**Call for Papers "The European Green Deal: moving to action**
**Opportunities and challenges for the European citizens"**

# The European Green Deal: an opportunity across national borders

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**Executive Summary**

The European Green Deal (EGD) is an ambitious agenda designed to transform the EU into a prosperous, sustainable, competitive, and carbon-neutral society by 2050. This strategy is intended to encompass a wide range of economic sectors, making it a potentially game-changing policy tool in the battle against climate change in and beyond European borders. However, EU member states are still divided on some matters such as those related to the role of Europe's future energy mix, the use of renewable energies, energy efficiency, and reduction of the greenhouse gas (GHG). Energy implications are also expected to have international effects in terms of global energy trade and energy security with possible geopolitical consequences. This paper attempts to discuss and explore some of the energy challenges and opportunities the deal sees on the horizon to develop and corroborate future policy discussion(s).

**Social Media summary**

Energy transition in and beyond European borders is at the core of the European Green Deal success.

**Keywords**

# energymix #renewableenergy #energypolicy

**Short bio**

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## Table of acronyms

AEEP - Africa-EU Energy Partnership

CO2 - Carbon Dioxide

COVID-19 – Coronavirus, Disease, 19

EGD - European Green Deal

ETD - Energy Taxation Directive

EU - Europe

EU ETS - EU Emissions Trading System

GDP – Gross Domestic Product

GHG - Greenhouse gas

LULUCF - Land use, land-use change and forestry

NDICI - The Neighbourhood, Development and International Cooperation Instrument

# 1. Introduction

The European Green Deal (EGD) is an ambitious agenda designed to make Europe (EU) a healthy, sustainable, prosperous, climate-resilient, and net-zero emission society by 2050 (EC, 2019). Outlined as a strategic priority in the political guidelines of Commission President Ursula von der Leyen, it is aimed to respond to the climate emergency and is positioned at the core of the EU's COVID-19 recovery package. Its roadmap includes 47 key policies and measures covering a broad range of sectors, ranging from energy, agriculture, smart mobility to the environment and circular economy, other than the investments needed and the financing tools available to achieve its targets.

However, the success of the plan lays also upon the EU's ability to build a coherent and trustable system supporting sustainable solutions beyond and inside its borders. EU member states are still divided over the details of the European Green Deal agreeing or disagreeing with one another in varying constellations on some matters such as the role of Europe's future energy mix, the use of renewable energies, energy efficiency, and reduction of the greenhouse gas (GHG) (Dennison, Loss and Söderström, 2021). Moreover, the implications of this strategy are expected to have international effects in terms of global energy trade and energy security, affecting third countries' economies based on solid fuel exports. This setup makes the implementation of the European Green Deal an intricate puzzle (Dennison, Loss and Söderström, 2021) requiring a multiple and inclusive perspective to address the challenges and opportunities the deal sees on the horizon.

The present work proposes to assess the current state and future implications of the European Green Deal by using different sources of information and data from both academic studies, institutional documents, and public opinion. The first part of this paper will discuss the experience of Europe in the implementation of climate and environmental policies related to the European Green Deal through a systematic, transparent, and reproducible review process of the scientific literature. The second part will explore past and contemporary policies' effectiveness in reducing greenhouse gas emissions, mainly focusing on the performance of the energy sector. The third part will investigate three future scenarios related to the European energy mix and the possible implications beyond and inside the EU borders, providing recommendations to inform future policy discussion(s). The last chapter will be mainly addressed to provide some final considerations and remarks on the matters discussed in previous paragraphs.

# 2. The experience of Europe concerning the implementation of climate and environmental policies related to the European Green Deal.

The ambition of the EGD to make the European Union (EU) the first carbon-neutral continent has its roots in climate- and related energy policies dating back to the early 1990s (Skjærseth, 2021). Starting with the 1992 "Earth Summit" in Rio de Janeiro and the 1997 Kyoto Protocol, which set the international framework for the world's climate agenda, the UE has been at the forefront of climate change policy. It was the first organization establishing energy and climate targets (2006) for then playing a key role also in the enforcement of the 2015 Paris Climate

Agreement. But, it was just with the adoption of the European Green Deal that Europe committed itself to become a low-carbon economy and a sustainable society while, at the same time, delivering a new game-changing policy tool.

To capture the complex phenomena and outbreaks developed by the scientific literature on the topic (the EGD), a bibliometric analysis was performed on 156 documents published in Scopus from January 2020[1] to August 5th, 2021 (see Annex1 for a detailed description of the process). The first part of this analysis was carried out in R through the application of a Bibliometrix package developed by Aria and Cuccurullo (2017), which supports the main stages of the recommended science mapping workflow (Zupic and Čater, 2015): data collection, data analysis, and data visualization. The outcomes of this analysis showed that a large part of the literature on the topic was mainly developed by European countries (countries with a production frequency higher than 30): Italy (69), Spain (45), Poland (40), and Germany (39). Nevertheless, some publications were also developed outside Europe, especially in Asia and America (see Annex 2), perhaps due to the implications the plan might have at the international level, and that will be discussed later on. Among the most frequent keywords used by the scientific community (see Annex 3) particular attention was focused on: European Union and Europe, energy efficiency, and sustainable development. These terms permit the reader to understand what matters captured the attention of the scientific community, even if without stressing the connection between them.

The second part of this analysis was aimed to run a co-occurrence analysis of the author's keywords (Figure 2) through the use of the VOSviewer software. This technique permits us to analyze the conceptual structure of themes developed in the scientific literature and construct a co-word map representing the intellectual content from the viewpoint of scientists. The principal connective nodes[2] identified in the literature referred to the words: European union (171), sustainable development (100), europe (98), european green deal (96), sustainability (93), circular economy (92), energy efficiency (81), energy policy (75) and climate change (73). Beyond this, the application of this methodology also allowed us to identify four main clusters of terms ( Figure 3). The smallest yellow sub-network is related to the European climate policy, mainly covering greenhouse gas and emission control. The blue cluster focuses on climate change matters linked to biodiversity, agriculture, and green manufacturing in the context of policy.

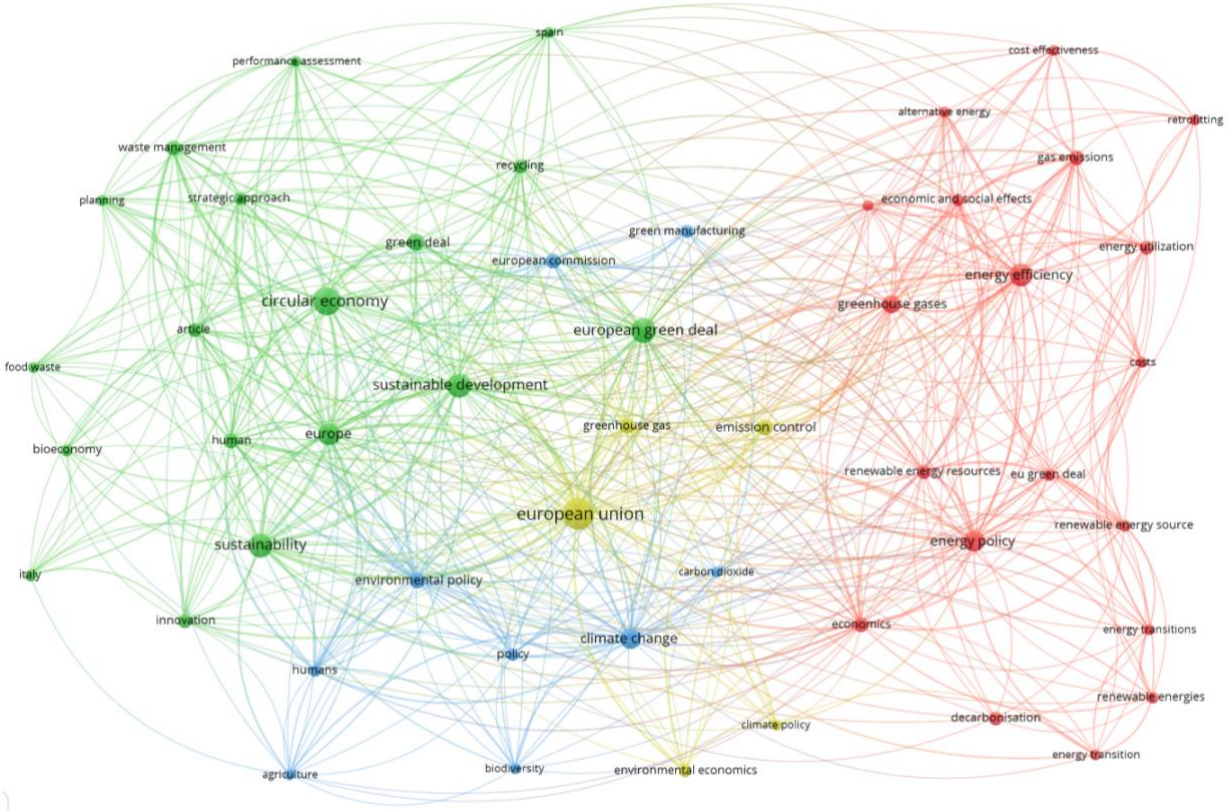
The second-largest cluster is centred on sustainability matters identified by the terms "sustainable development, circular economy, European Green Deal and Europe". The largest cluster in red (including 19 terms) shows keywords related to energy policy and energy efficiency such as renewable energy source, energy transition and utilization. According to the significant

[1] The reason behind the choice of the baseline is related to the fact the European Green Deal package of policies was announced in December 2019.

[2] Each node in the network represents a keyword, and the link between the nodes represents the co-occurrence of the keywords. The distance between the keywords is representative of their relative co-occurrence, e.g., two keywords that are close to each other co-occur more frequently, whereas a large distance between two keywords indicates that they do not co-occur. Furthermore, in the visualization of a map, items with a higher weight are shown more prominently than items with a lower weight, indicating the importance of the item. There are two standard weight attributes, referred to as the Links attribute and the Total link strength attribute. In my example, I used the Total link strength attribute to indicate the total strength of the co-occurrence links co-authorship links of a given term with other terms.

interest in matters related to the energy sector, the next chapters will discuss some of the opportunities and challenges associated with it.

*Figure 1: A Co-occurrence network map based on bibliographic data*

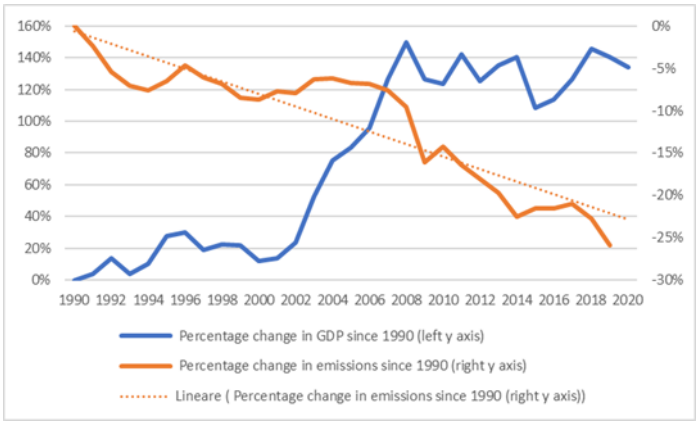



*Source: Author's elaboration*

## 3. The effectiveness of climate and environmental policies: a focus on the energy sector.

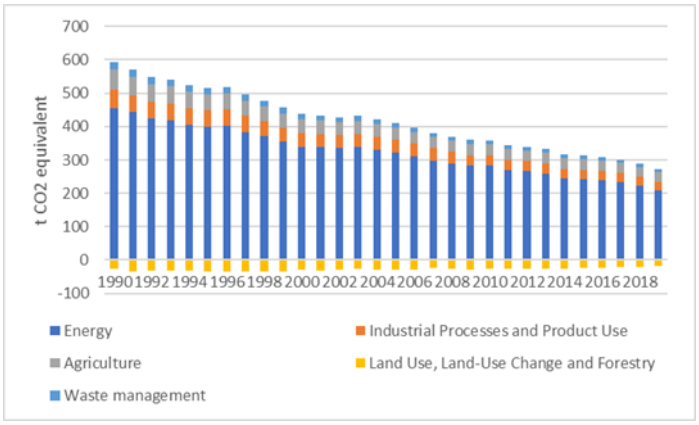
With the European Green Deal, for the first time, climate and environmental policies were set at the centre of a comprehensive plan considering the needs of the society. This challenging plan aims to transform Europe into a resource-efficient and competitive economy through a gradual reduction of GHG emissions by 50–55 % (in 2030) compared to 1990 levels. Greenhouse gas emissions have been significantly reduced in the last 20 years, even without reducing GDP growth (Figure 2), but further efforts are required to achieve the new targets envisaged by the EGD.

*Figure 2: Emissions and GDP percentage (%) change in EU-27 since 1990*




*Source: EEA and World Bank*

*Figure 3: Trends of Emission per GDP by aggregated sectors in EU-27*




*Source: Eurostat*

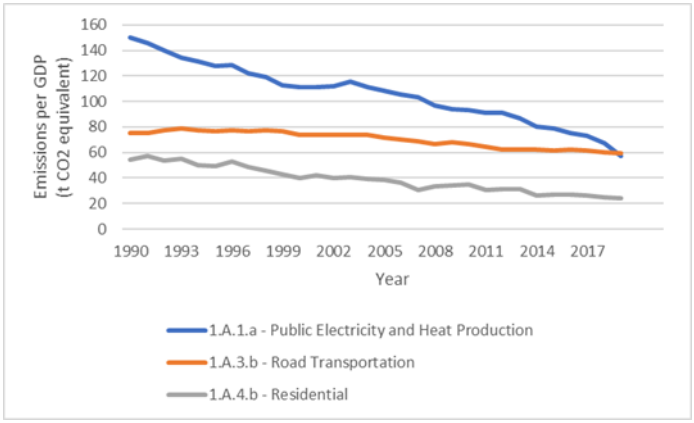
Effective action is particularly asked of the energy sector since its emissions account for around three-quarters of total GHG emissions (Figure 3) and are mainly linked to the power and heat generation for production, transport, and residential consumption (Figure 4). Transport emissions remain one of the main challenges for future policymakers (these have remained almost stable since the 1990s) due to the fact they are linked to urban form, physical infrastructures, and everyday behaviour making mitigation strategies difficult to implement (Creutzig *et al.*, 2015). Behind this, some transport sectors such as aviation and shipping remain hard to electrify making the situation even more complex (IRENA, 2020).

Although these three sectors encounter their challenges in terms of climate change mitigation, they also present deep interconnection between each other. Special linkages concern electrification and heating, whose emissions in the building and industry mainly depend on upstream energy systems, but also the material and fuel used as in the case of industry and transport (IEA, 2020; Jakob *et al.*, 2020; Lamb *et al.*, 2021).

According to this, energy infrastructure decisions are one of the key strategies speeding up the transition of many sectors other than encouraging energy efficiency use (Giannelli and Fischer, 2020). Energy efficiency is potentially one of the most important and cost-effective means by which countries can mitigate their greenhouse gas emissions for sustainable development. Similarly, the promotion of the use of renewable energies might also have beneficial effects by ensuring long-term solutions for the security and independence of the energy supply. A shift from fossil fuels to renewable energy in power generation has contributed to reducing power and heat emissions substantially in the last few years.

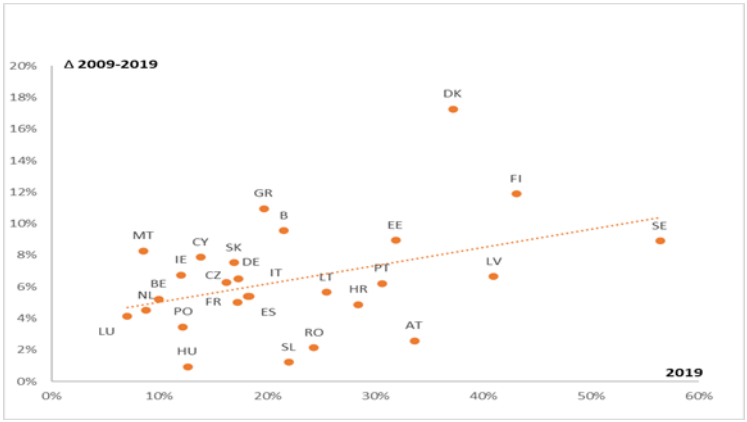
However, countries have made different levels of progress on renewables (Figure 7) with some of them moving more slowly (e.g. Luxemburg, Hungary, Poland), and others (e.g. Portugal, Lithuania, Croatia) working hard to catch up with the best performers (e.g. Denmark, Sweden, Finland).

*Figure 4: Trends by IPCC sectors in EU-27*




*Source: Eurostat*

*Figure 5: Share of renewable energy*



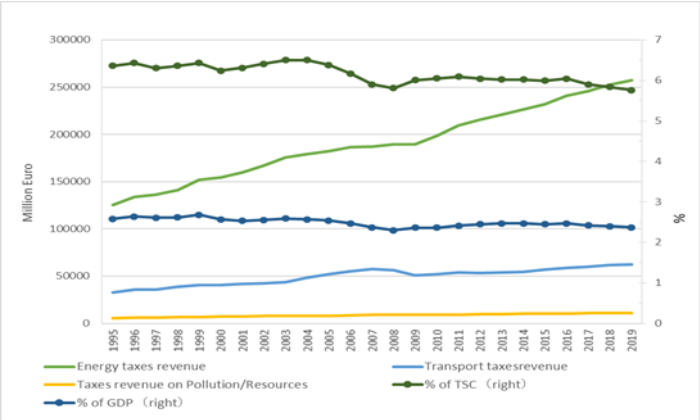

***Source: Eurostat***

Another important strategy to safeguard the balance of the goals of competitiveness, innovation, and economic efficiency in the context of the European Green Deal is green taxation. Taxation initiatives at both EU and Member State level not only guarantee an important share of tax revenues but they can help to reach climate policy goals by incentivizing more sustainable behaviour among citizens, corporations and businesses (UNIDO Brussels, 2020). However, today, the share of revenues derived from environmental taxation is still limited and cannot support the green transition envisaged by the European Green Deal (Figure 6).

Energy and carbon taxes are at the core of the European environmental taxation, but in the way they are framed today they achieve two different results. Carbon taxes are levied on the carbon content of fossil fuels and succeed in incentivizing a change in the energy mix toward cleaner technologies (Organisation for Economic Co-operation and Development, 2019). On the contrary, energy taxes price the volume of energy products consumed rather than their energy content and CO2 emissions with the result of increasing and discriminating against renewables (Nora, 2021). According to this, the European Commission on 14 July 2021 published the proposal for revision of the Energy Taxation Directive (ETD) intending to bring in effective environmental taxation of energy products and remove incentives for fossil fuel consumption throughout the EU. One of the most significant changes it proposes is to base energy taxation on the energy content of the energy products and electricity (i.e., the net calorific value) coupled with their environmental performance from 2023.

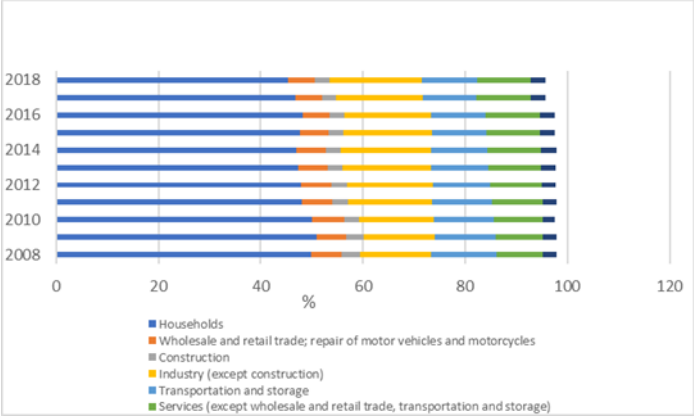
Whether the revision of the ETD appears to be beneficial for the whole society and innovative for a large part of its text, it also faces some challenges that need to be considered before it is approved. First, it faces two main obstacles linked with carbon imports: the difficulty of calculating the emissions content of imports (as all emissions along the entire value chain would need to be considered) and the risk of retaliation by trade partners (Leonard, Pisani-Ferry, *et al.*, 2021). Second, the new ETD should also enhance new actions to raise awareness among citizens towards more responsible consumption and practices by also taking into consideration its social implications (e.g. without discriminating against lower-income people). Last, but not least, the main energy suppliers or big energy consumers should be charged more for the payment and collection of the taxes rather than the normal households being the last the most taxed category (Figure 7).

*Figure 6: Environmental tax revenue by type and total environmental taxes as share of TSC and GDP*




*Source: Eurostat*

*Figure 7: Energy taxes by paying sector*



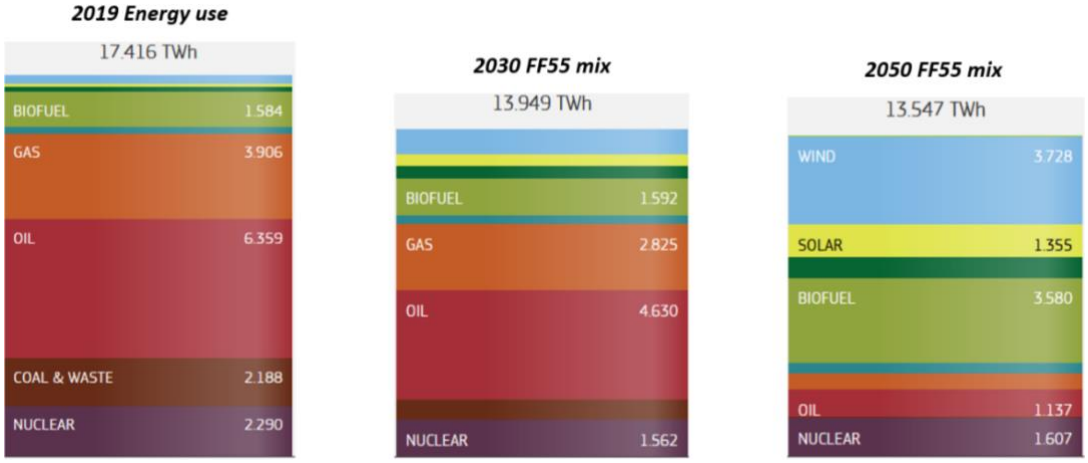

*Source: Eurostat*

## 4. The energy scenarios associated with the European Green Deal and its policy implications beyond EU borders.

The European green transition in the next future is believed to revolutionize the EU's energy system by reshaping the way energy is produced and consumed in the EU (Leonard, Pisani-Ferry, *et al.*, 2021). Today, oil dominates the EU energy mix driven by demand in transport and industry but between 2030 and 2050 this fossil fuel is expected to be almost entirely phased out by renewables. Figure 8 shows the transition from today's energy system of three different sectors

(industry, buildings and the transport sector) under three different scenarios[3] (the historical energy use (2019), the 2030 FF55 mix[4] and the 2050 FF55 mix[5]) to the 2050 net-zero emissions system. Immediately, it appears clear as oil, gas, and coal & waste power will be gradually replaced by wind, biofuel and solar energy. However, to achieve these EGD's energy and climate objectives requires facing some challenges both at the European and international levels (Brodny and Tutak, 2020).

*Figure 8: Energy Scenarios*




*Source: JRC Digital Media Hub*

First, the European socioeconomic structure and energy mix are so diverse that a variety of patterns in each target's implementation and potential attainment across the EU have progressed at its own pace. Second, the 1 trillion euros of sustainable investments as envisaged by the European Green Deal for financing the green transition will be not sufficient to reach climate targets up to 2030 since it represents a third of the European "green investment gap"(Claeys, Tagliapietra and Zachmann, 2019). Third, the European Green Deal does not foresee an expansionary fiscal policy aimed at incentivizing environmental public investments (Pianta, Lucchese and Nascia, 2020) and excluding them from European fiscal constraints (Pianta and Lucchese, 2020).

[3] Here, we refer to the energy scenario tool developed by the European Commission and the JRC to explore what changes – both in terms of energy efficiency and renewable energy sources –would be needed to achieve no net emissions in the future.

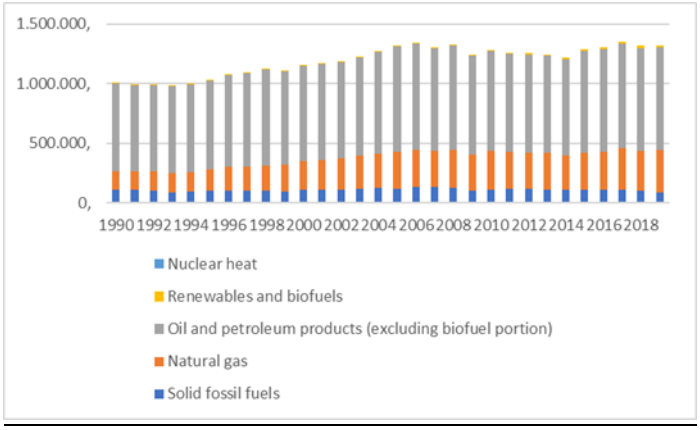
[4] This MIX scenario achieves net 55% GHG emission reductions economy -wide by 2030 compared to 1990. The MIX policy scenario builds further upon the logic of the MIX scenario as included in the impact assessment supporting the 2030 Climate Target Plan, but are based on the updated Reference scenario as baseline (JRC Digital Media Hub: https://visitors-centre.jrc.ec.europa.eu/en/media/tools/energy-scenarios-explore-future-european-energy).

[5]This MIX scenario achieves net zero objective for 2050. The MIX policy scenario builds further upon the logic of the MIX scenario as included in the impact assessment supporting the 2030 Climate Target Plan, but are based on the updated Reference scenario as baseline (JRC Digital Media Hub: https://visitors-centre.jrc.ec.europa.eu/en/media/tools/energy-scenarios-explore-future-european-energy).

Moreover, the EGD remains too narrow in scope since it does not take into account the counter effects and the likely geopolitical repercussions, especially for oil and gas-producing countries. Europe's energy import dependence on oil and gas stands today at ca. 55% and it is expected to fall in 2050 to 20% (Hafner and Raimondi, 2020). This anticipated decline in EU imports of oil and gas might have a knock-on effect on exporters around the world (e.g. Russia, Algeria, Azerbaijan, Kazakhstan, and Libya, etc.) who will need to raise standards for accessing the Single Market and, contemporary, experience a reduction of investments in new fossil fuel infrastructure and maintenance of existing infrastructure (Teevan, Medinilla and Sergejeff, 2021). Countries such as Russia and Algeria might be highly penalized by the European green transition due to the fact the fall in global oil demand might depress prices of this natural resource.

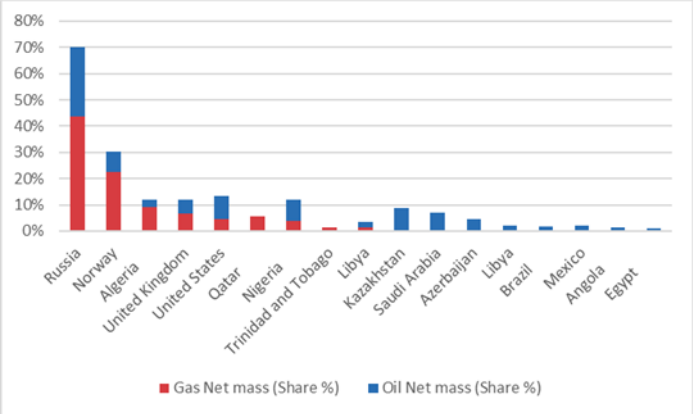
To tackle these challenges, Europe has established new special regional strategies (e.g. Africa-EU Energy Partnership (AEEP), The Neighbourhood, Development and International Cooperation Instrument (NDICI), etc.) with some neighbouring countries, especially with Western Balkans and African countries. However, there is still no one external strategy integrating trade, foreign and development policy at the global level and, so, it is of paramount importance for Europe to fill the current global leadership vacuum in climate terms, and to initiate and build global partnerships with third countries (Tagliapietra and Veugelers, 2020). The EU's energy diplomacy will need to avoid a very short-sighted and simplistic vision of the complexities involved in the region's energy interdependencies in favor of a more realistic and country-tailored approach (Escribano and Lázaro, 2020; Pastukhova, Pepe and Westphal, 2020). In this sense, necessary for Europe will be to strengthen relationships with global players such as the USA, China, and Russia and engage with developing countries in order to channel to them the capabilities and liquidity for a green transformation (MDPD Seminars, 2020; The European Think Tanks Group (ETTG), 2021).

*Figure 9: Total imports of Gross available energy*




*Source: Eurostat*

*Figure 10: Extra-EU imports of petroleum oil and gas, shares (%) of main trading partners, 2020*




*Source: Eurostat*

*Policy recommendations:*

- Reduce greenhouse gas emissions from the transport sector in the most cost-efficient way over the long term. It will imply a smart combination of efficient vehicles as well as an increasing move towards low-carbon energy carriers used for transport supported by a sustainable policy framework. The new framework should enable affordability and market uptake of vehicles, and charging and refuelling infrastructure.
- Fostering investment shifts and labour substitution in key economic sectors, while putting in place a compensation scheme funded by green taxation to compensate the population to accept climate policies. This should mean creating new jobs in the renewable energy sector than the fossil-fuel energy sector by heavily investing in adult education, re-training, and policies to improve the labour mobility of older workers.
- Promote an energy transition beyond technical environmental applications and economic profit by also including social, geographic, political aspects. This means to design an effective monitoring system of progress towards targets, policy output and revision of directives (e.g., Energy Taxation Directive) including country levels differences related to existing gender inequalities, social status, race, religion, and ethnicity to reduce inequalities among European member states.
- Reflect CO2 impact of fuels in taxation rates for diesel, petrol & natural gas and support transition schemes at the EU and national levels by harmonizing diesel and petrol taxes and promoting electro-mobility. Behind this, it might be important to give tax rebates or incentives to zero-emission (electric) corporate fleets/company cars encouraging the use of renewable fuels as well as other fuels with low net-carbon emissions.
- Strengthen the EU's external development policy supporting green projects financially and with capacity-building activities. This will also mean promoting transparent cooperation mechanisms for technical-regulatory dialogue and transition from a form of "capitalist geopolitics" to "cooperative and sustainable micro-geopolitics". Essential will be to continue supporting the multilateral trade regime and to explore the potential for

plurilateral negotiations on green public procurement, including identifying barriers to the take up of low-carbon technologies.

## 5. Conclusion

The success of the European Green Deal will depend on the EU's ability to deliver on its commitment to climate neutrality, requiring a paradigm shift of the economy from fossil fuels to zero-carbon in a way that is socially and politically viable (Lu *et al.*, 2020). Europe should be able to properly orientate a climate policy that is acceptable by individual EU countries taking into account their economic and demographic potentials as well as, to a slightly smaller extent, their geographical location and area. Socio-economic factors represent one of the biggest perceived risks associated with the European Green Deal, with its main preoccupations related to the higher costs for energy and fuel, the loss of jobs, and the declining living standards (Dennison, Loss and Söderström, 2021).

Energy remains the most polluting sector requiring major shifts in the industrial structure and in energy consumption. Successful implementation of the EGD targets to effectively reduce greenhouse gas emissions depends on an adequate financial endowment, including the shift of public fund allocation from hydrocarbons to renewables and energy efficiency, and the shift of taxation from labour to pollution (Claeys, Tagliapietra and Zachmann, 2019; Siddi, 2020). However, since transitions proposed in the Green Deal are uncertain and complex, policy evaluations must also pay attention to synergy and trade-offs between policies (targets, measures, instruments) during their implementation, but without forgetting to also pay attention to the possible counter-effects and externalities. This might permit an exploration of the EU's role in future green partnerships with historical and new partners and to achieve a common level of green transition in all its Member States.

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## 7. Sitography

Eurostat: https://ec.europa.eu/eurostat/data/database/

JRC Digital Media Hub: https://visitors-centre.jrc.ec.europa.eu/en/media/tools/energy-scenarios-explore-future-european-energy

World Bank: https://data.worldbank.org/

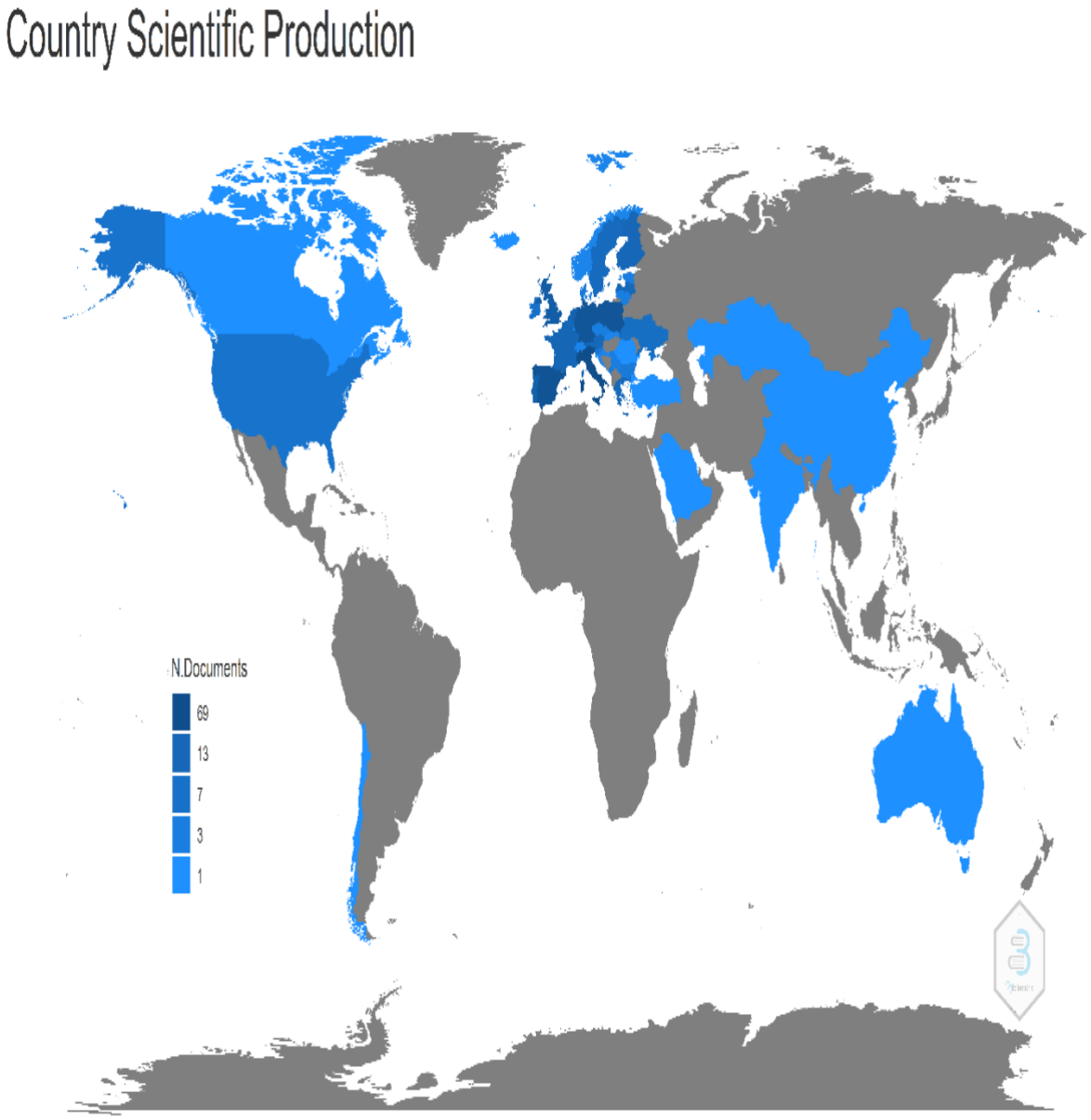
# 8. Annex 1

The bibliometric analysis permits to obtain a systematic, transparent, and reproducible review process of a corpus of documents based on the statistical measurement of the scientific activity on the topic. With regards to the data collection stage, the documents were assessed for eligibility and systematically filtered in a two-step procedure: a screening of papers titles, keywords and abstracts followed by a more detailed inspection of the full-text articles. In the first step (Table 1), a query of selected keywords was launched in the Scopus database, limiting the search to English sources published from January 2020 and August 5th 2021. From the initial number of 162 results, 6 documents were excluded because not including (at least on time) the words "European Green Deal" among title/ abstracts/authors' keywords (Table 2), and so reducing the number to 156.

*Table 1: Query launched in Scopus.*

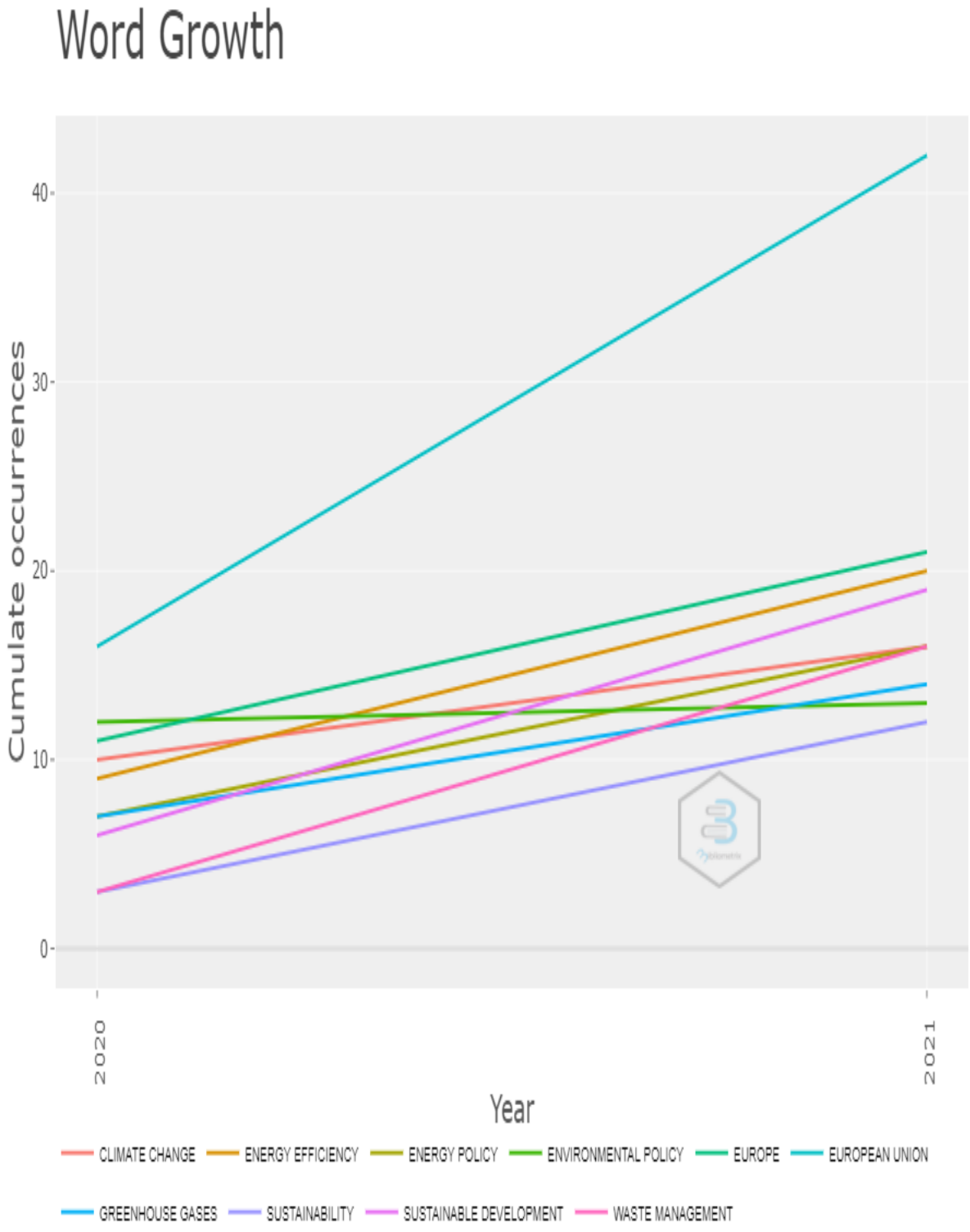
| |
|---|
| SCOPUS: TITLE-ABS-KEY (european AND green AND deal AND ( (challenges ) OR ( opportunities ) OR (tax AND issues ) OR ( mining AND sector ) OR ( industrial AND strategy ) OR (renewable AND energy AND transition ) OR (energy AND efficiency ) OR ( sustainable AND mobility ) OR (cap AND organic AND agriculture ) OR (new AND technologies ) OR ( circular AND economy ) OR (green AND standards ) ) ) AND (LIMIT-TO ( PUBYEAR , 2021 ) OR LIMIT-TO (PUBYEAR , 2020) ) AND (LIMIT-TO ( LANGUAGE , "English" ) ) |

# 9. Annex 2. Country scientific production




*Source: Author's elaboration through the Biblioshiny package for bibliometrix.*

## 10. Annex 3. Word Growth




*Source: Author's elaboration through the Biblioshiny package for bibliometrix.*