



Romania, the path to a green and digital economy

OUTLOOK FOR 2040



VA URMA

EDITION 2022

Cuprins

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|---|-----------|
| The purpose of the project | 3 |
| The sector dynamics and estimation of growth for the Romanian economy for the period 2021-2040 | 5 |
| Destination, objectives and components that will support the green transition | 9 |
| Description of the component's contribution to GVA growth | 12 |
| Digitalization, robotics, technology, innovation | 12 |
| Institutional capacity and state-owned companies | 16 |
| Human capital – labour, education and health | 19 |
| Energy mix and energy infrastructure | 23 |
| Annex I. Calculation methodology | 26 |
| Sector dynamics and estimation of growth for the Romanian economy for the period 2021-2040 | 26 |
| Investment effort estimates | 30 |

The purpose of the project

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AND DIGITAL
ECONOMY

In the first edition of the **Va Urma** project, published in 2018, the Foreign Investors Council (FIC) proposed a development model for Romania that facilitated faster economic convergence towards the average well-being of the member states of the European Union (EU)¹. Through the implementation of specific measures, focused on three pillars of economic growth, the model estimates that Romania's economy could grow approximately four times in size, during 2016–2036, thus reaching the tenth economy in the EU in terms of nominal gross domestic product (GDP)².

Meanwhile, starting in 2020, the coronavirus pandemic (COVID-19) generated a crisis, both of the healthcare system and at the socio-economic level, which required responses at several levels, within all industries in Romania. At the same time, the global economic reality has changed significantly, both as a result of the pandemic and due to the increased interest in addressing climate change and global warming processes. At European level, the measures adopted by the member states to address these issues encourage a long-term sustainable economic development model that takes into account the new changes³.

This context marks the need for major changes in economic growth models, especially at the level of EU member states. In order to meet the *"economy of the future"*, FIC estimated an updated economic growth model for Romania, compared to the previous version presented in 2018, a model that takes into account components related to the objectives regarding the energy transition and digital transformation:

- a) digitalization, robotics, technology and innovation;
- b) institutional capacity and state-owned companies;
- c) human capital – labour, education and health;
- d) energy mix and energy infrastructure⁴.

All of these are covered to a large extent in the 2018 analysis. The novelty of the current model, launched at the beginning of 2022, consists in estimating a development trajectory of Romania's economy until 2040 that also takes into account the constraints imposed by the fulfillment of climate objectives⁵.

The **Va Urma** model tracks all sectors of the economy where the trajectory of gross value added (GVA)⁶ could be simulated under the influence of new environmental policies, namely: agriculture; industry; constructions; trade, transport and HoReCa activities⁷; information technology and telecommunications; financial brokerage and insurance; real estate transactions; professional, scientific and technical activities; public administration – health, education and performing, cultural and recreational activities.

1 [Romania, the tenth economy in the EU in 2036](#) – Va Urma, 2018 edition

2 [How can Romania grow until 2036 – Va Urma, 2018 edition](#)

3 For example, the adoption of the European Green Deal, through which the EU targets climate neutrality by 2050, or the support offered to EU member states through the instrument called the Recovery and Resilience Facility (RRF) in order to exit the crisis and start economic recovery.

4 Including housing rehabilitation, recycling and waste management, infrastructure adaptation to electric mobility

5 The new edition of the Va Urma project can also be interpreted as a complementary analysis to the activities carried out by the National Strategy and Forecast Commission and the Ministry of European Investments and Projects (MIPE) regarding the simulation of the impact of the National Recovery and Resilience Plan (NRRP).

6 Gross value added (GVA) is the balance of the production account and is measured as the difference between the value of goods and services produced (assessed at basic prices) and intermediate consumption (assessed at buyer's prices), thus representing the newly created value in the production process. GVA is calculated before consumption of fixed capital.

7 HoReCa is the acronym for the hospitality industry: Hotels, Restaurants and Cafes, mainly used in Scandinavia, Benelux, France and Romania.

The analysis⁸ is built on growth pillars focused on achieving the energy and digital transition objectives, and also approximates the investment effort for Romania by means of the coefficients derived from the forecasts for the evolution of greenhouse gas emissions⁹ and GVA dynamics. The quantitative analysis estimates this financial effort to generate the new growth model taking into account, at the same time, the structural changes that may affect the economy in the next two decades.

Annex 1 fully details the calculation methodology used for the new model. The basic idea of this exercise is to:

- i) identify a series of strategic objectives for each component of the model;
- ii) quantify the impact (cost) generated by the need to adjust Romania's economy to the new model imposed by the targets undertaken at the level of the European Union and
- iii) estimate the size of the investment needed to define the new model.

The results of the simulations indicate that the objectives can be achieved gradually, through sustained cooperation at the level of the entire society (consumers, private and state-owned companies, central and local public administrations, academia, non-governmental organizations). The achievement of these objectives depends on the change of behavior at the level of the entire society and requires a significant initial financial effort.

We consider it a new opportunity for citizens, civil society, business environment and academic environment to engage in a constructive dialogue resulting in a long-term plan at the level of a country project for Romania, which intersects with the EU targets and be supported by all decision-makers. FIC wants Romania to prosper and its citizens to be ambitious and generate solutions.

The following sections detail the working assumptions and the estimated economic impact of the core components that contributed to the construction of the model. A set of general recommendations is stated for each of these.

⁸ The analysis corresponds to fundamental scenarios based on the studies of international institutions such as: International Monetary Fund, World Bank, Organization for Economic Co-operation and Development, public documents and independent research studies.

⁹ Forecast available at [European Environment Agency \(EEA\)](#)

The sector dynamics and estimation of growth for the Romanian economy for the period 2021-2040

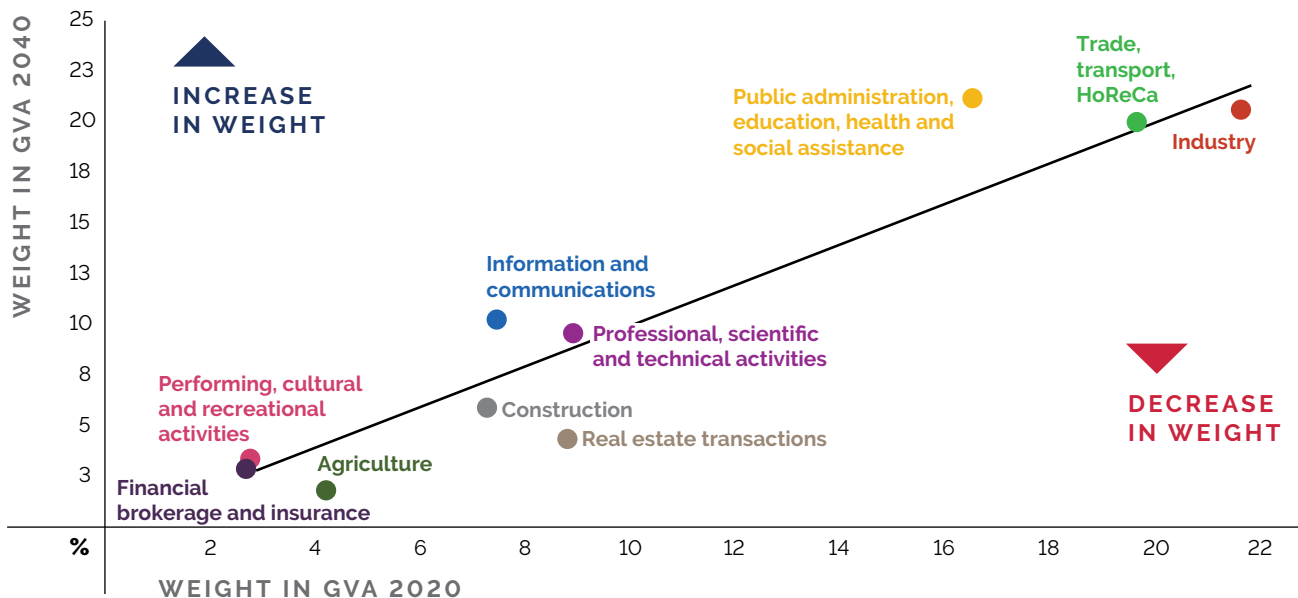
In the period 2007-2020, the total GVA of the Romanian economy increased its volume 2.5 times, from RON 379 billion to RON 962 billion, and the average nominal growth rate was slightly over 7% per year. The **Va Urma** model takes into account the historical context and relies on estimates of a baseline scenario for the GVA projection, on the time horizon 2020 - 2040, where it turned out that Romania's economy could reach almost RON 2,600 billion in 2040, with an average nominal growth rate of approximately 5% per year¹⁰.

10 According to the authors' calculations

However, the unprecedented level of the envisaged investment and the structural changes in industry, construction, services, trade or transport have the potential to change future developments, being less oriented towards the growth catalysts of the past. Thus, we propose a growth model with an ambitious long-term vision, which takes into account a greener and more digital future, also taking into account the leverage effects generated by investments made from European funds and from the state budget. The model built on the basis of this ambitious vision estimates an initial growth of the economy of up to RON 4,367 billion in the year 2040, with an average nominal growth rate of approximately 8% per year¹¹.

11 According to the authors' calculations

The investment potential that will be available will generate additional gains from potential training and learning effects on all economic players. Thus, in the hypothesis of a structural change of the national economy in the next 20 years, the sectors that will most benefit from the energy transition and digital transformation (such as public administration, industry and information technology), will continue to have a significant weight in the GVA composition.



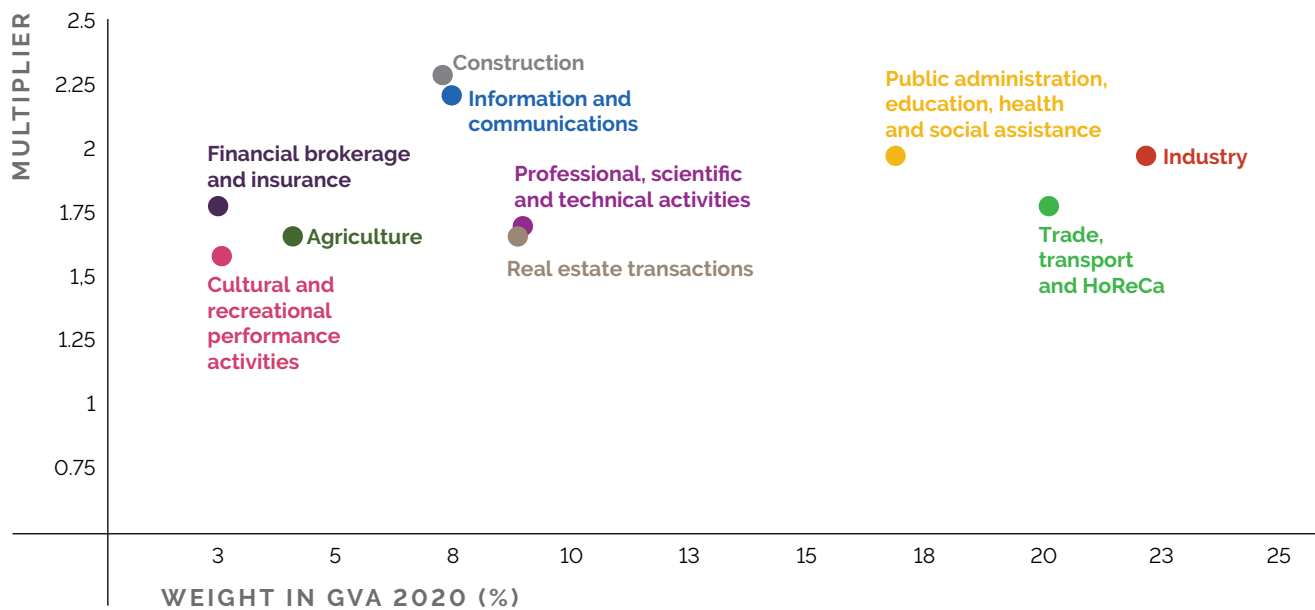
Source: Authors' calculations

Although not all types of investment may have the expected positive effect in the economy (maximizing the benefits associated with capital infusion is closely related to certain conditions that ensure a favorable framework, such as well-grounded and implemented government policies, the availability and skills of the labor force, the quality of the institutional environment, etc.) investments will play an important role in recovering the development gaps compared to advanced EU countries.

A key element in estimating the effects of investments on economic growth is the size of existing multipliers, both in the overall economy and in each sector. For example, a study by the International Monetary Fund (IMF)¹² from April 2021 calculates different multipliers of European investment expenses from structural and public funds in the EU member states. It indicates an aggregate level multiplier of 1.3 to 1.6 for Central and Eastern Europe countries. In the Va Urma model, a more optimistic value was chosen, using an average value of 1.6 (e.g. RON 1 placed into circulation in the economy as investment generates RON 1.6 in a one-year period).

The values of the used multipliers are presented in the figure below, where values greater than 1.5 are found in the construction, information and communication, industry and energy sectors, but also in the public sector. The model was built on this more optimistic variant as a result of the fact that multipliers are usually time-varying and differ from one phase of the economy to another (recession vs. expansion). Also, according to specialized studies, the multiplier estimates at regional level (depending also on the stage of development of the economy), often reveal higher values compared to the average values at the European level.

¹² [The Fiscal Multiplier of European Structural Investment Funds: Aggregate and Sectoral Effects with an Application to Slovenia](#) - panel 1 - European funds and public investment shocks (page 6).



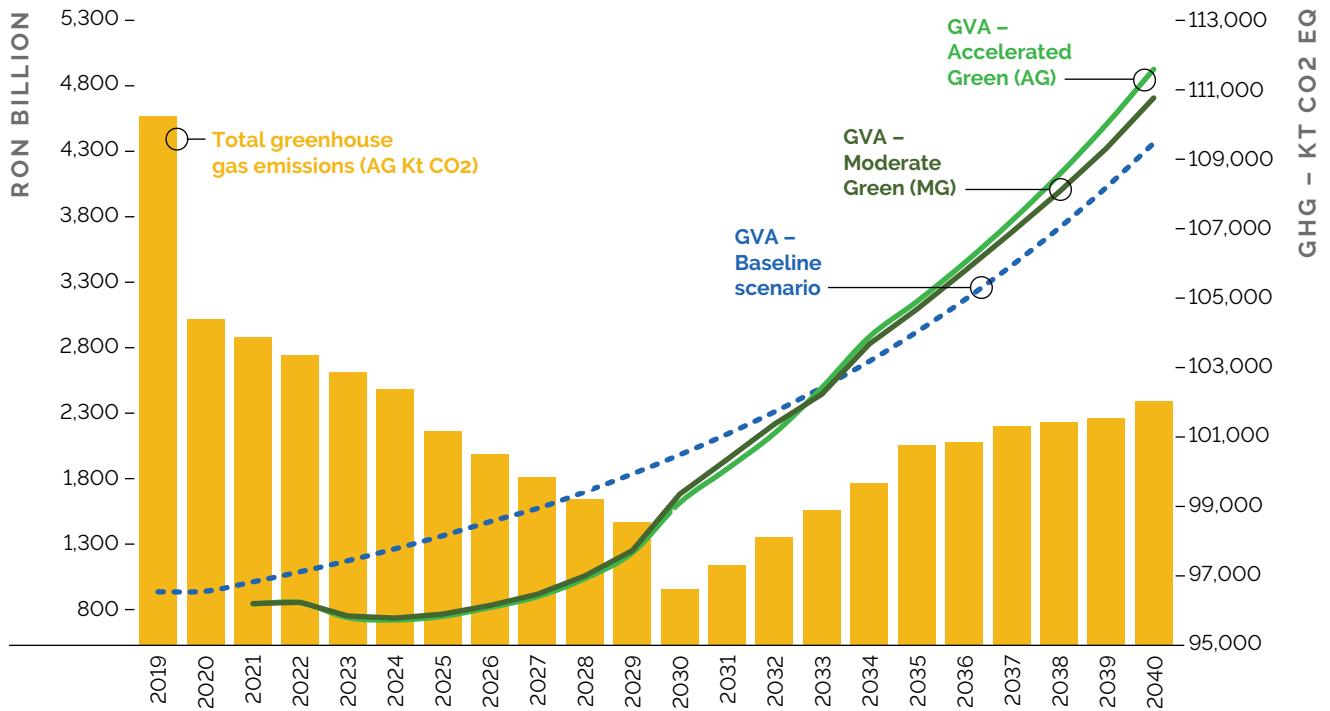
Source: The IMF study - The Fiscal Multiplier of European Structural Investment Funds, the authors' calculations

Taking into account the structural changes, Romania's economy can grow annually with values between RON 77 billion and RON 242 billion, during the period under review¹³. Starting from 2021, digitalization, institutional capacity, human capital, energy mix and energy infrastructure are estimated to accelerate the trajectory of economic growth, in particular in the following sectors: industry, trade activities, information technology and public administration, including health and education.

¹³ According to the authors' calculations in the optimistic view.

In the construction of the **Va Urma** economic model, we estimated the GVA increase for Romania in the period 2021-2040, then added the perspective of two environmental scenarios predicted by the European Commission, referred to as: the *Accelerated Green* (AG) scenario and the *Moderate Green* (MG) scenario.

According to our estimates, the economic model identifies, based on the GVA gap, a certain required level of investment. This investment requirement (in English *investment gap*) was calculated as the difference between the GVA in the Accelerated Green/Moderate Green scenario and the GVA in the baseline scenario, the one in which the economy functions and grows in a similar way to the evolution of the reference period 2007-2020. If the positive, driving effects of the investments that will be made in the Romanian economy in the next decade materialize, the GVA curve in the case of the *Accelerated Green* scenario will experience faster growth compared to the other scenarios.



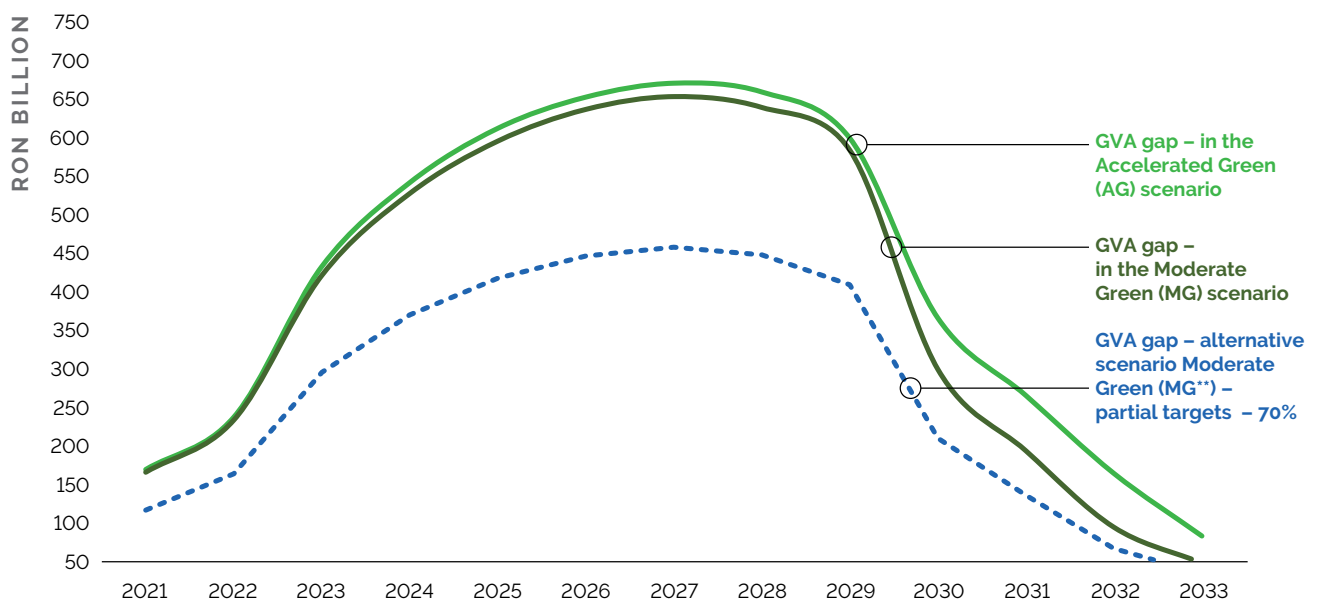
As can be observed in the graph below, the investment requirement will have a period of continuous growth, and starting from 2027, a gradual decrease in the investment requirement is expected. However, the investment effort will be kept at a constant level after 2033 to maintain the structural transformation of the economy.

Source: Authors' calculations. Forecasts of greenhouse gas emissions were taken from the European Environment Agency¹⁴

In analyzing the investment needs, the model also presents an alternative scenario, an intermediate variant for the Moderate Green scenario that assumes an incomplete implementation of environmental measures and a partial achievement of the climate objectives.

GVA GAP PROJECTION CONSIDERING THE MODEL SCENARIOS

Source: Authors' calculations



14 The forecasts regarding the total emissions of greenhouse gases (GHG) offered by the European Environment Agency do not contain descriptions of the methodological approaches used, or definitions and assumptions related to the estimations in the case of Romania. In the absence of methodological clarifications, it is difficult to identify the assumption by which a decrease in GHG emissions is forecast until 2030, followed by an increase in emissions until 2040 according to the forecasts. A possible explanation could be related to the maturity of the existing legislative packages or the slowdown of the European financing support of the energy transition (mainly targeting 2030) and the uncertainty regarding the environmental protection measures that will exist after 2030. For other member states in the area of Central and Eastern Europe, the forecasts of the European Environment Agency show a downward trend in emissions for the same time horizon. However, the target of reducing emissions by 55% (compared to the 1990 level) by 2030 has a different stage from one country to another, Romania being one of the few member states that reached this target as early as 2020.

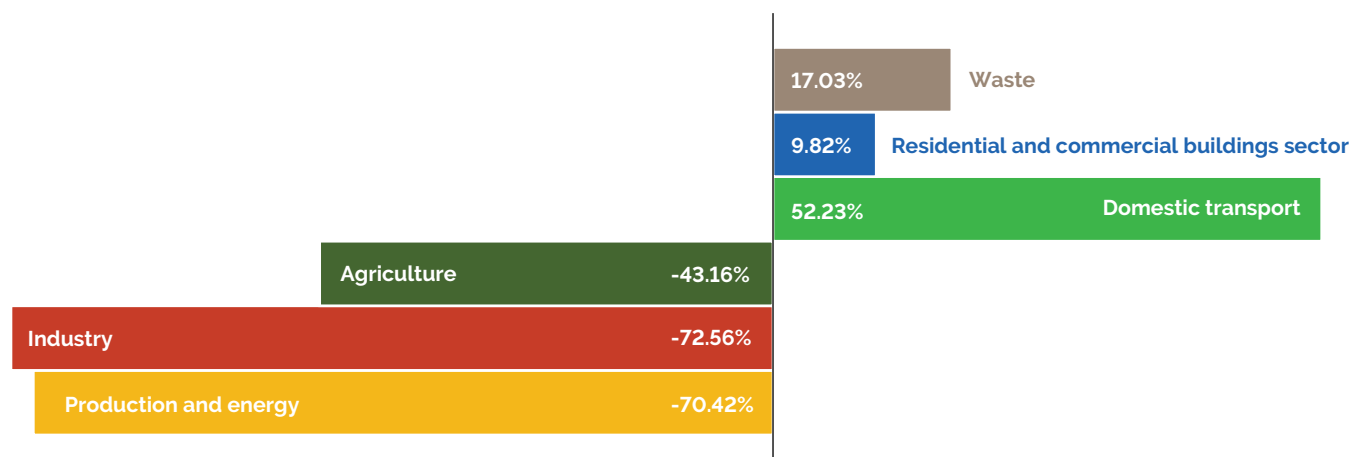
Destination, objectives and components that will support the green transition

Implications from the perspective of environmental protection measures and projections for investment requirements

At the end of 2019, the intensity of greenhouse gas emissions of GDP in Romania was above the average of European states¹⁵. But in the last three decades, significant progress has been registered in Romania in terms of greenhouse gas (GHG) emissions, especially in sectors such as energy generation (70% decrease compared to the 1990 level), industry (approximately 73% decrease compared to 1990) and agriculture (43% decrease compared to 1990).

¹⁵ According to the data of the [European Environment Agency - total greenhouse gas emissions per capita in 2019](#)

PERCENTAGE CHANGE OF EMISSIONS IN ROMANIA PER SECTOR 1990 VS 2019



Source: processing based on data from the database of the European Environment Agency¹⁶

On the other hand, emissions have increased significantly in the domestic transport area due to the increase of the number of cars, but also in two other sectors, such as residential and commercial buildings and that of waste produced by households and economic activities.

¹⁶ [EEA greenhouse gases - data viewer - Romania](#)

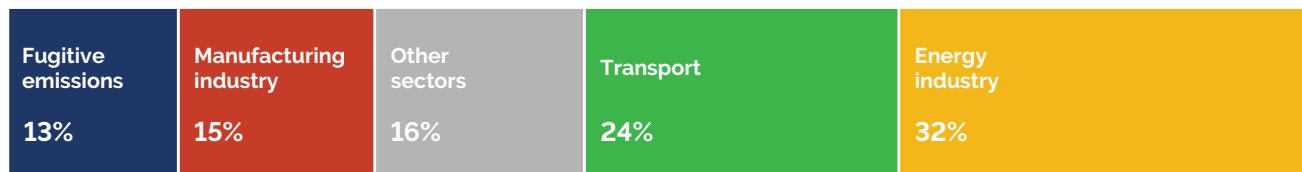
According to the new objectives assumed by the EU regarding the reduction of greenhouse gas emissions, Romania should produce major changes in the energy mix, in favor of a higher share for renewable energy sources, gradually reducing the intake of coal. At the end of 2019, the contribution of renewable energy to the energy generation mix in Romania was estimated at 24%¹⁷ according to Eurostat data, and an increase of 9 percentage points is expected until 2035.¹⁸

¹⁷ According to Eurostat data: [Energy from renewable sources - SHARES detailed results](#)

¹⁸ According to the data in the [ENCP](#). Expected evolution of primary energy generation, based on energy sources, in the context of current policies and measures (graph 37).

Source: processing based on data from the ENCP¹⁹ – Structure of GHG emissions per each sector in 2017 exclusive of LULUCF²⁰(graph 18)

STRUCTURE OF GHG EMISSIONS FROM THE ENERGY INDUSTRY, 2017



STRUCTURE OF GHG EMISSIONS PER EACH SECTOR EXCLUSIVE OF LULUCF, 2017



At the European level, there are common objectives, with member states aiming to reduce emissions by 55% by 2030 compared to 1990 and to achieve an environment without net greenhouse gas emissions by 2050. In a broader sense, the basic intention is to decouple economic growth (based on resource consumption) from the impact on the environment, elements that the specialized literature and various international organizations have discussed in the last decades²¹.

Obviously, the implementation of measures to protect the environment in order to change the economic growth model can generate potential losses in GDP, in the short/medium term, determined by the necessary adjustments to support the green transition. Also, these mutations occur simultaneously with the consequences of the COVID-19 pandemic on the economic and business models. The pandemic has accelerated digitalization and at the same time changed the perspective on the labor market and on global and regional value chains (by considering their shortening in the context of isolation and mobility restrictions).

From this perspective, the **Va Urma** model was built based on two scenarios. Both in the *Moderate Green* (MG) scenario – in which the existing environment measures are those implemented at the level of 2019 (reference year in this case), as well as in the *Accelerated Green* (AG) scenario – in which additional measures are implemented, the four facilitating factors taken into account - i) Digitalization, robotics, technology and innovation; ii) Institutional capacity and state-owned companies; iii) Human capital – workforce, education and health; iv) The energy mix and energy infrastructure - each had an associated weight²² depending on the scale of each in generating the new growth model. The only component that has a lower allocation in the AG scenario is that of human capital, from 27.5% to 17.5%, assuming a high potential for absorbing new technologies and increasing the efficiency of processes through digitalization.

19 The National Integrated Plan in the field of Energy and Climate Change 2021 – 2030

20 ENG: Land use, land-use change, and forestry (LULUCF) - A GHG inventory sector covering GHG emissions and removals resulting from direct and indirect land use and forestry activities.

21 E.g., [United Nations](#), in 2011.

22 Weights associated with country-specific recommendations and allocations recommended by the EC for Member States at the time of writing the NRRP for: green transition (37%) and digital transition (20%).

WEIGHT OF COMPONENTS, DIFFERENT SCENARIOS

Source: Authors' estimates



The differences between the two scenarios are significant, the *Accelerated Green* scenario requiring average annual investments of approximately RON 170 billion, both from public and private sources - loans, foreign investments in key sectors of the economy, funds from the state budget and European funds through available financing facilities. Investment projects will generate additional needs or demands in related industries upstream (utility suppliers, raw materials, materials, etc.) or downstream (distributors and/or consumers of goods and services) and implicitly there will be chain increases in revenues for all economic agents involved.

Description of the component's contribution to GVA growth

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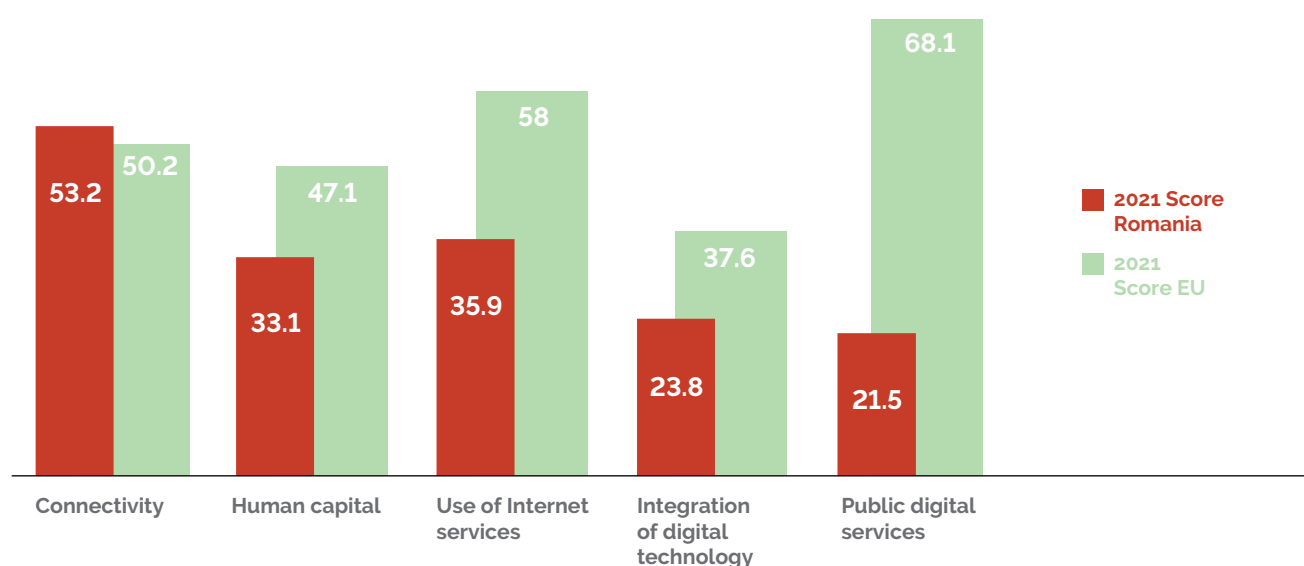
Digitalization, robotics, technology, innovation

Companies will need to understand and take advantage of the opportunities offered by digitalization, increasing the adoption of digital tools that help improve productivity, allowing to reach new customers and expand into global markets. The public sector will need to integrate technologies to increase efficiency as well as improve services provided to taxpayers and citizens so as to facilitate the use of online services among the general population.

Increasing training to develop or update the information and communication technology (ITC) skills of staff for both public and private sectors is also important.

DESI 2020 - RELEVANT PERFORMANCE FOR EVERY DIMENSION

Source: Authors' processing of the data from the [European Commission](#) regarding DESI²³

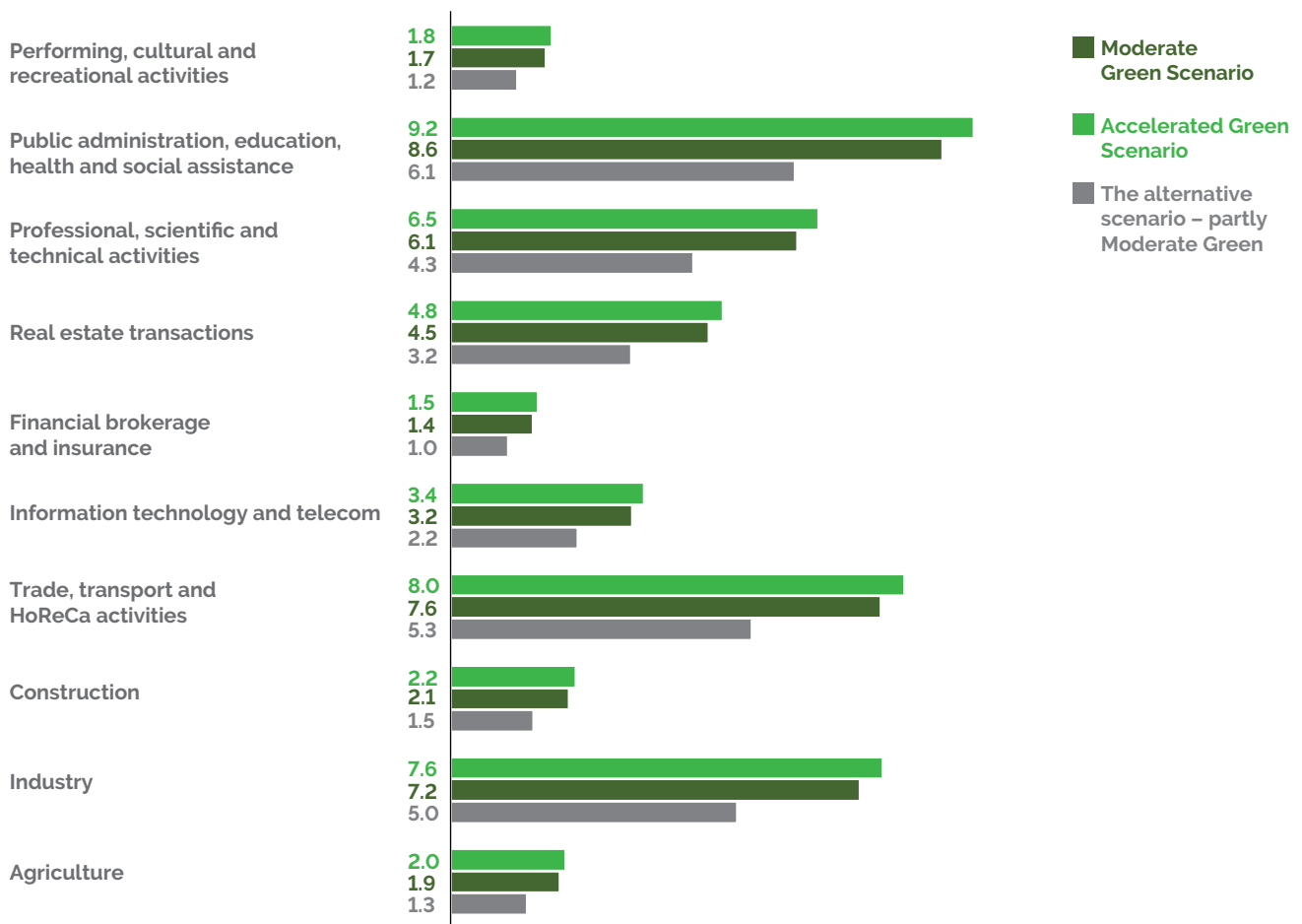


Both in the *Moderate Green* and in the *Accelerated Green* scenarios, the working assumptions on which data processing and development estimates were based considered important contributions from digitization, robotics, technology and innovation in general, almost a third (27.5%) being covered by the growth of this component.

²³ DESI stands for Digital Economy and Society Index, 2021. [DESI - Romania | Shaping Europe's digital future \(europa.eu\)](#)

The average annual investments required for the digital transition in Romania were approximated at RON 44 billion in the *MG* scenario and RON 47 billion in the *AG* scenario, the highest amounts to be injected into the following sectors: public administration - health and education, industry, trade activities, transport and HoReCa. According to the alternative scenario, partial fulfillment of the objectives from the perspective of this facilitator could mean a lower investment effort of approximately RON 31 billion per year on average.

DIGITALIZATION, ROBOTICS, TECHNOLOGY, INNOVATION (RON BILLION)



As specialized studies show, the adoption and use of technology essentially contributes to the competitiveness and growth of countries and companies²⁴. Simplifying the internal processes of private and public companies through digitalization (marketing, sales, accounting, logistics, etc.) reduces costs and improves competitiveness, while also facilitating access to foreign markets. Research²⁵ shows that in order to benefit from the adoption of technologies, to provide better services and to explore new business opportunities, at least three conditions should be met: the existence of infrastructure, skilled ITC personnel and sources of funding for technology investments.

Data from the Organization for Economic Co-operation and Development (OECD)²⁶ shows that, in general, large companies have a majority share in the exports made by Romania, Hungary and Poland, and close to 50% in the Czech

²⁴ Ollo-Lopez & Aramendia-Muneta (2012); Steinfeld, LaRose & Chew (2012).

²⁵ Manocchhari, Al-Esmail and Ashrafi (2012).

²⁶ Organisation for Economic Co-operation and Development, <https://www.oecd.org/>

Republic and Bulgaria. In addition, the marketing capacity – strengthened, for example, by using a website that presents more sophisticated functionalities²⁷ – has an important role in the ability of small and medium-sized companies to sell on the domestic market, but also to export outside the country of origin, especially when it comes to companies that, due to lack of access to financing, low marketing power and limited staff, cannot open their own headquarters on a foreign market. Thus, countries where companies manage to integrate digitalization components into their business activity have a higher technological intensity and, as a consequence, will manage to grow and export more.

Based on automation, artificial intelligence can revolutionize healthcare domain by helping to improve the daily life of practitioners, allowing them to refocus their attention on patients, allocating less time to administrative tasks.²⁸

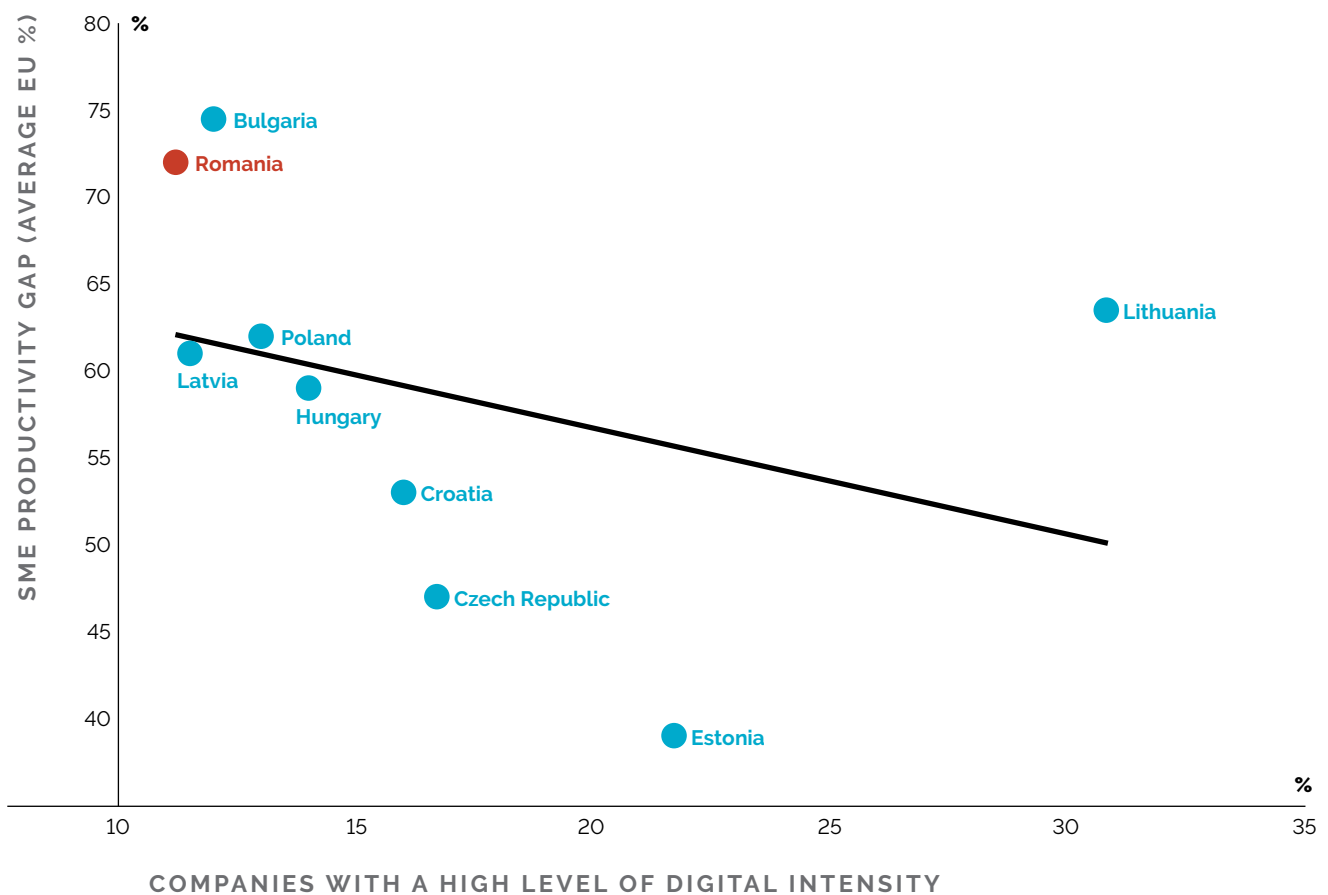
The adjacent figure shows the "productivity gap" (value added per employee) compared to the EU average in various Central and Eastern European (CEE) member states in correlation with the level of digital intensity at the company level.

27 ENG: Website having at least one of the following four functionalities: product catalogues or price lists, possibilities for visitors to customise or design the products, order tracking available online or personalised content in the website, for regular/repeated visitors (Source: https://digital-agenda-data.eu/datasets/digital-agenda_scoreboard_key_indicators/indicators#ebusiness)

28 [Artificial Intelligence in Healthcare](#).

Source: European Commission - SMEs Performance Analysis; Key indicators of the digital agenda scoreboard (European Commission - SMEs Performance Review; Digital Agenda Scoreboard key indicators)

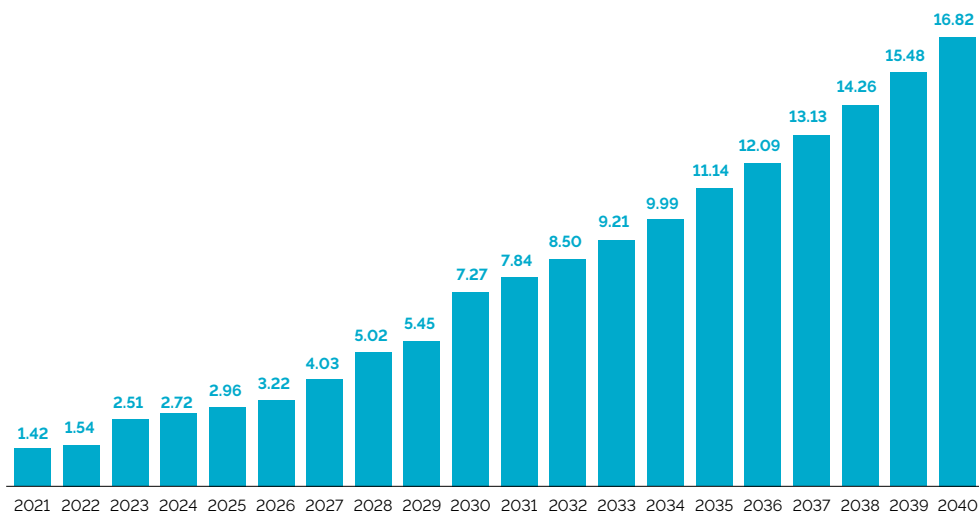
THE PRODUCTIVITY GAP AND DIGITAL INTENSITY IN CEE COUNTRIES



The proposed objective: Increasing the degree of digitalization

For the hypothesis of this facilitator, we relied on the analysis in the World Development Report (WDR) of the World Bank²⁹, which was correlated with the contribution of the ITC industry³⁰ to the growth of Romania's GDP and the evolution of this industry.

THE CONTRIBUTION OF DIGITIZATION TO GDP GROWTH (RON BILLION)



²⁹ World Bank, World Development Report 2016 – [Accelerating growth](#).

³⁰ According to data from the National Institute of Statistics (INS), the IT sector represented 5% of GDP in the period 2012-2017, and in 2019, it amounted to 5.7% [according to the final data](#). Also, from the INS release for 2019, we note that the IT industry contributed by 0.9% to GDP growth during that period.

Source: Authors' estimates

Recommendations:

- Promotion and adoption of technology in both the public and private sectors;
- Promoting measures to improve digital literacy among the population.
- Stimulating the absorption of technology/innovation, in which case the focus could be on:
 - a. the use of digital tools in the business activity of companies, including the facilitation of access to non-reimbursable external financing to finance the most important private initiatives regarding the adoption of digital tools;
 - b. the digitalization of the interaction between the business environment and central and local administrations, with direct effects in the efficiency of the tax payment process, higher degree of fiscal compliance and substantial savings regarding time resources;
- Increasing the export competitiveness of Romanian companies.
- Creating a collaborative framework for countries in the CEE region to cooperate and share the best practices they have used to accelerate digitization.
- Creation of industrial parks dedicated to "smart factories"³¹.

³¹ Concept for expressing the ultimate goal of digitization in manufacturing. The Smart Factory is a concept for expressing the end goal of digitization in manufacturing.

Institutional capacity and state-owned companies

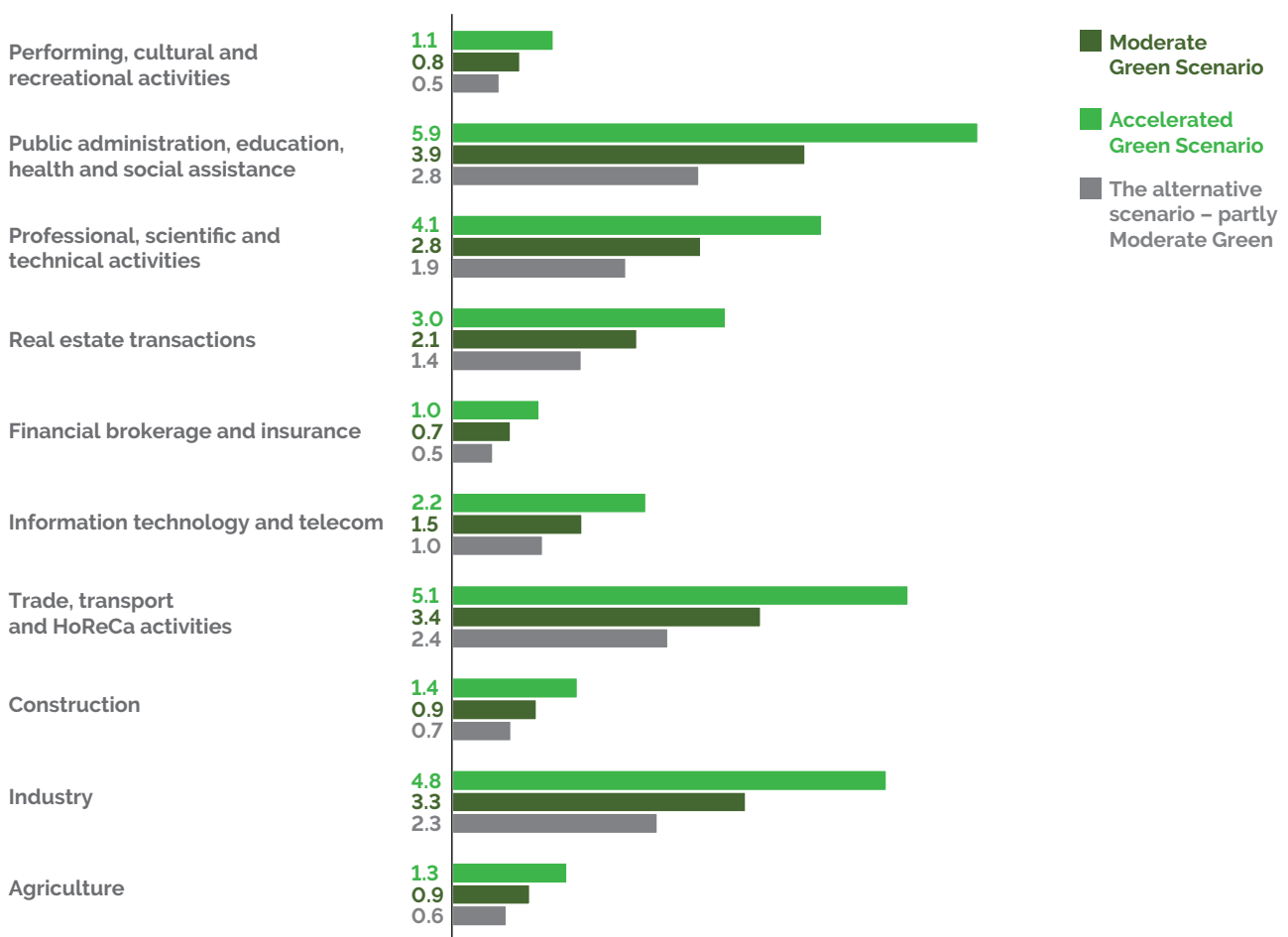
Public institutions in Romania, as in the rest of the world, must move from a process of simple management to a process of innovation and proactive interaction with the market. The green and digital transformation of Romania's economy can only occur through close cooperation with economic actors from the private sector as implementation vectors. That is why the state itself must become entrepreneurial in cultivating new initiatives and sustainable development directions through the instruments at its disposal, the legislative framework, ensuring macroeconomic balances (especially the government and current account balance), and the public investment budget³².

32 World Bank (2021) Urban Review.

The working assumptions on which data processing for the administrative sector was based – through administrative capacity and state-owned companies – would have a contribution of 12.5% in the *MG* scenario and of 17.5% in the *AG* scenario, respectively.

INSTITUTIONAL CAPACITY AND STATE-OWNED COMPANIES

Source: Authors' calculations



The average annual investments needed to increase the institutional capacity and efficiency of Romanian state companies were approximated at RON 20

billion in the *MG* scenario and RON 30 billion in the *AG* scenario. Partial fulfillment of the objectives from the perspective of this facilitator could mean a lower investment effort of approximately RON 14 billion per year on average, according to the alternative scenario.

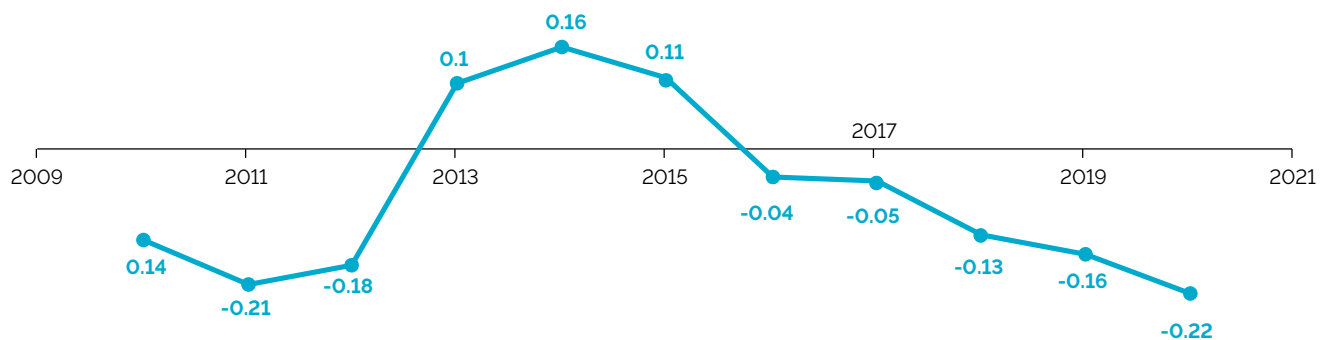
From the point of view of human resources, the public administration in Romania has often been affected by a weaker attractiveness on the labor market, but also by politicization processes. For these reasons, the result is often a lower quality of human resources in the public sector and less intensive continuous training of such human resources.

From the point of view of material resources, public institutions in Romania are not so much faced with a lack of resources as with a weak capacity to manage them. There is a reduced capacity for strategic investment programming at both central and local levels, resulting in projects being undertaken that either cannot be completed in the contracting and implementation process or cannot be sustained from the current budget once the investment has been completed. Most of the time, the public budget is considered exclusively in relation to public expenditures, and there is no vision in the current institutional mechanisms of collaboration with the private sector and of amplifying the impact of public investments through the contribution of private capital. The activity of Romanian private companies often faces challenges similar to those related to resource management or strategic planning³³.

Other components considered are the quality of the administrative process itself, but also its outcomes.

At the global level, a positive correlation was highlighted between the level of economic development measured by the domestic product per capita (GDP/capita), and the level of institutional effectiveness. In the case of Romania, it can be observed how institutional effectiveness has decreased in the public sector in recent years. Although there has been a sustained trend of economic growth in recent years, administrative deficiencies have probably decreased the multiplier effects that economic growth could have had at the level of society.

INSTITUTIONAL EFFECTIVENESS IN ROMANIA



Source: The World Bank - Institutional Effectiveness (Government effectiveness)

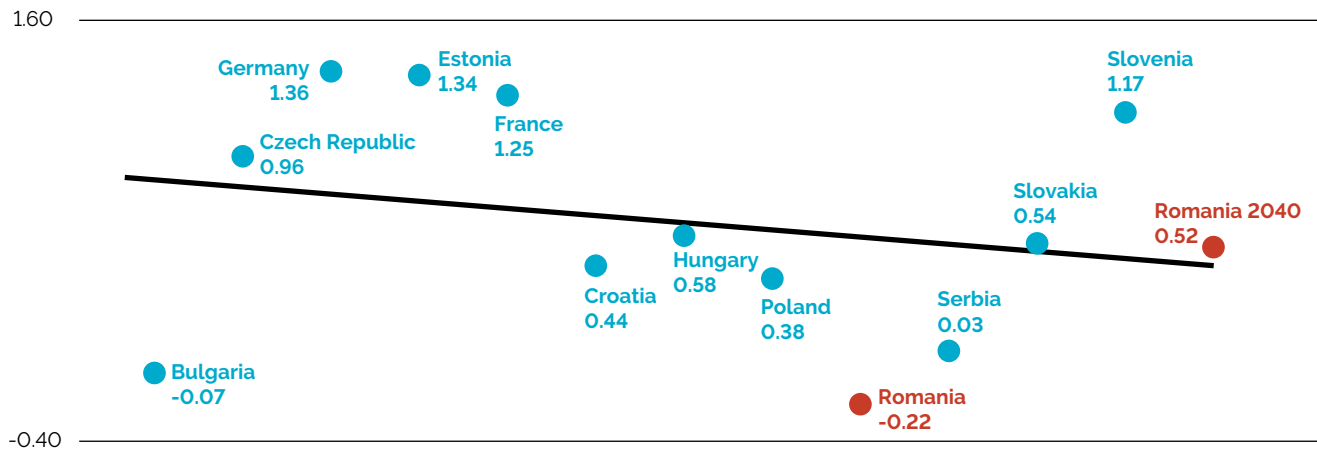
An increase in institutional effectiveness, embodied in solid reforms and concrete actions, could have an indirect impact including by increasing the confidence of investors from the private sector. Thus, the benefits to the economy can be amplified also by increasing the level of future private investments.

³³ Box 1 includes a descriptive analysis and recommendations for increasing the performance of domestic capital.

The proposed objective: Improving institutional effectiveness

INSTITUTIONAL EFFICIENCY, A POTENTIAL BENCHMARK FOR ROMANIA

Source: authors' calculations based on World Bank estimates for institutional effectiveness³⁴.



Recommendations for improving the quality of the institutional framework in Romania:

- The reduction of various types of politicization until their complete elimination, with effects in improving administrative capacity, in particular with regard to local public administration;
- Increasing the predictability of the legislative framework and improving the regulatory measures of the business environment;
- Defining the procedures for implementation and monitoring of the aspects provided by law (situation encountered in the case of state-owned companies in Romania);
- The development of an institutional framework for the coordination of public and private investments in order to amplify the effects of economic growth and development in Romania.

³⁴ The institutional effectiveness of the Member States refers to the estimates for the year 2020. Romania's objective for 2040 was calculated as an average of the results of the member states in 2020.

Human capital – labour, education and health

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The crisis generated by the COVID-19 pandemic has led to job losses at global, regional (EU) and national level. In order to reduce this impact, decision-makers may have to adopt a series of policies, which would create a safety net, in the medium and long term, beyond the support measures applied in the context of the pandemic. The objective is to maintain jobs by keeping the digital transition at the core of supporting policy development.

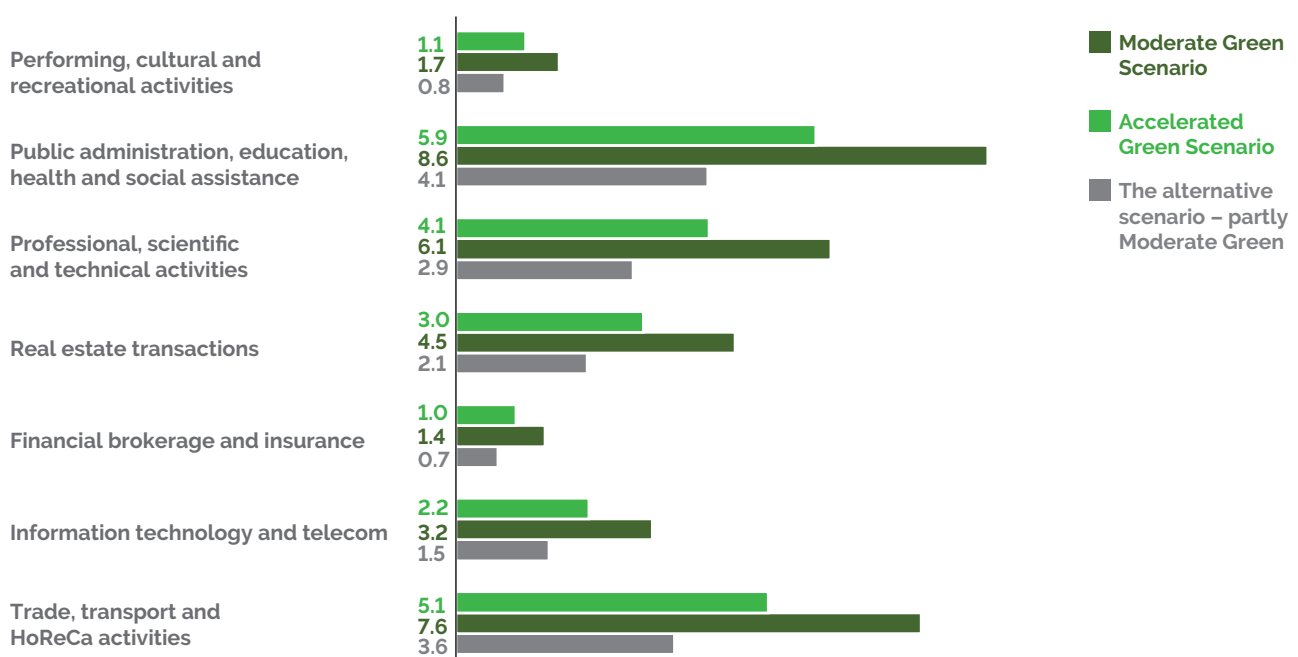
In recent decades, the public health benefits of vaccines, antibiotics and adequate nutrition have saved millions of lives and have proven to be a powerful catalyst for economic growth. Better health promotes economic growth by expanding employment and boosting productivity, while providing immense social benefits.³⁵

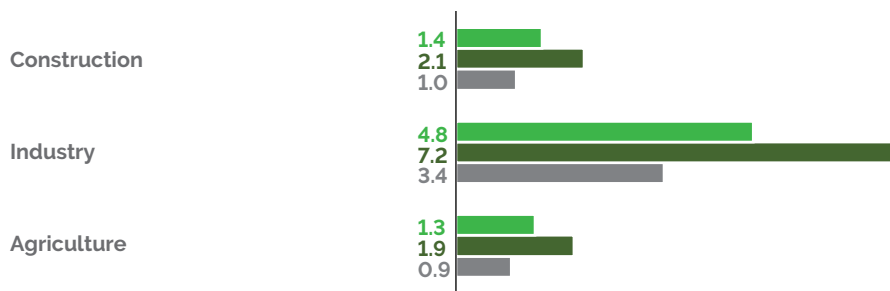
³⁵ [Prioritizing health: A prescription for prosperity - Workbook](#)

The working assumptions on which data processing for the labour force and human capital was based – would have a contribution of 27.5% in the *MG* scenario and of 17.5% in the *AG* scenario, respectively. In this case, the *Accelerated Green* scenario assumes that a good portion of the contribution for labour force from the *Moderate Green* scenario is redirected mainly to the pillars of institutional capacity and the energy mix and energy infrastructure, taking into account the EU's ambitious plans to reduce greenhouse gas emissions, as well as the possibility of progress for increasing productivity, generated by the absorption of new technologies and digitization.

HUMAN CAPITAL - LABOUR, EDUCATION AND HEALTH (RON BILLION)

Source: Authors' calculations





The average annual investments needed to increase the labour force and human capital in Romania were approximated at RON 44 billion in the *MG* scenario and at RON 30 billion in the *AG* scenario. Partial fulfillment of the objectives from the perspective of this facilitator could mean a lower investment effort of approximately RON 21 billion per year on average, according to the alternative scenario.

36 [ASE \(2021\) The burden of cancer and its economic repercussions in Romania.](#)
World Health Organization
(WHO – Global Cancer
Observatory database)

The structural changes needed to adapt the economy to the energy transition, accelerate digitization and post-pandemic recovery have a major impact on the labor market. A number of jobs will disappear while others will be replaced by new market demands and needs as technology increases its presence in the activity of societies and economies. Continuous learning for improvement and retraining is very important for adapting to the new labor market. The COVID-19 pandemic has accelerated two trends that herald both challenges and opportunities for the labor market:

1. working in a hybrid system - employees will work both from the office and from home, in particular those who perform office work (*office activities*). This will generate reduced demand for activities such as: local transport, cleaning services and restaurants/cafes (in particular for business meetings that will move online), but will lead to increased demand for e-commerce and home deliveries. This trend, specific to urban centers, will decrease the number of jobs in the first category of services and generate new jobs in distribution centers and delivery activities.
2. the use of technologies and artificial intelligence – companies have accelerated digitalization and the introduction of artificial intelligence to adapt to the restrictions imposed during the pandemic (e.g. self-service cash registers, robotization of distribution centers and in the manufacturing industry, etc.) and will continue this trend.

Romania is going through a series of challenges regarding the labour force. On the one hand, there is a pronounced and disruptive trend towards external migration from the economic and social point of view. On the other hand, the living and working conditions in Romania make the labour force in the country generate added value below its potential in the economy – for example, 1 out of 2 cancer patients in Romania are of working age, but late diagnosis or deficiencies in the treatment process are the reason why EUR 3.4 billion in added value is lost annually due to this type of disease alone³⁶. Moreover, EUR 3.4 billion is the annual (direct and indirect) cost of mental health in Romania, while the cost of mental health in Romania's annual GDP is 2.12%, compared to 4% in the European Union³⁷. Studies also show that, at the country level, the lower the coverage of

health services, the greater the potential economic loss through illness and disability.

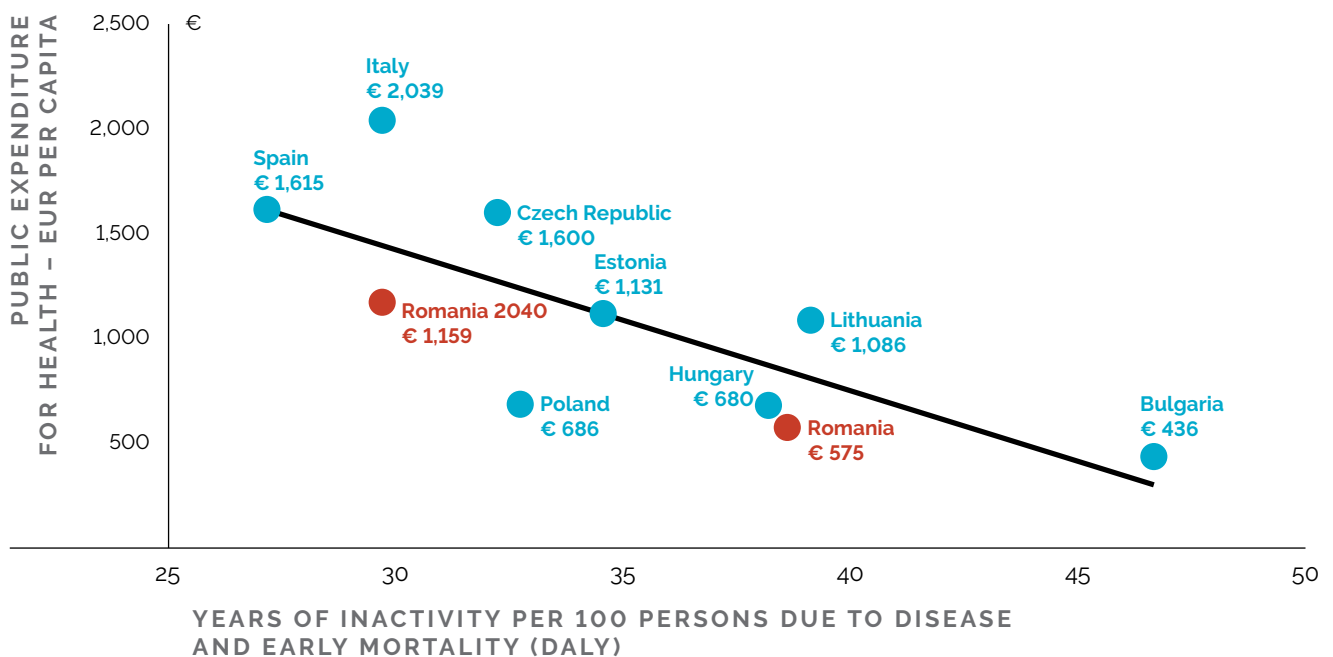
Investments in healthcare are critical to improving human well-being. They are also a key mechanism for increasing national income and prosperity. The positive economic effects of investing in healthcare are evident at both individual and macroeconomic levels³⁸. Healthcare is an investment, not an expense, as there is a large number of evidence that reveals that good health leads to higher incomes³⁹. Health increases labor productivity and improves the return on investment in education. Improved access to healthcare and medicines leads to longer life expectancy⁴⁰.

With an average life expectancy of 74.2 years, Romania has the second lowest life expectancy in the European Union, after Bulgaria, while the European Union average stands at 80.6 years. A rethinking of the healthcare system could bring significant benefits: in 2040 a 65-year-old could be as healthy as a 55-year-old today, infant mortality could drop by 65% and 230 million deaths could be prevented by 2040⁴¹. According to a study⁴² carried out by the research company McKinsey & Company, investments in the healthcare field to increase the health of the population could add USD 26 billion to Romania's GDP by 2040.

The proposed objective:

Reducing the number of years of inactivity of the population caused by diseases and the adaptation and reconversion of the workforce to the new professions generated by the digital transition

THE RELATIONSHIP BETWEEN PUBLIC HEALTH EXPENDITURE AND YEARS OF INACTIVITY (2019)



37 OECD, European Union. 2018. Health at a Glance: Europe 2018: State of Health in the EU Cycle. Paris: OECD Publishing

38 Bloom D and Canning D (2008). Population health and economic growth. Background paper for the Commission on Growth and Development. Washington, DC, USA: World Bank

39 Economic growth and healthy populations in developing countries: A summary of recent literature, EIU 2016

40 Bloom D and Canning D (2008). Population health and economic growth. Background paper for the Commission on Growth and Development. Washington, DC, USA: World Bank.

41 [Prioritizing health: A prescription for prosperity.](#) McKinsey & Company

[Prioritizing health: A prescription for prosperity - Workbook](#)

Source: Authors' calculations based on Eurostat and WTO data

- Correlation of health policies with those of economic development, in order to reduce the burden of disease on people of active age and thus amplify their productive capacity;
- The gradual increase of the budget allocated to health and the reduction of the gap between Romania and the EU average in terms of the percentage of GDP allocated to health, by allocating appropriate resources from the state budget, attracting European funds and implementing public-private partnerships;
- The adoption and implementation of a national cancer control plan dedicated to improving the prevention, detection, treatment and management of cancer, following the European model together with investments in health infrastructure dedicated to patient access to therapies, including cell therapies;
- Updating mental health legislation to ensure rapid and sustainable access to innovative services and treatments for patients with mental health conditions, in particular those with treatment-resistant major depression;
- Identification of new sources of health financing and maximizing the financing opportunities offered by European funds, including those provided by the National Recovery and Resilience Plan;
- Increasing the degree of adaptability of employees to new jobs, by investing in their reconversion where the decline of activity sectors is clear;
- Implementation of job retention policies, such as technical unemployment and state subsidization of reduced working time (*kurzarbeit*)⁴³ and the gradual decrease of these policies as the economy recovers;
- Stimulating lifelong learning programs and those dedicated to increasing the capacity of individuals to participate actively in the new economy (see for example the periodic reports and reviews by the World Economic Forum⁴⁴);
- Development of a medium/long-term strategy regarding the adaptation of the educational system to the new economic growth model based on the digital and energy transition, including through learning programs for teaching staff. Updating this strategy at regular intervals;
- Regular review of occupations, in order to update public policies in the area of labour.

43 According to the IMF, these short-term policies are more effective in reducing unemployment and implicitly maintaining employment (e.g. the pandemic situation), while employee relocation policies such as employment incentives, job search assistance and programs of retraining, stimulate finding a job and professional changes. Historically, less skilled workers have benefited more from job retention policies.

44 The World Economic Forum: [These are the skills you will need for the future of work](#)

Energy mix and energy infrastructure

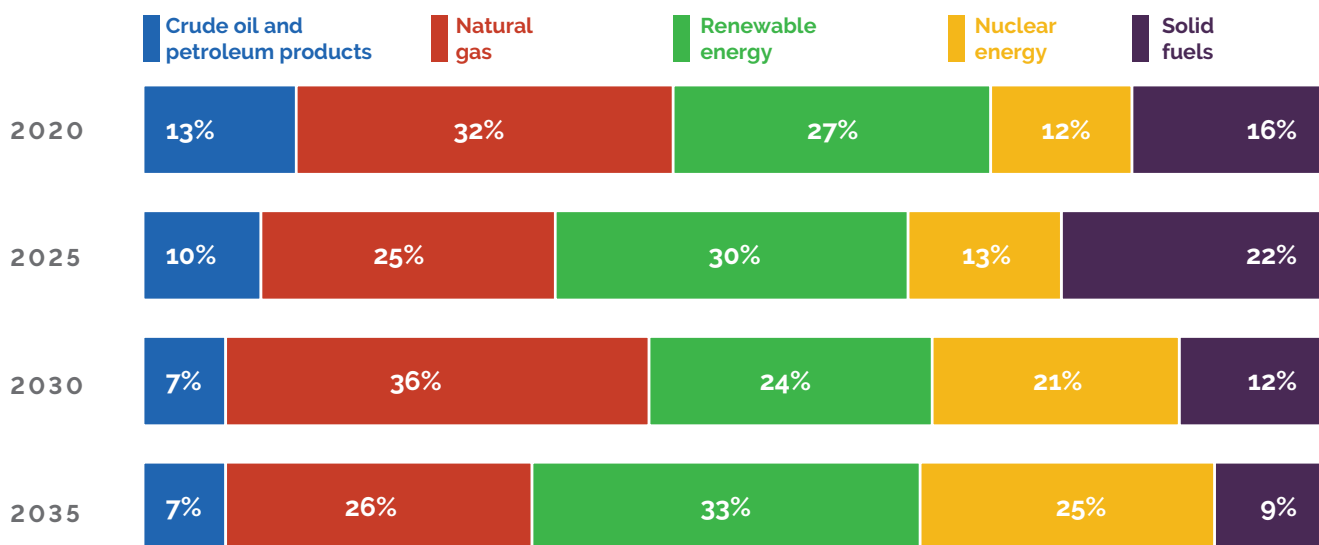
VA URMA
ROMANIA, THE
PATH TO A GREEN
AND DIGITAL
ECONOMY

Romania should change its energy mix, with a higher share of renewable energy sources, gradually reducing the intake of coal. Currently, the contribution of coal to Romania's energy generation mix is significant, being estimated at 16% of the total energy generation at the end of 2020⁴⁵.

⁴⁵ According to data from the ENCP.

EXPECTED EVOLUTION OF PRIMARY ENERGY GENERATION, BASED ON ENERGY SOURCES, IN THE CONTEXT OF CURRENT POLICIES AND MEASURES

Source: ENCP



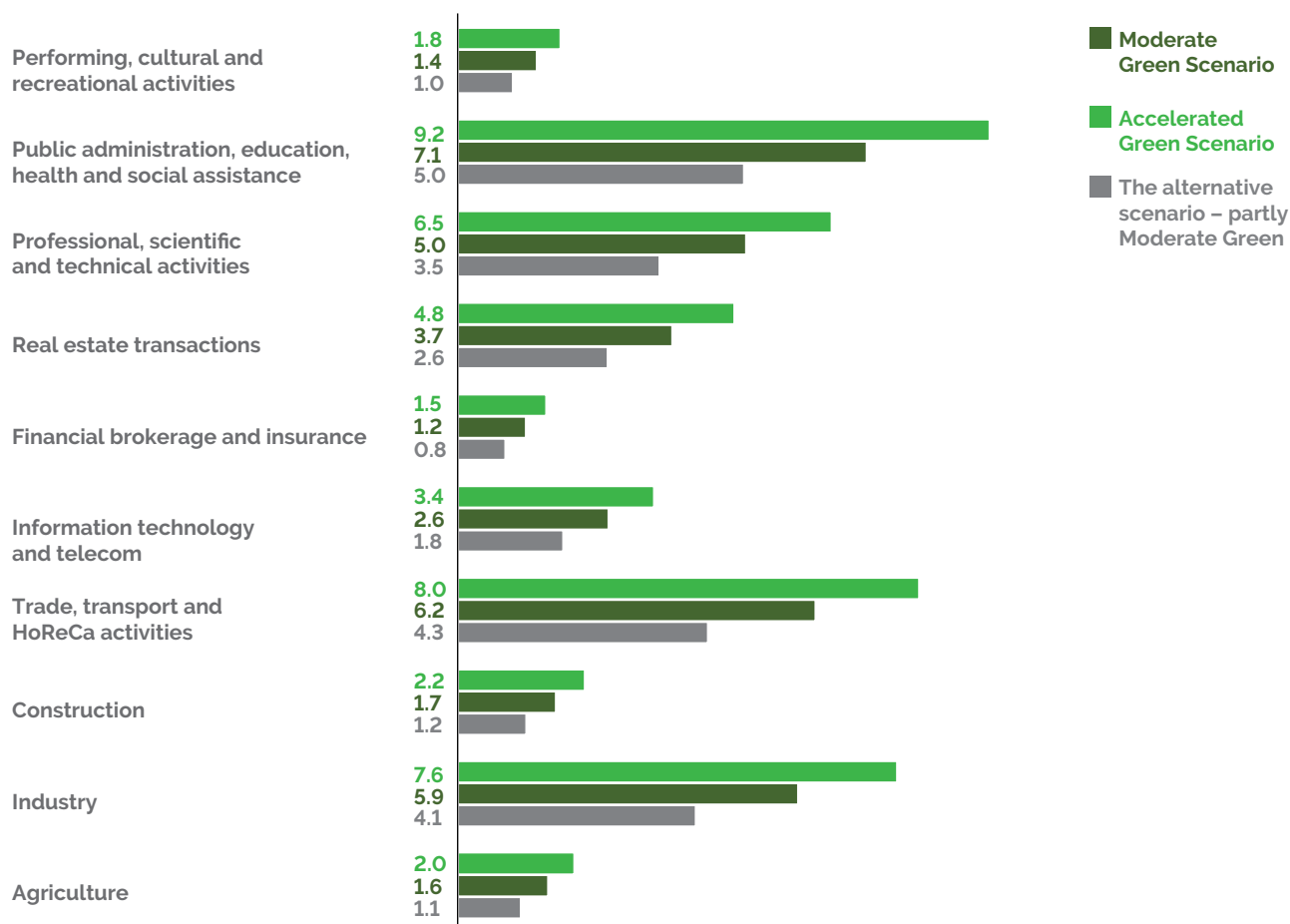
As part of a broad response, the objective of the recovery and resilience facility is to mitigate the economic and social impact of the coronavirus pandemic and make European economies and societies more sustainable, resilient and better prepared for the challenges and opportunities of the energy transition, in particular for increasing energy efficiency, improving the generation mix and transport infrastructure.

The energy transition requires a long-term structural change in our approach to energy systems, creating a more integrated and smarter energy system that is better able to manage and balance dynamic supply and demand patterns at EU, national and local level.

The working assumptions on which data processing for energy and infrastructure was based would have a contribution of 22.5% in the *Moderate Green* scenario and of 27.5% in the *Accelerated Green* scenario, respectively.

ENERGY MIX AND ENERGY INFRASTRUCTURE

Source: Authors' calculations



The average annual investments needed to accelerate the energy transition in Romania were approximated at RON 36 billion in the VM scenario and at RON 47 billion in the AG scenario. Partial fulfillment of the objectives from the perspective of the energy transition could mean a lower investment effort of approximately RON 25 billion per year on average, according to the alternative scenario. Poland, the Czech Republic, Romania and Bulgaria are the EU economies most dependent on coal⁴⁶, being, at the same time, those that still do not have a concrete plan for the gradual withdrawal of this resource from the energy mix.

For Romania, the second gas producer in the EU⁴⁷, with a horizontally developed hydrocarbon industry for 100 years, the energy transition is currently a major challenge, in particular since no firm decision has been made at the European Union level regarding the taking into account of natural gas as a transitional fuel. At the same time, the estimated investment requirement represents a very large amount compared to Romania's economy, which involves the contribution of the public and private sectors (energy companies, but also financial institutions), both from own funds and non-reimbursable sources (e.g. European funds).

The energy transition involves reducing the demand for labor among greenhouse gas emissions-intensive activities, in particular in the generation of energy based on fossil fuels (e.g. coal) and increasing the number of green jobs. The biggest challenge is for regions dependent on activities that use fossil fuels (e.g. Jiului

[Decarbonization of Eastern Europe's Energy Mix Key to Higher EU Climate Goals](#) (Bloomberg NEF).

47 According to Eurostat data: [Natural Gas supply, Primary production of natural gas, by producing country, 2019-2020](#).

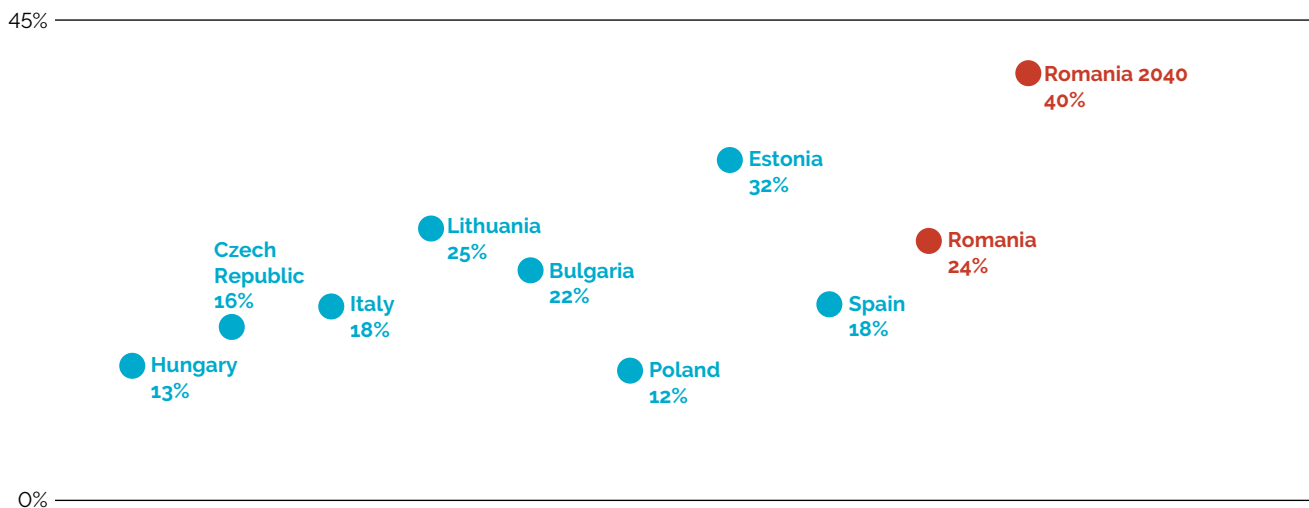
Valley). At the EU level, specific transition funds will be allocated, such as the Just Transition Fund, and Romania will be able to benefit therefrom.

48 [According to Eurostat data: - SHARES detailed results](#)

The proposed objective: Increasing the level of ambition for renewable energy

CONTRIBUTION OF RENEWABLE ENERGY IN TOTAL ENERGY CONSUMPTION - 2019 (%)

Source: the authors' processing based on Eurostat data - Energy from renewable sources⁴⁸



Recommendations:

- Increasing the level of ambition regarding energy efficiency and renewable energy for 2030, by revising, including in terms of public policies, the National Energy and Climate (ENCP) Plan as well as the need to harmonize the various strategic documents (for example NRRP, etc.);
- Accelerating the decision-making process regarding the use of available European funds (Modernization Fund, Just Transition Fund) for the modernization of the energy sector;
- Developing a credible plan to accelerate the use of renewable sources in the difficult decarbonization sectors, especially in the heating and cooling sector;
- Accelerating the professional reconversion process at national and regional level so that the energy transition balances the potential reduction in labor demand among greenhouse gas emissions-intensive activities, in particular in the generation of energy based on fossil fuels (e.g. coal) by educating and training workers about job opportunities in renewable energy;
- Establish a strategy that includes detailed plans for educating and engaging all parties in the energy transition.

Annex I.

Calculation methodology

Sector dynamics and estimation of growth for the Romanian economy for the period 2021-2040

The economic growth model starts from the baseline scenario, which assumes the use of an average annual growth rate of GVA, both the aggregated value and the value for each industry, reported to the period 2007-2020, covering a period of 14 years. However, the economic growth catalysts from the historical context will experience important changes in the coming years, which is why more ambitious growth rates are used in the model, which come out of the logic of historical evolution and anticipate a more pronounced dynamics of some sectors or the need to restrict others in the structure of Romania's economy.

In this regard, to determine the forecast of the evolution of GVA for 2021-2026, a growth rate determined for each industry was used, and the total GVA was determined as an aggregate (of all economic activities - NACE).

For the period 2027 to 2040, growth rates have been adjusted, with a focus on industries expected to benefit more from the energy transition and digital transformation, also taking into account the multipliers used in the model (values in the range of 1.3 – 2.2, on average 1.65) as follows:

Agriculture

The green transition in the agricultural sector refers to more extensive use of organic fertilizers, agricultural research and development, pest control and food processing. In such a case, value added in agriculture is expected to increase at a faster, progressive rate over time (e.g. from 2040 onwards).

This outcome could be mainly due to higher yield per hectare due to improved soil quality (thanks to the extensive use of organic fertilizers), research and development efforts and effective pest control. The annual growth rates used for forecasting in the agricultural sector were:

- 2021 – 2026: historical rate (4%);
- 2027 – 2034: historical rate halved as a result of convergence (2%);
- 2035 – 2040: more ambitious growth rate (5%).

Industry:

The energy sector will implement the expansion of renewable energy and is expected to create more jobs with a large impact on indirect employment. The most efficient and sustainable path to a low-CO₂ industry could be achieved through the use of even more technologies.

Industrial Internet of Things (IoT) systems are primarily configured to collect, store, and structure various types of data in a way that can be easily managed and analyzed. These systems are mainly installed to improve operational efficiency, energy efficiency, resource efficiency and productivity, to develop new and higher value-added services or to reduce business failures and discontinuities and facilitate decision-making.

Industrial IoT systems are therefore at the heart of the digital transformation of European industry. Technology is expected to increase its value added over time. The annual growth rates used for the forecast were:

- 2021 – 2027: historical rate (5%);
- 2028 – 2040: more ambitious growth rate (9%).

Constructions:

After a positive contribution to GDP during the pandemic in 2020, the outlook remains positive especially against the background of the need for energy efficiency measures in buildings. The National Strategy and Forecast Commission estimates increases between 6% and 9% over the next four years (until 2025). The annual growth rates used for the forecast were:

- 2021 – 2027: historical rate (3.9%);
- 2028 – 2040: more ambitious growth rate (8.3%).

Wholesale and retail trade, transport, accommodation and food service activities:

The transition to electric, connected and autonomous vehicles (Clean Connected Autonomous Vehicles) is driven by sustainability goals adopted at the EU and international level, technological progress and anticipation of future consumer demand. This requires major investment in research and development for all vehicle components, for charging and connection infrastructures, for the road system, for vehicle and infrastructure maintenance, for end-of-life vehicles and components, but also for mobility services. The annual growth rates used for the forecast were:

- 2021 – 2027: historical rate (6%);
- 2028 – 2040: more ambitious growth rate (9%).

Information and Telecommunications:

The effective use of industrial IoT data, generated inside or outside a company, requires extracting potential value by determining unexpected correlations. Big Data and artificial intelligence techniques, including *deep learning*, can improve value extraction.

Developing these methods and tools and making them available on demand would significantly reduce costs, mitigate risks, enhance industrial resilience and increase productivity. At the same time, it would affect suppliers and end-

users in the ITC sector, SMEs and large companies, with positive effects on the competitiveness of industries.

A resilient, low-latency and secure local network infrastructure built on 5G and its evolution to 6G is critical for the digital transformation of European industry towards smart factories (the same applies to smart agriculture, smart energy and smart mobility). The annual growth rates used for the forecast remained high and were:

- 2021 – 2030: historical rate (9.8%);
- 2031 – 2040: adjusted rate (9.4%).

Financial and insurance activities:

Banks have adopted or decided to adopt green financing practices from 3 perspectives: reputation and brand, industry trends, corporate social responsibility (CSR). When other financial alternatives are reduced in the market, banks can make funds available for green investments.

The annual growth rates used for the forecast were:

- 2021 – 2029: historical rate (8.6%);
- 2030 – 2034: historical rate halved as a result of convergence (4.3%);
- 2035 – 2040: more ambitious growth rate (11%).

Public administration, health and education, social assistance activities:

A combination of healthcare and digital technologies, digital media, mobile devices and biomedical engineering has the potential to bring significant economic impact, given the aging population and the need for improved health services. Health data and data analytics have become key in the healthcare flow, radically improving the way healthcare is delivered.

The development of smart health industries is highly dependent on the availability and quality of the underlying data infrastructure, big data analytics and ITC solutions to generate the necessary knowledge and support innovative healthcare solutions.

It is important to know the particularities of the healthcare sector and of its various *stakeholders*. A wide variety of healthcare providers offer their services within national health systems. Typically, the industry will offer smart health products and solutions to healthcare providers who rely on healthcare payers and/or healthcare authorities and healthcare regulators for their purchasing decision. Therefore, the successful development of the smart health value chain depends on the interaction of all these stakeholders at national and European level.

- 2021 – 2027: historical rate (10.9%);
- 2028 - 2040: more ambitious growth rate (8.3%).

Arts, entertainment and recreation; other service activities; domestic and extraterritorial activities:

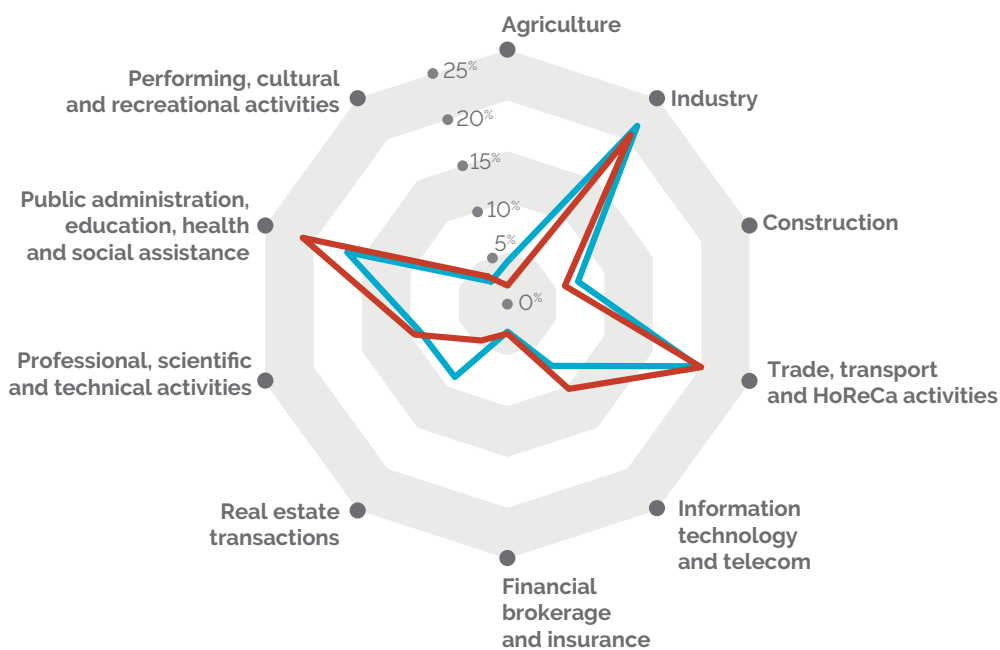
The use of technology and artificial intelligence (AI) accelerates the digitalization process. The introduction of AI will make a contribution despite the restrictions imposed in the pandemic (e.g. self-service cash registers, robotization of distribution centers and in the manufacturing industry, etc.). This trend is expected to continue, and the digitalization process, together with the hybrid work model, could lead to an increase in the demand for recreational activities:

- 2021 – 2027: historical rate (7.1%);
- 2028 – 2040: more ambitious growth rate (10%).

After applying the adjustments mentioned above, the **Va Urma** economic growth model estimates that in the period 2020-2040 the total GVA of the Romanian economy could increase its volume 4.5 times, from RON 962 billion to RON 4,367 billion, with an average growth rate of approximately 8% per year.

HYPOTHETICAL PROJECTIONS OF DEVELOPMENTS PER SECTOR, WEIGHTS IN TOTAL GVA

Source: Authors' calculations



■ Weight 2040
■ Weight 2040

Investment effort estimates

According to the [European Environment Agency](#)⁴⁹, every two years, each EU Member State reports projections for the level of greenhouse gas emissions in several scenarios (without measures/with existing measures/with additional measures for environmental protection)⁵⁰. National projections take into account any policies and measures adopted at Union level. For Romania, the GHG projections used in the model are those published by the European Environment Agency in October 2021, being the latest data available at the time of the project update.

The model links the GVA curve to the greenhouse gas emissions projections, in the context of the scenarios used, and then determines the investment requirement in the context of the scenarios with additional measures *for environmental protection (Accelerated Green)*, existing measures for environmental protection (*Moderate Green*) and the alternative scenario.

[Member States' greenhouse gas \(GHG\) emission projections – European Environment Agency \(europa.eu\)](#)

50 [Regulation \(EU\) 2018/1999 of the European Parliament and of the Council of 11 December 2018](#)

51 The investment requirements (annual averages) were estimated with the help of the GVA gap and the application of multipliers at sector level (1.65 on average).

| Scenarios used in the model | The investment requirement (annual averages) ⁵¹ | GVA gap (average values for the period 2021-2033) ⁵² |
|--|--|---|
| Accelerated Green ⁵³ | RON 170.8 billion | RON 284.3 billion |
| Moderate Green ⁵⁴ | RON 161.3 billion | RON 268.5 billion |
| The alternative scenario ⁵⁵ | RON 112.9 billion | RON 187.9 billion |

The investment effort will bring additional gains from possible training and learning effects on economic operators, which may result in the optimization of their activity. According to specialized studies, there is a possibility that the training (positive) effects materialize only depending on the capacity to absorb the technologies⁵⁶.

In the **Va Urma** economic growth model, it is estimated that the level of investment will be the highest in the next 5 years, followed by a gradual decrease, but which will be maintained over time at a relevant percentage of GDP, even after the closing of the GVA gap.

Starting with the year 2033, the model also captures a pronouncement of the driving effects in the Romanian economy and in the ambitious scenario, in which the structure of the economy transforms according to expectations, the potential GDP curve will exceed the current evolution forecast based on the historical growth rate.

The four components that are taken into consideration Digitalization, robotics, technology, innovation; Institutional capacity and state-owned companies; Human capital – workforce, education and health; Energy mix and energy infrastructure were each associated with a weight depending on the importance of each component in generating the new growth model.

52 The GVA gap was calculated as the difference between the GVA in the baseline scenario and the GVA obtained in the AG and MG scenarios. Later, the GVA gap was divided among the 10 economic sectors, and adjusted with a sectoral social discount rate - set at an average of 6%, but with higher values for sectors with higher associated risks.

53 The scenario in which environmental protection measures additional to those existing in 2019 are implemented.

54 The scenario in which the existing measures for the environment are those implemented at the level of 2019 (reference year for this scenario).

55 The alternative scenario assumes an intermediate variant for the Moderate Green scenario: an alternative that implies an incomplete implementation of the environmental measures and automatically a partial achievement of the climate objectives.

56 (Jude, 2012; Damijan et al., 2013).

| Sectors | Sector multiplier |
|--|-------------------|
| Agriculture | 1.4 |
| Industry | 1.8 |
| Construction | 2.2 |
| Trade, transport, HoReCa | 1.55 |
| ITC | 2.1 |
| Financial | 1.55 |
| Real estate | 1.4 |
| Professional services | 1.45 |
| Public sector including health and education | 1.8 |
| Arts, entertainment and more | 1.3 |

Source: authors' calculations based on IMF (2021)

The multiplier of European investment expenses from structural and public funds used in the economic growth model estimates values between 1 and 1.9 when deconstructing the effect for each sector that contributes to GDP:

Thus, in our analysis, an average multiplier value of 1.65 was chosen, meaning that RON 1 injected into the economy as an investment generates RON 1.65 in one year.

Components of the model that facilitate GVA growth

In the *Accelerated Green* scenario, with the more ambitious environmental targets established by the GHG development forecast, taking into account the previously mentioned multiplier effects, for the four facilitating factors considered for the generation of the growth model we identified an average annual investment requirement of RON 170.8 billion, as follows:

ACCELERATED GREEN

Source: Authors' calculations



In the *Moderate Green* scenario, with the slightly less ambitious environmental targets, taking into account the previously mentioned multiplier effects, for the four components considered for the generation of the growth model we identified an average annual investment requirement of RON 161.3 billion as follows:

MODERATE GREEN

Source: Authors' calculations



The model also estimates an investment requirement in the case of another scenario, as an alternative to *Moderate Green*, where the environmental targets/reduction of greenhouse gas emissions will only be partially achieved (up to 70%). Thus, for the four components considered for the generation of the growth model, we identified an average annual investment requirement of RON 112.9 billion as follows:

PARTIAL FULFILLMENT OF CLIMATE OBJECTIVES

Source: Authors' calculations



The section named *Others* includes a number of other components such as port and road infrastructure, financial brokerage, etc. representing in fact an aggregate of components that will also contribute to the growth of the economy in the context of digital transformation and green transition.

This division of the contribution to the recovery of the potential loss of GDP, as a result of the implementation of measures regarding the protection of the environment and, essentially, for the change of the current economic-social-industrial model, was carried out in accordance with the recommendations of the European Commission regarding the NRRP, but also with the major global trends regarding the implications of the Fourth Industrial Revolution (Industry 4.0.), as well as changes in the economic model generated by the COVID-19 pandemic, which accelerated some processes/phenomena and also changed the outlook on the labor market and on global/regional value chains (by considering their shortening in the context of reducing isolation and mobility restrictions).

It is important to emphasize that the initial level of economic development has an impact on the effect of EU investments/transfers, as shown by the specialized literature on this topic. Becker, Egger and Von Ehrlich (2013) show that positive effects on economic growth occur only in regions where there is sufficient human capital and sufficient quality of institutions. The same conclusion appears in the study by Breidenbach, Mitze and Schmidt (2016), adding that potential negative effects may arise as a result of structural and technological lags that cannot absorb investment flows.



VAURMA

Romania, the path to a green and digital economy

OUTLOOK FOR 2040

