

Research on Policies and Mechanisms That Can Streamline the Process of Transition to Green Energy and Achieving Climate Change-related Targets

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Abstract

Climate change is a dangerous phenomenon that humanity is currently facing and is a direct result of increasing greenhouse gas emissions. The European Union, as a global leader in combating climate change, has an important role to play in international efforts to reduce CO2 emissions as well as to reduce the impact of climate change, by creating and implementing mechanisms aimed to deliver climate change direction by establishing a path towards climate neutrality and supporting this transition to green energy.

The objective of this paper is to identify and analyze the main tools that can streamline the process of transition to green energy and achieving climate targets associated with climate change.

In this sense, the comparative analysis is used which aims to understand the need to implement these international mechanisms, being based on the presentation of strategies that can be used to stimulate the global transition to a neutral economy in terms of climate impact.

Keywords: green energy, climate change, climate neutrality

1. Introduction

Global warming or changing climatic conditions is a dangerous phenomenon that humanity is currently facing and is a direct result of increasing greenhouse gas emissions. (Cerovic Smolovic, J., 2020). Without making clear concrete measures to reduce these emissions, it is estimated that average temperatures worldwide will increase by 1.8 degrees to 4 degrees Celsius by 2100, bringing with it substantial changes in climate and extreme weather events, heat waves, frequent rainfall and a significantly increased volume. [Esperanza Mata Perez, M, 2019]

The European Union, as a global leader in combating climate change, has taken various actions aimed to reduce and even stop greenhouse gas emissions. These actions derive mainly from the obligations assumed by the 1992 United Nation Convention, the 1997 Kyoto Protocol, as well as by the Paris Agreement adopted at the Paris Climate Conference in December 2015 and ratified on 5 October 2015. These approaches are joined by the environmental protection policy established by the 1997 Amsterdam Treaty and reconfirmed by the 2007 Lisbon Treaty, as well as other international mechanisms, including: the Modernisation Fund, Innovation Fund and Just Transition Fund and the European Green Deal. The European Union declared that it will become the first economic neutral zone in terms of the climate by 2050.

The Paris Agreement established ambitious global targets for climate change mitigation and set a long-term goal in line with the goal of keeping global average temperatures rise well below 2 degrees Celsius above preindustrial levels and to maximize efforts to limit temperature rise to 1.5 degrees Celsius above pre-industrial levels.

Therefore, "the European Union can only succeed if its efforts stimulate the global transition to a fair, climate-neutral, resource-efficient and circular economy" this transition being one of the most important policy objectives of the Union.

Analysis of the literature on policies and mechanisms for promoting green energy

The analysis of this paper presents several international mechanisms whose main purpose is to combat climate change by reducing and even stopping greenhouse gas emissions. In the present study we aimed to analyze these mechanisms by presenting legislation and relevant EU policies, which must relate to the objective of neutrality climate and under conditions of fair competition, so as to meet the objective set out by the Union and maintain an equal importance on emissions as well as on removals of greenhouse gases to arrive zero net emissions by 2050.

The principal mechanisms promoted by the EU in order to reduce CO₂ emissions and to reduce the impact of climate change, which are analyzed in this material are: The Modernisation Fund, The Innovation Fund, Just Transition Fund and the European Green Deal.

A. Modernisation Fund

Modernisation Fund is a program that aims to help the transition to climate neutrality of 10 low-income EU countries, thus contributing to the modernisation of their energy systems and improving energy efficiency.

Its main role is to help the European Union in the process of transition to climate neutrality, so that the beneficiary states succeed in meeting their set targets in this regard. At the same time, the Modernisation Fund will involve both the modernisation of energy networks and the promotion of the exchange of good practices between the beneficiary Member States. Last but not least, it will help finance renewable energy sources and help improve Member States' national energy systems by turning them into greener and more economical ones.

This mechanism supports substantial investments to help achieve the Union's climate and energy change objectives, both set by the Paris Agreement and by other legislative taken measures. Most of the resources of the Modernisation Fund (at least 70%) must be invested in priority areas such as the creation and use of electricity from renewable sources, but also in areas aimed to improve energy efficiency (including areas such as transport, buildings, agriculture, waste and excluding energy efficiency related to the generation of energy using solid fossil fuels). Consideration is also given to how to store energy, modernise energy networks and also support for a fair transition in the carbon-dependent regions of the beneficiary Member States.

The Modernisation Fund consists of the sale of auctions of 2% of greenhouse gas emission certificates for the period 2021-2030, Romania having been allocated 33.018.490 certificates from the total number of greenhouse gas emission certificates (11.98 %).

To this number can be added a number of certificates that are intended for the Solidarity Fund (81.673.875), which according to the EU-ETS Directive can be transferred free of charge and another significant number of certificates according to Article 10c of the directive (86,073,704), Romania being able to capitalize on a total of 200.766.069 certificates.[Tantau, A, 2023]

In the first year of operation, the Modernisation Fund made available 898.43 million Euros for eight EU countries with the aim of modernising their energy systems, reducing greenhouse gas emissions in the energy, industrial and transport sectors and agriculture, but also for meeting the climate and energy objectives for 2030, as is apparent from the information communicated on the European Commission's website, mentioned at point 5part B from bibliographical references.

Though the Modernisation Fund cannot finance investments involving solid fossil fuels, unless such investments relate to efficient and sustainable heating in economical less developed countries such as Bulgaria or Romania.

In order to fulfill its role, the Modernisation Fund will work with the responsibility of the beneficiaries Member States and will collaborate with the European Investment Bank (EIB), Committee of Investments and the European Commission.

An important role in achieving European Union's goals on climate and improving energy efficiency is played by the European Investment Bank, which has several functions, of which to mention, by way of example, auctioning of allowances ensuring the resources of the Modernisation Fund. In this respect, such certificates shall be auctioned in annual volumes equal split between 2021 and 2030 and the auction shall be conducted in accordance with the Auction Regulation. Other tasks assigned to the European Investment Bank are also the confirmation of whether an investment is a priority or not, the achievement of financial and technical diligence of non-priority investments, including an assessment of expected emission reductions.

To this end, the Joint Procurement Agreement for procuring common auction platforms was signed by the European Commission and 24 Member States in 2011, 2012 (including Romania), except Germany, Poland and United Kingdom, with the aim of establishing the practical arrangements governing the joint procurement procedure, as governed by Article 125 letter c of the Implementing Rules.

At the same time, according to the Article 4 paragraph (2) letter a) of the aforementioned normative act, the Commission is authorized by the participating states to act on their behalf and to carry out the common public procurement procedure, including the award and signing of the resulting contract. The integrated parts of this contract are the escrow agreement and the custody agreement according to Article 46 of Regulation (EU) 1031/2010.

A settlement of these auctions also follows from Directive 2003/87/EC of the European Parliament and of the Council. According to the Final Report on the Analysis of the use of auctioning revenues by Member States, the auction means the method of allocating allowances under phase 3 of the European Union's emissions trading scheme and is considered the simplest and most efficient way to do so in the absence of other factors.

Table 1. Modernisation Fund Financing

Modernisation Fund	Member States	Share	Allowances	Transfers	Total
2% of cap	Bulgaria	5,84%	16.095.825	0	16.095.825
	Czechia	15,59%	42.968.135	150.184.557	193.152.692
	Estonia	2,78%	7.662.054	0	7.662.054
	Croatia	3,14%	8.654.262	5.978.852	14.633.114
	Latvia	1,44%	3.968.834	0	3.968.834
	Lithuania	2,57%	7.083.265	8.696.818	15.780.083
	Hungary	7,12%	19.623.677	0	19.623.677
	Poland	43,41%	119.643.793	0	119.643.793
	Romania	11,98%	33.018.490	167.747.579	200.766.069
	Slovakia	6,13%	16.895.104	35.011.645	51.906.749
	Total	100,00%	275.613.439	367.619.451	643.232.890

Source: https://ec.europa.eu/clima/policies/budget/modernisation-fund_en

As far as Romania is concerned, on October 11st 2022, the press release was issued through which the Ministry of Energy brought to the attention of electricity distribution operators the concessionaires defined in Law no. 123/2012 on electricity and natural gas, the launch of the non-competitive procedure - Investment support for the expansion and modernisation of the electricity distribution network - with funding from the Modernisation Fund.

The purpose of the project is the non-refundable financing for investment projects in the energy infrastructure to modernise, but also to create new sections in the transmission and distribution networks of electricity and natural gas. At the same time, this project involves the transition of natural gas transmission and distribution networks capable of receiving green hydrogen, as well as the construction and modernisation of natural gas storage warehouses and to increase the level of interconnection of the electric transmission network.

Another important aspect to mention is that the estimated support offered by the Modernisation Fund is 80% of the eligible expenses, and the financing that is granted in the form of reimbursement of expenses is the following with a minimum value of 5,000,000 euros without VAT and a maximum value of 50,000,000 euros without VAT, as resulted from the information communicated on the Romanian Government’s website, mentioned at point 6part B from bibliographical references.

B. The Innovation Fund

The Innovation Fund is one of the largest funding programs in the world, which aims to create technologies to reduce carbon emissions and which will provide around € 38 billion of support from 2020 to 2030 (at EUR 75/tCO₂), taking into consideration the price of the carbon for the development of low-carbon technologies.

It has the purpose to create innovative technologies and projects that can reduce CO2 emissions. It has also the objective to finance project pipeline, supports cross-cutting projects on innovative low-carbon solutions that can drive to emission reductions, being at the same time open to small-scale projects with total costs under Euro 7.5 million, as we found out from European Union's website: https://climate.ec.europa.eu/eu-action/funding-climate-action/innovation-fund/what-innovation-fund_en.

The Innovation Fund helps create jobs, stimulate both growth and investment in clean energy and it will be funded from the auction of 450 million certificates (allowances) from 2020 to 2030, as well as any unused funds from the NER300 program provided by the EU Emissions Trading Scheme (EU ETS), which is set up by art. 10a paragraph (8) of the ETS Directive to support innovative low carbon technologies in the period 2021-2030. Detailed rules for official are established in the Commission Delegated Regulation (EU) 2019/8566.

It should be mentioned that for both the Modernisation Fund and the Innovation Fund the quotas are to be auctioned on the common auction platform, in accordance with Article 10 d paragraph 3 of Directive 2003/87 / EC (ETS) and article 20 paragraph (1) of the Rules from Delegated Regulation (EU) 2019/8566. In order for the rules on security and custody to be applicable to the common auction platform and for the bidding of certificates for the Modernisation Fund and the Innovation Fund, the Escrow Agreement and the Custody Agreement should enter into force in respect of the shares to be auctioned for these two mechanisms.

C. The Just Transition Fund

The Just Transition Mechanism (JTM) ensures that the transition to a climate-neutral economy takes place in a fair way, leaving no one behind, with the most disadvantaged regions receiving financial support of 150 billion in the period 2021-2027. It is intended to mitigate the socio-climatic impact of the transition by gradually eliminating their dependence on fossil fuels, including coal, peat and oil shale or high-emission industrial processes.

At the same time, the most relevant instruments of this mechanism, in particular the European Regional Development Fund ("ERDF") and the European Social Fund Plus ("ESF +"), will complement the European Union's contribution from the allocated budget perspective. It is supposed to be a part of the European Green Deal Investment plan, the main purpose being to reduce regional disparities and to address structural change in the European regions.

This mechanism will help develop measures created to promote public investments to offer sustainable development in the regions in questions. All the needed actions will be thought depending on the circumstances.

The Just Transition Fund ("FTJ") is one of the most important part of the Just Transition Mechanism and aims to reduce the negative impact of the climate transition by directly contributing to financing and modernising the local economy and improving employment. for work.

In this context, a specific scheme for a just transition within Invest EU will join the support provided by this Fund, mainly with a view to broadening the scope of investments, such as investments in renewable energy and green energy programs. Following this plan, it will also be possible to provide financial benefits for energy and transport infrastructure, but also for projects on the decarbonization process, economic diversification of regions and social infrastructure.

Finally, a Platform for a Just Transition should be established, so as to allow for bilateral and multilateral exchanges of experience on lessons learned and good practice in all affected sectors.

The Just Transition Mechanism will include a sound governance framework focused on territorial transition plans, which sets out the territories in which the Fund will be used and which will be identified through a dialogue with the Commission. These plans will set out the challenges in each territory, as well as the development needs, but also the objectives to be met by 2030.

Member States can gain access by preparing equitable territorial transition plans covering the period up to 2030, which should also set out the most effective ways to best address social, economic and environmental challenges.[Soeiro, S., 2020]

D. European Green Plan - European Green Deal

Given the need to rethink energy supply policies in all political and industrial sectors, the European Commission has created the European Green Deal. The Green Deal represents the EU's most ambitious project in terms of the allocated budget, the total sum amounting to 1,000 billion Euro. The aim of this Pact is to create a fair and fast growing society, with a modern, competitive and resource-efficient economy, where by 2050 there will be no net greenhouse gas emissions. The first steps are the development and adoption of action plans, taking into account also the updating and completion of the legislation in accordance with the priorities and ambitions of the EU regarding the Green Deal, as resulted from the Media Platform dedicated to Green Deal: <https://greendeal.ro/green-deal-pactul-ecologic-european-prezentare/>.

Achieving this goal will need the implementation of measures in all areas of the economy, as well as the involvement of all consumers by offering them certain benefits. An important role will be played by renewable energy sources, which involves increasing offshore wind energy production. A good way of integrating the renewable energy sources and energy efficiency will contribute to succeed in a low emission of CO₂. The rapid decline of renewable energy sources coupled with improved policy development that favors this goal, has already reduced the impact of the use of renewable energy sources on household energy bills. [Montanarella, L., 2021].

Investment will thus in the development of technologies that are to generate low-carbon product and service them sustainable, taking, however, into account and reduce waste significantly.

With more than a quarter of its carbon emissions growing, the transport sector plays an important role in the objectives of the European Green Pact, ensuring climate neutrality by reducing emissions from transport by 90% by 2050.[Christodoulou, A., 2019].

The design of green buildings, as well as the modernisation of the existing ones so that they become more energy efficient, the effective afforestation, conservation and restoration of forests in Europe, as well as an environment free of toxic substances are other main objectives of the new EU strategy.

The Invest EU Fund will help combat climate change, with at least 30% of its revenues allocated in this direction. A major collaboration will be made with the European Investment Bank Group (EIB), the national banks and other international financial institutions. In this sense, European Investment Bank aims to double its objective climate from 25 % by 50 % by 2025, thus becoming the first European climate bank.

The private sector will play an important role in financing the transition to a green economy, with the aim of directing financial sources to green investment and creating opportunities to help identify sustainable and credible investments.

By mobilising national public and private investment, Horizon Europe plays an important role in achieving these goals by funding at least 35% of the budget for new solutions to climate change.

With a budget set at 95.5 billion Euro (including EUR 5.4 billion of the next generation of the EU - Recovery Fund), all the available tools in this mechanism will support the necessary research and innovation efforts. In this sense, four "Green Pact missions" will take part to major upgrades in areas such as climate change adaptation, oceans, cities and soil.

However, in order to achieve the mandatory goal of obtaining climate neutrality by 2050, the Proposal of the Regulation of the European Parliament and of the Council creates a framework for achieving climate neutrality goal and amending Regulation (EU) 2018/1999, also known as the European Law of climate change, which sets the scenario for the irreversible and progressive reduction of greenhouse gas emissions and for increasing uptake by natural or other absorbents in the Union.

The target of reducing net greenhouse gas emissions by at least 55% by 2030 finds a new improvement regarding the field of aviation where by 6th December 2022 there was made an amendment of the EU Emissions Trading System (EU ETS) rules on the above-mentioned field.

The gradual elimination of free quotas in the aviation sector is being considered until 2026 according to the "polluter pays" principle. The goal is to increase the responsibility of this industry to pay for its carbon footprint, but it is also considered to grant more economic incentives to reduce emissions precisely due to a robust price signal, as we can see from the European Union's website: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7609.

E. Similarities and differences between these mechanisms

Even if the purpose of all of these Mechanisms is to combat the climate change by reducing and even stopping greenhouse gas emissions, there are some differences in how they manage to implement their strategies and approach in reaching this purpose, like it is presented in the following table:

Table 2. Differences between these mechanisms

	Modernisation Fund	Innovation Fund	Just Transition Fund	European Green Deal
Objective	transition to climate neutrality of 10 low income EU countries, thus contributing to the modernisation of their energy systems and improving energy efficiency.	both decarbonising Europe and fostering its transition to climate neutrality	reduce the negative impact of the climate transition by directly contributing to financing and modernising the local economy and improving employment. for work	create a fair and fast growing society, with a modern, competitive and resource-efficient economy, where by 2050 there will be no net greenhouse gas emissions.
Implementation Term	2021 - 2030	2020 - 2030	2021 - 2027	Until 2050
Who is responsible	Beneficiary State	European Commission, Bruxelles	Beneficiary State	European Commission, Bruxelles
Financing	Up to €14 billion	Around € 10 billion	Up to €150 billion	€95.5 billion
Funding procedure	<ul style="list-style-type: none"> -Selection of investments by states -Their submission to the EIB -Confirmation -Either Disbursement decision (priority investment) or recommendation for financing (non-priority) 	<p>Two methods: Large scale and small scale as described in the diagram below</p> <p>Beneficiary are selected by:</p> <ul style="list-style-type: none"> -effectiveness of greenhouse gas emissions avoidance -degree of innovation -project maturity -scalability -cost efficiency 	<p>territorial Plans of just transition (territories in which will be used the transition fund) determines challenges of each area, the need of development and the goals to be met up in 2030</p>	<ul style="list-style-type: none"> -clean, safe and affordable energy -mobilising industry for a clean and circular economy -construction and renovation of energy efficient buildings -conservation and restoration of ecosystems and biodiversity Accelerating the transition to sustainable and smart mobility

2. Method

The aim of this paper is focused on the comparative analysis of several international mechanisms whose main purpose is to combat climate change by reducing and even stopping greenhouse gas emissions. The research method is the comparative analysis aimed to understand the need to implement these mechanisms, being based on the presentation of strategies that can be used to stimulate the global transition the world to a fair, climate-neutral and efficient.

In carrying out the work, a documentation activity was carried out in the field of instruments and mechanisms from the EU that have as objective the reduction of CO₂ emissions and implicitly of the effects of climate change. It was studied literature of specialty related to the possibility of facilitating the transition to a green pattern energy, by taking into account the practical tools for analyzing them, but also all legislative measures taken at the Community level. In this regard, the paper aims to present, in the most efficient way possible, the steps to be followed and the mechanisms that can be used to develop innovative solutions on decarbonising Europe and supporting its transition to climate neutrality

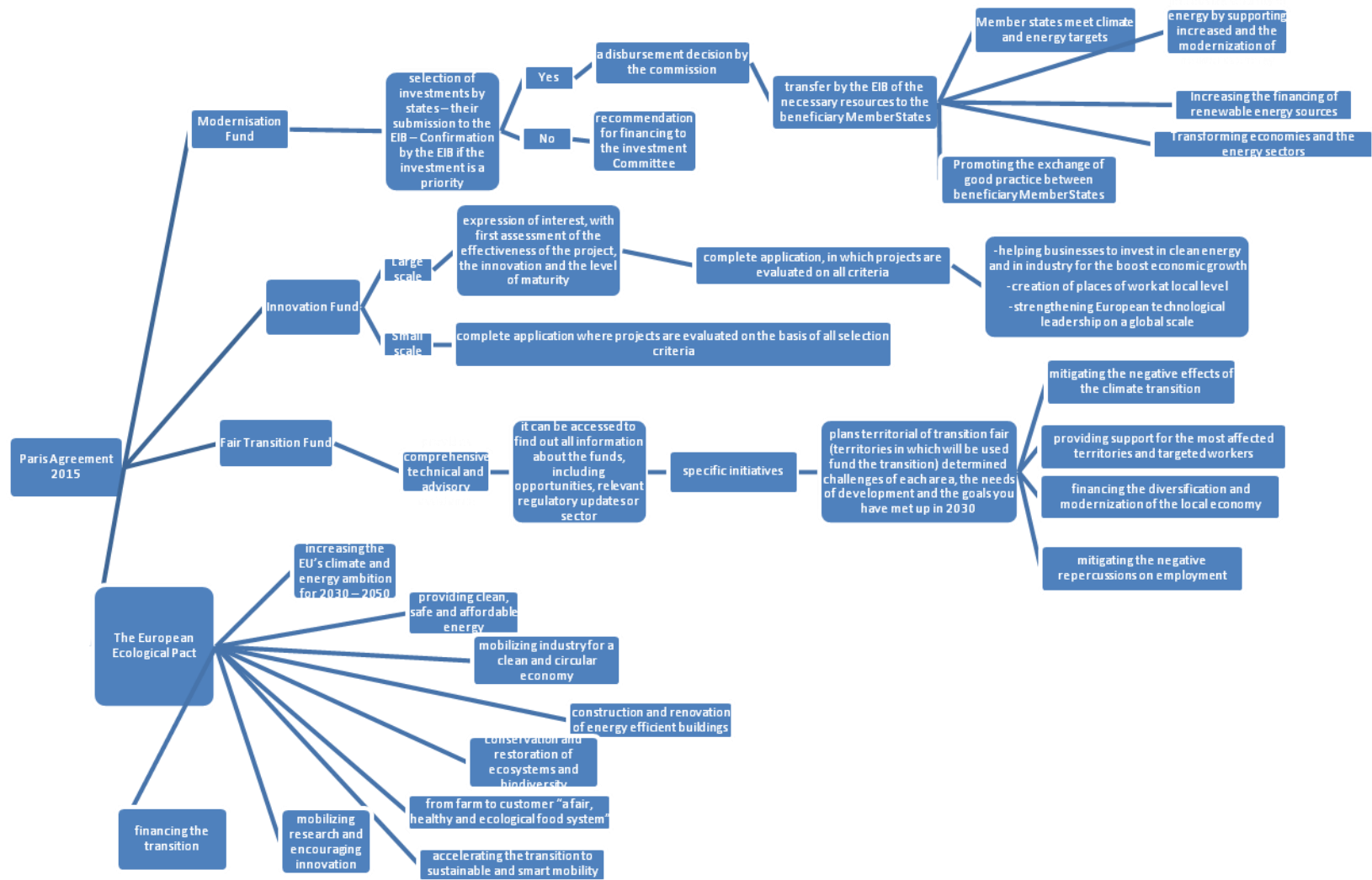


Diagram 1. Implementation of the mechanisms analysed in this article.

2. Discussion and Results

The need of a neutral society from the climate point of view and keeping the rate of global warming below 1.5 ° C above pre-industrial levels have been embraced by all EU countries, who are aware of the risks to which citizens are exposed, but also of the impact that these climate changes have on both the health and food system, but also on the ecosystems and biodiversity of the planet. In this sense, in order to limit the rise in temperature, it is mandatory to achieve climate neutrality in all sectors of the economy, neutrality that can only be achieved by implementing relevant legislative and budgetary measures on climate and environment and reforming investment policies in agriculture, trade, transport, energy and infrastructure.

While the goal behind the achievement and implementation of these mechanisms is the same, namely achieving climate neutrality, each tool discussed in this article comes with its own element of novelty, to which is added a complete and accurate strategy to support the achievement of the initial goal. In this regard, unlike the Modernisation Fund, which has as main objective the support in the transition to climate neutrality of 10 low income states of the European Union, including Romania, The Innovation Fund and the Just Transition Fund contribute to the financing and modernisation of the local economy and to the job creation. The European Green Deal is a culmination of these mechanisms and aims to rethink all ideas on energy supply in the political and industrial sectors in order to obtain the ultimate goal which is climate neutrality.

Therefore, the creation of these mechanisms and the allocation of financial resources reaffirm the Commission's goal to make Europe, by 2050, the first climate-neutral continent.

An example of this is the Modernisation Fund whose total revenues could be around 14 billion Euro in 2021-2030, depending on the price of carbon, 2% of which will be distributed in form of allowances to the beneficiary Member States.

Therefore, to achieve its objective, the European Union established a framework of comprehensive policies to limit CO₂ emissions, the process of modernisation and transformation of the economy in order to achieve neutrality has already started. Results are some encouraging it is "on track to meet its 20% emissions reduction target for 2020", as noted on the European Commission website:

- EU greenhouse gas emissions were reduced by 24% between 1990 and 2019, while the economy grew by about 60% over the same period.
- Power plants experienced the most significant decline in emissions from stationary installations in all countries, decreasing by 9.1% between 2018 and 2019. A year earlier, these emissions decreased slightly.
- In the field of aviation, there has been an increase of CO₂ emissions, by 2% more than in the previous year, emissions which are constantly increasing, aviation emissions being taken into account by the directive, but only in terms of flights from European Economic Area (EEA). (Christodoulou, A., 2019).

A new target has been set by the European Union, which wants to reduce carbon dioxide emissions by at least 40% by 2030 - as part of the EU's 2030 climate and energy framework and the current contribution to the Paris Agreement.

Effective implementation of the national energy and climate plans presented to the Commission in 2019-2020 could lead to reductions in the EU's - 27 greenhouse gas reduction by 41% in 2030 compared to 1990 and this can be done by introducing and complying with national energy and climate plans, their correct application can even lead to a reduction of about 45% in greenhouse gas emissions.

Another serious measures were taken by the European Commission within the European Green Deal Plan regarding the aviation field and these are the evaluation of the Carbon Emission Compensation and Reduction Scheme for International Aviation (CORSIA) in order to see if the objectives of the Paris Agreement are met.

Also, this Agreement provides a new support scheme that aims to accelerate the use of sustainable fuels for aviation financed from EU ETS revenues, estimated at 1.6 billion EUR. A new change will consist of creating a new system for airlines to monitor, report and verify non-CO₂ emissions, but also the effects that aviation has on the climate, which currently represents two thirds of the total impact of aviation on the climate, aspects revealed and published by the European Commission on its website: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7609

Acknowledgments

The world is evolving and the emerging trend is towards green. As is clear and the foregoing, the European Union implemented new mechanisms to help adapt to changes in climate and energy and turn the European Union into a society fair and prosperous, with a modern, competitive and efficient from the point of view of resource use, in which there are no net greenhouse gas emissions. These initiatives are important, as climate change will keep on having an essential impact in our continent, despite mitigation efforts. It is crucial to step up efforts to immunize against climate change, build resilience, prevent and prepare.

The transition to a green Europe can only be successful if it is carried out in a fair and favorable way for the implementation of these strategies. Managing these objectives will help changing the terms of living standards, people's perception towards the implementation and observance of these mechanisms. Depending on the circumstances, the level of development, but also the capacity to react, each state will start on this path of transition from another point, the achievement and implementation of these objectives being mandatory to be strongly analyzed and thought at the national level.

Climate change adaptation work will continue to have a power on public and private investment, including in nature-inspired solutions and allow for the creation of schemes to carry out ongoing monitoring of greenhouse gas emissions of the progress made by the European Union and the Member States regarding the objectives set by these mechanisms.

It can be clearly seen that the evolution is a productive one and that the norms implemented at European level, through concerns related to the environment and climate, are decisive in the decision-making by the member states regarding their implementation. From the data we have presented, it can also be seen that the European Union is more determined than ever to promote and help regulate and implement at national level the created mechanisms. A point that must be emphasized by reading this article is given by the fact that Romania, especially through the Modernisation Fund, is on the list of states that can benefit from funds in reaching, in a fast and unequivocal manner, the established climate targets. A first step in this direction was taken, as I showed previously, Romania announcing the launch of the non-competitive procedure - Investment support for the expansion and modernisation of the electricity distribution network - with financing from the Modernisation Fund, with a budget allocated in the amount of 1,103,442,829 euros. Regarding the estimated support provided by the Modernisation Fund, it is 80% of the eligible expenses, and the financing that is granted in the form of reimbursement of expenses is as follows with a minimum value of 5,000,000 euros without VAT and a maximum value of 50,000,000 euros without VAT.

Therefore, steps forward have been taken, at least as far as Romania is concerned, in compliance with the principle established by the European Commission and according to which the transition to a climate-neutral economy be made without leaving anyone behind.

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