

EUROPEAN FUNDING FOR ENERGY TRANSITION – OPPORTUNITIES AND CHALLENGES

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Abstract

The new energy transition is a challenge for stakeholders taking in account the implications of the process on economic, social, technical and behavioural fields. In addition, different opportunities are available for companies, public authorities and consumers. Behavioural changes among consumers, financial challenges for the population, changes in business strategies for companies are some results of this new transition. The need for financial resources, provided from public and private sources is noticed taking into account the complexity of technical solutions. This new energy transition clearly differs from the previous ones in that it is a politically coordinated process, with the European Union being the indisputable leader of the energy transition on an international level. The specific instruments, programs and mechanisms are set up and implemented to support this process. The aim of the paper is to analyse how European funding contributes to the promotion of the energy transition in Romania, with an emphasis on identifying opportunities and managing associated challenges. This study examines the funds allocated to Romania through structural financing during the 2014-2020 programming period, extended through 2023, for a low-carbon economy. The methodology consists of analyzing officially reported data on the execution of projects under thematic objective no. 4 of the Cohesion Policy (CP). Specifically, the projects implemented in the localities of the component counties of a region were selected, and then the data were divided by thematic financing details. The amounts are those eligible for EU co-financing. The analysis results highlight the role of non-reimbursable funds from the previous programming period in achieving energy

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transition goals, as well as the challenges faced by Romanian beneficiary organizations during the implementation process.

Keywords

energy transition, European funding, low-carbon economy, sustainable development, Cohesion Policy (CP)

JEL Classification

Q58, R58, P48, F36, D60

Introduction

The purpose of this article is to examine the role of European funding in supporting the energy transition in Romania, with an emphasis on identifying opportunities and managing associated challenges. The importance of the energy field is increasingly highlighted in recent years within the global efforts to reduce extreme phenomena caused by climate change, but also in the context of much increased attention paid to the health of the population (in heavily industrialized areas). The European funds are a tool to support these policies and without it, the social implications of the energy transition could seriously endanger the very existence of any endeavour (Khan et al., 2022; Popescu et al., 2022; Tian et al., 2022).

The complexity of the energy transition process resides not only in the social and technological challenges it generates, but also in the need to allocate considerable public and private funds to support the transition from fossil fuels to renewable energy. For this reason, the legal and financial framework of the European Union supports this process through specific instruments (Petrescu et al., 2023; Popescu et al., 2024; Ionescu et al., 2024). This study focuses on the funding allocated to Romania through structural funds during the 2014-2020 programming period, extended until 2023, for a low-carbon economy. It presents a case study of the Central region of Romania, analyzing the use of non-reimbursable funds allocated to thematic objective (TO) 4 during the 2014-2020 programming period, which concluded on December 31, 2023. This paper adds a perspective regarding the allocation and use, at the regional level, of the funds dedicated to the energy transition. The working hypothesis proposed that the amounts allocated for TO 4 from non-reimbursable European funds in the Central region are comparable to those in the other development regions of Romania. This hypothesis appeared because the specialized literature identified situations in which the interest in the European funds intended for the energy transition was not necessarily linked to the areas with the most intense pollution, but the allocations seem balanced between the various areas. This study used the officially provided data on project implementation from the government's website, specifically for TO 4 - Supporting the transition to a low-carbon economy ("low carbon"), an objective of the CP. It should be noted that this study does not refer to the allocations through the Just Transition Fund, dedicated only to certain counties in Romania, because these funds belong to the current programming period, theoretically implemented from 2021, but practically from 2023. Financial allocations used efficiently, no matter the area, would enhance the idea of a long-term European fund for the low-carbon economy.

This paper includes a brief review of the scientific literature, the detail of research methodology, three sections containing statistics and comparative issues about European funding for TO 4 in the Center Region, results and discussion, conclusions.

1. Review of the scientific literature

During the previous financial programming period, the Cohesion Policy (CP) at the EU level served as a crucial source of investment for member states, particularly during times of economic and budgetary challenges (Comes et al., 2018), and played a significant role in supporting the population's consumption patterns (Zaharia et al., 2019). Investments in renewable energy project development face a global challenge due to the exceptionally high costs, which, at present, negatively affect the transition to renewable energy (Panait et al., 2022; Martí-Ballester, 2022). However, the costs for ensuring the energy transition process cannot be avoided or ignored, and EU funds allocations are a support to develop an eco-friendly work environment (Kawecka-Wyrzykowska, 2022, Dembicka-Niemiec et al, 2023). (Kouloukoui et al, 2019), in their research for the period 2015-2017 on the 100 largest greenhouse gases (GHG) emitters in the whole world, suggest that a study would be required on the ratio between the number of energy transition projects implemented and the reduction emission intensity, the author suggesting that an important factor in the decisions to realize the projects seems to be the level of profitability. Similarly, in his study on a sample that includes 500 large companies in the world and their sustainability projects, (Elijido-Tenet et al, 2019) concluded that the corporations with the best performances consider energy transition strategies rather as an opportunity than as a risk management issue related to climate change. Surprisingly, some authors (Kozera et al, 2023) have shown that there is not necessarily a connection between the most polluted areas and the size of attracting funds for green energy, and even that administrations in areas apparently less affected by pollution were interested in financing renewable energies.

The main challenge faced by decision-makers in all countries is strengthening budgetary support for the energy transition. In this context, Gkonis et al. (2020) argue that the successful implementation of energy efficiency policies must be grounded in realistic cost estimates, which should be incorporated into national energy and climate plans while considering the social and economic conditions of each country. Furthermore, from the perspective of sustainable development goals, Shahbaz et al. (2020), Kirikkaleli & Adebayo (2021), and Raza et al. (2021) highlight the importance of public-private partnerships. These partnerships are essential for addressing the complexities of the energy transition and overcoming the challenges posed by emerging technologies. An important aspect is also the principle of legal security, which plays a major role in the certainty of investments (Fuschi, 2023).

The researchers generally agree that energy efficiency initiatives are key structural measures aimed at addressing long-term energy poverty (Gouveia et al., 2019; Boemi et al., 2019; Neaça et al., 2020; Panait et al., 2022). These actions, over the coming years, are expected to help reduce the EU's dependence on energy imports (Hursthouse et al., 2022). In support of this, some experts advocate for the establishment of a permanent EU fund dedicated to financing climate change mitigation and green energy initiatives (Heimberger et al., 2023; Noera, 2024). Therefore, considering these studies, it is

necessary to carry out a detailed analysis of Romania, a country that faces numerous challenges in the energy transition process and that benefits from financial support from the EU, being an important regional player from the perspective of energy security.

2. Research methodology

The data used for this paper were obtained from MySMIS 2014 (MEIP, 2023). Specifically, the "Open Data - List of Operations" platform was consulted, which includes a database of projects contracted under the Operational Programs of the 2014-2020 programming period. For each category, localities from the six counties that form the Center region were selected. The limits of this study are defined by the period of time (2014-2023), the type of funding examined (European funds, specifically the Regional Operational Program (ROP) and the Large Infrastructure Operational Program (LIOP)), and the geographical area of the projects (Braşov, Covasna, Harghita, Alba, Sibiu, and Mureş counties). Therefore, the statistical data were extracted from the Open Data database—specifically, the list of Beneficiaries (Government of Romania, Ministry of European Funds (MEF), Statistics, 2024). The data, covering the period from 2014 to 2023, reflect the closure of the 2014-2023 programming period on December 31, 2023. In the database, the term "operation" refers to a "financed project." The data were then aggregated at the development region level, with the case study focusing on the Center Region of Romania.

Projects for energy transition in the Central Region, in the period 2014-2020, through the Cohesion Policy

The key programs that funded TO 4 were LIOP and ROP

Table 1. Projects by sector codes within TO 4 in Center Region of Romania

Sector code	No. of projects
001 - broad-based productive investments in small and medium-sized enterprises (SMEs)	1
003 - productive investments in large companies related to the low-carbon economy	3
010 - renewable energy: solar power	28
011 - renewable energy: biomass power	1
012 - other renewable energy sources and their integration	3
013 - renovation of public infrastructure to improve energy efficiency, along with demonstration projects and supporting measures	60
014 - renovating the existing housing supply to improve energy efficiency, including pilot projects and supporting measures	27
015 - smart power distribution systems for low and medium voltage	21
023 - environmental protection actions designed to reduce and/or prevent GHG emissions	1
multi-sectoral (roads, air quality, bike lanes, etc.)	40
068 - energy efficiency initiatives and demonstration projects in SMEs, along with supporting measures	18

069 - promoting eco-friendly production processes and efficient resource use in SMEs	5
070 Promoting energy efficiency in large corporations	3
116 - enhancing the quality, efficiency, and accessibility of tertiary and equivalent education to boost participation and skill development, especially for disadvantaged groups	1

Source: authors, based on MEIP data, 2023, MySMIS 2014 Open Data

The data analysis reveals that, in the Central Region of Romania, most of the projects financed during the 2014-2020/2023 programming period aimed at supporting the transition to a carbon-neutral economy, focused on the renovation of public buildings, accounting for over 28% of the total projects. These funds were primarily directed towards upgrading public education infrastructure, including high schools, schools, kindergartens, and nurseries, as well as the buildings of central and local administration authorities. Following this, approximately 19% of the projects addressed multi-thematic issues, such as planning bicycle lanes and creating eco-friendly routes. This distribution highlights the priority given to enhancing public infrastructure and fostering sustainable urban development.

Around 15% of the total projects contracted under TO 4 in the Central Region were focused on the development of renewable energy facilities. These projects primarily targeted solar energy and biomass, but also included initiatives for hydropower, as well as gas and hydrogen infrastructure. In addition, SMEs benefitted from six projects under TO 4 in the region. Moreover, a project dedicated to sustainability education was also included in the regional portfolio. Another significant focus at the regional level was the advancement of smart electricity distribution systems, which encompassed smart grids and ICT solutions, further supporting the transition to a more sustainable and efficient energy system.

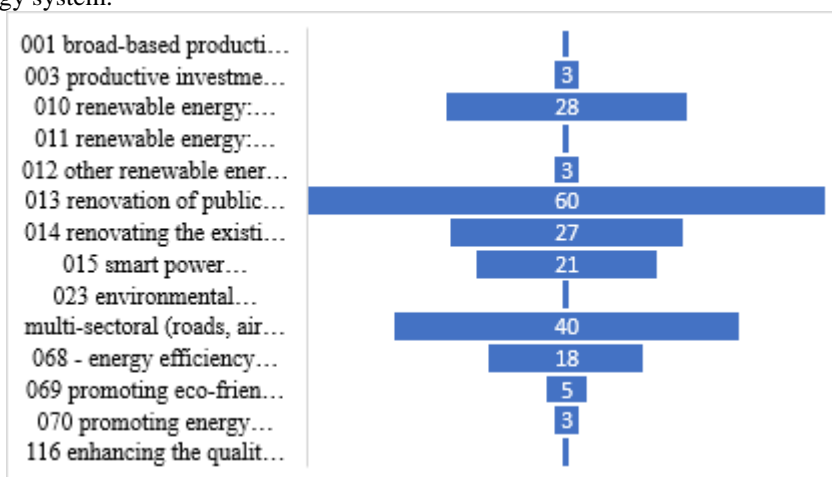


Figure 1: A comparative overview of the submitted projects for TO 4 across each thematic area.

Source: authors, based on MEIP data, 2023, MySMIS 2014 Open Data

It is noteworthy that over half of the projects implemented under TO 4 in the Central Region were focused on financing energy efficiency initiatives. These projects not only targeted public infrastructure but also aimed at renovating the housing stock, particularly multi-apartment buildings in urban areas. Additionally, energy efficiency measures were extended to SMEs, highlighting the broad scope of the region's commitment to improving energy use across various sectors.

Non-reimbursable funding for the energy transition in the Central Region from 2014 to 2020

The following section presents an analysis of the data related to the value of projects financed through non-reimbursable funds under the CP, specifically targeting TO 4 in the Central Region of Romania. The adjacent column provides a breakdown of the financial contribution from the EU budget. All values are expressed in millions of lei and have been rounded for clarity.

Table 2. The funding value of projects through non-reimbursable funds for TO 4 in the Central Region of Romania, 2014-2020

Field code	Spent (mil RON)	UE co-funding (mil RON)
001 - broad-based productive investments in small and medium-sized enterprises (SMEs)	0,77	0,36
003 - productive investments in large companies related to the low-carbon economy	2,44	1,98
010 - renewable energy: solar power	159,58	84,94
011 - renewable energy: biomass power	5,49	4,67
012 - other renewable energy sources and their integration	11,80	10,03
013 - renovation of public infrastructure to improve energy efficiency, along with demonstration projects and supporting measures	314,21	263,87
014 - renovating the existing housing supply to improve energy efficiency, including pilot projects and supporting measures	263,38	158,79
015 - smart power distribution systems for low and medium voltage	167,33	142,11
023 - environmental protection actions designed to reduce and/or prevent GHG emissions	1,07	0,59
multi-sectoral (roads, air quality, bike lanes, etc.)	2.411,03	2.049,38
068 - energy efficiency initiatives and demonstration projects in SMEs, along with supporting measures	15,51	11,13
069 - promoting eco-friendly production processes and efficient resource use in SMEs	5,08	5,06
070 Promoting energy efficiency in large corporations	1,65	1,40

116- enhancing the quality, efficiency, and accessibility of tertiary and equivalent education to boost participation and skill development, especially for disadvantaged groups	24,90	21,16
Total	3.384,24	2.755,47

Source: authors, based on MEIP data, 2023, MySMIS 2014 Open Data

The examination of the financial data provides a different perspective compared to the earlier analysis based on the number of projects. While projects focused on the development of renewable energy facilities (solar, biomass, hydroenergy, and hydrogen) accounted for 15% of the total number of projects, they represented only 5.22% of the total expenditure. In contrast, the largest investments under TO 4 in the Central Region were directed towards multi-thematic objectives, such as the planning of bicycle lanes and the development of eco-friendly routes. These projects, which made up 19% of the total number of projects, absorbed more than 71% of the total funds allocated. Although over 50% of the projects focused on energy efficiency, they accounted for approximately 17.6% of the total expenditure under TO 4 in the region. Furthermore, projects benefiting SMEs accounted for less than 1% of the total expenditure.

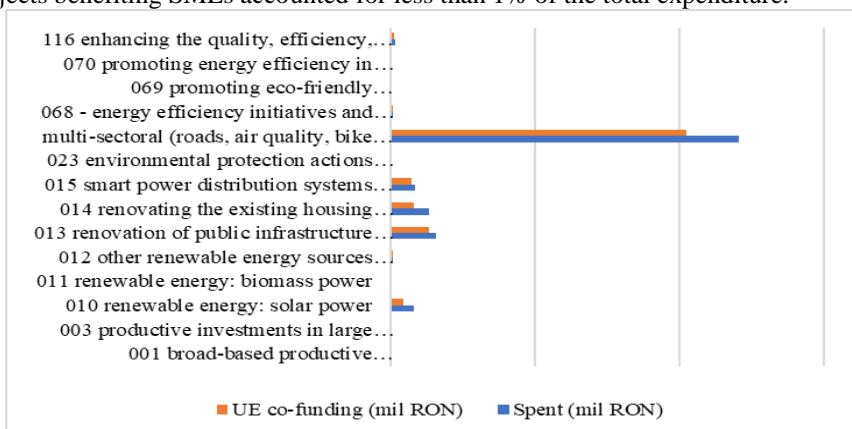


Figure 2: A comparative overview of the funding value of projects financed through non-reimbursable funds under TO 4 in the Central Region of Romania, 2014-2020. Source: authors, based on MEIP data, 2023, MySMIS 2014 Open Data.

This figure illustrates the distribution of financial resources across different project categories, highlighting the relative share of funding allocated to each area within the region during the specified period.

The Central Region's contribution to achieving the objective of supporting Romania's transition to a low-carbon economy, 2014-2020.

In the next phase of the study, the number of projects and the associated expenses for their implementation in the Central Region were quantified and compared with similar data at the national level in Romania. The statistical analysis reveals that the Central Region accounted for 12.09% of the total number of projects implemented under TO 4

in the country, while the expenses incurred represented approximately 7% of the national total for this target. The EU co-financing attracted by the Central Region amounted to about 14% of the national total for the transition to a low-carbon economy. A positive observation is that projects in the Central Region were able to leverage over 80% of eligible expenses in EU co-financing, significantly higher than the national average, where the co-financing rate was just over 40%.

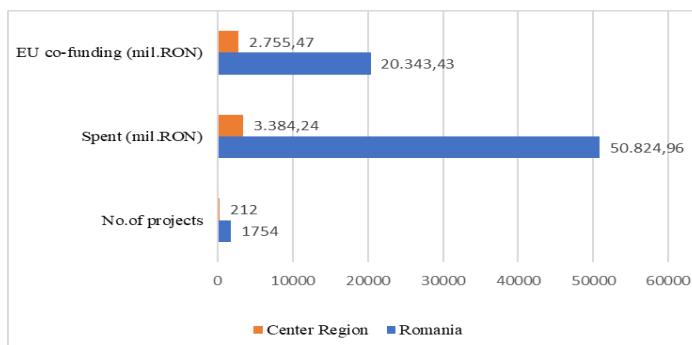


Figure 3: Comparative overview of the number and funding value of projects financed through non-reimbursable funds for TO 4 in Romania and the Central Region, 2014-2020.

Source: authors, based on MEIP data, 2023, MySMIS 2014 Open Data.

This figure presents a comparison between the national and regional levels, highlighting both the number of projects and the financial values allocated to each, offering insight into the Central Region's contribution to achieving the target for the transition to a low-carbon economy.

3. Results and discussions

The research conducted does not support the hypothesis of a proportional use of funding at the national level for the thematic objective addressing the energy transition during the 2014-2020 programming period. However, a common trend observed across all development regions in Romania is the significant allocation of financial resources toward energy efficiency, particularly for the renovation of public infrastructure and housing stock. Additionally, similar to national trends, projects with higher financial values were predominantly implemented in urban areas rather than rural areas. This disparity can be attributed to the more inefficient use of energy resources in urban agglomerations.

The extension of the programming period by an additional three years provided the Central Region with an opportunity to complete projects that were nearing maturity at the end of the initial period. It also allowed for the further capitalization of available funds through the resumption of certain calls for projects between 2020 and 2023. This study's findings contribute to the specialized literature, particularly since no similar studies have been identified that compare the use of low-carbon economy funds across Romania's development regions.

Conclusions

The analysis we carried out confirms the working hypothesis regarding the balanced use of non-reimbursable European funds for TO in the Center region by comparison with the other development regions. A conclusion that emerges from the study of the data is that, within TO 4, very important amounts were capitalized for detailed thematics that refer to energy efficiency and multithematic details.

Funds were also allocated and implemented by both local public authorities and private entities (SMEs). There are numerous projects whose actual implementation took place towards the end of the programming period, including in the n+3 interval, i.e. until December 2023. This situation also highlights the challenges faced by project beneficiaries during the previous programming period, since a considerable number of projects needed the implementation period extended beyond 2020, extending until 2023. However, the inability to fully utilize the allocated funds for this thematic objective resulted in the need to reopen some calls for projects even after 2020.

An important conclusion of our analysis is that the previous programming period offers valuable lessons for the management authorities and local authorities in the Central Region of Romania, particularly regarding the management of overcontracting processes. These lessons should be considered for the 2021-2027 programming period to enhance the chances of improving the absorption of non-refundable funds in Romania within the planned timeframe.

We believe that the main limitations of such a research approach are given by the difficulty of identifying the data reported on the part of amounts used versus contracted values, considering the problems faced by the beneficiaries of the projects during their development. However, in terms of public policies, the experience of using financing through TO 4, continued with the current period of European funding, we believe it can be a solid argument for supporting the idea of a permanent EU fund, dedicated to mitigating climate change and the energy transition. The limitations of the research are determined by the data collection period (2014-2023) and the geographical scope, which is focused on one of Romania's development regions. Also, the limits are given by the type of funds analyzed (structural funds, through the Cohesion Policy) and national contributions or through other financial instruments (bank loans, private investments, etc.) were not included.

As future research directions, we propose a similar analysis for each of Romania's regions, as well as a comparison with the data resulting from the 2021-2027 programming period.

Abbreviations and acronyms

CP - Cohesion Policy

ROP – Regional Operational Program

LIOP - Large Infrastructure Operational Program

TO -OT – thematic objective

SMEs – Small and midsize enterprises

MEIP - Ministry of European Investments and Projects

GHG - Greenhouse gases

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