 million per year. Applying a discount rate of 5 percent for a planning horizon of 20 years, one obtains the discounted values of cost and benefit amounting at EUR 8.69 million, respectively EUR 15.35 million. The main indicators of the CBA for energy efficiency measures are reported in Table 5.

Table 5. Main indicators of CBA for energy efficiency measures

BCR	NPV (Euro)	IRR (%)	Payback Period (Years)
1.77	6,663,056	13.8	11

10. **Combined benefits of seismic retrofitting and energy efficiency measures.** The benefits for seismic risk reduction measures are calculated considering the GDP per Capita adjusted for purchasing power. The results of the economic analysis considering the combined beneficial effects of implementing integrated measures for seismic risk reduction (for both earthquake scenarios) and energy efficiency are reported in Table 6.

Table 6. Main indicators of CBA for seismic risk reduction and energy efficiency measures

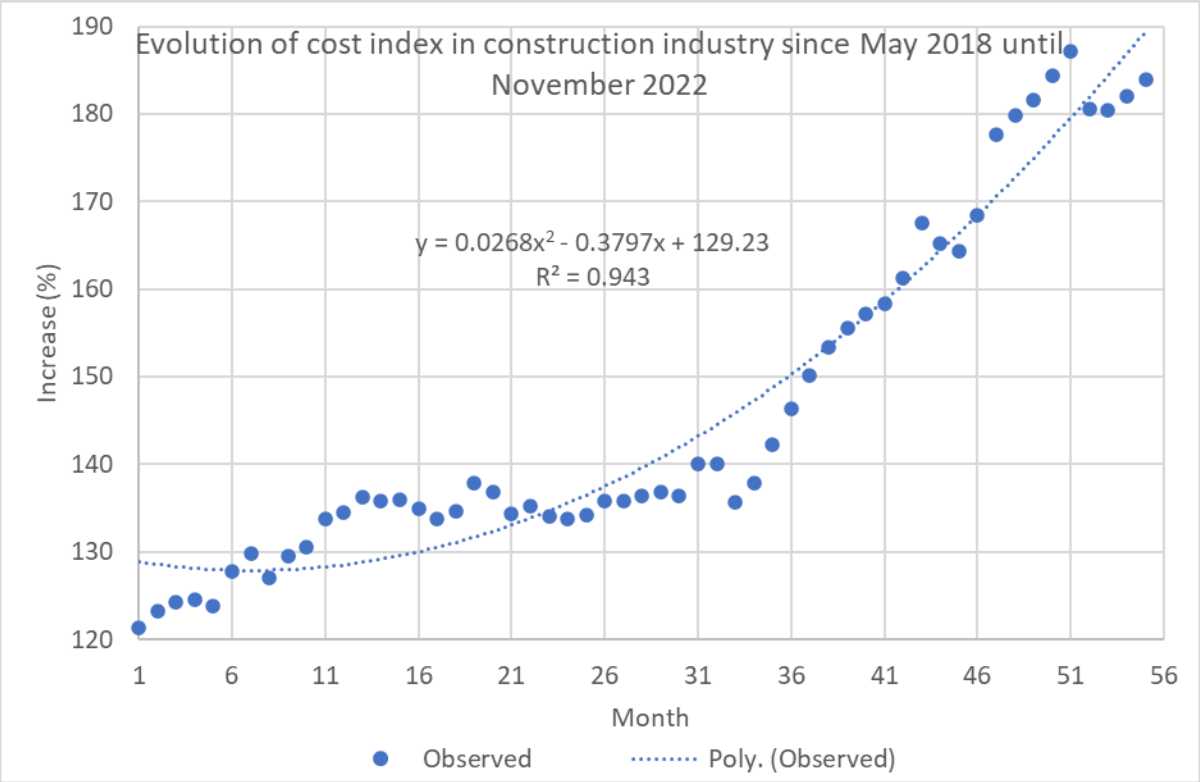
Scenario earthquake	BCR	NPV (Euro)	IRR (%)	Payback Period (Years)
1	5.34	308,911,269	58.2	5
2	3.94	209,352,541	37.9	6

D. Impact of potential continued increase in construction costs

11. **In this section the influence of the increase in costs for the construction industry upon the Additional Financing results is investigated**. According to the data centralized by GIES in November 2022, the total investment cost for the construction works for the 25 identified priority buildings amounts at EUR 80.36 million. This section will consider the impact of potential increase in costs for the construction works to be implemented through Additional Financing in the period November 2023 – December 2026.

12. **According to the National Institute for Statistics (NIS), the reference year for the construction cost index is 2015.** Based on the values of the cost index observed in the period May 2018-November 2022, different equations are considered in the analysis to fit the observed data. The best fit is provided by a polynomial series (Figure 1). The values of the cost index fitted by the polynomial series are median ones. Besides the median values, the values of the cost index with 5 percent and 95 percent non-exceedance probabilities are determined considering a normal distribution of probability. The parameters of the normal distribution are the mean of the observed cost index and the standard deviation of the residuals (obtained as the difference between observed and median fitted values). The 5 percent and 95 percent fitted values are considered as lower and upper bounds for the observed value and will serve for estimates in an “upper-bound” and “lower-bound” scenario – i.e., a scenario that is above, and one that is below the best-fit scenario.

Figure 1. Observed and median fit for the cost index in the construction industry in the period May2018 - November 2022



13. **Based on the median values observed, it is assumed that the increase in cost with respect to November 2022 is 1.22 for the fiscal year 2024, 1.45 for the fiscal year 2025 and 1.72 for the fiscal year 2026**. These median values are for the beginning of each fiscal year and will be applied to increase the investment costs for the 25 GIES buildings grouped in three batches for the three fiscal years considered in the analysis. Because of the predicted increase in cost, the investment cost of 80.36 million Euro will be exceeded, in these scenarios, and it is likely that some of the GIES buildings will not fit within the Additional Financing. In order to investigate the effect of the cost increase, the buildings shall be grouped in three batches for the fiscal years 2024, 2025 and 2026.

14. **Two strategies for grouping the buildings are considered hereinafter**:

    Strategy 1 is based on the average value of the seismic risk score assigned for individual buildings; it is mentioned that this approach was used in 2018 when the project was launched and was accepted both by the Client and the WB team. This score is a weighted average of four scores on a scale from 1 to 4 that refer to the parameters that contribute to the seismic risk: hazard, fragility, and exposure. The first parameter is characterized by the value of peak ground acceleration (PGA) of the building site, the second one by the year of construction and structural system of the building and the third one by the importance of the building in the territorial system of GIES. The lower the scores are, the higher the seismic risk is. The weights are 0.2 for the seismic hazard, year of construction and structural system, respectively 0.4 for the importance of the building. One may notice that all the four weights add up to unity. The individual and weighted scores are reported in Table 7.

    Table 7. Seismic risk score for the 25 GIES buildings

No.	Name of the building	Address	Year	PGA	Structure	Importance	Score
1	ISUJ Vrancea Secţia Pompieri Adjud	Str. Izlazul, nr. 2, Adjud,	3	1	3	3	2.6
2	U.M.0543 TECUCI Depozitul de Rezerve Proprii TECUCI	Str.Fd.Militari, nr.2, Tecuci, Jud.Galaţi	1	1	1	2	1.4
3.1	ISUJ Galaţi Garda de Intervenţie Bereşti	Str. Drumul Taberei nr. 2, Bereşti	2	1	1	3	2
3.2	ISUJ Galaţi Garda de Intervenţie Bereşti	Str. Drumul Taberei nr. 2, Bereşti	3	1	1	3	2.2
4	ISUJ Buzău Detașamentul de Pompieri Râmnicu Sărat	Str. Crângul Meiului, nr. 85, Rîmnicu Sărat	4	1	4	3	3
5	ISU București Ilfov Detașamentul de Pompieri Vitan	Str. Breaza, nr. 79, Sector 3, București	3	2	2	2	2.2
6	Baza pentru Logistică a IGSU Sediul Baza pentru Logistică a IGSU	B-dul. Iuliu Maniu, nr.63, Bucureşti,	3	2	3	2	2.4
7	Baza pentru Logistică a IGSU Sediul 2 al IGSU	Str. Ceasornicului, nr.19,sector 1, Bucureşti	3	2	2	2	2.2
8	ISUJ Argeș Detașamentul de Pompieri Câmpulung Muscel	Str.Ion Mihalache, nr.20, Câmpulung Muscel	3	2	3	3	2.8
9	ISUJ Argeş Detaşamentul de Pompieri Bradu	Str. Staţionarului, nr. 3, Bradu	3	2	2	3	2.6
10	ISUJ Covasna Detașamentul de Pompieri Tg. Secuiesc	Str. Ady Endre, nr. 13, Tg. Secuiesc	2	2	1	3	2.2
11	ISUJ Caraș-Severin Secţia de Pompieri Moldova Nouă	Str. Nicolae Bălcescu, nr. 99, Moldova Nouă,	1	2	2	3	2.2
12	ISUJ Braşov Pichetul de pompieri Bod	Str. Tudor Vladimirescu nr.62, Bod	3	3	1	4	3
13	ISUJ Braşov Detaşament Făgăraş	Str. Luncii, nr.2, Făgăraş	3	3	3	3	3
14	ISUJ Teleorman Detașamentul de Pompieri Zimnicea	Str. Republicii, nr. 44, Zimnicea	4	3	4	3	3.4
15	ISUJ Constanța Secția de Pompieri Mangalia	Str. DN Constanța, Mangalia (Stațiunea Neptun)	2	3	1	3	2.4
16	ISUJ Constanța Detașament de Pompieri Port	Poarta nr. 5, Incinta Port, Constanța	3	3	4	2	2.8
17	ISUJ Dolj Sediu Secţia de Pompieri Băileşti	Str. Independenţei, nr. 16, Băileşti	4	4	4	4	4
18	ISUJ Harghita Garda de intervenție Toplița	Str. Gării, nr.4, Toplița	3	4	4	4	3.8
19	ISUJ Cluj Detaşament Turda	Str. Calea Victoriei, nr.1, Turda	3	4	3	3	3.2
20	ISUJ Bihor Detașamentul de Pompieri Salonta	Str. Calea Aradului,nr. 39, Salonta	2	4	1	3	2.6

No.	Name of the building	Address	Year	PGA	Structure	Importance	Score
21	ISUJ Arad Sediu Detaşament de pompieri Ineu	Str. Mihai Eminescu, nr. 35, Ineu	2	4	1	3	2.6
22	ISUJ Alba Sediu Detaşament de pompieri Aiud	Str. Cuza-Vodă, nr. 33, Aiud	2	4	2	3	2.8
23	Sediul Inspectoratului pentru Situații de Urgență ”Cpt. Dumitru Croitoru” al județului Sibiu	Sibiu, str.Vasile Cârlova, nr.16-22, jud.Sibiu	2	3	2	2	2.2
24	Pavilion administrativ cu Garaj	Str. Gheorghe Doja nr.79, oraș Cehu Silvaniei, județul Sălaj	3	4	4	3	3.4
25	Sediu Detașament de pompieri ”Slt.Fripis Marius Daniel” Constanța Oraș (48-48-07)	Str. Mircea cel Bătrân, nr. 110, mun. Constanța, jud. Constanța	1	2	2	2	1.8

Strategy 2 is based on the investment costs of the 25 GIES buildings evaluated in November 2022. According to this strategy, the buildings are sorted in descending order of the investment costs, such as the costliest ones to be prioritized first, in order to be less affected by the increase in cost. The batches are arranged to provide a balanced amount of yearly investment cost for the period of Additional Financing. The yearly batches of buildings obtained by sorting the buildings for decreasing values of the investment costs, and the revised cost by applying the median values of the cost increase with respect to November 2022 estimates are given in Table 8. One may notice that the estimated median value of the investment costs increased from 80.36 million Euro as of November 2022 to EUR 111.05 million through the implementation period of the Additional Financing. In this scenario, if one considers the initial investment cost of EUR 80.36 million, then 11 buildings in the third batch will lack financing.

Table 8. Yearly batches of buildings according to Strategy 2 and revised median costs of investment for the 25 GIES buildings

No.	Name of the building	Score	Investment cost as of November 2022 (Euro)	Batch No.	2024 revised cost (Euro)	2025 revised cost (Euro)	2026 revised cost (Euro)
23	Sediul Inspectoratului pentru Situații de Urgență ”Cpt. Dumitru Croitoru” al județului Sibiu	2.2	9,414,878	1	11,486,151	-	-
18	ISUJ Harghita Garda de intervenție Toplița	3.8	7,800,899	1	9,517,096	-	-
19	ISUJ Cluj Detaşament Turda	3.2	5,207,773	1	6,353,483	-	-
13	ISUJ Braşov Detașament Făgăraș	3	4,459,962	1	5,441,154	-	-

No.	Name of the building	Score	Investment cost as of November 2022 (Euro)	Batch No.	2024 revised cost (Euro)	2025 revised cost (Euro)	2026 revised cost (Euro)
5	ISU București Ilfov Detașamentul de Pompieri Vitan	2.2	3,647,242	1	4,449,636	-	-
8	ISUJ Argeș Detașamentul de Pompieri Câmpulung Muscel	2.8	3,647,242	1	4,449,636	-	-
9	ISUJ Argeş Detaşamentul de Pompieri Bradu	2.6	3,647,242	1	4,449,636	-	-
11	ISUJ Caraș-Severin Secţia de Pompieri Moldova Nouă	2.2	3,647,242	1	4,449,636	-	-
14	ISUJ Teleorman Detașamentul de Pompieri Zimnicea	3.4	3,647,242	2	-	5,288,501	-
17	ISUJ Dolj Sediu Secţia de Pompieri Băileşti	4	3,647,242	2	-	5,288,501	-
20	ISUJ Bihor Detașamentul de Pompieri Salonta	2.6	3,647,242	2	-	5,288,501	-
24	Pavilion administrativ cu Garaj Cehu Silvaniei, județul Sălaj	3.4	3,647,242	2	-	5,288,501	-
22	ISUJ Alba Sediu Detaşament de pompieri Aiud	2.8	3,448,535	2	-	5,000,376	-
16	ISUJ Constanța Detașament de Pompieri Port	2.8	2,909,109	2	-	4,218,208	-
7	Baza pentru Logistică a IGSU Sediul 2 al IGSU	2.2	2,890,005	3	-	-	4,970,809
10	ISUJ Covasna Detașamentul de Pompieri Tg. Secuiesc	2.2	2,630,786	3	-	-	4,524,952
12	ISUJ Braşov Pichetul de pompieri Bod	3	2,549,596	3	-	-	4,385,305
4	ISUJ Buzău Detașamentul de Pompieri Râmnicu Sărat	3	2,014,667	3	-	-	3,465,227
15	ISUJ Constanța Secția de Pompieri Mangalia	2.4	1,238,261	3	-	-	2,129,810
21	ISUJ Arad Sediu Detaşament de pompieri Ineu	2.6	1,238,261	3	-	-	2,129,810
25	Sediu Detașament de pompieri ”Slt.Fripis Marius Daniel” Constanța Oraș	1.8	1,238,261	3	-	-	2,129,810

No.	Name of the building	Score	Investment cost as of November 2022 (Euro)	Batch No.	2024 revised cost (Euro)	2025 revised cost (Euro)	2026 revised cost (Euro)
6	Baza pentru Logistică a IGSU Sediul Baza pentru Logistică a IGSU	2.4	996,913	3	-	-	1,714,691
1	ISUJ Vrancea Secţia Pompieri Adjud	2.6	955,230	3	-	-	1,642,996
2	U.M.0543 TECUCI Depozitul de Rezerve Proprii TECUCI	1.4	955,230	3	-	-	1,642,996
3.1	ISUJ Galați Garda de Intervenţie Bereşti	2	619,131	3	-	-	1,064,905
3.2	ISUJ Galați Garda de Intervenţie Bereşti	2.2	619,131	3	-	-	1,064,905

15. **Using lower bound predictions of the cost increase.** Based on the lower bound values, it is assumed that the increase in cost with respect to November 2022 is 1.18 for the fiscal year 2024, 1.41 for the fiscal year 2025 and 1.68 for the fiscal year 2026. Because of the predicted increase in cost, the investment cost of EUR 80.36 million will be exceeded and it is likely that some of the GIEs buildings will not fit within the Additional Financing. Under **Strategy 1**, the revised investment costs are EUR 44.11 million in year 2024, 34.17 million Euro in 2025 and 31.49 million Euro in 2026. Under **Strategy 2,** the revised investment costs are EUR 48.94 million in year 2024, 29.53 million Euro in 2025 and EUR 30.15 million in 2026.

16. **Using upper bound predictions of the cost increase.** Based on the upper bound values, it is assumed that the increase in cost with respect to November 2022 is 1.26 for the fiscal year 2024, 1.49 for the fiscal year 2025 and 1.76 for the fiscal year 2026. In order to investigate the effect of the cost increase, the buildings were grouped in three batches for the fiscal years 2024, 2025 and 2026 using the same two strategies for grouping the buildings that is consider when using the median predictions of the cost increase. Under **Strategy 1**, the revised investment costs are EUR 47.11 million in year 2024, EUR 36.11 million in 2025 and EUR 32.99 million in 2026. Under **Strategy 2,** the revised investment costs are EUR 52.26 million in year 2024, EUR 31.21 million in 2025 and EUR 31.58 million in 2026.

17. **Summary results are presented in the table below:**

Table 9. Summary results of different construction cost increase scenarios

	Median prediction of the cost increase		Lower bound prediction of the cost increase		Upper bound prediction of the cost increase	
	Strategy 1 of prioritization	Strategy 2 of prioritization	Strategy 1 of prioritization	Strategy 2 of prioritization	Strategy 1 of prioritization	Strategy 2 of prioritization
Total predicted value of investment cost (Euro)	112,990,566	111,835,227	109,775,983	108,620,645	116,205,149	115,049,810

Exceedance of the Additional Financing (Euro)	32,626,000	31,470,662	29,411,418	28,256,079	35,840,583	34,685,244
Number of buildings included in the Additional Financing	21	14	22	15	20	13
Number of buildings not included in the Additional Financing	4	11	3	10	5	12