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Moldova SDG Push

Consolidated Report

Acronyms and Abbreviations

CGE	Computable General Equilibrium
SAM	Social Accounting Matrix
INFF	Integrated National Financing Framework
GDP	Gross Domestic Product
SDG	Sustainable Development Goals
SOE	State owned enterprise
EVFR	Energy Vulnerability Reduction Fund
EVIS	Energy Vulnerability Information System
HBS	Household Budget Survey
EU	European Union
NDS	National Development Strategy
GAP	Government Action Plan
UNSCDF	United Nations Sustainable Development Cooperation Framework
NSAEP	National Social Assistance Electronic Platform
MLSP	Ministry of Labour and Social Protection
GHG	Greenhouse gas emissions
VAT	Value added tax
MDL	Moldovan Lei
LIHC	Low income-high costs
TFP	Total factor productivity
ODA	Official development assistance

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Executive summary

Moldova is faced with significant structural deficiencies, encompassing weak governance, limited institutional capability, and an unfavourable business environment. The country has faced a series of obstacles in recent times, including a constitutional crisis in 2019 that ushered in a change in the Government, and a substantial economic downturn in 2020 triggered by the COVID-19 pandemic. High emigration rates, particularly among youth, are still a prevailing concern. Despite the current administration's dedication to an ambitious reform agenda fuelled by Moldova's European aspirations, advancements have been hampered by the Russian Federation invasion of Ukraine, which has led to an influx of refugees, intensifying the burden on public services and infrastructure. Additionally, the macroeconomic landscape deteriorated significantly in 2022, marked by inflation surpassing 30 percent, widening public deficits, and stagnation in GDP growth. These pressures have exacerbated pre-existing vulnerabilities, including a sizable yet ineffective state-owned enterprise (SOE) sector, ineffective governance, and pronounced energy insecurity arising from Moldova's historical reliance on a sole energy source and supplier.

Faced with uncertainty in energy prices and commodity prices in general, the SDG Push framework in Moldova supports the efforts of the Ministries of Labour and Social Protection (MLSP), and of Economy and Digitalization to analyse the effectiveness of options put on the table to reduce the uncertainty by the Government and the potential for long-term mainstreaming to solve complex development challenges. Specifically, it focuses on analysing the impact of the current, short-term compensation on Moldovan households and how it can be institutionalized towards longer-term energy efficiency and Sustainable Development Goals (SDG) achievement.

In order to address these challenges and achieve the SDGs, an evidence-based approach is crucial to identify key areas of intervention that can drive SDG progress in the country. The SDG Push framework is a comprehensive and country-specific tool to plan and implement SDG breakthroughs in various development contexts for both pro-cyclical and anti-cyclical response– elevating fiscal, financial, digital/data and governance enablers of sustainable development. It is envisaged as an all-terrain tool that catalyses breakthroughs from real-world opportunities and constraints.

As part of the SDG Push process in Moldova, MLSP and the Ministry of Economy and Digitalization have made efforts to reduce energy poverty and vulnerability in the country.

Moldova implemented a scaled-down version of the SDG Push that focuses on leveraging responses put in place in a time of uncertainty as an anchor for accelerating development in the country. One of the drivers is leveraging digitalization. Digital transformation has been prioritized with important specific use cases, ranging from addressing energy vulnerability and the use of digital technology to tackle the energy crisis, to education, digital literacy and affordability of digital technologies.

With UNDP's support, the Government deployed a rapid digital solution to connect citizens with the Government via a dedicated platform for applying to the Energy Vulnerability Reduction Fund (EVRF). This Fund is expected to positively mitigate energy vulnerability, support energy-poor households through short-term compensations (https://compensatii.gov.md/en) and longer-term energy efficiency, and through awareness-raising interventions. Given that the Fund is providing compensation to about 70 percent of households in Moldova, its sustainability is critical, and modelling and analytical foundations are required to show impact and ensure the environmental sustainability of the interventions.

During the SDG Push process, the emphasis was placed on evaluating the effectiveness of the digital system used for the household registration and the potential leveraging of the success of the EVRF in terms of reducing poverty and increasing the welfare of households (including income and energy poverty).

To this aim, the analysis was conducted in three parts:

- Evaluation of the impact of EVRF on energy and income poverty of households using Household Budget Survey (HBS) data;
- Use of the Computable General Equilibrium (CGE) model to assess the effects of the crisis on macroeconomic indicators, and explore the effects of a targeted price subsidy and an alternative subsidy scheme consisting of a targeted cash transfer;
- Evaluation of the EVIS digital platform's functionality during household registration to receive compensation for energy bills.

Analysis of survey data found that energy subsidies provided under the current mechanism outlined in the EVRF have strong positive effects on reducing energy poverty but with some differentiated effects by energy sources. The proportion of highly vulnerable energy-poor households reduces by 71 percentage points for natural gas, users and 10 percentage points for electricity user due to the provided compensations. The current mechanism benefited the high vulnerability households more than other energy vulnerability categories.

The overall effect of the decrease in income poverty is significant, which has been observed across all four vulnerability categories – very high; high, medium and low vulnerability. For the very high energy vulnerability category, the proportion of income-poor households decreased by 43 percent. It is important to highlight that the effect rises gradually with the vulnerability category, which indicates that the energy compensations are well targeted and benefit more households in the high and very high energy vulnerability categories, a desired effect of the policy intervention.

Findings from CGE modelling indicate that elevated energy costs, particularly with natural gas, adversely influence GDP, consumption and unemployment. Furthermore, while the policy of price subsidies has aided the nation in mitigating the adverse repercussions of price fluctuations, the approach of targeted cash transfers performs more effectively, enabling households to allocate supplementary income according to their individual preferences.

The three key lessons from the SDG Push framework are as follows:

1. **While the EVRF significantly reduced vulnerability at a time of uncertainty, current support mechanisms cannot fully offset the negative effects of energy price shocks.** This necessitates determining the ideal subsidy rate (cash/income transfer) that assists households in sustaining their consumption at pre-shock levels while also encouraging a shift away from natural gas.
2. **As a part of Moldova's 2030 Digital Transformation Strategy, the development and deployment of the EVIS platform is a first step to providing equal access to quality public services in health, education, sanitation and e-government.** While the system has provided equal access to all households, the categorization algorithm used to assess the vulnerability of households and the simplification of the registration process may ensure better identification, targeting and enrollment of households in need, including those in lower vulnerability categories.

3. **The key challenges that were identified relate to technological and institutional arrangements.** These challenges affected data access and quality, highlighting the need for effective data governance measures to ensure timely information for energy vulnerability reduction efforts. Future improvements in EVRF administration lie in developing a data governance framework that defines the roles and responsibilities of various stakeholders involved in the EVRF and outlines the processes and key policies for managing the data. In addition, data quality needs to be a key priority; thus, investing in tools and technologies is necessary to ensure data accuracy, completeness and consistency.

Introduction

The Sustainable Development Goal (SDG) Push framework is a set of comprehensive and country-specific tools developed by the United Nations Development Programme (UNDP) to accelerate progress towards achieving the Sustainable Development Goals (SDGs). The framework aims to reimagine and recalibrate how development interventions are planned and implemented to create meaningful progress in sustainable development. The framework is designed to adapt to the unique challenges faced by and the opportunities available to each country. It considers individual countries' specific contexts, priorities and development trajectories. It allows for addressing various constraints and issues that countries face to achieve the SDGs.

The framework combines the power of data, state-of-the-art modelling and finance to enhance the effectiveness of development interventions. By leveraging data and evidence-based approaches, fostering innovation and mobilizing financial resources, the SDG Push framework seeks to make interventions more impactful. The SDG Push framework recognizes the importance of a participatory approach, i.e. collaboration and partnerships, in achieving the SDGs. It aims to bring together various stakeholders, including governments, civil society organizations, private sector entities and international agencies, to work collectively towards common goals.

The ultimate goal of the SDG Push framework is to expedite the progress toward achieving the SDGs by providing countries with a comprehensive toolkit and support. It aims to accelerate positive outcomes and make a tangible difference in sustainable development.

This report synthesizes the main findings of the scaled down SDG Push framework in the Republic of Moldova. It provides information and an analysis of the country's soci0-economic and political context followed by an overview of development priorities. The second part summarizs the outcomes of the economic analysis of the energy compensation scheme and provides recommendations on how the Energy Vulnerability Reduction Fund (EVRF) can be improved.

Scoping Overview: Socio-economic challenges and political implications

Moldova is a lower-middle-income country with a current gross domestic product (GDP) of US$11.9 billion and a per capita GDP of US$4,512, which in terms of purchasing power parity (PPP) represents around 30 percent of the European Union (EU) average in 2020, up from 25 percent in 2013. Despite a solid economic performance over the past two decades, Moldova remains among Europe's poorest countries. Although a growth model reliant on remittance-induced consumption generated high growth and reduced poverty, it had become less sustainable before the COVID-19 pandemic.

The decline in remittances, combined with a shrinking and ageing population, has resulted in low productivity growth, and a significant portion of the lower-income population has become dependent on pensions and social assistance. Moldova lags behind in achieving income convergence compared to its geographical peers, and the pandemic has erased some recent gains. **Public spending is inefficient and poorly targeted, and a persistent under-execution of public investment widens the already large infrastructure gaps.** Private investment and productivity are constrained by an unfavourable business environment, lack of competition, weak investor protection, and underperforming state-owned enterprises (SOEs) and energy reforms.

In recent years, Moldova has faced multiple difficulties on the social, economic, political and security front. The country is characterized by significant urban-rural disparities in living standards and a high degree of inequality of opportunity, entrenched mainly across the spatial dimension (World Bank, 2021a).

The COVID-19 pandemic, the energy crisis, and most recently, the Russian Federation's war against Ukraine, which, in addition to regional insecurity, generated an unprecedented humanitarian crisis, with over half a million Ukrainian refugees who have crossed Moldova since 24 February 2022 whom over 100,000 remain.

Some Ukrainian citizens opted to seek shelter in Moldova. Although more than three-quarters of these refugees have moved on to the European Union (EU), the remaining influx of refugees is increasing pressure and additional fiscal costs and squeezing the resources that were aimed at long-term development priorities. In addition, high emigration deters human capital accumulation and innovation.

After Ukraine, Moldova is perhaps the most affected state by the war in Ukraine. Moldova has to navigate simultaneously with an unprecedented influx of refugees, massive trade disruptions, economic slowdown, and a dramatic increase in energy prices. Additionally, Moldova is critically reliant on natural gas imported from the Russian Federation to power its energy needs. Import disruptions are expected to increase price pressures, eroding the competitiveness of firms and household incomes, especially for the poor.

Since August 2021, when the new, reform-oriented government took office, all political powers in Moldova (i.e. the President, the Government and Parliament) are aligned, supporting a common ambitious reform agenda, with a focus on key policy areas such as justice sector reforms, good governance and the fight against corruption. Among the key internal challenges that the current government inherited are systemic corruption and weakened institutions responsible for the rule of law, which hamper investment and productivity growth, and continue to undermine the business climate.

Hence, despite multiple crises, the Government is advancing the reform of its justice system, enhancing internal resilience and administrative capacity. and taking significant steps to tackle corruption. In contrast, ongoing regulatory reforms aim to reduce red tape.

The role of international development partners in mitigating crises and increasing internal resilience is critical. Over the last years, Moldova also received important macro-financial assistance from the International Monetary Fund (IMF) (US$ 564 million) and the EU (EUR 150 million). It has also direct budget support and technical assistance from other development partners, through pledges made during the Moldova Support Platform initiated by Romania, Germany and France in Berlin. As a result, the massive deficit of around EUR 1 billion planned for 2022 will be financed exclusively from external financial support (Lupusor et al., 2022).

The way forward - the "Europeanization" of reform

Corruption and governance challenges are significant issues in Moldova. Corruption has deeply penetrated various sectors of Moldovan society, from government institutions to public services. This pervasive nature of corruption has led to a loss of trust in public officials and institutions, and hindered the effective functioning of the State. The prevalence of corruption undermines economic development by discouraging foreign investment, deterring local businesses, and creating an environment of uncertainty. In addition, citizens are often required to pay bribes for services that should have been accessible to all. This not only erodes public trust, but also limits equal opportunities for citizens.

Despite these shortcomings, in June 2022, the EU granted EU candidate country status to the Republic of Moldova, which was a result of a positive assessment conducted by the European Commission of political and economic criteria.

EU candidate country status marks the beginning of new economic, political and social transition characterized by comprehensive EU monitoring that will not only reduce the room for corruption, but will incentivize decision makers to implement more comprehensive institutional reforms. Currently, with the view to start EU accession negotiations next year, Moldova is engaged in fulfilling the nine policy reform commitments in such areas as justice reform, the fight against corruption, quality public services including by stepping up implementation of public administration reform, public financial management, macro-financial stability, and protection of human rights.

Two out of the 13 actions of the Action Plan aimed at meeting the conditions of the European Commission on pre-accession requirements involve highly complex reforms that will require substantial time and resources to produce tangible effects in the near future. **These measures mainly relate to the reform of the local public administration (Luposur et al., 2022) where digitalization plays an important role.**

Despite positive news on EU candidate status and the incentive that it has created with respect to institutional reforms, the increased socio-economic vulnerability of Moldova's population also poses increased political risks. Since September 2021, the country has entered an energy crisis that has had major socio-economic and political implications for governance. The inflation rate reached around 34 percent year-on-year in September 2022, largely due to the increase in the price of public services as a result of at least a nine-fold increase in the price of natural gas purchased from the Russian Federation and an almost seven-fold increase in the natural gas tariff paid by final consumers.

The SDG Push entry point is the analysis of the effectiveness of the digital system and efficient social protection, energy vulnerability fund in terms of changing poverty and welfare of households as good examples that can be built from EU candidature. The SDG Push entry point is supporting the Government of Moldova to:

- Understand the impact of the current short-term compensation to households in Moldova and investigate how the compensation can be institutionalized in the country as a longer-term sustainable interventions;
- Inform the Government on the impact of the Fund on longer-term energy efficiency;
- Provide tools for the Government to analyse those households who may be left behind through the Fund, especially given the use of digital tools for registering and assigning households to vulnerability levels.

The national priorities and progress analysis, including Moldova 2030 document, explicitly reference digital transformation's role and cross-cutting potential for the country's sustainable development (Annex A1). The digital transformation of governance and Government, society and the economy are key directions and strategic national priorities.

Attaining candidate country status facilitates the expansion of financial support diversification and an increase in non-repayable funds from the broader pool of financial aid provided by the EU. This extends beyond conventional methods such as macro-financial assistance and other forms of aid. Additional financing sources could help the country tackle the ongoing energy crisis by expanding the social protection system and developing digital platforms that could help build responsive, inclusive and participatory decision-making processes.

Digital data collection and analysis provide insights for evidence-based policymaking. Data-driven approaches help governments identify areas of concern, allocate resources effectively, and monitor progress in addressing key issues related to governance and justice. Digitalization promotes the inclusivity of institutions by making information and services accessible to diverse populations, including marginalized communities, persons with disabilities, and those in remote areas.

Given the Government's focus on digitalization as a cross-cutting enabler through almost all of the priorities or areas that can promote transformational change, it was critical as part of the solution to the country's current energy crises. The SDG Push focused on analysing the viability of the intervention of energy compensation powered by digitalization.

The analysis and findings from analysis presented in the next sections shed light on the success as well as key challenges of implementing digital tools when developing a robust and inclusive social protection scheme.

The National Development Strategy and the Government Action Plan

The National Development Strategy (NDS) is based on the principle of the human life cycle, human rights and quality of life, built, to a great extent, around the targets and goals of the 2030 Agenda, adapted to the new multi-crises context.

Thus, Moldova's development vision by 2030 is centred on the quality of life. Moldova aspires to achieve tangible and sustainable improvements in all dimensions of the quality of life, in accordance with the SDGs and the European aspirations established in the Association Agreement with the European Union and the new EU candidate status of the Republic of Moldova.

The 10 General Objectives of the new Moldova 2030 NDS aiming at contributing to SDGs, are as follows:

1. Increasing income from sustainable sources and reducing inequalities (SDGs 1, 2, 7, 8)
2. Improving living conditions (SDGs 6, 7, 9, 11, 13)
3. Guaranteeing relevant and quality education for all (SDG 4)
4. Raising the level of culture and personal development (SDGs 4,8)
5. Improving the health of the population through the active contribution of a modern and efficient health system that responds to the needs of each individual (SDG 3)
6. A robust and inclusive social protection system (SDG 1)
7. Ensuring efficient, inclusive and transparent governance (SDG 16)
8. Building a fair, incorruptible and independent justice system (SDGs 5, 16).
9. Promoting a peaceful and secure society (SDG 16)
10. Ensuring a healthy and safe environment (SDGs 13, 14, 15)

The NDS Moldova 2030 serves as the primary comprehensive strategic policy document, aligning national and sectoral policies with the budgetary framework. This document encompasses a network of interlinked priorities and objectives that, when executed by diverse stakeholders, should culminate in the realization of the SDGs. Simultaneously, it duly considers Moldova's obligations of the EU-Moldova Association Agreement, particularly the aspects that hold the potential to impact the attainment of these objectives.

The principal policy planning document that outlines government priorities and resource allocation is the Government Action Plan (GAP). The most recent Action Plan, covering the 2021–2022 period, amalgamates initiatives concerning the endorsement of legal enactments and other types of actions geared toward fulfilling sustainable development goals stated in the Government Activity Programme (GAP), as well as the international commitments of the Republic of Moldova. These commitments encompass the Association Agreement between the Republic of Moldova and the EU, as well as the 2030 Agenda for Sustainable Development.

Policy measures of GAP 2021–2022 are geared towards contributing to achieving most of the SDGs in the short to medium term. Around 31 percent of these measures focus on advancing SDG 16 (Peace, Justice, and Strong Institutions), around 6–11 percent on SDG 9 (Industry, Innovation, and Infrastructure), 6 percent on SDGs 3, 4, 7, 8, 11 and 12; and 3 percent of the policy measures on the remaining SDGs.

Digitalization at the forefront

The Government of Moldova, through its Programme of Actions, made a bold decision to accelerate digital transformation of the nation by making use of the existing opportunities and exploring a ‘whole-of-society’ approach, thus ensuring that transformation is inclusive and sustainable.

The digital transformation is seen as a cross-cutting enabler through almost all of the priorities or areas that can promote transformational change developed for the United Nations Sustainable Development Cooperation Framework (UNSDCF). In particular, these priorities or areas are:

- Equal access to quality public services in health, education, sanitation, e-government (top priority)
- Other priorities for which digital transformation is a key enabler

The specific focus areas are:

- Promoting the full digitization of public services (SDG targets 1.1, 1.2, 2.2, 7.1, 7.2, 8.3).
- Ensuring access to administrative data sources for all authorities through mandatory interconnection between them and excluding mandatory presentation of official documents on physical support by citizens and entrepreneurs (SDG targets 1.1, 1.2, 2.2, 7.1, 7.2 and 8.3).
- Increasing the accessibility of public administrative services and government data open, including through alternative, socially inclusive access points at the local level (SDG target 7.2).
- Promoting the principles of transparency, open data and information traceability official, the responsiveness of public authorities/institutions to the requests of citizens and the environment of business (SDG target 7.2).

- Fully digitizating administrative processes in public administration at the central level and local, excluding paper from the document circuit, and issuing physical documents only at the explicit request of the applicant (SDG targets 1.1, 1.2, 2.2, 7.1, 7.2 and 8.3).

- Revising the regulatory framework of customs procedures, postal and courier services and online payments to facilitate electronic commerce (SDG/ argets 1.1, 1.2, 2.2, 7.1, 7.2 and 8.3).

- Ensuring access to broadband internet at affordable prices for all categories of population, in each locality and the legislation of the right to the Internet for every citizen (SDG targets 2.2 and 7.2).

- Unifying the system of administrative registers, ensuring interoperability and the compatibilities of information systems and the access of statistical and fiscal authorities to administrative data (SDG targets 1.1, 1.2, 2.2, 7.1, 7.2 and 8.3).

- Transcending other strategic policy objectives through a digital focus, including culture and related policies (SDG 1.2., 4.1–4.4); support to the development of SMEs objectives (digitalization of the customs services) (SDG 1.2, 7.1. and 8.3); policies in education, research and youth development (focus on digital literacy and inclusion) (SDG targets 1.1–1.3, 3.2, 3.3, 7.1 and 3.1 regarding digital competencies of the didactic personnel); public order and security (digitalization of services for citizens) (SDG targets 9.2 and 9.3).

Energy security has been a long-term challenge for Moldova, and the war in Ukraine made it a critical short-term problem. Digitalization with compensation by the government to reduce the vulnerability of households helped lay a foundation for support to households. In addition, the Government invested in parallel in finding alternative energy sources and improving energy efficiency. The SDG Push analysed the feasibility of the demand-side intervention as a long term policy support to households powered by an effective digital system.

Development of digital platform and data integration

To tackle the impact of the energy crisis and with the technical support from UNDP Moldova, the Government of Moldova introduced the Law on the Energy Vulnerability Reduction Fund (EVRF) in July 2022, which entered into force in September 2022. The Law aims to prevent and combat the population's energy vulnerability and to increase energy accessibility among vulnerable consumers.

UNDP Moldova provided a conceptual vision for setting up and operating an information system designed for the implementation of the EVRF, including aspects related to the EVRF's objectives, principles, main characteristics, functionality and conceptual architecture, and functional and non-functional requirements of the information system. The information system is the first step towards digitalization of public services, as outlined in the previous section.

The information system has streamlined the compensation application process for households, making it more inclusive and transparent. Moreover, by integrating with various governmental databases, the system efficiently categorizes households based on a predefined vulnerability category and seamlessly transfers data to energy companies' systems for adjusting monthly energy bills.

While the system is functional, future enhancements should address challenges such as limited resources to handle substantial requests. Additionally, the information systems of energy companies lack automated error detection, a proper assignment of unique registration numbers and standardized reporting. Within government internal systems, provisions for gender-disaggregated data are essential to identify gender-specific trends in energy consumption, expenses and access to energy services. Lastly, the data of fiscal authorities require vigilant monitoring of household income to prevent instances of unregistered income for certain households.

Development of the Energy Vulnerability Information System and databases used

Initial discussions envisioned the development of a National Social Assistance Electronic Platform (NSAEP) under the Ministry of Labour and Social Protection (MLSP), to which the EVRF would be connected. However, due to the time limitation (i.e. the heating season was to start in few months), it was decided to develop first the Energy Vulnerability Information System (EVIS)and later to focus on developing the NSAEP.

The law provides for five categories of energy vulnerability for households: consumers with extremely high, high, average, low, or without energy vulnerability. In addition, Law 241/2002 states the criteria for the category of energy vulnerability of the household consumer:

- Income level of the family or of the single person;
- The ratio between expenses for energy resources and income of the family or of the single person;
- Type of heating system;
- Family composition;
- Other criteria established by the Government.

The criteria were defined by the Government Decision 704/2022.

To implement the EVRF effectively, the Government, with support of UNDP, deployed a rapid digital solution to connect citizens to the Government via a dedicated platform "Ajutor la contor". The EVIS system relies on various governmental datasets and services provided by MConnect, a technological solution to ensure interoperability and data exchange between various information systems in the Government.

Additionally, it was decided to develop the system in two major stages: first, developing the interface before the end of September 2022, allowing the end users to register by the end of October 2022, and second, developing other needed modules allowing to calculate the vulnerability level of each household and transferring the information to all energy suppliers to ensure bill compensation.

The selective datasets and services used during the EVRF registration process were as follows:

- The Public Services Agency, the central authority of the state registration of civil status documents, which creates and maintains the real estate cadaster, and which is particularly useful for the EVRF registration process;
- The State Population Register, a unique integrated system of citizens' automated records;
- The National Social Insurance House, a central administrative authority, administers and manages the public social insurance system;
- The State Fiscal Service, which is a public authority empowered to administer taxes, fees and other payments; and
- Monthly consumption data from the private or public energy distributors.

As part of the registration process for the EVIS platform, citizens are informed and agree to the use of their personal data. The Terms and Conditions of the platform clearly state that the MLSP is committed to ensuring transparency in the collection and use of personal information and its retention. The privacy of personal data is ensured and not shared with third parties, including for marketing purposes or for generating revenue from the use of personal data, without the holder's consent or at the request of law enforcement authorities in accordance with the regulatory framework. Additionally, MLSP guarantees the respect of the rights of the holders of personal data provided for by Law no. 133/2011 on the protection of personal data, taking all measures to protect such data against unauthorized access, use and disclosure. Therefore, citizens who register for the EVIS platform are fully informed and agree to the use of their personal data in accordance with the platform's Terms and Conditions.

A network of librarians and social workers supported households who struggled with online registration. Also, a dedicated Call Centre and Communication Unit within the MLSP further supported the registration process.

Key implementation challenges and potential solutions

During the development phase, there were data and services-related issues, mainly those related to technological and institutional set-ups. These challenges affected data access and quality, highlighting the need for effective data governance measures to ensure correct and prompt information for energy vulnerability reduction efforts.

Inaccessible data services or delayed responses

Cadastral data

- The data requested included cadastral numbers and property area, among other details. However, the data service provider faced delays due to an outdated system and inadequate resources to handle large requests. Consequently, the data service could not be effectively utilized. To address these challenges, a decision was made to retrieve data in comma -separated value (CSV) format. Nonetheless, this solution required more development effort and manual intervention, and the process needs to be performed periodically to prevent data from becoming obsolete.

- Determining whether a household falls under condition 2 (as per Law No. 704/2022, p.2512) required standardizing property shares owned by the household. This task proved time-consuming due to the varying formats in which shares were presented in the cadaster data, such as fractions, percentagesand variations of decimal notation. Standardizing these shares demanded approximately six hours of manual work to rectify erroneous data. Moreover, some real estate properties lacked value information, while others had been assessed decades ago, further complicating the procedure.

- Despite these challenges, the dedicated efforts of EVIS administrators enabled the review and manual correction of several dozen cases involving discrepancies in cadastral data.

Energy consumption data provided by private energy distributors

The requested information pertains to the energy consumption data of customers. However, challenges arose due to data quality issues stemming from non-standardized data, errors in assigning unique registration numbers (Place of Consumption Number, pr NLC) to consumers, and instances of duplicated entries in the database, where a single customer was registered multiple times, or two customers indicated the same NLC in their submissions.

Similar to the above scenario, the solution involves acquiring the data in XLS format and conducting data cleaning procedures. However, this approach also entails a heightened degree of manual effort and should be conducted on a monthly basis to obtain accurate customer energy consumption data.

To address these challenges, it is advisable to establish a standardized process for NLC numbers. This process can encompass the formulation of guidelines and rules for NLC number assignment, combined with the integration of data quality checks to ensure precision. Additionally, enhancing data collection and storage procedures involves incorporating data quality checks during the data gathering process, deploying data validation techniques, and storing data in a standardized format to facilitate analysis and manipulation.

By enhancing the processes of data collection and storage, the likelihood of errors and inconsistencies within the data can be diminished, leading to an overall improvement in data quality.

Fiscal data

The datasets encompass details related to citizens' income. However, a predicament arises from the service that supplies fiscal data, since it consistently exhibits delayed responses. This typically requires submitting subsequent requests, often the second or third, to successfully procure the desired information. This situation introduces an inefficiency within the system's overall functioning, generating surplus requests that impose an undue load on the server.

These factors collectively contribute to a scenario where the fiscal data service struggles to promptly address initial requests, prompting clients to make multiple attempts. Consequently, a vicious cycle is engendered wherein the server becomes inundated with redundant requests, exacerbating the delay in response time, and adversely impacting the system's comprehensive performance.

To mitigate this predicament, it is of paramount importance to conduct a comprehensive examination of the service architecture. This entails identifying bottlenecks or constraints and subsequently implementing appropriate optimizations or enhancements to ensure that the server's responsiveness is both efficient and timely.

Incomplete or missing data

Gender disaggregated data

Due to interoperability challenges, data pertaining to gender could not be retrieved for approximately 0.1 percent of respondents. Within the population data service, the lack of gender data can be attributed to various factors, including human errors, system or equipment malfunctions, sample loss, and/or deficiencies in the technical aspects of data recording.

To address this issue, it is imperative to establish robust protocols for data exchange, ensure uniform data formats and adherence to standards, and implement error-checking mechanisms. These measures collectively aim to minimize the adverse effects of these factors on the accuracy and comprehensiveness of gender data within an interoperable framework.

The availability of gender-disaggregated data is pivotal in identifying gender-specific trends in energy consumption, expenditure, and accessibility to energy services. Subsequently, this information can be used to design targeted interventions aimed at enhancing energy access and alleviating energy poverty among both women and men. Furthermore, gender data aids in identifying the distinct requirements and vulnerabilities of women and girls in the context of energy poverty and susceptibility. For instance, it can highlight the impact of energy poverty on women's health, safety and education.

Heating data from tenants' association of condominium

The challenge linked with the heating data sourced from the condominium dataset lies in its aggregated nature at the association level. Consequently, it becomes complex to attribute heating usage and consumption to individual households, given that they lack distinct NLCs on a per-household basis. Instead, a singular NLC is assigned for the entire condominium.

This presents a hurdle for the EVRF's objective of tailoring compensations based on energy consumption and vulnerability, specific to each household.

Since the NLC is unique to each association rather than each household, the association receives a collective heating bill encompassing all households within it. Subsequently, the association's accountant must generate separate invoices for each apartment or household, derived from energy metre readings of individual apartments.

To tackle this challenge, it is imperative to devise a means of disaggregating the data down to the household level directly within the EVIS. This enhancement would facilitate more accurate targeting of compensations based on individual energy consumption and vulnerability levels. This endeavour involves collaborating with condominium associations to acquire more detailed data or exploring alternative data sources, such as individual household energy bills, to augment the existing dataset.

For the 2022–2023 heating season, these data were procured through email exchanges and the sharing of Excel files between EVIS administrators and administrative bodies of associations. This process proved immensely labour-intensive, with up to 500 emails exchanged per month. A more direct integration of association data into EVIS would streamline operations, alleviate the manual workload, and minimize the likelihood of human errors.

Income data

Despite EVIS incorporating data from the Fiscal Inspectorate to validate, supplement and rectify income information provided by applicants, instances still arise where the energy vulnerability category is computed using a reported monthly household income of zero. This stems from the fact that the Fiscal Inspectorate lacks income data for these specific households, resulting in MConnect's inability to furnish this information to EVIS.

As of March 2023, there were 28,384 households denoted with "total monthly income = 0". This circumstance highlights cases where fraud may be occurring, yet EVIS lacks the capability to rectify them. It is implausible for a family to subsist without any income. Because the computed income for these households was zero, they were categorized as having "very high" energy vulnerability.

Given that undisclosed employment is a significant challenge in the Moldovan labour market, various ambitious initiatives have been launched nationwide in the past year to address this issue. These include the "Trecem pe alb" campaign, the overhaul of the Labour Inspectorate, and a comprehensive campaign to recruit labour inspectors. While these endeavours aim to enhance the comprehensiveness of the national income database, there is also room to implement internal measures within EVIS to prevent unjust categorization of energy vulnerability for such cases.

Evaluating the impact of the energy compensation scheme

Overview of energy market

Moldova's economy remains highly energy- and carbon-intensive, with a large potential to increase energy efficiency, a broader deployment of renewable energy, and reduction of air pollution and greenhouse gas (GHG) emissions (Kirchner et al., 2021). Around 90 percent of its national energy needs are covered by energy imports associated with substantial costs and volatility. According to the national statistics, in 2021, the annual energy imports amounted for around US$1.1 billion, or 8 percent of country's GDP.

Limited progress has been achieved on the supply side in the diversification of the supplies of both gas and electricity through an interconnection of the existing gas distribution system with Romania. Similarly, greater efforts are needed in deploying renewable energy, including introducing relevant incentives and support mechanisms.

On the demand side, Moldova has had limited experience with targeted systems of energy price subsidies. Historically, some households in Moldova were eligible for sporadic support distributed by the local authorities. For example, some municipalities have a history of providing subsidies (around US$30–60 per month) to vulnerable groups. Households' support schemes are generally non-targeted and based on tax reductions and exemptions. For example, the value-added tax (VAT) imposed on gas and electricity is set at 8 percent instead of the standard level of 20 percent. Before establishing the EVRF, energy consumption subsidies increased from US$141 million in 2011 to $182 million per year in 2014, i.e. around 2.3 percent of GDP.

In recent years, Moldova has been making efforts to diversify its energy mix and increase the share of renewable energy. It has significant potential for renewable sources such as hydropower, solar, wind and biomass. Several renewable energy projects have been implemented, including wind farms and solar power plants.

Additionally, Moldova has recognized the importance of improving energy efficiency to reduce energy consumption and dependency on imports. Various initiatives and programs have been implemented to promote energy-efficient technologies and practices in buildings, industry, and transportation.

The country aims to enhance its energy security by reducing its reliance on imported energy resources, diversifying energy sources, and improving energy efficiency. The country has been exploring opportunities to increase domestic energy production and improve interconnections with neighbouring countries by actively participating in regional energy cooperation initiatives, including the Energy Community and various projects aimed at enhancing energy connectivity in the region. It seeks to strengthen energy cooperation with neighbouring countries and diversify its energy supply routes.

The rationale for energy subsidies in Moldova

Moldova is recovering from the pandemic-induced economic downturn in 2020. In addition, the Russian invasion of Ukraine has now led to the worst energy crisis ever experienced in the country. In 2022, Gazprom from the Russian Federation reduced its gas delivery to Moldova by over 30 percent and Ukraine stopped exporting electricity to Moldova, which led to an even greater energy deficit. The situation has placed energy vulnerability and energy poverty at the forefront of any policy debate in Moldova.

The immediate effect of the energy crisis in Moldova has been a rapid increase in the rate of inflation, driven by a quadrupling of electricity prices on the back of the gas supply shock. The increase in energy prices started in the winter of 2021–2022 and peaked in November 2022. Due to the pre-existing socio-economic challenges, such as food poverty in both rural and urban areas, a high proportion of the population live in poverty, and a health crisis exacerbated by the COVID-19 surge in prices, the level of energy poverty has risen to over 60 percent in Moldova (Gray Molina et al, 2022).

Research conducted by the UNDP Global Policy Network (UNDP, 2022) highlighted that inflation figures showed an increase in overall utility prices of 105 percent in September 2022 compared to September 2021. As a result, Moldovan households were reported to have started supplementing their additional spending on energy from lower spending on other subsistence goods such as food, after already cutting spending on virtually all non-essential goods. The study suggests that under the current levels of inflation, the number of people living in poverty could increase by around 640,000 people, with approximately 35 percent of the Moldovan population at risk of falling below the poverty line; if the energy crisis had not occurred, it was estimated that only over 10 percent of the population would have fallen below the poverty line.

A combination of supply and demand interventions are needed to curtail the effects of the energy crisis and alleviate energy poverty. A situation where subsistence spending on one necessity (energy) must be carefully weighed against spending on another (e.g. food) is not a tenable and had to be addressed with the utmost urgency.

As a demand-side measure and to tackle the impact of the energy crisis, the Moldovan Ministry of Labour and Social Protection (MLSP) with technical support from UNDP, introduced a Law on the Energy Vulnerability Reduction Fund, in July 2022 (Law 241/2022), which came into force in September 2022. The Law aims to prevent and combat the population's energy vulnerability, to increase the energy accessibility among vulnerable consumers, and to promote energy efficiency. The main objective of the energy vulnerability fund is to finance energy vulnerability reduction measures and programmes including compensations for the payment of energy bills intended for vulnerable energy consumers, subsidies for the efficiency of energy resources consumption, and other measures of social assistance.

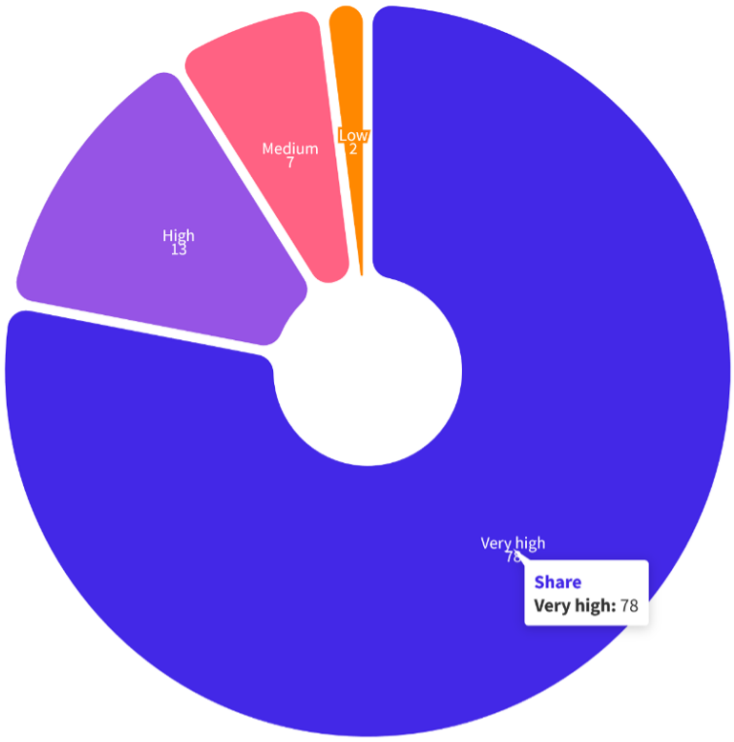
As part of the Law, the Government of Moldova launched the EVIS in October 2022, an online platform that allows registering and processing of requests for on-bill compensation of people's expenses towards energy-related consumption. The programme stipulates a differentiated compensation scheme with five categories of energy vulnerabilities for households: (i) consumers with very high; (ii) high; (iii) medium; (iv) low energy; or (v) no energy vulnerability. These categories are based on income level, number of people within households, number of assets (real estate) owned, and main type of heating source and energy expenses, among others. Based on a ratio between energy expenses and disposable

income of each family, households are assigned into one of the five categories.1 Once assigned a vulnerability category, the household's energy tariff is re-calculated with the actual subsidies and the consequent changes in tariffs by vulnerability category.

During the online registration process on the dedicated platform, data are automatically cross-referenced with other relevant official government datasets to ensure concordance of data and avoid mistakes and duplicated entries. As of the end of March 2023, over 850,000 households, which represent more than half of Moldova's households, according to national census data, registered to benefit from the compensation scheme (Figure 1).

As part of this scheme, the compensation is paid directly to the energy supplier, which credits the energy account of consumers. This helps households to retain some of their disposable income that would otherwise be spent on energy and allows them to dedicate their expenditure towards purchasing food and other basic items. By subsidizing the energy bills of vulnerable households, the Moldovan Government is helping to keep these households afloat and reduce what would otherwise have been a massive increase in the national poverty rate.

Figure 1. Share of beneficiaries with an approved vulnerability category (EVRF) (%)

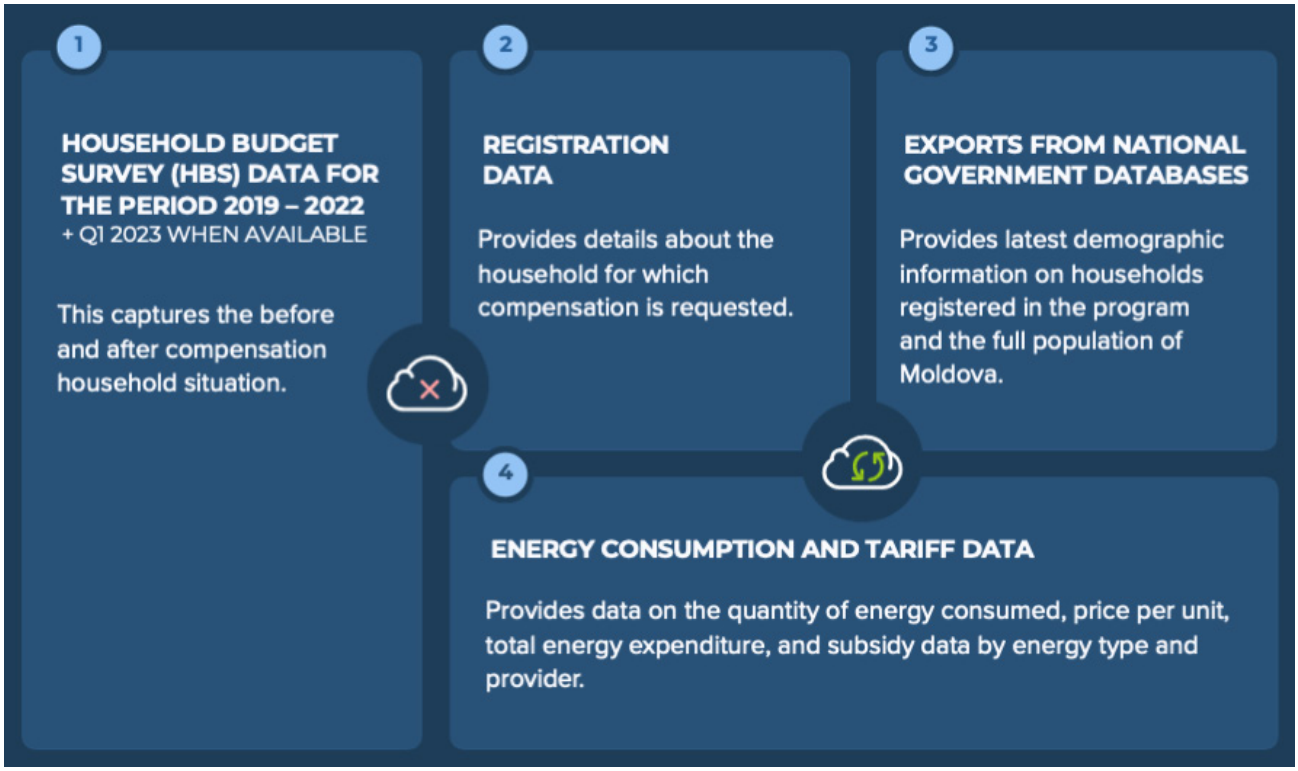


Vulnerability category	Number of households in each vulnerability category	Percentage (%) of households in each vulnerability category
4 - Very High	592 835	77.7%
3 - High	97 715	12.8%
2 - Medium	54 794	7.2%
1 - Low	13 202	1.7%
No vulnerability category	4 298	0.6%
Total	**762 844**	**100%**

Data and overview of household's energy consumption

The evaluation of the impact of EVRF on curbing energy and income poverty relied on several datasets summarized in Figure 2 and described in detail in Annex A1.

Figure 2. Datasets used in microsimulation



The main objective is to analyse the impact of the EVRF on energy and income poverty by focusing on these key research questions:

1. What is the impact of the energy compensation on energy and income poverty?
   - What is the impact on households below the poverty line?
   - What has been the impact in terms of lifting those below the poverty line above the poverty line?
2. What is the impact of the energy compensation on energy consumption?

The data presented in this section are based on the data gathered from the registrations to the EVIS for the period from November 2022 to February 2023. Registering and providing key data allowed households to qualify for energy compensations, based on their category of energy vulnerability.

The total sample comprises more than 700,000 observations. The data cover basic demographic characteristics of applicants such as the household size, gender, age and economic variables such as average household monthly income (declared and calculated, in the last six months), net expenditure, sum of monthly social benefits received, estimated expenditure on energy, and the vulnerability category based on the ratio of energy expenditure to net income (as calculated in the EVRF programme).

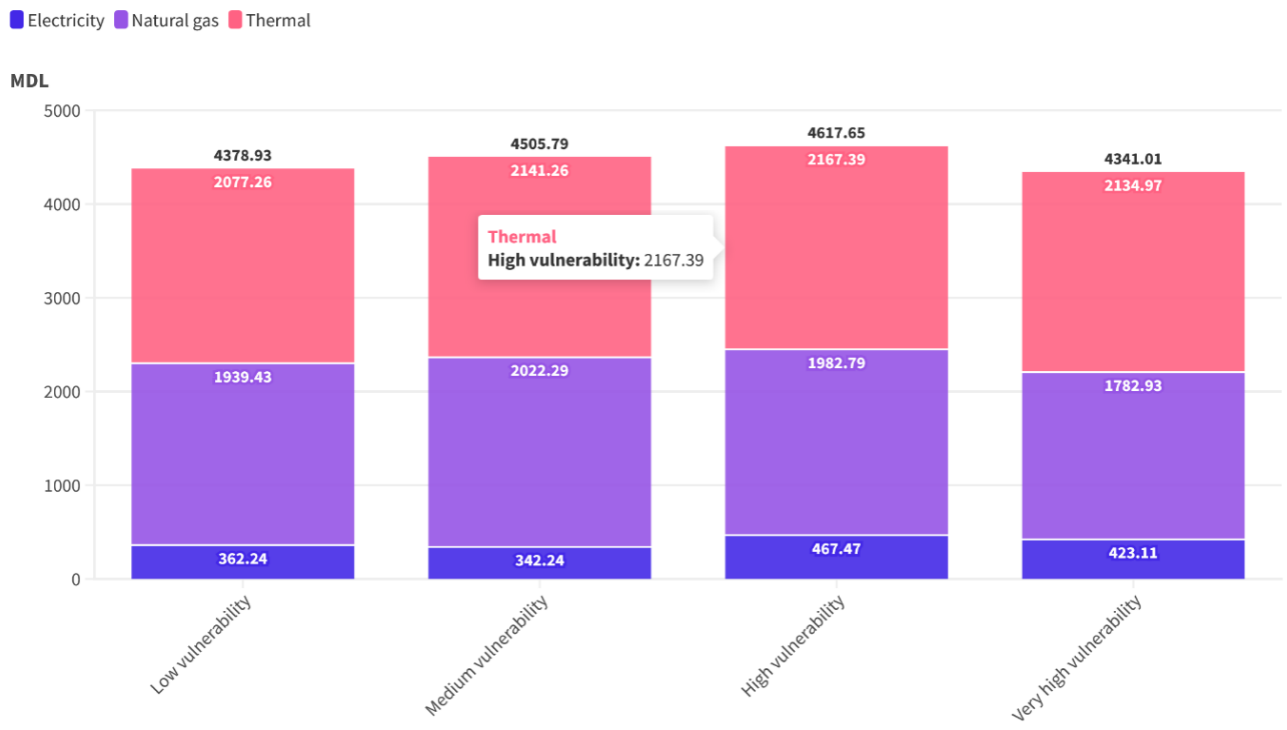
Figure 3 shows that household expenditures on thermal energy and gas were disproportionately higher than on electricity and do not significantly differ across vulnerability category.

To compensate households, most of them received subsidies, which varied according to vulnerability category and the type of energy being used to heat their home. The most vulnerable households that consumed thermal energy and gas received between two and three times more, respectively, than low vulnerability households to prevent a negative impact on household budget and thus reduce energy poverty.

On average, highly vulnerable households that consumed natural gas received over MDL 1,000 more subsidies than medium and low vulnerability households, which received MDL 853 and MDL 359, respectively. Similarly, very high vulnerable households using thermal energy saw their bills reduced by MDL 1,324, while low vulnerable households received a compensation of MDL 795 L on average (Figure 4).

In comparison to the winter of 2022, gas prices have risen significantly by MDL 15.87,or 118 percent. For natural gas, the price range that households are required to pay per m3 starts at MDL 12 for the high vulnerability category, to MDL 29.27 for the non-vulnerable category without any compensatory contribution.

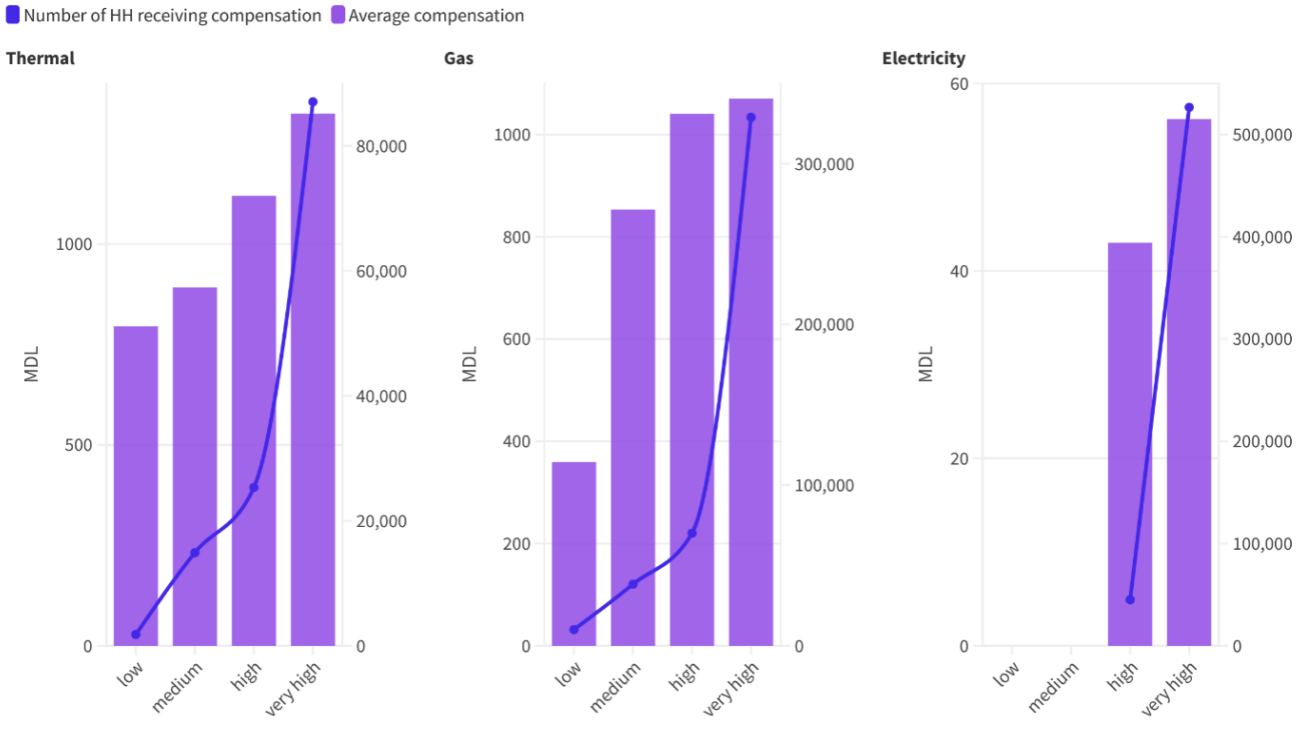
Figure 3. Energy expenditure by vulnerability category – registration data



However, the government's gas subsidies were able to cover 63 percent of this price increase. This means that households were only left to bear 37 percent of the additional cost due to the higher gas prices. For households using thermal energy, the situation was more challenging, as the price of thermal energy saw a substantial increase of 75 percent. The price that households are required to pay per m3 ranges from MDL1,450/GCal for highly vulnerable households, to MDL3,082/GCal for the least vulnerable who are not receiving any subsidy. Nonetheless, the government's subsidies managed to cover 84 percent of this price hike. Electricity subsidies, although covering a significant portion of the population, were not as effective in dealing with the rising electricity prices. They were only able to cover 11 percent of the price increase for electricity, leaving households to pay the remaining 89 percent of the increased costs.

The average household net income (calculated as the household income after deducting the household's minimum expenditure level – MDL 3,430 for the main applicant and an additional MDL 2,400 for each subsequent family member registered) is MDL 5,725, which is above Moldova's average minimum wage of MDL 4,000 per month.

Figure 4. Compensation by vulnerability category – registration data



Microsimulation – effects of EVRF on energy and income poverty

Given the significance of the residential sector in terms of energy consumption, a comprehensive understanding of households' energy consumption patterns and choices is imperative. As a departure point, this section provides essential information concerning the sensitivity of household energy demand relative to price changes and the expenditure of products contained in the basket of household goods, as well as interdependences between energy types at this level. The details of the methodology used to assess the effectiveness of EVRF is described in detail in Annex A2.

Table 1 shows the price elasticities for energy in the two expenditure categories across different vulnerable groups. Each cell in the table quantifies the change in demand of the commodity specified in each column in response to the change in energy prices. This is estimated for each vulnerability category, shown in each row.

Increasing energy prices will reduce energy demand through two channels. In the face of higher prices, economic theory predicts a reduction in demand for the product. The purchasing power of vulnerable households will also be affected, yielding a further reduction in demand for the product. These two effects are summarized by the un- compensated elasticities displayed in Table 1. Note that the own price elasticity for the most vulnerable category (most energy poor) has the smallest absolute value. Higher energy prices and low demand responses will expose vulnerable households to higher energy expenditure. This group already spends a higher proportion of their income on energy expenditure than do more affluent households. This implies that, in the face of higher energy prices, households in these groups will face the largest burden given their inability to reduce energy consumption and the fact that they already spend a disproportionate share of their income on this commodity.

In general, households react weakly to price changes for all energy items. Most own-price elasticities are below −1, with the strongest response observed for gas in the low vulnerability category (-0.360). Based on the estimates, some differences are expected in energy poverty before and after the introduction of EVFR in November 2022. The evaluation of cross-price elasticities reveals that electricity and gas are weak complements, even more so for households in the higher vulnerability category. The cross-price elasticities between energy items and other categories clearly shows the important role of energy prices for other categories of expenditure. If energy

Table 1. Uncompensated own and cross price elasticities

		ELECTRICITY	GAS	OTHER
Low vulnerability	Electricity	**-0.283*** **	-0.053***	-0.597***
	Gas	-0.071***	**-0.360*** **	-0.635***
	Other	-0.039***	-0.028***	**-0.934*** **
Medium vulnerability	Electricity	**-0.165*** **	-0.077***	-0.698***
	Gas	-0.095***	**-0.246*** **	-0.820***
	Other	-0.045***	-0.038***	**-0.911*** **
High vulnerability	Electricity	**-0.103*** **	-0.081***	-0.737***
	Gas	-0.100***	**-0.144*** **	-0.914***
	Other	-0.048***	-0.042***	**-0.905*** **
Very high vulnerability	Electricity	**-0.065*** **	-0.086***	-0.853***
	Gas	-0.099***	**-0.153*** **	-0.859***
	Other	-0.051***	-0.042***	**-0.900*** **

prices are declining because of energy subsidies, households are expected to increase the consumption of other goods.

Table 2 reports income elasticities. High income responses towards gas use can be observed, with slightly rising budget elasticities all above 1 and rising over the vulnerability categories. Gas is clearly a luxury good for households of all incomes. Electricity also exhibits budget elasticities close to 1 and seems to be a necessity since the quantity demanded declines with rising income. However, for highly vulnerable households, electricity is a luxury good.

Table 2. Income elasticities

	ELECTRICITY	GAS	OTHER
Low vulnerability	0.932***	1.065***	1.001***
Medium vulnerability	0.941***	1.160***	0.995***
High vulnerability	0.920***	1.158***	0.996***
Very high vulnerability	1.004***	1.110***	0.994***

Microsimulation results

Based on the estimated price elasticity matrices reported above, the authors simulate how much a household would have spent in November and December of 2022 if it had not received the reduced bills; i.e. total expenditure on electricity and gas is simulated using market prices and evaluate whether EVRF had any effects in reducing energy poverty. Market prices are obtained from energy distributors directly. In case of multiple energy distributors for gas and electricity, the average value was taken for specific month.[1]

Since EVRF was in operation since November 2022, the simulation of energy compensation on energy poverty was conducted using HBS data limited to the months of November and December 2022. The authors calculated two metrics commonly used to estimate energy poverty. As a first indicator, the share of energy expenses relative to its disposable income (income minus taxes) was calculated. A common threshold of 10 percent is applied when categorizing household as being energy poor; however, the threshold should be set relative to the actual distribution in a specific country. The second indicator used is based on minimum income standard. The most common indicator in this group is referred to as low-income high-cost (LIHC). This measure is helpful in distinguishing energy poverty from generalized poverty because the household is not considered poor before the deduction of energy costs (poverty due to energy costs). A household is considered energy poor if the equivalized income is less than 60 percent of the median household income, and its energy expenditure constitutes more than 60 percent of median energy expenditure.

Figure 5 shows the change in the energy indicator (10 percent threshold) before and after the compensation. It emerges that energy subsidies have strong effects on the energy poverty rate. In the case of gas, the share of very highly vulnerable households in energy poverty increases by 71 percentage points, or 272 percent, and in the case of electricity by 12 percent if the households were not subsidized. An electricity price increase results in much lower energy poverty levels than gas price increases. Looking at different categories of vulnerability, it can be observed that the impact of EVRF is progressive in the case of gas; i.e. the percentage change increase in the number of low vulnerable households facing energy poverty after a price increase is several times higher than for very high vulnerability households, which suggests that EVRF benefited the latter group more.

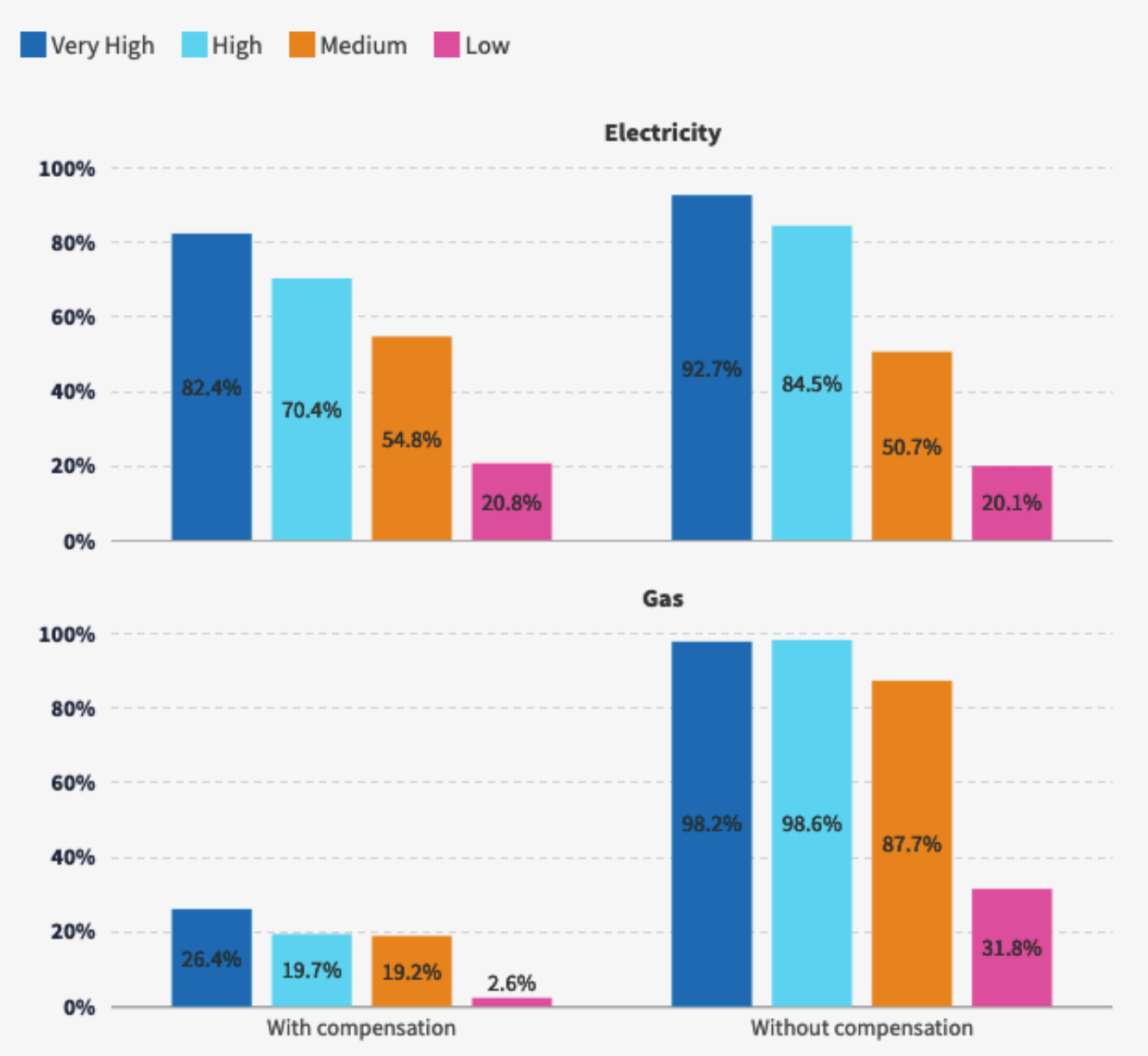
However, there is a significant difference between the type of fuel being used: an increase in electricity prices benefit low and medium vulnerability households, while an increase in gas prices has a disproportionately higher detrimental impact on low vulnerability households, and to a certain extent, medium vulnerability households.

Figure 6 sheds more light on how compensation measures introduced in November 2022 affect poor households whose per capita expenditures is below the national poverty line. Yet for the low vulnerability group, there are no households that are energy poor, and whose per capita expenditure is below the national poverty line: the impact of compensation starts to be noticeable for households who are highly vulnerable to energy poverty. As was the case before, subsidies for gas have a higher impact on reducing energy poverty for those below the national income poverty line. For the highly vulnerable group, for instance, the gas compensation completely eliminates energy poverty and reduces it to 12 percent for very high vulnerability households.

For electricity, the subsidies do not impact low and medium vulnerable households. However, number of energy poor among the most vulnerable households drops by about 31 percent on average.

1 The use of thermal energy is very limited across households in the HBS and therefore was excluded from the analysis.

Figure 5. Proportion of households in energy poverty



In addition, across all four vulnerability categories, the decrease in income poverty is substantial (Figure 7). For the very high vulnerability category, the proportion of poor households is decreased by 43 percent. More importantly, the reduction in income poverty rises progressively according to the vulnerability category, thus benefiting the households in the high and very high vulnerability categories the most.

Change in energy consumption

To further examine the impact on energy subsidies, the authors use the data provided from the EVRF applicant registration data for the periods from November 2021 to February 2022, and from November 2022 to February 2023. The dataset described in more detail in Annex A1 provides the opportunity to examine how energy compensation introduced in November 2022 affects energy consumption of households with different levels of vulnerability.

Figure 6. Proportion of households in energy poverty below the absolute national poverty line

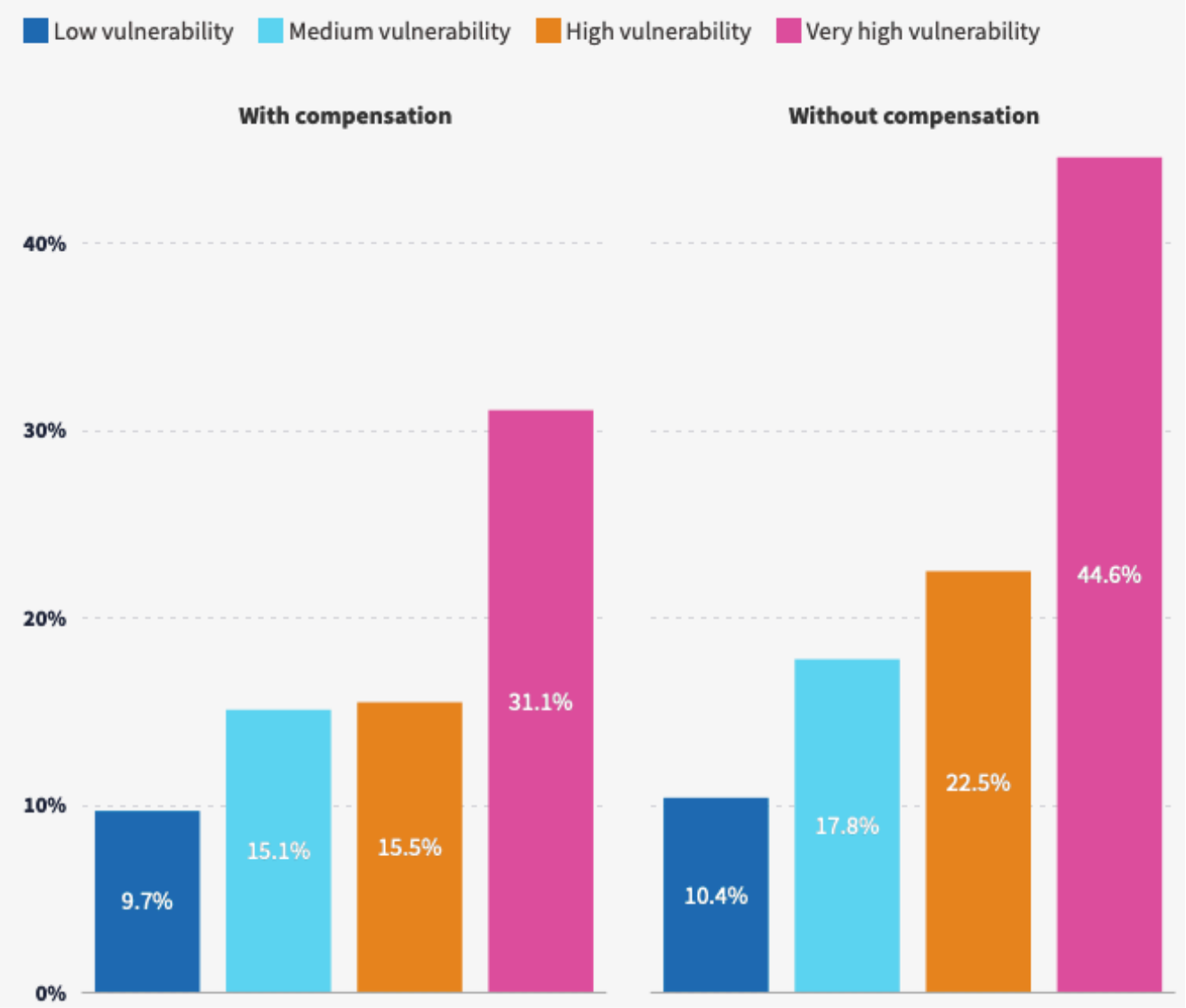
To this end, the authors relied on the panel-data random-effects model in which the dependent variable is one of the energy sources used in households for heating (electricity, gas or thermal energy), and the main explanatory variables are the amount of energy compensation and vulnerability category of households. In addition, household size and whether the applicant has a disability are considered control variables.

The graphs in Figure 8 show the effects of energy compensation on energy consumption across different energy sources for each vulnerability category. The effects of gas compensation declines according to the level of vulnerability, implying that the subsidies, although they increase energy consumption on gas for households in the low and medium vulnerability categories, start to decline with more severe levels of vulnerability.

The compensated amount for electricity seems to decrease consumption for low vulnerability household but increase it for other groups, especially for medium vulnerability households.

Subsidies related to thermal energy have the opposite effect than those related to gas and electricity because they decrease consump-

Figure 7. Proportion of households in income poverty



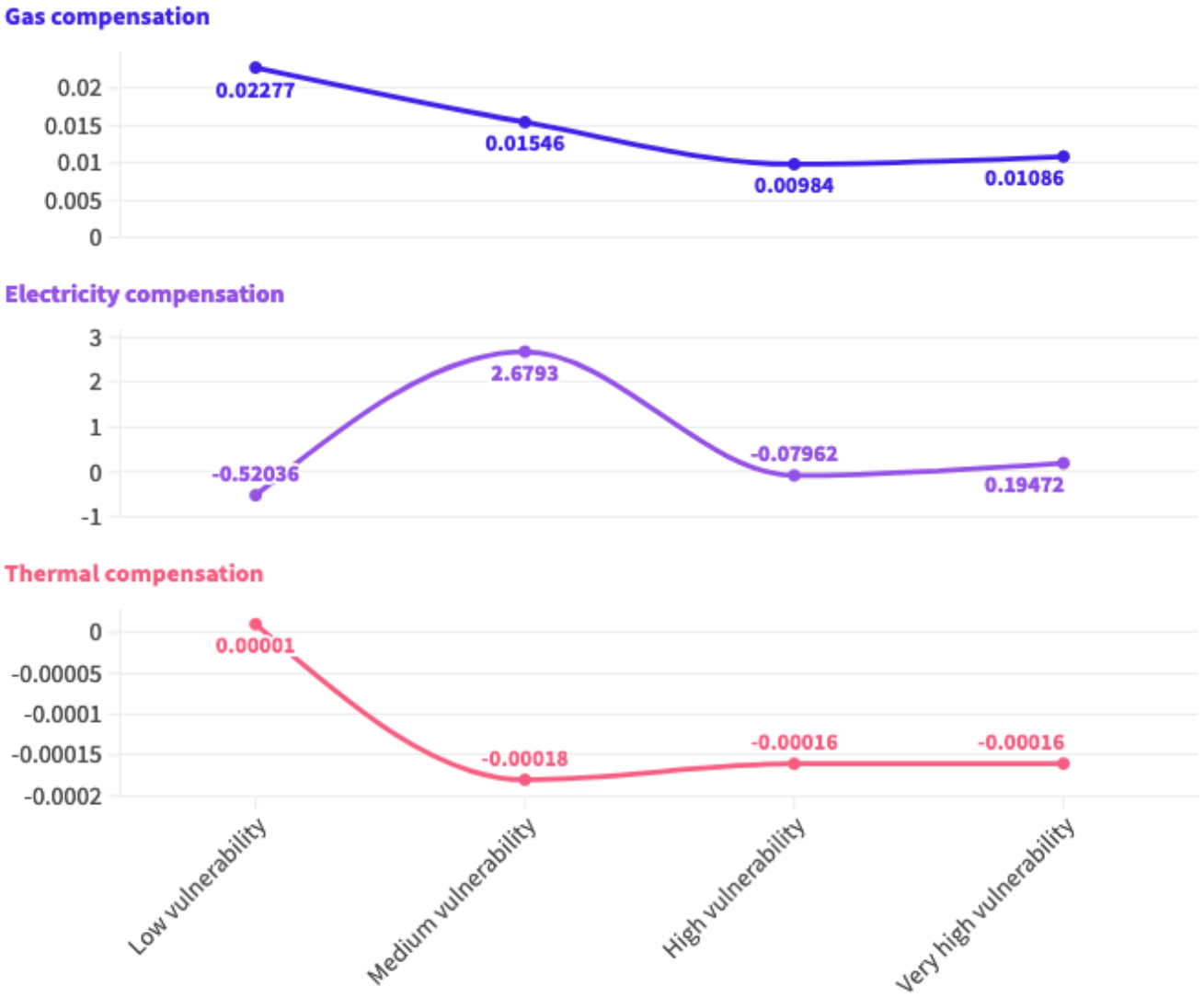
tion across all vulnerability groups, but less so for the very high and high vulnerability households than for the medium vulnerability one.

Key insights: microsimulation

The findings from microsimulation suggest that energy subsidies benefit those in the very highly vulnerability category the most. Given its success, it can be applied to other type of energy sources, but this would require a more detailed dataset that not only includes household characteristics that are necessary for better targeting, but also details on households that did not receive such a compensation to evaluate the true causal impact of the scheme.

A caveat that concerns this analysis is that the microsimulation was conducted only for the months of November and December 2022, without considering the entire winter period,

Figure 8. Impact of compensation on energy consumption



from November 2022 to March 2023, due to data limitations at the time of conducting the analysis. In addition, the EVRF applicant registration data had limited household characteristics that could be useful to gauge the impact of the compensation to a more disaggregated level and types of households, dwellings, etc. In general, there is also a lack of theoretical consistency with the existing energy poverty metrics. This requires research on the development of microeconomic foundations that allow transparency, homogeneity and replicability of these metrics.

Future research could address some of these challenges and take a step further by examining how incorporating an energy efficiency measure such as the inability to reduce energy consumption when facing higher energy prices can be linked to low energy efficiency levels.

Economy-wide Impacts of the Energy Price Compensation Policy

For the Government and policymakers to understand how interventions in a particular area impact the desired targets, it is necessary to use a comprehensive and systematic framework to analyse the entire economy, capturing the interconnections between various sectors, industries and agents. This allows for a more holistic analysis of the economy's response to different policy measures and helps make informed decisions and design policies that are more likely to achieve desired economic outcomes.

The SDG Push employs a CGE model to understand the potential impacts of and interventions. This model is used to build a case for policy intervention and assist policymakers in understanding the extent to which some sectors of the economy might be affected by change. Its main advantage is its flexibility, which allows to focus on the structure and details of agent-specific behaviour, and capture the detailed economic relationships and connections that would otherwise be missed in other models. This complexity allows the models to be applied to a wide range of 'what if' questions (see Annex A3 for further details).

Table 3. Key baseline macroeconomic indicators

	2019	2020	2021F	2022F	2023F
GDP, % real change	3.6	-7	3.8	3.7	3.8
Consumption, % real change	2.6	-7	2.5	2.7	2.7
Gross fixed investments, % real change	12.9	-2.1	7.8	8.7	8.9
Exports, % real change	7.3	-15.5	6.6	7.1	7.5
Imports, % real change	6.7	-8.9	5.1	6.3	6.5
External debt, % GDP	62	70.1	74.6	74	73.5
Fiscal balance, % GDP	-1.4	-5.1	-4	-2.8	-2.5
Public and guaranteed debt, % GDP	27.4	35.2	41.3	42.5	43.6

Source: World Bank (2021a).
Note: 2021, 2022 and 2023 are forecasts.

The baseline for the analysis is taken from the International Monetary Fund (IMF) April 2021 economic outlook (IMF, 2021) for Moldova (Table 3). The outlook was marked by multiple uncertainties, including the evolution of the COVID-19 pandemic and the local political environment. Given the limited economic activity in 2020 and GDP declining by 7 percent, driven by lower private consumption and five-year low employment levels, a slow recovery is expected.

The slow rebound in 2021 gave rise to inflation, reaching 3.8 percent in 2020 and sharply increasing in 2021. The country's fiscal stance was challenging due to the efforts to mitigate the impacts of the pandemic and weak labour market conditions. As a result, public debt is expected to increase. The expected budget deficit in 2023 will reach around 6 percent of Moldova's GDP. Poverty, measured by the US$5.50 PPP per day poverty line, is expected to increase.

Scenarios used

A series of scenarios were run – baseline scenario, an external gas price shock, and two alternative policy responses to the external shock.

In the baseline scenario, labour supply increases in line with population growth, and total factor productivity (TFP) is adjusted to mimic IMF GDP projections. The 2021 projections for 2022–2025 were used because they do not include price shocks due to the war in Ukraine.

TFP was maintained at the same level as in the baseline for the external price shock scenario. However, here, changes in the international price of natural gas are introduced for 2022–2024. Data from the World Bank's com-

modity price forecasts[2] were used to compute the price changes. This dataset includes observed and projected prices for two categories of goods: energy products and non-energy products. To calculate price changes, price projections before the war in Ukraine and during the war were compared (Table 4).

As shown in Table 4, the price of natural gas on the European market more than doubled in 2022 after the start of the war, which could represent a significant negative shock for an economy like Moldova's, which depends on imported gas.

In the targeted price subsidy scenario, it is assumed that the Government introduces a subsidy on the consumption of natural gas for households in response to rising prices. It is also assumed that gas prices will return to pre-war values by 2025. The model endogenously determines household-specific subsidy rates consistent with the total funds allocated to the compensation policy. However, the model includes assumptions consistent with the fact that the most vulnerable households would receive the highest subsidy rate. The total subsidy to households during the three years (2022–2024) of the Funds' contribution amounts to MDL 1,750,5, or 0.72 percent of the 2021 GDP. The Government's contributed 42 percent of the total Fund, while external transfers covered 52 percent. It is assumed that the Government's contribution is drawn from its savings, i.e. the compensation policy will likely reduce its capacity to invest in projects. Since the model assumes that public investment is exogenous, the Government will likely take money from the private sector to maintain the required level of investment.

There are multiple options to deliver subsidies to vulnerable households. These options typically differ in efficiency costs or incentives that they generate for households. For comparison, the authors explored an alternative intervention design in the form of a cash transfer where the eligible households would receive a respective amount in the form of a cash transfer from the Government. In reality, the amount would be determined by a specific law and maintain the distinction between households that reflects their degree of energy vulnerability. For the modelling scenario, the single household cash transfer is determined endogenously, so that the overall amount spent on this intervention remains equal to the scenario with price subsidy. The structure of financing the intervention remains the same as in the case of price subsidy.

Table 4. Key baseline macroeconomic indicators

2023 PROJECTIONS (UNIT - $/MMBTU)

COMMODITY	2020	2021	2022F	2023F	2024F
Natural gas, Europe	3.2	16.1	40.3	19.0	17.0
Natural gas, U.S.	2.0	3.9	6.4	2.7	3.7
Liquefied natural gas, Japan	8.3	10.8	18.4	18.0	16.0

2021 PROJECTIONS (UNIT - $/MMBTU)

COMMODITY	2020	2021	2022F	2023F	2024F
Natural gas, Europe	3.2	14.6	12.6	9.2	8.9
Natural gas, U.S.	2.0	4.1	4.0	3.9	3.9
Liquefied natural gas, Japan	8.3	11.9	11.4	10.0	9.8

Source: World Bank (2023). Commodity Markets.

Wide economic impact

The authors analysed an increase in the world price of natural gas starting in 2022, which increased by 219.84 percent relative to the baseline. For 2023 and 2024, the price increase is projected to be 106.52 percent and 91.01 percent, respectively. These price increases were estimated by comparing the world natural gas projections in 2021 and 2023.

2 World Bank. Commodity Markets. www.worldbank.org/en/research/commodity-markets#1

An increase in natural gas prices leads to a decline in the country's GDP, as shown in Figure 10. The higher world price of natural gas increases the consumer price of natural gas and draws much of the demand of the households away from other goods. Concurrently, resources are drawn from other sectors to gas distribution, mining and services due to the temporary higher profitability. As a result, both supply and demand for production from the remaining sectors decline.

Income of all market agents, and with some exemptions, all households, declines in all scenarios year-on-year. In the targeted cash transfer scenario, it can be observed that the income transfer outweighs the income loss caused by the external price shock for household U3. The year-on-year income growth of all market agents and households is higher than in the baseline. In absolute terms, income remains below its baseline levels for the duration of the intervention.

Households U3 and U2 are better-off than the other households given that their income exceeds their baseline levels in 2023 and 2024, respectively. The strongest income growth relative to the baseline is recorded for u3 and the weakest for u2. As a result of the shock, all households reduce their consumption. Income dynamics are also affected by lower economic activity and resulting changes in tax revenues. Incomes and consumption continue rising after the natural gas world prices return to their original levels.

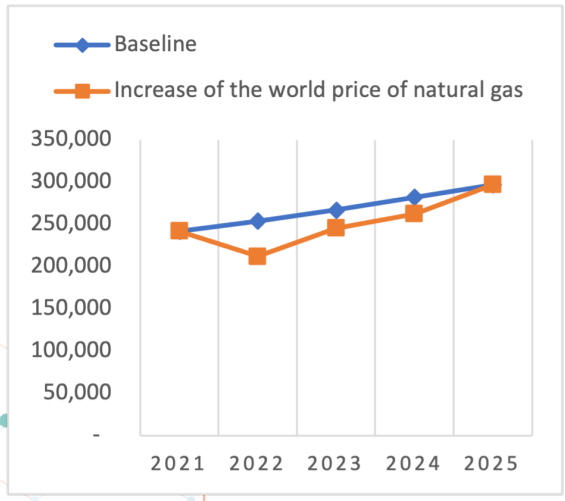
Exports decline for all products, together with a slow strengthening of the real exchange rate. Correspondingly, imports, specifically of agricultural commodities and services, continue increasing.

A decline in savings from all agents (firms, households and the Government) during the intervention can be observed. Only government savings continue declining once the world's natural gas prices return to equilibrium levels.

Most importantly, investments decline through the entire simulation period due to the rising prices of investment goods and declining demand (Figure 11). The turning point is 2025, when investments start increasing again. As a result, the GDP declines relative to the baseline scenario. The results also show an increase in unemployment following the price shocks.

Figure 10. Impact of natural gas price increase on GDP and consumption

GDP



CONSUMPTION

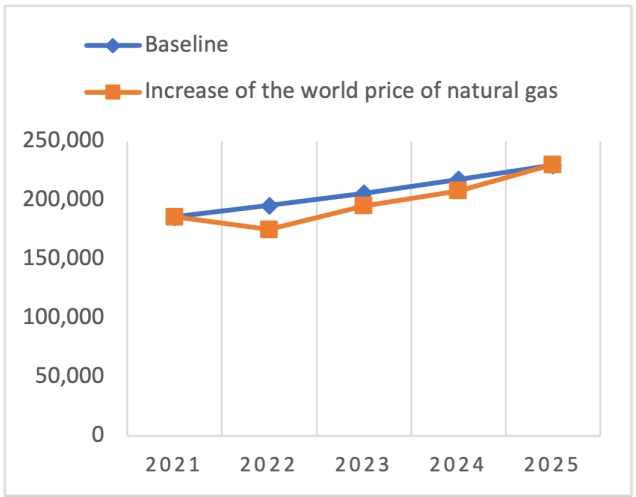
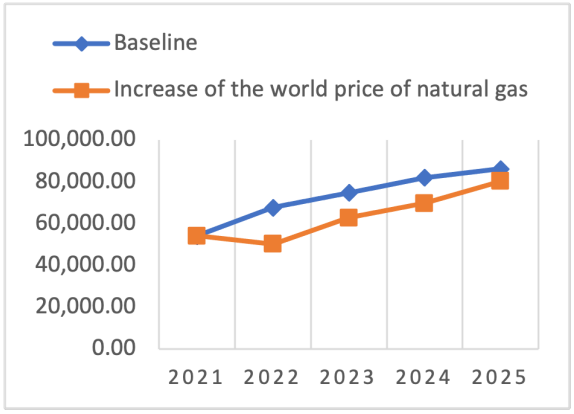
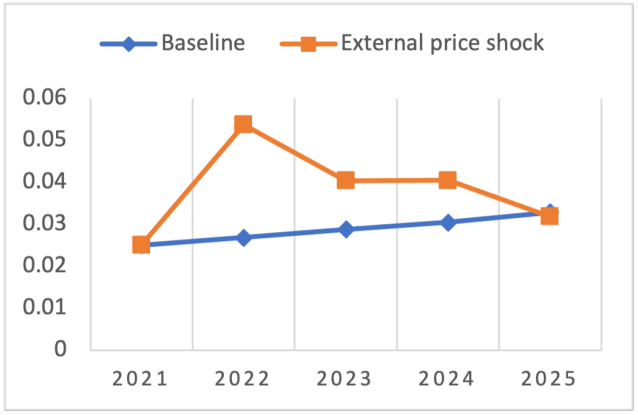


Figure 11. The impact of an increase of the world price of natural gas on investments, and the unemployment rate, 2021–2025

INVESTMENTS



UNEMPLOYMENT RATE



The two subsequent scenarios explore the impacts of the two distinctive designs of a fiscal intervention, i.e. a targeted price and income support to the households reflecting their energy vulnerability. More specifically, the following two scenarios are:

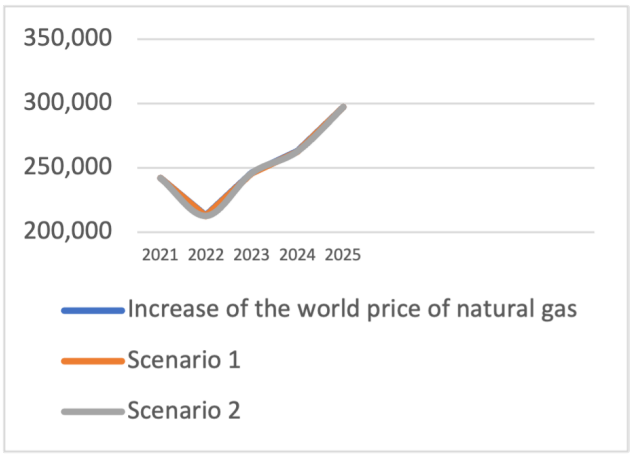
- **Scenario 1**: An increase in the world price of natural gas and a targeted price subsidy for natural gas consumption according the energy vulnerability of the households.
- **Scenario 2**: An increase in the world price of natural gas and a targeted income transfer according to the energy vulnerability of the households.

For both scenarios, the same funding structure of the intervention is maintained, i.e. 42 percent of domestic resources, and 58 percent are covered by the official development assistance (ODA). The overall value of the fiscal intervention also remains the same. Both interventions aim to offset the negative impacts of the shock of the increase in the world price of natural gas. Nevertheless, the results suggest that the impact of the intervention is small. Energy consumption price subsidies may also divert consumption away from or toward other products, depending on their degree of substitutability.

The results show that subsidy policy has mitigated the negative effect of the increased price of natural gas. If the goal is to increase GDP, then future subsidies should explore the targeted income transfer. It fares better than the targeted price subsidies in terms of GDP (Figure 12), consumption (Figure 13), investment (Figure 14) and unemployment (Figure 15). This is expected given that a cash transfer would allow households to allocate additional income according to their preferences. Consequently, they might consume domestically supplied products, which can have a higher multiplier effect.

Figure 12. GDP impact of price subsidy and cash transfer scenarios

GDP



GDP IMPACT

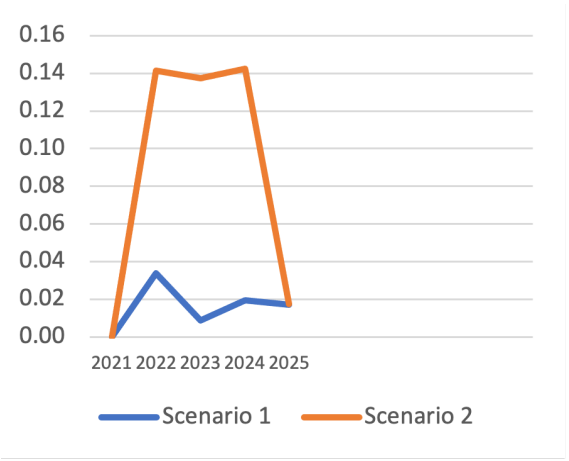
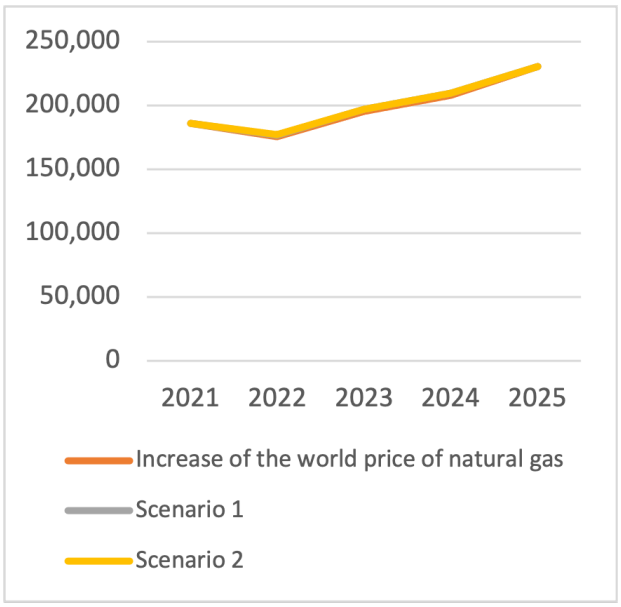


Figure 13. Impact on consumption of an increase in the world price of natural gas

CONSUMPTION



CONSUMPTION IMPACT

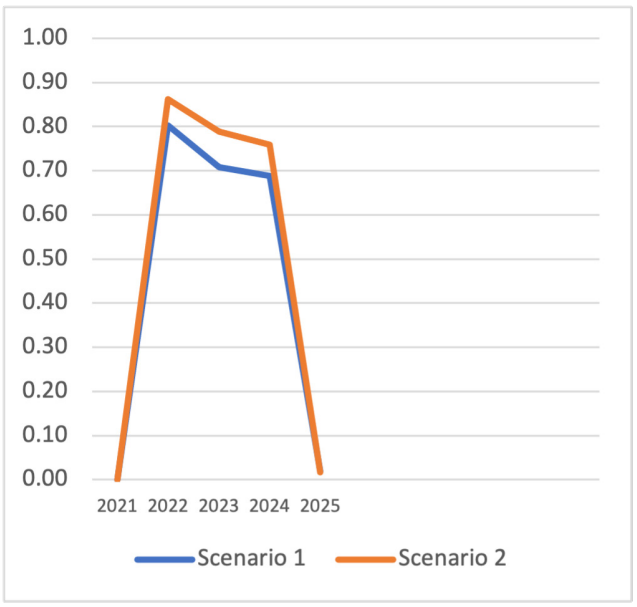
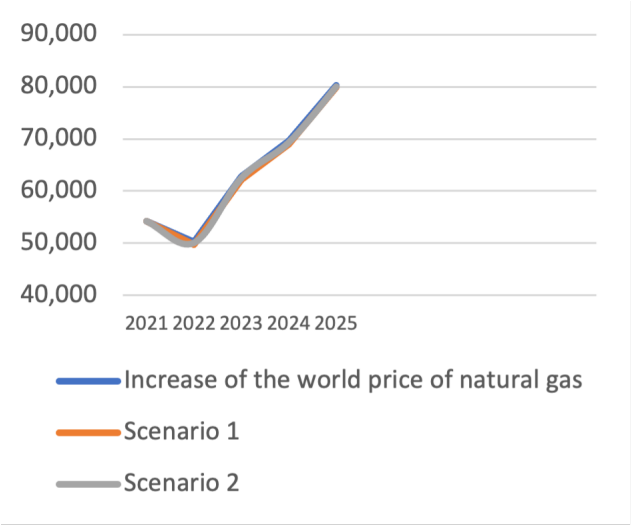


Figure 14. Investment impact of price subsidy and cash transfer scenarios

CONSUMPTION



CONSUMPTION IMPACT

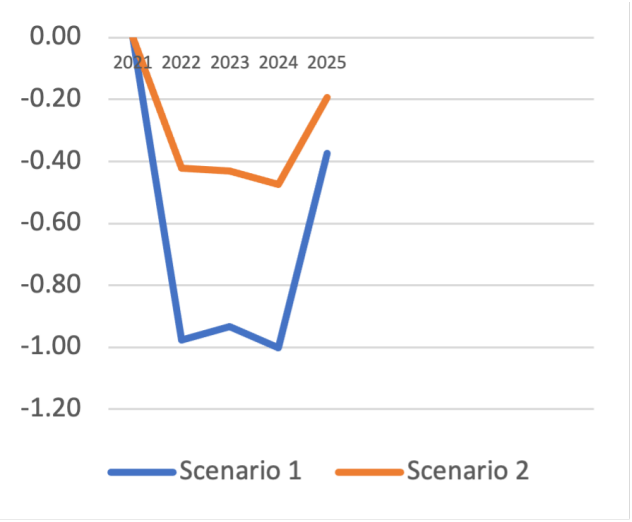
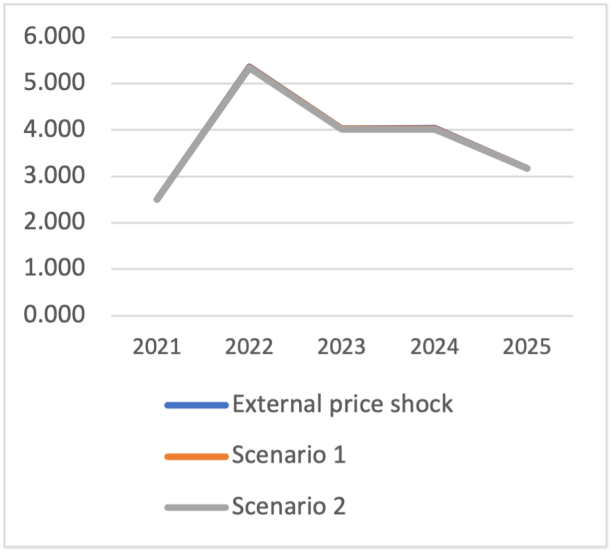


Figure 15. Unemployment impact of price subsidy and cash transfer scenarios

UNEMPLOYMENT RATE



UNEMPLOYMENT IMPACT

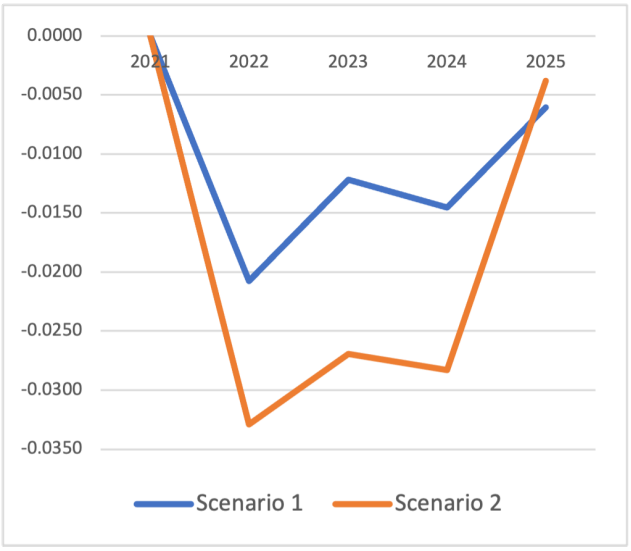
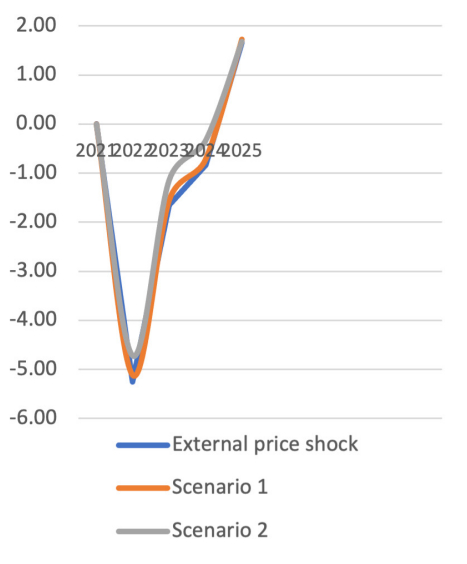


Figure 16 shows the impacts on household income. According to the estimated SAM, households generate their income from diverse sources including labour, capital and transfers from the Government and abroad. The results suggest that both scenarios offset the impact of external price shock. The cash transfer, however, is more effective by offsetting a larger share of the income lost due to the price shock. Several factors might be driving these results, including changes in demand by the preference mentioned earlier. Although the price subsidy contributes to the decline of natural gas prices, the price subsidy also alters the relative prices. As a result, households adjust their consumption and do not fully benefit from the support.

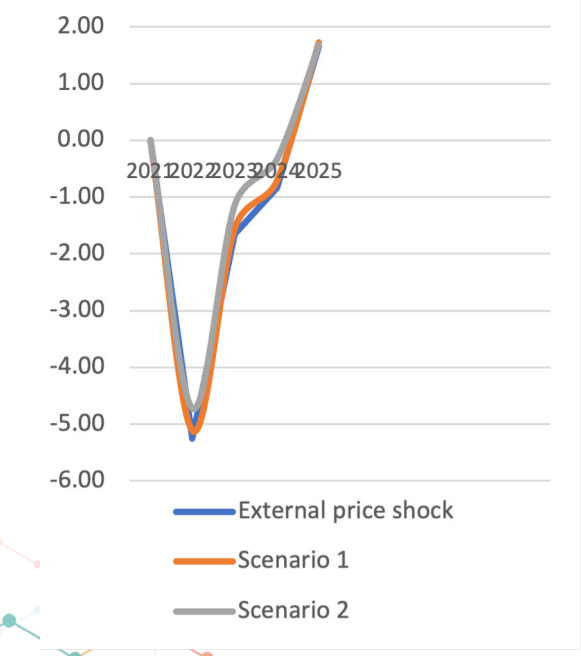
Figure 16. Households' income impact of price subsidy and cash transfer scenarios

HOUSEHOLD U1



HOUSEHOLD U2

HOUSEHOLD U3



HOUSEHOLD U4

Table 5 presents the estimated multipliers for both subsidy schemes. In line with previous results, fiscal multipliers are relatively higher in targeted cash transfers than in targeted price subsidies. However, a degree of caution is required in using the estimated values of fiscal multipliers as a measurement of the impacts of fiscal policies; there is a circularity problem with these estimates.

Table 5. Estimated values of multipliers

	2022	2023	2024
Fiscal intervention (MDL billion)	1,757.50	1,757.50	1,757.50
Fiscal multipliers (%)			
Scenario 1: External price shock and targeted price subsidy	0.041	0.012	0.029
Scenario 2: External price shock and targeted income transfer	0.171	0.192	0.213

Note: Funding structure for both scenarios: 42 percent covered using domestic resources and 58 percent using overseas development assistance.

The context for interpreting the results is crucial for drawing policy conclusions. Although the model offers a unique framework to study the transmission of external price shocks through the markets, the analysis carried out here is not without its limits. Major values of elasticities and assumptions regarding the production and consumption nesting are the key parameters that determine the strength of the pass-through effect and the overall macroeconomic impact. However, the authors conducted a credible sensitivity analysis elasticity parameter.

Key insights: CGE modelling

The increase in the import price of natural gas has severely affected Moldova's economy due to its high dependency on energy imports and lack of diversification among the fuels and sources.

The subsidy policy has helped to mitigate negative effect of price shocks. The targeted cash transfer is better than the targeted price subsidies. Although the difference is not significantly higher, the cash transfer reflects the households' preferences, including using the additional income for savings.

Neither price subsidies nor cash transfers of this order of magnitude can fully offset the negative impact of higher natural gas prices. This calls for finding an optimal subsidy rate (cash transfer income) to help households maintain their pre-shock levels of consumption while incentivizing substitution away from natural gas as part of the long-term goal of increasing energy efficiency.

This is a short- or medium-term analysis of energy price subsidies aiming to reduce energy poverty incidence in Moldova. In the longer term, energy price subsidies may constitute an incentive for, or a deterrent from, innovation, technological development and productivity growth. They may also affect individuals' decisions in the allocation of factors and distribution of consumption over time. Through their impacts on relative prices and investment decisions of the firms, energy price subsidies may have significant adverse effects on allocating resources across sectors and economic agents, as the resulting price signals may not reflect the overall social costs of energy use.

The Government's limited fiscal space might be another factor to consider. Its use for energy subsidies might reduce the ability of the Government to meet other immediate fiscal needs. The United Nations Secretary-General's SDG Stimulus to Deliver Agenda 2030 lays out a blueprint to provide the means to implement energy subsidies by providing liquidity to support recovery in the near term, enhance debt relief for vulnerable countries, and better leverage lending.

Key recommendations

Based on the insights gained through the SDG Push process, the following interventions are proposed for further digitalization of public system services and for the future disbursement of energy subsidies through the EVRF platform:

1. **Enhanced Integration of ministry systems:** There is a need to further consolidate the systems within the MLSP into a unified collaborative platform. This integration will facilitate seamless connectivity with internal data from other agencies. Such streamlining will improve data availability and enhance their quality.

2. **Establishment of a national master database:** This centralized repository would compile data from various governmental databases, yielding multiple benefits for both governments and citizens. This unified database can provide accurate, current, accessible and comprehensive data, which can guide energy policy decisions and foster better inter-agency collaboration.

3. **Incorporation of standardized data from private energy suppliers:** Collaboration with suppliers on standardized data from private energy, gas and heat suppliers holds potential for offering valuable insights into energy consumption trends. This collaborative approach can lead to cost reductions and provide the basis for informed interventions to mitigate energy vulnerability.

4. **Integration of data from local public administrations:** Integrating data sourced from local public administrations can furnish a clearer understanding of energy consumption patterns at the community level. This localized insight can pinpoint areas requiring the most urgent interventions.

5. **Capacity building and staff training:** Given the substantial personnel involvement in the EVRF registration process, it is advisable to establish a dedicated staff training centre or utilize existing centres for enhancing data management skills. This training initiative will ensure improved data quality and proficiency among staff members.

In addition to specific recommendations related to the EVRF platform above, the MLSP should:

- Formulate and communicate a comprehensive data governance plan for the Ministry, uniting efforts related to data governance. It should also establish an internal data governance framework within the Ministry, outlining the roles and responsibilities of the various stakeholders engaged in the EVRF. Additionally, delineate processes and key policies for managing the data. This framework should undergo periodic evaluations and updates by the Ministry of Labour and Social Protection to ensure its continued relevance and efficacy;

- Give paramount importance to data quality by elevating data quality concerning the EVRF (and related systems) to a central priority. It should allocate resources to acquire the necessary tools and technologies, crucial for guaranteeing the precision, completeness, and uniformity of data. This encompasses regular data cleansing and standardization processes, combined with continuous monitoring and validation;

- Ensure robust data security by initiating the development and enforcement of an internal data privacy and security policy within the Ministry of Labour and Social Protection. It should also establish a dedicated working group to oversee how data are stored and utilized within the EVRF framework and align these practices with the GDPR regulations, adhering to EU standards;

- Streamline the registration process by simplifying it. This can be achieved by minimizing the number of required steps and information during the registration procedure. Such simplification enhances user convenience, facilitating their registration and access to compensation.

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Annexes

A1. Data used for microsimulation

For the microsimulation analysis, Moldova Household Budget Survey (HBS) data from 2019 to 2022 were used. The HBS, which is nationally representative, was administered by the National Bureau of Statistics of the Republic of Moldova. The total sample size of the Survey across the four waves was 16,648 households (HHs), distributed as follows: 2019 (n=4,408 HHs), 2020 (n=4,282) HHs, 2021 (n=4,079 HHs) and 2022 (n=3,879 HHs). This sample captures the before and during compensation household situation.

The Moldova HBS collects a wide range of variables to capture various aspects of the population's living conditions, socio-economic status and well-being. Some of the key variables are:

1. Demographic variables: These include information about household members such as age, sex, marital status, educational attainment and relationship to the head of the household.

2. Economic variables: These variables focus on the economic activities and financial situation of households. They may include employment status, occupation, industry of employment, income sources and household expenditure patterns.

3. Housing variables: These variables provide insights into the housing conditions of households, including type of dwelling (e.g. house, apartment), housing quality, ownership status, rental costs, access to basic amenities (e.g. water, electricity) and sanitation facilities.

4. Assets and wealth variables: These variables capture information on household assets such as land, livestock, vehicles, savings and other financial holdings. They help assess the wealth and economic well-being of households.

5. Education variables: These variables cover educational indicators such as literacy rates, school enrolment, highest level of education completed, and educational aspirations of household members.

6. Health variables: These variables focus on the health status and healthcare utilization of household members. They may include information on self-reported health, disability status, access to healthcare services, and health insurance coverage.

7. Social assistance variables: These variables capture the participation of households in social assistance programmes or safety net initiatives, such as social pensions, child allowances and targeted cash transfer programmes.

8. Migration variables: Given the significance of migration in Moldova, surveys often collect information on migration patterns, including international and internal migration, remittances and the impact of migration on households.

9. Access to services variables: These variables assess the accessibility of households to essential services such as education, healthcare, clean water, sanitation and transportation.

10. Poverty and inequality variables: These variables are used to estimate poverty rates and measure income or wealth distribution within the population. They include variables related to income, consumption and wealth, and various poverty indicators.

These variables provide valuable insights into the social and economic conditions of households in Moldova, helping to inform policies and interventions aimed at improving the well-being of the population.

1. Energy consumption data by distributor and energy type: This dataset contains the respective quantities consumed and expenditure on gas, electricity and thermal energy. The data cover the period from October 2021 to July 2022.

2. Energy consumption data by distributor and energy type for the period November 2022 to February 2023. The variables covered include the following:

   - the total volume of the energy type delivered to the household consumer;
   - the volume of the energy type delivered within the limits of the maximum compensated;
   - the total expenditure in each energy type – electricity, gas and thermal by each household;
   - the total energy expenditure by each household;
   - the category of energy vulnerability as assigned by energy companies;
   - the amount of compensation for maximum volume compensated per month (in MDL);
   - the name of the energy distributor .

3. The registration data of the Energy Vulnerability Reduction Fund (EVRF) shows that there were 758,546 applicants (see the application site at https://compensatii.gov.md/en): These data provide details about the household for which compensation is requested, as follows:

   - average net monthly income of the household indicated by the applicant in the application form (calculated based on the last six monthly incomes, in MDL);
   - the household income (in MDL) used in the calculations to determine their category of energy vulnerability. If the income provided by government databases (CNAS, Fiscal Inspectorate) is higher than the income indicated in the application, then the higher income will be the one used in the calculations;
   - the household income (in MDL) after deducting MDL 3,430 from the household's minimum expenditure level for the main applicant and deducting MDL 2,400 for each subsequent family member registered);
   - the sum of social benefits that the household receives per month, as provided by The National House of Social Insurance (in MDL);
   - global monthly income reported by the household;
   - the household's estimated monthly expenditure on energy (in MDL), obtained by multiplying last year's average monthly energy consumption (monthly average for November 2021 to March 2022) (in GCal, m3, kWh) by current non-compensated rates (MDL/GCal, MDL/m3, MDL/kWh);
   - the category of the energy vulnerability attributed to the applicant for November, December, January and February, (0 – non-vulnerable; 1 – low vulnerability; 2 – medium vulnerability; 3 – high vulnerability; 4 – very high vulnerability;
   - number of household members;
   - dummy for at least one person in the household with a confirmed disability;
   - district name;
   - number of land plots registered per household;
   - number of cars owned by the household;
   - gender ratios in the household;
   - age brackets in the data.

4. Distributor and applicant identification, which contains the applicant's and distributor ID variables that were used to merge the datasets (1 to 3), i.e. with the energy and applicant registration data.

A2. The QUAIDS and panel data model

Our methodology to estimate the household demand for energy is based on the Almost Ideal Demand System (AIDS) model, which gives an arbitrary first-order approximation to any demand system derived from utility-maximizing behaviour. Also, its functional form is consistent with household-budget data. Individuals are assumed to maximize their satisfaction level by the consumption of different goods such as energy, food and clothing. The utility maximization will be subject to a budget constraint determined by the individual's income (or desired expenditure) and the prices of the goods consumed.

The Quadratic Almost Ideal Demand System (QUAIDS) model chosen for this analysis is an extension of the AIDS originally proposed by Deaton and Muellbauer (1980). Based on a non-parametric analysis of consumer expenditure patterns, Engel curves have been shown to be of higher rank than 2, thus requiring quadratic terms in the logarithm of expenditure.

To derive the budget shares in QUAIDS, the same procedure used for AIDS can be applied, which yields the following expenditure share equations:

$$w_i = a_i + \sum_j \gamma_{ij} \ln p_j + \beta_i \ln\left(\frac{X}{a(p)}\right) + \frac{\lambda_i}{b(p)}\left[\ln\left(\frac{X}{a(p)}\right)\right]^2$$

Where, wi is the share of commodity i in a household budget, defined as:

$$w_i = \frac{p_i q_i}{m} \; and \sum_{i=1}^{n} w_i = 1$$

Pj is the market price for commodity j, M represents consumer total expenditures or income, and P is an overall price index. For prices, the Stone price index was used, which is defined as:

$$Log\ P = \sum_{i=1}^{n} W_i log p_i$$

where wi is the of budget share for good i and p is CPI index obtained from Moldova Statistical Office for each of 52 commodities reported on a monthly basis in HBS. For the analysis, budget share equations are estimated and elasticities obtained for electricity and gas, and other commodities, the latter being grouped into the category “other”.

In addition to price and income, the socio-demographic characteristics also alter spending in different ways. For instance, it is expected that a larger family increases its overall expenditure on energy compared to a smaller family with the same preferences. The socio-demographic variables included in the model are the size of the household, adults over the age of 65, education, whether they live in an urban or rural area, and whether or not the household head is female.

In addition to elasticity estimation, which is a crucial input in microsimulation using HBS data, panel random effects regression was used to estimate the effects of energy sub-

sidies on the change in volumes consumed by households between the current (November 2022 to February 23) and the previous winter (November 2021 to February 2022), controlling for household characteristics. The latter technique is applied to registration data. The availability of repeated observations on the same units, in this case households, allows to enrich the model by inserting an additional term in the regression, capturing individual-specific, time-invariant factors affecting the dependent variable but unobserved to the econometrician. Generalized least squares estimators of the parameters of such a model are more efficient than those obtained in the simpler model, which neglects these unobserved factors.

The random effects model is an alternative to the Fixed Effects Model, which helps capture the effects of all variables that do not change over time. Hence, anything else that does not change over time at the household level, such as its location, would be captured by these fixed effects terms in the model. Therefore, it is not possible to separately estimate the effect of the firms' location on their performance, which is highly restrictive for some applications. Hence, the authors chose to adopt the random effects framework instead, even though these models impose stronger assumptions about the unobserved effects. The random effects model allows for a consistent and efficient estimate of regression coefficients and allows to identify the effect of the compensation by exploiting its variation across households when some of the control variables are time-invariant.

A3. The CGE analytical framework

The analysis is built on Partnership for Economic Policy- (PEP) 1-t (dynamic version for a single country) by Decaluwé et al. (2013). It is a recursive dynamic CGE model. The model is calibrated to replicate the base year (2021) Social Accounting Matrix (SAM). In the model, the public investment is quasi-exogenous, and savings are fully endogenous (investment-driven). The historical growth rate drives the dynamics of the main variables at 6.7 percent per annum. Labour market variables follow the country's population growth rate, which has been declining at 2.3 percent annually.

Investment levels from the previous period determine the sectoral capital accumulation rates in the current year, considering the prices of capital goods and depreciation. Capital depreciation is set at 5 percent. Modelling of the labour market determines wages, labour allocation across different industries, and unemployment.

The unemployment rate starts at 2.6 percent, as reported by the Statistical Agency for 2021. In the model, unemployment is determined through a wage curve, a functional relationship between unemployment and wages, which determines the wage-employment relationship. For the sake of simplicity, current account balance and savings are treated as exogenous variables. Similarly, government spending remains exogenous, leaving the fiscal balance to adjust to the revenues. It should be noted that the model does not fully capture the full pricing framework for energy commodities. A government-owned monopoly company distributes natural gas in Moldova. As a result, households pay regulated prices, which do not necessarily cover the production costs.

The analysis draws on Moldova's estimated SAM, which reflects the base year 2021.[1] The procedure deployed to estimate the SAM builds on available statistics from the aggregated national accounts, generation of income account and government finance statistics, industry production accounts, and external trade. The data were compiled and used to disaggregate the activity, commodity and

1 Note that the underlaying SAM was estimated in its aggregated from on a basis of the available statistical evidence.

production factor accounts of the SAM, and domestic institutional sectors. The 2021 SAM can distinguish between 10 different activities and commodities, two types of production factors (labour and capital) and four categories of households (distinguished based on their energy vulnerability). The SAM also includes the main fiscal policy instruments, including VAT, taxes on imports, products and production, income and excise taxes. Table A3.1 captures the structure of demand and supply structure of the economy. Private consumption (83.55 percent) is the main driver of the GDP growth. The supply side is dominated by services that target the domestic market and are produced by local producers, followed by manufacturing (21 percent of GDP). The ratio of imports and domestic production is close to 1, i.e. the competition in the domestic market between imports and domestic production for this sector is critical. The share of value added of energy sector is about 2 percent of GDP, and the supply of energy commodities is dominated by imports (Table A3.2).

Private consumption accounts differentiate between four categories of private households, which are classified according to their degree of energy vulnerability.

Table A3.1. Structure of the GDP

	RATIO TO GDP (%)
Private consumption	83.55
Public consumption	16.76
Investments	26.86
Exports	30.65
Imports	57.82

Source: Author's calculations.

Table A3.2. Structural indicators

	VA/GDP	IMPORT/XS	EXPORT/XS
Agriculture	0.10	0.04	0.12
Manufacturing	0.21	0.90	0.30
Energy	0.02	1.70	
Services	0.55	0.10	0.15

Table A3.3. Structure of private consumption of each representative household (RH).

	RH1	RH2	RH3	RH4
Agriculture, forestry and fishing	0.0080	0.0117	0.0101	0.0159
Manufacturing	0.4585	0.5475	0.4336	0.5096
Production, transmission and distribution of electricity	0.0367	0.0511	0.0422	0.0485
Gas production	0.0329	0.0451	0.0383	0.0387
Supply of steam and air conditioning	0.0014	0.0049	0.0016	0.0055
Water supply and waste management	0.0147	0.0152	0.0095	0.0088
Construction	0.0092	0.0095	0.0059	0.0055
Private services	0.1922	0.2338	0.1529	0.1770
Social contributions	0.1419	0.0468	0.1762	0.1097
Direct tax	0.0346	0.0114	0.0430	0.0267
Investments and savings	0.0698	0.0230	0.0867	0.0539

Source: Author's calculations.

A4: Towards the 2030 Agenda for Sustainable Development

An in-depth review of strategic policy and planning documents was a first step towards developing Moldova's Sustainable Development Goal (SDG) Push framework. This review supported an integrated analysis of the countries' socioeconomic, institutional and environmental landscape, mapping out gaps in achieving the Sustainable Development Goals (SDG), evaluating SDG progress, and identifying potential interventions that could accelerate the achievement of the 2030 Agenda for Sustainable Development. In addition, the scoping phase of SDG Push identified data availability, disaggregation and consistency during their monitoring over time. This is important because data availability, reliability and accuracy are needed to correctly identify gaps in achieving the SDG and the development pathways that can accelerate progress towards achieving the SDGs.

The national priorities and progress analysis, including the National Development Strategy (NDS) 'Moldova 2030', explicitly reference digital transformation's role and cross-cutting potential for the country's sustainable development. The digital transformation of governance and Government, society and the economy are key directions and strategic national priorities.

Given the Government's focus on digitalization as a cross-cutting enabler through almost all of the priorities or areas that can promote transformational change, it was critical as part of the solution to the country's current energy crises. The SDG Push focused on analysing the viability of the intervention of energy compensation powered by digitalization.

National development priorities

In the Republic of Moldova, the first stage of nationalizing the 2030 Agenda for Sustainable Development took place from July 2016 to March 2017 by mapping and identifying the relevance of SDGs and targets, and by analysing the correlation between the 2030 Agenda for Sustainable Development and the national policy priorities, adapting and formulating) the goals and targets of the 2030 Agenda according to the national priorities and needs. Also, policy papers to be mainstreamed were identified and the data ecosystem for monitoring and evaluating the SDGs implementation was defined.

Subsequently, the SDGs and their targets adapted at the national level were integrated into the first draft of the National Development Strategy (NDS) 'Moldova 2030' developed in 2018, which was revised twice to reflect the changing political priorities and addressing the emerging multiple-crises. Once the new NDS is adopted, it will be translated into the sectoral development strategies, programmes, National Development Plan and Medium-Term Budgetary Framework.

As a result of the 2017 SDG systems mapping, the following barriers and potential accelerators have been identified:

Barriers

1. Lack of effective, accountable and inclusive institutions

   - high corruption levels that impact the entire society, public and private institutions;
   - tolerance by society of a non-functioning of rule of law leading to acceptance of corruption;
   - state institutions that do not ensure the creation of good laws and proper policy;
   - lack of good governance of state institutions;
   - poorly developed rule of law, which creates a lack of justice;

- lack of confidence in government, which increases emigration and creates a lack of participation in civic matters.

2. Reduced social cohesion

   - an unfriendly business environment;
   - reduced social cohesion;
   - lack the sense of belonging to a common society;
   - identification with different ethic and religious groups.

3. Quality of life

   - lack of job opportunities and wage growth, which leads to high unemployment and emigration;
   - the gap between current education and what the labour market requires, which decreases employment opportunities (poor human capital);
   - disparity between rural and urban areas;
   - unequal distribution and access to resources;
   - lack of security or not feeling safe for the future;
   - inadequate health and social services;
   - the most vulnerable populations are not ensured the needed resources.

In addition, assessing the level of implementation of the SDGs has identified solutions that would accelerate progress in the lagging areas.

Potential accelerators

1. Responsible and accountable institutional development

   - Creation of a rule of law (target 16.3)
   - Fair access to the rule of law and justice for all, creating a participatory society
   - Reduction in corruption and bribes (target 16.5)
   - Elimination of the culture of tolerance for corruption
   - Institutional development (target 16.6).

2. Social cohesion for the inclusion of everyone

   - No one is left behind and there are equal opportunities for all
   - Everyone contributes to the vision
   - Universal health coverage (target 3.8)
   - Health and public services are rebuilt to meet the needs of the client
   - A reformed education system in place to serve students, which includes civic learning and older demographics.

3. Labour force

   - Quality of education with valid skills needed in the market (target 4.4)
   - Knowledge and skills for sustainable development (target 4.7).

4. Creation of a favourable investment environment

   - Credibility to keep investments from leaving
   - Attraction of foreign investments
   - Job creation with decent salaries to reduce emigration and enhance human capital (target 8.5).

5. Environmental focus

   - Prevention of pollution through strategic environmental objectives

(targets 13.2, 15.9)
- Improvement of health and quality of life (target 1.2).

In addition, Moldova conducted a light Rapid Integrated Assessment (RIA) of its national policy documents (e.g. strategies, programmes and plans). This exercise aimed at identifying gaps and weaknesses n the national policy framework regarding the implementation of the SDGs.

The RIA showed that, overall, the national policy agenda is only partially aligned to the SDGs, and a third of the SDG targets are not included in any national policy papers. A total of 169 SDG targets was analysed, and special focus was placed on 126 quantitative targets. After mapping the national policy agenda and comparing it with the SDGs, it was found that only 11 percent of SDG targets were aligned to the national policy papers; therefore, they do not require any adjustments in terms of SDG alignment.

In addition, most of the SDG targets (57 per cent) are only partially aligned to Moldova's policy papers – only a few components of these targets are included, so the relevant national strategies need to be adjusted to better reflect the spirit and details of the SDG targets. In addition, the national policy papers do not reflect approximately one-third of the SDG targets.

An integral aspect of the scoping process is the utilization of the SDG Push Diagnostic Simulator, which leverages sophisticated machine learning techniques to detect disparities in SDG advancement on a national scale. Moreover, it undertakes a preliminary, in-depth examination of accessible national data and knowledge reservoirs to pinpoint areas of paramount importance for national development.

Based on the Diagnostic Simulator, it was possible to assess the progress that Moldova made in attaining distinct SDG targets, systematically organized in accordance with 'the five Ps' of sustainable development: People (47 targets), Peace (12 targets), Planet (46 targets), Prosperity (45 targets) and Partnership (19 targets). As illustrated in Figure A1, countries' national priorities are generated using machine learning to reveal the most prominent SDGs referenced in national policy documents. In assessing six strategic documents (i.e. VNR 2020, NDS 2030, Common Country Analysis 2021, Cooperation Framework 2022, Moldova-EU Association Agreement and Programme of the Government), SDG 16, 11, 10, 8, 5 and 3 are the most prominent Goals.

Figure A1. AI analysis of national priorities' aligned with the SDGs

In addition, the mapping of the alignment of SDG priorities to current SDG progress identified in trend analysis helps to understand which SDGs are off-track but potentially a low or high priority in national documents, thus providing an insightful starting point for national dialogues. For instance, SDG 1 has been identified for review and ranks high in national development documents.

Furthermore, through the analysis of synergies and tradeoffs, 24 synergy links with other targets, shared across 12 of the 16 SDGs, are found for indicator 1.3. Achieving SDG 1 is vital for Moldova's progress. Moldova is severely affected by the repercussions of the war in Ukraine – increasing gas prices, economic turmoil and waves of refugees. A nexus approach is required to balance immediate response to crises and longer-term development needs.

The poverty rate remains relatively high – a quarter of the population are below the national poverty line – and inequalities widespread. The Government prioritizes poverty alleviation, specifically addressing energy and food insecurity. Target 1.3 aims to implement dynamic and adequate social protection systems and cover the poor and vulnerable by 2030. Effective social protection should contribute to poverty reduction and to ensuring food security (SDG 1 and 2), to narrow inequalities (SDG 5 and 10) and to alleviate energy poverty (7.1). It contributes indirectly to health and education outcomes (SDG 3 and 4). Poverty and food insecurity worsen due to climate change (SDG 13) and the war in Ukraine (SDG 16).

In addition, achieving by 2030 access to affordable and sustainable energy, while being a low priority in key national documents, is off-track. Therefore, putting more emphasis and funds in efforts to narrow the gap is essential for Moldova's development and to address climate change. Target 7.1 plays a pivotal role in reducing income poverty (1.2) and supporting healthcare and education services (SDGs 3 and 4). Sustainable energy sources contribute to climate change mitigation and promote a low-carbon economy (SDGs 12 and 13), driving economic growth and improving livelihoods (SDGs 8, 10 and 11).