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SELECTED ISSUES PAPER

Making Romania Fit and Resilient for the Net-Zero Transition

Augustus J. Panton

SIP/2023/063

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IMF Selected Issues Paper
Romania

Making Romania Fit and Resilient for the Net-Zero Transition

Prepared by Augustus Panton

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December 2023

ABSTRACT: Romania is on track to become '*fit for 55'*—reducing its absolute emissions by 55 percent (relative to 1990) by 2030, consistent with the European Green Deal. However, becoming carbon-neutral by 2050 in an economically resilient and competitive manner would require an accelerated decarbonization path, especially in the transport and building sectors—two emission-intensive sectors that are projected to raise Romania's carbon footprint over time. The analysis presented in this paper shows that complementing the existing decarbonization measures with further national carbon pricing instruments in these sectors could put Romania on track to carbon neutrality. Crucially, these complementary measures would incentivize green private investment and boost energy security, while enhancing the Romania's resilience and unlocking its potential in the global green value chains.

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SELECTED ISSUES PAPERS

Making Romania Fit and Resilient for the Net-Zero Transition

Romania

Prepared by Augustus Panton[1]

[1] The author would like to thank Karlygash Zhunussova, Jan Kees Martijn and the IMF Romania team, the Romanian authorities (the Ministry of Energy; Ministry of Environment, Water, and Forests; Ministry of Transport), the World Bank Romania team, and seminar participants at the National Bank of Romania for helpful discussions and comments.

INTERNATIONAL MONETARY FUND

ROMANIA

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November 16, 2023

Approved By
European Department

Prepared By Augustus J. Panton

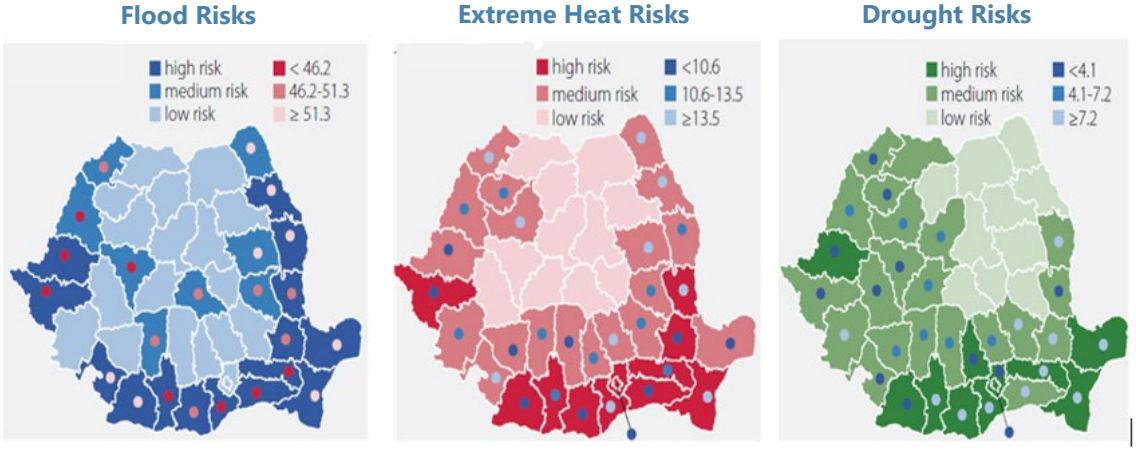
CONTENTS

MAKING ROMANIA FIT AND RESILIENT FOR THE NET-ZERO TRANSITION[1]

A. Introduction

1. Climate change is macro-critical for Romania. As a member of the European Union (EU), Romania is committed to the union's ambitious new Green Deal which requires all member states to cut their absolute greenhouse gas (GHG) emissions by 55 percent (relative to 1990) by 2030 and achieve carbon neutrality by 2050. Achieving such decarbonization targets in a timely and orderly manner could unlock Romania's enormous green potential, including in the green hydrogen and wind energy value chains. However, the transition to a low-carbon economy entails significant costs and challenges for Romania. For example, decarbonizing crucial sectors like transport, electricity, and buildings requires enormous investments—amounting to at least 3.2 percent of cumulative GDP by 2050 (World Bank, 2023). Furthermore, a sizable portion of Romania's non-financial corporate sector—accounting for over 40 percent of gross value added and 48 percent of total assets—remains highly exposed to the phasing out of activity in the country's large fossil fuel sector (National Bank of Romania, 2022). There is also the added challenge of addressing costly climate adaptation risks—notably floods, heatwaves, and droughts to which Romania is highly vulnerable[2] (Figure 1). With relatively modest public support for climate mitigation[3], these challenges complicate Romania's transition to carbon neutrality in a socially inclusive manner.

Figure 1. Share of Firm-Level Gross-Value Added (GVA) Exposed to Climate Risks in Romania



Sources: National Bank of Romania, Think Hazard; European Commission, and Romanian Ministry of Finance.

[1] Prepared by Augustus Panton.

[2] In 2021, Romanian firms in flood-vulnerable sectors contributed 15 percent of gross value added (GVA) and held 13.7 percent of total assets, while firms impacted by extreme heat risk contributed 9 percent of total GVA and held 9.2 percent of total assets (National Bank of Romania, 2022).

[3] According to the 2023 EU Climate Action *Citizens Survey on Climate Attitudes,* a minority (just over 40 percent) of Romanians indicate willingness to pay for climate action. Research on climate change perception in Romania (see Cheval and others, 2022) shows that awareness and public support for climate mitigation differs across regions, with areas highly vulnerable to climate disasters more in support of stringent policy effort.

2. Romania's structural challenges may amplify the effects of climate change. Existing structural challenges, when interacted with Romania's high climate risk exposure, may amplify the costs of climate change and the stringency of attendant policies for achieving carbon neutrality. Of particular concern is the country's fast aging infrastructure stock, which on the one hand diverts resources toward costly reconstruction amid climate extremes (e.g., flooding) while on the other hand it drives inefficient energy demand and consumption. This is particularly concerning given that Romania has one of the highest energy poverty rates[4] in the EU (EU, 2023).

3. Climate mitigation efforts are well underway in Romania, with room for further policy action. Romania's absolute and per capita emissions are low and continue to fall, partly due to the structural transformation that began with the transition to a market-based economy in the post-communist era. In recent years, Romania has complemented the EU Emissions Trading System (EU ETS) with a suite of national measures, as outlined in the *Integrated National Energy and Climate Plan* (INECP)[5] and the *Long-Term Strategy* (LTS), in promoting the national decarbonization agenda. But the Romanian economy remains highly emission- and energy-intensive amid the country's strong dependence on fossil fuels. Notably, the high fossil-fuel intensity (especially in the transport sector) and low energy efficiency (particularly in the building sector) require urgent policy action.

4. This analysis proposes complementary policies for strengthening Romania's transition to carbon neutrality while ensuring energy security and enhancing green resilience and competitiveness. According to the EU Environmental Agency's (EEA) projection[6], Romania appears to be on track to cut its absolute emissions by 55 percent (relative to 1990) by 2030, consistent with the EU's ambitious Fit-for-55 climate mitigation package. However, achieving carbon-neutrality by 2050 in an economically resilient and competitive fashion would require an accelerated decarbonization path (World Bank, 2023). In such context, this paper aims at identifying policy options—notably tax-based measures—that would strengthen Romania's resilience and competitiveness in a growth-friendly (Schoder 2023) and fiscally sustainable manner (IMF, 2023) in the transition to a low-carbon economy.

5. The remainder of the paper is organized as follows. The next section reviews the recent trends and drivers of GHG emissions in Romania. Section C summarizes the key policy instruments underpinning the decarbonization process in Romania, while section D examines the decarbonization challenges facing Romania. Section E outlines and quantifies the effects of the proposed complementary policy options. Finally, section F sums up the paper and provides policy recommendations.

[4] According to the EU, over 15 percent of households in Romania could not afford to keep their home adequately warm in 2022

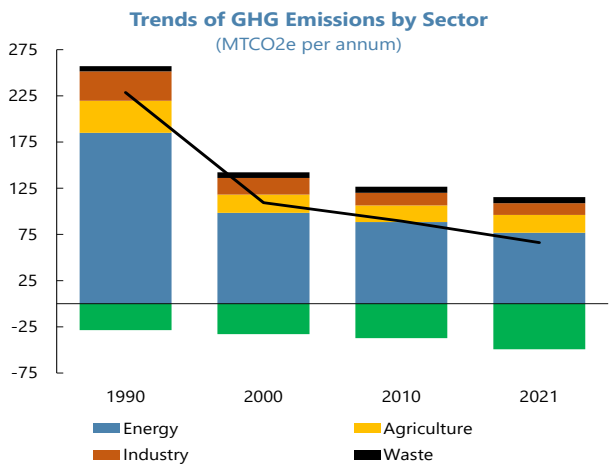
[5] On the climate adaptation front, Romania has strengthened its institutional frameworks for disaster response over the past decade, with the National Adaptation Strategy aimed at promoting climate resilience and ensuring a just transition. Yet, the climate adaption effort remains inadequate, notably in sectors like agriculture where a large share of activity and workers are exposed (World Bank, 2022).

[6] EEA greenhouse gas projections - data viewer: https://www.eea.europa.eu/data-and-maps/data/data-viewers/eea-greenhouse-gas-projections-data-viewer/

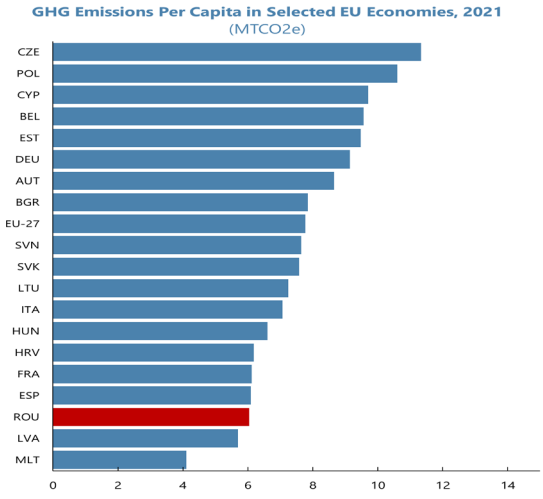
B. Greenhouse Gas Emissions and Energy Mix in Romania

6. Romania's absolute and per capita emissions are comparatively low and continue to decline. Romania's contribution to EU-wide and global emissions remains marginal, with a decarbonization trend that sees absolute GHG emissions persistently declining since 1990 (Figure 2). The country's per capita carbon footprint also continues to fall since 1990—to 6.0 metric tons of CO_2 equivalent in 2021—below the EU average of 7.8 metric tons of CO2 equivalent. Romania's transition to a market-based economy in the early 1990s largely explained these strong initial decarbonization trends. The transition involved the restructuring and privatization of heavy-polluting state-owned enterprises. This attracted private investment in renewable energy sources (Campos and others, 2002; Roaf and others, 2014), further reducing the carbon footprint of the Romanian economy (Colesca and Ciocoiu, 2013).

Figure 2. Absolute and Per Capita GHG Emissions



Sources: Eurostat and IMF staff calculations.
Note: LULUCF=Land Use, Land-Use Change and Forestry

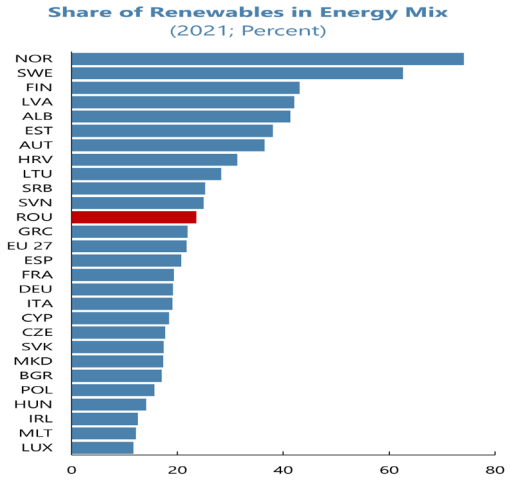


Sources: Eurostat and IMF staff calculations.

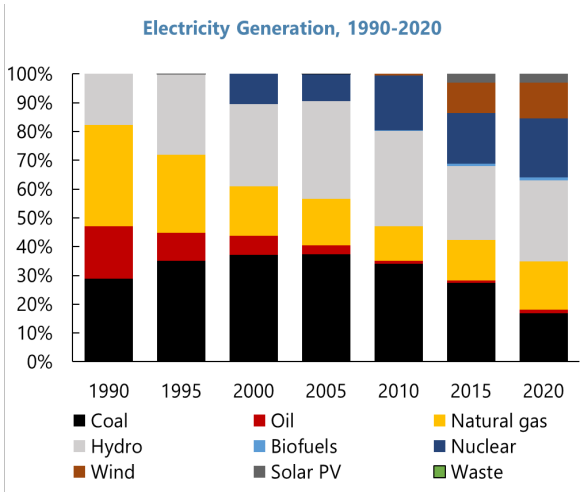
7. The ongoing phase-out of coal, coupled with investments in low-carbon energy sources, will reduce emissions further. Under Romania's 2022 Decarbonization Law, coal is scheduled to be phased out and coal-fired power generation facilities will be decommissioned by 2032. Although coal accounted for approximately 20 percent of Romania's electricity generation in 2022, it disproportionately contributed up to 70 percent of the country's electricity related GHG emissions. Furthermore, the phase out of coal, if fully committed to, will catalyze green private investments, and quicken the pace of decarbonization across the economy. For example, investments in green hydrogen—which is highly dependent on the availability of low-carbon energy supply (i.e., wind, solar, hydro)— and carbon capture and storage infrastructure will be critical in meeting Romania's growing energy demand in a climate-friendly manner, especially in hard-to-abate sectors (World Bank, 2023). The ongoing exploration of the Black Sea natural gas reserve—as a transitional fuel—can help strengthen short-term energy security as Romania pursues a cleaner energy future.

8. Overall, renewable energy generation continues to increase, although Romania's energy mix is still fossil fuel dependent. The share of renewables in Romania's energy mix has been steadily rising in recent years and stood at 23.6 percent in 2021, above the EU average of 21.8 percent (Figure 3). Notably, electricity generation continues to shift more toward low-carbon sources, including hydro and biomass in addition to nuclear, wind, and solar. In 2021, these sources accounted for up to 64 percent of Romania's electricity mix. Electricity generation from biomass is small but growing rapidly, with the need for more sustainably sourced wood-generated biomass becoming urgent. That is because while biomass is counted toward achieving renewable energy target across member states, EU rules require strict sustainability criteria[7] for woody biomass.

Figure 3. Evolution of Romania's Energy Mix



Sources: Eurostat and IMF staff calculations.



Sources: IEA and IMF staff calculations.

C. Climate Policies in Romania

9. Romania is committed to the decarbonization targets under the EU Green Deal, with access to regional funding for a just transition. These targets are currently captured by two comprehensive goals.

- **First,** over the medium term (2023-2030), member states must cut their GHG emissions by at least 55 percent by 2030 (relative to 1990 levels) under the Fit-For-55 package, to be facilitated by a more stringent new ETS regime. While on path to achieve the Fit-for-55 target, Romania's decarbonization drive moving forward would be challenged on at least three fronts:

  i. *Stringent 'Effort Sharing Regulation (ESR):* As a key element of the Fit-for-55 package, the ESR imposes binding annual GHG emissions reduction targets for sectors not currently covered by the ETS (i.e., transport, buildings, agriculture, waste management, and small industries). For the period up to 2030, the ESR also sets specific annual emission limits, with member states receiving decreasing emission allocations each year. For Romania, adhering

[7] European Commission, Joint Research Centre, *Brief on biomass for energy in the European Union*, Publications Office, 2019, https://data.europa.eu/doi/10.2760/546943

to these targets will require significant policy and structural changes. The country must develop and implement national strategies to quicken the pace of emissions reduction in the effort-sharing sectors—up to 12.7 percent relative to 2005—rather than the lower 2 percent required under the old effort sharing Directive (Figure 4).

ii. *Gradual phase-in of the 'Carbon Border Adjustment Mechanism (CBAM)' and phaseout of free ETS allowances:* The gradual introduction of the CBAM from 2026, and the concurrent phasing out of free ETS allowances, mark a pivotal shift in EU climate policy. The CBAM levels the cost of greenhouse gas emissions between EU and non-EU products by pricing carbon on specific imports, aiming to prevent carbon leakage and promote global emissions reduction. This shift may challenge Romania, especially sectors dependent on free ETS allowances, underscoring the need for more stringent decarbonization effort moving forward.

Figure 4. EU Effort-Sharing Emission Reduction Targets
(Percent)

Sources Eurostat and IMF staff calculations.

iii. *Separate ETS applied to Transport and Building sectors.* The introduction in 2027–28 of a separate ETS for transport, buildings, and select small industries ('ETS 2') will harmonize carbon pricing and reduce distortions across the EU, especially since such extra taxes already exist in some EU countries (e.g., Denmark, Finland, Latvia). Where such additional taxes are absent (like in Romania), the immediate gradual introduction of carbon pricing in these sectors can ease the transition towards ETS 2. Additionally, early revenues generated from these taxes could support further decarbonization effort and exempt implementing countries from the eventual introduction of ETS 2.

- **Second,** all member states must become carbon-neutral (net-zero GHG emitters) by 2050. In addition to several other funding schemes toward the green transition, including via Romania's National Resilience and Recovery Plan (NRRP), the EU's Just Transition Mechanism provides further funding aimed at ensuring a fair and inclusive green transition.

10. Several national measures, in addition to the EU ETS, are underpinning the decarbonization agenda in Romania. Beyond the ETS, Romania has institutionalized several national instruments to facilitate the country's decarbonization effort in the medium term (via the Integrated National Energy and Climate Plan) and over the long run (through the Long-Term Strategy). Several sectoral green schemes are in place to promote the national decarbonization agenda, targeting increased renewable energy generation (e.g., the National Hydrogen Strategy; contract-for-difference for renewables), strong energy efficiency standards (via the District Heating Program), high modernization rates in the buildings sector (via the National Long-Term Renovation Strategy), and an inclusive and fair climate transition (via the National Adaptation Strategy).

11. Specifically, Romania has earmarked renewable energy penetration and energy efficiency benchmarks consistent with EU's targets.

- **Renewable energy:** Romania commits to increase the overall share of renewable energy in gross final energy consumption to 30.7 percent in 2030. This translates into a renewable energy share of 49.4 percent in electricity, 14.2 percent in transport, and 33.09 percent in heating and cooling (Table 1).

- **Energy efficiency improvement:** Primary and final energy consumptions are targeted to be cut by 45.1 and 40.4 percent respectively, by 2030 to meet the EU-wide target of 32.5 percent energy efficiency improvement.

Table 1. Romania: Renewable and Energy Efficiency Targets (2021–30)

Increasing Share of Renewable Energy (RE) in Energy Mix (%)	
Overall Share of RE in Final Energy Consumption	30.7
Electricity	49.4
Transport	14.2
Heating and Cooling	33.0
Improving Energy Efficiency (%)	
Primary Energy Consumption	-45.1
Final Energy Consumption	-40.4

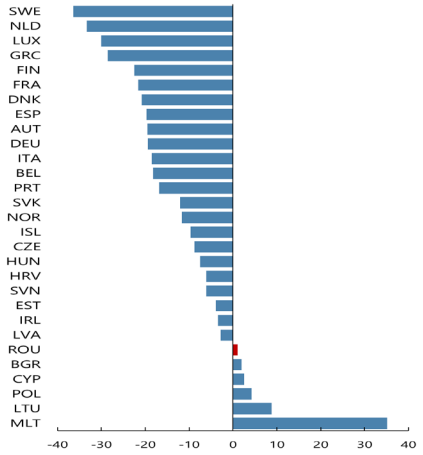
Source: Romania Integrated National Energy and Climate Plan (INECP),
Note: These figures are based on the latest INECP which is being updated by the authorities.

12. There is strong national coordination of decarbonization measures. Romania has centralized its decarbonization efforts through the Inter-ministerial Committee on Climate Change (CISC), which streamlines climate policies across various agencies. For example, the Ministry of Energy, in coordination with the Ministry of Environment, Water, and Forests, oversees the decarbonization and environmental policy agenda, while the Ministries of Finance and European Investments and Projects are pivotal in green financing. But the CISC not only coordinates these efforts (including at the sub-national level, especially regarding green public investments) but also enhances public engagement in climate action.

D. Decarbonization Challenges in Romania

13. Nonetheless, emissions continue to rise in sectors not covered by the EU ETS, with the potential to slowdown the transition to carbon neutrality. While overall emissions have been falling in Romania, non-ETS emissions continue to rise. For example, in 2022, Romania was among the EU countries whose non-ETS emissions exceeded the new national limit under the new Effort Sharing Regulation (Figure 5). This presents a crucial decarbonization challenge and underscores the need for further policy measures.

Figure 5. EU Effort-Sharing Emission Reduction Progress
(Percent estimates, 2022)

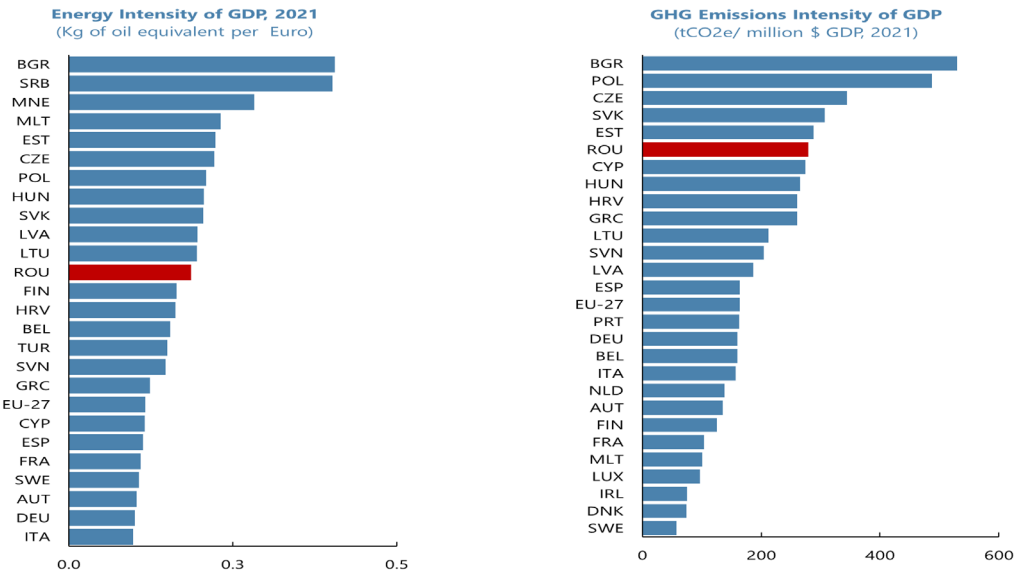


Sources: Eurostat and IMF staff calculations.

14. Relative to the EU level, the Romanian economy is highly energy and emission intensive. Romania's relatively low level of

emissions (Figure 2) is the result of its still modest per capita GDP (the lowest in the EU), rather than because of low emissions per unit of output. The Romanian economy uses about 60 percent more energy per unit of output—at 0.19 kg of oil equivalent—than the average EU economy in 2021 (Figure 6). As the share of low-carbon sources in total energy supply remains low, this high energy demand is largely sourced from fossil fuels, underpinning the country's high emission intensity—at over 70 percent above the EU average in 2021.

Figure 6. Energy and Emission Intensity of Output

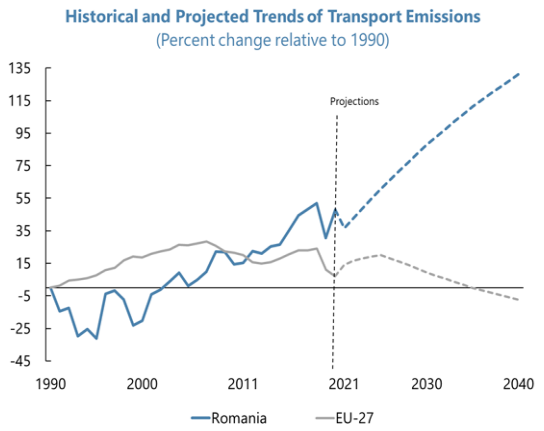


Sources: Eurostat and IMF staff calculations.

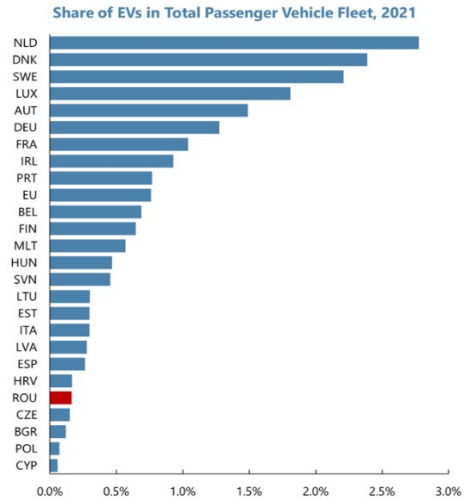
15. High oil dependency in the transport sector is fueling a persistent rise in emissions, which are projected to further diverge from the downward trend in the EU. The transport sector's emissions have been on a persistent upward trend over the last two decades, partly fueled by increased vehicle ownership as Romania closes the per capita income gap relative to the EU. According to the EEA, this trend is projected further upward, with emissions in the sector transport expected to surge by 84 percent by 2030 relative to the level in 1990 (Figure 7). Curbing this trend would require increased electric mobility. While progress is being made in electrifying public transport, the share of electric vehicles (EVs) in Romania's total passenger vehicle fleet was well below 1 percent in 2021, like the rest of the EU where EV penetration remains low (Figure 7). Romania's generous EV subsidies—under the *'Rabla Plus Program*[8]—will likely increase EV ownership over time, requiring further investments in charging stations (powered by low-carbon energy sources) to incentivize uptake.

[8] Grants for battery electric vehicles can reach up to €4,450 (20,000 RON), while plug-in hybrids can receive €1,100. An additional subsidy of €10,000 is available for the purchase of a new electric vehicle, and an extra €1,430 can be obtained for scrapping vehicles over eight years old. The funding covers up to 50 percent of the vehicle's value.

Figure 7. Transport Emissions and Electric Vehicle Fleet



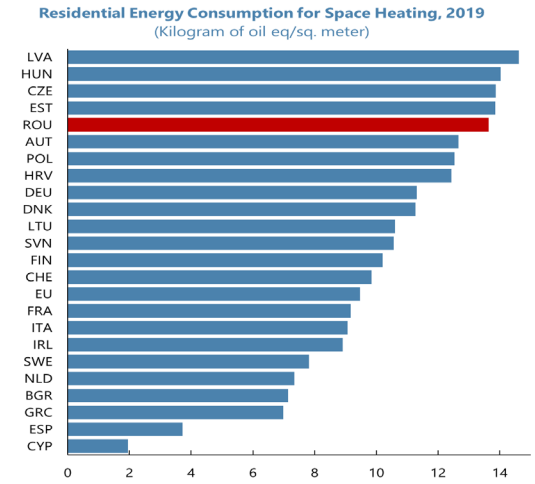
Sources: EU Environmental Agency and IMF staff calculations.



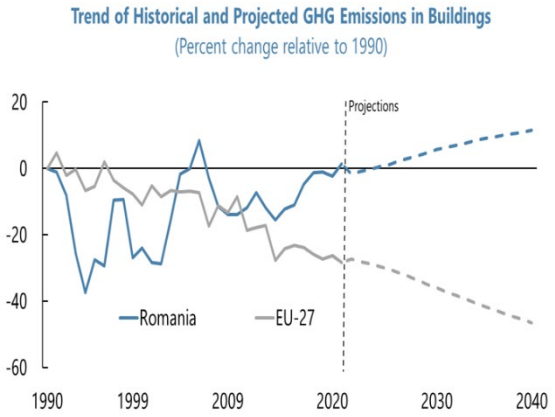
Sources: Eurostat and IMF staff calculations.

16. Furthermore, emissions from Romania's aging building stock have been increasing and are also projected to diverge from the falling trend in the EU. Romania has one of the most energy inefficient building stocks in the EU, with emissions in the sector projected to rise over time (Figure 8). High energy demand, mostly met by fossil fuels, underpins the projected increase in emissions from buildings. Arresting this trend, including through better insulation, is vital for keeping the country on course to net-zero emissions. Romania's current renovation rate of 0.5 percent annually is targeted to rise to 3½ percent by 2030 under the National Renovation Strategy. Meeting this ambitious goal requires substantial investment. This underscores the need for stronger incentives in addition to the "CasaVerde" program which provides grants for heat pumps and insulation to foster residential energy efficiency.

Figure 8. Energy Efficiency and Emission Profile of Buildings in Romania



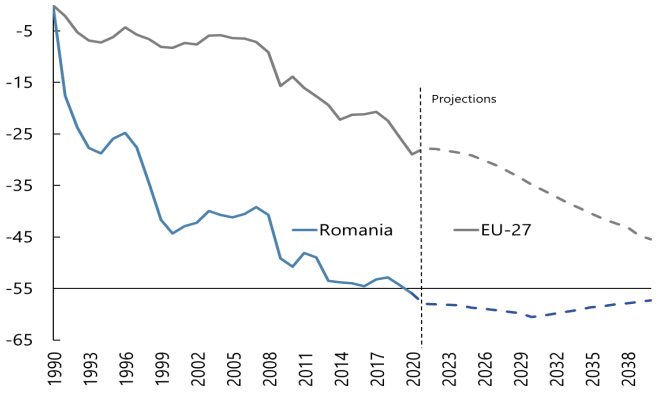
Sources: Eurostat and IMF staff calculations.



Sources: EU Environmental Agency and IMF staff calculations.

17. In sum, while Romania appears to be on track to meet the EU's Fit-for-55 target, meeting the longer-term net zero target is far from secured. The current level of emissions is relatively low, and projection by the EEA shows the country is on track to exceed the 55 percent reduction target well before 2030 (Figure 9). However, beyond this horizon, Romania is expected to continue to converge to the higher income levels elsewhere in the EU, while its energy and emission intensity remains high, notwithstanding efforts to decarbonize through a variety of programs. As a result, the pathway to carbon neutrality by 2050—which partly depends on the state of progress in low-carbon innovations globally—remains highly uncertain, underscoring the need for significant additional policy action and green investments.

Figure 9. Historical and Projected Trends of GHG Emissions (Percent change relative to 1990)



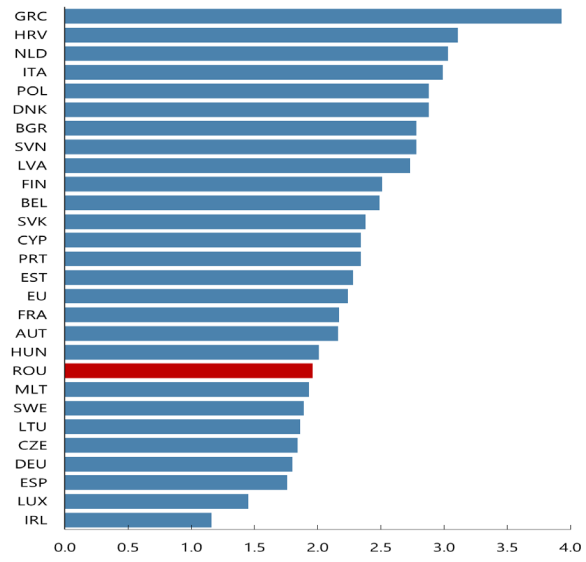
Source: EU Environmental Agency (EEA); IMF staff calculations.

E. Complementary Policy Options

18. Romania has made significant progress in reducing emissions and greening its energy mix, but the transition to carbon neutrality requires further policy effort. Notably, the ongoing rise in non-ETS emissions—particularly in the transport building sectors—as discussed in the preceding section underscores the need for a further decarbonization push. Tax-based decarbonization measures—starting with pre-announced rates that phase in gradually—can complement the ETS and other national policies in driving Romania's transition to a low-carbon economy. Using the IMF-World Bank Climate Policy Assessment (CPAT) tool, this section examines the decarbonization and macroeconomic effects of complementary green tax policy options that the Romanian authorities could consider.

19. Green tax instruments are the most efficient, although not the only measures, that can drive the further decarbonization effort. While further positive incentives, including subsidies, do have a role in facilitating the net-zero transition, tax-based decarbonization tools will need to play a greater role in Romania. Optimal pricing of fossil fuels would incentivize efficient energy use while facilitating strong private investments in renewables. Moreover, the negative

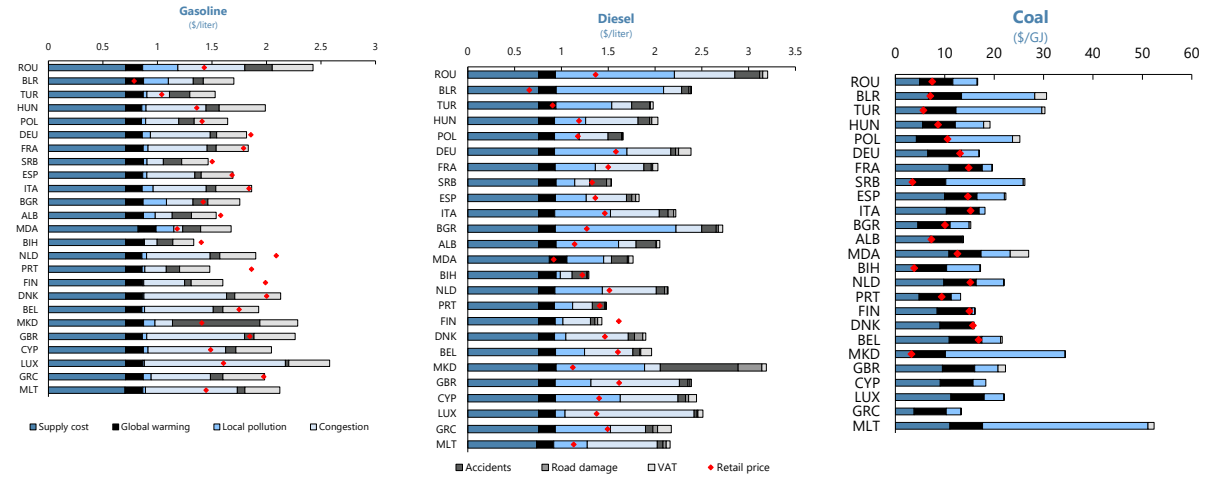
Figure 10. Environmental Tax Revenues, 2021 (Percent of GDP)



Sources: Eurostat and IMF staff calculations.

externalities of fossil fuels are underpriced in Romania (relative to other EU member states). This is reflected in Romania's low environmental tax revenues—below the EU average in 2021 (Figure 10). Tax measures that fully internalize these externalities (Figure 11) can promote decarbonization and fiscal sustainability at the same time (IMF, 2023).

Figure 11. Explicit and Implict Fossil Fuel Subsidies in Selected Economies



Source: IMF fossil fuel subsidies database (2022).

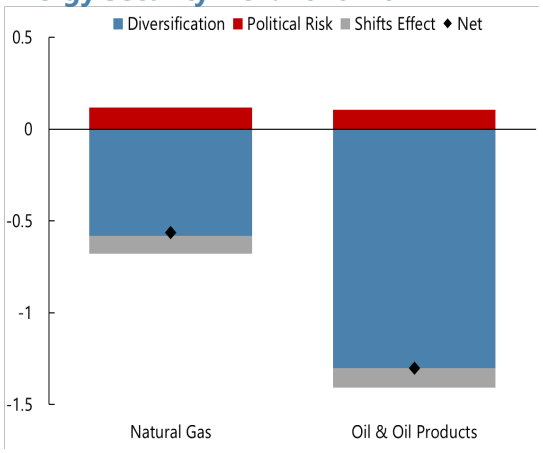
20. In this context, two tax-based measures are simulated in this paper, specifically aimed at reversing the rising trends in non-ETS emissions while putting Romania on a firmer net-zero path. Complementary national carbon pricing schemes are common in the EU, with carbon taxes that vary in stringency from €9 in Latvia to €108 per ton of CO_2 in Sweden. While more stringent carbon price signals would be needed to achieve the desired emission reduction in Romania, the need to broaden political support by gradually phasing in such measures cannot be overemphasized (Andersen, 2019). Therefore, the goal in this section is to illustrate that tax-based measures (explicit carbon taxes and excise reforms), even if starting low before rising linearly over time, can induce investment in low-carbon energy sources while shifting preferences away from fossil fuel use (Stiglitz and Others, 2017; IMF, 2022). In this context, the proposed instruments below are largely illustrative and not intended as optimal policy paths.

- **A carbon tax in the transport and building sectors** that Starts low at €25 in 2024, before linearly rising to €75/ton of CO2 by 2030. For such a sectoral policy to deliver large cuts in emissions, the tax rate would have to be significantly higher. This tax, when implemented before the new EU ETS 2 is rolled out in 2027–28, would facilitate the early collection of revenues and the eventual exemption of the transportation and building sectors under ETS 2.

- **Gradual phase-in of excise taxes on fossil fuels:** This option sets additional excises on fossil fuels to reach 75 percent of the optimal price by 2030, effectively internalizing a large part of the externalities associated with burning fossil fuels beyond their supply costs (Black and others, 2023). These excises would be phased in from 2024, rising gradually to their target levels by 2030. On an equivalent basis, the excise for coal, gasoline, and diesel would be €68.1, €257.7, and €474 per ton of CO2 in 2030, respectively.

21. Well designed and communicated, these measures could also enhance energy security in Romania. The energy crisis due to Russia's war in Ukraine has demonstrated the energy security risks posed by high fossil fuel reliance. Over the last two decades, Romania has maintained a diversified portfolio of energy supply, strengthening overall energy security (Panton and others, 2023). However, a strong decarbonization agenda that promotes green investment while phasing out reliance on fossil fuels would be required to ensure energy security during the green transition. Such a policy agenda, as advocated in this paper, would promote energy security on at least two fronts. First, decarbonization policies will promote energy efficiency and reduce fossil fuel demand. Second, increased renewable energy penetration amid stringent decarbonization measures will reduce energy import dependence and improve energy security. However, the increased penetration of intermittent renewable energy sources requires substantial investments in modern energy infrastructure to balance loads and store energy, underscoring the need for tax-based measures that can generate fiscal revenues.

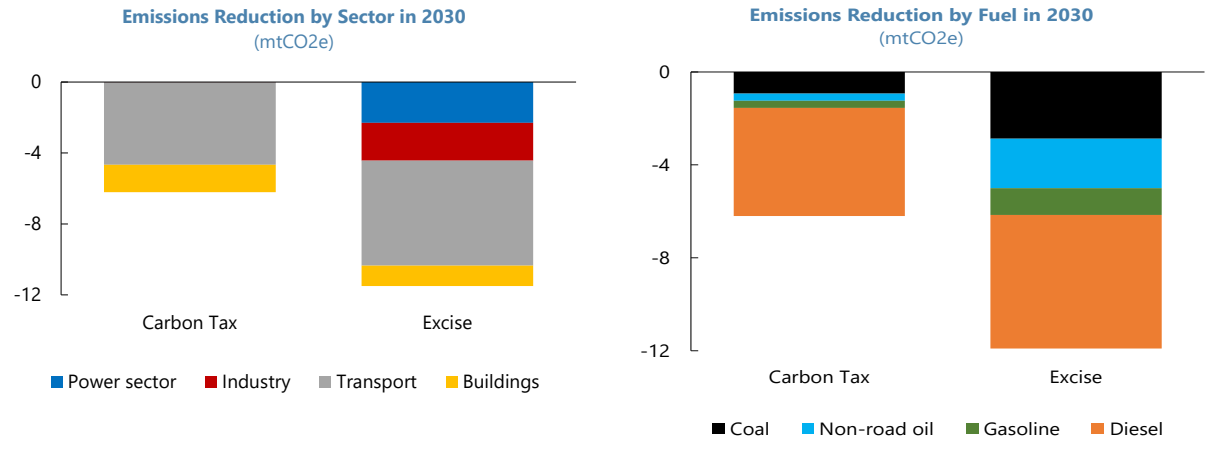
Figure 12. Decomposition of Romania's Energy Security Risk: 2010–20



Source: Panton and others (2023).
Note: Note: A country is said to have low energy security risks when supply sources are well diversified. The risk of internal instability (based on International Risk Guide, ICRG index) in energy producing partners serves as proxy for political risk. The shift effect captures changing supply sources from high to low-risk partners. The net effect is the change in the index in 2020 relative to 2010.

22. These tax measures would reverse the rising trend in non-ETS emissions. The simulated carbon tax is effective at reducing transport and building emissions by 2030 by 6 percent. The relatively higher rate of emissions reduction in the transport sector reflects the stronger dependence of the transport sector on fossil fuels (mainly gasoline and diesel) while coal's contribution to heating in building continues to fall with its phase out. The excise tax, which applies to a larger fossil fuel base, delivers faster emissions reduction, although its implementation might need to be more gradual to broaden public support. Across individual fuels, diesel usage declines at a faster rate due to its (implicitly) highly subsidized pre-policy level, followed by coal.

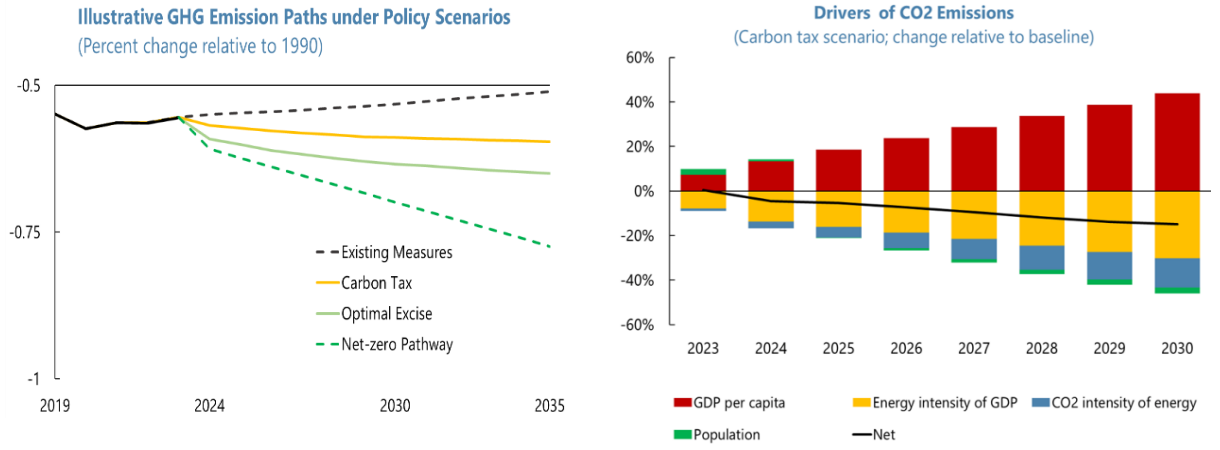
Figure 13. Decarbonization Effects of Policies in 2030



Source: IMF staff using CPAT.

23. These measures can incentivize emission reduction across the economy, putting Romania on track to carbon neutrality. Under existing policies, our model projection shows that Romania's emissions would rise over time, diverging from the path to carbon neutrality (Figure 14). The simulated tax-based instruments, despite starting at relatively low rates, facilitate a reversal of that rising trend in emissions, thus reducing the gap between current emission levels and the desired net-zero path. These measures work through several important channels. Foremost, the carbon tax—like the excise tax reform—incentivizes efficient energy use, gradually reducing the high energy intensity of activity in Romania. Second, the introduction of these measures also shifts consumption preferences to low-carbon energy sources while promoting renewable energy investments, gradually decoupling per capita income growth from emissions. For a carbon-intensive economy like Romania, these dynamics are critical in charting a sustainable course to carbon neutrality (Budina and others, 2023). In short, complementing Romania's existing policies with stringent national measures would help put the country on track to carbon neutrality.

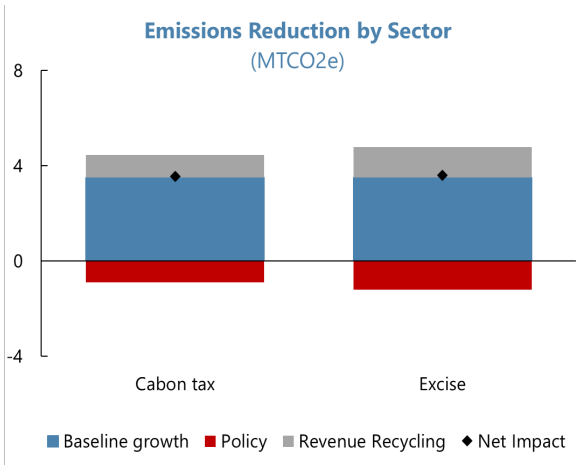
Figure 14. Policy Pathways and Drivers of GHG Emissions in Romania

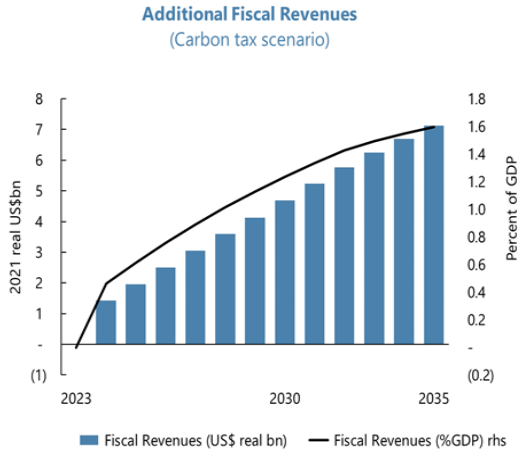


Source: IMF staff using CPAT.

24. Furthermore, these tax-based measures can generate substantial fiscal revenues in a growth-friendly way. Tax-based decarbonization measures, as simulated in this paper, when well designed (e.g., well communicated and phased in gradually), can deliver their desired outcome (emissions reduction) while also serving as a means of fiscal reform in a growth-friendly way (Gilbert and Stock, 2023; IMF, 2023). For example, the carbon tax would raise fiscal revenues of up to 1.1 percent of GDP (while the excise tax could deliver up to twice) by 2030, while having a net positive effect on output (Figure 15).

Figure 15. Growth and Fiscal Impacts of Extra Decarbonization Measures

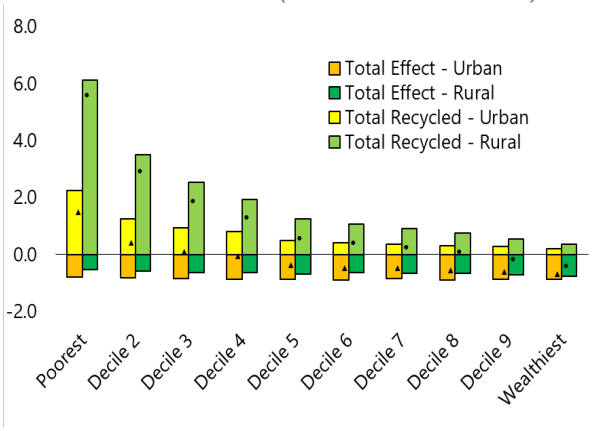




Source: IMF staff using CPAT.

25. The proper recycling of the generated revenues can help broaden political support and strengthen social cohesion. The growth-friendly nature of these measures crucially hinges on how the generated revenues are recycled—from lowering labor income taxes and providing transfers to vulnerable households to reducing fiscal deficit and investing in green infrastructure (IMF, 2022)[9]. The generated revenues can be recycled towards effective emission reduction avenues such as green public investments in low-carbon energy infrastructure (IMF, 2022, 2020). These investments would not only contribute to further emission reduction, but they will also generate higher growth—consistent with evidence in the literature that green spending's output multipliers are quite large (Batini and others, 2022). As further evidence suggests (see Schoder, 2022; World Bank, 2022), the high emission intensity of the Romanian economy makes it very attractive to tax-based policies as instruments of growth- and employment-friendly decarbonization. Absent effective tools to mitigate the adverse distributional effects[10] of decarbonization policies, the imposition of these measures would have stronger disproportionate impact on vulnerable segments—including low-income households and vulnerable workers. However, as indicated in

Figure 16. Relative Mean Consumption Effect: Urban vs Rural (Carbon tax scenario)



Source: IMF Staff using CPAT.

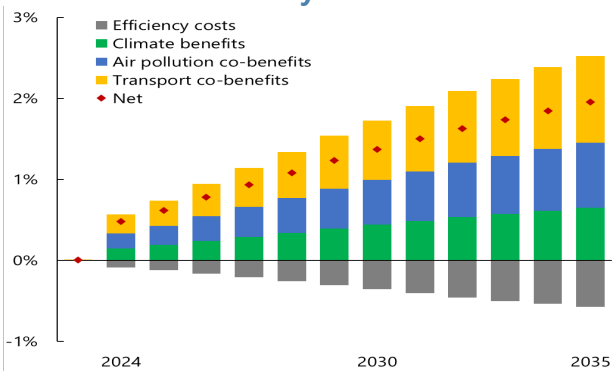
[9] For the illustrative CPAT model simulation analyzed in this paper, the carbon tax and excise revenues are recycled as 30 percent apiece to public infrastructure and household transfers and 40 percent to labor income tax reduction. These revenue allocations are merely illustrative as governments may decide on alternative uses, including fiscal deficit reduction.

[10] It is worth noting that these policies do generate other positive co-benefits, including lower local air pollution and pollution mortality, that society can enjoy.

Figure 16, strategic revenue recycling can mitigate these negative effects, potentially making the reforms progress for both rural and urban consumers.

26. These complementary measures can also generate significant co-benefits for Romania. While the simulated carbon tax and excise taxes do indeed impose some costs on the Romanian economy, the net benefits—beyond being growth friendly while reducing GHG emissions—are positive. For example, an accelerated green agenda underpinned by a complementary carbon tax could improve economic efficiency and induce cleaner production processes economywide. Other meaningful co-benefits include less air pollution as well as reductions in traffic congestion and accidents.

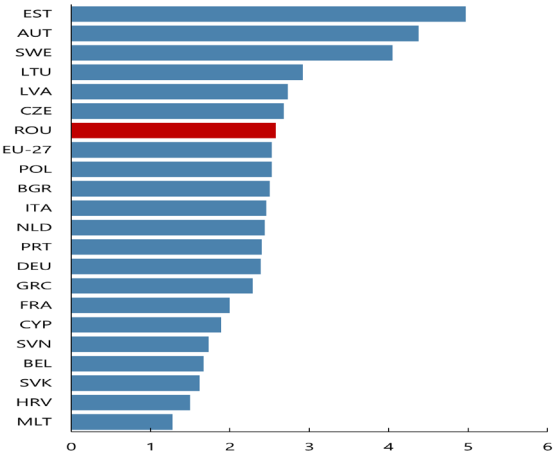
Figure 17. Welfare Benefits from €75 Carbon Tax by 2030



Source: IMF staff using CPAT.

27. Beyond decarbonization, a stronger green push could enhance Romania's resilience and competitiveness in critical green value chains. In 2020, Romania outperformed the EU average in the production of environmental goods and services, with low-carbon goods and services amount to 2½ percent of GDP (Figure 18). With such potential, an accelerated decarbonization agenda could serve as a catalyst for the private sector to channel more investments into green value chains, building on Romania's existing advantage. These investments would not only diversify Romania's economy but also stimulate job creation in high-value green tech industries.

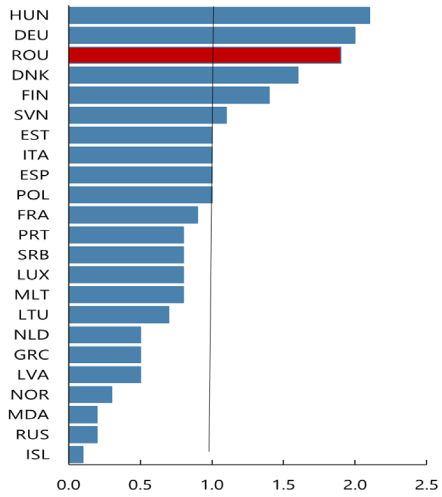
Figure 18. Gross Value Added in Environmental Goods and Services in 2020
(Percent of GDP)



Source: European Environmental Agency; IMF staff calculations

28. Romania is also well positioned to exploit opportunities in emerging green industries. Romania has high comparative advantage in the production of low-carbon technologies which are key to facilitating the global transition to carbon neutrality (Figure 19). To support private sector development in the related value chains, a strong domestic agenda is critical (Barker and others, 2009). For example, Romania has high potential in the production of green hydrogen given the availability of low-carbon sources like hydro power. The introduction of the EU's CBAM beginning 2026 will transform trade into a lever for climate policy, incentivizing cleaner production methods. As an EU member state, Romania is well-positioned to leverage this shift to enhance its global trade resilience. By greening its production processes, Romania stands to benefit from increased competitiveness in a market where sustainability is becoming a prerequisite, not just an option, for economic success.

Figure 19. Comparative Advantage in Low-Carbon Tech Products, 2021
(Values greater/less than 1 imply advantage/disadvantage)



Sources: IMF Climate Change Dashboard and IMF staff calculations.

F. Conclusions and Policy Implications

29. The transition to carbon neutrality presents both challenges and transformative growth opportunities for Romania. The transition to a low-carbon economy presents enormous opportunities for Romania's structural transformation. The country's potential in sectors like green hydrogen and wind energy production is vast, promising economic benefits alongside environmental progress. However, this transition is not without its challenges. Most importantly, substantial investments are needed for whole-of-economy decarbonization, particularly in hard-to-abate sectors like transport, buildings, and industries. Additionally, the country must confront the immediate and costly impacts of climate change, such as floods, heatwaves, and droughts, to which it is notably vulnerable.

30. Romania has in place several policies to address the macro-critical challenges posed by climate change. Romania has institutionalized several policy measures to adapt to and mitigate the impact of climate change. Strongly anchored by EU funding and climate policy stance, efforts are being made to promote renewable energy generation, strengthen energy efficiency standards, ensure energy security, and deliver an inclusive and fair climate transition. But the Romanian economy remains highly emission- and energy-intensive amid the country's strong dependence on fossil fuels.

31. Romania is on course to becoming fit for 55, but the transition to carbon neutrality now requires a more stringent and well-designed decarbonization agenda. While the country's absolute and per capita emissions are currently low and projected to stay below the EU's 55 percent reduction benchmark by 2030, there are rising concerns in specific sectors. The transport sector is

moving away from the EU's downward trend, necessitating a shift towards increased electric mobility powered by low-carbon energy sources. Similarly, Romania has one of the most energy-inefficient building stocks in the EU which continues to drive the country's high fossil fuel demand. Strategic policy initiatives, such as the CasaVerde" program, are crucial to enhance energy efficiency and integrate renewable energy in heating and cooling. Achieving these ambitious targets requires further decarbonization measures to urgently incentivize and catalyze green private investments that are pivotal for Romania's transition to a low-carbon economy.

32. Tax-based instruments can support the green transition in a growth friendly manner while strengthening fiscal sustainability and social inclusion. Romania should make greater use of various tax measures, including targeted carbon taxes (as illustrated in the transport and building sectors) and fossil fuel subsidy removal to price more effectively the externalities from the country's high reliance on fossil fuels. By shifting consumption preferences to low-carbon energy sources while promoting renewable energy investments, these measures can gradually decouple per capita income growth from emissions.

33. A proactively stringent decarbonization agenda can enable Romania to realize its full green potential and exploit opportunities in emerging green industries. Romania's strong potential in critical green value chains, including wind energy and green hydrogen, can serve as an engine of macroeconomic resilience and competitiveness during the green transition. To this end, the role of strong policy signals in terms of fully pricing fossil fuel externalities while fostering green private sector investments cannot be overemphasized. By greening its production processes, Romania stands to benefit from increased competitiveness in a global economy where sustainability is becoming a prerequisite, not just an option, for economic success.

34. The strategic recycling of revenues generated from decarbonization policies is pivotal for broadening political support and bolstering social cohesion. Revenues generated from tax-based measures can help to facilitate an effective and inclusive green transition. These revenues can be recycled towards multiple ends depending on national priorities. They can be used for reducing labor income taxes, thereby easing the financial burden on the working population. Additionally, providing targeted support can cushion the impact of decarbonization policies on vulnerable households. Investing in green infrastructure is another significant avenue for using these funds. This does not only contribute to the overall goal of reducing carbon emissions but also stimulates job creation in new, sustainable industries. Furthermore, these revenues can play a role in reducing fiscal deficits, contributing to the overall health and stability of the economy.

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