FINANCING THE CIRCULAR ECONOMY THROUGH STATE AID: A CROSS COUNTRIES ANALYSIS

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Abstract: The circular economy is a key development goal for the European Union (EU), in line with its broader objective of achieving climate neutrality by 2050. The circular economy is built on the 3Rs: recycle, reuse, and repair, which aim to reduce waste, promote sustainable development, enhance renewable energy, and protect the environment. While several EU initiatives support financing for the circular economy, our research focuses on how State Aid can be used to foster objectives such as renewable energy and environmental protection. The primary goal is to analyse the progress made by EU Member States during and after the COVID-19 pandemic in financing the circular economy through State Aid, highlighting key challenges and opportunities. We employ a quantitative analysis based on the latest State Aid Scoreboard, primarily using data from 2019-2022, the most recent available. The analysis includes a case study of Romania, examining its performance in granting State Aid for energy and environmental protection. Our main finding is that while State Aid related to the pandemic decreased in 2022, many Member States continue to address post-pandemic economic imbalances. There remains significant potential for boosting State Aid to support the circular economy, particularly in the areas of energy and environmental protection.

Key-Words: circular economy, sustainable development, State aid, EU, Romania
JEL Classification: *H23, O38, Q57*

1. Introduction

The circular economy incorporates the principles of sustainable development, as highlighted by several recent studies (Berndtsson, 2015; Suárez-Eiroa et al., 2019; Rodriguez-Anton et al., 2019), which emphasize the importance of environmental protection and social equity. In the vision of European authorities, the circular economy involves decoupling economic growth from resource consumption and transitioning to circular systems in production and consumption (European Council, 2024).

Achieving stronger environmental protection and expanding the use of renewable energy are key pillars of the circular economy. Both foster the sustainable use of resources while reducing the pollution typically associated with industrial processes. However, enhancing circularity in these processes often faces market failures, as investments in green technology and clean energy are costly and require innovation. Given the reluctance of the business sector to invest in green technologies, State Aid can provide a crucial incentive to stimulate this circular approach to economic development (Ahmadov, Gerstlberger & Prause, 2022). According to the EU's legal framework, State Aid must be limited in scope, have clear objectives, and avoid distorting competition by granting unfair advantages to beneficiaries (Piechucka, Saurí-Romero & Smulders, 2023). Nevertheless, aids aimed at renewable energy and environmental protection are encouraged at the EU level, as they serve horizontal objectives (Elkerbout et al., 2020).

During the COVID-19 pandemic, a Temporary Framework for State Aid was introduced (European Commission, 2020), allowing Member States to make exceptional interventions to support their economies. Following the outbreak of the Russia-Ukraine war, another derogation framework was adopted to further assist sectors affected by the conflict (European Commission, 2022). While many Member States fully utilized these special derogations, horizontal objectives — such as aid for environmental protection and renewable energy — were applied to a lesser extent compared to crisis-related aid.

Against this backdrop, our research aims to assess which Member States have been most effective in supporting the circular economy through State Aid schemes, the instruments they favored, and where Romania stands within the European hierarchy.

2 Literature review

The EU's State Aid policy has not traditionally been analyzed through the lens of circularity, as much of the existing literature tends to focus on how this policy has supported industrial development (Aiginger & Rodrik, 2020; Wallace et al. 2020) and why strict regulations are needed to prevent distortion of competition in the EU's internal market (Duso et al., 2024; Werner & Caramazza, 2019).

For instance, Aiginger & Rodrik (2020) are showing that "unsatisfactory rates of productive transformation and shortfalls in generating quality jobs in manufacturing or modern services" have led to a need "for proactive government policies" (including State Aids) "to diversify and upgrade economies beyond simply freeing up markets". Werner & Caramazza (2019) reveals the delicate balance existing between the "wide interpretation of the concept of State Aid resources encompassing public funds and the Commission's burden of imputing money to the state". Majone (2019) examines the paradoxical focus on regulation amidst the international discourse on privatization and deregulation, emphasizing how European policymakers are increasingly viewing regulation as a distinct form of state intervention.

While these aspects are crucial, the relevance of State Aid for the circular economy is increasingly gaining attention, particularly as the European Union strives to meet the ambitious targets set by the European Green Deal. Verschuur & Sbrolli (2020) are showing that the Guidelines for State Aid for Environmental Protection and Energy are an important tool that can be used to achieve Green Deal targets across EU, enabling the Member States to subsidise these domains.

Transitioning to a circular economy is not only about the environmental intent, but it entails a systemic transformation and thus demands massive investments in green technologies, renewable energy sources as well as sustainable practices. This transition may be supported economically by the State Aid, especially since in many sectors the green investments are characterized by various market failures (Kaur, 2009). While businesses are presumably reluctant to bear the high costs of innovation alone, this raises the question of how State Aid may be effectively applied to support the development of the circular economy in the Member States. Kaur (2009) states that more specific State Aid rules are also increasingly important to reduce greenhouse gas emissions and tackle the resource intensive measures of climate change. Lilja Jensen (2021) also highlights that State aid may further support the goals set out under the flagship initiative of the European Green Deal while pursuing the sustainable investment across EU. The author emphasize that this principle is typically implemented either by increasing the cost to use high-polluting technologies and processes or by providing a price advantage for cleaner alternatives. In an age where industry is facing the challenges of high globalization, distinction between new technologies or cleaner production process incentives have unintended consequences in keeping Europe competitive (where if the intent was to avoid carbon leakage). When State Aid is confined and focuses on the gradual eradication of subsidies once negative externalities are internalised, distortion in competition would be limited and market failures corrected.

A cross-country analysis that follows both the pandemic and post-pandemic trends is crucial in this context. The COVID-19 pandemic led to unprecedented levels of State Aid being granted under emergency frameworks, which were designed to stabilize national economies (Kubera, 2021). Kubera (2021) reveals that while State aid is typically incompatible with the EU internal market, only allowed under specific conditions set by EU law, the unprecedented challenges of the COVID-19 pandemic required equally unprecedented measures. To introduce greater flexibility and expedite state aid decisions, the European Commission issued a Temporary Framework for state aid, which has already been revised multiple times. Moreover, the scale of aid granted during this period was immense, and most Member States quickly seized the opportunity to benefit (Honoré, 2020).
As the EU emerges from this crisis, understanding how State Aid policies are being recalibrated to support longer-term goals, such as the circular economy, is essential. Such an analysis would shed light on whether Member States are prioritizing sustainable development in their recovery plans or if crisis-related aid is overshadowing these objectives. Moreover, the pandemic exposed structural weaknesses in various sectors, like construction (Kassem et al., 2023) or agriculture (McIntyre & Roy, 2023) many of which are now more focused on resilience and sustainability, making it all the more important to investigate how State Aid is being leveraged to strengthen circular economy initiatives in the post-pandemic landscape.

In the aftermath of the COVID-19 pandemic, state aid focused on enhancing sustainability and resilience is more crucial than ever. Cavallo & Powell (2021) underline that as economies move forward, governments must prioritize capital spending that increases productivity and drives growth, all while strengthening resilience.

Additionally, in this study is shown that the many small and medium-sized enterprises that went into hibernation during the pandemic require continued support to participate in the recovery and contribute to long-term, sustainable growth.

The implications of the war in Ukraine further complicate this picture. The war has disrupted energy supplies, triggered inflation, and reshaped economic priorities across the EU, prompting the adoption of another derogatory framework for State Aid (Mukarzel, 2023). In the post-2022 economic outlook the Member States need to mitigate the economic impact of the war, particularly in sectors most affected by the energy crisis. Moreover, Ateed (2024) shows "the importance of proactive measures to address vulnerabilities, enhance energy security, and foster international cooperation for a more resilient and sustainable future". Analyzing how these recent developments influence State Aid allocations, particularly in the context of renewable energy and environmental protection, is critical. Given the pressure on Member States to secure alternative energy sources and accelerate the green transition, State Aid could be a key instrument in reducing reliance on fossil fuels and bolstering energy resilience, which directly supports circular economy goals (Antimiani et al., 2023). As shows by Nguyen et al. (2024) in the aftermath of the Russian – Ukrainian war "renewable energy companies experienced a greater rise in returns than non-renewable counterparts, indicating a potential shift towards renewables during times of geopolitical tension". A comparative analysis across countries can reveal how different states are navigating these multiple crises and whether they are maintaining focus on long-term sustainability or being sidetracked by short-term crisis responses.

In this context, Romania's situation provides valuable insights. As a Central and Eastern European (CEE) country, Romania faces unique challenges in its transition to a circular economy (Mocanu et al., 2024), including lower levels of industrial innovation and financial constraints compared to some Western European states (Hajdukiewicz & Pera, 2023). Romania's response to both the pandemic and the war in Ukraine, particularly in terms of its State Aid allocations for green and circular economy objectives, offers a case study of how CEE countries are managing these overlapping crises. By examining Romania's approach, we can better understand the specific barriers faced by less developed EU Member States and explore whether targeted State Aid policies can help bridge the gap between EU-wide ambitions and local realities. Furthermore, there is a noticeable gap in the literature when it comes to analyzing Romania's performance in this area. Our research fills this gap, offering a fresh perspective on the role of State Aid in promoting the circular economy, with particular attention to the post-pandemic and geopolitical context.

3. Methodology

Our research employs a comparative analysis of EU Member States performances in granting State Aids for circular economy using a quantitative assessment based on data from the European Commission's State Aid Scoreboard for the period 2019-2022. The methodology is designed to evaluate the effectiveness of State Aid in supporting the circular economy, with a specific focus on renewable energy and environmental protection, in both the COVID-19 and post-pandemic periods.

The quantitative analysis relies on publicly available data from the State Aid Scoreboard, which provides detailed information on the financial allocations made by EU Member States. This dataset is filtered to isolate aids specifically directed towards horizontal objectives, namely environmental protection and energy sustainability.

We begin by aggregating the relevant data across Member States, focusing on two key variables: (1) the total value of State Aid directed towards circular economy objectives, and (2) the proportion of these aids compared to overall State Aid allocations. This allows us to rank Member States based on their commitment to promoting the circular economy through State Aid.

A comparative approach is used to analyze how different Member States have responded to the dual challenges of the pandemic and the green transition. This involves assessing variations in aid allocation strategies and the types of instruments employed (e.g., grants, tax exemptions, subsidies). By examining differences between countries, we aim to identify best practices and the structural factors that influence the effectiveness of State Aid in fostering circular economy goals.

A case study of Romania is incorporated to provide a more detailed understanding of how a specific Member State has utilized State Aid in this context. Romania's performance is compared against the EU average and leading Member States to highlight its strengths and areas for improvement in supporting environmental protection and energy sustainability through State Aid.

Through this comparative and quantitative framework, our study aims to provide a comprehensive overview of the role of State Aid in advancing the EU's circular economy objectives.

4. The State aids granted in EU for boosting the circular economy

In discussing how the State Aid have been employed by the Member States for environmental protection and renewable energy during and after the COVID-10 pandemic, one must consider that the new adopted Temporary Framework has not changed the essential regulations in this field. Such State Aids aiming to boost the green transition are continuing to be regulated by the Guidelines on State aid for environmental protection and energy 2014-2020 (European Commission, 2014).

The guidelines are setting some general compatibility provisions regarding the State Aid granted for various types of aids serving the goals of the circular economy. Such allowed State Aids are as follows:

i) Aid to energy from renewable sources
ii) Aid to energy efficiency measures, including cogeneration and district heating and cooling
iii) Aid for waste management
iv) Aid to Carbon Capture and Storage (CCS)
v) Aid in the form of reduction in or exemptions from environmental taxes
vi) Aid to energy infrastructure.

The article 107 TFUE prohibits State aid that distorts competition by giving advantages to certain companies or industries within the EU internal market, but allows such aids if some specific conditions are fulfilled. In some cases, State aid can be approved to counter serious economic disturbances, such was the case during the COVID-19 pandemic. It is important to mention that each type of State Aid granted for boosting circular economy (as displayed in Box 1) must typically be notified to and approved by the European Commission unless it falls under specific exemptions. These conditions refers to the fact that the aid must address objectives of common interest (such as promoting economic development in disadvantaged regions, supporting research and innovation, or advancing environmental protection). The State Aid must be necessary and proportionate, meaning that the aid should be the least disruptive measure to achieve its purpose. Also, the State Aid should not overly distort competition or affect trade between Member States.

Box 1: State Aid for Boosting the Circular Economy in the EU – An Overview of the Regulatory Framework

TYPE OF STATE AID	GRANTING CONDITIONS	GOAL
Aid to energy from renewable sources[1]	✓ **Market Instruments**: Competitive bidding for renewable energy should minimize and eventually eliminate subsidies. ✓ **Technology-Specific Tenders**: Member States can conduct tenders for innovative technologies based on potential and grid needs. ✓ **Exceptions for Installations**: Small or demonstration-phase installations may be exempt from bidding processes. ✓ **Investment Aid for Biofuels**: Investment aid for food-based biofuels is generally not justified, but conversion to advanced biofuels is allowed.	**To enable cross-border support and to minimize costs** for Member States[2].
Aid to energy efficiency measures	✓ **Compatibility:** if granted for investments in high-efficiency technologies. ✓ **Demonstrating Environmental Benefits**: Member States must use quantifiable	**To compensate** for net extra production costs resulting from the

[1] According to these guidelines such State Aid schemes are authorised for a maximum period of 10 years. If maintained, such measure should be re-notified after such period.

[2] It is important to note that such State aid schemes should generally be open to other European Economic Area (EEA) countries, hence cooperation mechanisms may be needed to ensure foreign production counts toward national targets.

TYPE OF STATE AID	GRANTING CONDITIONS	GOAL
	indicators, such as energy savings and efficiency gains, to demonstrate the aid's contribution to environmental protection. ✓ **The form of Aid:** State aid can finance energy-efficiency measures, regardless of its form. ✓ **Repayable Advances**: A repayable advance is an appropriate state aid instrument for energy efficiency measures, especially when revenue is uncertain. ✓ **Limiting Aid to Extra Costs**: The aid should only compensate for net extra production costs arising from the investment, considering benefits from energy savings. ✓ **Duration of Operating Aid**: Operating aid for district heating and cooling is limited to five years.	investment, taking account of benefits resulting from energy saving
Aid for waste management	✓ **Waste Reduction Focus**: The investment targets waste from other undertakings, not the beneficiary's own waste. ✓ **No Relief for Polluters**: The aid should not relieve polluters from legal burdens considered normal business costs. ✓ **Beyond Current Standards**: The investment must exceed the state of the art in prevention, reuse, recycling, or innovative use of conventional technologies. ✓ **Material Disposal Alternatives**: The materials treated would otherwise be disposed of or managed less environmentally friendly. ✓ **Increasing Collection**: The investment should enhance material collection for recycling, not just boost demand for recycled materials.	**To make a positive contribution to environmental protection**, but not allowing to the undertakings generating waste to be relieved of the costs of its treatment.
Aid to Carbon Capture and Storage (CCS)	✓ **Eligible Projects**: Aid may support fossil fuel and biomass power plants with CO2 capture, transport, and storage facilities. ✓ **Cost Limitations**: Aid is restricted to additional costs for CO2 capture, transport, and storage. ✓ **Funding Gap Definition**: The funding gap is defined as the difference between the project costs and a scenario where CCS is not implemented, as it involves unnecessary infrastructure.	To ensure that the support to individual elements of the CCS chain has **a positive impact on other fossil fuel installations owned by the beneficiary.**
Aid in the form of reduction in or exemptions from environmental taxes	✓ **Objective Criteria for Beneficiaries**: Beneficiaries are selected based on transparent criteria, and aid is granted equally to competitors in similar situations. ✓ **Cost Absorption by Beneficiaries**: Beneficiaries cannot pass the increased costs onto customers without substantial sales reductions. ✓ **Minimum Tax Payment**: Aid beneficiaries must pay at least 20% of the national	To prevent that some undertakings be placed at such a competitive disadvantage that it would not be feasible to introduce the environmental tax in the first place.

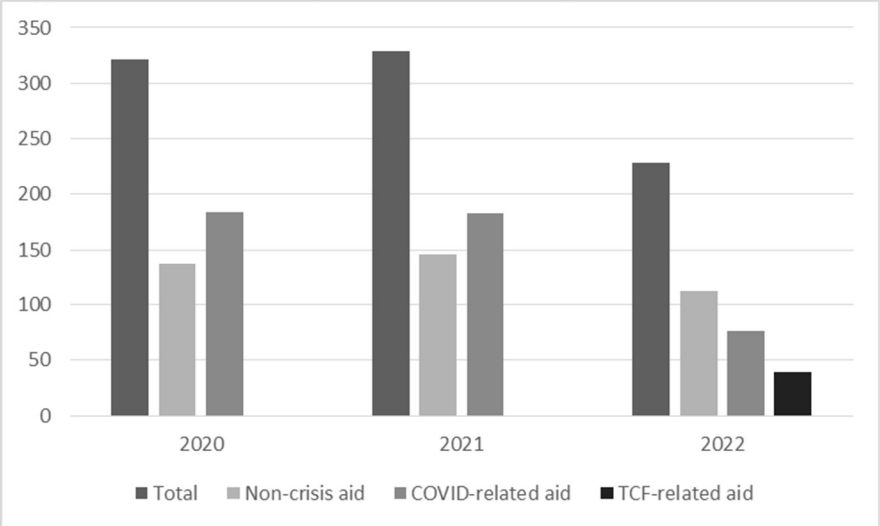
TYPE OF STATE AID	GRANTING CONDITIONS	GOAL
	environmental tax or applying the Union minimum tax level.	
Aid for energy infrastructure	✓ **Aid Limitation**: The aid amount must be limited to what is necessary to achieve the infrastructure objectives. ✓ **Counterfactual Scenario**: For infrastructure aid, the counterfactual scenario assumes the project will not occur, making the funding gap the eligible cost. ✓ **Aid Intensity Limit**: Aid measures for infrastructure should not exceed 100% of eligible costs.	**To overcome the market failure** other than by means of compulsory user tariffs.

Source: Author's representation based on the EU's legal framework.

As one may see, the pillars of circular economy are covered by these types of State Aids that are all permitted to the Member States with the condition to respect first the main provisions of Article 107 from the Treaty on the Functioning of the European Union (TFUE) and the additional requests specified in the Guidelines for State Aid for Environmental protection and energy (Box 1).

According to the latest data from the State Aid Scoreboard, in the first year of the COVID-19 pandemic (2020), the largest share of State Aid granted in EU were crisis-related aid, while in the following years (2021 and 2022), the share of such aids has gradually decreased (Graph 1).

Graph 1: Total State Aid granted in EU during 2020-2022 (Billion EUR)

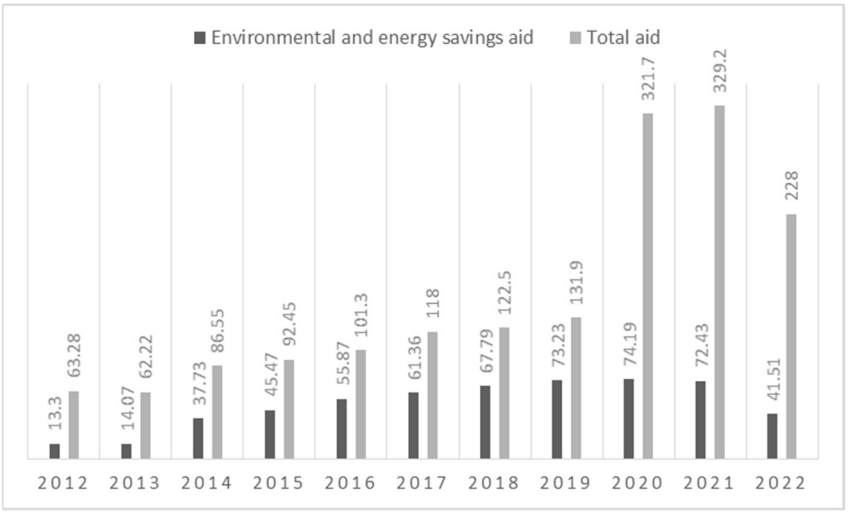


Source: Author, based on the State Aid Scoreboard (2024).

Note: The data for 2022, are the latest available. The TCF – related aid refers to measures approved under the Temporary Crisis Framework (TCF), adopted in the context of the war from Ukraine **in** March 2022 to enable Member States to support companies directly impacted by the war or the ensuing sanctions against Russian Federation.

As shown by Graph 1, while COVID-related aid significantly decreased in 2022, TCF-related aid amounted to 39.33 billion euros. At the same time, 2022 is the first year after the COVID-19 pandemic when non-crisis aid surpassed crisis-related aid, with 112 billion euros compared to 76.65 billion euros for COVID-related aid and 39.33 billion euros for TCF-related aid. The share of environmental and energy saving State Aid gradually increased across EU in the last decade (Graph 2).

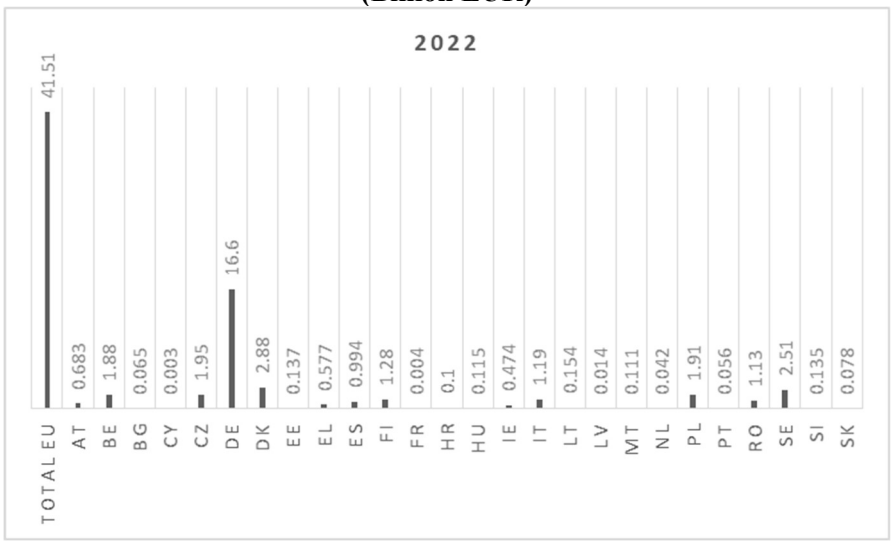
Graph 2: The evolution of State Aids for environmental protection and energy savings in EU, compared with total aid during 2012-2022 (Billion EUR)



Source: Author, based on the State Aid Scoreboard (2024).
Note: The data for 2022, are the latest available.

As highlighted by Graph 2, one may notice that, after 2019 (the year of the European Green Deal adoption), there was a strong increase in State Aid granted for environmental protection and energy savings, while in 2022, such aids registered a downfall, most likely because of the post-Ukrainian war economic imbalances that forced Member States to grant more TFC-related aids. If we look at the evolution of total State Aid granted in the EU during 2012-2022, the strongest increase can be noticed in the pandemic and post-pandemic period (a total of 228 billion euros granted in 2022, compared with the pre-pandemic level of 131.9 billion euros granted in 2019), given that the increased flexibility of the regulatory framework allowed large amounts of crisis-related aid to be granted across the EU.
So, what is the share of the environmental protection and energy saving in all the Member States? When analysing the situation in 2022, one may notice that Germany, Denmark, Slovenia and Italy are ranking high in the European hierarchy, while the lowest performances are registered by Cyprus, Latvia and France (Graph 3).

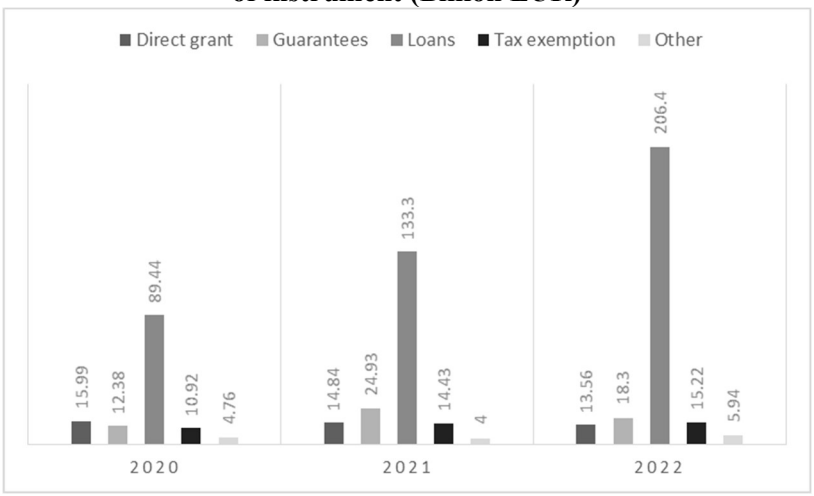
Graph 3: State Aid for environmental protection and energy savings in the EU Member states in 2022 (Billion EUR)



Source: Author, based on the State Aid Scoreboard (2024).
Note: The data for 2022, are the latest available.

Regarding the type of instrument preferred by Member States for aid related to environmental protection and energy savings, we notice that loans were most used both during and after the COVID-19 pandemic. These types of State Aid showed a clear upward trend between 2020 and 2022 (Graph 4).

Graph 4: State Aid for environmental protection and energy savings in the EU Member States, by type of instrument (Billion EUR)



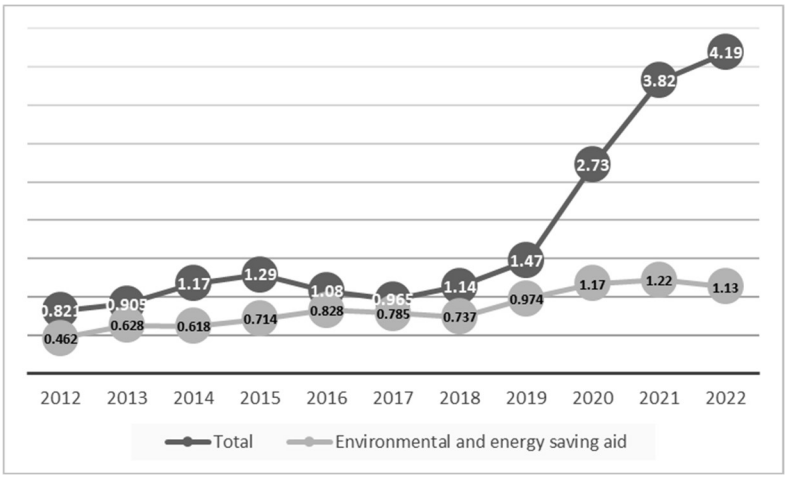
Source: Author, based on the State Aid Scoreboard (2024).
Note: The data for 2022, are the latest available.

The Member States choose loans for granting environmental and energy saving State aid for several reasons. Firstly, the loans offer more financial flexibility, providing businesses and public entities with the necessary capital without requiring immediate full funding. This type of State Aid allows to the beneficiaries to manage cash flow effectively while investing in projects that promote environmental sustainability and energy efficiency.

5. The case of Romania: State Aids for circular economy

As shown in the previous sections of our analysis, the COVID-19 pandemic and the war in Ukraine dramatically changed the focus of State Aid policy in the EU during 2020-2022. These "black swan" events required the rapid adoption of a new regulatory framework for coping with the new economic imbalances and allowed Member States to grant an unprecedented amount of crisis-related aid. In the case of Romania, the national authorities fully benefited from this flexibility, granting numerous crisis-related aids, but environmental and energy savings aid continued to register good performance during 2012-2022, with a constant increase even after the COVID-19 pandemic (Graph 5).

Graph 5: The evolution of State Aids for environmental protection and energy savings in Romania, compared with total aid during 2012-2022 (Billion EUR)



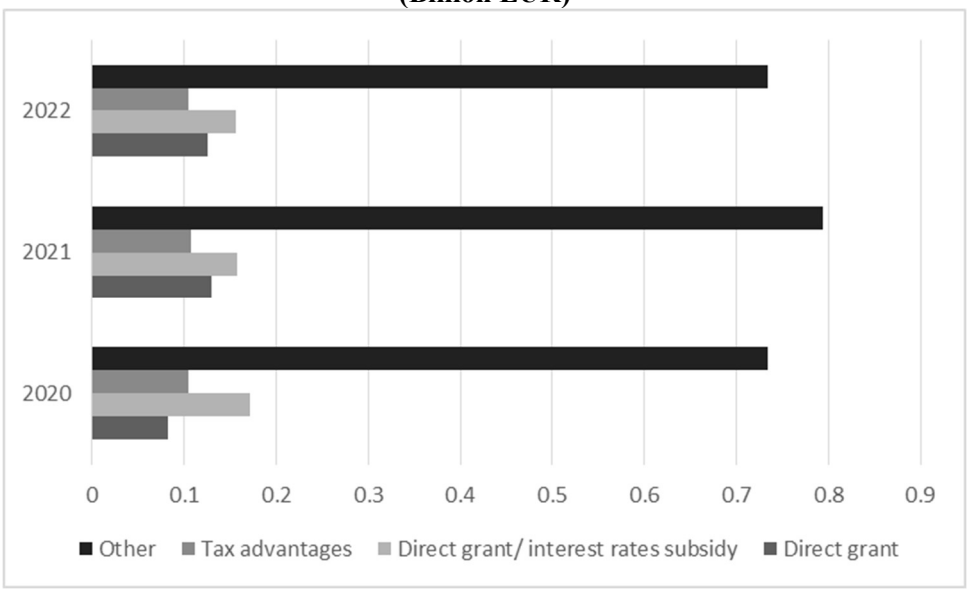
Source: Author, based on the State Aid Scoreboard (2024).
Note: The data for 2022, are the latest available.

As shown by the Graph 5, an upward trend of State aid for environmental and energy savings can be noticed in Romania after the European Green Deal adoption (in 2019), with a peak of such aids being registered in 2021 (1.22 billion euros).

The upward trend of State aid for environmental and energy savings in Romania can be attributed to several key factors. Firstly, while the European Green Deal outlines ambitious climate and environmental objectives for all the Member States, Romania aligned its national policies with these goals, leading to increased funding and support for initiatives aimed at environmental protection and energy efficiency. Secondly, while the Romanian government has recognized the importance of transitioning to renewable energy sources, the increased State aid has likely been directed toward supporting the development and integration of renewable energy projects, contributing to the overall upward trend. Moreover, in the post-pandemic era Romania saw an opportunity to rebuild its economy with a focus on sustainability, hence prioritizing increased investments in green technologies, further boosting State aid for environmental and energy savings.

In terms of preferred instrument for granting State Aid for environmental protection and energy savings, Romanian authorities did not granted loans, thus taking a different path compared with the EU's tendencies in the field (Graph 6).

Graph 6: State Aid for environmental protection and energy savings in Romania, by type of instrument (Billion EUR)



Source: Author, based on the State Aid Scoreboard (2024).
Note: The data for 2022, are the latest available.

As revealed by Graph 6, the preferred instrument for environmental and energy saving State Aid in Romania were the direct grants. This preference of the Romanian authorities was related to the fact that direct grants provide businesses and public entities with immediate financial resources without the burden of repayment. Moreover, in the post-pandemic period, many Romanian companies faced economic challenges and needed quick access to funds to implement green initiatives.

6. Conclusion

Our main finding is that although, in recent years, the State Aid policy has been reshaped by major exogenous crises, such as the COVID-19 pandemic and the war in Ukraine, it has also managed to support the green transition and circular economy initiatives. Especially after the European Green Deal adoption, a clear increase in such State Aid can be noticed at the EU level and in many Member States.

Our second finding shows that, while ranking in the middle of the European hierarchy, Romania has managed to register good performance in supporting the circular economy through State Aid. While the preferred instrument for the pandemic and post-pandemic period remained direct grants, Romanian authorities have managed to offer effective incentives for companies to adopt new environmental technologies and practices. Moreover, by reducing the upfront costs associated with green projects, such State Aid has encouraged more entities to invest in energy efficiency and sustainability.

However, despite the overall progress noted among all Member States, there is room for improvement in the field of State Aid for the circular economy, and most likely, an upward trend will be registered after the economic difficulties derived from the post-pandemic imbalances and those brought by the war in Ukraine are addressed.

In our opinion, in the short and medium term, Member States in general and Romania in particular should focus on providing State Aid for environmental and energy-saving projects, leading to increased support for boosting the circular economy across the EU. As shown by recent years' experience, many businesses, especially SMEs, may lack the financial capacity to take on loans for energy-saving investments and other circular economy goals. Given this reality, tailored State Aid schemes could eliminate this barrier, making it easier for these entities to engage in environmental initiatives while facilitating quicker and more effective investments in sustainability across all EU Member States.

Acknowledgement: This scientific paper was published during the sustainability period of the project with the title: "Support Center for IEM research projects - competitive innovation in Horizon 2020", ID 107540. The project was co-financed from the European Regional Development Fund through the Competitiveness Operational Program 2014 - 2020.

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