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The European Green Deal: a "*man-on-the-moon*" moment for Europe to save the Earth?

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My final thanks go to my dear boyfriend who took way too much of his holiday time to help me on this thesis and on the side. This was a difficult but enriching year: I have learned a lot about myself and the world around me. I chose to write on a topic that scares me because I wish, at my scale, to make a change.

This paper will not revolutionise the world, but I hope that it will make you question it.

Executive Summary

The purpose of this thesis is to assess the ability of the European Green Deal to deliver the changes that are required for the European Union to meet its climate commitments.

To answer our research question, we first look at which new targets, instruments and budget the Green Deal brings, in order to conclude whether it is as ground-breaking as how it was announced by the European Commission in 2019. As a second step, we study the past performances of the European Union on environmental indicators, in order to estimate the likelihood that it will meet its green engagements with the measures currently in place.

Combining these two analyses, we conclude that the European Green Deal will probably not fulfil our commitment of limiting global warming to 2°C. Since it has not brought any radical change in the policies adopted by the European Union and considering that the objective of becoming carbon neutral by 2050 would require efforts that are unprecedented at the European level, we do not quite see how we could effectively keep our promises.

Not only are our climate targets insufficient from a global perspective, they are also out of reach because not many tools have been put in place for us to actually hit these goals. If, in the past, we have indeed managed to reach all of our climate targets, it is partly because we were helped by contextual factors (e.g., the 2008 crisis) and because we moved part of our problems abroad. Today, our ambitions are (should be) much higher, and we cannot afford to transfer our emissions overseas if we want to solve climate change. Against this challenge, the EU continues to rely on market-based mechanisms and adopts protectionist policies, avoiding a reflexion on the structural reforms that would be required for us to really make a change. In particular, the Green Deal lacks measures, at home but most importantly abroad, in support of more sustainable behaviours, of clean technologies, and of citizens who will face the most adverse consequences of this change in societal directions. One of the reasons for these limitations is a clear budget deficit at the EU level: while the money reserved for climate expenditures has increased in total value in the next multiannual financial framework, what this sum represents compared to the EU's GDP is insignificant (less than 1%) and is actually decreasing proportionally to the growth of the wealth we create every year.

This report is addressed to all EU citizens willing to learn about the decisions of their leaders concerning the future of our shared planet, to NGOs for the preparation of their advocacy campaigns, as well as to the European institutions themselves if they wish to read an external analysis of their decisions.

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Introduction

Heat waves, flooding disasters and new diseases are some of the risks scientists have been warning us about for years if we were to continue pushing back the limits of nature. Year after year, the conclusions of the Intergovernmental Panel on Climate Change are becoming increasingly alarmist about the impacts humans have on the planet and the consequences of this on our future life on Earth. While environmental discussions have been taking place on the international scene since the 1970s, we had to wait until 2015 and the Paris Agreement for worldwide leaders to agree on a binding commitment to limit global warming to 2°C above pre-industrial levels (United Nations, n.d.). On the European scale, multiple engagements have been taken over time, followed by the design of a large portfolio of environmental policies. The latest initiative in that regard was released in 2019 by the European Commission under the name "*The European Green Deal*". This strategy consists of a vast plan of new commitments and reforms which are still ongoing, which explains why many items of this deal have not yet been analysed in-depth and critically assessed by the scholars' community at large. In addition to summarising what has already been said on the Green Deal by other analysts, this paper aims to review the Deal based on the most up-to-date data that was able to be consulted until mid-July 2021. The research question and sub-questions tackled by this thesis are the following:

Does the European Green Deal live up to the commitment made by the European Union in the Paris Agreement to limit global warming by 2°C above pre-industrial levels?

1) What is the European Green Deal?
2) What is new in the European Green Deal?
3) Considering the European Union's past climate performance, how likely are its chances of meeting its climate commitment with the European Green Deal?

This paper is structured on the basis of these research questions. A first chapter will describe the European Green Deal and review a series of critical analyses that have already been made in relation to this plan. In the second chapter, we will look at historical data on the environmental policies adopted by the European Union over time, as well as its past performance on a selection of climate indicators, enabling us to answer our last two questions. Finally, we will reply to our main research question at the end of this thesis, in the concluding section.

Chapter 1: What is the European Green Deal?

This first chapter introduces the European Green Deal, from its overarching objectives to its operational budget. It will then close on the criticisms the Deal has received so far.

1. Introduction to the European Green Deal and its overarching objectives

Published by the European Commission, led by President von der Leyen, in December 2019, the European Green Deal is a broad policy framework encompassing environmental, social, and economic objectives. Regarding the environmental pillar, the Commission confirms its willingness for the European Union to become carbon neutral by 2050 and to better nurture its natural capita (European Commission, 2019a). On the social side, von der Leyen's team wishes to conduct this transition in a "*just and inclusive*" way (id., p. 2). Economically speaking, the Commission aims to transform the European economy, decoupling its growth from resource extraction, thereby reinforcing its competitiveness (id.). Besides these overarching objectives, a large number of more specific political commitments are mentioned by the Commission, bringing together targets that were previously dealt with in a separate manner, under different policies (Wildauer et al., 2020). Indeed, this framework covers ambitions in relation to the Internal Market, sectors ranging from agriculture to mobility, as well as our interactions with the rest of the world (cf. Figure 1 for a detailed structure of the Communication). With the European Green Deal, the Commission is also announcing a long list of reforms and new initiatives supporting these commitments. All of this, however, remains described in a very general manner, without giving many details about the contents of these reforms or exact timelines (The Sounds of Economics, 2019). With this Communication, a policy instrument described by scholars as "*soft law"* (e.g., Sikora, 2020), the European Commission is engaging itself and all the other EU actors in an extensive process of revision, redaction and planification, a process which is currently ongoing and that we will outline in the next section.

Figure 1: Structure of the European Green Deal's Communication

2. What does the European Green Deal encompass?

In this section, we present and describe the political commitments announced by the von der Leyen Commission in its Green Deal Communication, the different tools and instruments mentioned in that paper as milestones to reach these objectives and, finally, the budget and investment strategy engineered by the Commission to support these endeavours.

2.1. Political commitments

Throughout the 24 pages of the European Green Deal Communication, the European Commission announced a large series of political commitments, listed in Table 1. These commitments range from more or less precise targets in terms of emissions reductions, to broad engagements to transform our economy. Many of these commitments, because they are not limited in time or not clear enough, do not meet the definition of *SMART* objectives (i.e., specific, measurable, attainable, relevant and time-bound) and are, therefore, difficult to monitor. The only objectives that meet these requirements and which are consequently easier to trace over time are written in bold in the following table.

Table 1: Political commitments mentioned as part of the European Green Deal	
Internal actions	
Climate policy	**"*No net emissions of greenhouse gases in 2050*"** (p.2)
	By 2030, reduce greenhouse gas emissions by *"50% towards 55% compared with 1990 levels*" (p.4)
Industrial policy	*"Accelerate the EU's industry transition to a sustainable model of inclusive growth*" (p.7)
	Develop *"breakthrough innovations"* by 2030 in clean hydrogen and other alternative fuels, energy storage and carbon capture (p.8)
Energy	The power sector must be *"based largely on renewable sources*" (p. 6)
	We should rapidly *"phase out of coal*" (p. 6)
	Ensure "*a secure and affordable"* access to energy *"for citizens and businesses*" (p. 6)
Construction	At least double the renovation rate of public and private buildings in EU MS (p. 9)
Mobility	**By 2050, reduce by 90% transport emissions** (p. 10)
	"Fossil-fuel subsidies should end" (p. 10)
	A substantial part of inland transport should move from road to rail/maritime shipping (p. 10)
Others	Stop exporting waste outside the EU (p. 8)
	All packaging should be reusable or recyclable by 2030 (p. 8)
Agricultural policy	European food should *"become the global standard for sustainability"* (p. 11)
	Increase *"level of ambition to significantly reduce the use and the risk of chemical pesticides, fertilisers, and antibiotics"* (p. 12)
Environmental policy	Increase *"the coverage of protected areas"* (under the Natura 2000 framework) (p. 13)
	Improve *"quality and quantity"* of our forests (p. 13)
	"Increase biodiversity (in urban space)" (p. 13)
	"Better monitor, report, prevent and remedy pollution" (p. 14)
	Align air quality standards "*more closely"* with the ones recommended by the World Health Organisation (p. 14)
Investments	*"Redirect public investment, consumption, and taxation to green priorities and away from harmful subsidies"* (p. 17)
Research & Innovation	*"Boost EU's ability to predict and manage environmental disasters"* (p. 18)
	Develop *"knowledge, skills, and attitudes"* on sustainability (p. 19)
Policy Alignment	Ensure that *"all Green Deal initiatives achieve their objectives in the most effective and least burdensome way"* (p. 19)
External actions	
"Promote and implement ambitious environment, climate and energy policies across the world" (p. 20)	
"Ensure EU's resource security" (p. 22)	
Call for collective action	
Engage with citizens on climate actions (p. 22)	
The Commission committed *"to become climate neutral by 2030"* (p. 23)	
Quotes selected from the European Green Deal Communication (European Commission, 2019a)	

None of these objectives are binding on their own, as they come from a Commission communication, which is merely a political instrument. Some of these objectives have nevertheless been translated into a Regulation proposal, the EU Climate Law, which should soon be adopted by the Parliament and the Council. If so, these objectives will become legally binding. These are namely: 2050's goal of zero net emissions and 2030's target of reducing greenhouse gases by 55% compared to 1990 levels. The Commission believed that it was essential to enshrine these long-term objectives in EU law in order to clearly indicate to all stakeholders – consumers, businesses, workers and international partners – that this is the way to go and that there will not be any reversal of ambition from the institutions (European Commission, 2020b) (cf. the following quote from the Commission).

« *The Climate Law is the legal translation of our political commitment and sets us irreversibly on the path to a more sustainable future*." (European Commission, 2020c)

Article 2 of the Commission's proposal of the Climate Law, as it reads today, provides that those targets should be binding at the EU level. In other words, Member States should "*collectively achieve"* these objectives, "*taking into account the importance of promoting fairness and solidary among Member States"* (EU Climate Law Proposal, Art. 2(2)).

Considering the importance of these emission reduction objectives for the Commission and the fact that these are *SMART* and binding targets, they will be at the core of our analysis in chapter two of this paper. This should not undermine the importance of other objectives mentioned in the Commission's Communication, but as they are only indicative and often not as clear, they will be excluded from our research scope.

2.2. Instruments

In order to meet the previously stated objectives, a number of new instruments and reforms of existing policies have been announced by the Commission. We are going to focus here on those related to our scope, i.e., with a clear link to emission reductions or enabling these reductions by triggering investments in clean technologies (other instruments, not directly related to our scope, will be shortly detailed in Appendix 1 of the paper). These initiatives will be sequentially described along with their state of advancement (cf. the boxes appearing before each tool's description).

EU Climate Law

The Commission's proposal was presented in 2020 to the Parliament and the Council which, in April 2021, reached a provisional agreement on its content. The regulation shall soon be adopted by these institutions.

Besides its aim to enshrine the EU's commitment to become a carbon neutral society by 2050, this new legislative framework encompasses the possibility for the Commission to adopt, under the scrutiny of the Parliament and of the Council, delegated acts on the actions needed for the Union to reach its targets (EU Climate Law Proposal, Art. 3 and 9). The proposal also includes monitoring obligations for the Commission: every five years, it will assess, based on the data communicated by Member States under pre-existing governance systems, "*the collective progress of Member States on the objectives"*, as well as *"the consistency and adequacy of Union's and national measures"* (EU Climate Law Proposal, Art. 5 and 6).

2030 Climate Target Action Plan (Fit for 55)

The reforms announced as part of this action plan should have been presented as formal proposals in June 2021. At the time of writing this paper, the author did not have access to these drafts.
This plan should normally encompass the revision of the following measures: • The Emissions Trading System (Directive 2003/87/EC); • The Effort Sharing Regulation (Regulation 2018/842); • The Regulation on Land Use, Land Use Change and Forestry (Regulation 2018/841); • The Energy Efficiency Directive (Directive 2012/27/EU); • The Renewable Energy Directive (Directive 2009/28/EC); • The $C0_2$ emissions performance standards for cars.

The aim of this action plan is to implement the new EU's emission reduction target for 2030. So far, this plan only foresees the strengthening of existing instruments in accordance with the EU's heightened climate ambitions. It includes, among others, increasing the scope of the EU's carbon trading system to new sectors (e.g., construction and road transport), adjusting the Effort Sharing Regulation accordingly, and reinforcing the measures part of the energy efficiency and renewable energy directives. Informed by a recent impact assessment study, the Commission is expected to upgrade our current targets in terms of renewables deployment and energy efficiency. According to this study, a GHG (i.e., greenhouse gases) reduction by 55% for 2030 requires a 38 to 40% share of renewables in our energy consumption, as well as a target of 39 to 41% in primary energy savings (European Commission, 2020d). Whether the Commission will follow these recommendations or not remains to be confirmed.

Carbon Border Adjustment Mechanism

A formal proposal for this instrument should be presented by the Commission in 2021. Public consultations have already been conducted on this topic.

The aim of this suggested mechanism is to mitigate the risk of what people refer to as *carbon leakage,* i.e., the risk of seeing industries moving their production to regions with lower environmental standards (Clays et al., 2019). Today, this risk is dealt with by granting free carbon allowances, under the ETS program, to the most polluting industries in Europe (European Commission, n.d.1). This methodology is believed to prevent carbon prices from increasing and to be incompatible with strengthened climate ambitions (Clays et al., 2019). To replace this and to avoid the delocalisation of European companies, the Commission's idea is to tax products imported into the EU according to their carbon footprint (European Commission, n.d.1).

New EU Industrial Strategy

The strategy was adopted by the Commission on the 10th of March 2020.

By redacting this industrial strategy, the Commission recognises that, while pricing carbon helps to push polluting technologies out of the market, clean technologies also need support. This strategy foresees the revision of EU's competition rules, with a particular attention to state aid guidelines (European Commission, 2020f). With this strategy, the Commission is also working on new actions concerning the protection of our intellectual property and our access to critical raw materials (id.). Priorities for European actors are set: these are, among others, to "*modernise and decarbonise energy-intensive industries, support sustainable and smart mobility industries, promote energy efficiency, and secure a sufficient and constant supply of low-carbon energy at competitive prices"* (id.). At the EU level, an instrument often mentioned when it comes to reaching these objectives is the creation of alliances - projects gathering different actors from across Europe aiming to scale-up promising technologies. While we already had an official alliance for batteries, the Commission has recently created another one focused on hydrogen (id.). Others should follow for Low Carbon Industries and Raw Materials (id.).

Strategy for Smart Sector Integration

The strategy was adopted by the Commission on the 8th of July 2020.
This strategy encompasses the following measures: • The revision of the TEN-E Regulation (Regulation 347/2013); • The redaction of a new offshore wind strategy; • The redaction of a new hydrogen strategy.

This strategy aims to better connect energy carriers with each other's and with end users (European Commission, 2021a) and includes various actions, such as the revision of the regulation on Trans-European Energy infrastructures (the TEN-E Regulation) for it to be better

suited to the development of new energy technologies (European Commission, 2020h). This revision, as proposed by the Commission in December 2020, implies new sustainable requirements for TEN-E projects and the end of the EU's support for the development of oil and gas infrastructures (id.). Two specific technologies won the favours of the Commission, which now wishes to further support their deployment. These are offshore wind and hydrogen solutions for generating clean energy (id.). Indicative targets have been set up in that regard: among others, increasing our offshore wind capacity to at least 60 GW by 2030 (European Commission, 2020i) and our hydrogen production capacity to 40 GW across the same time span (European Commission, 2020j).

Renovation Wave Strategy

The strategy was adopted by the Commission on the 14th of October 2020.

The objective of the Commission with this strategy is to at least double the EU's renovation rate (currently at 1%) by 2030 in the aim of boosting our buildings' efficiency in terms of energy consumption (European Commission, 2020k). This strategy is also presented as bringing social benefits, as it could help the least fortunate Europeans to pay their energy bills by reducing their energy needs (id.). The priorities of this strategy are to decarbonise heating and cooling systems, as well as renovate public buildings such as schools and hospitals (id.). Besides improving access to funding, notably thanks to the recovery programme agreed upon in 2020 (i.e., Next Generation EU), this strategy also foresees the revision of buildings' standards concerning their energy performance and of the regulation on construction products (Regulation 305/2011) (European Commission, 2020l).

Strategy for Sustainable and Smart Mobility

The strategy was adopted by the Commission in December 2020.
This strategy encompasses the revision of the following measures: • The Alternative Fuels Infrastructure Directive (Directive 1999/62/EC); • The Combined Transport Directive (Directive 92/106/EEC); • The Emissions Trading System (Directive 2003/87/EC); • The TENT-T Regulation (Regulation 1315/2013); • The Energy Taxation Directive (Directive 2003/96); • The $C0_2$ emissions performance standards for cars.

With this strategy, the Commission has set itself indicative targets in terms of *green* mobility. These targets provide for a progressive increase, from 2030 to 2050, of zero-emission vehicles (i.e., from cars to aeroplanes) and rail traffic (e.g., by 2030, the Commission plans to have at least 30 million zero-emission cars on European roads, while rail freight traffic should double by 2050) (European Commission, 2020m). This strategy will imply the revision of existing

instruments, among which we could cite the inclusion of road and maritime transport emissions to the ETS programme (id.).

Sustainable Finance Strategy

A public consultation concerning the revision of the 2018 Sustainable Finance Strategy is currently being conducted by the Commission.
This strategy encompasses the following measures: • The development of a European Green Taxonomy; • The development of an EU Green Bond standard; • The revision of the Non-Financial Reporting Directive (Directive 2014/95/EU); • The development of standardised natural capital accounting practices; • The redaction of a new Regulation on Sustainable Finance Disclosure.

A first strategy for Sustainable Finance was redacted in 2018, and encompasses the following actions: the creation of a European taxonomy clarifying which type of investments should be considered as contributing the most to the EU's environmental objectives, opening the way for the harmonisation of what could be classified as *green bonds* across the European Union (i.e., debt instruments issued in order to finance projects considered as sustainable – The World Bank, 2015) (European Commission, 2020q). New regulations on non-financial reporting obligations and announcements made by the financial industry with regards to sustainability were also planned and are currently on their way (id.). The Commission is now working on updating the strategy for Sustainable Finance in the aim of further enhancing clarity for investors with regards to *green* products (European Commission, n.d.4). In particular, the Parliament and the Council having jointly adopted the Taxonomy Regulation (Regulation 2020/852) in June 2020, the Commission is now working on implementation acts, defining, in more details and with the support of a Technical Expert Group, a set of requirements enabling the classification of investments as contributing more or less substantially to the EU's *green* targets (European Commission, 2021c).

Others

Table 2 gathers a set of other scattered instruments announced by the Commission in the aim of mitigating climate change.

Table 2: Other climate reforms announced by the European Green Deal

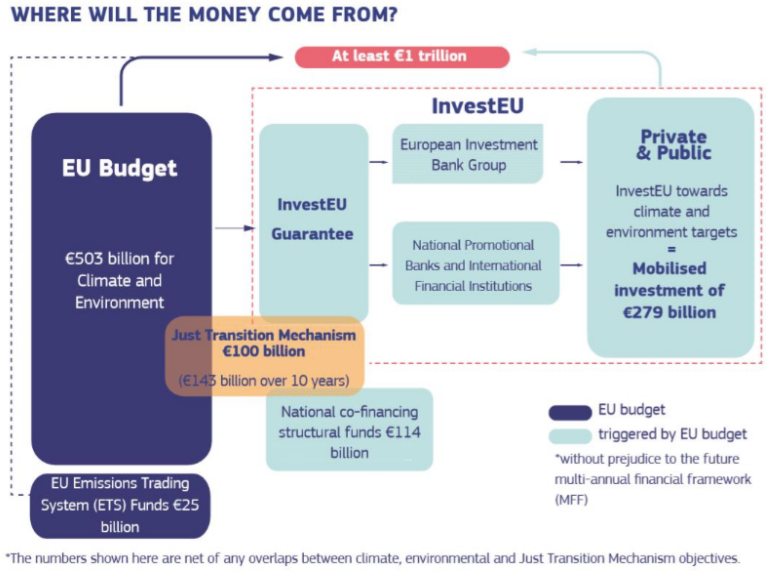
Action	State of Advancement	Description
Revision of the Energy Taxation Directive (2003/96)	A formal proposal should be presented by the Commission in 2021.	This directive harmonises the taxation rules for energy products in the EU. Judged by the Commission as being no longer aligned to the EU's climate objectives, it is currently working on revising measures concerning tax exemptions and minimum rates in the aim to, among others, reduce (direct and indirect) fossil fuel subsidies (European Commission, n.d.1).

Revise the Methane Strategy	Adopted by the Commission on the 14th of October 2020.	Methane comes after carbon dioxide as the second most important greenhouse gas responsible for climate change (European Commission, 2020e). This strategy from the Commission provides for an improvement of emissions measurement and reporting (id.).
Revise the Better Regulation Guidelines	Adopted by the Commission in April 2021.	Policy alignment is now considered as capital by the Commission which, from now on, commits to justifying each of its proposals based on the "*do no significant harm"* principle (as defined by Article 17 of the Taxonomy Regulation) (European Commission, 2021d). The goal is to see all EU policies positively (or at least not negatively) contribute to its advancement on its long-term objectives (id.).

2.3. Budget

In the initial Communication announcing the Green Deal, there was no indication about the amount of money its implementation would require. The budgeting aspect of the Green Deal was detailed, at a later stage, in January 2020, by the Commission in its *Green Deal Investment Plan* (cf. Figure 2), in which it promises to raise at least €1 trillion for green investments over the next ten years. We will now describe the structure of this plan and how it has been affected by the European budget for 2021-2027.

Figure 2: The Green Deal Investment Plan



Source: European Commission, 2020s

EU budget

The European Commission is planning to *mainstream green objectives* in the Union's budget, both on the expense and revenue sides. Looking firstly at expenditures, the European institutions have agreed to dedicate 30% of them to climate projects (note that the initial target suggested by the Commission in its Investment Plan was at 25%) (European Commission,

2020t). This money will be split across various funds and policies aiming to support different projects with different tools (cf. Table 3).

Table 3: Key EU funds for green investments in 2021-2027 – in 2018 prices.

Name	Total value (in € billion)	Climate target	Climate spending target (in € billion)	Description
Horizon Europe	84.9	35%	29.7	Horizon Europe is the research programme of the EU. It provides funding and encourages partnerships between stakeholders for research purposes.
Connecting Europe Facility	18.4	60%	11	This fund supports the development of trans-European transport and energy networks.
LIFE	4.8	61%	2.9	LIFE offers grants to projects with benefits in terms of biodiversity, circularity, energy transition, climate change mitigation or climate change adaptation.
Cohesion Policy	242.9	30% Cohesion Fund 37% European Regional Development Fund	81.4	This policy's goal is "*reducing disparities between the levels of development of the various regions"* of the EU (TFEU, Art. 174). While the cohesion fund aims to support capital-intensive projects, the ERDF grants money to EU's regions for the implementation of cross-regional projects and for research and innovation activities.
Common Agricultural Policy	343.9	36% 2021-2022 40% 2023-2027	123,8	The Common Agricultural Policy of the EU is mainly funded through the European Agricultural Guarantee Fund (supporting European farms and stabilising markets), as well as the European Agricultural Fund for Rural Development (funding projects enhancing the competitiveness and sustainability of the EU's rural areas).
Neighbourhood, Development & International Cooperation Instrument	71.8	30%	21,5	The NDICI is a new fund which gathers all of the previous instruments used by the EU for its support to non-EU countries and their development.
European Recovery & Resilience Facility	673.3	37%	249.1	Set up as part of Next Generation EU, this fund aims at supporting Member States in their recovery efforts after the pandemic.

Sources: European Commission, n.d.9 (for the climate targets); European Commission, 2020u (for the funds' value and description)

While the Commission initially foresaw a contribution of €503 billion from the EU budget to the Green Deal's Investment Plan over the next ten years (or €352 billion over the next seven years), this amount has actually been increased following the negotiations for the European budget, thanks to the introduction of Next Generation EU, the EU's temporary support

programme towards its Member States and their recovery efforts in the aftermath of the COVID-19 pandemic (cf. Table 4).

Table 4: EU budget for green investments in 2021-2027 – in 2018 prices.

	Total value (in € billion)	Climate target	Amount dedicated to climate projects (in € billion)
Total budget	1085.3	30%	325.6
Total budget including Next Generation EU	1835.3	30%	550.6

Sources: European Commission, 2020u

On the revenue side, the EU is planning to increase the scope of its own resources by introducing new taxes with environmental benefits. A first new contribution has been in effect since January 2021: a tax on non-recycled plastic waste. The Commission expects this new revenue stream to generate about €6 billion per year (or 3.9% of the annual budget of the European Union) (European Commission, 2021e). Note that this estimation has been provided without any explanation on its underlying assumptions, nor on for how long the Commission was expecting to trigger such an amount. However, it must be pointed out that, if the tax works as planned and reduces the quantity of waste, the amount of money collected through this revenue stream should progressively go down. Other taxation measures should follow (e.g., the carbon border adjustment mechanism mentioned earlier) for which no reliable estimation is for now available.

ETS funds

Two funds have recently been set up as part of the European Carbon Trading System: the Modernisation Fund and the Innovation Fund. While the first funding mechanism is focused on helping lower-income Member States (i.e., Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia) modernise their energy infrastructures (European Commission, n.d.6), the second fund seeks to finance large-scale projects involving low-carbon, renewable or carbon capture/storage technologies across the whole Union (European Commission, n.d.8). Since these two funds are funded through the auctioning of carbon allowances, their value will depend on carbon prices. According to the European Commission, the Modernisation Fund is expected to reach €14 billion over the period from 2021 to 2030 (European Commission, n.d.7), whereas the Innovation Fund should amount to around €10 billion (European Commission, n.d.8). Note that this is, combined, less than what

Romania on its own will get from the Cohesion Policy over the period spanning 2021-2027 (estimated at €26.8 billion) (European Commission, 2020u). Since the Commission does not communicate on the assumptions it took to reach these estimations, we confronted them with our own computations using the average price of carbon on the European primary market between 2017 and 2021 (cf. Table 5; Appendix 2 for more details on these computations). What this exercise shows is that it is extremely complicated to estimate the value of these funds over ten years. While carbon prices have been going up since 2017, it is not yet sure how they will evolve in the coming years. Ironically, in an ideal world without any emissions of carbon, the value of these funds would actually be equal to zero.

Table 5: Estimation of the value of the ETS funds

	2017	2018	2019	2020	2021
Average allowance price on the primary market (€)	5.8	15.5	24.72	24.26	45.12
Value of the Modernisation Fund over the period 2021-2030 (in € billion)	3.73	9.97	15.90	15.60	29.02
Value of the Innovation Fund over the period 2021-2030 (in € billion)	3.35	7.71	11.86	11.65	21.04

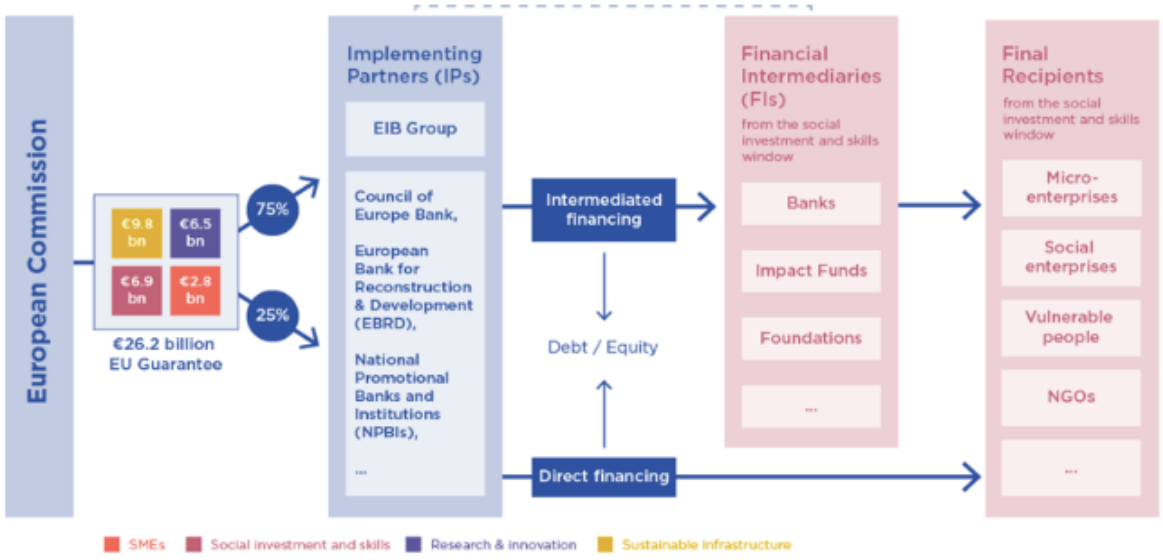
cf. Appendix 2 for the detail of these computations

InvestEU

The goal of InvestEU is to spur private investments aligned on the EU's goals, via the intermediary of partners such as the European Investment Bank, by acting as a public guarantee. In other words, this instrument aims to leverage funding from financial actors by *de-risking* projects run by private individuals (cf. Figure 3). European leaders agreed to dedicate 30% of the money raised in such a way to *green* investments. In its Investment Plan, the Commission had announced that they were expecting to mobilise, directly through InvestEU or as a spillover to this programme, €650 billion over the next seven years, among which €195 billion was to be devoted to sustainable investments. These amounts must, however, be adjusted to the agreement reached by Member States on the European budget for 2021-2027. While the Commission expected to be able to rely on a guarantee of €47.5 billion for the InvestEU programme (European Commission, 2020a), this guarantee will eventually amount to €29 billion (European Commission, n.d.10). The amount of money expected to be raised on that basis is consequently lower than previously announced. The Commission now postulates that it could raise, thanks to InvestEU, about €330 billion over the next seven years, which correspond to about €100 billion for green projects over the same period. This is equal to €14 billion per year or about 0.1% of the EU's GDP (estimated at 13.9 trillion in 2019 –

Eurostat, 2021a). Note, however, that this computation relies on some precarious and non-transparent assumptions concerning the amount of private investment that InvestEU will manage to trigger (cf. Appendix 2 for more details on these computations).

Figure 3: How InvestEU works



Source: EVPA, n.d.

Just Transition Mechanism

The Just Transition Mechanism (JTM) is a novelty introduced by the European Green Deal in the goal of supporting regions that are expected to be the most affected by the *green* transition (European Commission, 2020a). This mechanism is currently targeting regions and communities that are active in the fossil fuel value chain (id.). It is funded on the basis of three pillars with different priorities:

- A Just Transition Fund (JTF) has been set up, valued at €17.5 billion (European Commission, 2020u), in order to send grants to regions facing difficulties (European Commission, 2020s). For each project conducted by these regions with the support of the JTF, they must invest some of their own money, as well as a share of the funds they receive as part of the Cohesion Policy (id.). Taking this into account, the Commission could expect to mobilise, with this tool, between €57 (multiplier = 3.2) and 83 billion (multiplier = 4.7) (cf. Appendix 2 for more details on these estimations). While all countries in the EU will receive some funds from the JTF, the top-5 beneficiaries of this mechanism will be: Poland (receiving 20% of the funding), Germany (12.9%), Romania (11.1%), Czechia (8.5%) and Bulgaria (6.7%) (id.).
- A share of the InvestEU programme (cf. previous point), called Just Transition Scheme, is also dedicated to this objective of conducting a just transition. This pillar is focused

on private investments and is currently expected to raise between €10 to €15 billion (European Commission, n.d.11). Note that this estimation is far from what had initially been suggested, €45 billion, by the Commission in its proposal (European Commission, 2020s).

- A similar mechanism to the InvestEU instrument, but this time focused on the public sector, has been put in place. This programme, managed by the European Investment Bank and backed by the EU budget, is foreseen to deliver €25 to €30 billion worth of public investments (European Commission, n.d.11).

Altogether, this mechanism is expected to generate between €92 and €128 billion in support of regions struggling the most with the *green* transition (cf. Appendix 2 for more details on these estimations). This corresponds to an annual investment of about 0.1% of the EU's GDP. This funding, released in accordance with *territorial transition plans,* will be accompanied by technical guidance offered by the Commission, as well as by some flexibilities concerning the use of state aids (European Commission, 2020u).

National co-financing

As we have just seen with the Just Transition Fund, it is sometimes mandatory for Member States to top up EU investments with some of their own financing. This is typically the case for funds used in the context of the cohesion policy. This is why the Commission estimates that for each euro it spends on climate action, more money should stem from national authorities. In its initial Investment Plan, the Commission thereby announced a national contribution of €79.8 billion over the next seven years (European Commission, 2020s). Assuming a linear relationship between the EU spending and national investments, and based on the previous estimation, we computed that Member States, in the new EU multiannual financial framework, should spend at least €123 billion on climate projects. In addition to this, the Commission is planning to incentivise Member States to accelerate their transition by providing them with targeted recommendations in the context of the European Semester (European Commission, 2019a).

Aggregated budget for the EU's green transition

The table below (cf. Table 6) compares the Green Deal's Investment Plan before and after the agreement reached on the 2021-2027 financial framework (cf. Appendix 2 for more details on these computations). While this data seems to indicate a willingness of European leaders to further boost their climate engagement, it is worth mentioning the following points of attention.

As already mentioned, without the Next Generation EU programme, the EU budget contribution would have been lower than what was initially suggested by the Commission. Member States have, indeed, cut down on the Commission's budget proposal during the MFF negotiations, thereby impacting the share that was supposed to go towards climate expenses. If this has been (over)compensated by Next Generation EU, note that this programme is temporary and not expected to be renewed after 2027. Another point to keep in mind is that €128.4 billion, which is the total amount of money that the EU is expected to invest in the green transition per year, corresponds to less than 1% of the EU's total GDP. Even though these investments triggered at the EU level will probably be complemented by other investment plans designed at the national level, this indicator suffices to put in perspective what was said earlier about the alleged willingness of EU leaders to accelerate the green transition. Finally, many of the estimations gathered in the table below rely on fragile assumptions (e.g., on carbon prices or on spillover investments) and should be treated with caution.

Table 6: The Green Deal's Investment Plan before and after the agreement on the next MFF - in 2018 prices for the period 2021-2027.

in billion €	Initial Plan	With the new MFF + Next Gen
EU budget contribution (excluding overlapping items with the instruments mentioned below)	352.1	542.5
ETS funds	17.5	23.8
InvestEU contribution	195.3	99.3
Just Transition Mechanism	100.1	110
National co-financing	79.8	123
Total	700	898.5
Per year	100	128.4
Over the period 2020-2030	1000	1283.6
Sources: European Commission, 2020s (for the initial plan); author's computations (for the new MFF)		

3. Review of the criticisms received so far

The European Green Deal, as proposed by the Commission in 2019, has already been criticised by various parties. While it received much criticism from people with business interests, on the grounds that it would compromise the future of their industry, it has also been attacked by scientists, economists and environmentalists, describing this initiative as lacking ambition (Storm, 2020). This section details this second category of criticism, focusing on the ideology behind the deal, how it was negotiated, its climate targets, policy content and budget.

3.1. The ideology behind the Green Deal

The Commission describes the Green Deal as a *new growth strategy* (in Greenpeace, 2019). This paradigm relies on the belief that "*economic growth can be decoupled from environmental violence",* in a way that would not compromise standards of living (Ossewaarde & Ossewaarde-Lowtoo, 2020, p. 4). Under this perspective, the main issue to solve is market failures: the natural incapacity of markets to integrate negative externalities on the environment, which has led to wrong technological choices and, therefore, the accumulation of carbon in the atmosphere (in Samper et al., 2021). The solution to this issue, as imagined by the adepts of this ideology, is to implement market-based instruments aiming to correct these failures by highlighting the hidden costs of production and consumption and integrating them in the market (Mastini et al., 2021). This can be done, one the hand, through taxes and carbon pricing and, on the other hand, through R&D funding and small subsidies for the development of alternative technologies (id.). This is the strategy followed by the Green Deal (id.). This strategy relies on a classic neoliberal approach to climate politics (Samper et al., 2021), inspired by the scientific field of environmental economics. These economists use instruments developed in the context of classical economics in order to address climate challenges (Vankatachalam, 2007). People who believe in this approach tend to be optimistic concerning the market's ability to develop performant technologies able to solve climate change (id.). There is, however, no scientific consensus on this assumption. Another school of thought, led by ecological economists, is much more skeptical (id.). For them, the issue is much more profound than just a question of money or technology: it concerns the socio-cultural structure of our society that is driving our economic behaviours, the underlying reasons why we depend on such sub-optimal technologies (Samper et al., 2021). This alternative ideology, therefore, doubts of the ability of market-based policies to solve the complex issues behind climate change (id.). Their recommendation is, instead, for the public sector to drive and coordinate the green transition by making use of significant public investments (id.) and by setting strict environmental standards (Mastini et al., 2021). The goal of this second group of ideologies is to "*reform capitalism from the inside"* (Samper et al., 2021, p.12). A third group of people goes even further than that and wishes to challenge capitalism and its underlying foundations: some environmental activists and scholars, described as *degrowth* supporters, claim that mitigating climate change would require downsizing production and consumption (Mastini et al., 2021). These people advocate for a fundamental change of our society towards more simplicity (Samper et al., 2021). If these two last groups of people disagree on their ideal end

state, they both agree on the fact that the European Green Deal, relying on a traditional way of envisioning climate policies, will not bring any structural changes (id.). Favouring the status quo, they worry that this plan could delay the implementation of policies targeting behaviours that are responsible for climate change (id.). The general opinion of these critics on the ideology behind the Green Deal is that simply replacing technologies will not be sufficient; on the contrary, its primary objective should be to tackle the underlying causes of climate change.

3.2. How the Green Deal was negotiated

The consultation process around the Green Deal and its implementation is said to be dominated by business lobbies. According to the Corporate Europe Observatory (2020), the Green Deal was the most lobbied-on topic in Brussels over the past months, with millions of euros spent on spreading the influence of carbon-intensive industries. They therefore argue that *"the fingerprints of the industry can be seen all over the European Green Deal"* (p. 1), illustrating this with the fact that, instead of striving for absolute carbon neutrality, the Commission opted for a net target, allowing the industry to continue polluting. The efficiency of businesses at lobbying is explained by scholars by the fact that they represent interests which are a lot more concentrated than those of the general public, and that it is therefore easier for them to coordinate their actions (Elkerbout, 2020).

3.3. Climate targets

While the 2030 GHG emission reduction target set as part of the Green Deal is ambitious compared to what other emitters have committed to, it would not match what science requires to maintain the rise of the global mean temperature under 1.5°C (Storm, 2020; Greenpeace, 2019). According to Greenpeace (2019), to meet this objective, we would need to divide global GHG emissions by two by 2030. In order to leave room for developing countries to pursue their own development, Greenpeace believes that the European Union should and could do better than just halving its emissions by 2030 and, instead, suggests increasing this rate to 65%. To fulfil this target, the EU would need to, first, transform its energy mix towards 100% renewable energy faster than what is currently planned (id.), and then further strengthen its ambitions in terms of energy efficiency (European Environmental Bureau, 2020).

Going further, some critics also take aim at the 2050 emission target adopted by the European institutions. First, according to the European Environmental Bureau (2020), this target date

comes too late as, to remain below the 1.5°C temperature increase, the whole world should be carbon neutral in 2050. Then, the choice of a net target is criticised by scholars, arguing that many renowned scientists are sceptic about the ease of deploying carbon capture technologies on a wide scale (Wildauer et al., 2020). As mentioned, this decision is believed by some to have been driven by the lobbying activities of the fuel industry (e.g., Corporate Observatory Europe, 2020).

Another criticism concerning these targets is the fact that they were not set at the national level, but at the EU level (Giannelli, 2021). Legal scholars are particularly worried about that as they believe it is weakening the EU's enforcement strategies with regards to these objectives (Monti & Martinez Romera, 2020).

Essentially, critics are of the opinion that, although the Green Deal does show ambition to increase the EU's ecological efforts, further actions would be required to meet our commitment to address the global climate crisis.

3.4. Policy content of the Green Deal

This subsection gathers general criticisms – without entering into technical details – aimed at some of the tools presented earlier as related to our climate targets.

The European Emissions Trading System (ETS)

The ETS is, according to some experts, more efficient for generating incremental emission reductions than what would be required to reach carbon neutrality (Elkerbout, 2020). According to Elkerbout (2020), this tool is therefore incapable of bringing us the radical outcomes we are expecting from the Green Deal. This belief is reinforced by the fact that first, it is full of loopholes and second, as emphasised by many experts, carbon prices are currently too low and, therefore, not sufficient to encourage the industry to adopt cleaner technologies (Clays et al., 2019). Theoretically, if this mechanism is seen solely as a tool to regulate how much carbon is emitted into the atmosphere, low prices should not be an issue (Elkerbout, 2020). However, in practice, if businesses fail to reduce their emissions, their licence to operate would be lost, which is very unlikely to be effectively enforced (id.). Without this threat and with low carbon prices, critics doubt the capacity of the ETS to help us to reach our climate objectives.

Carbon Border Adjustment Mechanism

While a carbon border tax would be possible to implement, critics point out the challenge of doing so (Tagliapietra & Veugelers, 2020). This would firstly be due to the technical difficulty of calculating the footprint of foreign goods (Clays et al., 2019; Siddi, 2020). As illustrated by the following quote, their second fear is that this mechanism would also trigger some geopolitical tensions, as some countries might judge this measure as protectionist (Tagliapietra & Veugelers, 2020; Clays et al., 2019). Indeed, this tax could put emerging economies, whose processes are less efficient, at a disadvantage, sparking trade disputes (Siddi, 2020).

> "*For a growing number of developing countries, translating these European ideals into trade policy evokes darker traditions of protectionism and oppression*" (Beattie, 2019).

Despite these difficulties, many people believe that a carbon tax is essential in order to protect the competitiveness of the European industry while imposing stricter environmental standards, thereby avoiding carbon leakages (in Siddi, 2020). Others are, on the contrary, claiming that there is currently no evidence that this is or will be an issue and, therefore, that the immediate focus of the European institutions should not be on this measure but on more pressing challenges (e.g., Clays et al., 2019).

New EU Industrial Strategy

From the point-of-view of some pundits, the new industrial policy of the European Union lacks consistency, by gathering an aggregation of existing initiatives (Tagliapietra & Veugelers, 2020) and relying too heavily on the so-called benefits of the single market (Pianta & Lucchese, 2020a). Wildauer et al. (2020) would, for example, like to see this strategy be upgraded to a much more comprehensive climate master plan, enhancing the clarity of its targets, enforcement procedures and timelines. Beyond this general assessment of the strategy, critics also denunciate the fact that the Commission has not been very clear, so far, regarding which technologies this strategy should support (European Environmental Bureau, 2020). According to the Corporate Europe Observatory (2020), there is a risk that this could be used by the industry in order to get support for technologies that are not unanimously judged as sustainable (e.g., the production of hydrogen based on fossil fuels).

Green Taxonomy

One of the main problems identified by critics vis-à-vis the taxonomy is once again related to the lobbying pressures from the industry regarding what should be or not considered as *green* (cf. 3.2). These lobbies appear to have facilitated the provision of loopholes for activities that

are considered by many as unsustainable (e.g., biofuels) (Siddi, 2020). By convincing regulators to stick the green label on as many things as possible, people described by Gabor (2020) as "*carbon financiers*" then hope to benefit from the green investment strategy of the EU under which the institutions have committed to promote green assets with public guarantees. Against these issues, some people (e.g., Fontan, 2021) argue that it would have been more efficient to adopt an approach based on penalising brown bonds, for which the definition appears more clearly, instead of rewarding green ones. So far, this methodology has, however, been rejected by the Commission (Gabor, 2020).

Just Transition Mechanism

As the transition is expected to require a large set of regressive measures, affecting poorer people much more than the rich, it is of the opinion of some experts that these people should be compensated appropriately (e.g., Clays et al., 2019). In the Green Deal, there is an emphasis put on inclusivity and fairness, which is a good sign in that regard (Ossewaarde & Ossewaarde-Lowtoo, 2020). However, it is already quite clear for some critics that the Green Deal and its Just Transition Mechanism (JTM) will neglect a large part of the issue, as it will be primarily focused on compensating coal- or mining-dependent areas whose jobs represent fewer than 10% of the total number of jobs expected to be lost with the green transition (Storm, 2020). Another issue with the JTM is that it will rely on national allocation plans, which could, according to some experts and based on past experiences, lead to the money being diverted by local elites instead of being used on upskilling programmes for the population at large (Varoufakis & Adler, 2020; Siddi, 2020). Furthermore, as this mechanism will function on a pre-allocation basis, some people fear that it could lack flexibility (Clays et al., 2019). Finally, as this programme puts an emphasis on job losses due to the green transition, there is a risk of incentivising *green blaming,* i.e., people starting to automatically associate job losses to the transition, reinforcing their resistance to change (id.).

3.5. Budget

A recurring statement by critics on the Green Deal is that it is under-funded (e.g., Storm, 2020; Pianta & Lucchese, 2020a). Some people justify this statement by comparing the Green Deal's budget with the money spent on bailing out the European banking sector after the 2008 crisis (Siddi, 2020) - as Varoufakis & Adler (2020) state, "*one cannot resist comparing the two sums and the priorities they reveal: more than €4.2tn to save Europe's financial sector; €1tn to save our world*". Others compare the amount of money suggested by the Commission for the

transition to the estimated investment needed to reach its environmental objectives (e.g., out of the 1 trillion euro proposed by the Commission, according to a study published by its services in 2012, about one quarter should already go to the renovation wave, restricting the budget of many other policies announced with the Green Deal) (Storm, 2020). Let us now look at some more targeted criticism concerning the plan put in place by the Commission in order to raise these 1 trillion euros over the next ten years (i.e., the Sustainable Europe Investment Plan).

EU spending

The 30% target for climate spending in the EU's multiannual financial framework should be treated with caution (Tagliapietra & Veugelers, 2020). First, these expenditures will cover both investments and traditional expenses (Clays & Tagliapietra, 2020). Then, the current methodology used by the EU to estimate its climate spending is described by some people as flawed: it would overestimate the climate contribution of the EU, especially concerning its agricultural funds (Claeys et al., 2019). More importantly, current plans would rely primarily on the repackaging of pre-existing resources, and not on the creation of new funds (Tagliapietra & Veugelers, 2020; Pianta & Lucchese, 2020b; Siddi, 2020; Storm, 2020). With that in mind, we should also add that, if this target of 30% should mobilise about €550 billion over the next seven years (i.e., €78 billion per year), this amount of money is, following the opinion of some experts (e.g., Storm, 2020), far from being sufficient. Indeed, according to a study conducted by the European Commission, the EU would need to spend €260 billion per year in order to reduce its emissions by 40% in 2030 (in Storm, 2020). While a budget gap can already be spotted there, this estimation does not take into account the stricter target of the EU to reduce its emissions by 55% in 2030, nor the effort it should make in order to support poorer regions of the world throughout the transition (Wildauer et al., 2020). Including this into the reasoning would bring the annual amount of green investment required to €855 billion (id.). This estimation should be interpreted carefully as prediction models face difficulties to estimate the cost of implementing future low-carbon technologies (Claeys et al., 2019; Wildauer et al., 2020). Taking that into account means that it is safer for the EU to invest more money than these estimations into the green transition (Claeys et al., 2019). As a conclusion, critics believe that the EU is not going to spend enough on climate projects as compared to what is actually needed. This overall criticism has also been mentioned concerning the size of specific funds at the EU level judged insufficient to reach their objectives (e.g., the Just Transition Fund, currently amounting to €17.5 billion, will have to cover the social restructuring costs of the transition estimated at €130 billion for the mining regions of Eastern Europe - Storm, 2020).

Private investments

The private sector is presented by the European Commission as the only actor able to bridge the investment gap for the green transition (in Tagliapietra & Veugelers, 2020). Some people find this problematic as, if the Green Deal depends so critically on private finance, the Commission's paths for change through tougher regulations become more limited (e.g., Storm, 2020). This issue is, according to some scholars, even more controversial when we consider the fact that large private financers, having invested much money into industrial activities, often defend the interests of carbon-intensive sectors (Storm, 2020). Going further and bearing in mind the small amount of fresh money the EU is going to invest in the transition, it is not yet known whether the investment plan of the EU will manage to mobilise sufficient private funding (Siddi, 2020; Clays et al., 2019). An incentive offered to private investors for them to pour their money into green projects is the Green Deal's proposition to offer a public guarantee on these investments. However, as mentioned by some experts, shifting risks away from private investors towards the EU budget might weaken the financial stability of its institutions (e.g., Varoufakis & Adler, 2020). It is also worth mentioning that the opportunity costs of sending EU money into a guarantee fund are non negligeable considering that other EU programmes could make better use of it (Clays & Tagliapietra, 2020).

Member States' investments

To encourage an increase in green investments at the national level and fill the green investment gap, Member States should also play a vital role (Wildauer et al., 2020). Experts are, however, fearing that they will not live up to the challenges ahead. Again, if the EU is expecting Member States to co-finance some of its green projects, this money is likely to be re-directed from other missions and not mobilised from new revenue streams (Clays & Tagliapietra, 2020). If we were to encourage Member States to effectively increase their climate spending, some experts believe that, as illustrated by the following quote, we would need to change the EU's fiscal framework by loosening the rules of the Stability and Growth Pact (Clays & Tagliapietra, 2020; Pianta & Lucchese, 2020a; The Sounds of Economics, 2020; Siddi, 2020).

> "*National co-financing is unlikely to involve additional spending, because member states have to stick to the deflationary straitjacket of the Stability and Growth Pact*" (Storm, 2020, p. 9).

This could be done, as suggested by Pianta & Lucchese (2020b), by introducing a *golden rule* to the pact, i.e., an exemption of green investments from fiscal constraints. This topic is,

however, avoided by the Commission in its proposal (Clays & Tagliapietra, 2020), which is strongly criticised by some economists, as illustrated by this quote:

> "*Instead of ambitious green fiscal activism, the macroeconomics of the European Green Deal remains trapped in the black zero logic of austerity*" (Gabor, 2020).

3.6. Conclusion

In this section, we explored what scientists, economists and environmentalists had to say with regards to the main weaknesses of the European Green Deal. While some people have criticised the ideology behind this deal as too focused on replacing technologies, others consider that the influence of carbon-intensive industries has been too strong on the course of its negotiation. This resulted, according to our critics, in climate targets that are judged to be difficult to enforce and insufficient in order to curb climate change while allowing poorer regions of the world to advance in their development. The policy content of the deal has also been criticised for not offering enough incentives or legal requirements to businesses for them to adopt cleaner business models, for its difficulty of implementation, for its lack of consistency and clarity vis-à-vis its exact priorities, for its many brown loopholes, as well as its regressivity. The budget of the EU dedicated to the green transition did not convince many analysts either. It was assessed as far too insufficient, creating strong, uncertain and risky dependencies on private investments. This issue will not be solved by Member States, as some economists believe that they will not be able to increase their climate expenses if there is no foreseen reform of the EU's Stability and Growth Pact. In the next chapter of this paper, we will elaborate on some of these critics by focusing on the capability of the European Union to meet its climate commitments if it relies on the European Green Deal.

Chapter 2: Historical Timeline of Policies vs. Performances

This second chapter aims to critically assess the Green Deal by, first, looking at which new measure it brings to fight climate change and then at whether, with these new elements and based on past performances, this plan has the potential to bring us closer to our commitment to curb global warming.

1. What is actually new in the European Green Deal?

In this section, we compare what was in place before the Green Deal with what has been announced by the Commission as *new* objectives, instruments, and budgets.

1.1. Objectives & Instruments

Here, we first detail how environmental policies have evolved before listing what the Green Deal brings as new elements.

Evolution of environmental policies in Europe

The redaction of environmental policies in Europe effectively started in the late 1950s, even though this competence was not formally mentioned in the first treaties of the European Community (in van der Heijden, 2010). Over time, however, European leaders, invited to participate to international conferences on the environment held by the United Nations, increasingly saw the relevance of agreeing on a common environmental policy (id.). In the 1980s, an extensive portfolio of environmental acts was thereby developed, often driven by northern European Member States (in Adelle et al., 2018) and focused on targeted challenges (European Environmental Agency, 2019a). In 1990, after the publication of the first Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), a joint Council of energy and environmental ministers agreed to stabilise CO_2 emissions at the European level (in Eikeland & Skjærseth, 2020). This was followed, in the context of the 1992 UN summit of Rio de Janeiro and as part of the United Nations Framework Convention on Climate Change (UNFCCC), by the commitment of European leaders, along with other countries, to progressively reduce worldwide emissions of carbon dioxide (in van der Heijden, 2010). In 1996, European leaders then endorsed the objective of limiting global warming to two degrees Celsius above pre-industrial levels (in Siddi, 2020). These initiatives indicate a growing awareness regarding environmental challenges, confirmed by the adoption of the Treaty of

Amsterdam in 1997, introducing "sustainable development" as a fundamental objective of the EU (in van der Heijden, 2020).

1997 was also the year when the Protocol of Kyoto was signed: an international agreement setting national targets for greenhouse gases (GHG) reductions among developed countries (in Dicken, 2015). At the European level, our target under the Kyoto Protocol was to reduce our emissions by 8% for 2008-2012 when compared to 1990 levels (in Wettestad & Jevnaker, 2016). In order to meet this commitment and support clean technologies, the EU adopted a set of policies aiming to trigger the replacement of polluting processes (Eikeland & Skjærseth, 2020). Carbon pricing thereby became the dominant climate tool in the EU policy-making space, with the establishment of the European Emissions Trading System (ETS) in 2003 (Elkerbout, 2020). This mechanism was set up as a carbon market where Member States could issue emission allowances that would then be traded among polluters from carbon-intensive industries (e.g., steel producers) (id.). This architecture was chosen as it was aligned with the system adopted at the international level with the Protocol of Kyoto (id.). A new directive was also adopted by European institutions to stimulate demand for renewable electricity (the RES-E Directive) (in Eikeland & Skjærseth, 2020). With this directive, an indicative target of 12% renewables in gross energy consumption by 2010 was set at the EU level (id.).

2008 unfortunately arrived with a terrible financial crunch at the worldwide level. This financial crisis was presented by the European Commission as an opportunity to invest in green technologies, getting its inspiration from the concept of "*Green New Deal*" imagined by T. Friedman in the USA as a solution to the economic downturn (in Adelle et al., 2018; Bloomfield & Steward, 2020). This reaction laid the groundwork for the "Europe 2020" package, proposed by the Barroso Commission as a green crisis response plan (Adelle et al., 2018). "Europe 2020" actually rested on the Lisbon strategy's foundations (Green Europe Foundation, 2010), reusing its main objectives (Defraigne & Nouveau, 2017) but enhancing its environmental focus (Green Europe Foundation, 2010). Suggested before the financial crisis, three new environmental objectives were confirmed under "Europe 2020": a 20% reduction in GHG emissions, a 20% share of renewables in gross energy consumption (10% of which in agrofuel) and a 20% reduction in primary energy consumption (compared with energy consumption forecasts for 2020) by 2020 (in Eikeland & Skjærseth, 2020). In 2009, a longer-term but non-binding agreement to reduce the EU's GHG emissions by 80 to 95% by 2050 was also reached (id.). Several directives and regulations were therefore adopted to support the market deployment of low-carbon innovations. A notable policy agreed on at the time was the Effort Sharing

Decision, defining binding GHG reduction targets in sectors non-covered by the ETS at the Member States' level based on their Gross Domestic Product (GDP) (Kulovesi & Oberthür, 2020). The RES-E Directive, for the deployment of renewable sources of energy, was replaced by the Renewable Energy Directive (RED-I), translating the heightened ambitions of the EU in that regard into national binding targets (European Parliament, 2020). On the side of energy efficiency, we also witnessed a new initiative: the Energy Efficiency Directive, adopted in 2012 to transform the goal of reducing by 20% the EU's primary energy consumption by 2020 to a binding target at the EU level (id.). As a complementary tool, the EU introduced the Strategic Energy Technology Plan (SET plan) aiming to help low-carbon technologies (e.g., solar energy and carbon capture solutions) reach a certain level of maturity by offering funding and coordinating the actions of academic, industrial and public stakeholders (Eikeland & Skjærseth, 2020).

Despite these announcements, energy efficiency and emissions reductions did not emerge as priorities in the years following the crisis (Elkerbout et al., 2020). Austerity measures taken across Member States led to environmental sceptics voicing their opinions louder than ever before (Adelle et al., 2018). It was not rare to see leaders and governments perceive environmental policies as obstacles to GDP growth (Persico, 2014). The European institutions also reacted to the crisis by pushing environmental initiatives to the background: the Juncker Commission, appointed in 2014, shifted its priorities towards creating jobs and growth rather than focusing on the green economy; the European Parliament, inconsistently with its usual behaviour, weakened some environmental proposals in the crisis' wake; the Council was shaken by environmentally unwilling Member States (e.g., Poland) who used this opportunity to temper the EU's ambitions in that regard (Adelle et al., 2018). This led, in the years following the crisis, to an overall decline in the number and scale of EU legislations in relation to the environment (Burns et al., 2020; Adelle et al., 2018). It has also been demonstrated that financial resources raised by the EU for green projects over that period did not match prior commitments (Adelle et al., 2018), leading to the failure of, for example, the carbon capture programme set up as part of the SET plan (Eikeland & Skjærseth, 2020). However, despite the crisis, the environmental *acquis* of the EU remained in place, demonstrating its relatively strong resilience (Burns et al., 2020). A series of reforms across the existing EU environmental policy portfolio was even conducted in the aim to fix some issues we had faced as a result of the crisis. In particular, the carbon trading system was modified, at different points in time, in order to avoid seeing the carbon price fall under €10 a ton as experienced during the crisis due to an

allowance surplus on the market (Elkerbout, 2020; Wettestad & Jevnaker, 2016). These reforms included a centralisation of the allowance granting system at the EU level, the creation of a Market Stability Reserve serving as a buffer in case of severe demand fluctuations, and the generalisation of auctioning as the standard method to distribute allowances (id.).

We had to wait for the European economy to stabilise itself before witnessing an increase in climate ambitions at the EU level. While the 2030 Climate and Energy Policy Framework was proposed in 2014, it was only agreed upon in 2018, with updated targets for 2030: an emissions reduction of at least 40% vis-à-vis 1990 levels, at least 32% of renewables in gross energy consumption, and a reduction of 32.5% of primary energy consumption (compared with energy consumption forecasts for 2030) (in Kulovesi & Oberthür, 2020). Note that the emissions reduction target of 40% by 2030 is the one for which we are currently accountable on the international scene as part of the Paris Agreement. Concerning the renewables target, under the impetus of central and eastern European Member States, willing to defend their sovereignty regarding the composition of their energy mix, it was no longer set at the national level, but collectively at the EU level (as part of the RED-II Directive) (Monti & Romera, 2020). This change was criticised by legal scholars, who were convinced that it weakened our enforcement options (id.). It was, however, partly compensated by another novelty in the 2030 Framework: the Governance Regulation (id.). This Regulation established new monitoring systems ex ante (i.e., requiring Member States and the European Commission to prepare energy and climate plans for the short and longer terms) and ex post (i.e., obliging Member States to publish biennial progress reports) (in Kulovesi & Oberthür, 2020), enabling the Commission to spot discrepancies between the EU's ambitions and actual actions, as well as react to them, based on a set of measures provided for by the Regulation (in Monti & Romera, 2020). Several other tools were also reformed with the 2030 Framework. Besides further increasing the ETS annual cap reduction, new funding mechanisms (i.e., the Innovation and Modernisation funds) were set up as part of the ETS in order to support the development of low-carbon technologies and of appropriate infrastructures in lower-income Member States (in Kulovesi & Oberthür, 2020). The Effort Sharing Decision was also reworked, upgraded to a Regulation and providing for a 30% emissions reduction target in non-ETS sectors by 2030 (id.). A final novelty within this 2030 Framework was the inclusion of the LULUCF sector (i.e., land use, land use change and forestry) to the energy and climate discussions. It was thereby agreed that LULUCF GHG releases would not exceed the number of emissions absorbed by the sector itself (id.). Kulovesi & Oberthür (2020) concluded from the comparison of the 2020 and 2030 frameworks that this

new plan merely provided a foundation for incremental changes, as opposed to more radical ones.

With the climate crisis becoming more and more evident across the globe, growing environmental concerns became visible, especially in western Member States, through the European elections of 2019 (Siddi, 2020). Environmental considerations spanned the whole political spectrum (Bloomfield & Steward, 2020) and were therefore increasingly brought forward at the European Parliament (Beattie, 2019). A consequence of this was its endorsement, in March 2019, of the objective of reaching net-zero emissions by 2050 (European Commission, 2020b). The European Council gave its own approval for this target in December 2019 (id.). "*A clean planet for all*" (2018), a Commission-published study, partially motivated these decisions, as it presented different scenarios demonstrating the ability of the EU to reach climate neutrality thanks to technology and behavioural changes. These developments led to the European Green Deal and to the European Climate Law, as described in chapter 1 of this paper.

Summing up, the European Union has, over time, adopted a series of policies with regards to environmental challenges. Firstly very much targeted on specific issues, it has evolved to cover more diffuse problems such as climate change, setting up indicative objectives and legally binding commitments in terms of GHG emissions reductions, renewables deployment and energy efficiency. These targets were followed by the design of, mostly, market-pull policies (i.e., aiming to support the development of a market for clean technologies), such as the European Emission Trading System, that have been regularly updated according to the latest green ambitions of European stakeholders. Market-push policies (i.e., aiming to support the actual development of clean technologies) have, so far, been more limited. The following table summarises the evolution of EU's climate targets and policies over time (cf. Table 7).

Table 7: Evolution of the European Union's climate targets and policies over time.

Area	Targets' Timeline	Policies' Timeline
Greenhouse gases reduction	1990: **stabilise** CO_2 emissions at the 1990 levels – indicative target at the EU level. 1992: **progressively reduce** CO_2 emissions – indicative objective at the worldwide level. 1997 (Kyoto): **reduce by 8%** GHG emissions by **2008-2012** based on the 1990 baseline – binding at the EU level.	2003: launch of the EU's **Emissions Trading System**.

	2007 (Europe 2020): **reduce by 20%** GHG emissions by **2020** based on the 1990 baseline – binding at the EU level for the ETS sectors and at the Member States' level for effort sharing sectors. 2009: **reduce by 80-95%** GHG emissions by **2050** based on the 1990 baseline – indicative target at the EU level. 2018 (2030 Climate & Energy Framework): **reduce by 40%** GHG emissions by **2030** based on the 1990 baseline – binding at the EU level for the ETS sectors and at the Member States' level for effort sharing sectors. 2019-2020 (Green Deal and EU Climate Law): **zero-net emissions by 2050** and **reduce by 55%** GHG emissions by **2030** based on the 1990 baseline – binding targets at the EU level if approved by the Parliament and the Council.	2009: adoption of the **Effort Sharing Decision** (406/2009/EC) and reform of the ETS (EU-wide allowance cap). 2015: reform of the ETS (setting up a Market Stability Reserve) 2018 (2030 Climate & Energy Framework): inclusion of the **LULUCF** sector as part of the emissions reduction efforts, reform of the ETS (increasing the cap reduction and setting up new funds) and adoption of the Effort Sharing Regulation (2018/842).
Renewable energy deployment	2001: **12%** renewable energy in gross energy consumption by **2010** – indicative target at the EU level. 2007 (Europe 2020): **20%** renewable energy in gross energy consumption by **2020** (of which 10% in agrofuel) – binding at the EU and Member States' level. 2018 (2030 Climate & Energy Framework): **32%** renewable energy in gross energy consumption by **2030** – binding at the EU level.	2001: adoption of the Renewable Electricity Directive (**RES-E** Directive). 2009: adoption of the Renewable Energy Directive (**RED-I** - 2009/28/EC). 2018: reform of the Renewable Energy Directive (**RED-II** - 2018/2001/EU).
Energy efficiency	2007 (Europe 2020): **reduce by 20%** primary energy consumption by **2020** compared with the energy consumption forecasts for 2020 – indicative target at the EU level. 2012: reduce by 20% primary energy consumption by 2020 compared with the energy consumption forecasts for 2020 – **binding at the EU level** (with indicative targets at the Member States' level). 2018 (2030 Climate & Energy Framework): **reduce by 32.5%** primary energy consumption by **2030** compared with the energy consumption forecasts for 2030 – binding at the EU level (with indicative targets at the Member States' level).	2012: adoption of the **Energy Efficiency Directive** (2012/27/EU). 2018: reform of the Energy Efficiency Directive (2018/2002).
Other relevant measures		2009: adoption of the **Strategic Energy Technology plan** (SET plan). 2018: adoption of the **Governance Regulation** (2018/1999).

Green Deal's novelties

This timeline enables us to set up the context in which the Green Deal was redacted and to identify which elements from this framework are actually new.

A first novelty we can mention is the fact that, as already stated, the European Green Deal - for the first time - brings together policies that were previously dealt with in a separate manner. This might be a sign that the European institutions recognise the systemic nature of environmental challenges and that we are moving towards more consistency across the board. This can be illustrated by the commitment of the Commission to assess all its future proposals on the principle of "*do no significant harm*". However, it remains to be seen whether this commitment will actually deliver against the powerful influence of carbon-intensive industries, as pointed out earlier in this paper by some critics.

Regarding the engagements mentioned in the Green Deal, we can also highlight the increase of ambition with regards to the reduction of our emissions for 2030, from 40 to 55%. While this is a first step in the right direction, as previously discussed, it remains insufficient when considering our commitment to limit global warming to +2°C. Another novelty with the Green Deal is the enshrinement of a long-term target, net-zero emissions by 2050, in European law. While long-term targets were previously indicative, the Commission opted here for what is, in theory, a stronger engagement. However, enforcement mechanisms remain unclear as these climate targets continue to be set at the EU level. Consistently with previous frameworks, the European institutions rely on tools such as the Governance Regulation or the European Semester, which, while they facilitate the monitoring of Member States' progress, do not provide any possibility of sanction. This raises some questions about the credibility of these commitments, even if binding.

To meet these engagements, the cornerstone tool of the Green Deal appears to be, once again, the European Trading System. This time, this mechanism will be revised in order to include a larger number of sectors. This reliance on a system that has been criticised as not being adapted to our level of climate ambitions and full of loopholes reflects a deep belief of the European Commission in the efficacy and efficiency of market-based tools to bring climate benefits. The ETS is not the Green Deal's only measure that illustrates this conviction: the carbon border adjustment mechanism and the taxonomy, which we could consider as new instruments, also rely on the assumption that, by adjusting prices and improving transparency, the market will automatically adapt and shift demand and capital towards sustainable solutions. This

preference towards market-based mechanisms over more coercive measures can be illustrated by the following quote from President von der Leyen about the way the European Union should meet its climate goals:

> "*If not through the ETS, then through another way, which means more regulation, more standards, more interim steps and more taxes. In that case, I prefer a system that's betting on the market. It leaves industry and the economy more space to get creative and find its own solutions*." Ursula von der Leyen to Süddeutsche Zeitung (in Oroschakoff, 2021).

Our assumption is that this position of the European Commission reflects, firstly, a division of Europeans on stricter rules – it indeed appears that each country fiercely defends its industrial champions (e.g., the French agriculture or car manufacturing activities in Slovakia; Cienski et al., 2020) – then, the lobbying power of carbon-intensive industries (cf. Chapter 1 – criticism on the lobbying process surrounding the Green Deal) and finally, the hegemony of neo-liberal ideologies within the European Commission (cf. Chapter 1 – criticism on the ideology behind the Green Deal).

In comparison to the importance of the ETS as part of our trajectory towards carbon neutrality, not much is planned in order to help the industry to develop more sustainable solutions. Considering the limited size of the EU budget for the green transition (cf. what we mentioned in Chapter 1 and what we will develop in the next section), the European Union does not have any other choice than to rely on the so-called benefits of the Single Market. While it will work on further improving the ability of firms to reach economies of scale (e.g., by enhancing Trans-European infrastructures, a longstanding project), it will also support the establishment of new alliances. Although there is nothing new there, we should note the addition of a new mechanism in the Green Deal, forming a third category of tools complementing market-pull and push strategies: the Just Transition Mechanism, aiming to support the green transition by compensating those who will face its negative outcomes. This had, so far, been forgotten and is, therefore, a true positive, though not yet sufficient (as argued in Chapter 1 – criticism on the Just Transition Mechanism), novelty.

To conclude, our analysis of the Green Deal confirms that it is not as ground-breaking as the way it had been announced by President von der Leyen, as "*a man-on-the-moon moment*". This strategy proposes weak targets; instead of stricter rules vis-à-vis the industry, it relies on old and deficient market-based mechanisms and fails to compensate citizens appropriately; finally,

measures to support the development of clean technologies are compromised by a clear lack of budget, a topic we are going to further explore in the next point of this chapter.

1.2. Budget

In the previous section, we concluded that although the Green Deal came with heightened ambitions, it did not come with a long list of innovative instruments to meet these commitments. It is now time to see whether the Green Deal has had any impact on the budget dedicated by the European Union to the green transition by comparing the Green Investment Plan outlined in Chapter 1 to what already existed under the last multiannual financial framework (2014-2020).

EU budget contribution

The 2014-2020 MFF was the first budgeting period during which the European Union had committed itself to *mainstream* climate expenditures, i.e., to spend a fixed share of its budget on green priorities (European Commission, n.d.12). While the climate spending target for the period 2014-2020 was set at 20%, we repeat that it has been increased for the new financial framework to 30% (id.). This is also visible at the level of individual funds, which have all seen their climate spending target increase, except for two instruments: the Connecting Europe Facility and the Common Agricultural Policy (cf. Table 8). The decision of raising climate spending targets was probably motivated by the announcement of the Commission that the Union had spent more than 20% (20.15%) of its budget on climate projects in the previous years (id.). The methodology applied to reach this conclusion is the one that was developed at the Rio's Earth Summit of 1992. Called the "Rio marker methodology", it assigns a coefficient to each expenditure – 0, 40 or 100% – that varies according to its expected impact(s) on climate objectives (id.). This way of accounting for climate expenditures has, since then and at the European level, been criticised, as it would over-estimate countries' climate efforts (cf. Chapter 1, criticism section). For the next financial period, this accounting methodology should change but there is not much information on that, yet.

Table 8: Comparison of climate spending targets across budgeting periods.

2014-2020 MFF		2021-2027 MFF	
Name of the fund	Climate expenditure	Name of the fund	Climate target
Horizon 2020	28%	Horizon Europe	35%
Connecting Europe Facility	70%	Connecting Europe Facility	60%

LIFE	48%	LIFE	61%
European Regional Development Fund	12%	European Regional Development Fund	30%
Cohesion Fund	28%	Cohesion Fund	37%
Common Agricultural Policy	28%	Common Agricultural Policy	26% for 2021-2022 40% for 2023-2027
Neighbourhood, Development & International Cooperation Instrument	19%	Neighbourhood, Development & International Cooperation Instrument	30%
Total	20.15%	Total	30%

Sources: European Commission, n.d.12 (for the 2014-2020 framework); European Commission, n.d.9 (for the 2021-2027 framework)

Keeping in mind these methodological flaws, we can now compare the total value of the 2014-2020 climate expenditures of the European Union, as communicated by the Commission, to what has been announced for the next financial period (cf. Table 9).

Table 9: Comparison of climate spending budgets across periods (in 2018 prices - € million).

	2014-2020 MFF	2021-2027 MFF
Total budget	1 081 000*	1 085 300**
Climate target	20.15%	30%
Climate budget***	217 821	325 590

* After removal of UK's transfers
** This amount does not take into account Next Generation EU.
*** Own computations

Sources: Haas, Rubio & Schneemelcher, 2018 (for the 2014-2020's total budget); European Commission, n.d.12 (for the 2014-2020 climate target); European Commission, 2020u (for the 2021-2027 framework).

For this comparison to hold, note that we did not take into account the effect of Brexit, nor the inclusion of the programme Next Generation EU to the 2021-2027 MFF as it is only meant to be temporary. On that basis, we can make the following observations. First, the total change of budget between these two programming periods amounts to +0.4% (*finding 1)*. This means that the share of the European budget in the EU's total GDP proportionally decreased as its GDP rose, on the same period, by about 2%. Then, zooming in climate expenses, these are estimated to go up by 49% across the two periods, reflecting the heightened climate spending target of the EU (*finding 2)*. While this looks like a positive sign, in absolute values, this change represents an addition of €108 billion for climate projects over seven years, which is essentially nothing when compared to the total budget for this period (0.01%). Combining these two findings, we can also conclude that this increase in climate spending will come at the expense

of other projects. As the EU budget has not been significantly boosted for the next financial period (again, not taking into account Next Generation EU), spending more on the climate means reshuffling existing funds. We estimate that only 1.2% of the additional capital brought to climate project will actually be "new money" (cf. Table 10).

Table 10: What is the share of "new money" in the additional budget sent to climate projects in the programming period 2021-2027? (in 2018 prices - € billion).

New money in total budget*	New money for climate projects**	Additional budget for climate projects***	% of new money in the additional budget for climate projects
4.3	1.3	107.8	1.2%

* Finding 1
** Assuming a linear spending target, this is equal to 30% of the new money in the total budget.
*** Finding 2

Sources: Own computations.

This reshuffling effect should also be visible on the scale of individual funds, but it is much more difficult to quantify, as data on the impact of Brexit at that level is lacking. However, what is striking is the fact that many of the financing instruments used in the past programming period remain in use for the next one (cf. Table 8). In total value, the most important financing tools for the green transition remain the Cohesion Policy (€21 billion) and the Common Agricultural Policy (€99 billion). The only new long-term fund set up for the new budgeting period and related to the European Green Deal is the Just Transition Fund, which without Next Generation EU amounts to €7.5 billion (European Commission, 2020u). Beyond the fact that this money also partly comes from other projects, it falls short of what would be needed to meet the ambition of this fund to conduct a fair transition. If we were to spend all this money on compensating mining workers only and assuming that this money would be equally and effectively distributed among this population, each miner would get about €2 700 per year over the next seven years (according to Eurostat, we indeed had, in 2018, a total of 398 000 people working in the mining and quarrying sector in the EU – Eurostat, 2021b). Beyond the fact that this compensation will probably not be sufficient for these miners to welcome with a smile the idea of changing jobs, this computation also ignores many other sectors that will be affected by the transition.

ETS funds

Two other funds have been set up in relation to the Green Deal but outside of the traditional budget of the European Union, based on the auctioning fees it collects from the sale of carbon

allowances on the European Trading System: the Innovation and Modernisation funds. This is not a new concept: a similar fund called NER 300 existed in previous years, with the objective of funding low-carbon technologies with a particular focus on carbon capture and storage solutions (European Commission, n.d.8). Amounting to €2.1 billion, this fund did not have much success, having struggled, as already mentioned in section 1.1. of this chapter, to attract private investors interested in engaging themselves in such projects. While the Modernisation fund should serve another purpose (i.e., €14 billion to modernise the infrastructures of a region that is 37 times bigger than Belgium – European Union, n.d.), the Innovation Fund will work in a very similar manner to NER 300 with a budget estimated, this time, at €20 billion (let us however recall that this estimation is fragile and non-transparent – cf. Chapter 1). Although this represents a significant growth in the budget allocated to these projects, we can cite several issues that relate to this financing strategy. Firstly, having maintained the same percentage of allowances to be auctioned for the next programming period as compared to the previous period (European Commission, n.d.13), this increase of budget means that the share of income that Member States usually get from this programme is being reduced, which is money that they had to spend at least partly on climate projects anyway. Again, this can be seen as a reshuffling game, where the EU announces new money which is actually taken from existing projects. Going further, if the Innovation Fund works exactly like NER 300, what are its chances of success? Will the budget increase constitute a sufficient guarantee for private investors to, this time, add their own capital? Considering the high and volatile cost of these novel technologies, as well as the significant investment that would be required to equip all our industries with these tools, our opinion is that €2 billion per year does not seem much on the scale of the European Union. Finally, basing the financing of any kind of projects on the sale of carbon allowances that, in a world without carbon, should ideally disappear, does not appear to be a sustainable solution.

InvestEU / European Fund for Strategic Investments

Introduced in Chapter 1, InvestEU is the successor programme to the European Fund for Strategic Investments (EFSI) set up by Juncker's Commission in the aftermath of the 2008 crisis. InvestEU follows, except for a few details, the same methodology as its predecessor. Where it differs the most on paper is in its objectives. While the EFSI was rather focused on growth and job creation (cf. section 1.1. of chapter 2), InvestEU is explicitly presented as a *greener* programme. The EFSI only had a climate target (40%) for the second term of its mandate (2016-2018) and which only applied to one of its pillars (Infrastructure and

Innovation), but 30% of the projects pursued on under InvestEU must now work towards a climate objective (European Commission, 2020u). As they have different aims, it is therefore complicated to use the outcomes of Juncker's plan as proxies for what will be the performances of InvestEU. What we can mention is some of this programme's shortcomings that are likely to reappear with InvestEU. While many official reports praise the economic performance of this plan (e.g., European Investment Bank, 2019), some analysts have pointed out that, due to the difficulty of attracting private investors, it mainly served to finance old projects in the core of Europe, instead of new promising missions in the periphery (Gordon, 2017). It has been demonstrated that this helped to reinforce regional disparities across Europe (Lambri, 2020). From an environmental point-of-view, it is also worth mentioning that the EFSI, despite its pledge of alignment on European goals, has been used to finance fossil fuel infrastructures such as motorways and airports (Gordon, 2017). This could very well happen again under InvestEU as, even though it has a climate spending target, it is not limited by any requirements restricting lock-in investments in carbon-intensive activities for the time being.

Conclusion

In this section, we compared the financing tools used during the 2014-2020 financial framework with those made available for the next seven years. Without counting Next Generation EU, which is only temporary, we found out that the European budget for green investments had only been slightly increased and so, at the expense of other programmes conducted by the EU. Going further, despite much criticism concerning these tools, the European Union continues to rely on programmes such the Common Agricultural Policy (i.e., one of the only instruments for which the climate target has not been raised), ETS funds and InvestEU. All of this confirms that the Green Deal is far from ground-breaking: our objectives are now more ambitious than before, but not much has actually been put in place for us to reach these objectives: the European Green Deal counts only a few new instruments and a budget increase of just €15 billion per year (or 0.1% of EU's GDP in 2019).

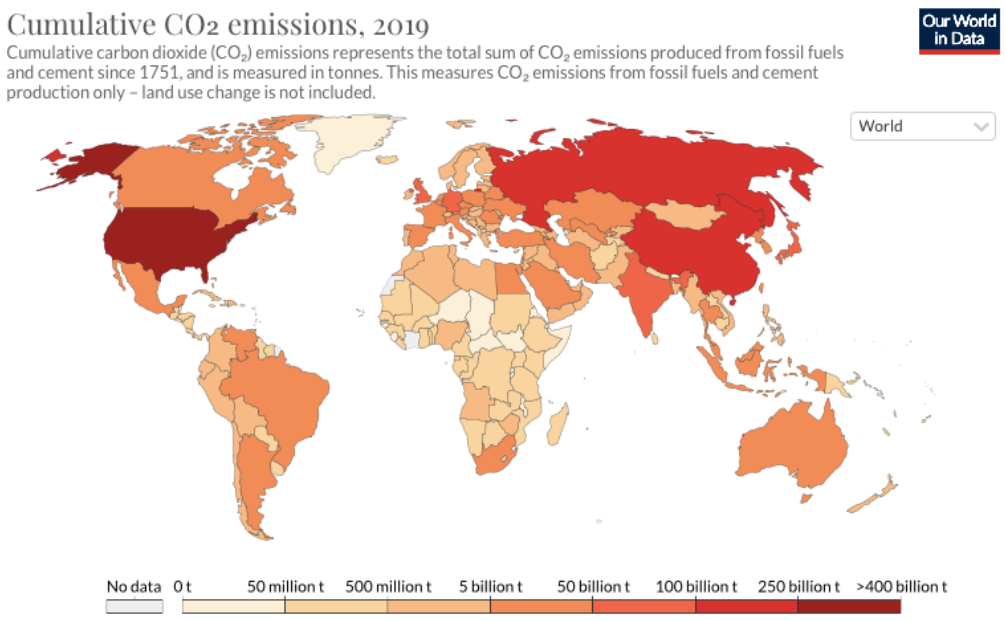
2. What are the EU's chances of reaching its climate targets?

We have just learned from the previous section that the European Green Deal was not radically different from previous EU climate policies. Key questions are therefore: how successful were these past policies? Considering our past performances, are we going to meet, thanks to the Green Deal, our global and internal commitments? This section explores these questions by looking at three different levels of governance: international, European, and national.

2.1. The European Union compared to the rest of the world

We will start this section by asking ourselves a bold question: who is to blame for climate change? The best indicator to answer this is the cumulated number of greenhouse gases emissions that a country has emitted since the industrial revolution. Figure 4, displaying a similar indicator but focused on carbon emissions, enables us to point out the United States as the country having contributed the most to historical carbon emissions. According to Our World in Data (2021a), while the US are responsible for more than 25% of these emissions, the EU as a whole is not too far from this: all the 27 Member States combined have released more than 22% of all carbon emissions. This is far ahead of the second national contributor of CO_2 emissions at the worldwide level: China and its 12% share (id.). This indicator suffices to justify why it is the responsibility of the European Union to act against climate change.

Figure 4: Cumulative CO_2 emissions in 2019.

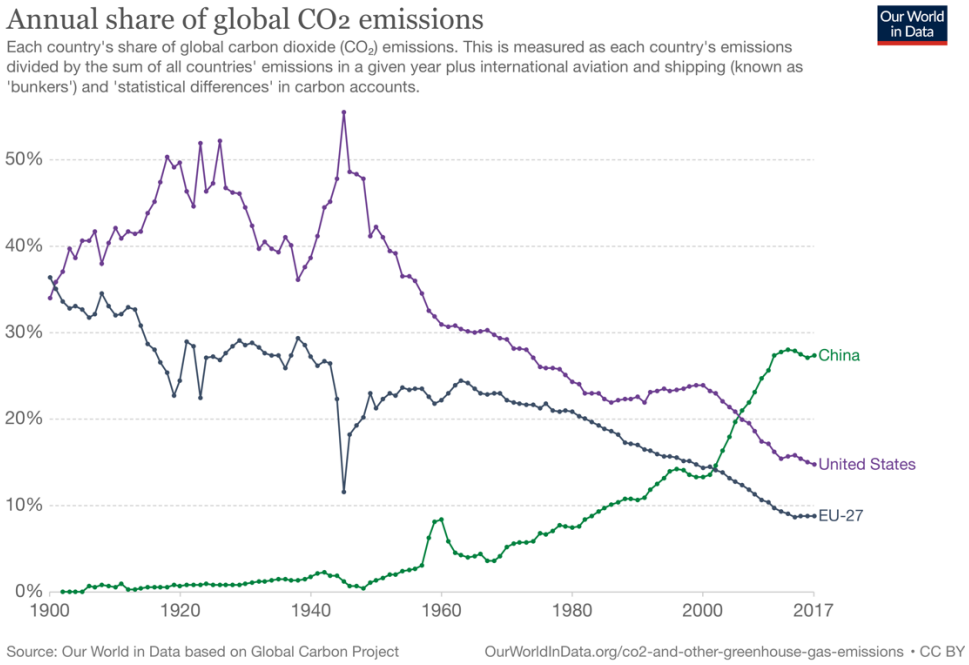


Source: Our World in Data, 2021a

This conclusion is not the one shared by the European institutions: in many of their publications, we can read that the EU does not emit more than 10% of the world's total emissions and is, therefore, unable to solve climate change on its own (e.g., Climate Law Proposal). Both observations are correct but while we were reasoning in terms of cumulated emissions, the institutions look at our annual emissions. Whereas before the 20th century, more than 90% of all carbon emissions were released in Europe and the United States, Asian countries, led by China, have today taken the lead (Our World in Data, 2021a). While the EU

has managed to slightly reduce its emissions over time, the reduction of its share in worldwide annual emissions is mostly due to the rise of other countries' shares such as China's (id.) (cf. Figure 5). In 2016, the EU's share in global CO2 emissions per year was at 8.7% and in global greenhouse gases emissions per year at 6.4% (id.). Under this perspective, we understand that, while we are historically responsible for climate change, this issue is today mostly out of our direct control.

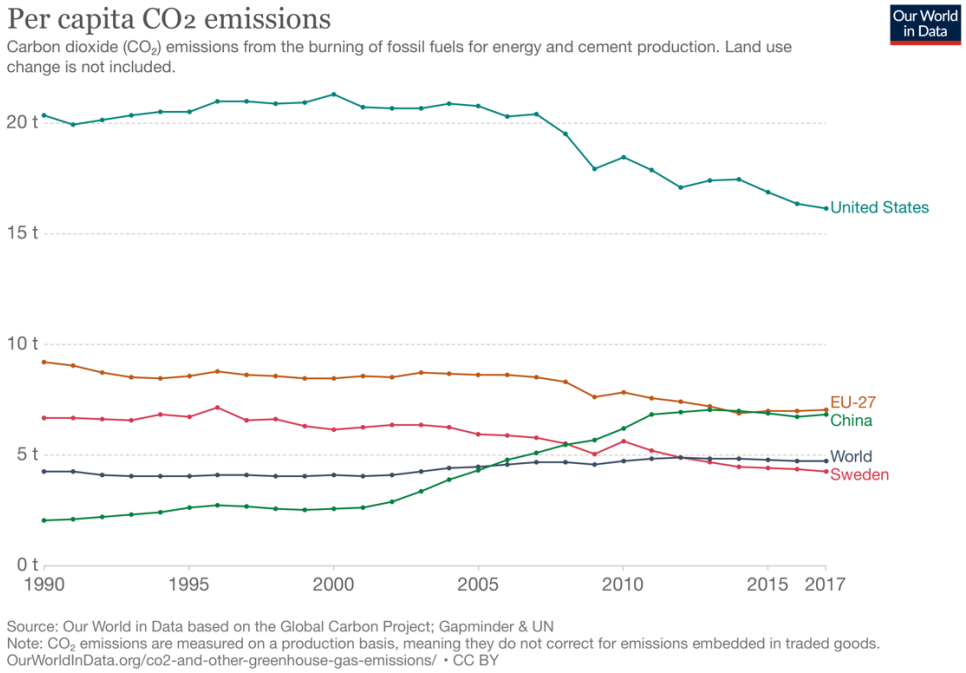
Figure 5: Evolution of the annual share of a selection of countries in worldwide CO_2 emissions between 1900 and 2017.



Source: Our World in Data, 2021a

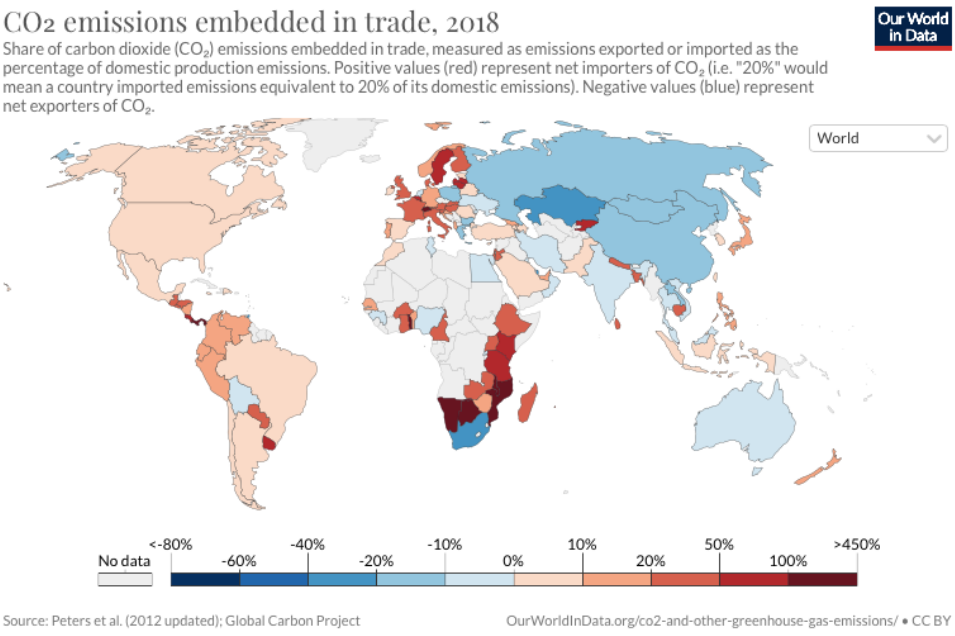
To better compare the performance of countries, it is interesting to look at the number of emissions their populations release per capita (cf. Figure 6). This indicator allows us to learn that, while in the past, the EU released more emissions per capita than China, this is now over: the Chinese have now caught up with the Europeans but remain far behind the Americans. We can also conclude from this indicator that it is not perfectly correlated with the standards of living of these countries' population. Some European countries (e.g., Sweden) have a GDP per capita superior to the one of the US but perform better in terms of emissions per capita (Our World in Data, 2021a).

Figure 6: Evolution of the emissions per capita of a selection of countries between 1990 and 2017.



Source: Our World in Data, 2021a

Figure 7: Map of net CO_2 exporting and importing countries (2018).

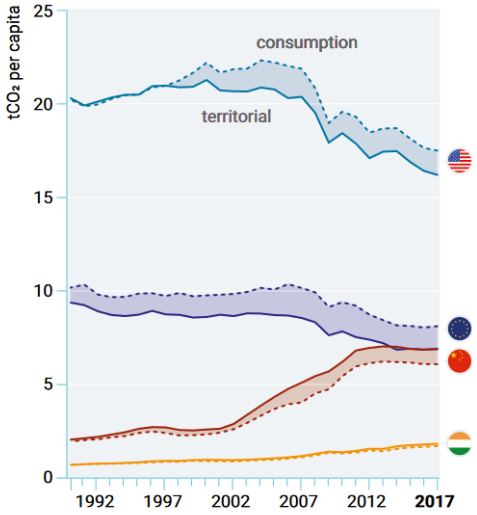


Source: Our World in Data, 2021a

Even though it is therefore tempting to state that the EU is a better climate performer than other developed countries, we must adjust our indicators according to one parameter that has been ignored so far: trade. All the previous observations were made by looking at indicators based on the carbon a country releases within its territory, without considering the emissions it is

responsible for through its imports. While our previous indicators are important because these are the ones used to compute the official achievement of countries on their climate objectives, it is vital to account for trade when assessing responsibilities in the context of climate change (id.). Some countries are, indeed, net importers of CO_2 - e.g., the EU - while others are net carbon exporters - e.g., China (cf. Figure 7). Having become the world's manufacturing plant for carbon intensive industries such as the production of steel (Page, 2017), China ships a great deal of its industrial production to countries such as those of the EU, affecting carbon indicators (Dicken, 2015): when accounting for trade, EU's carbon emissions per capita are much higher, while those of China are lower (cf. Figure 8). Despite this correction, note that the carbon footprint of Chinese people is today superior to the global average, invalidating the past observation that if China was polluting so much, it was solely because it was producing for the rest of the world (Our World in Data, 2021a). However, this observation can still be made in countries such as India or Tunisia, two net-carbon-exporting countries with an adjusted number of emissions below the world average (id.). Global value chains, often headed by Western multinationals, thereby affect the statistics of countries concerning their environmental performance. Note that while similar questions are increasingly raised concerning fiscal unbalances, this issue of carbon delocalisation is largely avoided by the European institutions.

Figure 8: Comparison of different countries' territorial and consumption-based emissions per capita.



Source: in Fontan, 2021

What we can conclude from the analysis of all these indicators is that, while it is important to reduce our emissions at home, we also have the shared duty, as Europeans, to act globally. Why? 1) Because we are responsible for a large share of past emissions; 2) because we have

already showed that we were able to reduce our emissions while raising our standards of living; 3) because we have outsourced a large part of our production abroad and are now importing emissions from abroad. Is the Green Deal going to help us to fulfil this duty? We very much doubt it as not much is planned in this regard. The only global instruments mentioned in the Green Deal are diplomatic pressures, the inclusion of climate pledges in trade agreements and the establishment of a carbon border tax. In other words, the way we deal with our duty is by imposing our own standards to the rest of the world, including on regions that are currently incapable of meeting our requirements. According to some critics (cf. Chapter 1), this looks like hidden protectionism as no significant budget has been made available in order to help these countries to improve their climate performance. While clean technologies should be adopted as quickly as possible everywhere around the world, the European Union is, like many other countries, planning to better reinforce the protection of its intellectual property and is ready to defend its industry by all means. Commercial battles for who is going to dominate the world of clean technologies are ongoing, as reflected by a series of disputes between the EU, the US and China within the World Trade Organisation (Page, 2017). Whether this fight for who is going to impose its standards will put a burden on the deployment of clean technologies around the world, or on the contrary, lead to an acceleration of the transition through what European lingo calls the "Brussels effect" is a question that goes beyond the scope of this thesis, but that would deserve more attention. To close this section, the following quote from Daniel Tanuro (2012) perfectly illustrates the climate in which we are evolving today:

> *« Ce n'est donc pas la coopération qui est à l'ordre du jour, mais bien la concurrence la plus effrénée »* Daniel Tanuro in *L'Impossible Capitalisme Vert,* p. 90.

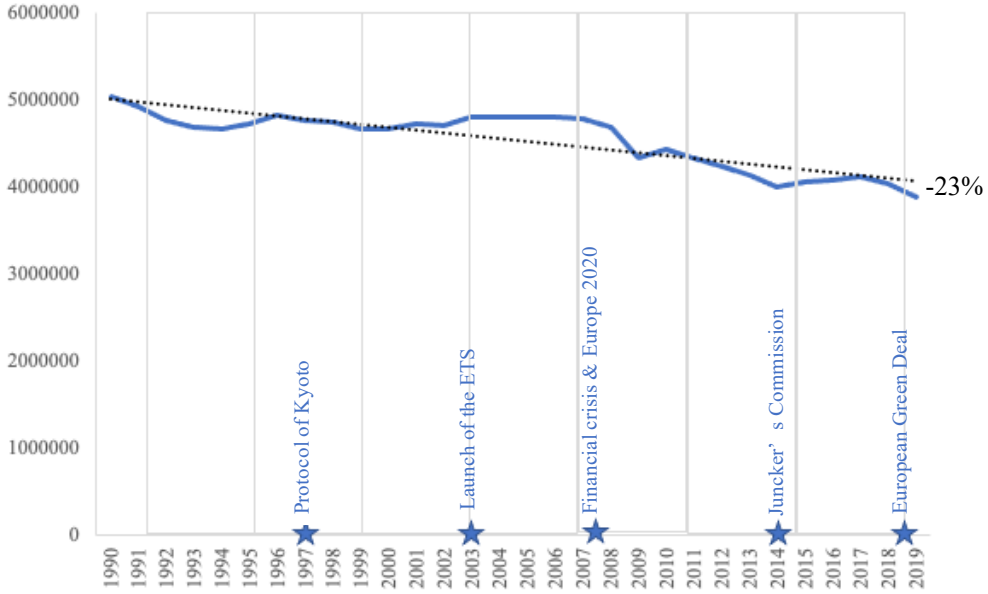
2.2. Performance of the European Union

In this section, the aim is to look more closely at the performance of the European Union regarding its past objectives in terms of GHG emissions reductions, energy efficiency and renewable deployment. After having analysed the relevancy of the Green Deal vis-à-vis our global responsibilities, this analysis will help us to assess the chances we have, thanks to the instruments and budget of the Green Deal, to reach our new internal targets for 2030 and 2050.

Reduction of Greenhouse Gases

In the EU-27, we have so far reduced our annual greenhouse gases emissions by 23% as compared to 1990 (cf. Figure 9).

Figure 9: Evolution of the annual GHG emissions in the EU-27 (in $KtCO_2eq.$)



Note: The indicator here displayed is the total number of GHG emissions including international transport.
Source: Graph from the author based on data collected from the European Environmental Agency (2021a).

This reduction has, however, not been uniform over time (cf. Table 11). 21% of our total reduction of GHG emissions took place in the 1990s, before any binding commitment by the European Union concerning its carbon releases. Between 1999 and 2007, the period just after our first climate engagement taken in Kyoto and during which the European Trading System was launched, our annual emissions increased before stabilising themselves. The period which contributed the most to our emissions reduction, at 62%, is 2007-2015, a period characterised by the financial crisis of 2008 and a set of measures taken by the European Union in the context of "Europe 2020". Finally, between 2015 and 2019, the EU's annual emissions continued to decrease, representing 15% of the total negative change in emissions registered since 1990.

Table 11: Change in annual GHG emissions per 5 years periods in the EU-27 (in $KtCO_2eq.$).

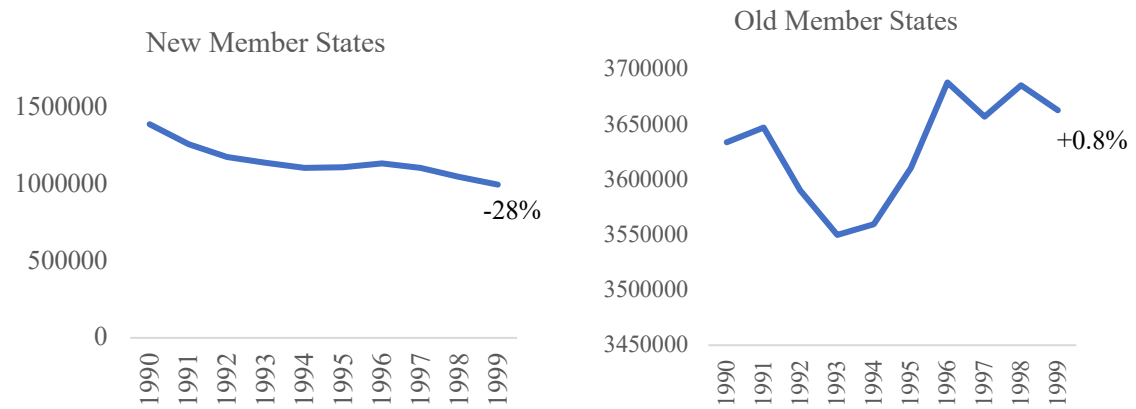
	1991 -1995	1995 - 1999	1999 - 2003	2003 - 2007	2007 - 2011	2011 - 2015	2015 - 2019	1990 - 2019
Change during the period	-189 225	-59 426	+129 359	-14 962	-455 119	-262 544	-178 206	-1 030 123
% in total change*	15%	6%	-13%	1%	44%	25%	17%	100%
% in total negative change**	16%	5%	/	1%	39%	23%	15%	100%
Per 10 years	21%		1%		62%		15%	100%

* % in total change = change during the period / change between 1990 and 2019
** same computation but only factoring in the negative changes that took place between 1990 and 2019 (= -1 159 482).

Sources: own computations based on data from the European Environmental Agency (2021a) - Total GHG emissions including international transport.

In the 1990s, reductions in GHG emissions were explained by the progressive des-industrialisation of Eastern European Member States (e.g., Storm, 2020). With the data we collected from the European Environmental Agency, we confirm that the reduction of emissions announced for the European Union over that period took place in the new Member States (cf. Figure 10). According to Storm (2020), this reduction was a one-off event which will not be easy to reproduce.

Figure 10: Reduction of GHG emissions in new vs. old EU Member States during the 1990s (in $KtCO_2eq.$).

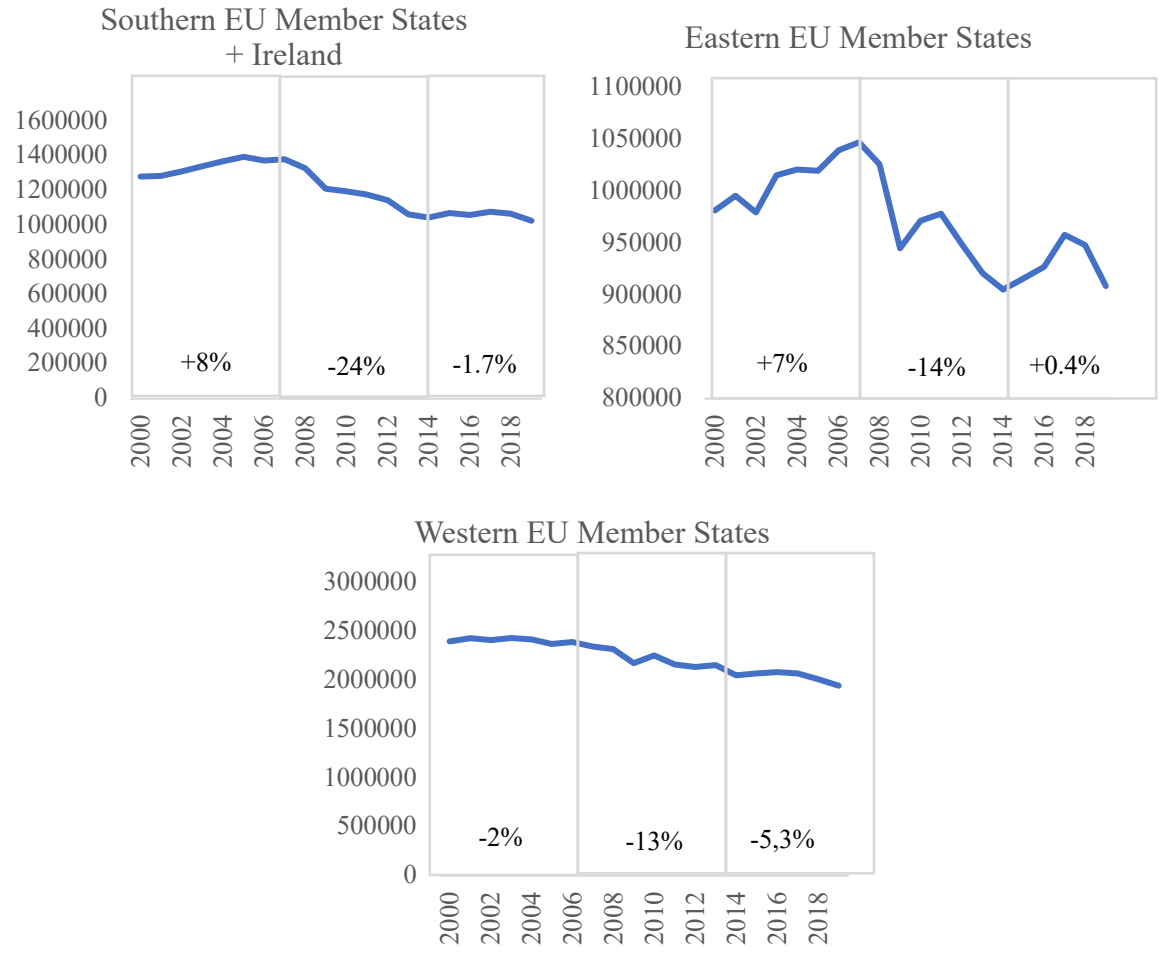


Note: The indicator here displayed is the total number of GHG emissions including international transport.
Source: Graph from the author based on data collected from the European Environmental Agency (2021a).

After 2007, the European reduction in carbon emissions was described as the combined outcome of climate policies progressively being developed at the European and national level, as well as of other factors such as the financial, economic, and sovereign debt crisis of 2007-2014 (European Environmental Agency, 2019b). The effects of this recession on carbon emissions were particularly strong in southern European Member States and Ireland: while their emissions increased before 2007, they sharply decreased during the crisis (cf. Figure 11). The impacts of the recession were also visible in the other regions of Europe, although to a lesser extent. Other factors explaining the decrease of carbon emissions after 2007 are: the transition of our economies towards a greater focus on services, the outsourcing of our manufacturing processes to other regions of the world (cf. previous section discussing issues at the international level) and milder winters which have affected our demand for heat in recent years (European Environmental Agency, 2019b; Storm, 2020). The issue with these factors is that they almost all have a reversible nature: e.g., if we decide to repatriate industrial activities in Europe for economic, strategic or security reasons (e.g., reshoring), as it is currently

discussed following the COVID-19 crisis, our emissions will again increase. Note, however, that this should not have many consequences on the worldwide level, since emissions will simply move from one continent to the other. This is worrying as, according to Storm (2020), half of the EU's reduction in emissions can, in fact, be attributed to these "*historically contingent factors"* (p. 5), and not to the efficiency of its climate policies.

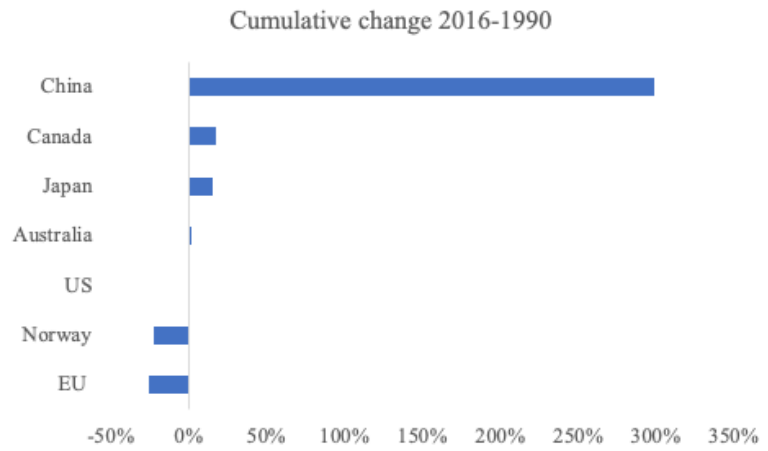
Figure 11: Effect of the 2008 recession on regional emissions (in $KtCO_2eq.$).



Note: The indicator here displayed is the total number of GHG emissions including international transport.
Southern EU Member States are Greece, Italy, Portugal, and Spain; Western EU Member States are Belgium, Denmark, Finland, France, Germany, Luxembourg, The Netherlands, and Sweden; Eastern EU Member States are Bulgaria, Croatia, Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia.
Source: Graph from the author based on data collected from the European Environmental Agency (2021a).

Between 1990 and 2016, the European Union has, nevertheless, managed to reduce its emissions by a greater percentage than most other developed economies (cf. Figure 12). Many of these countries have committed themselves to a carbon neutrality objective by 2050 or 2060 (apart from Norway and Australia) (Climate Action Tracker, 2021). Nevertheless, if all these countries continue to behave as they have done in the past years, none of them, including the EU, will manage to reach their commitments on time (cf. Table 12).

Figure 12: Comparison with other developed economies – GHG emissions reduction.



Note: The indicator here displayed is the total **net** GHG emissions including international transport.
Source: Graph from the author based on data collected from Our World in Data (2021a).

Table 12: Emissions forecasts for developed economies by 2050, based on the assumption that they all continue on the same path as in the past years.

	Annual emissions in 2016 (million tCO_2eq)	Average annual change between 2010-2016	Linear forecast for 2050 (million tCO_2eq)
EU	3 163	-1.3%	2 012
Canada	779	+0.8%	1 027
China	11 577	+1.4%	18 886
Japan	1 264	+0.1%	1 297
US	5 833	-1.3%	3 744

Sources: own computations based on data from Our World in Data (2021a) - Total **net** GHG emissions including international transport.

By looking more closely at the performance of the EU compared to its past pledges, we can confirm that it met its Kyoto's commitment of reducing its emissions by 8% in 2008 compared to 1990, as well as its target of reducing its emissions by 20% for 2020 (cf. Table 13). Considering the EU's 2030 target, some linear projections were computed, demonstrating that more efforts are needed as compared to previous periods for us to fulfill our commitment. To reach a reduction of our total emissions by 55% in 2030 (without factoring in carbon removals), we would need to reduce our emissions by an annual rate of 4.8%, a performance that we have never managed to reach so far, except in 2009 at the peak of the economic crisis. This rate of decarbonisation is five times faster than the average annual reduction rate we have been experiencing since 1990.

Table 13: Performance of the EU on its GHG emissions reduction commitments.		
	Cumulative change since 1990	
2008	-8% (for the EU-28)	
2019*	-23% (for the EU-27)	
* Used as proxy for 2020.		
	If we continue on the same pace as we did since 1990 (-0.9% per year)	If we continue on the same pace as we did in the past five years (-0.6% per year)
2030	- 30%	- 28%
2050	- 41%	- 36%
What annual performance should we have if we want to reduce our emissions by 55% for 2030?		
- 4.8%		
Sources: own computations based on data from European Environmental Agency (2021a). - Total GHG emissions including international transport.		

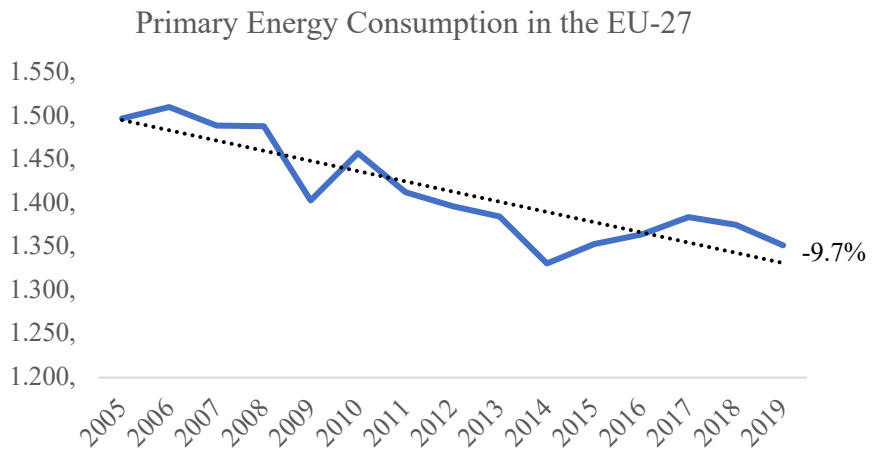
These projections confirm the conclusion of a report delivered by the European Environmental Agency in 2020 on the progress of the EU on its climate targets. This report calls on the European Member States to increase their efforts. This institution computed that based on the measures currently in place and on those announced by the European Union as well as by its Member States, we will only be able to reduce our emissions by 36% by 2030. Although this is already much better than our own projections, it still falls short of what we committed to. Note, however, that these projections did not take into account the effects of the COVID-19 pandemic. The exceptional measures we took in 2020 to curb contaminations are expected to have brought a reduction of about 10% of our GHG emissions between 2019 and 2020 (Climate Action Tracker, 2021). This reduction should, however, not be seen as systemic but rather circumstantial and will not, on its own, bring us closer to our carbon neutrality objective for 2050 (European Environmental Agency, 2020). To conclude, while the EU has met its reduction targets in terms of GHG emissions so far, extra efforts are needed for it to reach its more ambitious objectives set for 2030 and 2050. Several external factors, such as the current health crisis, may boost our performance on paper but do not bring, on their own, the radical changes that are required for us to reach carbon neutrality.

Energy Efficiency

To meet its GHG emissions targets, the European Union is, among other things, planning to improve its energy efficiency. To measure this, its institutions are envisaging reductions in terms of primary and final energy consumption (i.e., our final consumption in energy is our primary energy consumption minus the energy needed by the industry to transform and distribute this energy – European Environmental Agency, 2020). Primary energy consumption,

representing the total energy need of a region, has decreased in the EU in 2019 by 9.7% as compared to 2005, the reference year (cf. Figure 13). Between 2010 and 2014, the trend was rather positive, with a continuous decrease in energy consumption. This reduction was explained by the Environmental European Agency (2020) as the combined outcome of actual improvements in energy efficiency and the effect of the global recession that took place during that period. This trend, unfortunately, ended in 2014, with a return to positive growth in primary energy consumption, mainly pushed by a boom in the energy needs of the transport industry (Environmental European Agency, 2019b). Note that, since 2017, it seems that we are back on a trend towards a progressive decrease in energy consumption.

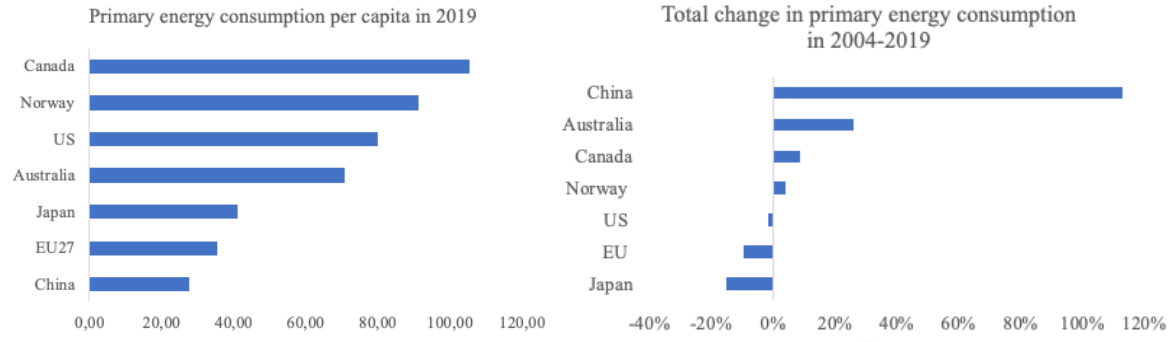
Figure 13: Trend in the EU's primary energy consumption between 2005 and 2019 (in million tons of oil equivalent).



Source: Graph from the author based on data collected from Eurostat (2021c).

Compared to other developed economies, our energy needs per capita remain superior to those of China but below those of the US and most other developed countries (cf. Figure 14). We are, in fact, one of the only economies which has decreased its energy needs between 2004 and 2019.

Figure 14: Comparison of the energy needs of several developed countries (in Mwh).



Source: Graph from the author based on data collected from Our World in Data (2021b).

Although we therefore perform well compared to other developed countries, it does not mean that our performance matches our objectives. Our energy efficiency target for 2020 was set, in equivalent terms, as a reduction by 13.8% of our primary energy consumption in relation to our level of consumption in 2005 (Environmental European Agency, 2019b). We therefore failed on this target and are in a good position to miss the next one as well, fixed at -24.7% for 2030 compared to 2005 (id.). Indeed, our linear projections, assuming that we are going to maintain the same pace of reduction as the one of past years, forecast a reduction of our primary energy consumption of maximum 16% in 2030 (cf. Table 14). To reach our energy efficiency target, which we recall has been assessed as insufficient to fulfill our goal to cut carbon emissions by 55% by 2030, we would need to more than double the rate at which we have been reducing our energy consumption per year since 2005. If we were to adopt a more ambitious energy target, we would need to reduce our consumption at a rate that we have only experienced, since 2005, at the peak of the economic crisis (above -2.5%). In other words, and as recalled by the European Environmental Agency in its latest report (2020), the EU must speed up its efforts in terms of energy efficiency.

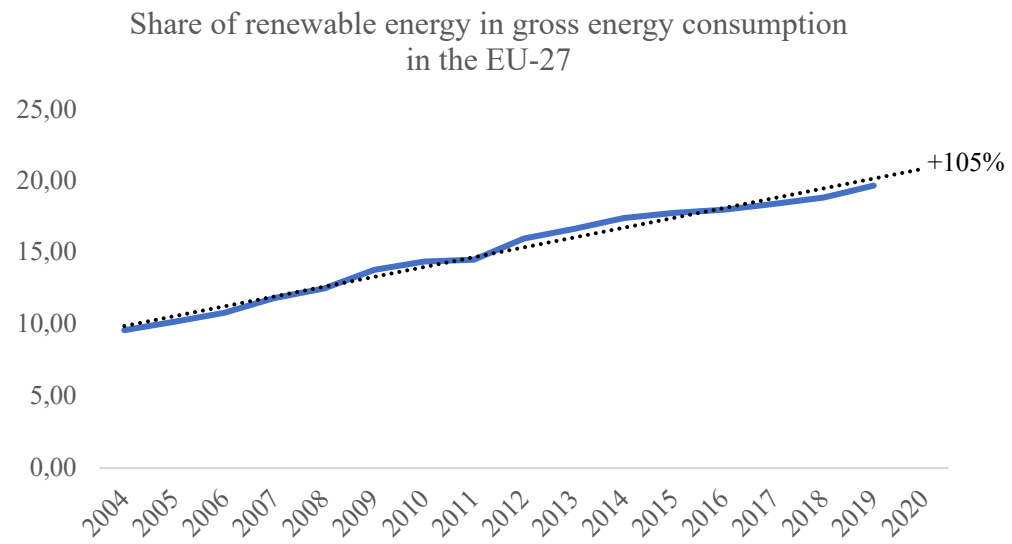
Table 14: Performance of the EU on its energy efficiency commitments.

	Cumulative change since 2005	
2019*	-9.7% (for the EU-27)	
* Used as proxy for 2020.		
	If we continue on the same pace as we did since 2005 (-0.6% per year)	If we continue on the same pace as we did in the past five years (+0.3% per year)
2030	- 16%	- 6.5%
Which annual performance should we have if we want to reduce our primary energy consumption by 25% for 2030?		
- 1.6%		
Sources: own computations based on data from Eurostat (2021c).		

Deployment of Renewables

Another pillar on which the European Union is working in order to reach its GHG emissions reduction target is the deployment of renewables, or the decarbonisation of its energy system. To assess its achievements in that regard, the EU uses its share of renewable energy in its gross energy consumption as an indicator. This indicator has been continuously increasing since 2004: it rose from 9.6% to 19.7% in 2019 (cf. Figure 15).

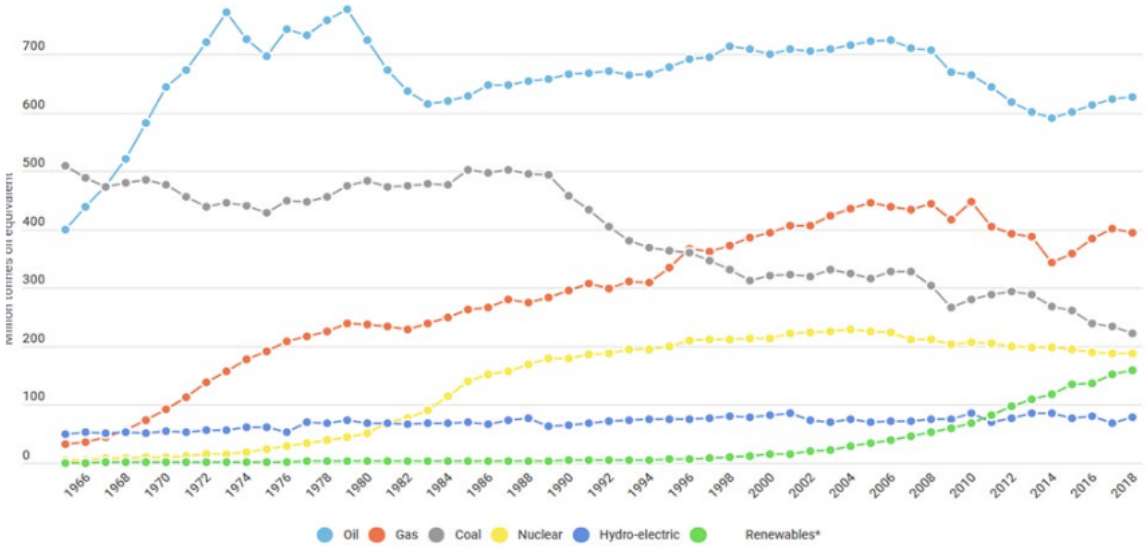
Figure 15: Evolution of the renewable share in the energy consumption of the EU-27 between 2004 and 2020 (in %).



Source: Graph from the author based on data collected from Eurostat (2021d).

This can be explained by, firstly, an actual increase in the production of renewable energy (which has almost been multiplied by two since 2005), but also by the decrease in energy consumption described in the previous point (European Environmental Agency, 2020). This latter component explains why our progression on this composite indicator slowed down around 2014 (cf. previous point). Our improvement on this target is also hampered by some tenacious legal and administrative barriers that are maintained in some EU Member States against the implementation of renewable projects (European Environmental Agency, 2019b). As a result of this and of other historical factors, the energy mix of the EU remains very much reliant on fossil fuels (cf. Figure 16). Despite a significant increase in renewable energies, fossil fuels continue to be responsible for about 80% of the GHG emissions released in the EU (European Environmental Agency, 2019b).

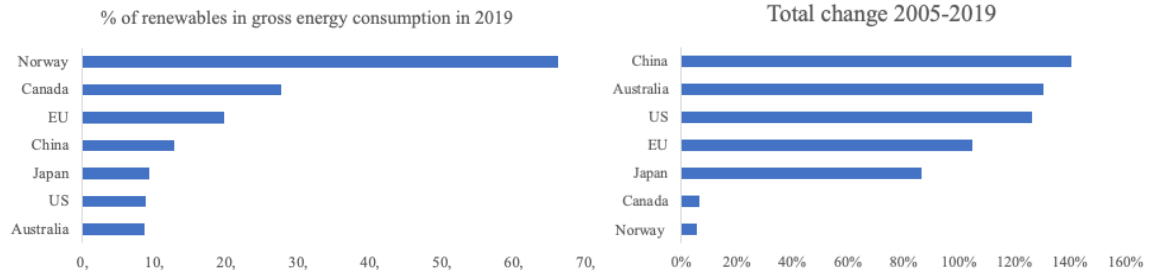
Figure 16: Evolution of the EU's energy mix (in million tons oil equivalent).



Source: Jacques Delors Institute, 2019.

Despite this observation, we must admit that the EU is relatively well placed in the ranking of developed economies according to their renewable share in energy consumption (cf. Figure 17). It is, however, far behind Norway and is currently being challenged by the fast growth of renewables in China. According to E3G (2021), China has installed, in the past five years, three times more solar and wind power capacity than the EU.

Figure 17: Comparison of several developed economies regarding their share of renewables in their energy consumption.



Source: Graph from the author based on data collected from Our World in Data (2021b).

Concerning our renewable energy targets, analysis of the data provided by Eurostat (2021d) indicates that the EU reached its objective of sourcing more than 10% of its consumed energy from renewable sources in 2010 (cf. Table 15). Its 2020 target of increasing this share to 20% was also met. If we continue on the same pace of development as in the past years, we will however end up facing some difficulties to fulfill our longer-term commitments. Our linear projections indicate, at best, a renewable deployment of 33% for 2030 (which means that we would meet our current 2030 target of 32%) and of 88% for 2050. This level of renewable coverage, as high as it looks, is incompatible with our objective of net-zero carbon in 2050. In

order to fully rely on renewable energies in 2050, we would need to increase their share by 5.4% per year, which does not appear to be such a big effort compared to what we have previously achieved (i.e., since 2005, we have reached this level of performance six times out of 15 years). These conclusions are aligned with those of the European Environmental Agency (2020) which computed that, although with all the measures announced so far, we should get a 33% share of renewables in our energy consumption by 2030, we need to further step up their deployment in order to meet our longer-term objectives.

Table 15: Performance of the EU on its renewable energy commitments.		
	Cumulative change since 2005	
2010	13% (for the EU-28)	
2019*	20% (for the EU-27)	
* Used as proxy for 2020.		
	If we continue on the same pace as we did since 2005 (+4.9% per year)	If we continue on the same pace as we did in the past five years (+2.5% per year)
2030	33.5%	25.8%
2050	87.9%	42.1%
Which annual performance should we have if we want to reach the following targets?		
2030 – 32%	+4,5%	
2050 – 100%	+5.4%	
Sources: own computations based on data from Eurostat (2021c).		

Conclusion

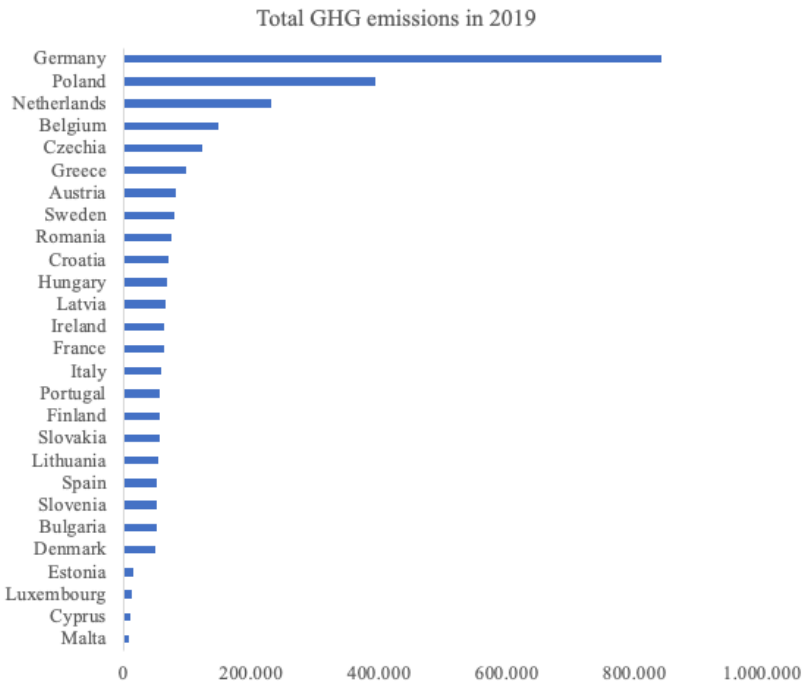
The EU's past performance on indicators such as our annual GHG emissions, energy consumption and use of renewables are not very encouraging. Although we have, up to now, met most of our targets, with a performance ahead of most other developed economies, the efforts that are now required for us to meet our future commitments are much bigger than what we have demonstrated so far. Note that our projections are, in addition, probably too optimistic, as a great deal of our past performances can be explained by exogeneous factors such as the financial crisis of 2008. While they boost our performances on paper for a short period of time, these economic factors do not bring sufficient structural changes for us to fulfil higher climate ambitions. On a positive note, we can highlight our renewables target as the one that we are the most likely to validate on time, as the efforts required to upgrade our performance on its indicator are not as significant, compared to our past achievements, as those for the other targets. However, what this analysis demonstrates is that maintaining the status quo will not be sufficient: in the absence of additional instruments and budget, there is a high chance for the

EU to not fulfil its longer-term commitment to become carbon neutral by 2050. Since the European Green Deal, as detailed in the previous section, does not bring any radical changes to the way the EU manages the climate emergency, we do not quite perceive how we are going to boost our annual performance in the coming years for us to indeed meet our engagements.

2.3. Performance of European Member States

In this final point, we will dig deeper into the performance of the EU on its climate indicators by looking at regional disparities regarding national accomplishments. Our objective is to identify whether there are significant differences between Member States on environmental KPIs and whether these differences have increased or decreased over time. This will help us to complete our assessment concerning the adequacy of the measures announced as part of the Green Deal.

Figure 18: Annual GHG emissions of European Member States in 2019 (in $KtCO_2eq.$).



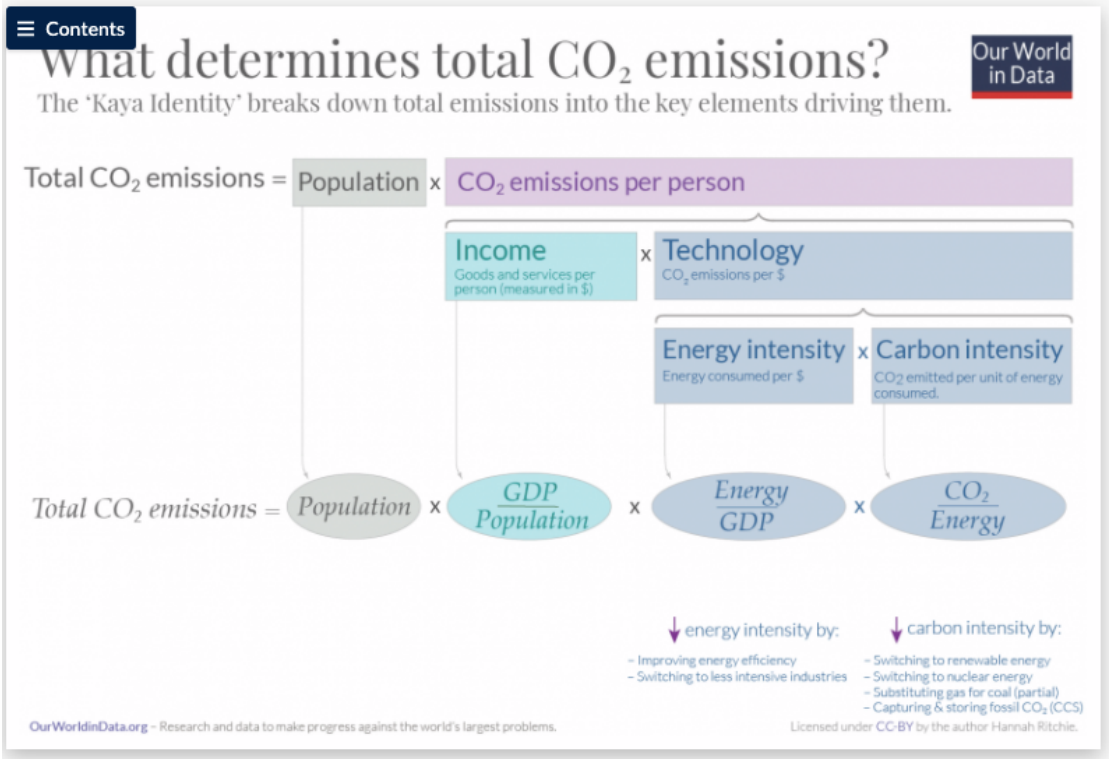
Note: The indicator here displayed is the total number of GHG emissions including international transport.
Source: Graph from the author based on data collected from the European Environmental Agency (2021a).

Who are, today, the environmental leaders and laggards of the European Union?

To answer this question, it is tempting to look at which countries emit the most emissions per year (cf. Figure 18). Based on this single indicator, we would therefore announce that Germany is by far the worst performer, while Malta seems to be the example to follow. This reasoning is, of course, absurd as it does not take into account a series of factors, such as the size of these

countries, that are important to understand the underlying challenges faced by each Member State. In order to identify these subtleties and find a better answer to the bold question we raised at the beginning of this section, we will decompose the annual emissions of all these countries using the well-known "*Kaya's Identity*". This equation breaks down a country's emissions based on the size of its population, its standards of living and the performance of its technology (cf. Figure 19).

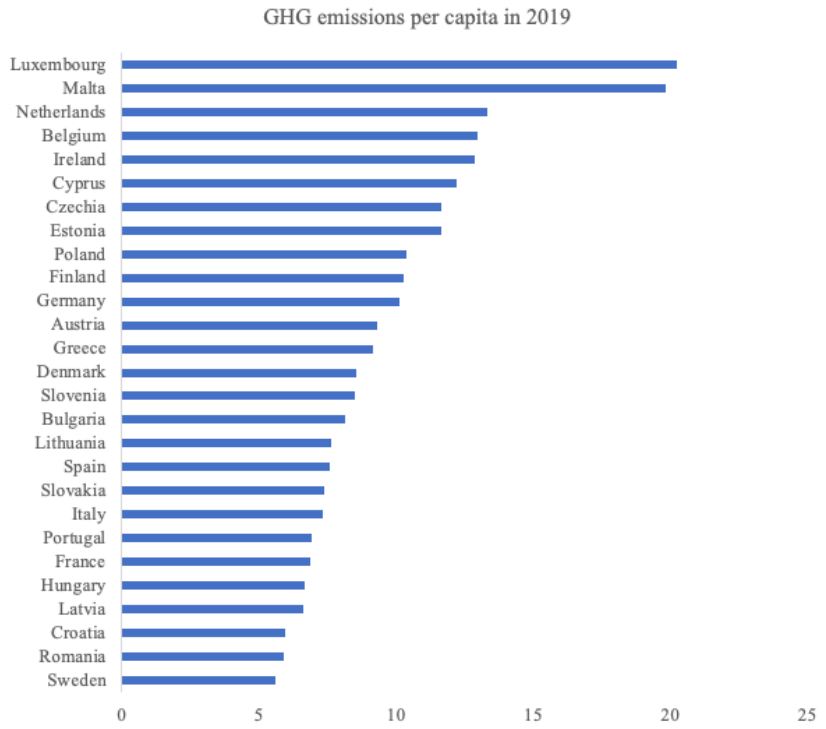
Figure 19: Kaya's Identity.



Source: Our World in Data, 2021a

To better compare European countries, we should firstly factor in the size of their population and look at their emissions per capita (cf. Figure 20). With this indicator, we can quickly correct what we said earlier: Malta is clearly not an example to follow, as its citizens release almost four times more emissions into the atmosphere than the Swedes. As a matter of fact, we see that all the small EU Member States can now be considered as laggards, while in the leaders' category we find some *poor* Eastern countries, as well as some *very rich* Northern nations. In theory, a country can indeed release a small number of emissions either because its economy is quite poor, or because it possesses a technology that enables its industry to decouple its activities from pollution.

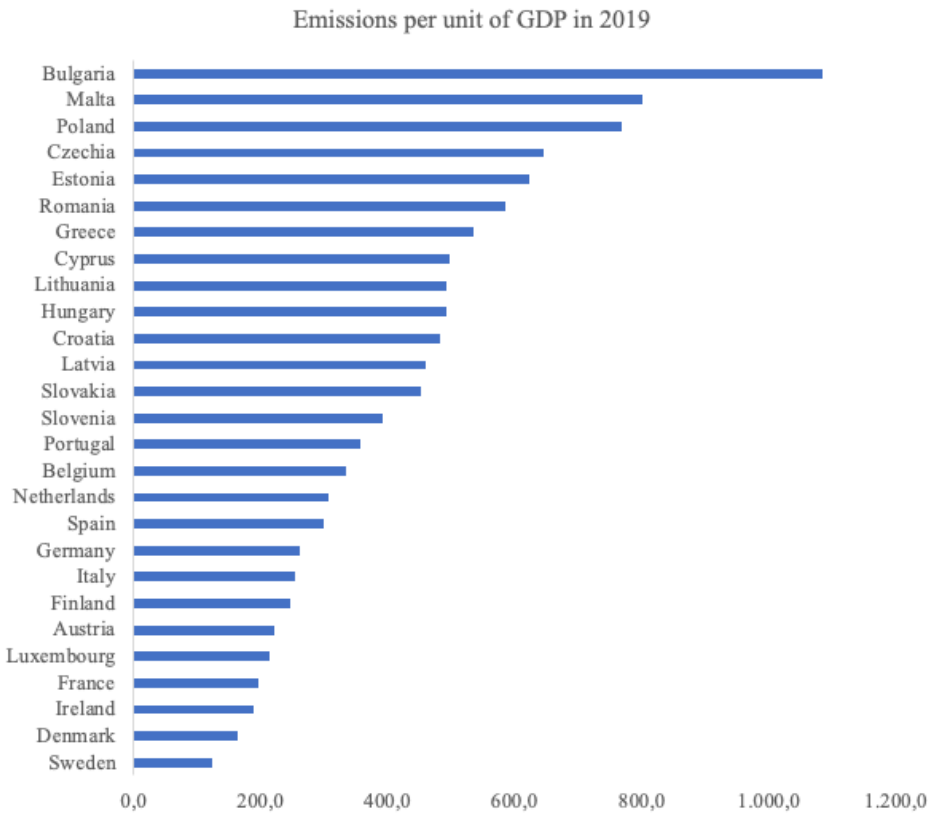
Figure 20: Annual GHG emissions per capita of European Member States in 2019 (in $tCO_2eq.$).



Note: The indicator here displayed is the total number of GHG emissions including international transport.
Source: Graph from the author based on data collected from the European Environmental Agency (2021).

If we consider that social inequalities should be levelled down in Europe and that Eastern European Member States deserve similar standards of living as in the West, what is important to look at is how this economic boom would be followed by an increase in emissions. To assess the quality of a country's technology, we divide its annual emissions by its GDP (cf. Figure 21). Based on this indicator, we learn that, to produce one unit of wealth in Bulgaria, its population releases almost nine times more emissions than Sweden's. In fact, this measurement reveals a clear divide between countries from the West and those from the East, reflecting a difference in the type of technologies these regions rely on. To assess whether this issue mostly comes from a problem of energy overconsumption or rather from an energy system that is dominated by fossil fuels, we will further decompose this indicator using Kaya's identity.

Figure 21: Annual GHG emissions per unit of GDP of European Member States in 2019 (in $tCO_2eq.$).

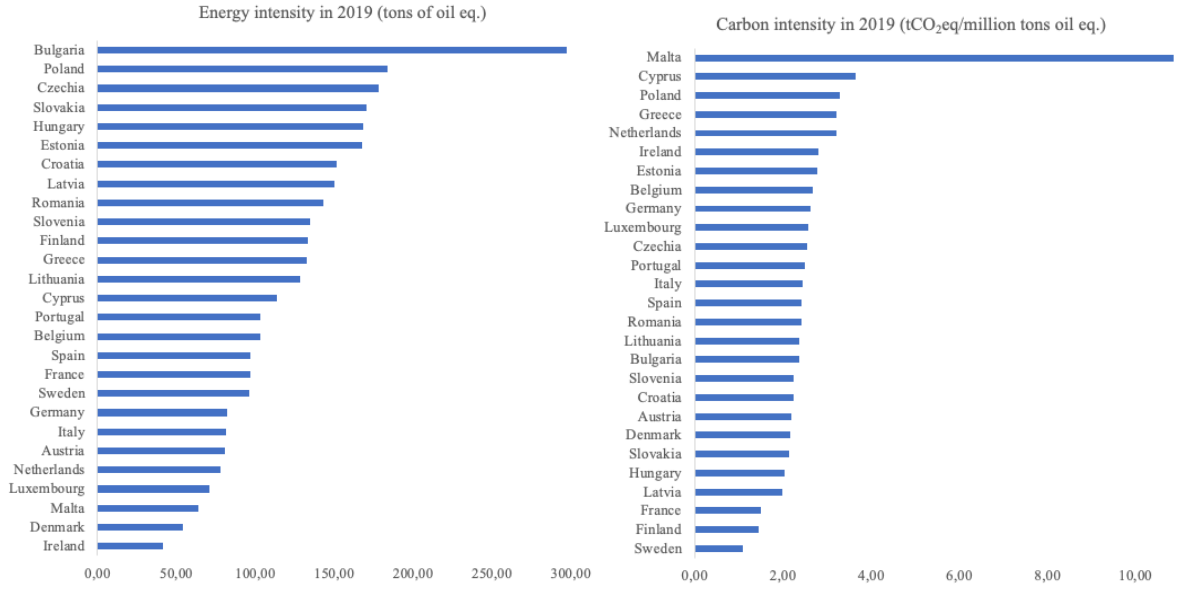


Note: The indicator here displayed is the total number of GHG emissions including international transport.
Source: Graph from the author based on data collected from the European Environmental Agency (2021a).

The energy intensity of a country represents how much energy it needs to create one unit of wealth, whereas its carbon intensity is how much carbon it releases per unit of energy it consumes (cf. Figure 22; pay attention that this graph only displays carbon emissions and not all GHG emissions). Looking firstly at the energy intensity of Member States, we can again observe a clear regional divide between Eastern countries, which are almost all located at the top of the graph, and Western regions, which perform better on this indicator. Regarding carbon intensity, regional disparities are not as clear: while Poland indeed scores very poorly on this KPI, a country such as Hungary performs as well as Denmark. Note that the countries we could classify as bad performers on this indicator all have an energy mix relying on fossil fuels such as coal or gas. On the contrary, the countries that are the best ranked here have an energy system based on renewables and nuclear infrastructures (e.g., France). Many debates, however, exist around nuclear energy as, although it does not release much carbon into the atmosphere, it creates many other sorts of waste, and its production process involves very high risks. Not counting on nuclear as a source of clean energy, the only countries that mostly rely on renewables are Austria, Denmark, Luxembourg and Sweden, with between 70 and 80% of their

energy production from renewables (Our World in Data, 2021b). Note that this is not very well reflected in Figure 22 as this graph displays the amount of carbon emitted per unit of energy consumed in each country, while we were talking here in terms of energy production without considering the effect of trade.

Figure 22: Energy and carbon intensity of European Member States in 2019.



Note: We used, in the second graph, the total number of **carbon** emissions including international transport.
Sources: Graph from the author based on data collected from Eurostat (2021c; 2021e) and the European Environmental Agency (2021a).

These observations regarding regional disparities in the environmental performance of the European Union, that we have made based on graphs, have been confirmed by an ANOVA test performed on three indicators: the emissions countries release per unit of wealth, their energy intensity, and their carbon intensity (cf. Table 16). To perform this test, all European Member States were divided into three groups: those from the North (Denmark, Sweden and Finland), those from the West (Austria, Belgium, France, Germany, Greece, Ireland, Italy, Luxembourg, Spain, Portugal and the Netherlands) and those from the East (Bulgaria, Croatia, Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia). Our assumption was that these groups had, on average, a distinct performance on the indicators we had chosen. The ANOVA tests conducted confirm this assumption with a high level of confidence for our first two indicators, but not for the third one.

Table 16: ANOVA test on climate indicators for 2019.

GHG/GDP

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
North	3	532,338742	177,446247	3978,03742
West	11	3165,99343	287,817584	9778,31427
East	13	7773,86144	597,989342	36601,4486

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	779886,517	2	389943,258	17,1731807	2,34622E-05	3,40282611
Within Groups	544956,601	24	22706,525			
Total	1324843,12	26				

Energy intensity

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
North	3	283,737631	94,5792102	1574,51947
West	11	966,523232	87,8657484	529,146983
East	13	2051,15977	157,781521	2780,74241

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	31714,402	2	15857,201	9,10256218	0,00114328	3,40282611
Within Groups	41809,4177	24	1742,05907			
Total	73523,8197	26				

Carbon Intensity

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
North	3	4,71141174	1,57047058	0,29666807
West	11	28,1817407	2,56197642	0,22274621
East	13	40,9871419	3,15285707	5,61769213

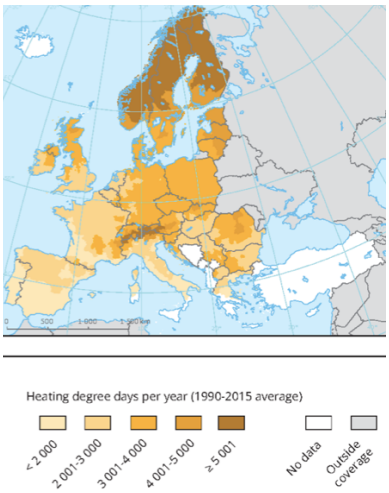
ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	6,66750783	2	3,33375391	1,13920772	0,336778851	3,40282611
Within Groups	70,2331038	24	2,92637933			
Total	76,9006116	26				

This outcome confirms that there is a regional divide in terms of emissions per unit of wealth and energy intensity. Looking at emissions, the North performs usually better than the West, which is, on its side, far ahead of the East. Regarding energy intensity, the North has, on average, a lower performance than the West, but is performing much better than what is

happening in the East. An assumption for the weakness of the North on this indicator of energy intensity could be their much tougher climate in winter, which exerts an influence on their demand for heat (cf. Figure 23).

Figure 23: Differences in heating days in Europe.



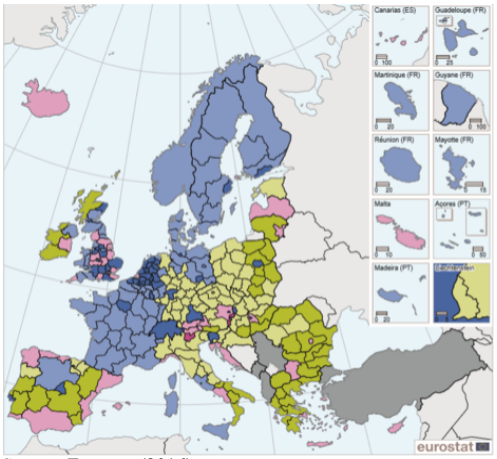
Source: European Environmental Agency (2019a).

Concerning the performance of Eastern European Member States, an assumption is that it mostly reflects the structure of their economy, still very much centered around industrial activities as opposed to services (cf. Figure 24a & b). In addition, while most of the European Union is a net importer of carbon, some of these countries are actually net carbon exporters, which means that a share of their emissions should, in fact, be allocated to other countries (cf. Figure 24c). Finally, what distinguishes the industry of the East from the industry of the West is also the fact that the East does not benefit from the same capabilities in terms of sustainable innovations (cf. Figure 24d). According to Lucchese and Pianta (2020), European countries are in a highly unequal position when it comes to developing green technologies and raising capital for doing so. This difference is particularly visible when looking at the expenditures that European countries spent on Research & Development as a percentage of their GDP (cf. Figure 24e): while it is generally high in the West, it is much lower in the East.

As far as the carbon intensity is concerned, regional trends are, as we saw previously, not as strong, which we can assume might be related to the fact that all countries in Europe are net importers of energy, with a strong reliance on Russia, Norway and the Middle East (Eurostat, 2021f). Countries such as Luxembourg have an energy mix that is mostly composed of renewables but is insufficient to meet their needs, pushing them to import energy from non-renewable sources. Such cases affect the outcomes of our indicator, which is partly why it is more complicated to conclude on a potential regional trend here.

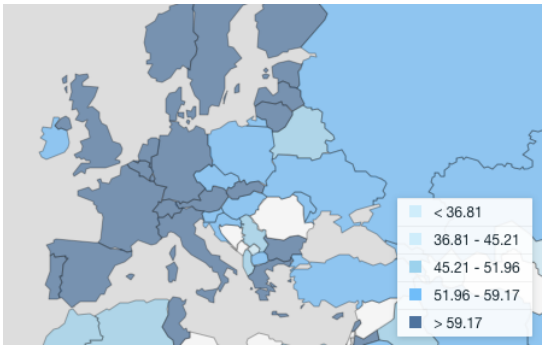
Figure 24: Why does the East consume more energy and emitting more carbon than the West?

a) Dominant economic activity in terms of employment in the EU (in light green = industry; in blue = financial and insurance, real estate, professional and scientific services).



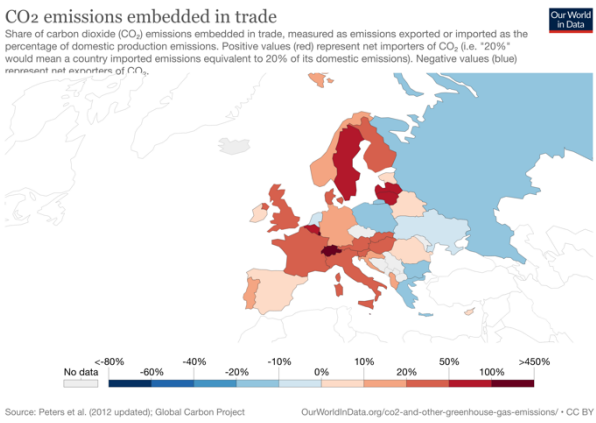
Source: Eurostat (2016)

b) Share of services in Member States' GDP



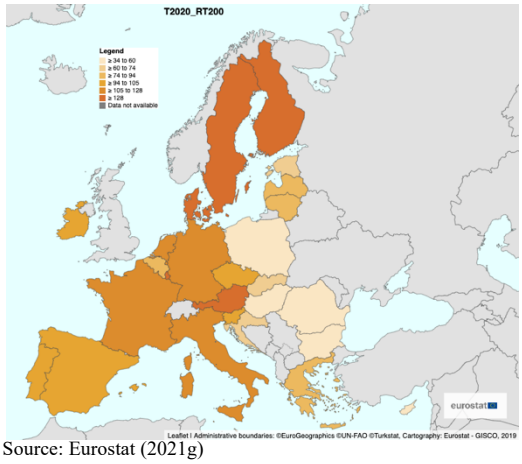
Source: World Bank (2021)

c) Balance of carbon in Europe (in red = net carbon importers; in blue = net carbon exporters)



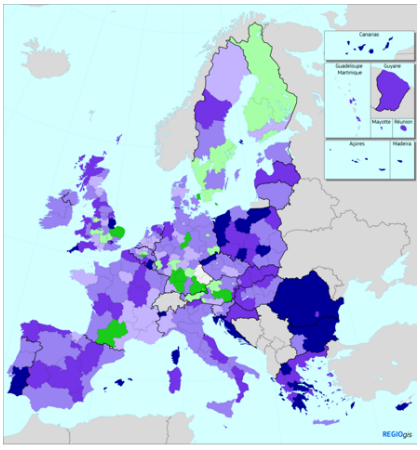
Source: Our World in Data (2021a)

d) Eco-Innovation index (the darker it gets, the higher the index)



Source: Eurostat (2021g)

e) R&D expenditures as % of GDP (in green = high; in blue = low)



Source: Eurostat (2015)

In conclusion, although regional disparities are not strongly marked in terms of carbon intensity, they are well established in terms of energy intensity and GHG emissions per unit of wealth: new European Member States are lagging behind older ones.

How have regional disparities evolved in the past?

We are now interested to see how these regional disparities in the environmental performance of European countries have evolved over time. To do so, we are going to zoom on one indicator only, the one enabling us to describe both the energy and carbon intensity of the technology used by countries: their emissions emitted per unit of GDP. To assess the evolution of regional disparities over time, we worked based on data from four distinct years - 1999 (i.e., before the arrival of Eastern Member States in the EU), 2005 (i.e., just after their arrival), 2009 (i.e., at the peak of the economic crisis) and 2019 (i.e., the most recent data we have) – and conducted a series of ANOVA tests. Each time, the hypothesis that we were testing was whether our regional groups had, on average, a distinct performance on the indicator we had chosen. The outcomes of these tests confirm, with great confidence, the presence of regional disparities all along the analysed period. To assess whether these have increased or decreased, we looked at the evolution of the total variance of the sample, as well as its decomposition in between-group and within-group variances (cf. Table 17 for a summary of their outcomes; Appendix 3 for more details).

Table 17: Outcomes of our ANOVAs.

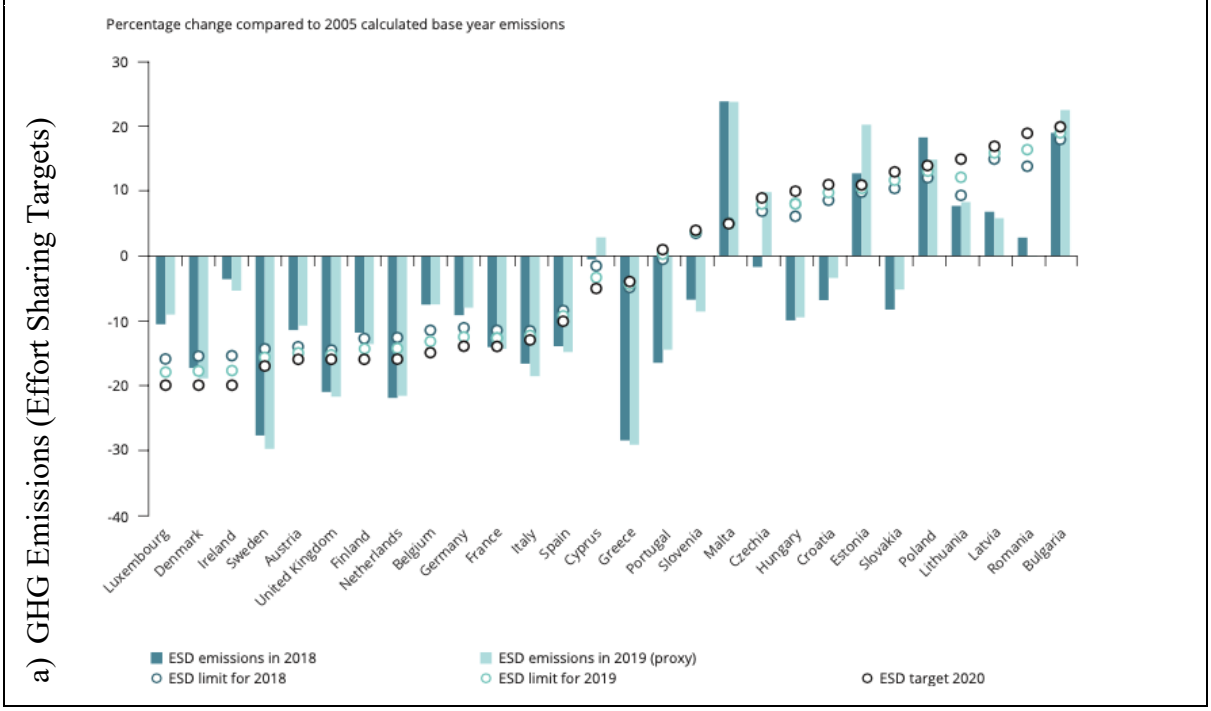
		1999	2005	2009	2019
Average per group (tCO2eq.)	North	460	339	298	177
	West	612	486	387	288
	East	2276	1285	892	598
Total variance		10 492 711	2 517 676	988 861	412 650
Between-group variance (% in the total variance)		9 725 171 (93%)	2 349 986 (93%)	936 979 (95%)	389 943 (94%)
Within-group variance (% in the total variance)		767 540 (7%)	167 691 (7%)	51 882 (5%)	22 707 (6%)
F statistic		12.7	14	18.1	17.2
P-value		$1.75E^{-04}$	$9.28377E^{-05}$	$1.63815E^{-05}$	$2.34622E^{-05}$

Note: The indicator used here is the total number of GHG emissions including international transport.
Source: Own computations based on data collected from the European Environmental Agency (2021a).

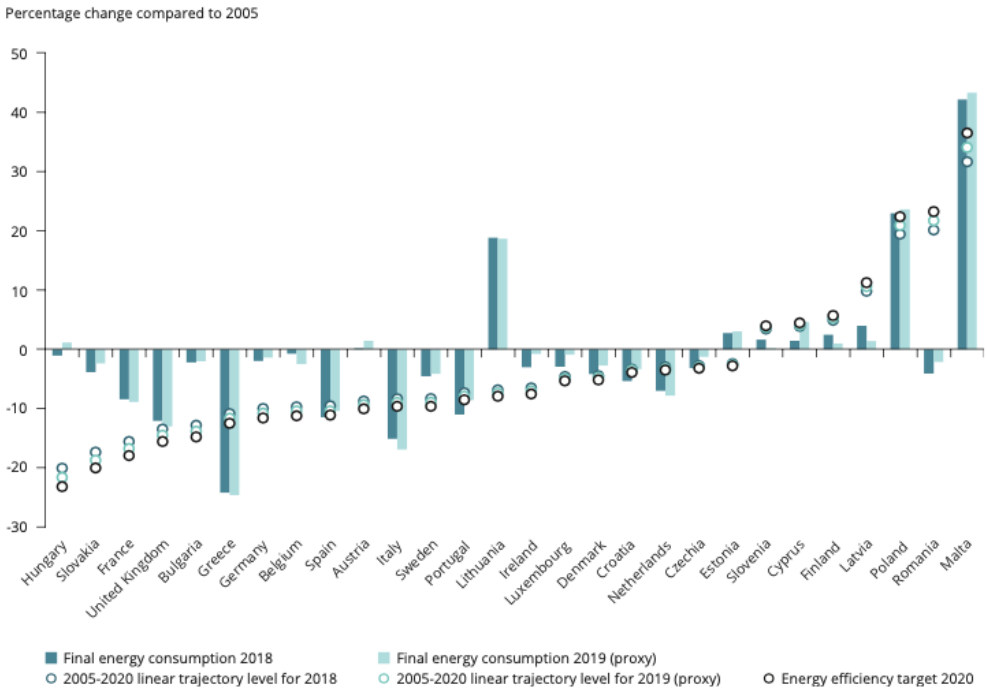
Our computations indicate a reduction of the sample's variance on the indicator we had chosen (i.e., GHG emissions/GDP). This means that our sample is getting more concentrated around

its global mean, indicating an overall reduction of disparities. While both the between- and the within-group variances decreased between 1990 and 2019, the within-group variance proportionally decreased more than the between-group variance. In other words, our groups of countries are becoming more distinct, as each Member State is getting closer to its group average. This trend is taking place at a faster rate than the convergence of these groups' averages, which explains why the F statistic is increasing. Note that we have observed a peak of such a trend in 2009, in the middle of the financial crisis. What this shows is that, while regional disparities within the EU in terms of green technologies are decreasing over time, this is, in fact, taking a lot of time. The average performance of Eastern European countries, today more homogeneous, is equal to the performance of Western EU Member States in 1999, twenty years ago. Despite being slow, this progressive convergence can be explained by the fact that, while Eastern Member States have been continuously improving their performance as compared to their starting position, this has been less the case of Western Member States, which seem to struggle more to further improve their deployment of clean technologies. Note, however, that this is not the case of Nordic countries which, although they initially had the highest level of performance on this indicator, continued to improve at a faster rate than the other old Member States. This observation is also visible when looking at the performance of European countries against their official targets in terms of GHG emissions, energy efficiency and renewables' deployment (cf. Figure 25).

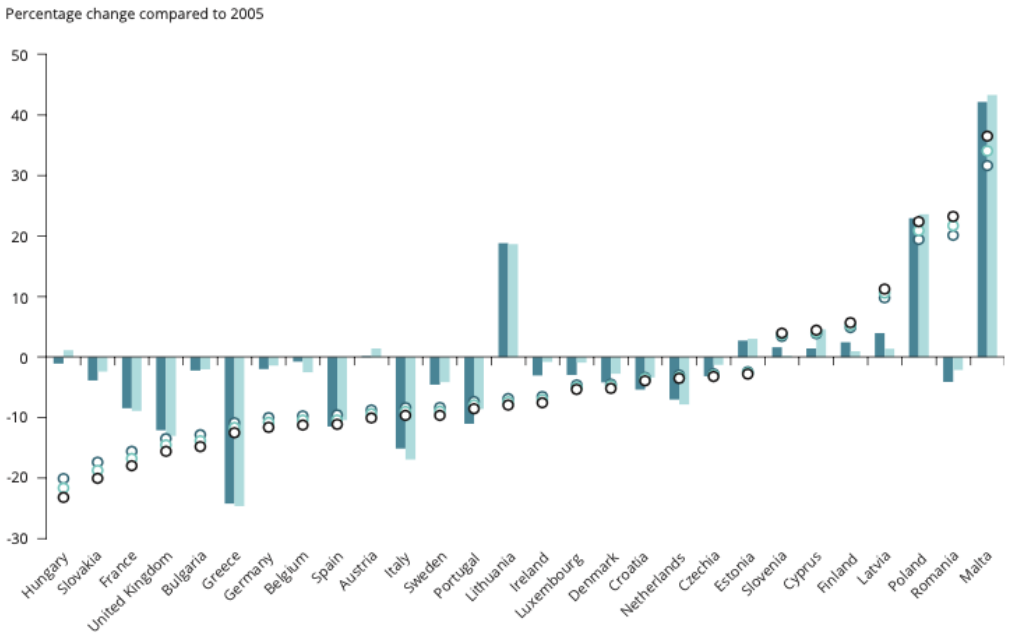
Figure 25: Progress of European Member States on their climate KPIs.



b) Energy Efficiency



c) Renewable Deployment



Source: European Environmental Agency (2020)

As countries which have failed to reach most of their commitments, we can cite in the West: Austria, Belgium, France, Germany, and Ireland. Note that, as key players at the European table, their past behaviours raise some concerns for the future direction of the EU on those topics. In the East, bad players are Bulgaria, Slovenia, and Poland, three countries which, if they continue on this path, will have increasingly greater difficulties to close the gap with the West. On the leaders' side, Finland and Denmark in the North continue to meet all of their commitments. This has also been the case, so far, of Greece, Italy and Portugal, but let us recall

that the economic crisis played a big role in bringing them closer to their climate objectives. Finally, we should cite Croatia, Latvia, Lithuania, and Romania as countries which have also met all their engagements. Although it is difficult to estimate the impact of the 2008 crisis in this achievement, the fact that they have delivered on their commitments, while some of their neighbours did not, is a good sign for the advancement of these countries' green transition. In conclusion, regional disparities in Europe regarding the deployment of clean technologies have been slowly decreasing over time. This is due to an overall improvement in the performance of most Eastern European Member States, combined with a slower rate of technological enhancement in some of their Western neighbours.

Conclusions on the relevancy of measures included in the Green Deal

The main takeaway from the two previous points is that there are some regional disparities in Europe concerning our ability to conduct a green transition. While they have been decreasing over time, measures that would contribute to bring us backwards, increasing the gap between Western and Eastern Member States, are to be avoided. A Europe working at two different speeds is, indeed, not a Europe that will reach its objective of carbon neutrality by 2050. It is therefore worried to see that the European Commission has centred its Sustainable Investment Plan – supposed to bring us closer to our targets – on InvestEU, a tool that has been proven to contribute to the growth of inequalities across European Member States. Other core instruments of the Green Deal can be pointed out as problematic in this context: one of these is the Cohesion Policy. If we assume that, in past years, Eastern European countries have indeed adopted structural reforms helping them bridge the gap with their neighbours, we could then be tempted to praise the performance of the Cohesion Policy at reducing disparities between countries. It is, however, difficult to estimate the actual impact of this policy as we do not possess any counterfactual against which we could compare our data. Nevertheless, if the Cohesion Policy has had any impact on the reduction of environmental disparities across regions, this impact has been far too small and too slow. Eastern European Member States are still a long way from performing as they should do for us to reach carbon neutrality. Despite these shortcomings, the European Green Deal continues, as we saw in the previous section, to greatly rely on the Cohesion Policy, and does not offer many other initiatives to reinforce convergence within Europe. If we assume now that the position of Eastern European Member States on environmental KPIs did not improve because of actual measures in support of sustainable processes, but because of an organic process of de-industrialisation incentivised by growing pressures from global competitors, we are therefore obliged to recognise that what we have

considered as a good performance inside of our borders has actually been rendered possible by moving our problem abroad. This issue of carbon delocalisation, referred to in chapter 1 as carbon leakage, is not only tweaking our indicators, but is also not bringing us any closer to ending global warming. Although some measures are planned to avoid reinforcing such a trend when strengthening our green requirements (e.g., carbon border tax), these risk protecting industries that are no longer competitive, while preventing their global competitors from upgrading their technologies, as nothing is done to support them in doing so. A final issue that we see in the Green Deal concerns its lack of actual measures backing the development of disruptive technologies and supporting behavioural changes. What Western countries illustrate with the slowing down of their improvement on environmental KPIs is that, once we reach a certain level of performance, it might become harder to keep on reducing our emissions. As we cannot afford to remain stuck at a low level of green performance, we need to prepare for these potential difficulties: while we need to massively invest in the development of technologies that will bring us forward, we also need to bring citizens on board. So far, as already mentioned in this paper, the Green Deal continues to mostly rely on market-based mechanisms in order to fulfil these two missions. Unfortunately, even though these measures could be efficient enough to bring incremental changes, as we have seen in the past, we believe that they will not be sufficient to deliver the radical outcomes we are chasing if we want them to be fair and to arrive on time. To sum up, as we have mentioned on multiple occasions throughout this paper, this European Green Deal, beyond the fact that its climate objectives would not match what is required to end global warming (a question that we left outside the scope of this chapter), does not even bring the necessary instruments and budget that would be required to meet the goals it has set itself. While this is partly due to a lack of resources and competences at the EU level, the resistance of some EU Member States to accelerating the transition can also be felt. Although we often mention Poland as a key opponent to climate projects, some Western European Member States are also to blame for their lack of ambition and their failed commitments. What our data at the Member States' level does not allow us to see is also the potential influence of European firms on this inertia. We can recall that the Green Deal has received a lot of attention from lobbying groups, and especially from the industry, which has had a considerable number of meetings with representatives at all levels of the decision-making process (cf. Chapter 1 -criticism on the negotiation process). The influence of private actors on the Green Deal and on Europe's environmental performance is a topic that falls outside of our research's scope but that would require additional research.

Conclusion

The aim of this paper was to answer the following research question: does the European Green Deal live up to the commitment made by the European Union in the Paris Agreement to limit global warming by 2°C above pre-industrial levels? Several sub-questions were addressed along this thesis in order to best reply to this broad interrogation.

A first chapter focused on the description of the European Green Deal. We learned that this is a wide-ranging policy framework encompassing many different targets and instruments, with environmental, social and economic objectives. To reach those goals, the Green Deal is accompanied by a Sustainable Investment Plan based on different pillars but heavily dependent on private investments.

In chapter two, a broad analysis of past policy initiatives on the environment undertaken at the European level enabled us to conclude that, in essence, this European Green Deal did not bring many new elements to the table. Even though it has raised the ambition of the EU in terms of emissions reductions, these new targets remain, according to the opinion of NGOs, insufficient with regards to our commitment to limit the increase in global temperatures. Concerning the tools made available to fulfil those engagements, the European Commission opted for a rather strong reliance on market-based instruments, and more specifically on the European Trading System launched almost twenty years ago. On the contrary, not much is planned to support the research and development of new behaviours and for technologies enabling these sustainable lifestyles. On the social side, while we must note the inclusion of a new compensation system for some workers at risk of losing their jobs due to the green transition, we must also recognise that this mechanism is very limited in scope and in scale. These limitations are mostly due to a lack of budget at the EU level: although additional money has been dedicated to the green transition, this amount is insignificant when compared to the wealth created every year in the EU and to the challenges ahead. In conclusion, in spite of promises made with regards to the ground-breaking nature of this strategy, the European Green Deal essentially brings us more of the same policies in place since the 2000s.

With that in mind, the EU's chances of meeting its climate commitments were assessed based on its past performances, in the aim of judging the suitability of the instruments proposed by the European Commission in the Green Deal in order to solve the climate crisis. At the international level, considering that the EU is directly responsible for a large share of historical

emissions but for only a small share of the current pollution, we regret a lack of stronger support measures towards other economies, as well as the introduction of what appear to be protectionist policies. At the European level, we computed based on past achievements that much more effort will have to be delivered in order to reach the targets we set ourselves as part of the Green Deal, and even more if we were to adopt more stringent objectives aligned with our global engagements. It is challenging to see, however, how a plan that mimics what we have done in the past will bring us closer to these commitments while protecting citizens at the bottom of the pyramid from regressivity. Market-based instruments and an investment tool such as Invest EU entail the risk, insufficiently compensated by the Just Transition Mechanism and the Cohesion Policy, of going backwards in terms of regional integration. This is not the way to go if we want the whole European Union to become carbon neutral by 2050 while reducing inequalities. Although the EU has, in the past, managed to improve its performance on environmental KPIs, its policies were supported by contextual factors which have not brought much structural change to our economy and, therefore, not enough long-term benefits for the environment. This is illustrated by the performance of some Western European Member States which is slowing down and falling short of their commitments. We concluded from these observations that the European Green Deal was rather incomplete, since it focused heavily on our internal affairs and mechanisms relying on markets.

Our answer to the research question stated above is, therefore, that the European Green Deal will probably not live up to our climate commitments, both globally and internally. Does that mean that it is all negative? No. Awareness on environmental issues has never been so high. We have a deal which explicitly puts the spotlight on climate issues, and which insists on policy consistency. Once again, green investments have been pointed out as opportunities for the recovery of the European economy after the COVID-19 crisis. However, what differs from previous plans is that these are not just nice words on paper: Next Generation EU was set up by raising money at the EU level, something that had never happened before, and implies green conditionalities on the disbursement of funds. As illustrated by this instrument, the terrible crisis we are in is offering us the opportunity to re-start differently. Will we do it? The author's view on that is that we simply have no other choice.

Several limitations are to be mentioned in relation to this research paper. Firstly, note that this paper was written on the basis of the information that was available to the author at the time of her research. Since the European institutions are currently working on those issues, it is an evolving topic which will require continuous scrutiny on the side of the academic community.

This independent monitoring is not an easy task as researchers such as the author of this thesis are often confronted with non-transparent information, either because some data is simply not publicly available or because it is not communicated in a clear and comparable manner. Some analyses of this thesis have been affected by the difficulty of accessing quality data. A second limitation of this paper relates to its restricted scope, focused on climate change and on our commitments thereon. It is worth mentioning that the European Green Deal includes initiatives on other challenges such as the protection of biodiversity. Additional research should be conducted on these areas and on the relevancy of the Green Deal to address these issues. Finally, the author of this thesis would like to acknowledge her own limitations. Because she is not a climate expert, the models she used were too simple to appropriately predict issues that go beyond the extent of her knowledge. She also recognises her bias: afraid by what she does not know, she is deeply convinced that humans should strive to end climate change no matter what it takes. On a topic like this one, remaining neutral was a challenge for the author whose criticism might have been affected by her fears.

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Appendixes

1. Appendix 1: Description of all other policies and reforms mentioned in the EU Green Deal Communication

Action	State of Advancement	Description
Revise the EU strategy on adaptation to climate change	Adopted by the Commission on the 24th of February 2021.	The Commission recently updated its adaptation strategy to climate change initially drafted in 2013. The aim of this strategy is "*to make adaptation smarter, swifter and more systemic, and to step up international action on adaptation to climate change*" (European Commission, n.d.2). It involves the creation of a knowledge-sharing platform on climate adaptation[1].
Revise the Circular Economy Action Plan	Adopted by the Commission in March 2020.	This new strategy, updating the 2015 action plan on circularity, is focused on resource-intensive sectors (e.g., ICT, plastic packaging, textile and food) (European Commission, 2020g). Among others, the following measures are part of this new action plan: the redaction of a new battery regulation (e.g., setting new recycling targets), the drafting of a new Sustainable Product Policy (i.e., as a revision to the Eco-Design Directive) and the revision of European waste shipping rules (id.).
New "Farm to Fork" Strategy	Adopted by the Commission in May 2020.	This strategy covering stages from production to consumption sets indicative reduction targets in terms of pesticides, fertilisers and antibiotics use (-50% by 2030) (European Commission, 2020n). It also implies non-binding targets concerning the conversion of farming lands to organic fields (25% by 2030) and the reduction of food waste (-50% by 2030) (id.). To reach these targets, the Commission is currently working on, among others, the revision of regulations and directives on feed additives and on the harmonisation of food labelling across the EU (id.).
New Biodiversity Strategy	Adopted by the Commission in May 2020.	With this strategy, the Commission announces its intention to propose binding targets concerning the restoration of damaged ecosystems (e.g., it wishes to turn at least 30% of EU's lands and seas into protected areas that are effectively managed) (European Commission, 2020o). This strategy also led to the (ongoing) development of action plans targeting specific habitats: a new EU Forest Strategy and a new Blue Economy Strategy.
New Zero Pollution Action Plan	Adopted by the Commission in May 2021.	One of the important aims of the Green Deal is to reduce all sorts of pollutions *"to levels no longer considered harmful to health and natural ecosystems*

[1] https://climate-adapt.eea.europa.eu

		[…], thereby creating a toxic-free environment" (European Commission, n.d.3). This action plan sets non-binding intermediary targets for 2030 (e.g., reduce by 55% deaths caused by air pollution) for us to reach this final objective by 2050 (id.). As supportive measures, the action plan foresees, among others, the revision of air and water quality standards, as well as of EU waste laws (European Commission, 2021b).
New Chemicals Strategy for Sustainability	Adopted by the Commission in October 2020.	This strategy proposes to ban the use of harmful chemicals for consumer products and the export of substances forbidden in the EU outside of our territories (European Commission, 2020p). It also suggests streamlining the EU's risk assessment process for chemicals and to better support the development of "*safe and sustainable"* chemicals (id.).
New European Climate Pact	Launched in December 2020.	The European Climate Pact[2] is a platform for citizens to share their knowledge about climate change. The goal of this tool is to further raise awareness on those issues and on the way everyone could contribute to their mitigation (European Commission, 2020r).
Revision of the Aarhus Regulation (Regulation 1367/2006)	Proposal made by the Commission in October 2020, in waiting for the approval of the Parliament and of the Council.	The Aarhus Convention has been signed by the European Union, guaranteeing judiciary access to its citizens in the context of disputes in relation to the environment (European Commission, n.d.5). The Commission suggested to further enlarge the material scope of the Aarhus Regulation (translating the Aarhus Convention in EU's law) to disputes concerning administrative decisions made at the EU level (today, the scope of this Regulation is limited to legal acts signed at the EU level) (id.).

[2] https://europa.eu/climate-pact/index_fr

2. Appendix 2: Detail of our computations regarding the European Investment Plan for the green transition

2.1. The Modernisation Fund

The European leaders agreed to provide this fund with 2% of the total carbon allowances issued over the period 2021-2030 (European Commission, n.d.6). In 2021, the number of ETS allowances put on the market amounted at 1 571 583 007 (European Commission, n.d.7). It has been agreed to linearly reduce this number over the next ten years by a factor of 43 003 515 (id.). This allows us to compute how many allowances will be issued between 2021 and 2030 and how many will go to the Modernisation Fund: 275 613 437,9. To this, we have to add a number of additional carbon allowances that the beneficiary countries of this fund have agreed to transfer to this mechanism: 367 619 451 (European Commission, n.d.6). To estimate the value of these allowances, we computed their average price on the primary market in 2017, 2018, 2019, 2020 and 2021 based on data published by their official dealer (i.e., EEX).

2.2. The Innovation Fund

It has been agreed to grant this fund a total number of 450 000 000 allowances for the period 2021-2030 (European Commission, n.d.8). We repeated the same exercise as for the Modernisation Fund to compute their hypothetical value. To this, we added an amount of €735 million that remained from this programme's predecessor, NER 300 (id.).

2.3. InvestEU

The table below details the methodology followed by the European Commission to estimate the amount of money it will be able to raise with its InvestEU mechanism before and after the agreement reached by European leaders on the new multiannual financial framework.

	As announced in the Investment Plan	After the agreement on the next MFF	Description
InvestEU Total Guarantee (in € billion of 2018)	47.5	29	This guarantee is composed of a public guarantee serviced by the European budget (23.22 billion after the MFF agreement) and of a private guarantee supplied by the implementation partners of this program (5.82 billion).

InvestEU Fund (in € billion of 2018)	15.2	9.4	Only 40% of the public guarantee is actually provisioned by the European Union in its InvestEU Fund.
Multiplier	13.7	11.4	The multiplier is an assumption by the European Commission of how much 1 euro of its InvestEU guarantee will generate as private investment. This assumption has been scaled down following the agreement on the next MFF. The Commission explains this change by arguing that, imposing more conditionalities on the utilisation of this mechanism, it would probably generate fewer investments than during past implementation periods.
Direct investments generated by InvestEU (in € billion of 2018)	650	331	This amount is obtained by multiplying the InvestEU total guarantee by the multiplier.
Total investments generated by InvestEU (including indirect ones) (in € billion of 2018)	?	372	The Commission estimates that the direct investments funded thanks to its InvestEU programme will generate a series of other related investments. This estimation comes from a publication of the European Commission (European Commission, n.d.10) but has not justified by its services. It must therefore be interpreted in a rather precautious way.
Direct green investments generated by InvestEU (in € billion of 2018)	195	99.3	This number corresponds to 30% of the direct investments generated by InvestEU, as agreed by the European leaders during the last MFF negotiations.
Source: European Commission, 2019b; European Commission, n.d.10; COM(2020)403.			

2.4. The Just Transition Mechanism

The Just Transition Mechanism as it was initially announced must be adjusted to updated data. It has, indeed, been affected by the negotiations of the new European budget. In the absence of communication on this by the EU, we decided to make our own estimation of how much money this mechanism will be able to raise over the next seven years. The detail of these computations can be found in the table below.

Name	Option 1	Option 2	Option 3	Description
1st pillar: Fund				
Just Transition Fund	17.5	/	/	The Commission initially suggested to grant €7.5 billion to this fund (European Commission, 2020a). €10 billion were added to it as part of the Next Generation EU programme (European Commission, 2020u).
Transfers from the cohesion policy	26.2	39.4	52.5	The Commission said that, for each €1 spent from the JTF, €1.5-3 would be spent from the cohesion policy (European Commission, 2020s). Option 1 correspond to a multiplier of 1.5, option 2 to a multiplier equal to the average between 1.5 and 3, and option 3 to a multiplier of 3.
National co-financing	13.1	/	/	Here, we assumed that there was a linear relationship between the EU spending and the amount of money invested by Member States. Based on the data initially communicated by the Commission in its Investment Plan, we found out that, if there was such a linear relationship, for each €1 spent by the EU in the context of the Green Deal, Member States would disburse €0.23 (European Commission, 2020s). In the absence of more transparent information on this, we decided to compute the amount of national co-financing as part of the JTM on the basis of this estimation.
2nd pillar: Scheme	10	15	/	This data has been retrieved from a recent communication from the European Commission (European Commission, n.d.11).
3rd pillar: Public Loan Facility	25	30	/	This data has been retrieved from a recent communication from the European Commission (European Commission, n.d.11).
Total	Min 91.8	Avg 110	Max 128.1	

2.5. Aggregated budget for the green transition

The table below provides additional explanations on our computations regarding the adjustment of the European budget for the green transition to the new MFF.

in billion € (2018)	With the new MFF + Next Gen	Description
EU budget contribution	542.5	This amount of money corresponds to 30% of the total EU budget (including Next Generation EU) from which we have removed the Just Transition Fund and the InvestEU Fund in order to avoid any overlap with the other components of the Investment Plan.

ETS funds	23.8	Since the value of these funds is extremely complicated to estimate in the absence of indication concerning the evolution of carbon prices in the EU, we decided to stick to the estimations provided by the Commission in its most recent communications (e.g., European Commission, n.d.5 and 6).
InvestEU contribution	99.3	This value has been retrieved from the reasoning detailed earlier in Appendix 2.3.
Just Transition Mechanism	110	We took here the average value of this mechanism as estimated in Appendix 2.4.
National co-financing	123	Based on the data communicated by the Commission in its initial Investment Plan, we found out that for each €1 spent by the EU, Member States would disburse €0.23 (European Commission, 2020s). We decided to work on the basis of this assumption, considering that there was a linear relationship between EU and national spending.

3. Appendix 3: ANOVAs

GHG/GDP 1999

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
North	3	1379,95225	459,984082	22326,9814
West	11	6732,54601	612,049638	29676,0073
East	13	29584,8205	2275,75542	1506628,9

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	19450341	2	9725170,52	12,670571	0,000175398	3,40282611
Within Groups	18420960,8	24	767540,034			
Total	37871301,9	26				

GHG/GDP 2005

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
North	3	1018,11082	339,370275	10390,7644
West	11	5344,99319	485,908471	13099,6377
East	13	16705,169	1285,013	322732,868

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	4699971,12	2	2349985,56	14,0138253	0,000093	3,40282611
Within Groups	4024572,32	24	167690,513			
Total	8724543,44	26				

GHG/GDP 2009

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
North	3	893,377088	297,792363	7310,79542
West	11	4257,20335	387,018486	6989,74533
East	13	11602,674	892,513383	96721,1276

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1873957,09	2	936978,547	18,0597337	1,63815E-05	3,40282611
Within Groups	1245172,58	24	51882,1907			
Total	3119129,67	26				

GHG/GDP 2019

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
North	3	532,338742	177,446247	3978,03742
West	11	3165,99343	287,817584	9778,31427
East	13	7773,86144	597,989342	36601,4486

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	779886,517	2	389943,258	17,1731807	2,34622E-05	3,40282611
Within Groups	544956,601	24	22706,525			
Total	1324843,12	26				

Abstract:

The purpose of this research paper is to assess the ability of the European Green Deal to deliver the changes that are required for the European Union to meet its long-term climate commitments. To answer our research question, we first look at which new targets, instruments and budget the Green Deal brings, in order to conclude whether it is as ground-breaking as how it was announced by the European Commission in 2019. As a second step, we study the past performances of the European Union on environmental indicators, in order to estimate the likelihood that it will, with the measures currently in place, meet its green engagements. Combining these two analyses, we conclude that the European Green Deal will probably not fulfil our commitment of limiting global warming to 2°C. Since it has not brought any radical change in the policies adopted by the European Union and considering that the objective of becoming carbon neutral by 2050 would require efforts that are unprecedented at the European level, we do not quite see how we could effectively keep our promises.

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