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Towards Green Transformation of the Republic of Moldova:

State of Play in 2021

Monitoring progress based on the OECD *green growth indicators*

Action implemented by:

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Foreword

Measuring the environmental footprint of economic activities is a fundamental element of green transformation. The OECD-based green growth indicators offer such a monitoring framework at the national level. They allow the Republic of Moldova to take informed decisions towards achieving policy priorities for green and circular economy, pollution reduction and decoupling economic growth from environmental degradation.

This analysis comes at a challenging but crucial moment. The new Government is establishing the foundation for the Program implementation "Moldova of good times". It also coincides with the development of several strategic policy documents – the Program on the promotion of Green Economy and its Action Plan 2022-27 and the Environmental Strategy 2030. The report takes stock of the progress achieved in promotion of the green economy but also identified priority areas for further action:

- Increase the forest share in the country and reinforce its management.
- Improve waste management and recycling.
- Reduce water pollution and better manage water resources.
- Promote eco-innovation and greening of small and medium-sized enterprises, and create more green jobs.
- Enhance energy efficiency and diversify energy sources, increasing share of renewable energy.
- Reduce greenhouse gas emissions in line with Nationally Determined Contributions.
- Unlock green investments.

Our common goal is to ensure green economic recovery without compromising environmental and climate targets. At the same time, we want to promote progressive decarbonisation and climate neutrality. By taking this path, we will align the Republic of Moldova with the provisions of the European Green Deal and new Association Agenda for 2021-27.

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Minister of Environment

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Background and acknowledgements

Background

What cannot be measured, cannot be improved. The green growth indicators provide a reliable and comprehensive set of tools for measuring the environmental footprint of economic activities. They track progress towards greening the economy, provide important insights for public policies and ensure accountability of policy makers. Given an international methodology developed by the OECD, these indicators can ensure comparability among countries. This allows tracking of progress in relation to a set of selected benchmarks, adding analytical value.

The Republic of Moldova (hereafter "Moldova") recognises on three levels the need to promote the green economy as a precondition for sustainable economic development in harmony with the environment. First, the Activity Programme of the government dedicates a chapter to promotion of the green and circular economy. Second, the National Development Strategy "Moldova 2030", which is the country's fundamental strategic plan, mentions among its key priorities the development of a sustainable and green economy, as well as climate change adaptation in all economic sectors. The vision outlined in Moldova 2030 anchors two strategic international commitments: the Association Agreement with the European Union and Agenda 2030 for Sustainable Development. Finally, the main sectoral policy planning document – the Environment Strategy for 2014-23 – lists integration of principles of sustainable and green economy into all economic sectors as a priority.

This report provides valuable statistical and analytical insights that can track progress against implementation of actions and objectives of the above-mentioned agendas on promoting green growth. It takes a snapshot of green transformation in the country, presenting both trends for indicators during 2015-20 (or latest data available) and the actual situation in certain sectors. In this regard, the report builds on the indicators and methodology in the previous edition of the report (OECD, 2017). In addition to comparing Moldova against other countries, it calculates supplementary national indicators that could help develop policies and monitor the country's performance in green economic development in line with the Association Agreement and Agenda 2030.

Structure of the report

Based on the green growth indicators framework proposed by the OECD (OECD n.d.a) and the guidelines for Eastern Partnership countries (EaP GREEN, 2016), this report is structured in five chapters around four main areas of green growth, supplemented by the socio-economic context:

- **Chapter I. The socio-economic context and characteristics of growth** provides important background information.
- **Chapter II. The environmental and resource productivity of the economy** captures the efficiency with which economic activities use energy, other natural resources and environmental services.
- **Chapter III. The natural asset base** reflects whether the natural asset base is being kept intact.
- **Chapter IV. The environmental dimension of quality of life** reflects how environmental conditions and environmental risks interact with the quality of life and well-being of people.
- **Chapter V. Economic opportunities and policy responses** captures the economic opportunities associated with green growth.

The report contains two annexes. The first one lists the 33 green growth indicators included in the 2018-20 Programme on Green Economy. The second annex explains the methodology for the indicators.

Challenges and ways forward

The development of this report encountered various challenges:

- The National Programme on the Promotion of Green Economy – the main strategic policy planning document of the government related to green growth – expired in 2020. It contained indicators that did not correspond to the OECD guidelines. Both the indicators from the National Programme and those proposed by the OECD measure the same phenomena but use different methodologies. For this reason, the report contains both national indicators (corresponding with indicators from the 2017 report) and international indicators (calculated according to OECD guidelines).
- Various national indicators, due to their specificities, cannot be compared with similar indicators from other countries (e.g. waste and use of fertilisers).
- No information is available in Moldovan public sources for some national indicators; however, data are available in international sources. Nonetheless, the use of external sources is confusing because indicators in each source have different values.

For any new assessment of green economy indicators, the government should address two major issues. First, it should ensure the international comparability of all environmental indicators from the National Programme. Second, it should ensure availability of data on environmental indicators at the national level. Overcoming these two challenges will require stronger co-operation between different institutions that produce environmental statistics.

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The report is available on the EU4Environment website and websites of Expert-Grup and the Ministry of Environment of the Republic of Moldova.

Disclaimers

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Table of contents

List of figures

Acronyms and abbreviations

CO_2	Carbon dioxide emissions
COVID-19	Coronavirus 2019
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
GHGs	greenhouse gases
GGIs	green growth indicators
HDI	Human Development Index
ISIC	International Standard Industrial Classification
IUCN	International Union for Conservation of Nature
MARDE	Ministry of Agriculture, Regional Development and Environment
MDL	Moldovan Leu
NDC	Nationally Determined Contribution
NBS	National Bureau of Statistics
NEA	National Employment Agency
NEF	National Environmental Fund
OECD	Organisation for Economic Co-operation and Development
$PM_{2.5}$	Fine particulate matter
R&D	Research and development
SDG	Sustainable Development Goal
USD	US Dollar

Main findings

The socio-economic context is improving in Moldova but not fast enough

- In recent years, the economy of the Republic of Moldova (hereafter "Moldova") grew at a modest pace. However, this pace was not fast enough to significantly improve the standard of living of most people. The national economy is still affected by systemic problems such as low competition, corruption, and a limited labour force. These problems are accompanied, in turn, by an increasing number of shocks generated by extreme climate factors such as floods, drought or frosts. Frequent political unrest also affects the capacity of state institutions to respond to crises. In 2020, for example, the state provided only limited social and economic support in response to the COVID-19 pandemic.

Economic growth partially decoupled from use of natural resources, but pressures remain

- Indicators that measured productivity of environmental resources were generally positive. Thus, carbon, energy and water productivity increased. Consequently, economic growth partially decoupled from carbon dioxide (CO_2) emissions, and use of energy and water. This means the economy grew faster than use of natural resources. Despite this progress, the level of environmental resource productivity in Moldova is much lower than in European countries. Thus, the intensity of environmental resource use in Moldova is relatively high, which implies pressures on both natural capital and the sustainability of economic development.
- The relative stability of CO_2 emissions combined with growth in gross domestic product (GDP) resulted in higher carbon productivity, which grew from 7.3 to 9.5 MDL/kg. At the same time, the ratio between GDP and greenhouse gas (GHG) emissions increased from 10.7 to 14 MDL/kg CO_2-equivalent (CO_2-eq). The higher carbon productivity shows that economic growth decoupled from CO_2 emissions. Despite this progress, Moldova remains at the bottom of European countries in terms of carbon productivity.
- The supply of primary energy and final consumption of energy increased in Moldova after 2010. Since energy supply grew at a lower rate than GDP, energy productivity increased. Nonetheless, this growth did not allow Moldova to improve its position relative to other European countries. Energy productivity grew much faster in Moldova than in other European countries. For example, between 2010 and 2019, productivity in the European Union grew by 24.4% and was 2.7 percentage points lower than growth in Moldova. Despite this progress, among European countries, Moldova ranks almost at the bottom in terms of energy productivity.
- The supply of renewable energy generally increased (decreasing only in 2019). As a result, the share of renewable energy in the supply of primary energy and in the final consumption of energy increased. Nonetheless, compared with other European countries, the share of biofuels and waste in the primary supply of renewable energy is extremely high in Moldova. Biofuels and waste account for 98-99% of the primary supply of renewable energy. Meanwhile, firewood represents more than 80% of biofuels and waste. This shows that renewable energy in Moldova is mostly obtained from cutting trees and that renewable energy production is at an early stage.
- Production waste has decreased, particularly after 2015. Between 2010 and 2019, the quantity of production waste decreased by 34.3%. During the same period, GVA – an indicator that

reflects the production process – increased by 42.1%. In this context, production process decoupled from the generation of production waste. At the same time, the volume of household waste is increasing. Between 2014 and 2020, the quantity of waste collected from the population grew by 20.9%, while household consumption increased by only 5.4%. Thus, the model of consumption continues to generate more and more waste. At the same time, there is no clear trend in Moldova on waste utilisation.

- Use of mineral fertilisers is accelerating, but this was not accompanied by a rapid increase in vegetal production. Instead, it led to a rise in the amount of fertiliser introduced per hectare of soil. Between 2010 and 2020, this indicator increased from 24 kg/ha to 95.8 kg/ha for chemical fertilisers and from 20 kg/ha to 110 kg/ha for organic fertilisers.
- Water productivity increased, but this growth did not allow Moldova to improve its position relative to other European countries. Between 2010 and 2020, water use was generally stable, while GDP increased by about 32%. As a result, water productivity increased and economic growth decoupled from water consumption. Despite this progress, the level of productivity in Moldova remains one of the lowest relative to other European countries.

Moldova needs action on several fronts to protect its natural resources

- Moldova has limited water resources compared with most European countries. It depends on water from the Prut and Nistru rivers, which accumulate mainly outside the country. At the same time, the agricultural sector accounts for a large share of the Moldovan economy but is represented by a large number of small farmers with rudimentary businesses. Increasingly frequent droughts mean agriculture requires higher volumes of water and irrigation. This water is often delivered through inefficient systems, leading to large losses. Thus, besides a high volume of water intake per capita and a relatively high level of water stress, Moldova still experiences significant water losses due to transportation with no sign of improvement.
- Despite the slight increase in afforestation, Moldova has limited forest resources. This is coupled with serious environmental issues and extreme weather events, which have become increasingly frequent. At the same time, the limited area covered by forests is accepted as a cause of climate change, which calls for prompt public policy actions.
- Soil resources have not changed significantly in the last decade. Factors such as urbanisation, population density or infrastructure expansion have been unable to change the structure of the land fund. Thus, Moldova remains a territory with predominantly agricultural areas, with soil as the main natural resource. However, large areas of agricultural land are still parcelled out and some are affected by erosion, which reduces performance of the agricultural sector.
- Organic agriculture offers only a modest contribution to the sector given that both land area and the number of operators involved remain small. The small scale of organic agriculture has multiple causes related to both consumer demand and producer supply. The state has released several strategic documents to promote organic agriculture but has offered limited financial support.
- Biological diversity needs more protection in Moldova. Biodiversity, which underpins the proper functioning of ecosystems, can be measured by the number of endangered plant and animal species. The latest edition of the Red Book in 2015 contains twice as many species of plants and animals needing protection in Moldova as the 2001 edition. Given these conditions, Moldova needs clear policies and measures to restore natural habitats in order to protect rare and vulnerable species.
- Moldova has added protected areas but still has a small number in relation to its territory. Moreover, it is difficult to conserve nature and associated cultural values in these areas when the state can neither ensure laws are respected nor limit harmful human intervention.

Some indicators point to progress in improving quality of life, while others identify challenges

- Air pollutants have been rising in Moldova since 2010, a trend that augments risks to the environment and human health. This trend is caused by the rapid increase in emissions of pollutants from road transport. A comparative analysis of emissions of pollutants (nitrogen oxides and sulphur oxides) related to population shows a worrying trend. Moldova occupies one of the lowest positions among European states in terms of pollutant emissions per capita. However, it has registered a significant increase in recent years. Emissions per capita grew by almost 83% between 2014-19, which is the highest growth in the region.
- Exposure of the population to fine particulate matter ($PM_{2.5}$) has decreased. In addition, Moldova occupies an average position in relation to other European countries regarding this exposure.
- The public water supply network is rapidly expanding. As a result, people's access to safely managed drinking water services has increased. However, Moldova is ranked near the bottom regarding people's access to safely managed drinking water services in relation to other European countries.
- Moldova had some progress in expanding the public sewerage network. However, public supply networks have grown faster than the length of sewerage networks. This creates additional pressures on water resources, as water consumption reduces the amount of quality water returned to the natural water cycle. Even if people have greater access to basic sanitation services, Moldova ranks among the lowest for these services relative to other European countries.

More economic opportunities associated with green growth can be unlocked

- Moldova ranks the lowest among European countries in terms of investment in environmental protection. Both the government and businesses spent too little for these purposes compared with most European countries. In recent years, Moldova allocated only 0.5% of GDP for environmental protection, while the EU average is 1.9%. There are multiple causes for the low investment, generally related to financial constraints and the state of the Moldovan economy. Environmental economic instruments (e.g. fees and environmental permits) are not able to improve the situation. Environmental protection is often sacrificed in favour of other political or economic priorities.
- Energy subsidies largely take the form of tax relief on gas and electricity for households. This is due to total dependence on imported energy and the low standard of living for a large part of the population. Thus, tariffs for energy resources are debated constantly, with discussions often becoming political. Unless the country has significant economic progress, any elimination of subsidies, resulting in increase of tariffs, is immediately attacked by the population, businesses or political opponents.

Chapter 1. Methodology and OECD green growth indicators framework

The starting point for preparing this document was the Report on Assessing the Performance of Green Economic Development in Moldova (2017) and The Green Economy Promotion Programme for 2018-2020. The Programme was a national mid-term policy document to promote green economy at national level in different areas: energy efficiency, renewable energy, green small and medium-sized enterprises, green agriculture, clean production and sustainable consumption.

This report was based on an analysis of indicator trends in the above-mentioned Programme, but it also examined evolving indicators. The report emphasised the time series analysis and international comparability of indicators included in the National Programme. However, it also calculated new indicators reflecting green growth. In addition, it proposed indicators for inclusion in the next evaluation report of green growth policies.

There are two categories of indicators in the report. The first one consists of indicators with time series generated by collection of data from national or international public sources. For this category, the report verified quality of data and ensured indicators corresponded with recommendations of the EaP GREEN Guide (EaP GREEN, 2016). The second category uses indicators calculated by the authors such as carbon or water productivity. These indicators were also estimated based on recommendations of the EaP GREEN Guide.

All indicators related to GDP or total population have been recalculated. First, the population was recalculated according to results of the 2014 Census. Second, the 2008 UN System of National Accounts dictated transition to a new method of calculating GDP.

In this report, each indicator has a dedicated section that briefly describes the indicator and analyses its evolution. Most indicators are also presented in international comparisons with other European countries. All methodologies related to the indicators appear in the final annexes of this report. The first annex presents a table with a list of green growth indicators for Moldova. The table shows the 33 environmental indicators in the 2017 report. It also lists national and international indicators (used for comparisons with other European countries) that have been estimated for this report. Finally, the table includes recommended indicators for future assessment of progress towards the green economy. The second annex has a table that explains the methodology used (sources of data and description of calculation method) for all the indicators.

Benefits of monitoring progress towards green economy

Green growth policies need to be supported with appropriate indicators to monitor progress. Green growth indicators can help:

- track and communicate progress in greening economic growth
- inform decisions
- demonstrate accountability to national and international stakeholders
- raise public awareness about the links between economic growth and the environment
- compare progress between countries.

Sustainable development and green growth monitoring in Moldova

Moldova integrated environment and green growth objectives into its strategic policy planning framework, which is periodically evaluated. The government Activity Programme contains a dedicated chapter on promotion of green and circular economy. The National Development Strategy "Moldova 2030", which is the country's most important strategic plan, is under revision with adoption expected in 2022. It includes among its key priorities the development of a sustainable and green economy, as well as climate change adaptation in all economic sectors. This is reflected in the first objective (building a sustainable economy) and in the tenth objective (promoting a green agenda).

The vision outlined in Moldova 2030 is anchored in two strategic international commitments. The first one is the Association Agreement with the European Union, signed in 2014, which commits the Parties to co-operate on environment matters. Moldova agrees to act on several fronts to support sustainable development and greening of the economy to generate benefits for citizens and businesses. Specifically, Moldova agrees to enhance public health, conserve natural resources, increase economic and environmental efficiency, integrate the environment into other policy areas and use modern, cleaner technologies that contribute to a more sustainable production model. Co-operation is based on equality and mutual benefit, as well as interdependence in the field of environmental protection and multilateral agreements in this field (article 86).

The second major international commitment is outlined in Agenda 2030 for Sustainable Development. Namely, Sustainable Development Goal (SDG) 8.4, adopted by the Moldovan government in 2017, states that authorities commit to improve progressively, through 2030, resource efficiency in consumption and production to decouple economic growth from environmental degradation. In addition, SDG 12 is dedicated to responsible consumption and production. Thus, according to the commitments, Moldova will fully incorporate the principles of sustainable development and procurement, as well as efficient management of national resources, in national policymaking and regulations. Meanwhile, it will encourage industries and businesses to adopt resource-efficient production and to share responsibility for disposal of toxic waste and pollutants. SDG 12 also states that people should take responsibility in regard to consumption of economic goods and natural resources by reducing waste and increasing recycling. The synergy and participation of all actors in this production–consumption chain will save and preserve natural resources and reduce the ecological damage caused by economic growth.

Progress against Agenda 2030 was assessed in 2020 under the Voluntary National Review Progress Report 2020 (Government of Moldova, 2020). Despite some progress, the review found many shortcomings:

> Environmental protection faces a shortage of institutional capacities and funding from the state budget, as the financial resources available every year for environmental protection are clearly lower than what is required to address the existing challenges; sectoral strategies and programmes estimate the cost to be hundreds of millions of euros. Therefore, it is quite important to re-evaluate funding in this field and streamline budgetary allocations so that financial resources will be used transparently and in accordance with the priorities set out in policy documents for environmental protection and promotion of the green economy.

Finally, the main sectoral policy planning document – the Environment Strategy for 2014-23 (Government of Moldova, 2014a) – lists as one of its priorities the integration of principles of sustainable and green economy into all economic sectors. The Ministry of Environment periodically monitors and evaluates this strategy.

Chapter 2. The socio-economic context and characteristics of growth

This chapter examines the socio-economic context and characteristics of growth through nine indicators. These range from the growth and structure of gross domestic product to economically active population, unemployment and population density to life expectancy, income equality and enrolment in education. These indicators help track the effects of green growth policies and measures on growth and development, linking green growth indicators to social goals: economic growth, productivity and competitiveness, labour market, education and income.

Socio-economic indicators: Key findings

- **GDP growth**: because of modest gross domestic product (GDP) growth and numerous recessions, economic growth did not allow for a convergence with Central and Eastern Europe countries and a significant increase in people's living standard.
- **GDP structure**: GDP did not change significantly, with trade contributing the most to economic growth. The annual volume of remittances consolidated the leading position of trade, which was followed by industrial production and, to a lesser extent, by agriculture.
- **Economically active population**: because of emigration, the number of economically active people decreased during the past seven years, dropping to about 867 000 people in 2020. At the same time, the participation rate of labour expressed as the ratio of economically active population to total population aged 15+ shrank from a high of 45.9% in 2018 to 40.3%.
- **Unemployment:** while unemployment remained low (below 5%), this indicator is not relevant for the Republic of Moldova (hereafter "Moldova"). In addition to a high reservation wage, many people are reluctant to register with the National Employment Agency (NEA) because they work abroad and are stuck in the wave of seasonal migration.
- **Population**: due to emigration, Moldova registered a continuous negative natural population growth and a rapid depopulation, mainly of rural areas. In these conditions, during the past seven years, the population with usual residence decreased by 225 000 to 2.6 million in 2020.
- **Population density:** this registers the same downward trend as the number of people. In 2020, there was an average of 89 people per square kilometre km^2 – 8 persons fewer than in 2014.
- **Life expectancy:** even if life expectancy at birth improved in recent years, Moldova remains at the lowest level among European countries with an average for both genders of only 70.9 years.
- **Income inequality:** after some marginal improvement, the level of inequalities in Moldovan society has being increasing again since 2018. Thus, the GINI coefficient reached 0.33 at the end of 2020.
- **Enrolment in education**: Despite overall high enrolment, the actual number of persons enrolled in certain levels of education is decreasing continuously and significantly. Over the past 12 years, the number of students dropped twice, reaching about 61 000 students at its lowest point.

Indicator 2.1. GDP growth

Key messages

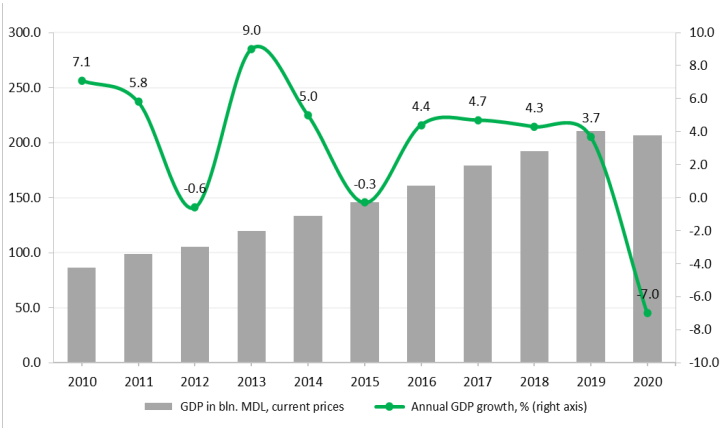
In recent years, the economy grew at a modest pace, but this was not enough to significantly improve living standards for most people. The national economy is still affected by systemic problems such as low competition, corruption and a limited labour force. These are accompanied by an increasing number of shocks generated by extreme weather events such as floods, drought or frosts. Frequent political unrest also affected the capacity of state institutions to respond to crises. In 2020, for example, the state provided only limited social and economic support in response to the COVID-19 pandemic.

Indicator trend

The economy has registered some improvements over the past decade. Except for 2012 (drought), 2015 (bank fraud) and 2020 (COVID-19 pandemic), the country had economic growth of at least 3-4% (Figure 1). This is confirmed by the GDP trend, which in 2020 doubled in nominal terms and increased by about 30% in real terms (compared to 2010). Nonetheless, the level of registered economic growth is still too modest to approach the growth of countries from Central and Eastern Europe or to significantly increase people's living standards. There are multiple causes – from extreme weather events and the increasingly frequent migration of labour to commercial divergences with key foreign partners (e.g. diminished exports to the Russian Federation after signing the Association Agreement with the European Union).

These are accompanied by shocks generated by events such as banking fraud or political crises that have weakened governance in state institutions and undermined capacity to respond to crises such as the COVID-19 pandemic.

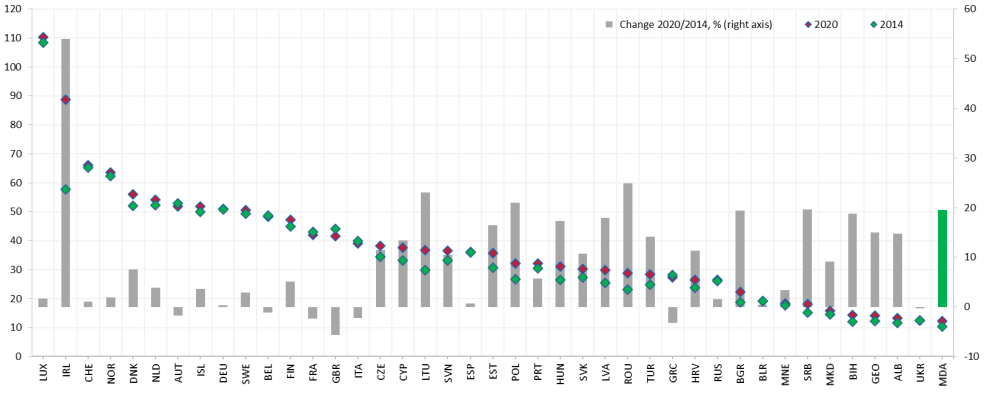
Figure 1. Trends in gross domestic product (GDP)



Source: National Bureau of Statistics.

Although the national economy has generally grown, the quality of growth is fragile, raising questions about its sustainability. An economic growth model based on consumption is limited given that migration trends are changing from periodic migration for employment to definitive migration based on factors that are not necessarily economic. These vulnerabilities have emerged in the context of the COVID-19 pandemic. The crisis hit the country at a moment of low competitiveness and economic freedom, coupled with the escalation of systemic vulnerabilities related to corruption, competition or access to funding (Expert-Grup, 2020a). As a result, the state offered a modest response towards the pandemic of 0.4% of GDP, while other countries were allocating up to 5% of GDP. In this context, the pandemic had a major impact on GDP, generating a 7% downturn in 2020. Despite GDP growth, the per capita ratio is only USD 12 300, the lowest among European countries (Figure 2).

Figure 2. GDP per capita (PPP 2017, USD)



Note: PPP = purchasing power parity.
Source: World Bank

Indicator 2.2: GDP structure

Key message

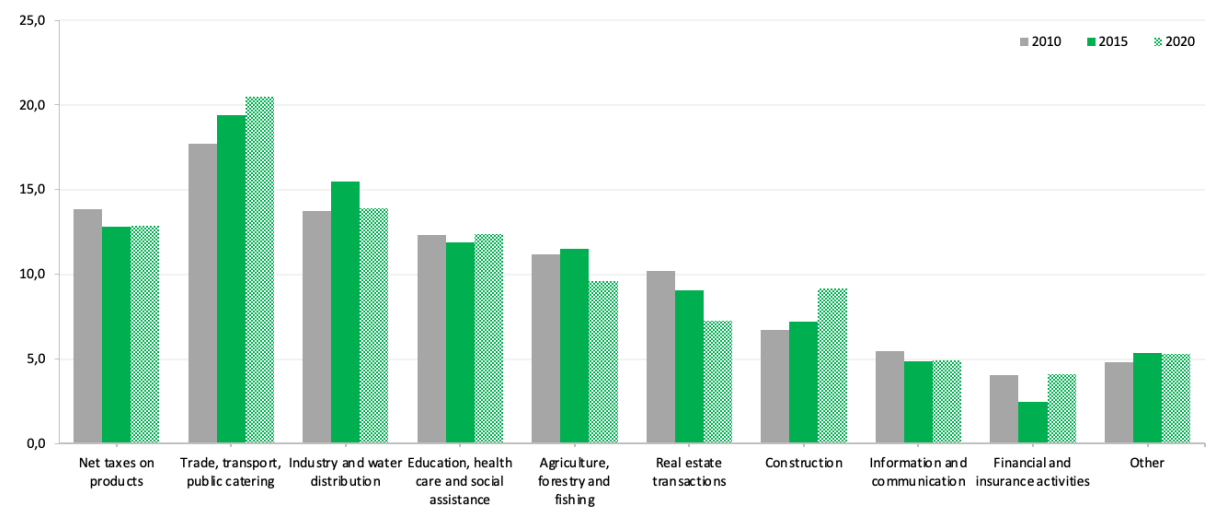
The structure of the national economy has not changed significantly over the past decade. The economic growth model based on consumption and financed by remittances brings the trade sector to the forefront. This model also stimulates construction activity, a sector that is growing steadily and seems poised to continue. On the other side, traditional sectors such as agriculture or industry have registered only modest gains as they remain vulnerable to shocks outside the realm of decision makers. These include climate conditions for agriculture or the export potential of many other industries.

Indicator trend

The economic structure of Moldova has not changed significantly since 2010. Trade contributes most to GDP due to the annual volumes of remittances. Trade is followed by the processing industry, which has surpassed agriculture in recent years as a result of foreign investments and higher export capacities. On the other side, agriculture depends greatly on climate conditions and generates only modest results during years affected by drought. Despite efforts to modernise the agricultural sector, systemic problems are not solved and some have worsened. Thus, irrigation and access to water sources is still a major problem given the increased frequency of droughts. Also, various agricultural products (e.g. apples and other fruits) still depend on export markets influenced by political decisions. The agro-industrial sector also faces certain problems as livestock products have a hard time finding external markets.

With many economic sectors affected by problems, sectors like construction, transport or services (particularly IT) are better positioned to succeed. Construction registered important growth given the strong demand for apartments, particularly in Chisinau, which motivated the developers to launch many residential projects. This demand is fuelled both by remittances and by access to real estate loans. These loans became more accessible following implementation of the state's “Prima Casa” programme and financial system reforms (Figure 3).

Figure 3. Contribution of economic activities to GDP (percentage)



Source: National Bureau of Statistics.

Indicator 2.3: Economically active population

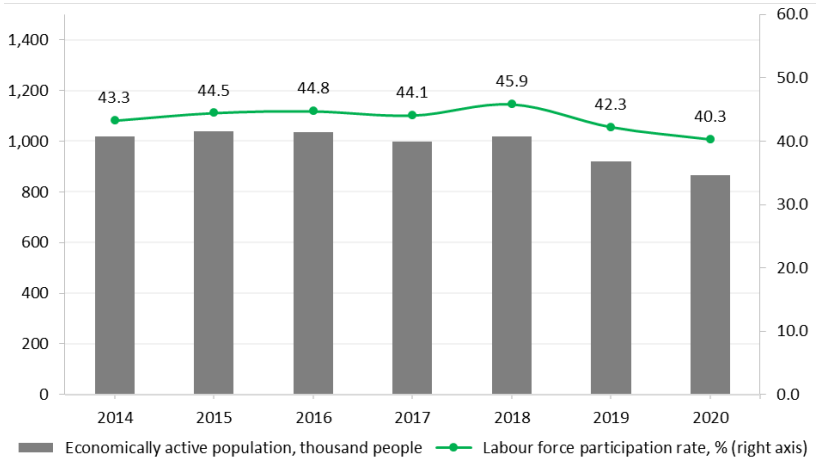
Key message

The 2014 Population and Housing Census revealed a much clearer picture of the labour force situation, especially the impact of emigration. All relevant indicators were adjusted significantly, reflecting a negative macroeconomic outlook. Moreover, the outlook has worsened since the Census, with no prospects in sight to reverse the trend. Indicators such as "economically active population" or "participation rate" continue to show a decrease and extremely low levels compared with European countries.

Indicator trend

Over the past two decades, emigration has been one of the primary factors that characterised the macroeconomic evolution of the country. The declining population has a direct impact on the volume and quality of labour available to the national economy. Once the "usual resident population" was introduced after the 2014 Census, labour force indicators underwent significant changes as well. Thus, the number of economically active people in 2014 (employed population plus unemployed) was lower than 1 million, decreasing steadily over the past seven years to about 867 000 in 2020. At the same time, the participation rate of labour force expressed as the ratio of economically active population to total population aged 15+ also shrank from a high of almost 45.9% in 2018 to 40.3% (Figure 4).

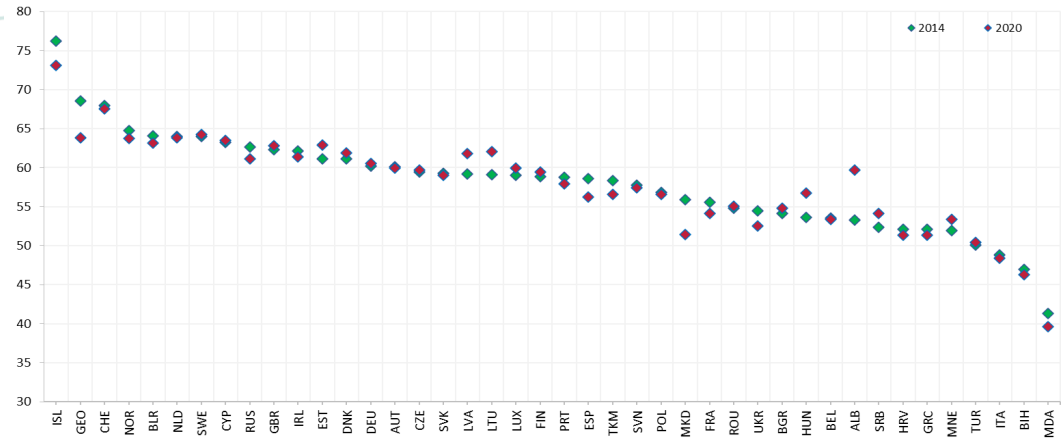
Figure 4. Economically active population and participation rate



Source: National Bureau of Statistics.

The seriousness of the labour force situation is also confirmed by comparison at the European level (Figure 5). Moldova ranks last among European countries in terms of labour force participation. It has a participation rate of under 45%; two other countries are between 45-50%, while most have a rate above 55%. Moreover, Moldova has one of the fastest decreases, starting already from a low level (compared with 2014), while other countries either register a decrease from a high level or an improvement.

Figure 5. Labour force participation rate at international level



Source: World Bank.

Indicator 2.4: Unemployment

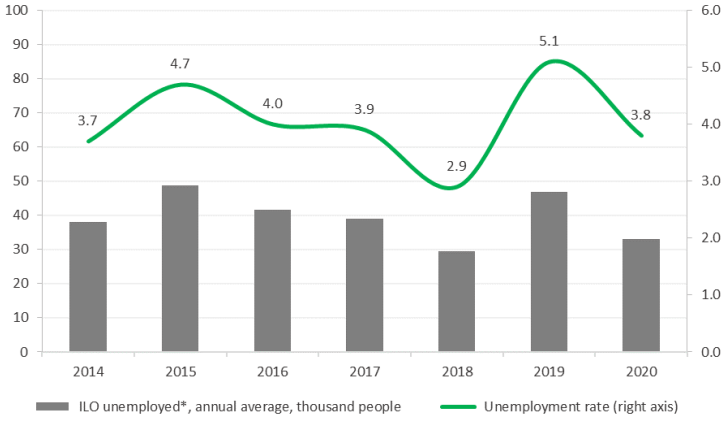
Key message

The 2014 Population and Housing Census revealed a much clearer picture of the labour force situation, including for unemployment. Although the unemployment level is low (under 5%), it does not count unemployed people who are not actively seeking work. Many people are reluctant to register with the National Employment Agency (NEA) because they migrate periodically abroad and are stuck in a pattern of seasonal migration.

Indicator trend

The unemployment rate has not changed much since 2014. The introduction in 2018 of a 12% flat personal income tax, as part of the tax reform, reduced both the population engaged in informal employment and the number of unemployed by tens of thousands of people. As a result, the unemployment rate hit in 2018 a historic low – slightly less than 3% (Figure 6).

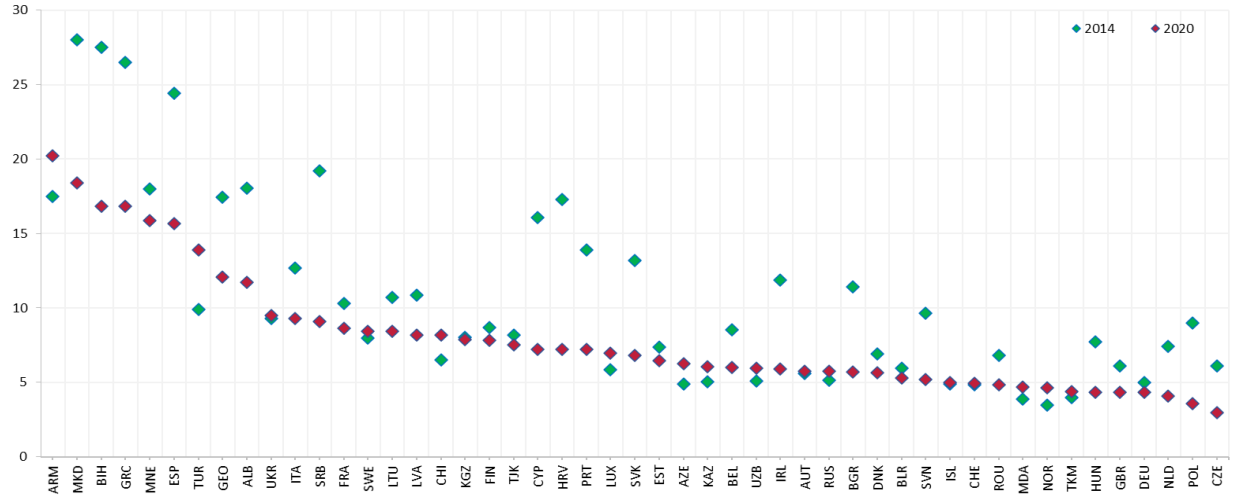
Figure 6. Number of unemployed people and unemployment rate (percentage)



Source: National Bureau of Statistics.
* According to the definition of the International Labour Office, https://statistica.gov.md/pageview.php?l=ro&id=2255&idc=302.

The level of unemployment in Moldova is among the lowest in European countries (Figure 7). Nonetheless, these results occur in the context of high levels of informal employment throughout the entire economy – about 16% of employed persons. Sectors such as construction or agriculture are at the top of the list when it comes to informally employed persons with more than half of the total. In addition, a high number of citizens do not have a job but are not searching for one; hence, they do not meet the requirements to be called "unemployed persons". The term refers to persons with a temporary job abroad and who alternate between staying at home and working.

Figure 7. Unemployment rate at international level



Source: World Bank.

Indicator 2.5: Population

Key message

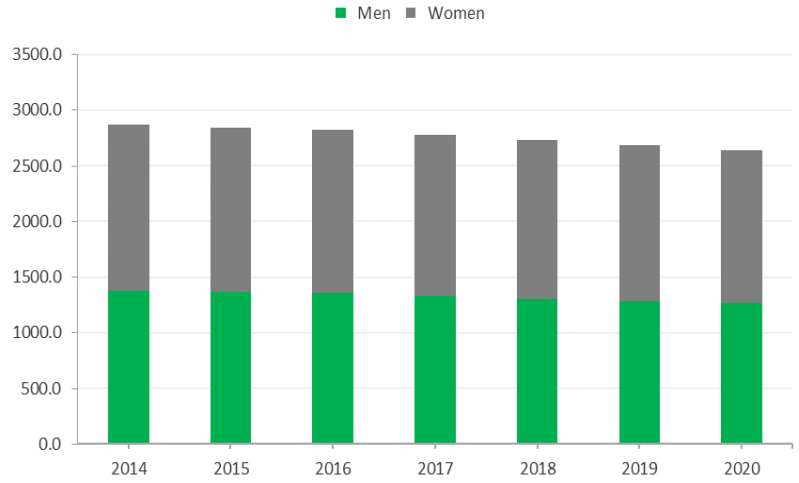
Moldova is in a period of demographic transition that will generate significant effects in the long run. Emigration remains a central feature of society, both for short periods (for work), and for long periods or even permanently. The characteristics of emigration are even more significant; it is no longer temporary and for employment. Rather, people emigrate to live abroad. Moldova also registers a continuous negative natural population growth and a rapid depopulation of rural areas. Given these conditions, the population with "usual residence" in Moldova over the past seven years decreased by 225 000, leaving the total population at 2.6 million.

Indicator trend

Massive emigration over the past two decades significantly affected national demographics. Because many people with Moldovan citizenship do not live in the country, certain measures were needed to describe the actual demographics. Thus, in 2014, the National Bureau of Statistics introduced the *usual resident population* indicator. This refers to the number of people who lived predominantly in the country over the past 12 months, regardless of temporary absences. The population with usual residence is based on the 2014 Population and Housing Census, then adjusted with natural population growth (births minus deaths) plus net migration. Besides migration, negative natural population growth has been registered for many years, as well as a rapid and persistent depopulation of rural areas, which puts more pressure on demographic indicators.

This change of focus resulted in a sharp drop in population. Using the new indicator, 3.5 million people held residence in the country, including those temporarily absent who left to live abroad (stable population). At the same time, an increasingly higher number of public authorities make decisions based on other figures, such as population with a usual residence that amounts to 2.6 million people (Figure 8). This report uses this figure predominantly to analyse different per capita indicators because it best captures the real number of people on the territory of the country.

Figure 8. Number of population (thousand people) and demographic structures by gender



Source: National Bureau of Statistics.

Indicator 2.6: Population density

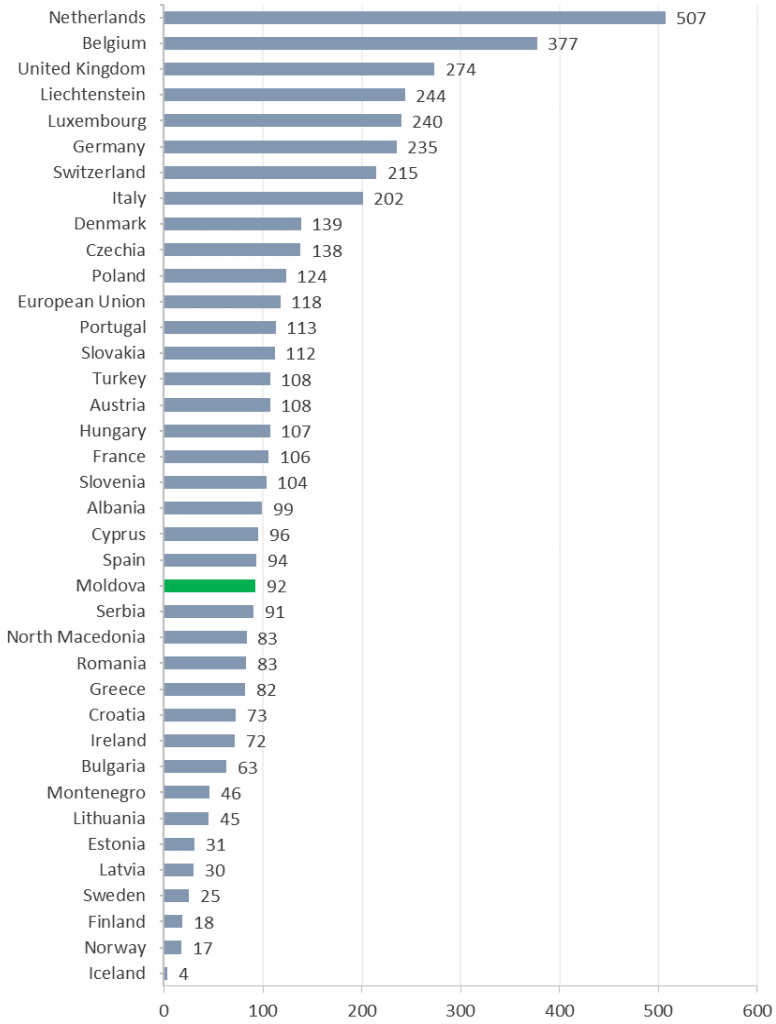
Key message

Population density registers the same downward trend as the number of people. In 2020, Moldova had an average of 89 persons per square kilometre – 8 persons fewer than in 2014. At the same time, significant changes took place at the regional level following a rapid depopulation of rural areas and concentration of population in urban areas, particularly in Chisinau municipality.

Indicator trend

Demographic trends characterised by emigration and negative natural population growth have an impact on population density. Based on population with usual residence (i.e. how many people live in the country), population density reaches only 89 persons per square kilometre. This level represents the situation in Moldova only for 2020, without the Transnistrian region, and projects a continuous decrease of one person on average annually. Figure 9 compares Moldova with European countries in 2018, showing the country ranks below the EU average of 118 persons per square kilometre.

Figure 9. Population density (persons/square kilometre in 2018)



Source: EUROSTAT.

Indicator 2.7: Life expectancy

Key message

Even if life expectancy at birth has improved in recent years, Moldova ranks at the lowest level among European countries with an average for both genders of only 70.9 years. Disaggregated by genders, women live on average eight more years than men – a high gap compared with other countries. At the same time, the COVID-19 pandemic significantly affected the general level of the indicator in 2020, translating into a higher number of deaths and a lower number of births. Thus, in 2020, life expectancy at birth decreased by about 1 year, reaching 65.9 years for men and 75.1 years for women.

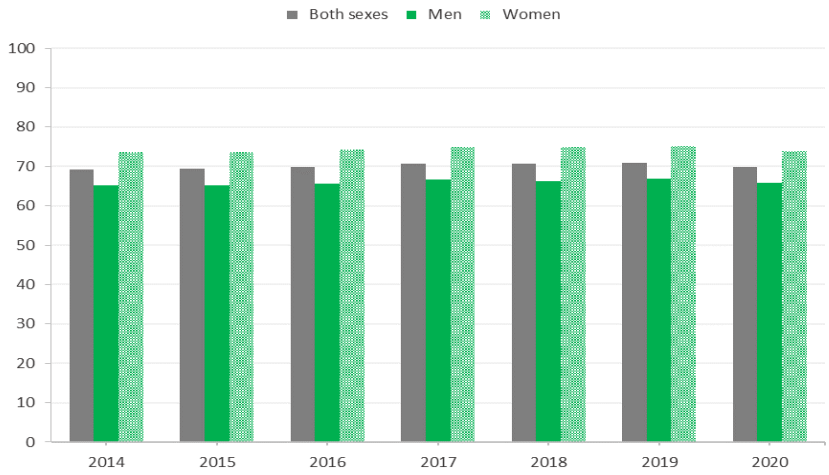
Indicator trend

Life expectancy at birth in Moldova has improved marginally over the past few years, but the COVID-19 pandemic had a strong impact in 2020. Until 2019, life expectancy had continued to increase and reached 70.9 years for both genders (69.3 years in 2014). In 2020, Moldova registered a decrease of about one year due to a higher number of deaths from COVID-19 and a lower number of births (probably for the same reason). Women still surpass men in terms of life expectancy at birth, reaching 73.9 years

compared with 75.1 years in 2019. For their part, men live on average 8 years less than women in 2020: their life expectancy is 65.9 years, 1.1 years less than in 2019.

Apart from 2020, life expectancy has increased in recent years due to a reduced overall mortality rate and infant mortality rate. The improved health of the population is essential in this regard, achieved through greater access to health care services rather than through improvements to the environment. Thus, the morbidity rate did not change significantly. However, Moldova has made important technological progress in health care services and better access to medicines and treatment.

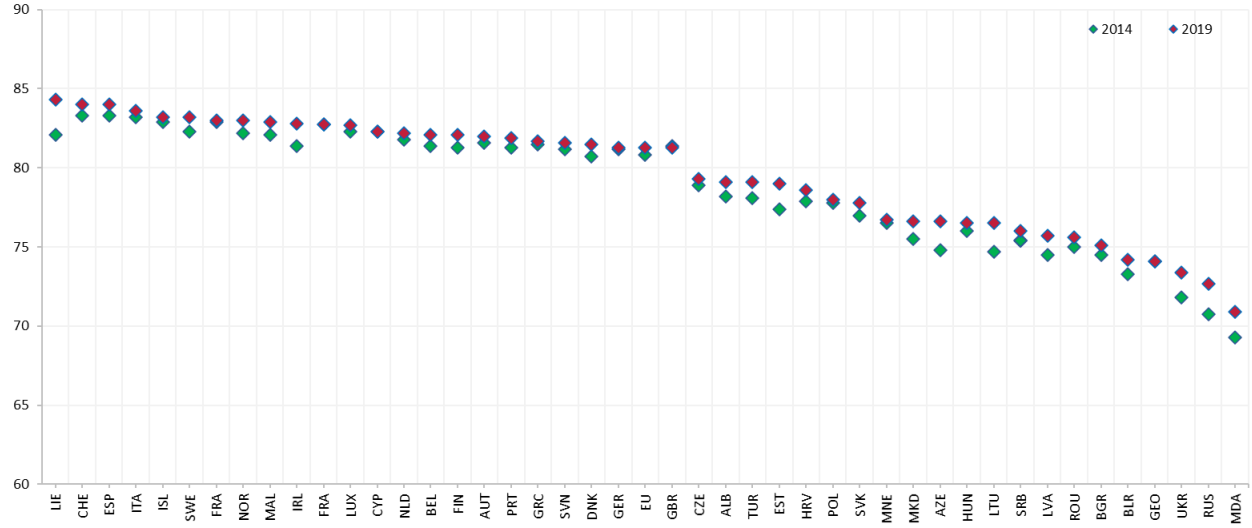
Figure 10. Life expectancy at birth in Moldova



Source: National Bureau of Statistics.

For comparison, Moldova is still at the bottom of the list among European countries with respect to life expectancy at birth (Figure 11). Western European countries are at the top of this ranking with a life expectancy of over 80 years, while Eastern countries, including Romania and Ukraine, register a level under 75 years. This is due to different factors, including access to health care goods and services, sanitation, quality of life and overall living standards.

Figure 11. Life expectancy at birth at the international level



Source: National Bureau of Statistics.

Another indicator for human capital is related to the Human Development Index (HDI), which comprises indexes on life expectancy, education level and living standards. According to the 2019 ranking, Moldova ranks 107th among world countries with HDI equal to 0.711 (i.e. among countries with high human development). Moldova jumped into the second group of countries after being included among countries with a medium level of human development for many years. Neighbouring countries, Romania and Ukraine, rank 52nd (HDI – 0.816) and 88th (HDI – 0.750), respectively, while Georgia ranks 70 (HDI – 0.786). EU countries belong to the group with a high level of human development.

Indicator 2.8: Income inequality

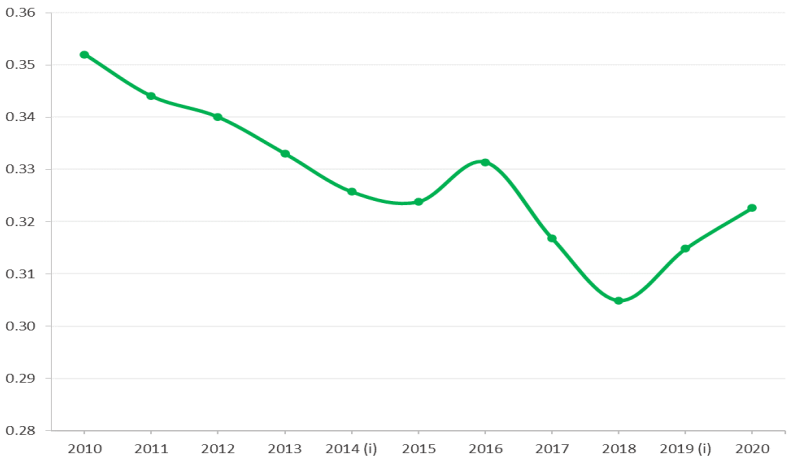
Key message

Socio-economic inequalities in Moldova tend to decrease following an increase in people's income. This is due largely to labour migration, which brings a significant volume of remittances into the national economy every year. Thus, on the one hand, the income of the population from the most vulnerable group increased and, on the other, the number of households with precarious economic situations decreased. Nonetheless, the COVID-19 pandemic revealed that economic precarity continues for groups that lost part of their income or even their jobs due to lockdown.

Indicator trend

After a period of marginal improvement, the level of inequalities in Moldovan society has being increasing since 2018. Thus, the GINI coefficient reached 0.33 (0 – perfect equality, 1 – maximum inequality) at the end of 2020 (Figure 12). Increasing external migration of the low-income population contributed to diminishing inequalities until 2018. As a result, the share of remittances by households from quintile I (20% of the population with the lowest income) has doubled up to 18% of their total disposable income. This level is comparable with that of households from quintile V (20% of the population with the highest income). This also results from coefficient values that decreased both for total available income of the population and overall consumer spending. Basically, the number of households with unfavourable socio-economic status diminished, particularly the number of those employed in the agricultural sector where salaries are among the lowest.

Figure 12. GINI coefficient

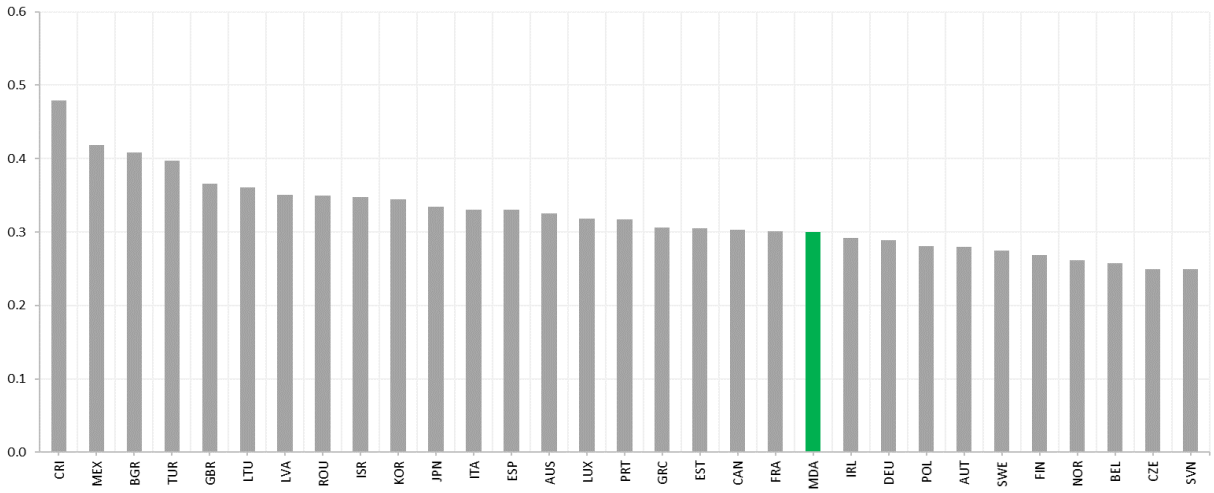


Source: National Bureau of Statistics.
(i) interruption in the time series[i]

Despite the somewhat positive trends in diminishing inequalities, their level is most likely underestimated because households struggle to obtain a higher level of income. In addition, during the household survey, people tend to underestimate income compared with consumption expenses. The level of inequalities was clearly visible during the COVID-19 pandemic. During the lockdown, for example, people with low income and without savings were the ones most affected by the inability to carry out certain economic activities.

Over the past ten years, the level of inequality has been essentially unchanged in most of Central and Eastern European countries. Moldova was the only country in the region that registered a significant positive performance on this front. Even so, the values of the GINI coefficient are among the lowest in Moldova, surpassed only by countries such as the Czech Republic, Poland and Slovenia. However, these comparisons should be analysed carefully given that national income cannot be compared.

Figure 13. GINI coefficient in European countries, 2018



Source: OECD.

Indicator 2.9: Enrolment in education

Key message

The enrolment rate in education differs depending on educational level. All children are enrolled in mandatory education, and to a lesser extent in preschool education. Education reforms of recent years have led to increased registration in secondary or tertiary education and efforts to correlate the educational offer with labour market requirements.

Indicator trend

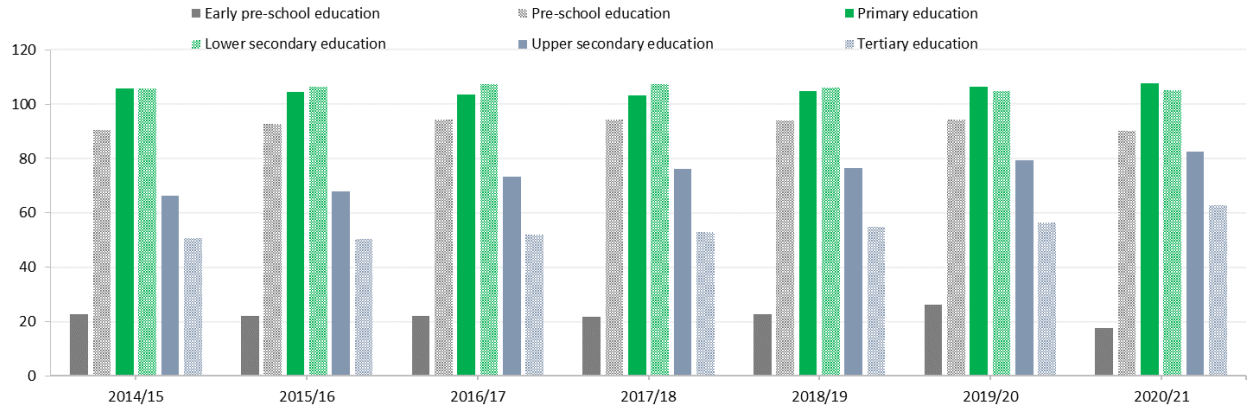
The enrolment rate in education continues to be high, although it differs depending on educational level. During the academic year 2019/20, about 435 000 persons were enrolled in the education system, or 16% of the population with a usual residence. The highest level of enrolment is registered at the level of primary and secondary education. The rate for mandatory education is still relatively constant and even exceeds 100% given children are enrolled in the first grade before the age of seven. The next highest rate is for preschool education (90.3%). This rate has stayed constant in recent years and shows the interest of parents for their children to attend kindergarten.

On the other side, gross enrolment grew significantly in secondary (high school and technical vocational education) and tertiary education (university). Thus, enrolment in secondary education grew by about

16 percentage points up to 82.5%, while enrolment in tertiary education grew by about 12 percentage points. These figures confirm the increasing interest of students in high school, vocational or even university education. These trends are also determined by a better correlation between the labour market and the education system to reach a higher impact on economic growth. A good example in this regard is vocational education that allows certain individuals to adapt easier to the labour market requirement.

Despite the above-mentioned figures, the actual number of persons enrolled in certain levels of education is decreasing continuously and significantly. The number of students has dropped twice over the past 12 years to about 61 000. The number of students enrolled in primary and general secondary education also decreased by about 28% down to about 334 000 students during the 2018/19 academic year. There are multiple reasons for these trends related to emigration – from families moving abroad together with their children to better conditions for studies and opportunities abroad.

Figure 14. Gross coverage rate in education by educational levels (percentage)



Source: National Bureau of Statistics.

Chapter 3. The environmental and resource productivity of the economy

This chapter explores whether Moldova is becoming more efficient in its use of natural resources and environmental services. It measures nine indicators of environmental and resource productivity: greenhouse gases, carbon productivity, final consumption of energy, energy intensity, share of renewable energy in the final consumption of energy, waste generation and recycling, and use of fertilisers and water. In this way, the indicators capture the efficiency with which economic activities – both production and consumption – use energy, other natural resources and environmental services. They reflect key aspects of the transition to a low-carbon, resource-efficient economy: carbon and energy productivity, resource productivity and multifactor productivity.

Environmental and resource productivity indicators: Key findings

- **Greenhouse gases:** greenhouse gas (GHG) emissions, including carbon dioxide (CO_2) – which accounts for two-thirds of emissions – have been relatively stable since 2010.
- **Carbon productivity:** since 2010, the relative stability of GHG emissions, including CO_2, was accompanied by growth in gross domestic product (GDP). As a result, carbon productivity increased and economic growth decoupled from CO_2 emissions.
- **Final consumption of energy:** after 2010, the supply of primary energy and final consumption of energy increased. Energy supply grew at a lower rate than GDP. As a result, energy productivity increased. Nonetheless, this growth did not allow the Republic of Moldova (hereafter "Moldova") to improve its position in relation to other European countries.
- **Energy intensity:** productivity grew and energy intensity decreased after 2010. Nonetheless, energy intensity did not diminish in all economic sectors.
- **Share of renewable energy in the final consumption of energy:** the supply of renewable energy increased generally (although it decreased in 2019). As a result, the share of renewable energy in the supply of primary energy and in the final consumption of energy increased.
- **Waste generation:** waste from enterprises has decreased, particularly after 2015. At the same time, the volume of household waste has been increasing.
- **Waste recycling:** there is no clear trend for waste utilisation. The largest waste utilisation occurred in 2010 (1.4 million tonnes). Between 2011 and 2019, the quantity of utilised waste varied between 300 000-700 000 tonnes.
- **Use of fertilisers:** more use of mineral fertilisers was not accompanied by an increase in vegetal production.
- **Use of water:** water consumption has been stable since 2010, but GDP increased. As a result, water productivity increased. Nonetheless, this growth did not allow Moldova to improve its position in relation to other European countries.

Indicator 3.1 Greenhouse gases

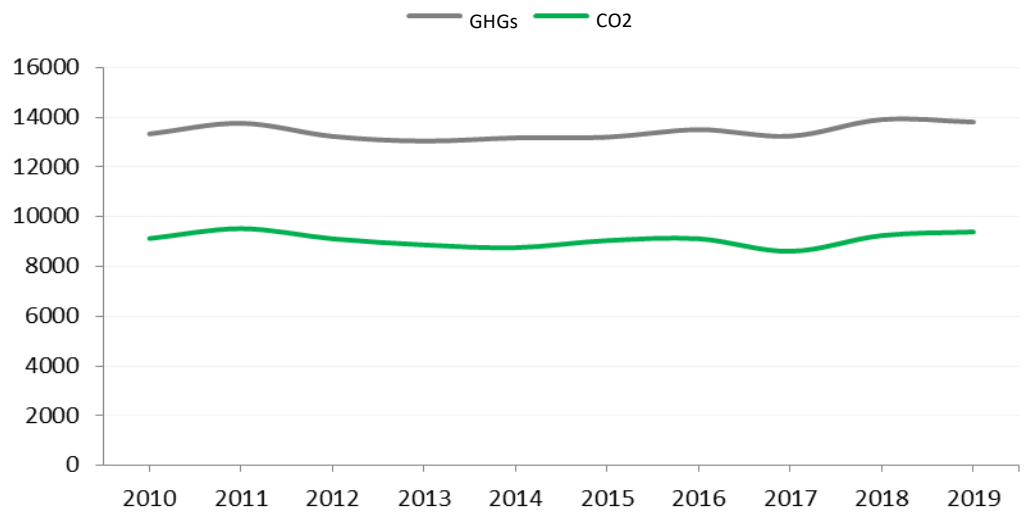
Key message

The increase in GHG emissions has major implications for the environment and increases vulnerability to climate change. The increase in GHG emissions led to temperature rise, degradation of climatic conditions and more frequent and intense extreme weather events. In Moldova, GHG emissions, including CO_2 – which accounted for two-thirds of emissions – have been relatively stable since 2010.

Indicator trend

Between 2010 and 2019, the rate of GHG emissions was relatively stable (Figure 15). During this period, there were annual emissions of about 13.4 million tonnes of CO_2-equivalent (CO_2-eq). Annual trends have fluctuated around this value, ranging between 13-13.8 million tonnes of CO_2-eq. CO_2 represents two-thirds of emissions. Between 2010 and 2019, CO_2 emissions have fluctuated between 8.8-9.5 million tonnes with an annual average value of about 9.1 million tonnes.

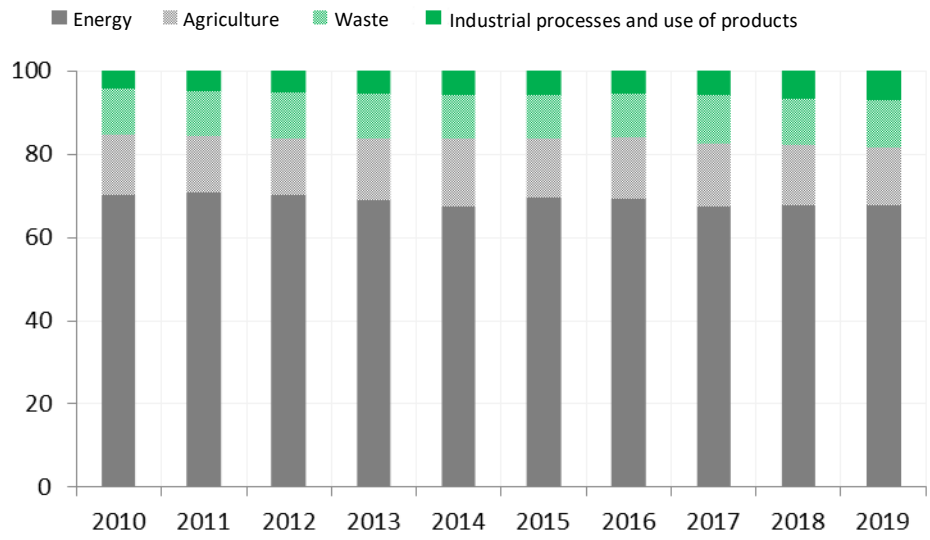
Figure 15. Greenhouse gas emissions, including CO_2 (thousand tonnes of CO_2-equivalent)



Source: http://clima.md/libview.php?l=en&idc=264&id=5024.

Between 2010 and 2019, the structure of GHG emissions, depending on the sector, did not change significantly (Figure 16). The share of emissions generated by the energy sector, for example, decreased from 70% to 67.5%. Meanwhile, the agricultural sector produced about 14.5% of emissions and waste produced at least 11%. The share of emissions from industrial processes and use of products increased from 4.2% to 7.2%.

Figure 16. Structure of greenhouse gas emissions by sector (percentage)



Source: http://clima.md/libview.php?l=en&idc=264&id=5024, authors' calculations.

Indicator 3.2: Carbon productivity

Key message

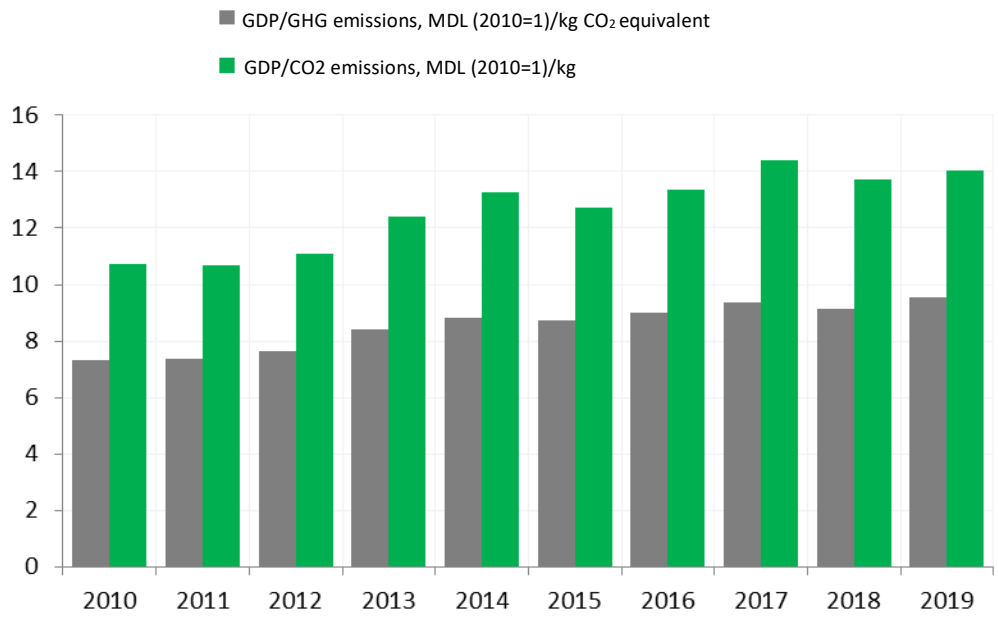
Carbon productivity reflects the correlation between CO_2 emissions and economic dynamics. Productivity is determined by the value of economic output (MDL or USD of GDP) per a certain quantity of CO_2. For example, higher productivity means production of 1 MDL or USD of GDP is accompanied by a reduction of CO_2 emissions.

In Moldova, a relatively constant volume of GHG emissions, including CO_2, has been accompanied by GDP growth since 2010. As a result, carbon productivity increased and economic growth decoupled from CO_2 emissions. Despite this increase, carbon productivity in Moldova is still low compared with other European countries.

Indicator trend

Between 2010 and 2019, the economy of Moldova began to rise, although GDP decreased in 2012 and 2015. As a result, GDP grew by about 42% between 2010-19. The constant volume of CO_2 emissions combined with GDP growth resulted in higher carbon productivity (Figure 17). Productivity grew from 7.3 to 9.5 MDL/kg. At the same time, the ratio between GDP and GHG emissions increased from 10.7 to 14.0 MDL/kg CO_2-eq. Higher carbon productivity shows that economic growth decoupled from CO_2 emissions.

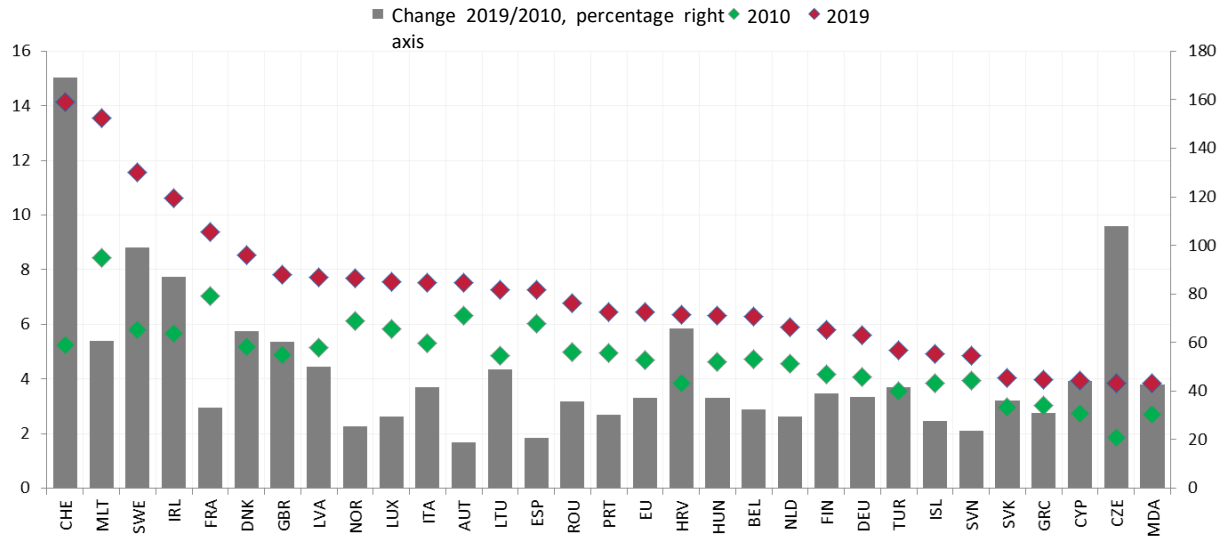
Figure 17. GHGs and carbon productivity in Moldova



Source: http://clima.md/libview.php?l=en&idc=264&id=5024, authors' calculations, National Bureau of Statistics, authors' calculations.

Carbon productivity expressed in USD at purchasing power parity (PPP) in constant 2017 prices grew from USD 3.0 to 4.0 PPP/kg between 2010 and 2019, an increase of 30.8%. Although this is positive, productivity in Moldova grew at a lower rate than in the European Union (35.5%). Hence, although productivity in Moldova grew by over 30%, it is still low compared with other European countries (figure 18). Moreover, Moldova ranks at the bottom of European countries in terms of carbon productivity. Thus, in 2016, productivity in Moldova accounted for 58.4% of the EU level.

Figure 18. Carbon productivity, USD PPP (2017=1)/kg



Source: EUROSTAT, World Bank, http://clima.md/libview.php?l=en&idc=264&id=5024, Bureau of National Statistics, authors' calculations.

Indicator 3.3: Final consumption of energy

Key message

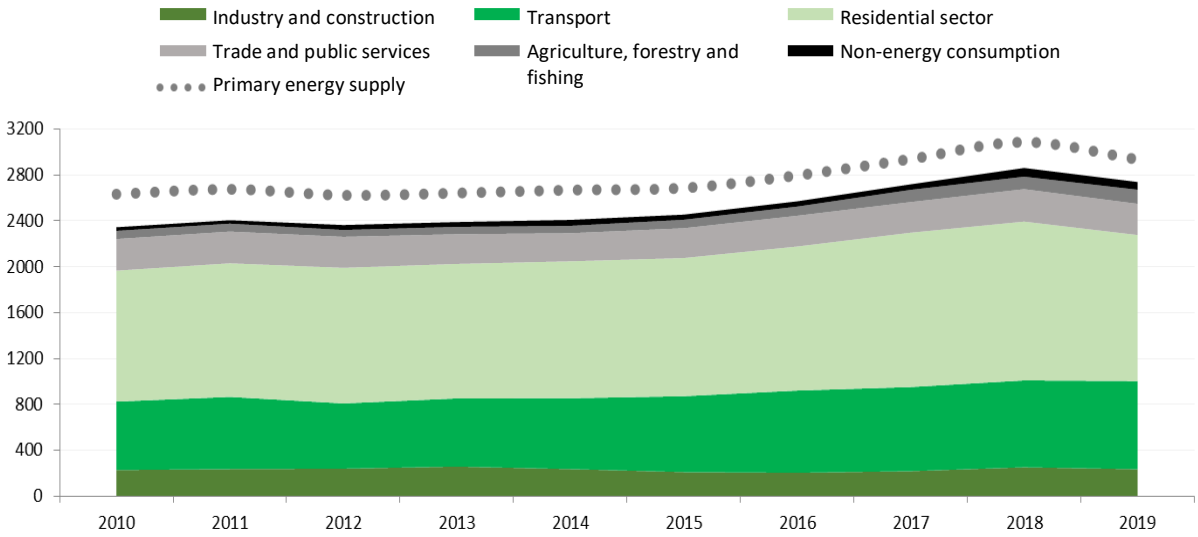
The way energy is used has an impact on the development of the green economy. Producing energy with less fuel generates fewer CO_2 emissions and helps maintain a clean environment. Energy productivity reflects the relationship between the use of energy and economic growth. Productivity is determined by the value of economic output (1 MDL or USD of GDP) per a certain quantity of energy. For example, growth in productivity reveals that production of 1 MDL or USD of GDP was accompanied by a decrease in energy consumption. In Moldova, the supply of primary energy and final consumption of energy increased after 2020. Energy supply grew at a lower rate than GDP. As a result, energy productivity increased. Nonetheless, this growth did not allow Moldova to improve its position in relation to other European countries.

Indicator trend

After 2010, the supply of primary energy increased (except for a decrease in 2019). Between 2010 and 2019, the supply of primary energy grew from 2.6 to 2.9 million tonnes of oil equivalent (toe), an increase of 11.5%. The increasing supply of energy was determined by the growth in consumption. Thus, in 2019, compared with 2010, final consumption of energy grew by 16.8%, from 2.3 to 2.7 million toe.

During 2010 and 2019, non-energy consumption triggered the fastest growth in energy use, from 32 000 to 67 000 toe. Energy consumption in agriculture also grew quickly: from 71 000 to 123 000 toe (73.2%). Meanwhile, energy use in the transport sector grew from 597 to 769 million toe (28.8%). The residential sector grew at a slower pace: from 1.1 to about 1.3 million toe (11.6%). Energy consumption in industry and construction, as well as in the trade and public service sector, remained generally stable. The use of energy in industry and constructions varied around the level of 230 000 toe. Meanwhile, in the trade and public service sector, consumption oscillated around the level of 270 000 toe.

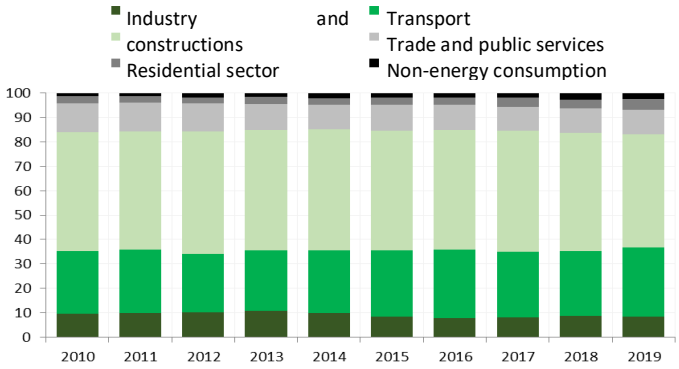
Figure 19. Supply of primary energy and final consumption of energy by sectors (thousand tonnes oil equivalent)



Source: National Bureau of Statistics.

Between 2010 and 2019, the structure of final consumption of energy underwent minor changes. The share of the residential sector in energy consumption decreased from 48.6% to 46.5%, while the share of transport increased from 25.5% to 28.1%. The share of energy consumption also decreased in industry and construction (from 9.7% to 8.5%) and in trade and public services (11.8% to 9.9%). The share of energy use increased in agriculture (from 3.0% to 4.5%) as did the share of non-energy consumption (from 1.4% to 2.4%). However, the sector still accounts for a small share of energy consumption.

Figure 20. Structure of final consumption of energy (percentage)

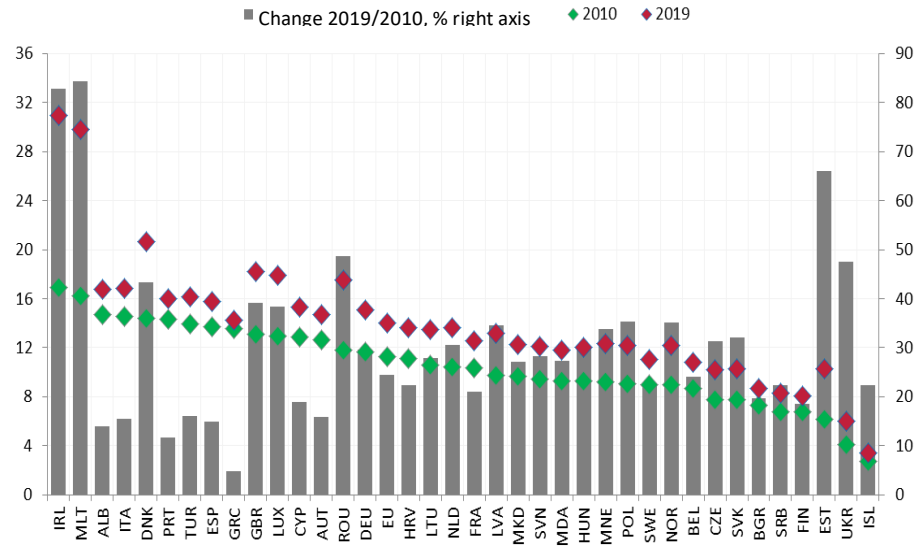


Source: National Bureau of Statistics, authors' calculations.

Between 2010 and 2019, the supply of primary energy increased by 11.5%, and GDP grew by about 42%. As a result, energy productivity increased and economic growth decoupled from energy use. In terms of economic output at PPP, the level of productivity grew by 27.2% – from 9.2 to 11.8 USD/kg.

Energy productivity grew much faster in Moldova compared with other European countries. For example, between 2010 and 2019, productivity in the European Union grew by 24.4% and was 2.7 percentage points lower than growth in Moldova. Despite this progress, productivity in Moldova is still low compared with other European countries. Among European countries, Moldova ranks near the bottom in terms of energy productivity (Figure 21).

Figure 21. Energy productivity, USD PPP (2017=1)/g oil equivalent



Source: EUROSTAT, World Bank, National Bureau of Statistics, authors' calculations.

Indicator 3.4: Energy intensity

Key message

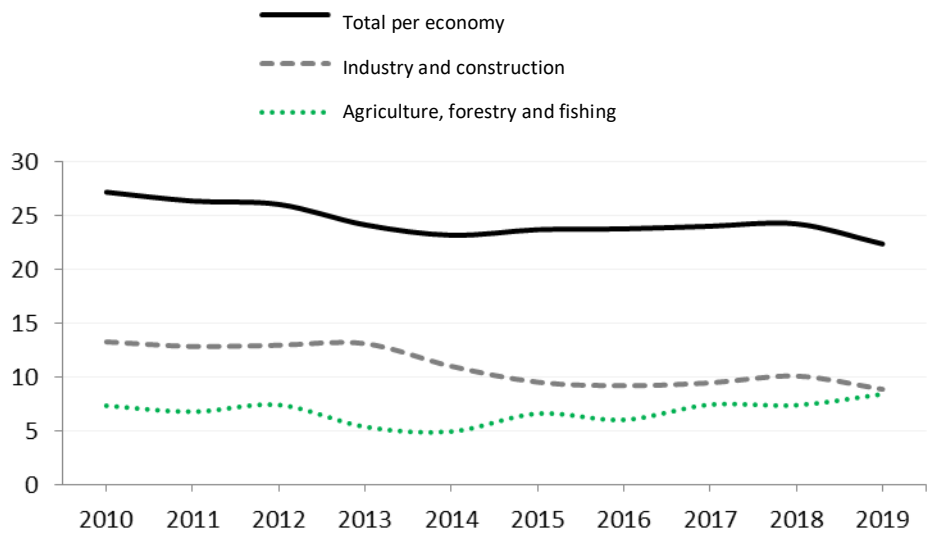
Energy intensity is the opposite of energy productivity. Energy intensity is determined by the quantity of consumed energy per one value unit of economic output (1 MDL or USD of GDP or GVA). A lower intensity shows that reduction in energy use was accompanied by production of the same level of GDP or even output growth.

A lower intensity or higher energy productivity shows that economic growth is accompanied by a more efficient use of energy resources. In Moldova, productivity grew and energy intensity decreased after 2010. Nonetheless, energy intensity did not diminish in all economic sectors.

Indicator trend

Between 2010 and 2019, GDP growth exceeded growth of final consumption of energy. These trends resulted in the growth of energy productivity and a decrease in energy intensity at the level of the entire economy (Figure 22). Over 2010-19, energy intensity declined by 17.7% – from 27.2 to 22.4 grammes oil equivalent/MDL. Energy intensity registered a more pronounced decrease in the industry and construction sectors. In this sector, GVA – an indicator that reflects the production process – increased by 54.1%, while energy consumption increased by only 3.1%. As a result, energy intensity in industry and construction decreased by 33.1% – from 13.3 to 8.9 grammes of oil equivalent/MDL. At the same time, energy intensity increased in agriculture. GVA in agriculture increased by 51.3% and energy use increased by 73.2%. As a result, energy intensity in the agricultural sector increased by 14.5% from 7.4 to 8.4 grammes of oil equivalent/MDL.

Figure 22. Energy intensity, MDL (2010=1)/g oil equivalent



Source: National Bureau of Statistics, authors' calculations.

Indicator 3.5: Share of renewable energy in final consumption of energy

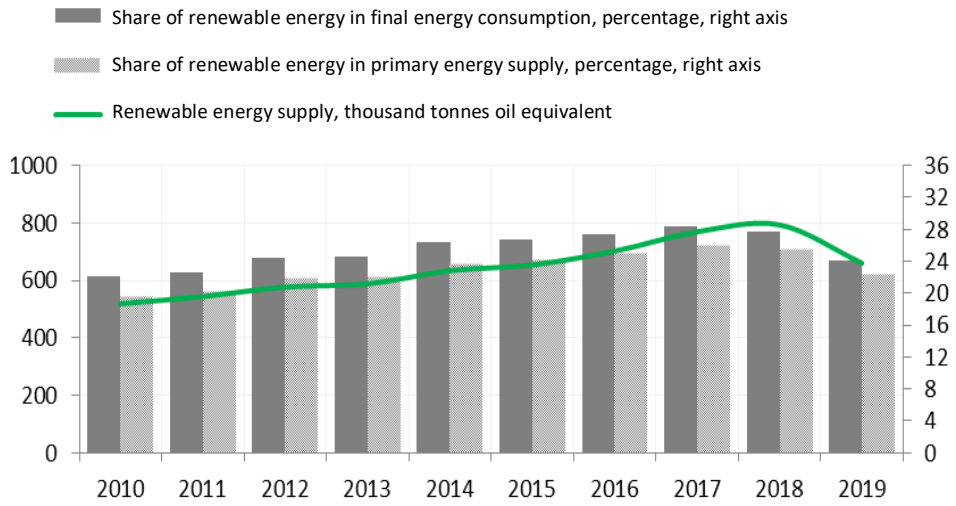
Key message

Renewable sources of energy are alternatives to fossil fuels and help reduce GHG emissions, diversify energy supply and decrease dependence on volatile oil and gas markets. In Moldova, the supply of renewable energy increased after 2010 (although it decreased in 2019). As a result, the share of renewable energy in primary energy supply and in final consumption of energy increased. Nonetheless, the supply of renewable energy in Moldova consists mainly of biofuels and waste. This shows efforts to develop a modern sector for generating renewable energy are still at an embryonic stage.

Indicator trend

In general, the supply of renewable energy increased after 2010 (decreasing only in 2019). Between 2010 and 2018, renewable energy supply grew from 519 million to 793 million toe, an increase of 52.8%. In 2019, the supply of renewable energy dropped to 660 000 toe. Following this trend, the supply of renewable energy increased by 27.2% over 2010-19. As a result, the share of renewable energy in the supply of primary energy and in the final consumption of energy increased (Figure 23). Renewable energy represented 19.7% of primary energy supply in 2010, increasing to 22.5% in 2019. During the same period, the share of renewable energy in final energy consumption increased from 22.1% to 24.1%.

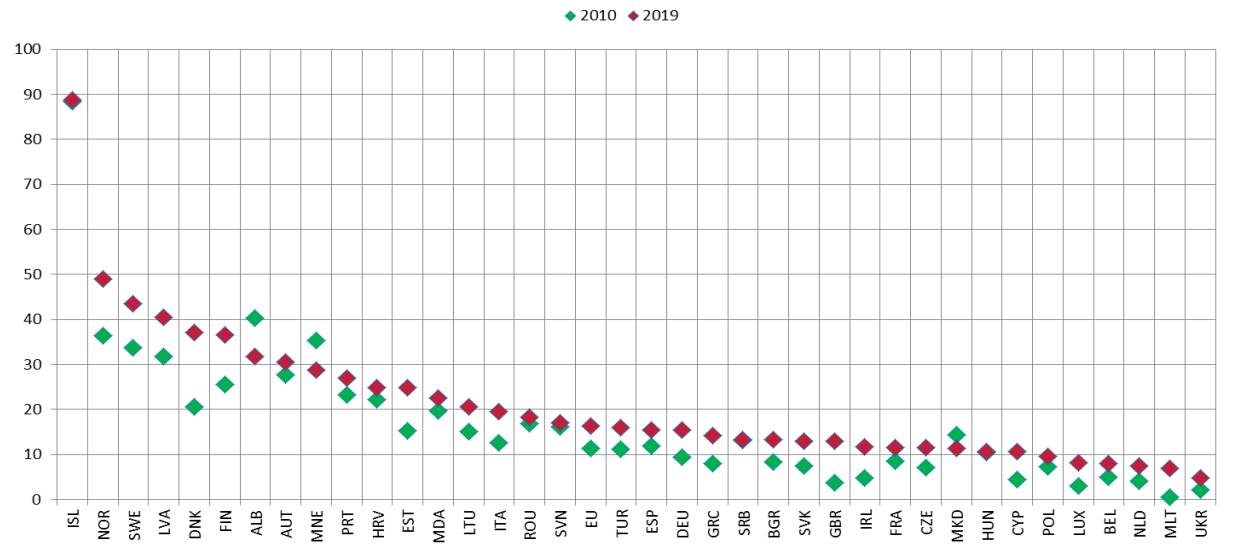
Figure 23. Supply of renewable energy (thousand tonnes oil equivalent) and share of renewable energy in primary energy supply and in final consumption of energy (percentage)



Source: National Bureau of Statistics, authors' calculations.

Compared with other European countries, Moldova is well positioned for renewable energy supply (Figure 24). Over 2010-19, the share of renewable energy in primary energy supply in Moldova grew from 19.7% to 22.5%. The average value of this indicator in the European Union grew at a much slower rate – from 11.4% to 16.0%.

Figure 24. Share of renewable energy in primary energy supply in European countries (percentage)



Source: EUROSTAT, World Bank, National Bureau of Statistics, authors' calculations.

Nonetheless, the share of biofuels and waste in the primary supply of renewable energy is extremely high in Moldova compared with other European countries. Biofuels and waste account for 98-99% of the primary supply of renewable energy. For its part, firewood represents over 80% of biofuels and waste. This shows that Moldova obtains most of its renewable energy from cutting trees, and that renewable energy production is at an early stage of development.

Indicator 3.6: Waste generation

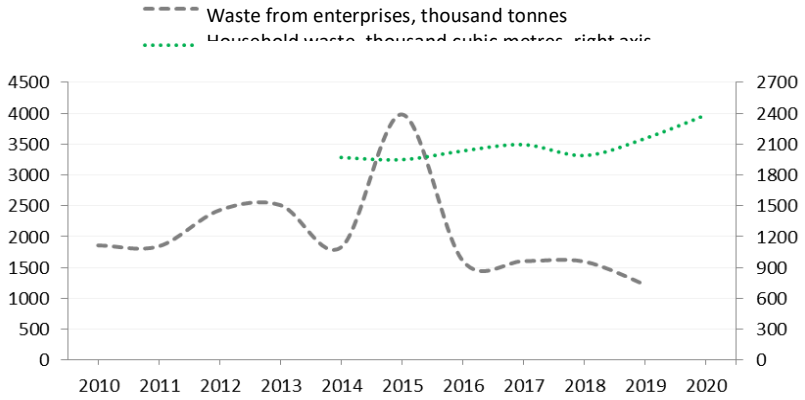
Key message

Waste represents processed products or substances that cannot be used in human activities (production or consumption). Due to prolonged decomposition and the emissions generated during the decomposition, waste is an important source of environmental pollution. Two trends are registered in the Republic of Moldova (hereafter "Moldova"). Waste from enterprises has decreased, particularly after 2015. At the same time, the volume of household waste is increasing.

Indicator trend

Since 2015, a clear trend is visible with respect to waste reduction from enterprises (Figure 25). Between 2015-19, the amount of waste dropped by 70% (from about 4.0 million tonnes to 1.2 million tonnes). At the same time, household waste increased, especially in 2018. Between 2014 and 2018, the volume of household waste fluctuated around 2 million cubic metres (m^3) before growing more intensely between 2019 and 2020. As a result, Moldova generated about 2.4 million m^3 in household waste in 2020.

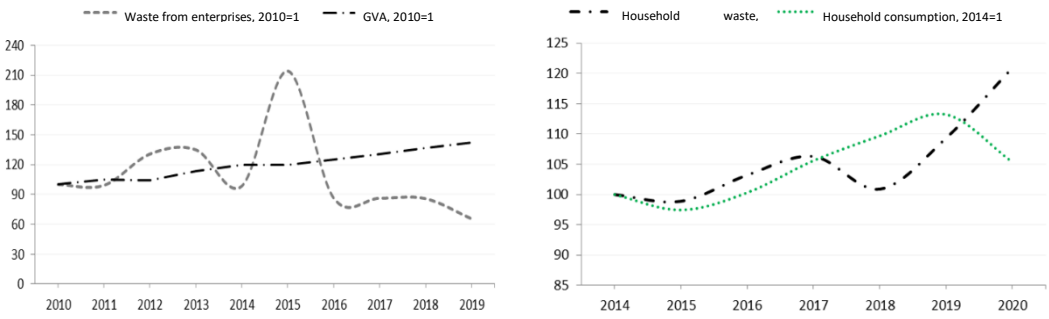
Figure 25. Waste generated by enterprises and households



Source: National Bureau of Statistics.

Between 2010 and 2019, enterprises decreased their waste by more than one-third (34.3%). During the same period, GVA increased by 42.1%. Consequently, enterprises decoupled production from their waste generation. Within households, waste and consumption levels were generally the same between 2014 and 2017. Beginning in 2018, household waste grew faster than consumption (Figure 26). Between 2014 and 2020, household waste grew by 20.9%, while household consumption increased by only 5.4%. Thus, Moldova continues to favour a model where waste levels surpass consumption levels.

Figure 26. Waste generated by enterprises, household waste, GVA and household consumption (percentage)



Indicator 3.7: Waste recycling

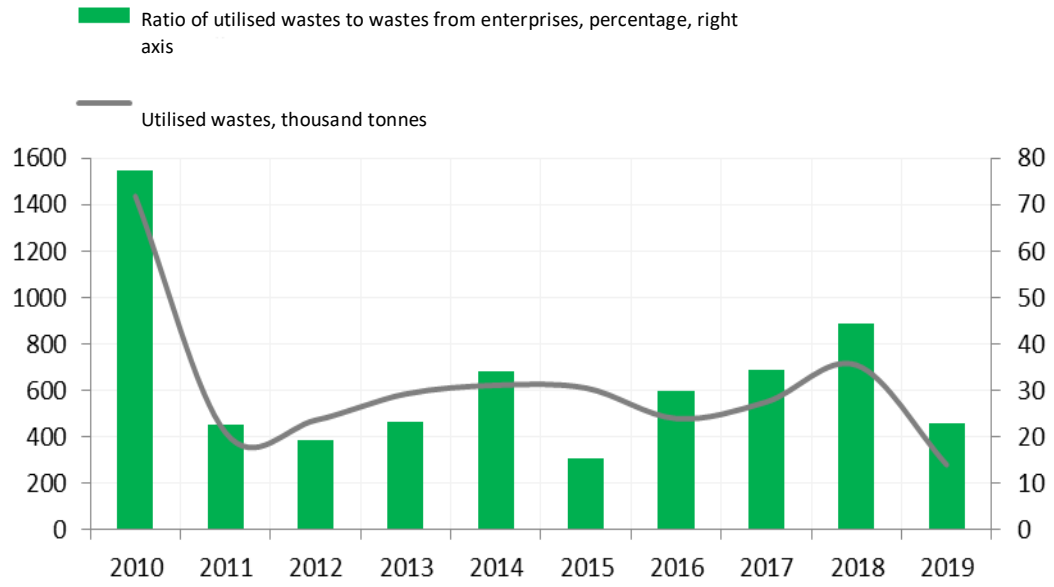
Key message

Waste utilisation means reintroducing waste in the economic circuit in the form of secondary raw materials or using them after processing as unfinished goods. Waste utilisation, including its recycling, has an important role in ensuring a healthy environment. Recycling reduces pressure on the environment because reintroducing waste in the economic circuit diminishes consumption of natural resources. Moldova uses the term "utilised waste" that comprises both recycling of waste and use of waste to produce energy. No clear trend is identified in Moldova in terms of waste utilisation.

Indicator trend

Moldova registered its biggest quantity of waste utilisation in 2010 (1.4 million tonnes). Later, between 2011 and 2019, the quantity of utilised waste varied between 300 000 and 700 000 tonnes (Figure 27). At the same time, the ratio between recycled waste and waste produced by enterprises had the highest value – 77.1% in 2010. Between 2011 and 2019, this ratio varied between 19% and 44%.

Figure 27. Recycled waste, and the ratio between recycled waste and waste generated by enterprises



Source: National Bureau of Statistics, authors' calculations.

In the "National Waste Management Program for 2022-2027" are presented some information about the recycling rate of some categories of municipal waste. However, this information is not official data and represent only estimations of program's authors. Thus, it was estimated that in 2018 the recycling rate of plastic waste was 4.1%, and the recycling rate was paper waste was 7.7%. A higher recycling rate is in the case of glass waste, which increased from 35.1% in 2018 to 41.5% in 2019.

Indicator 3.8: Use of fertilisers

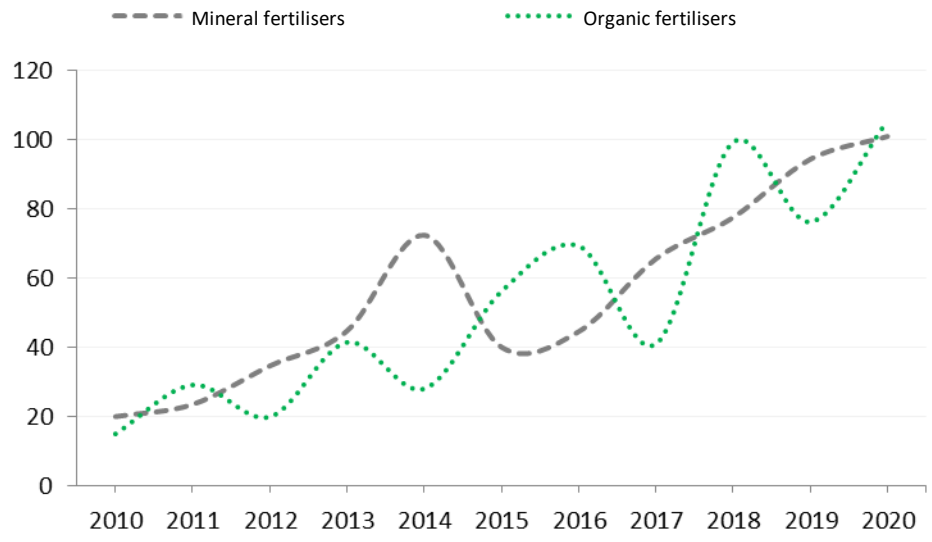
Key message

The sustainability of agricultural systems is an important element of the green economy. In this context, progress towards green growth can be assessed by analysing the intensity of mineral fertiliser use; intense use of nitrates and phosphates can pollute the environment. In international practice, nutrient balances are calculated to estimate the pollution potential of mineral fertilisers. Moldova does not estimate nutrient balances; other information can help analyse intensity of fertiliser use. Using these indicators, Moldova has accelerated use of mineral fertilisers. However, this was not accompanied by a rapid increase in vegetal production.

Indicator trend

In general, use of mineral and organic fertilisers in Moldova increased after 2010 (Figure 28). Between 2010-20, use of mineral fertilisers to treat land increased from 20 100 tonnes to more than 100 000 tonnes. While the trend was more erratic for organic fertilisers, there was still an increase. Between 2010-20, use of organic fertilisers on agricultural land increased from 15 100 tonnes to more than 105 000 tonnes.

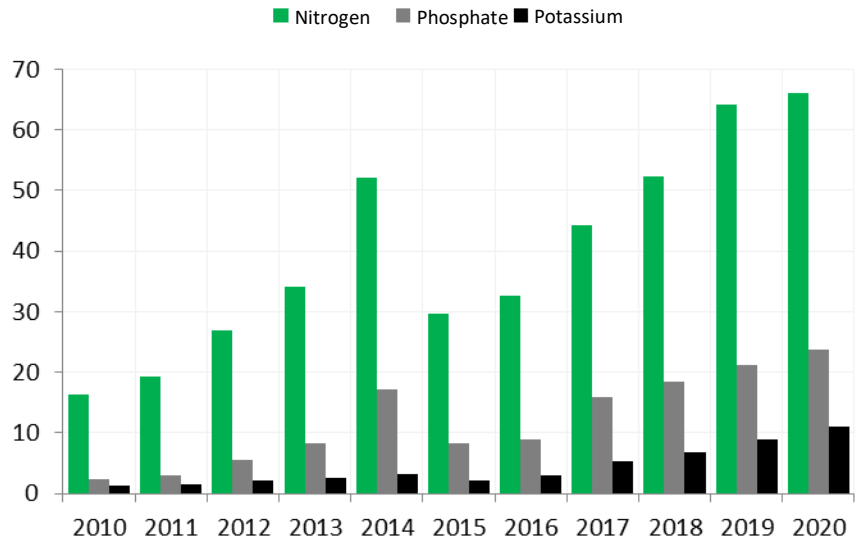
Figure 28. Mineral and organic fertilisers (thousand tonnes)



Source: National Bureau of Statistics.

Most mineral fertilisers are nitrates followed by phosphates and then potassium. Between 2010 and 2020, use of all types of fertilisers increased rapidly. During the same period, the quantity of nitrates used quadrupled – from just over 16 000 to 66 000 tonnes. At the same time, the quantity of phosphates increased almost ten-fold – from about 2 400 tonnes to 24 000 tonnes. The use of potassium fertilisers also increased almost 8.5 times – from 1 300 to over 11 000 tonnes.

Figure 29. Minerals in fertilisers (nitrogen, phosphate and potassium)



Source: National Bureau of Statistics.

Indicator 3.9: Use of water

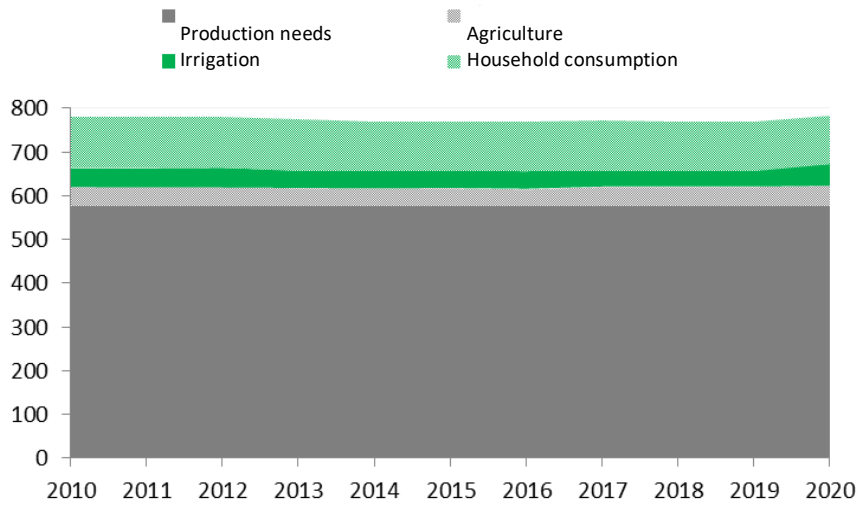
Key message

Availability of water resources is a basic condition for sustainable socio-economic development. Water is vital for agricultural development and for maintaining people's health at a satisfactory level. In addition, efficient use of limited water resources is necessary for green economic development. Water productivity can be calculated to assess the relationship between water use and economic dynamics. This indicator reveals the value of economic output (1 MDL or USD of GDP) per a certain volume of water used. For example, the growth of productivity reveals that production of 1 MDL or USD from the GDP was accompanied by less water consumption. In Moldova, water consumption has been stable since 2010, but GDP has increased. As a result, water productivity increased. Nonetheless, this growth did not allow Moldova to improve its position in relation to other European countries.

Indicator trend

Between 2010 and 2020, water use was stable. During that period, water use remained essentially unchanged, increasing 785 million m^3 to 787 million m^3. Indeed, in most sectors, water use and household consumption was stable, decreasing only slightly. During this same period, Moldova used about 580 million m^3 of water for production, which represents about three-quarters of water use. Meanwhile, it used 38-40 million m^3 of water for agriculture and 40-50 million m^3 for irrigation. Household water consumption decreased slightly, from 118 million m^3 to 112 million m^3.

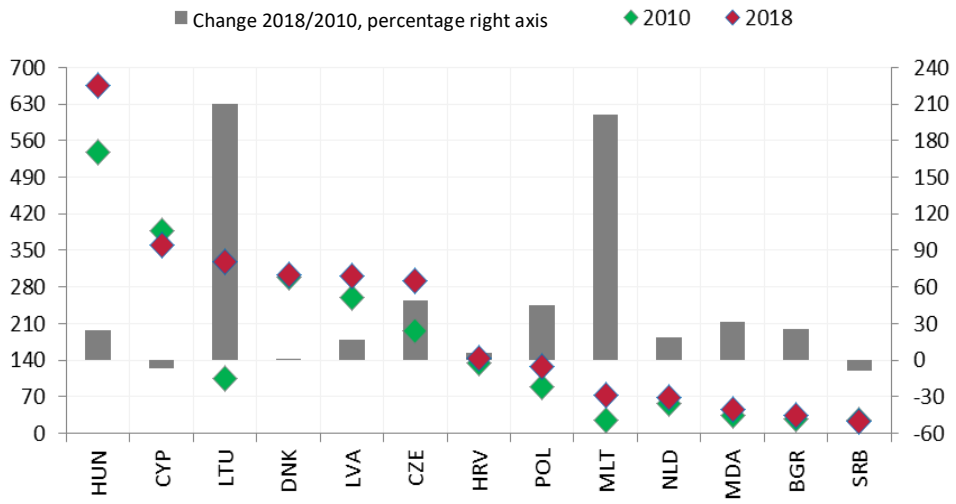
Figure 30. Use of water by sectors (million m^3)



Source: National Bureau of Statistics.

Between 2010-20, while water use was stable, GDP increased by about 32%. As a result, water productivity increased and economic growth decoupled from water consumption. Productivity grew from USD 35.2 to 45.5 per m^3 between 2010-18, an increase of 31% (with economic output expressed as PPP). Despite this progress, productivity levels in Moldova remain one of the lowest in relation to other European countries.

Figure 31. Water productivity (USD PPP (2017=1)/m^3)



Source: EUROSTAT, World Bank, National Bureau of Statistics, authors' calculations.

Chapter 4. The natural asset base

This chapter explores whether the Moldovan economy is maintaining its natural asset base. The six indicators measure water, forest and land resources, organic agriculture, biodiversity and protected land areas. In this way, they measure whether the natural asset base is being kept intact and within sustainable thresholds in terms of quantity, quality or value. Progress can be monitored by tracking stocks of natural resources and other environmental assets along with flows of environmental services: renewable resources, non-renewable resources, biodiversity and ecosystems.

Natural asset base indicators: Key findings

- **Water resources:** despite limited water resources, the volume of water intake is quite big, about half of the renewable water resources or a total annual volume of about 970 million cubic metres (m^3) (370 m^3 per capita).
- **Forest resources:** despite the slight increase in afforestation of the country's territory, the Republic of Moldova (hereafter "Moldova") still has limited forest resources. The country's afforestation level grew modestly, from 11.1% to 11.3%, with variations depending on the area. In the north, afforestation grew by 7.2%, in the centre by 13.5% and in the south by 6.7%, which remains one of the lowest levels in the region.
- **Land resources:** soil resources have not changed significantly in the last decade. Factors such as urbanisation, population density and infrastructure expansion have been unable to change the structure of the land fund.
- **Organic agriculture:** at the end of 2020, according to the Atlas of Organic Agriculture (2020), 144 active organic agricultural producers were processing an area of about 29 000 ha, or 1.4% of the agricultural area of the country.
- **Biodiversity:** the diminishing state of biodiversity is evidenced by the growing number of plant and animal species endangered because of poaching and uncontrolled fishing.
- **Protected natural areas:** the surface of natural areas protected by the state constitutes about 193 000 ha or 5.7% of the country's territory and includes 312 objects. It expanded continually yet remained one of the smallest protected areas in the EaP region.

Indicator 4.1: Water resources

Key message

Moldova, which has limited water resources compared with most European countries, depends on water from the Prut and Nistru rivers, which accumulate mainly outside the country. At the same time, while the agricultural sector accounts for a large share of Moldova's economy, it is represented by a large number of small farmers with rudimentary businesses. Increasingly frequent droughts require higher volumes of water and irrigation. This is often delivered through inefficient systems, leading to large losses. Thus, besides a high volume of water intake per capita and a relatively high level of water stress, losses during transportation are still significant with no solution in sight.

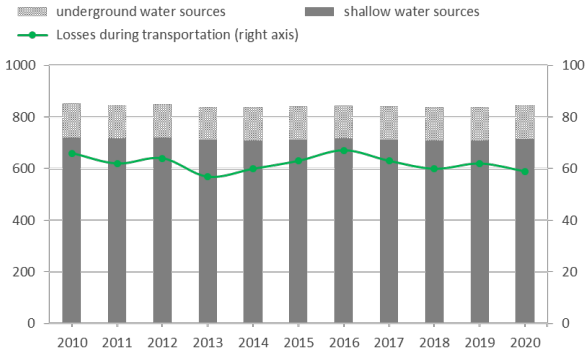
Indicator trend

The main source of water supply is surface waters from two different water catchment areas: Danube-Prut and the Black Sea on the one side, and Nistru, on the other. These are known for the water catchments areas of Nistru and Prut rivers, which in recent years had unstable flows due to hydro-meteorological conditions and economic activities carried out upstream. Even so, water resources depend on water coming down the Prut and Nistru rivers, which accumulate mainly outside the country. On the other hand, internal resources (rivers and underground water reserves) amount to 1.6 billion m^3. This represents 580 m^3 of water per capita, much below the volume reported in other European countries. Overall, the quality of internal water resources is poor because Moldova has ignored environmental factors for many years. According to the data, Prut and Nistru rivers meet Class III water quality requirements (moderately polluted), while internal rivers are ranked in Classes IV-V (polluted and very polluted).

Despite the limited water resources, the volume of water intake is quite big – about half of the renewable water resources or a total annual volume of about 970 million m^3 (370 m^3 per capita) (Figure 32). One of the reasons for the large water intake is the relatively large water losses during

transportation. Between 2001 and 2019, water losses during transportation were relatively stable, ranging between 60-70 million m^3. The volume of water intake decreased, primarily due to a declining population and less household consumption. On the other hand, in terms of production needs, volumes of water used by business entities had an insignificant decrease.

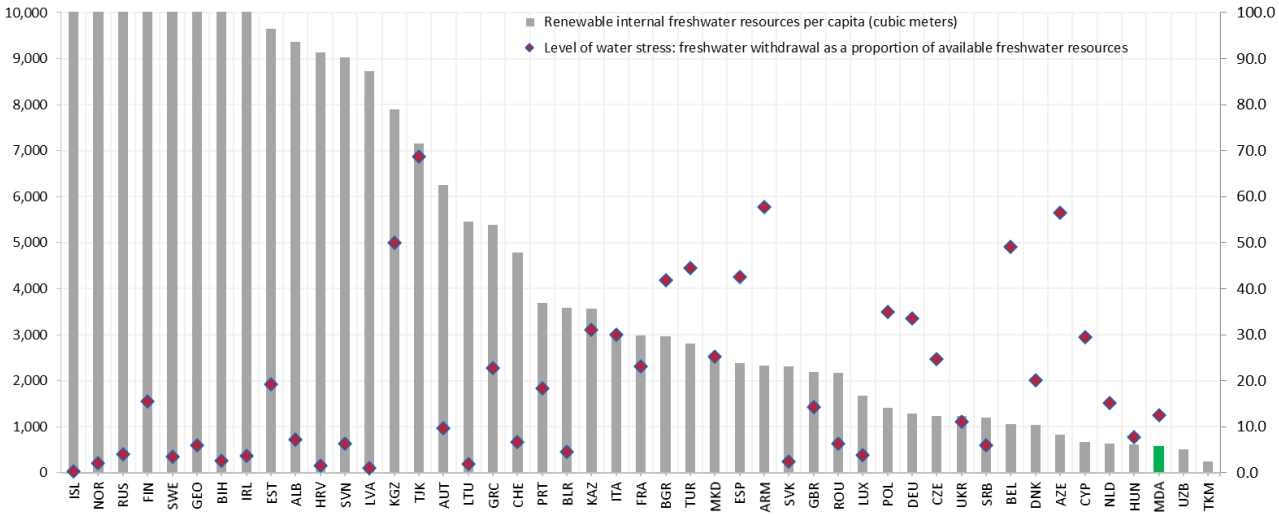
Figure 32. Water intake (million m^3)



Source: Atlas of Organic Agriculture of the Republic of Moldova (2020).

Moldova ranks among the lowest of European countries according to renewable internal sources of water per capita (Figure 33). In recent years, this indicator has improved due to a declining population rather than to improved water resources. Moreover, the level of water stress as a share of freshwater abstraction from the total available resources of freshwater has a value of 12.5, which exceeds the neighbouring countries of Romania (6.3) and Ukraine (11.2). This is due to irrational household and business consumption, as well as large losses during transportation. For example, irrigation in agriculture is still deficient; using improvised equipment often leads to considerable water losses.

Figure 33. Internal renewable water resources per capita (m^3) and water stress (percentage)



Source: World Bank.

At the same time, the ratio between losses and water intake is around 7-8%, which exceeds values in other European countries. Also, relative indicators such as losses of water per capita or reported to GDP reveal an unfavourable position. For example, in Moldova, losses per capita amount to about 23 m^3. Meanwhile, 6.9 litre are lost to produce USD 1.0 of the GDP, which ranks Moldova as one of the worst performers compared with other European countries.

Indicator 4.2: Forest resources

Key message

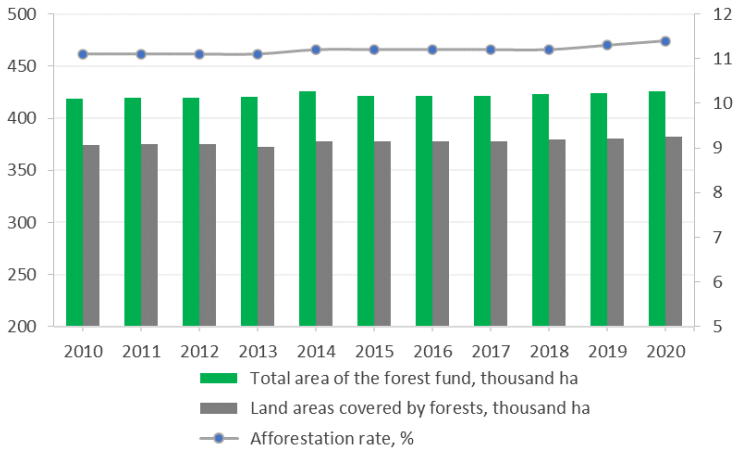
Despite the slight increase in afforestation of the country's territory, Moldova still has limited forest resources. This is coupled with serious environmental issues and extreme weather events, which have become increasingly frequent in recent years. At the same time, no one doubts the limited area covered by forests is one of the causes of climate change. This calls for prompt policy action.

Indicator trend

Moldova has a low level of afforestation, with the forest area growing insignificantly over the past few years. The biggest share of forest fund belongs to the state through the Agency Moldsilva (86.7%) followed by local public authorities (12.8%) and other institutions. Over the past decade, forest area increased from 419 000 ha to about 425 000 ha, largely due to land covered with hardwood trees. Due to these trends, the country's afforestation level grew from 11.1% to 11.3%, with variations depending on the area. Afforestation grew 7.2% in the north, 13.5% in the centre and 6.7% in the south.

Politicians have increasingly focused on the slow expansion of forest area, but recent extreme weather events indicate there is no time left to lose. In 2021, the presidency set up a working group to develop the National Afforestation Programme (Presidency of the Republic of Moldova, 2021). This programme aims to plant at least 100 000 ha of forest in the next ten years, which would allow Moldova to reach the target of 15% in forest coverage.

Figure 34. Indicators of forest resources

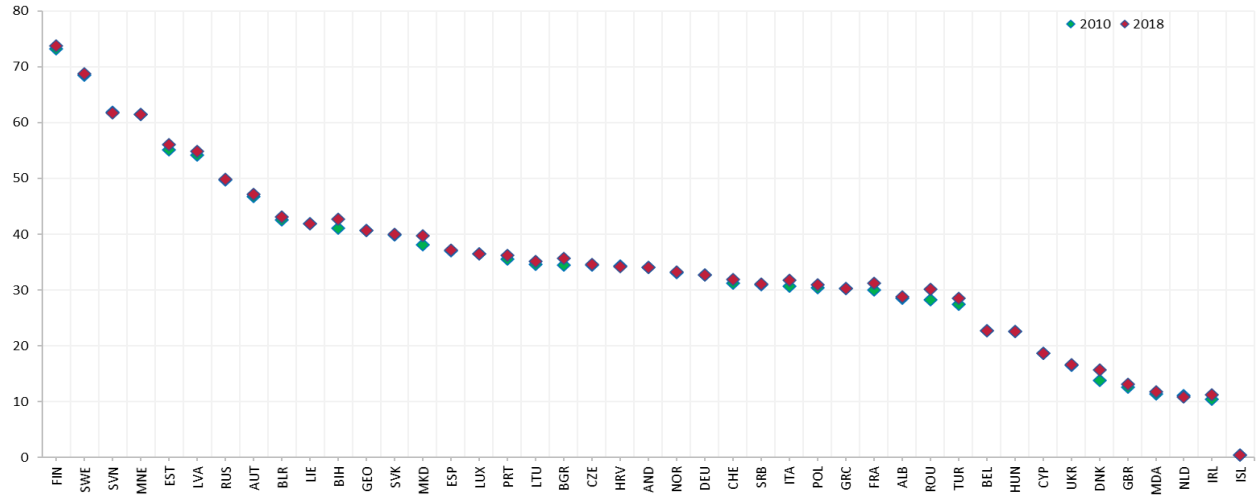


Source: National Bureau of Statistics.

As regards timber reserves, growth has slowed in recent years. Between 2005 and 2020, the reserve of standing timber increased from 45.0 million m^3 to nearly 50 million m^3. Nonetheless, this rate has decreased since 2015, in part because forest area being cut was larger than areas left to regenerate through tree planting. Thus, between 2015 and 2020, the deforested area increased from 4 603 to 4 925 ha, while the regenerated areas did not increase continuously and varied between 4 200 and 4 900 ha.

Moldova ranks among the lowest in terms of afforestation in comparison with other European countries (Figure 4.4). Moldova exceeds only some insular countries or those with extended areas of water, such as the Netherlands, Ireland or Iceland, with the average European level at around 30%. The same is true with respect to afforested areas per capita, with Moldova having a value of only 150 m^2.

Figure 35. Degree of afforestation at European level (percentage)



Source: World Bank.

Indicator 4.3: Land resources

Key message

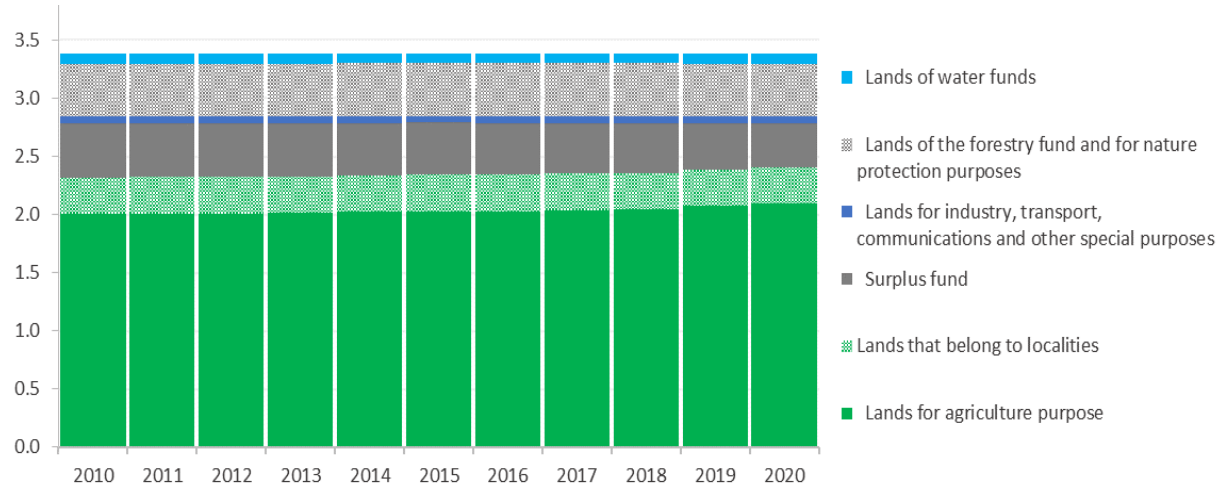
Soil resources have not changed significantly in the last decade. Factors such as urbanisation, population density and infrastructure expansion have been unable to change the structure of the land fund. Thus, Moldova remains a territory with predominantly agricultural areas; soil is its main natural resource. However, large areas of agricultural land are still parcelled out. Some are affected by erosion, which reduces performance of the agricultural sector.

Indicator trend

The land fund of the country is dominated by land used for agriculture. Its share remains one of the largest in the world, about 62% of the total land fund or 2.1 million ha. The use of agricultural land has remained virtually the same for many years. More than 70% is arable land and slightly over 10% is areas with multi-annual plantations divided more or less equally between vineyards and orchards. It is encouraging that in recent years the unprocessed agricultural areas (fallow land) have decreased by more than 15 000 ha. Thus, this type of land covers an area of about 27 000 or 1.1% of total agricultural lands. At the same time, the quality of soil tends to decrease due to erosion, and lack of crop rotation and measures for soil conservation. According to the Land Cadastre data, eroded soils cover about 877 600 ha, including 114 000 ha of strongly eroded soils (Ministry of Agriculture, Regional Development and Environment, 2020). The area of eroded soils has increased over the last 40 years by 283 400 ha, advancing by about 7 000 ha per year.

The other types of land included in the land fund still have the same areas, namely: (i) forests and other land with forest vegetation – 13.4%; (ii) community-owned land – 9.2%; and (iii) land of the water fund – 2.6%. An exception to this rule is land in the reserve fund. It has a share of 11.2% of the land fund area but has decreased by slightly over 90 000 ha in the past decade. The decrease is mainly due to the deduction of land occupied by construction and annexes of former agricultural units and their transfer into the category of land for agricultural use.

Figure 36. Land fund use as of 1 January (million hectares)



Source: National Bureau of Statistics.

Indicator 4.4: Organic agriculture

Key message

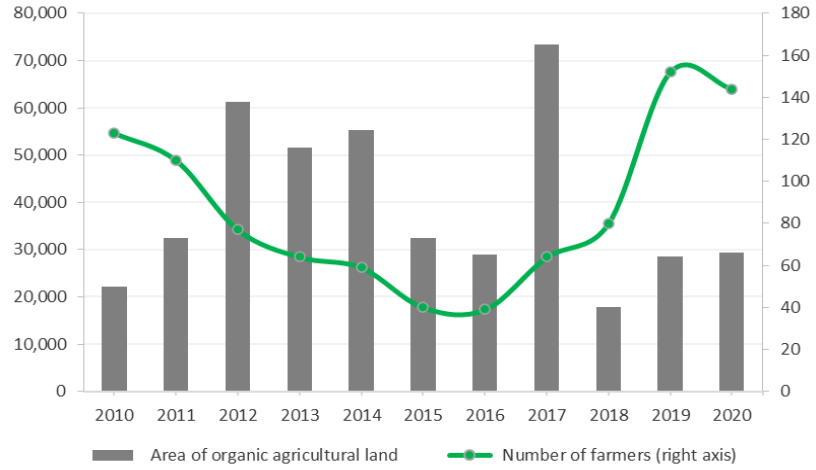
Organic agriculture cannot be considered a distinct branch of agriculture given that both the land area and number of operators involved remain small. There are multiple causes for its size, related to both consumer demand and the supply of producers. While the state has developed strategies to promote organic agriculture, its financial support is limited.

Indicator trend

Agriculture remains a key sector for the national economy even though its share in GDP is steadily declining. As of 2020, the contribution of agriculture to GDP was about 10%, almost half compared with the 2000s. With agriculture extremely sensitive to climate conditions, the state has adopted a sustainable approach to overcome challenges, including by greening the sector (Government of Moldova, 2014b). Thus, organic agriculture is seen through the lens of agri-food products obtained without use of synthetic chemical substances. This approach – known as *organic production* or *eco* – is supplemented by production technologies that must be environmentally friendly and have a low negative impact on biodiversity.

Although Moldova has progressed in terms of legislation on organic agriculture (regulations related to certification, inspection, labelling, export, etc.), production capacities have not increased significantly. Both the number of farmers involved and the area of organic agricultural land show an ambiguous trend (Figure 37). At the end of 2020, according to the Atlas of Organic Agriculture (2020), 144 active organic agricultural producers were processing an area of about 29 300 ha, or 1.4% of the agricultural area of the country. However, certain statistical limitations must also be considered; official statistics sometimes do not include organic producers that are not certified or are certified by foreign organisations.

Figure 37. Organic agriculture



Source: National Bureau of Statistics.

Indicator 4.5: Biodiversity

Key message

Biological diversity, or simply "biodiversity", represents a natural resource that underpins the proper functioning of ecosystems. The state of biodiversity can be measured by the growing number of endangered plant and animal species. The last edition of the Red Book in 2015 contains twice as many species of plants and animals as the 2001 edition. Given these conditions, Moldova needs clear policies and measures to restore natural habitats in order to protect rare and vulnerable species.

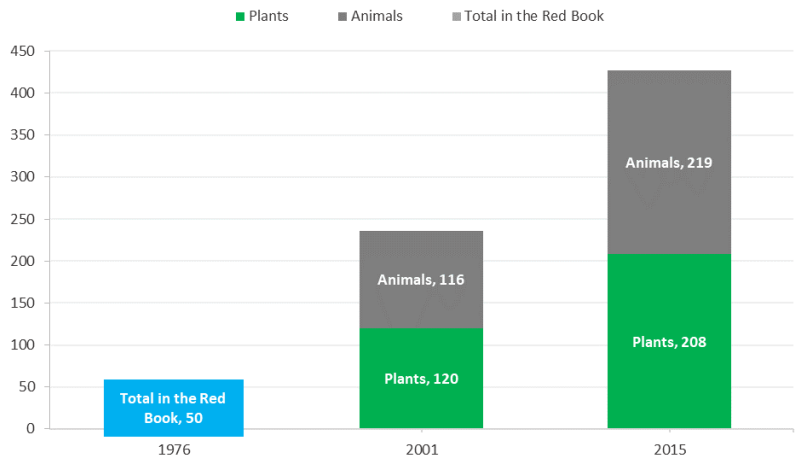
Indicator trend

The flora of Moldova includes about 5 500 species of plants, 208 of which are included in the most recent edition of the Red Book. With respect to fauna, the country has approximately 17 000 species of animals, 219 of which are under threat of extinction and included in the Red Book.

The Red Book of Moldova is normally updated every ten years following reassessment of the conservation status and geographical distribution of wild flora and fauna species. The latest edition dates from 2015 and practically doubles the number of protected species (Figure 38). The status of amphibians and reptiles is especially alarming. Of the total number of species, 64% of amphibians and reptiles are threatened with extinction, followed by 40% of mammals and 22% of birds. More species in these categories risk extinction without urgent and effective measures.

The status of fish resources is similar with 27% listed as endangered species. From an aquatic biodiversity point of view, the Nistru and Prut rivers are undoubtedly the richest in fish resources. While industrial fishing has been banned for many years, poaching and uncontrolled fishing are depleting these resources. In practice, state institutions and control mechanisms lack capacity to monitor activity, whether it is sport fishing, recreational fishing or commercial fishing.

Figure 38. Protected plant and animal species (included in the Red Book)



Source: National Bureau of Statistics.

Indicator 4.6: Protected natural areas

Key message

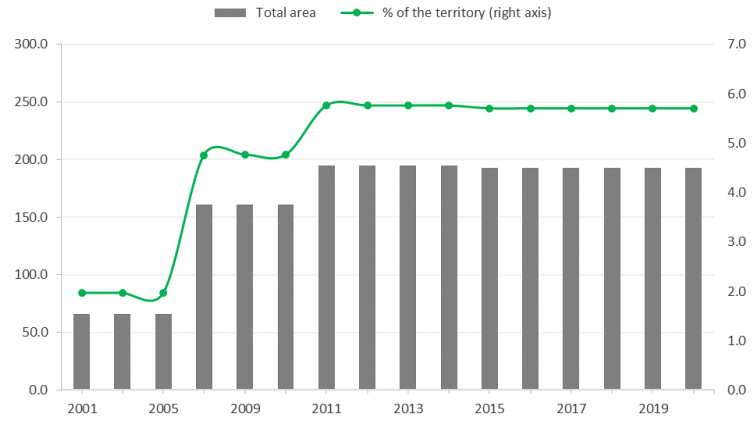
Moldova has a small number of protected areas in relation to the territory of the country, even if some areas are granted this status periodically. Moreover, the country struggles to conserve nature and its associated cultural values in these areas. It can neither ensure laws are respected nor limit harmful human intervention.

Indicator trend

The International Union for Conservation of Nature describes "protected area" as "a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values". According to national legislation (Government of Moldova, 1998), protected areas consist of several categories of natural objects and complexes. These have undeniable primary value for conservation of biodiversity and natural habitats; study of natural processes; restoration of ecological balance; and greater awareness about ecology.

Natural areas protected by the state represent about 193 000 ha or 5.7% of the country's territory and include 312 objects. The surface area expands whenever a new area becomes legally protected. In 2007 and 2011, for example, the size of protected areas nearly quadrupled (Figure 39). The most important protected natural areas are represented by five widely known scientific reserves: Codru, Iagorlac, Lower Prut, Plaiul Fagului and Padurea Domneasca. These reserves exist to protect all aspects of natural ecosystems, including tree species, shrubs and other plant species, as well as the entire wildlife complex.

Figure 39. Protected areas (thousand hectares)



Source: National Bureau of Statistics.

With respect to the share of protected areas in relation to total area, Moldova ranks near the bottom in Europe. At the same time, non-compliance with the protection regime, human interference, and poor response from state institutions have reduced capacity to respect requirements in international conventions to conserve biodiversity effectively.

Chapter 5. The environmental dimension of quality of life

This chapter explores whether greening growth generates benefits for people in Moldova. The four indicators measure air pollution, population exposure to fine particulate matter, and access to safe drinking water and sewerage. Using these measurements, the chapter reflects on how environmental conditions and environmental risks interact with the quality of life and well-being of people. They also point out how the amenity services of natural capital support well-being. Further, they show the extent to which income growth is accompanied (or not) by a rise in overall well-being.

Environmental quality of life indicators: Key findings

- **Air pollution:** since 2010, the Republic of Moldova (hereafter "Moldova") has seen a rise in air pollutants emissions – a trend that amplifies environmental and human health risks. This trend is caused by the rapid increase in emissions of pollutants from road transport.
- **Population exposure to fine particulate matter ($PM_{2.5}$):** exposure of people to $PM_{2.5}$ has decreased in line with trends in the European Union.
- **Access to safe drinking water sources:** the public water supply network is rapidly expanding. As a result, people's access to safely managed drinking water services has increased. However, Moldova ranks near the bottom with respect to this indicator in relation to other European countries.
- **Population connected to sewerage:** the expansion of public water supply networks far exceeds the increase in the length of sewerage networks. This creates additional pressures on water resources as water consumption reduces the amount of quality water returned to the natural water cycle.

Indicator 5.1: Air pollution

Key message

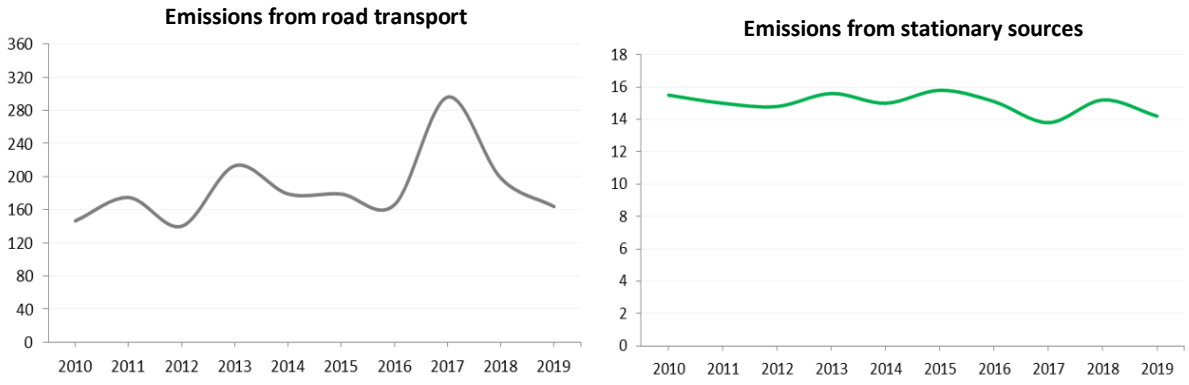
Emissions of pollutants into the atmosphere are the main factor contributing to environmental pollution. Degradation of air quality has substantial economic and social consequences, such as worsening health and reduced labour productivity, which leads to a decline in quality of life. In this context, emissions levels of air pollutants are an indicator for green growth.

Emissions of air pollutants have been rising in Moldova since 2010 – a trend that amplifies risks to the environment and human health. This trend is caused by the rapid increase in emissions of pollutants from road transport.

Indicator trend

Road transport emissions have steadily risen, increasing from 146 500 tonnes to nearly 164 000 tonnes over 2010-19 (Figure 40). In 2017, emissions reached about 300 000 tonnes, their highest level since 2010. Emissions from road transport are much higher than those from stationary sources. At the same time, emissions from stationary sources have been declining since 2010. Between 2010-19, emissions from stationary sources dropped from 15 000 tonnes of pollutants to just over 14 000 tonnes.

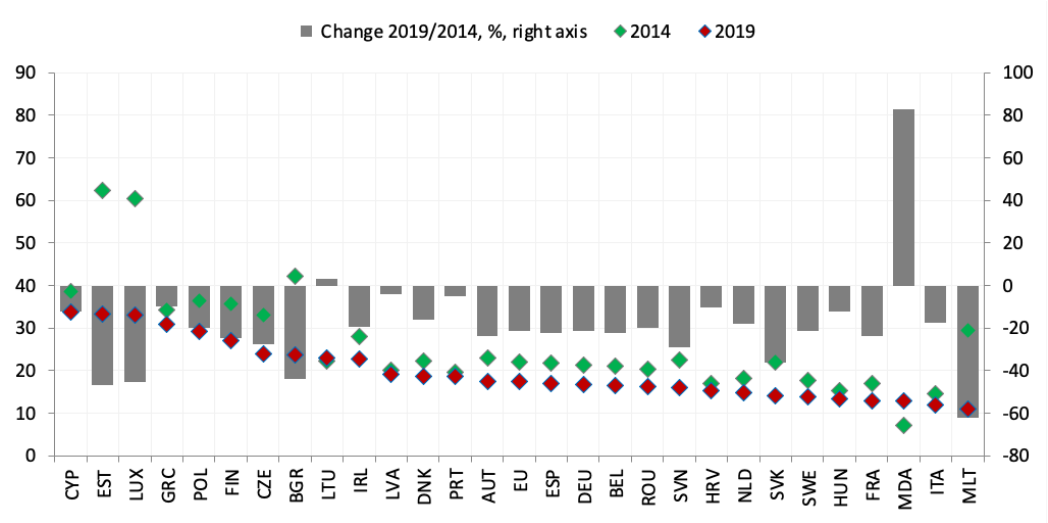
Figure 40. Pollutant emissions into the atmosphere (thousand tonnes)



Source: National Bureau of Statistics.

Emissions of pollutants (nitrogen oxides and sulphur oxides) in terms of the population rate show a worrying trend. Although Moldova ranks near the bottom among European states in terms of emissions of pollutants per capita, its emissions are rising rapidly. Compared with 2014, emissions per capita grew by almost 83% in Moldova in 2019, while dropping in almost all other European countries. Only Lithuania experienced a slight increase of 3.2% (Figure 41). Comparing these trends to a similar EU indicator, emissions per capita in Moldova more than doubled, increasing from 32.2% to 74.6%.

Figure 41. Atmospheric emissions of pollutants (nitrogen oxides and sulphur oxides) reported per capita



Source: EUROSTAT, National Bureau of Statistics, authors' calculations.

Indicator 5.2: Population exposure to fine particulate matter ($PM_{2.5}$)

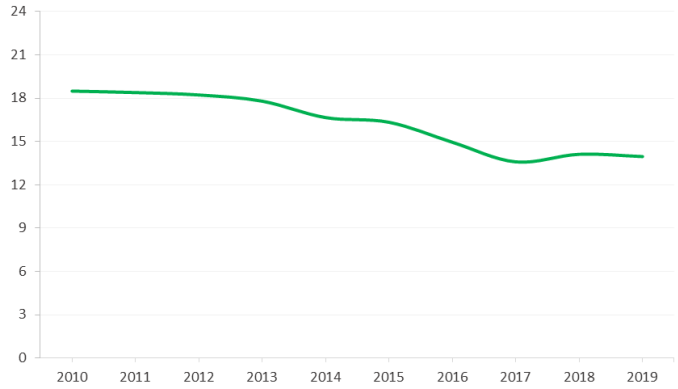
Key message

One of the direct effects of environmental pollution is decline in human health and damage to ecosystems. Exposure to fine particulate matter ($PM_{2.5}$) is an indicator of the impact of pollution on human health. $PM_{2.5}$ represents solid and liquid particles suspended in the air with a diameter of fewer than 2.5 microns. In Moldova, exposure of people to $PM_{2.5}$ has decreased. The country occupies an average position in relation to other European countries regarding $PM_{2.5}$ exposure.

Indicator trend

Exposure of Moldovans to $PM_{2.5}$ is decreasing (Figure 42). Over 2010-19, exposure dropped from 18.5 to 14.0 micrograms/m^3.

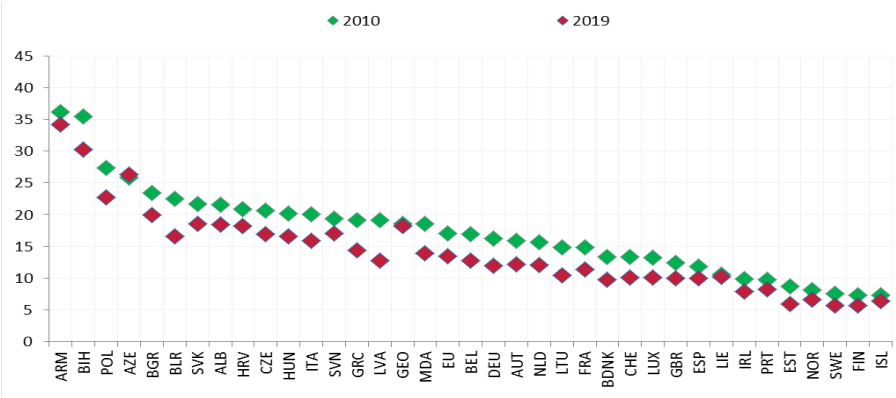
Figure 42. Population exposure to fine particulate matter in Moldova (micrograms/m^3)



Source: OECD.

The trend of exposure to $PM_{2.5}$ in Moldova is in line with the general trend of decreasing exposure in the European Union. In 2019, for example, Moldova had an exposure of 14 micrograms/m^3, a level close to the value of the EU indicator of 13.5 micrograms /m^3.

Figure 43. Population exposure to fine particulate matter (micrograms/m^3)



Source: OECD.

Indicator 5.3: Access to safe drinking water sources

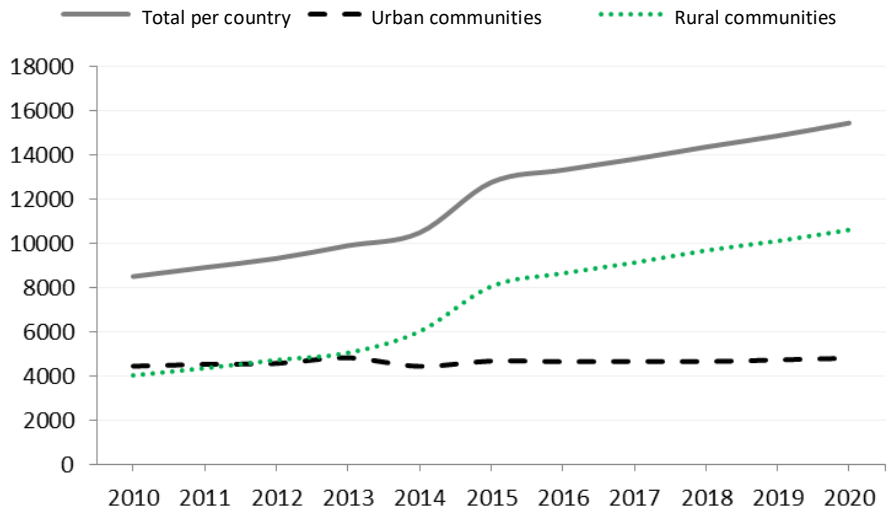
Key message

People's access to quality water is of particular importance for ensuring sustainable human development. Poor quality water affects people's health and can lead to higher costs for economic activities. The expanding footprint of human activity means it takes more advanced and expensive treatment to ensure people have access to safe drinking water. In this context, access to safe sources of drinking water is an indicator of progress towards green growth. To quantify this dimension, the indicator shows the share of the population using safely managed drinking water services (defined as use of a nearby improved drinking water source available as needed for uncontaminated water). Moldova is rapidly expanding its public water supply network, which has increased access of people to safely managed drinking water services. However, Moldova still ranks near the bottom in relation to other European countries with respect to this indicator.

Indicator trend

Between 2010 and 2020, the public water supply system expanded quickly, and the length of sewerage networks increased by 81.4% – from just under 8 510 km to about 15 436 km. This increase was largely due to expansion of public water supply systems in rural areas. Between 2010 and 2020, the length of public water supply networks in rural communities increased 2.6 times, from about 4 046 km to nearly 10 614 km. In urban areas, expansion of public water supply networks has been much slower, increasing by only 8% – from about 4 463 km to 4 822 km (Figure 44).

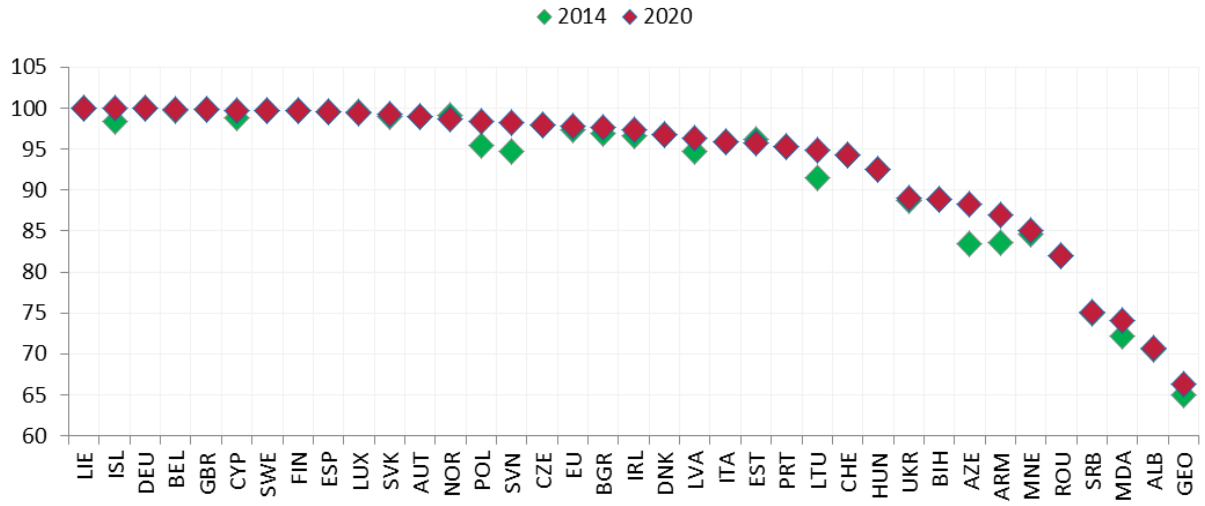
Figure 44. Public water supply networks length (km)



Source: National Bureau of Statistics.

The expansion of public water supply networks has augmented people's access to safely managed water services. Between 2014 and 2020, the share of the population using safely managed water services increased from 72.2% to 74.1%. However, despite this progress, Moldova remains well behind other European countries in ensuring the population access to safe water sources (Figure 45). In 2020, for example, the share of the population in the European Union using safely managed water services accounted for 97.8%, which is 23.7% more than the share identified by the similar indicator in Moldova.

Figure 45. Share of population using safely managed to drink water services (percentage)



Source: World Bank.

Indicator 5.4: Population connected to sewerage

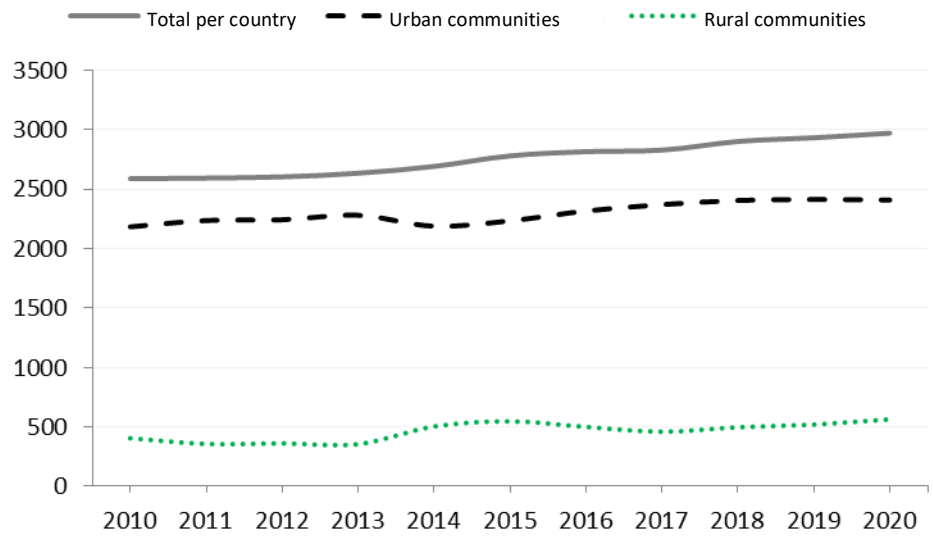
Key message

Access to sewerage and sanitation services has an important role in protecting people's health as it minimises the probability of human contact with harmful microorganisms. These services ensure the return of water through sewerage systems into water basins, which allows supply of ecosystem services to be maintained at an acceptable level. In this regard, people's access to sewerage and sanitation services is also an aspect of transition to green economy. The share of the population using at least basic sanitation services is an indicator for use of sewerage and sanitation services. Moldova has made some progress in expanding the public sewerage network. However, the expansion of public supply networks far exceeds the increase in length of sewerage networks. This creates additional pressures on water resources, as water consumption reduces the amount of quality water returned to the natural water cycle. At the same time, even if Moldova has increased access to basic sanitation services due to an expanded public sewerage network, it ranks among the lowest in relation to other European countries in terms of this indicator.

Indicator trend

Between 2010 and 2020, the public sewerage system expanded, increasing the length of sewerage networks by 14.8% – from about 2 587 km to just over 2 970 km. This expansion was more intense in rural areas than in urban areas. Between 2010 and 2020, the length of sewerage networks in rural areas increased from 404 000 km to 563 000 km (39%). In urban areas, the length of networks increased by 10.3% – from 2 182 km to 2 407 km (Figure 46).

Figure 46. Length of public sewerage networks (km)



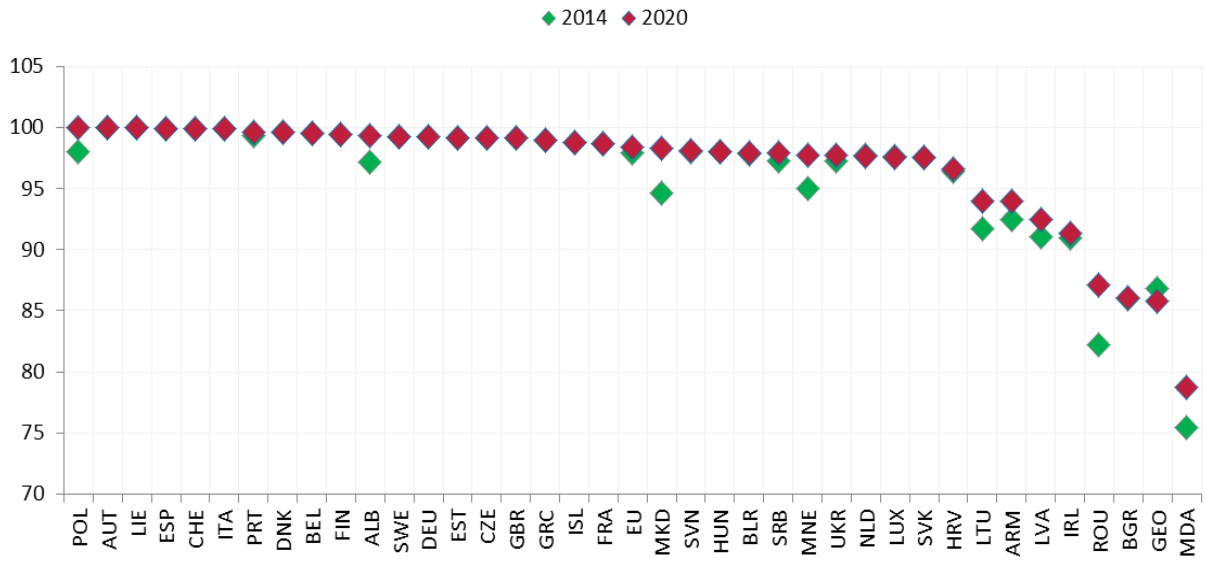
Source: National Bureau of Statistics.

National authorities in Moldova focus more on the expansion of water supply systems and less on the construction of sewerage systems. Between 2010 and 2020, the length of public water supply networks increased by 6 926 km. During the same period, the length of public sewerage networks increased by only 384 km. In 2020, due to these expansions, over 2.2 million people (82.3% of the population) were connected to the public water supply system. Meanwhile, just over 1 million people benefited from the public sewerage service (40.8% of the population). At the same time, extension of the sewerage network

was often not accompanied by new wastewater treatment plants. Thus, about 71% of total public sewerage systems were equipped with wastewater treatment plants in 2020. However, some wastewater treatment plants were in poor condition: 81 of 92 wastewater treatment plants were functional.

Expansion of public sewerage networks has widened people's access to sanitation services. Between 2014 and 2020, the share of the population using at least basic sanitation services increased from 75.5% to 78.7%. However, despite this progress, Moldova still ranks among the lowest of European states with respect to this indicator (Figure 47).

Figure 47. Share of population using at least basic sanitation services (percentage)



Source: World Bank.

Chapter 6. Economic opportunities and policy responses

This chapter explores how progress towards green growth is generating economic opportunities in Moldova. The indicators measure innovation in the green economy/environment, public and private expenditures for environmental protection, and subsidies for energy and organic agriculture. In so doing, they capture the economic opportunities associated with green growth, assessing the effectiveness of policy in areas such as technology and innovation, environmental goods and services, investment and financing, prices, taxes and transfers.

Policy responses indicators: Key findings

- **Innovations in the green economy/environment:** the number of innovations applied in practice, including on the environmental dimension, remains low, without any clear prospects for the next period.
- **Public expenditures on environmental protection:** environmental protection priorities continued to be underfunded. Both budgetary programmes and money allocation instruments have several deficiencies that limit the execution of expenditures. Still, the recent creation of a dedicated Ministry of Environment lays the groundwork for improvements.
- **Energy subsidies:** energy subsidies largely take the form of tax relief on gas and electricity for households. This is due to total dependence on imported energy and the low standard of living of a large part of the population. The total volume of subsidies remains relatively stable in relation to gross domestic product (GDP), certain fluctuations being determined by prices and the exchange rate.
- **Private expenditures for environmental protection:** the volume of total environmental expenditures is well below that achieved in European countries – only 0.2% of GDP compared with the EU average of about 1.9% in 2020.
- **Subsidies for organic agriculture:** organic agriculture is not strong enough to be considered a distinct branch of agriculture. With a small number of operators and land involved in organic agriculture, there can be no question of massive investments. The financial resources directed to farmers engaged in organic agriculture are extremely small, averaging only MDL 2 million per year or less than 0.2% of total subsidies.

Indicator 6.1: Innovations in the green economy/environment

Key message

Environmental and green economy innovations depend on both the overall national research and development (R&D) system and economic operators. Both dimensions require considerable financial resources for long-term results. However, such resources remain out of reach for both the state and the vast majority of economic operators. As a result, the number of innovations applied in practice, including on the environmental dimension, remains low, without any clear prospects for the next period.

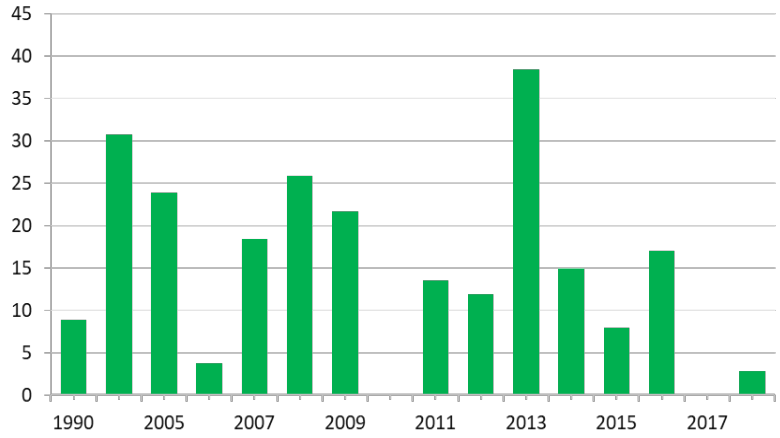
Indicator trend

The Republic of Moldova (hereafter "Moldova") considers innovations as "the introduction in the enterprise of a product, process, method of organisation or marketing method, new or significantly improved" (NBS, 2018). This definition largely coincides with the international approach promoted by the OECD (OECD, n.d.b) that goes beyond R&D systems. In this approach, innovations are based on companies that implement production processes, place goods or services on the market, or apply methods or marketing concepts that are new or significantly improved. Such research was conducted first in 2017, identifying 673 innovative enterprises during 2015/16, or about 21% of the total in the research. These figures are relatively modest compared with other countries due both to the situation of local entrepreneurs and national infrastructure in the R&D field. Research results were confirmed by the 2021 Global Innovation Index, where Moldova ranks 64th of 132 (or 37th among European states) (GII, 2020).

Environmental innovations can be assessed based on the number of environment-related technologies in the total number of technologies (Figure 48). Thus, on average, about one-fifth of new technologies applied by local enterprises can be considered environmental or address the green economy in some

way. Most are related to environmental management procedures and climate change mitigation in the energy sector or the production of goods.

Figure 48. Share of environmental technologies in all technologies developed (percentage)



Source: OECD.

Indicator 6.2: Public expenditures on environmental protection

Key message

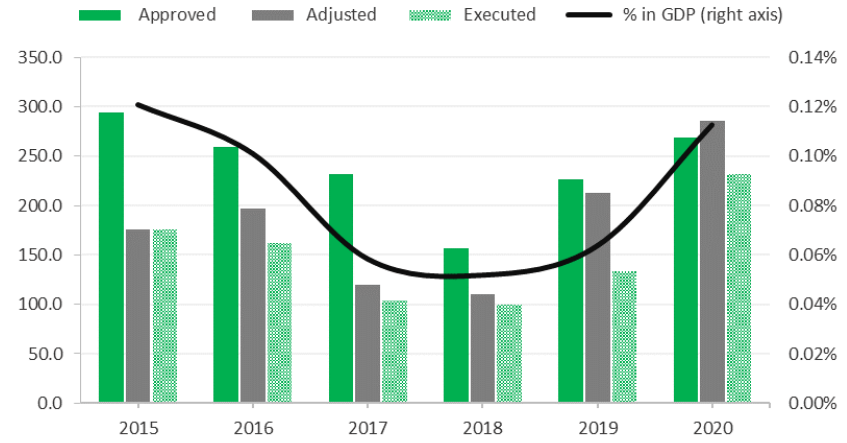
Environmental protection priorities continue to be underfunded. Both budgetary programmes and money allocation instruments have several deficiencies that limit the execution of expenditures. Moreover, the correlation of public expenditures with environmental tax revenues compares poorly to European countries, regardless of Moldova's priorities in this area. Still, the recent creation of a dedicated Ministry of Environment lays the groundwork for improvement.

Indicator trend

For a long time, the Environmental Funds (National Environmental Fund – NEF and Local Environmental Funds) were the main state instruments for environmental protection based on accumulations from environmental taxes. In 2017, this mechanism was changed by eliminating local ecological funds and providing an annual allocation to NEF from general revenues of the state budget. State expenditures in the field are also provided as part of the "Environmental Protection" budget programme. This programme attempts to transpose key elements of various strategic planning documents, including sectoral strategies, governmental action plans and other policy documents.

In recent years, an average of MDL 240 million has been allocated annually for the Environmental Protection Programme, or less than 0.1% of gross domestic product (GDP). On the one hand, this amount represents the capacity of the budget. On the other, it reflects Moldova's failure to fully correlate environmental expenditures with environmental tax revenues. Moreover, analysis of approved and executed expenditures indicates an average discrepancy of almost MDL 100 million annually. There are multiple causes of this discrepancy – from the sacrifice of the environment for other government priorities to the inability of responsible institutions to implement the assumed expenditure programmes.

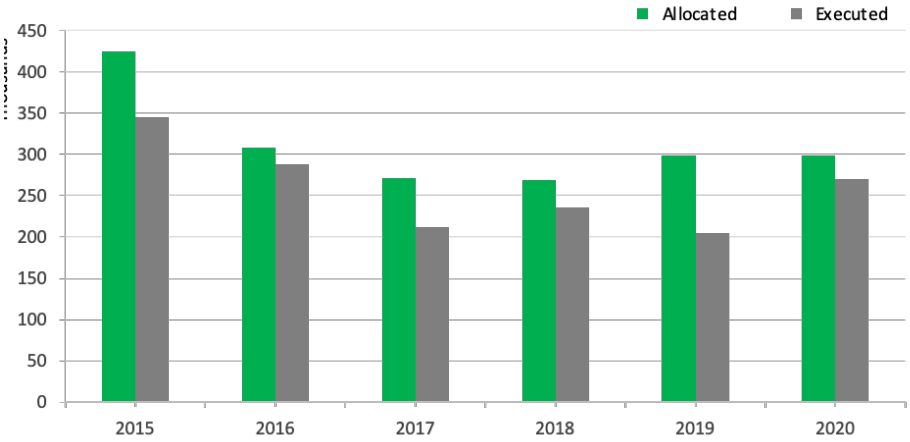
Figure 49. State budget allocations for environmental protection (million MDL)



Source: Reports on State Budget execution.

The state allocated other financial resources towards environment protection beyond the Environmental Protection Programme. Certain environmental expenditures (related to wastewater disposal and treatment) are included in Programme 75 "Development of housing and public utility services" sub-programme '7503' – water supply and sewerage". NEF allocates this money based on projects submitted by various authorities. Obviously, not all these expenses refer to the environment (e.g. construction of water pipes), only those related to wastewater collection and treatment (e.g. construction and improvement of wastewater treatment stations and sewage systems). Analysis of projects financed through NEF shows limited resources (20%) for wastewater collection and treatment; the rest are allocated to construction and management of water supply systems (Expert-Grup, 2020b).

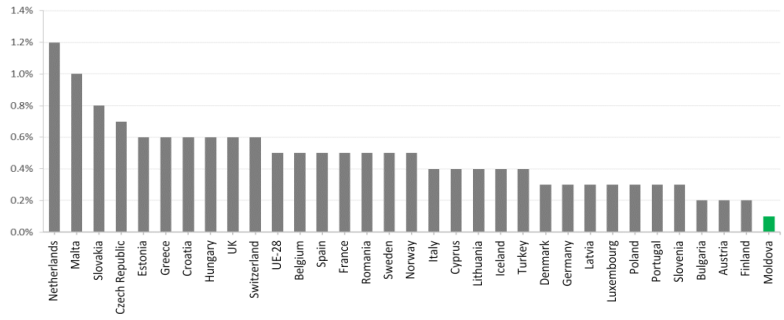
Figure 50. National Environmental Fund allocations (million MDL)



Source: Reports on State Budget execution.

Moldova ranks near the bottom in environmental protection in relation to European countries. In 2019, reported to the economic level, government expenditures in the EU-28 on environmental protection reached 0.5% of GDP, while Moldova remained at 0.1% of GDP. Basically, even if environmental priorities differ according to country, most states allocate at least twice as much as Moldova for the prevention, reduction and elimination of pollution or any other actions to prevent deterioration of the environment.

Figure 51. Government expenditures for environmental protection at European level (percentage of GDP in 2019)



Source: EUROSTAT, Reports on State Budget Execution.

Indicator 6.3 Energy subsidies

Key message

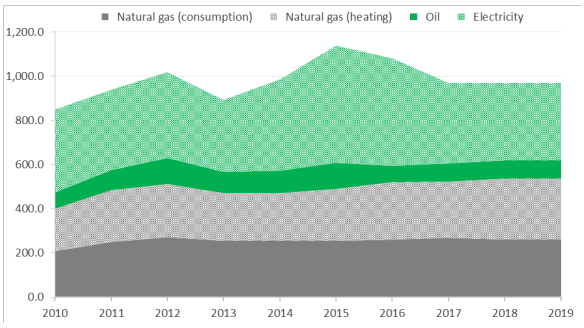
In Moldova, energy subsidies largely take the form of tax relief on gas and electricity for households. This is due to total dependence on imported energy and the low standard of living of a large part of the population. Thus, tariffs for energy resources are a topic of ongoing debate, and are often political. Unless the country has significant economic progress, any elimination of subsidies, resulting in increase of tariffs is immediately attacked by the population, businesses or political opponents.

Indicator trend

Moldova depends almost totally on imported energy, averaging at 6-7% of GDP in recent years. The annual cost borne by the population and local companies in recent years has averaged MDL 14 billion. These costs fluctuate significantly from year to year depending on international market prices and the exchange rate of the national currency. With a relatively low standard of living and large groups of vulnerable people, the state continues to apply tax relief to different categories of energy resources; these are effectively energy subsidies. Thus, most governmental support for the energy sector is intended for consumers rather than producers; this is true of other developing countries as well.

In monetary terms, the largest volume of subsidies comes in the form of tax reduction, i.e. zero-rate value added tax for electricity and 8% for natural gas. This generates subsidies of about MDL 350 million for electricity and about MDL 500 million for natural gas for own consumption or heating (Figure 52). At the same time, the total volume of subsidies remains relatively constant in relation to GDP, certain fluctuations being determined by prices and the exchange rate.

Figure 52. Estimates of consumer energy subsidies in Moldova (MDL million)



Source: OECD.

Indicator 6.4: Private expenditures for environmental protection

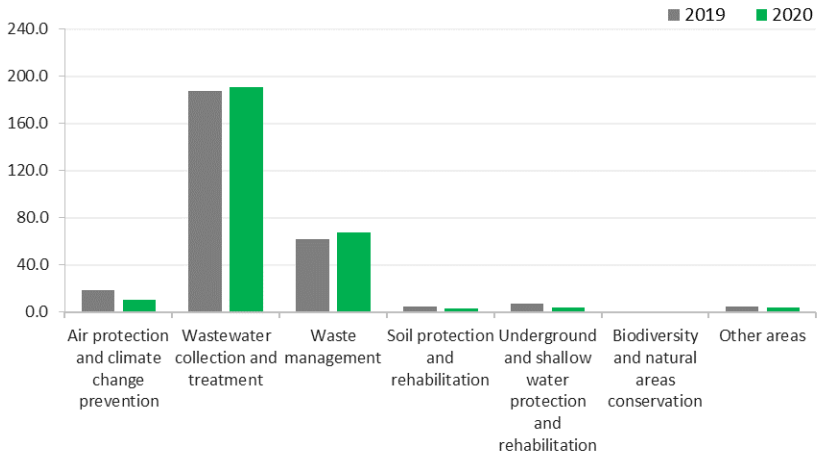
Key message

Information on private sector investments in environmental protection is limited. Even so, the volume of financial resources allocated by the private sector is about the same as that of public environmental expenditures. This leads to a volume of total environmental expenditures well below that achieved in European countries – only 0.2% of GDP compared with the EU average of about 1.9% in 2020.

Indicator trend

In addition to public environmental expenditures, the private sector makes a number of current expenditures or investments. Certain data on private environmental expenditures refer to *current expenditure and expenditure on capital repairs of fixed assets*. During 2019/20, these expenditures remained about equal (around MDL 250 million) to public environmental expenditures. Most are directed to wastewater collection and treatment (66%) and waste management (23%) with the remainder to other areas. This allocation is mainly due to increased regulation of entrepreneurial activity on water use, as well as rules for management of production waste. Even so, this volume of financial resources allocated by the private sector is much lower than that allocated in European countries. On average (EUROSTAT, n.d.) in the European Union, private environmental expenditures more than double public expenditures, reaching 1.9% of GDP (2020). By comparison, Moldova managed to secure total environmental protection expenditures of only around 0.5% of GDP in that year.

Figure 53. Current expenditures and expenditures for capital repairs of fixed assets for environmental protection (MDL million)



Source: National Bureau of Statistics.

In addition to government and private expenditures, external support programmes can be mentioned for a broader assessment of environmental expenditures. Moldova is part of the "EU4Environment" Project together with other Eastern Partnership countries. As such, it benefits from support in ensuring the sustainable use of natural capital, improving the quality of the environment and well-being of the population, and stimulating economic growth.

Indicator 6.5: Subsidies for organic agriculture

Key message

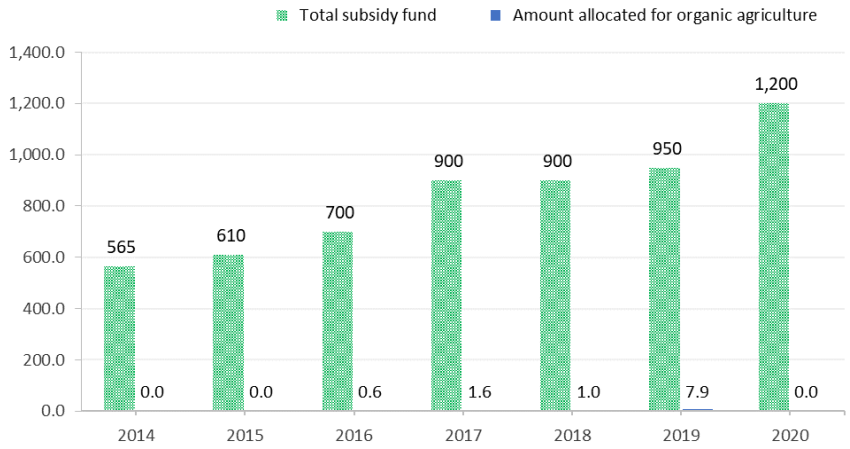
Organic agriculture is too underdeveloped to be considered a distinct branch of agriculture. With a small number of operators and land involved in organic agriculture, there can be no question of massive investments. In fact, without a well-defined group, subsidies for organic agriculture in Moldova cannot reach a level comparable to those in other countries, even with specific programmes. Thus, this sector is tiny, driven by a few enthusiastic farmers.

Indicator trend

Moldova continues to support local agriculture through direct payments to economic operators, widely known as *subsidies in agriculture*. The National Fund for the Development of Agriculture and Rural Environment is the main instrument for allocating financial resources. In 2020, the Fund reached a volume of about 0.6% of GDP. The regulations include a specific programme to promote and develop organic agriculture. Moreover, to encourage organic agri-food production, subsidies are provided in amounts up to 20%. However, Figure 54 shows that financial resources directed to farmers engaged in organic agriculture are extremely small, averaging only MDL 2 million per year or less than 0.2% of the total subsidy fund.

Even if the Fund is authorised to support organic agriculture, the share of grants allocated to this sector is rather small. It denotes the modest development of this sector and the challenges farmers face in complying to the generic requirements of organic agriculture. Moreover, the small number of operators and small area of organically cultivated land (only 1% of total agricultural land) also speak to the lack of interest of most farmers about such activity. There are multiple causes related both to demand (i.e. little interest within the domestic market) and to supply (i.e. increased certification requirements and the need for massive investments).

Figure 54. Volume of subsidies in organic agriculture (million MDL)



Source: Agency for Intervention and Payments in Agriculture.

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Annex 1. Comparative table of national green growth indicators, 2017 and 2021

Annex 1 contains a table with a short list of Green Growth Indicators (GGIs) for the Republic of Moldova. The table contains those 33 environmental indicators in the 2017 report: "Measuring the Performance of Green Economic Development in the Republic of Moldova", which de facto, represents a transcription of Green Growth Indicators of the Republic of Moldova from the *Programme on the Promotion of Green Economy.* These indicators are a benchmark for measuring the GGIs. The table lists national and international indicators (for comparison with other European countries) that were estimated in the context of the current exercise. It also includes indicators recommended for future assessments of progress towards a green economy.

Indicator included in the 2017 edition

New indicator included in the 2021 edition

Indicator proposed for calculation/inclusion in future editions

National Indicators, 2017 edition		National Indicators, 2021 edition	OECD GGIs, 2021
Group 1. The socio-economic context and characteristics of growth			
1.1	GDP growth	• GDP growth trends • The volume of production by "green" economic operators • Number of "green" economic operators	• Per capita GDP, PPP 2017, USD
1.2	GDP structure	• Contribution of economic activities to GDP formation • The activity of "green" economic operators by economic sectors	
1.3	Economically active population	• Economically active population • Participation rate • Rate of the population involved in the green economy	• Participation rate
1.4	Unemployment	• Unemployment rate • Number of unemployed people • Number of jobs available within "green" economic operators	• Unemployment rate
1.5	Population	• Population and the demographic structure by gender	
1.6	Population density	• Population density • Population density by urban/rural and by regions	• Population density
1.7	Life expectancy at birth	• Life expectancy at birth	• Life expectancy at birth
1.8	Income inequality	• GINI coefficient on available income	• GINI coefficient

1.9	Enrolment in education	• Number of people in primary, secondary and higher education • The gross enrolment rate in education by educational levels	
Group 2. The environmental and resources productivity of the economy			
2.1	Greenhouse gas emissions	• Greenhouse gas emissions in the Republic of Moldova	
2.2	Carbon productivity	• Carbon productivity	• Carbon productivity
2.3	Final energy consumption	• Final energy consumption	• Primary energy supply • Energy productivity
2.4	Energy intensity	• Energy intensity	
2.5	Share of renewable energy in final energy consumption	• Share of renewable energy in final energy consumption	• Renewable energy supply • Share of renewable energy in primary energy supply
2.6	Waste generation	• Material productivity • Waste from enterprises, household waste	
2.7	Waste recycling	• Utilised waste	
2.8	Use of mineral fertilisers	• Use of mineral and organic fertilisers • Nutrient flows and balances	
2.9	Use of water by sectors	• Use of water by sectors	• Water productivity
Group 3. The Natural asset base			
3.1	Water resources	• Water intake from natural basins • Water intake from underground water sources • Loss during transportation	• Water resources • Level of water stress
3.2	Forest resources	• The total area of the forest fund • Land areas covered by forests • Standing timber reserves	• Degree of forestation • Standing timber reserves
3.3	Land resources	• Structure of the land fund • State of the soil and level of degradation by erosion	
3.4	Organic agriculture	• Area of land used for organic agriculture • Number of farmers involved in organic agriculture • Number of employed people in organic agriculture • Areas and farmers divided according to cultivated crops	
3.5	Biodiversity	• Protected plant and animal species (Red Book) • Flora and fauna resources	
3.6	Protected natural areas	• The total surface area of protected natural areas • Share of protected natural areas	

Group 4. The environmental dimension of quality of life			
4.1	Air pollution	• Pollutants emission into the atmosphere from stationary sources and transport	• Emissions from transport sources per capita
4.2	Population exposure to fine particulate matter ($PM_{2.5}$)	• Population exposure to fine particulate matter ($PM_{2.5}$) • Disability-adjusted life year/DALY because of the environment	• Population exposure to $PM_{2.5}$ micrograms per m^3
4.3	Access to safe drinking water sources	• Public water supply systems (Length of public water supply networks)	• Share of population using safely managed drinking water services
4.4	Population connected to sewerage	• Public sewerage supply systems (Length of public sewerage networks)	• Share of population using at least basic sanitation services
Group 5. Economic opportunities and policy responses			
5.1	Innovations in the green economy/environment	• Share of environmental technologies in all technologies developed • Number of research and development projects in the environmental field • Number of environmental innovations/technologies applied in practice	
5.2	Public expenditures on environmental protection	• State budget allocations for environmental protection • National Ecological Fund allocations	• Government expenditures on environmental protection
5.3	Energy subsidies	• Estimates of consumer energy subsidies • Renewable energy subsidies	
5.4	Private expenditures for environmental protection	• Current expenditures on environmental protection • Expenditures for the capital repairs of fixed assets for environmental protection • Internal vs. external investments • Loans granted for green technologies • Investment's purpose	• Private expenditures on environmental protection
5.5	Subsidies for organic agriculture	• The volume of subsidies in organic agriculture	

Annex 2. Glossary of indicators

Annex 2 is a table with methodological explanations for all the indicators that were estimated during this assessment round.

No	Indicator	Source	Comments
		Group 1. The socio-economic context and characteristics of growth	
1.1	GDP growth	***National:*** • GDP growth https://statistica.gov.md/ ***International:*** • GDP per capita, PPP 2017, USD https://www.worldbank.org/	***GDP growth*** is presented based on annual data on the gross domestic product in current prices and real growth. GDP calculations were compiled following the UNSC-2008 methodology, according to which GDP shows the final result of production activity in resident production units and which corresponds to the value of goods and services produced by these units for final consumption. The information is presented without data of the districts on the left side of the Nistru and Bender municipality. Data source – NBS. ***GDP per capita*** is gross domestic product expressed in US dollars converted by the factor of conversion of purchasing power parity (PPP) in constant prices of 2017 (USD PPC 2017 = 1). For the Republic of Moldova, the information is presented without the data of the districts on the left side of the Nistru and Bender municipality. Data source – World Bank.
1.2	GDP structure	***National:*** • *Contribution of economic activities to GDP formation* https://statistica.gov.md/	***The contribution of economic activities to the formation of GDP*** represents the share of certain sectors in the formation of gross domestic product according to the Classification of Activities in Moldovan Economy (CAEM Rev.2) The information is presented without the data of the districts on the left side of the Nistru and Bender municipality. Data source – NBS.
1.3	Economically active population	***National:*** • Economically active population https://statistica.gov.md/ • Participation rate https://statistica.gov.md/ ***International:*** • Participation rate https://www.worldbank.org/	***The economically active population*** represents the population active from the economic point of view and includes all people aged 15+ who provide labour force available for the production of goods and services during the reference period, including both the employed and the unemployed population. The information is presented without data of the districts on the left side of the Nistru and Bender municipality. Data source – NBS, Labour Force Survey. ***The participation rate*** is the participation rate of the population aged 15+ in the labour force (or the activity rate) and represents the proportion of the workforce in the total population aged 15+. The data are presented based on the population with usual residence without the data of the districts on the left side of the Nistru and Bender municipality. Data source – NBS, Labour Force Survey. For international comparison, data source – World Bank.
1.4	Unemployment	***National:*** • Number of unemployed people https://statistica.gov.md/ • Unemployment rate https://statistica.gov.md/ ***International:*** • Unemployment rate https://www.worldbank.org/	***The number of unemployed*** represents the number of unemployed according to International Labour Organization (ILO) criteria, i.e. people aged 15+ who meet certain conditions during the reference period (https://statistica.gov.md/public/files/Metadate/AFM.pdf). The data are presented based on the population with usual residence without the data of the districts on the left side of the Nistru and Bender municipality. Data source – NBS, Labour Force Survey. ***The unemployment rate*** is the share of unemployed defined according to ILO criteria in the total active population, expressed as a percentage.The data are presented based on the population with usual residence without the data of the districts on the left side of the Nistru and Bender municipality. For the Republic of Moldova, the information is presented without the data of the districts on the left side of the Nistru and Bender municipality and is based on NBS data. For international comparison, data

			source – World Bank.
1.5	Population	***National:*** • Population and the demographic structure by gender https://statistica.gov.md/	***Population and the demographic structure by gender*** represent the population with usual residence – the number of people who have lived mainly in the last 12 months on the territory of the Republic of Moldova regardless of temporary absences (for recreation, vacation, visits to relatives and friends, business, medical treatment, religious pilgrimages, etc.) disaggregated by gender on 1 January. Estimation of the population with usual residence is based on the population with usual residence corrected from the 2014 Population and Housing Census, to which were added births minus deaths (natural population growth), including migration increase (net migration). The information is presented without data of the districts on the left side of the Nistru and Bender municipality. Data source – NBS.
1.6	Population density	***International:*** • Population density https://www.ec.europa.eu	***Population density*** is the number of the population relative to the country's area. The data for the Republic of Moldova does not include the Transnistrian region and are based on the NBS data. For international comparison, data source – EUROSTAT.
1.7	Life expectancy at birth	***National:*** • Life expectancy at birth https://statistica.gov.md/ ***International:*** • Life expectancy at birth https://www.ec.europa.eu	***Life expectancy at birth*** represents the number of years that those born in that period will live on average if during their life the level of mortality at each age will remain the same, as it was in the year of birth. Beginning with 2014, life expectancy at birth is calculated on the basis of the population with usual residence. The information is presented without data of the districts on the left side of the Nistru and Bender municipality. Data source – NBS. For international comparison, data source – EUROSTAT.
1.8	Income inequality	***National:*** • GINI coefficient on available income https://statistica.gov.md/ ***International:*** • GINI coefficient https://www.oecd.org	***GINI coefficient*** represents the degree of deviation of the actual distribution of income by equal groups of the population from the line of uniform distribution of income. The statistical size of the coefficient varies from 0 to 1, equalling 0 – total income equality for all population groups; and 1 – total inequality when all income belongs to one person. The information is presented without data of the districts on the left side of the Nistru and Bender municipality. Data source – NBS. For international comparison, data source – OECD.
1.9	Enrolment in education	***National:*** • The gross enrolment rate in education by educational levels https://statistica.gov.md/	***The gross enrolment rate in education by educational levels*** represents the total number of people by educational levels, regardless of age, expressed as a percentage of the population in the given age group for each level of education. The data are presented based on the usual resident population without the data of the districts on the left side of the Nistru and Bender municipality, and mentioned in the annual publication "Education in the Republic of Moldova".
Group 2. The environmental and resources productivity of the economy			
2.1	Greenhouse gas emissions	***National:*** • Greenhouse gas emissions https://statistica.gov.md/ ("Natural Resources and Environment in the Republic of Moldova" publication) • CO_2 emissions https://statistica.gov.md/ ("Natural Resources and Environment in the Republic of Moldova"	At the national level, estimates of ***greenhouse gas (GHG) emissions***, including ***CO_2 emissions***, are made in national assessment reports. Data on GHG emissions, including CO_2 emissions, reflect emissions from the whole country, including the Transnistrian region. The indicator is expressed in units of mass CO_2 equivalent. CO_2 emissions are expressed in units of mass.

		publication)	
2.2	Carbon productivity (production-based CO_2 productivity)	***National:*** • *Carbon productivity* http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya.html (data on the GDP of the Transnistrian region); www.cbpmr.net (data on the exchange rate of the Transnistrian ruble); authors' calculations ***International:*** • *Carbon productivity* https://ec.europa.eu/eurostat/web/main/data/database (data on CO_2 emissions in European countries); https://databank.worldbank.org/home.aspx (data on GDP of other countries expressed in purchasing power parity); authors' calculations	***Carbon productivity*** is calculated as the ratio of national economic output (GDP) to CO_2 emissions. In this report, productivity was calculated as the ratio between GDP and CO_2. As the CO_2 emissions data cover the whole country, including the areas on the left bank of the Nistru, the GDP of the whole country was also calculated (GDP of the whole country = GDP of the right bank + GDP of the Transnistrian region). The indicator was expressed in currency value relative to units of mass (MDL 2010 = 1/kg for national developments and USD PPP 2017 = 1/kg for international comparisons).
2.3	Final energy consumption	***National:*** • *Final energy consumption* https://statistica.gov.md (final consumption in the energy balance) • *Primary energy supply* https://statistica.gov.md (gross national energy consumption in the energy balance) • *Energy productivity* authors' calculations ***International:*** • *Total energy supply* https://ec.europa.eu/eurostat/web/main/data/database • *Energy productivity* authors' calculations	***Final energy consumption*** includes the quantities of primary and transformed energy that is used in consumer facilities, as a result of which no further processing or transformation of energy takes place. Final energy consumption includes consumption for production, lighting, water supply, heating and ventilation. To define the ***primary energy supply,*** the OECD definition was used (https://data.oecd.org/energy/primary-energy-supply.htm). Primary energy supply is calculated as energy production plus energy imports, minus energy exports and international bunkering and plus or minus changes in energy stocks (Primary energy supply = energy production + energy import - energy export - international bunkering +/- change of energy stocks). It should be noted the existence of indicators with different names, such as gross energy consumption (NBS) or total energy supply (EUROSTAT), de facto, reflect the primary energy supply and is calculated according to the formula mentioned above. Because different types of energy are expressed in specific natural units, to calculate the primary energy supply all types of energy are converted into mass units or energy units. ***Energy productivity*** is calculated as the ratio between the national economic output (GDP or GVA) and the primary energy supply. In this report, productivity was calculated as the ratio between GDP and primary energy supply. The indicator was expressed in currency units relative to units of mass (USD PPP 2017 = 1/g oil equivalent).
2.4	Energy intensity	***National:*** • Energy intensity	***Energy intensity*** was calculated at the national level as the ratio between final energy consumption for the whole economy and GDP, and the sectoral energy intensity was expressed as the ratio between

		authors' calculations	sector-specific energy consumption and the GVA generated in the sector. Indicators were expressed in units of mass relative to units of value (g oil equivalent/MDL 2010 = 1).
2.5	Share of renewable energy in final energy consumption	***National:*** • *Renewable energy supply* https://statistica.gov.md/ (Energy Balance); authors' calculations • *Share of renewable energy in primary energy supply* authors' calculations • *Share of renewable energy in final energy consumption* authors' calculations ***International:*** • *Share of renewable energy in total energy supply* https://ec.europa.eu/eurostat/web/main/data/database	Wind energy, solar energy, hydropower, ocean energy, geothermal energy, biomass and biofuels are renewable energy sources. ***Renewable energy supply*** is calculated as energy production plus energy imports, minus energy exports and plus or minus the change in energy stocks (Renewable energy supply = energy production + energy import - energy export +/- change in energy stocks). In the Republic of Moldova, the supply of renewable energy is represented by the supply of biofuels and waste and by the primary production of electricity from wind energy, photovoltaic energy and hydropower (produced at the Stanca-Costesti hydroelectric power plant). The supply of renewable energy is expressed in units of mass (g, kg, t) oil equivalent or coal equivalent, or in energy units (Joule). ***The share of renewable energy in the primary energy supply*** is calculated by relating the supply of renewable energy to the supply of primary energy. **The share of renewable energy in final energy consumption** is calculated by relating the supply of renewable energy to the final energy computation.
2.6	Waste generation	***National:*** • *Waste from enterprises* https://statistica.gov.md/ (formation and use of waste in enterprises) • Household waste https://statistica.gov.md/ (municipal waste)	**The generated waste** can be divided into production waste and household waste. In the Republic of Moldova, there are no data on the total amount of generated waste. Waste from enterprises is expressed in mass units and household waste in volume units. As a result, the generation of waste was analysed on two dimensions: waste from enterprises, which can be associated with production waste, and household waste. In the case of waste from enterprises, there are data from 2010. The data on household waste consists of two series that were joined: (1) for the years 2014-15 the statistical data on solid household waste and (2) for the years 2016-20 the data on municipal waste collected from the population (households).
2.7	Waste recycling	***National:*** • Utilised waste https://statistica.gov.md/ (formation and use of waste in enterprises)	The official statistical data from the Republic of Moldova for the period 2010-19 include only the information about the **waste utilised** by enterprises. At the same time, it should be noted that "waste utilisation" is a broader notion than "waste recycling". According to "Methodical guidelines on completion of the annual report form No 2 -waste 'Formation, use of waste"' (approved by Joint Order of the Ministry of Agriculture, Regional Development and Environment and the National Bureau of Statistics No 244/70 of 30 October 2018), the use of waste represents the reintroduction of waste in the economic circuit, both in the form of secondary raw materials or unfinished goods, as well as an energy resource. Thus, the national data refer only to waste from enterprises, but reflect both the recycling of waste (transformation into products, materials or substances) and the reuse of waste for energy purposes.
2.8	Use of mineral fertilisers	***National:*** • Use of mineral and organic fertilisers https://statistica.gov.md/	***Use of mineral and organic fertilisers*** reflects the introduction of chemical fertilisers (phosphates, nitrates and potassium fertilisers) and organic fertilisers in agricultural land by enterprises and peasant households/farms with an area of agricultural land of at least 50 ha.

2.9	Use of water by sectors	***National:*** • *Use of water by sectors* https://statistica.gov.md/ • Water productivity authors' calculations ***International:*** • *Water productivity* https://ec.europa.eu/eurostat/web/main/data/database; authors' calculations	***The use of water*** is the use of aquatic resources extracted from different sources to meet economic, social and household needs. This does not include the use of wastewater, drainage water, reused water and water used in closed circulation. ***Water productivity*** is calculated as the ratio between the national economic output (GDP or GVA) and the volume of water used. In this report, productivity was calculated as the ratio between GDP and the volume of water used. As the data on the volume of water used covers the whole country, including the areas on the left bank of the Nistru, the GDP of the whole country was also calculated. The indicator was expressed in currency units relative to volume units (USD PPP 2017 = 1/m3).
Group 3. The natural asset base			
3.1	Water resources	***National:*** • *Water intake* https://statistica.gov.md/ • *Losses during transportation* https://statistica.gov.md/ ***International:*** • *Water resources* www.worldbank.org/ • *Level of water stress* www.worldbank.org/	***Water intake from natural water bodies*** for use represents the water intake from shallow and groundwater bodies for further use. The total volume of water intake includes mine waters obtained as a result of the mining of ores. The data are presented as a whole for the Republic (including for the Transnistrian region). Data source – 'Apele Moldovei' Agency. ***Losses of water during transportation*** represent the losses of water from the intake site to the consumption site through evaporation, filtering, draining, etc. The data are presented as a whole for the Republic (including for the Transnistrian region). Data source – 'Apele Moldovei' Agency. The renewable internal freshwater resources per capita refer to renewable internal resources (internal flows of rivers and groundwaters from precipitation) from a certain country reported to the number of population. The indicator is calculated by using the population estimates of the World Bank, which do not include the Transnistrian region and are presented once in five years (last estimates in 2017). Data source – FAO. ***The level of water stress*** represents the share of freshwater intake by all major sectors from the total available renewable resources of freshwater. Major sectors, as defined by ISIC standards, include agriculture, forestry and fishing, processing industry; production, and supply of energy and services. This indicator is also known as water intake intensity. The indicator does not include the Transnistrian region and is presented once in five years (last estimates in 2017). Data source – FAO.
3.2	Forest resources	***National:*** • *Total area of the forest fund* https://statistica.gov.md/ • *Total land areas covered by forests* https://statistica.gov.md/ ***International:*** • *Degree of afforestation* www.worldbank.org/	***The total area of the forest fund*** represents the share of land covered by forests, as well as the land intended for forest management needs. The data are presented as a whole for the Republic (including for the Transnistrian region). Data source – Moldsilva Agency. ***The degree of afforestation*** represents the land covered with trees planted and raised naturally and are at least 5 metres tall, reported to the total area of the country. The indicator excludes trees from agricultural production systems (e.g. in fruit plantations) and trees from urban parks and gardens. Data source – FAO.
3.3	Land resources	***National:*** • *Land fund use* https://statistica.gov.md/	***The land fund use*** represents the structure of the land fund, as of 1 January, by categories of land. The data are presented as a whole for the Republic (including for the Transnistrian region). Data source – Land Relations and Cadastre Agency.

3.4	Organic agriculture	***National:*** • *Area of land used for organic agriculture* www.ecovisio.org/ro/ • *Number of farmers involved in organic agriculture* www.ecovisio.org/ro/	***Area of land used for organic agriculture*** represents the area of land planted with organic agro-food production in compliance with Law No 115/2005 on Organic Agro-Food Production. The data are presented as a whole for the Republic (including for the Transnistrian region). Data source – Atlas of Organic Agriculture of the Republic of Moldova (2019 and 2020) and MARDE publications. ***The number of farmers involved in organic agriculture*** represents the entities that plant organic agro-food production in accordance with the rules of organic production set by Law No 115/2005 on Organic Agro-Food Production and by the national and international standards in the field, certified in the prescribed manner. The data are presented as a whole for the Republic (including for the Transnistrian region). Data source – Atlas of Organic Agriculture of the Republic of Moldova (2019 and 2020) and MARDE publications.
3.5	Biodiversity	***National:*** • *Protected plant and animal species* https://statistica.gov.md/	***Protected plant and animal species*** represent the number of endangered species of fauna and flora, protected by law, included in the Red Book of the Republic of Moldova, third edition (2015). The data are presented for the whole country (including the Transnistrian region) and are mentioned in the annual publication "Natural Resources and Environment in the Republic of Moldova".
3.6	Protected natural areas	***National:*** • *The total surface area of protected natural areas* https://statistica.gov.md/ • *Share of protected natural areas* https://statistica.gov.md/	***The surface area of protected natural areas*** represents areas of land, water surfaces and air space above them on the territory of which natural complexes and objects are located, which have special environmental protection, scientific, cultural, aesthetic, entertainment and recreational value, that are excluded totally or partially from economic use and are under special protection regime. The data are presented for the whole country (including the Transnistrian region) and are mentioned in the annual publication "Natural Resources and Environment in the Republic of Moldova". ***Share of protected natural areas*** represents the area of protected natural areas reported to the total area of the country. The data are calculated by authors and are presented for the whole country (including the Transnistrian region).
Group 4. The environmental dimension of quality of life			
4.1	Air pollution	***National:*** • *Pollutants emission into atmosphere from stationary sources and transport* https://statistica.gov.md/ • *Pollutants emission into atmosphere (nitrogen oxides and sulphur oxides) per capita* https://statistica.gov.md/; authors' calculations ***International:*** • *Pollutants emission into atmosphere (nitrogen oxides and sulphur oxides) per capita* https://ec.europa.eu/eurostat/web/main/data/database; authors' calculations	***Pollutants emission into the atmosphere*** represent the evacuation into the atmosphere of pollutants from stationary and mobile (transport) sources. All the pollutants evacuated in the atmosphere are taken into account, both after they go through the dust and gas caption installations at organised sources of pollution and without treatment from organised and non-organised sources of pollution. ***Pollutants emission into atmosphere (nitrogen oxides and sulphur oxides) per capita*** was calculated as the ratio of the quantity of emissions of certain pollutants to the number of the population with usual residence.
4.2	Population exposure to fine particulate matter ($PM_{2.5}$)	***National:*** • *Population exposure to fine particulate matter ($PM_{2.5}$)*	***Fine particulate matter*** is made up of different organic and inorganic substances, such as sulphate, nitrates, sodium chloride, black carbon, mineral dust and water.

		https://stats.oecd.org/ ***International:*** • *Population exposure to fine particulate matter ($PM_{2.5}$)* https://stats.oecd.org/	
4.3	Access to safe drinking water sources	***National:*** • Public water supply systems (length of public water supply networks) https://statistica.gov.md/ ***International:*** • Share of population using safely managed drinking water services https://data.worldbank.org/	***Public water supply system*** represents a set of technological installations, functional equipment and specific facilities used to deliver the public water supply service. The public water supply system consists of the following components: intake, waterworks, treatment plants, pumping stations with or without sump pumps, storage reservoirs, water transportation public networks. ***The share of the population using safely managed drinking water services*** reflects the availability of services that provide the population with access to improved sources of drinking water. In its turn, improved sources include: water pipes inside and outside the dwelling, public taps; protected wells and springs; bottled water; supplied water and rainwater.
4.4	Length of sewerage networks	***National:*** • Public sewerage systems (length of public sewerage networks) https://statistica.gov.md/ ***International:*** • Share of population using at least basic sanitation services https://data.worldbank.org/	***The public sewerage system*** represents the set of technological installations, functional equipment and specific facilities used to deliver the public sewerage service. The public sewerage system consists of the following components: public sewerage networks, pumping stations, treatment plants, collectors for evacuation to the issuer. ***The share of the population using at least basic sanitation services*** comprises both persons who use basic sanitation services and those who use safely managed sanitation services. The safely managed sanitation services are the services that ensure the population's access to a public sewerage system and to individually improved sanitation facilities such as: septic tanks, latrines (toilets without sewerage system) and toilets connected to shaft.
Group 5. Economic opportunities and policy responses			
5.1	Innovations in the green economy/environment	***National:*** • *Share of environmental technologies in all technologies developed* https://oecd.org	Share of environmental technologies in all technologies developed presents the number of innovations in the environmental area and green economy reported to the total number of innovations developed. According to the National Bureau of Statistics (NBS), the innovations represent "the introduction in the enterprise of a product, process, method of organisation or marketing method, new or significantly improved". This definition largely coincides with the international approach promoted by the OECD, namely that innovations go beyond the Research and Development system (R&D) and are based on companies that implement production processes, place goods or services on the market, apply organisation methods or marketing concepts, new or significantly improved. The indicator does not include the Transnistrian region and is presented once in five years (last estimates in 2017). Data source – OECD.
5.2	Public expenditures on environmental protection	***National:*** • *State budget allocations for environmental protection* https://mf.gov.md/ • *National Environmental Fund*	***State budget allocations for environmental protection*** *represent the volume of financial resources allocated and executed through budget programmes.* The data are presented by the authors based on annual documents related to the budgetary process. Data source – Ministry of Finance. ***National Environmental Fund (NEF) allocations*** represent the volume of financial resources allocated and executed through NEF. The data are presented by the authors based on annual documents related to the budgetary process. Data source – Ministry of Finance. ***Government expenditures for environmental protection*** represent the financial resources for

		https://mf.gov.md/ ***International:*** • *Government expenditures for environmental protection* www.ec.europa.eu	government measures intended to prevent, reduce and eliminate pollution and any other environmental degradation. The data for the Republic of Moldova do not include the Transnistrian region and are based on the documentation related to the budgetary process. For European countries, data source – EUROSTAT.
5.3	Energy subsidies	***National:*** • *Estimates of consumer energy subsidies* https://oecd.org	***Energy subsidies*** represent the direct or indirect financial contributions provided by the state to consumers of energy obtained from fossil sources. These include reliefs/exemptions of tax, excise duties and other fiscal payments, as well as transfers in form of compensations for tariffs. The data are presented without the Transnistrian region. Data source – OECD.
5.4	Private expenditures for environmental protection	***National:*** • *Current expenditures for environmental protection* https://statistica.gov.md/ • *Expenditures for the capital repair of fixed assets for environmental protection* https://statistica.gov.md/ ***International:*** • *Private expenditures for environmental protection* www.ec.europa.eu	***Current expenditures for environmental protection*** represent the financial flows allocated by business operators for actions aimed at preventing, reducing or addressing the damage to the environment. The data are compiled based on the reports submitted by business entities and do not include the Transnistrian region. Data source – NBS. ***Expenditures for the capital repair of fixed assets*** for environmental protection represent the set of works and measures taken to restore the capacity or condition of buildings, constructions, elements and their parts, including engineering construction and equipment, resulting in an improved state of the environment. The data are compiled based on reports submitted by business entities and do not include the Transnistrian region. Data source – NBS. ***Private expenditures for environmental protection*** represent the financial resources allocated by companies to prevent, reduce and eliminate pollution and any other environmental degradation. The data for the Republic of Moldova do not include the Transnistrian region and are based on the NBS data. For European countries, data source – EUROSTAT.
5.5	Subsidies for organic agriculture	***National:*** • *The volume of subsidies for organic agriculture* https://aipa.gov.md	***Subsidies for organic agriculture*** represent the non-repayable and non-taxable financial support provided by the National Fund for the Development of Agriculture and the Rural Environment to support investments in organic agriculture development. The data are compiled based on the reports submitted by the Agency for Interventions and Payments in Agriculture and do not include the Transnistrian region. Data source – AIPA.

[1] According to the International Labour Organization (ILO), the participation rate of labour force is the share of economically active population aged 15+: all people who provide labour force for the production of goods and services in a specified period of time.
[1] Since 2014, the indicator has been estimated on the basis of the number of population with usual residence.
The Household Budget Survey methodology was changed in 2019

Towards Green Transformation of the Republic of Moldova

Green growth indicators help track progress towards a green economy, facilitate informed decision-making, demonstrate accountability, raise public awareness of the links between economic growth and the environment, and compare progress between countries.

This is the second monitoring report to use OECD green growth indicators in the Republic of Moldova adapted to the national context. It presents a snapshot of the country's progress towards green economy over 2015-20. This is also a first attempt to evaluate the implementation of the National Programme on the Promotion of Green Economy in the Republic of Moldova and its Action Plan 2018-20, based on green growth indicators. In addition, the report will support preparation of the new action plan on green economy for 2022-24 and of Environmental Strategy 2030.

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