European climate policy for decarbonization: State of the art

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Abstract

This paper aims to analyse European climate policy's state of the art concerning the urgent need to decarbonize society and the economy and meet pressing climate demands. Decarbonization refers to the progressive reduction of the carbon-to-hydrogen ratio within energy sources. The primary objective consists of a gradual transition to sustainable economic less polluting development models. The Paris Agreement (2015) highlighted the need to take concrete and timely action to prevent the planet's already precarious balance from definitively collapsing. This paper analyses the main strategies that the European Union has conducted to take an active part in the decarbonization project by critically highlighting the challenges and opportunities that await us in the future.

Keywords: decarbonisation, European Union, Green Deal, European climate policies, climate change, emissions, Taxonomy.

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Sommario

Il presente lavoro è volto a definire lo stato dell'arte della politica climatica europea rispetto all'urgente necessità di decarbonizzare la società e l'economia, nell'ottica di far fronte alle impellenti istanze climatiche. Con il termine decarbonizzazione si intende la progressiva riduzione del rapporto carbonio-idrogeno all'interno delle fonti energetiche. L'obiettivo primario consiste in una graduale transizione verso modelli economici di sviluppo sostenibili meno inquinanti e impattanti sull'ambiente. L'Accordo di Parigi (2015) ha evidenziato la necessità di intraprendere azioni concrete e puntuali per evitare che i già precari equilibri del pianeta collassino definitivamente. Nel presente lavoro sono analizzate le principali strategie che l'Unione Europea ha assunto per prendere parte attivamente al progetto decarbonizzativo evidenziando criticamente in particolare le sfide e le opportunità che ci attendono in futuro.

Parole chiave: decarbonizzazione, Unione Europea, Green Deal, politiche climatiche europee, cambiamento climatico, emissioni, tassonomia.

1. Introduction

Decarbonisation refers to the progressive reduction of the carbon-hydrogen ratio within energy sources to reduce the concentration of carbon dioxide (CO2) in the atmosphere.

The Intergovernmental Panel on Climate Change (IPCC) concluded its Sixth Assessment Report on Climate Change (AR6) on March 20, 2023, releasing the last part of the sixth report, which calls on the community to act immediately to avoid an imminent climate collapse.

Presently, there is an increase of 1.1 degrees Celsius in the average global temperature compared to the pre-industrial average, affecting more than 3 billion people. The main risks identified by the IPCC for the European continent are (Lionello, 2022):

- Risks from heat waves to populations (deaths), terrestrial and marine ecosystems (loss of habitat and biodiversity);
- Risks to agricultural production attributed to a mix of heat and drought. In Europe, for example, this context will affect an increasing population segment. A 3°C increase over pre-industrial levels would affect about 170 million people in severe drought conditions. Limiting warming to 1.5°C would reduce the number of people exposed to such conditions to 120 million;
- Risks associated with water scarcity;
- Risks produced by higher frequency and intensity of coastal, river and rainfall flooding.

As set out in the Paris Agreement, the goal is to limit the increase in global average temperature to 1.5 degrees Celsius above pre-industrial levels, achieving net emissions by 2050 while respecting the principle of common but differentiated responsibility (Conti, 2018). The opportunity to act now lies with those who can make a difference: Policy and Industry. Action must be taken in time and implement the solutions proposed by science. Transnational coordination is imperative; it is not enough for a single country to achieve its ladder of results, but joint action is needed. All countries should prepare to achieve the goals according to their capabilities.

Reducing emissions by 43% by 2030 (compared to 2019 values) and 84% by 2050 will make it possible to keep average global warming this century below 1.5 degrees. A more gradual reduction in emissions of 27% by 2030 and 67% by 2050 could limit average global warming to 1.5 and 2°C.

2. The European regulatory scenario for the decarbonisation challenge

The European Union is responsible for only 8% of global CO2 emissions. Europe cannot make a difference individually and acts as a pioneer by encouraging change. The decisions taken are mainly aimed at influencing the vision and approach of other countries in combating climate change (Tagliapietra, 2021).

The basis for the concretization of the transition is the Green Deal, or European Green Pact, announced in December 2019. This can be defined as a set of strategies and policy initiatives functional to implementing the 2030 Agenda. Through the Green Deal, the EU aims to position itself as a global leader in a climate-neutral economy model.

The initiative is driven by the president of the European Commission (Ursula Von Der Leyen), who has placed the ecological transition[1] at the top of the agenda (European Parliament, 2023).
The management of the Green Deal is entrusted to the European Commission, the European Parliament, and the Council (Tab. 1).

In the context of European climate policy, decarbonization is pursued by considering Fit for 55 as a reference scenario. The package presents new proposals and revised regulations, considering the climate sphere of transport, energy, taxation, and trade.

The Fit for 55 package aims to reduce greenhouse gas emissions by 55 percent by 2030.

Table 1. The main strategies of the Green Deal roadmap

European Climate Act	Regulation 2021/1119/EU sets a binding goal of climate neutrality in the European Union by 2050, also establishing an obligation for 2030 to cut 55 per cent of GHG emissions from 1990 levels.
European Industrial Strategy	It aims to strengthen the competitiveness and resilience of industries by accelerating the green and digital transition.
Action plan for the circular economy	Promotes the sustainable use of resources from a circular perspective, fostering production process efficiency, consumer awareness and empowerment.
European Biodiversity Strategy	To be achieved by 2030 by protecting the planet's natural resources.
European strategy "From producer to consumer"	Aims for the sustainability of the food system through an adequate and diverse supply of safe, nutritious and sustainable food at all times.
The European strategy for the integration of energy systems and hydrogen	It focuses on the development of renewable hydrogen produced through wind and solar energy. This will be done gradually, i.e., divided into several phases: - between 2020 and 2024, it is planned to install at least 6 gigawatts of electrolysers for renewable hydrogen and produce up to one million tons of it; - between 2025 and 2030, hydrogen should enter fully into the integrated energy system, with at least 40 gigawatts of electrolyzers and production of up to ten million tons of renewable hydrogen; - between 2030 and 2050, hydrogen-based renewable technologies are expected to reach maturity and find large-scale application in all hard-to-decarbonize (so-called hard-to-abate) sectors.
"Wave of restructuring" strategy	Aims to double energy renovation rates over the next decade to reduce energy and resource consumption in buildings.
Offshore renewable energy strategy	It is proposed to increase Europe's wind capacity from the current 12 GW to 60 GW by 2030, and to 300 GW by 2050 through the use of ocean energy and other emerging technologies, such as floating wind and photovoltaics.
European Battery Alliance	Launched in 2017, it provides for the revision of European battery legislation, presenting the first in a series of initiatives announced in the Circular Economy Action Plan.

Among the main changes the Fit includes (Dirigenti Industria 2022):

- the revisions to the Energy Efficiency Directive, which brought a 39% reduction in primary energy consumption compared to 1990;
- the amendment of the Renewables Directive using 32% renewable energy sources in the European energy mix;
- the revision of the Emission Trading System (EU-ETS) to achieve the goal of reducing emissions initially by 43%, brought to 62% by 2030 (revised April 2023);
- Revised legislation to reduce CO2 emissions from cars and vans by 55% by 2030;
- new initiatives in the aviation and maritime sectors to refuel aircraft and ships with sustainable fuels;
- the creation of the Carbon Border Adjustment Mechanism (CBAM), a carbon tax levied on the import of certain products to discourage companies from relocating to countries where emissions are not taxed.

The carbon tax will take effect in 2026 and must be observed by the cement, steel, aluminium, fertilizer, and energy sectors.

The package also includes changes related to the Energy Products "Minimum" Taxation Directive (ETD), Land Use and Forestry Regulations (LULUCF), and the Effort Sharing Regulation (ESR) to reduce emissions from sectors outside the EU-ETS (ISPI, 2021).

These objectives are then supported by a variety of means aimed at mobilizing EU resources and stimulating public and private investment. These include the Mechanism and Fund for a Just Transition, the European Taxonomy, and funding programs destined for research and innovation, such as Horizon Europe and Life.

In the "Investment Plan for a Sustainable Europe", the Commission published the Just Transition Mechanism (JTM). This mechanism will mobilize about 100 billion euros between 2021 and 2027 to mitigate the socioeconomic impacts of the transition and support the most vulnerable workers and communities.

The JTM consists of three pillars: the Just Transition Fund (JTF), the InvestEU and the Public Sector Loan Facility.

The JTF or Just Transition Fund aims to achieve the national climate neutrality target by 2050. If member states fail to meet these commitments, access to the fund may be limited to 50 per cent of the national allocation. So, to adjudicate funding, states are required to submit land conversion plans as part of the National Energy and Climate Plan by 2030. The plans may be amended to include new areas affected by transition impacts.

Second, it has been proposed to establish a just transition program under

InvestEU, with the aim of generating a wave of investment of €372 billion between 2021 and 2027.

The third and final pillar features the identification of the financial instrument that the European Investment Bank (EIB) will provide to the public sector. The fund includes €1.5 billion in grants from the EU budget and €10 billion in loans from the EIB's own sources.

In addition, the outbreak of the Covid-19 pandemic has highlighted the need for a €750 billion European emergency measure, to be added to the period 2021-2027 multi-year financial framework (MFF) of €1100 billion.

The Next Generation EU (NGEU), also known as the Recovery Fund, is an interim financing instrument that allows for timely and significant spending increases without increasing public debt (Masi, 2021).

But what is the link between the goals of the European Green Deal and the Recovery Fund? The answer lies in the opportunity to use the emergency funds allocated by the Recovery Fund, to accelerate the green transition, committing up to 37 per cent of the available resources.

This indicates that more than one-third of the resources will be used to finance green conversion projects. The Recovery Fund's other priorities will receive fewer resources, apart from funding for digital transformation, to which 20 per cent of the total funding will be allocated (Mazzantini, 2020).

Among other instruments, we recall Regulation 2020/852 or European Taxonomy.

The work, carried out by the committee about sustainable finance issues, revolves precisely around the Taxonomy, a tool used to define a list of activities considered sustainable. It is a guide that suggests investing in economic activities that do not negatively impact the environment (Etica sgr, 2020).

The technical criteria specify the conditions that must be met for an activity to be recognized and labelled as environmentally sustainable. Environmental and climate objectives include climate change mitigation and adaptation; sustainable use and protection of water and marine resources; transition to a circular economy; pollution prevention and control; and biodiversity and ecosystem health protection.

The legislation aims to combat *greenwashing*, a practice consisting of selling financial products falsely claimed to be environmentally friendly, to gain an unfair advantage over competitors.

An activity is eco-friendly if: it makes a positive and significant contribution to achieving one or more of the previously identified environmental objectives; it does not cause significant harm to other objectives, and it is performed with minimal social guarantees. Hence, actions that undermine

the good ecological status of water bodies and marine waters (e.g., pollution by chemicals), including surface and groundwater, cause significant harm to their sustainable use and protection.

Regarding the circular economy, significant harm occurs when there are considerable inefficiencies in the use of recovered and recycled materials, in the direct or indirect use of natural resources and the increase in waste, its incineration or disposal that causes significant long-term environmental damage (BeSafe Group, 2022).

In June 2021, the EU Taxonomy Compass was launched. This tool identifies which activities are included in the EU taxonomy, what objectives they contribute to, and what criteria they must satisfy (European Commission, 2022). Among the most controversial topics is the dispute about the use of natural gas (Greenreport, 2022).

Taxonomy has determined that for a gas-fired power plant to be considered sustainable, emissions must not exceed a threshold of 100 g of CO2 equivalent per kilowatt, a measure that to date cannot yet be guaranteed. Without a green label, gas-fired power plants could lose billions in private finance.

In this regard, the IEA (*International Energy Agency*) considers gas a necessary alternative to coal to ensure flexibility and storage capacity to the energy supply system, in order to meet peak demand that cannot be guaranteed by renewable energy sources alone.

The nuclear power industry is highly controversial, not so much because of pollutant emissions (modest in themselves), but because of the management of nuclear waste, which can be highly detrimental to the achievement of other goals.

Among the many critical issues are plastics (Simone & Conti, 2022), which are considered sustainable in the taxonomy if produced by mechanical or chemical waste recycling processes.

In February 2022, the Commission classified some activities in the nuclear and gas sector as environmentally sustainable, despite technical opinions. However, the Commission would like to specify the need to consider these activities as transitional, i.e., activities that cannot yet be replaced by affordable low-carbon alternatives but that contribute to climate change mitigation for achieving climate neutrality.

Nuclear and gas activities considered as sustainable activities, must meet clear and strict conditions (Tibaldi, 2022). Queste condizioni prevedono che le attività contribuiscano alla neutralità dei cambiamenti climatici e che soddisfino requisiti stringenti di sicurezza e impatto ambientale e un maggior utilizzo delle risorse rinnovabili.

Eurosif (2021), the European Sustainable Investment Promotion Associa-

tion, expresses an opinion against the inclusion of natural gas and nuclear energy in the European taxonomy. Eurosif believes that such decisions negatively impact the usefulness of the framework for sustainable investment, thus hindering the goals of the Green Deal. Indeed, including gas and nuclear in the Taxonomy seems driven more by an interest related to the various industry lobbies rather than a genuine interest in environmental protection.

In addition, the Taxonomy will need to be expanded to integrate environmental goals with social goals and sub-goals. The three main objectives of the social taxonomy cover: decent working conditions, living standards and well-being appropriate to end users, and inclusive and sustainable communities and societies (ESG News, 2022).

3. Conclusions

Despite the European Union's limited responsibility for global CO2 emissions, the decarbonization challenge has been at the centre of the political agenda, in line with the United Nations' Paris Agreement.

Through the Green Deal, the entire European productive economic system is stimulated toward a paradigm shift characterized by a reduced carbon footprint in order to achieve the net emissions target by 2050.

The current regulatory complex is constantly being updated, and the dibattles over the environmental sustainability of some energy resources, such as gas and nuclear, do not seem to be over.

Beyond the now-ended pandemic crisis, the war in Ukraine is an additional element of uncertainty. In both cases, these are unlikely events - N.A. Taleb (2007) would call them "black swans"- that have had significant impacts and consequences on the European decarbonization project. The sanctions imposed by the EU in response to the invasion led Russia to use energy as a weapon. In any case, to avoid climate collapse, transnational coordination is necessary to effectively implement the proposed solutions. Each country, based on the principle of common but differentiated responsibility, should strive to achieve the set goals.

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