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A Comparative Analysis of EU Member States and their performance with the UN Climate Change Agenda (UN SDG 13 - Climate Action)

by

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A Comparative Analysis of EU Member States and their performance with the UN Climate Change Agenda (UN SDG 13 - Climate Action)

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Abstract

The objective of this research is to assess the performance of the European Union (EU) 27, its regions and Member States (MS) towards the United Nations 2030 Agenda Climate Action Sustainable Development Goal (SDG13). To do so, a qualitative and quantitative analysis was held, applying the Alkire-Foster (AF) method, and developing the Multidimensional Climate Action Index (MCAI) framework. Results show that the EU and its regions are not performing satisfactorily. The individual composite scores of the MCAI framework revealed a better individual performance of individual Member States when compared to their group performances. There is a relationship between high GDP per capita level and satisfactory performance. Southern Europe and Central and Eastern Europe are the regions performing mostly unsatisfactorily regarding the UN 2030 Agenda SDG13. Southern Europe, more exposed to climate change related losses, is suffering the more negative effects related to climate change. Central and Eastern Europe is underperforming on promoting social political awareness regarding climate change.

Keywords: Climate change, Climate action, UN 2030 Agenda, SDG13, EU27, AF method

Number of words: 9441.

Resumo

O objetivo desta pesquisa é avaliar o desempenho da União Europeia (UE) 27, suas regiões e Estados Membros (MS) em relação ao Objetivo de Desenvolvimento Sustentável da Ação Climática da Agenda 2030 das Nações Unidas (ODS13). Para tanto, realizou-se uma análise qualitativa e quantitativa, aplicando o método Alkire-Foster (AF), e desenvolvendo a estrutura do Índice Multidimensional de Ação Climática (MCAI). Os resultados mostram que a UE e as suas regiões não apresentam um desempenho satisfatório. As pontuações compostas individuais do quadro MCAI revelaram um melhor desempenho individual de cada Estado-Membro em comparação com o desempenho do grupo. Existe uma relação entre o nível elevado do PIB per capita e o desempenho satisfatório. O Sul da Europa e a Europa Central e Oriental são as regiões com desempenho mais insatisfatório em relação ao ODS13 da Agenda 2030 da ONU. O sul da Europa, mais exposto às perdas relacionadas às mudanças climáticas, está sofrendo os efeitos mais negativos relacionados às mudanças climáticas. A Europa Central e Oriental tem um desempenho insatisfatório na promoção da consciência política social em relação às mudanças climáticas.

Palavras-chave: Mudanças climáticas, Ação climática, Agenda 2030 da ONU, ODS13, UE27, método AF

Número de palavras: 9441.

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Chapter 1

Introduction

How is the European Union 27 (EU 27) and its regions and Member States (MS) performing on the United Nations (UN) 2030 Agenda's Sustainable Development Goal 13 – Climate Action? To answer this question, the Alkire-Foster (AF) method was applied, allowing the development of the Multidimensional Climate Action Index (MCAI) framework to assess the performance of the EU 27, its regions and Member States on the UN 2030 Agenda SDG 13 and its 5 targets.

Sustainable development (SD) is a topic that has been developed throughout the years getting the UN attention around the sixties. The Club of Rome has introduced the discussion in the social political arena and presented the so called "The Limits to growth" calling attention to the fact that natural resources were limited (Meadows et al., 1972). With the Brundtland Report in 1987 it was visible that the idea of preservation of natural resources was related to economic growth, and with the Rio 92 conferences the concept of SD was finally incorporated to the international political agenda (United Nations [UN], n.d.a).

The Millennium Summit of 2000 consolidated the discussion with the Millennium Development Goals (MDGs), where at goal 7th the environment topic is prioritized (UN, n.d.b). As a result of a series of discussions, the development of the Sustainable Development Goals (SDGs)[1] was built upon the MDGs (Hák et al., 2016), The Agenda Transforming Our World: The 2030 Agenda for Sustainable Development, has produced 17 outcome goals, also called Sustainable Development goals (SDGs) involving all dimensions of SD mentioned in the MDGs and more (Biermann et al., 2017).

The SDG13th goal specifically, was set to fight Climate Change and its negative impacts for the future of mankind. The SDG13 accounts with 5 targets proposed by the UN that need to be achieved in order to fight the acceleration of human induced climate change

[1] MDGs available in Appendix D and the SDGs in Appendix F.

effects (UN, 2021). After the last assessments made by the UN with the Intergovernmental Panel on Climate Change (IPCC) it is known that Climate Change has accelerated and the scenario is getting worse in terms of environmental losses. The European Union (EU) Member States (MS) have been ahead with their contribution making positive efforts to reach GHG emissions reductions and some of its MS were some of the only G20 members that were prompt to increase their mitigation measures in 2021 (Moosmann et al., 2021).

The dissertation unfolds as follows. After this introductory chapter, chapter 2 provides a literature review on SD, climate change, and the UN SDG13. This is followed by chapter 3, where the MCAI framework (that uses the AF method) is developed. Results and discussion are presented in chapter 4. Chapter 5 concludes the dissertation.

Chapter 2

Sustainable development, climate change, and the UN SDG13 of the 2030 Agenda

2.1 Sustainable Development

In 1987 *Our Common Future*, also known as the Brundtland Report, was the result of an extensive research made by what the UN called the Brundtland Commission. The Commission, from 1984 to 1987, tried to reach what could be the mainstream concept of Sustainable Development (SD). According to the report SD is a normative concept of economic growth, where exclusively economic growth is not enough and does not turn into it, SD growth must lead to social inclusion and environmental protection (Baker, 2016). In other words it is a “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development [WCED], 1987, p. 43).

The UN Bruntland report (WCED, 1987) says the following on the concept of Sustainable Development (SD):

> 27. Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth. The Commission believes that widespread poverty is no longer inevitable. Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfil their

> aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes. 28. Meeting essential needs requires not only a new era of economic growth for nations in which the majority are poor, but an assurance that those poor get their fair share of the resources required to sustain that growth. Such equity would be aided by political systems that secure effective citizen participation in decision making and by greater democracy in international decision making. 29. Sustainable global development requires that those who are more affluent adopt lifestyles within the planet's ecological means - in their use of energy, for example. Further, rapidly growing populations can increase the pressure on resources and slow any rise in living standards; thus sustainable development can only be pursued if population size and growth are in harmony with the changing productive potential of the ecosystem. 30. Yet in the end, sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs. We do not pretend that the process is easy or straightforward. Painful choices have to be made. Thus, in the final analysis, sustainable development must rest on political will. (p.16).

The concept of Sustainable Development (SD) has three dimensions: economic, social, and environmental. It is economic growth with social inclusion and environmental protection. This is a normative concept of economic growth or, in other words, how growth should be. (WCED, 1987).

In this dissertation, the concern is with the environmental dimension of the SD concept, namely with the control of climate change caused by human economic activities. The reader can see Appendix A for a history of the SD concept.

2.2. Climate Change

One of the outcomes of the Rio 92 Conference was the creation of the UNFCCC. This convention was directed towards cooperation between countries for urgent action towards climate change and the fight against global warming. Industrial developments, the massive use of fossil fuels and deforestation among other human actions, and the corresponding exacerbated Greenhouse Gases (GHGs) emissions have been causing the acceleration of climate change. Therefore, the main driver of climate change is the greenhouse effect, which traps heat close to the Earth's surface, keeping the planet warmer than it would otherwise be. This means that the way countries are dealing with these emissions must change. This will automatically also help UN Member States to achieve the goals that were at the center of discussions on SD .The UNFCCC main goal was to stabilize GHG concentrations in the atmosphere at a level that would prevent dangerous human-induced interference with the climate system. (Leggett, 2020).

The climate change topic and exacerbate GHG emissions has been investigated and studied by the scientific community for quite some time. It was in the center of the discussion from 1985 to 1987 and materialized in the Intergovernmental Panel on Climate Change (IPCC) in 1988 under the UN Environment Program (UNEP)[2] and the World Meteorological Organization (WMO). Researchers from IPCC identified a series of matters that have been addressed since the Rio 92 (also known as ECO 92 Conference) onwards, which were present in the MDG's goals and further included in SDG 13 of the 2030 Agenda (Leggett, 2020).

The IPCC produces a series of reports called Assessment Reports (AR) which are the results of scientific assessments regarding the climate change phenomena and its impacts in the world. With the results of the latest AR5 (completed in 2014) and AR6 (which will be completed in 2022) reports, it is known that the world's climate conditions are still following the global warming path, but the 2015 UN Summit on Sustainable

[2] Find more about UNEP in Appendix B.

Development had better plans for 2030. 150 countries compromised with the *Transforming Our World: The 2030 Agenda for Sustainable Development by 2030* aiming to achieve the so-called sustainable development by the year 2030 (UN, n.d.c). The 17 outcome goals, also called SDGs, involved all the dimensions previously mentioned in the MDGs, however this, time each goal has a different number of targets and indicators.

SDG 13 Climate Action is the focus of this research. Its goal is to take actions to face climate change and its negative impacts on the planet (UN, n.d.d). In particular this work is focused on SDG 13 performance in the 27-EU member states.(UN, 2021).

SDG 13 brought all the legacy of previous years of discussions raised in Stockholm in 1972 until the year it was set in 2015. (UN, 2015) The objective brings much of the Paris Agreement ratified by 187 parties two months later in 2015.(UN, 1972) Authors such as Campbell et al. (2018) point that SDG13 is to some extent wide and to achieve all its targets it would also be needed to reach the other associated Development Goals(UN, n.d.c). The goal accounts with 5 Targets, these Targets proposed by the UN (UN, n.d.e) comprise 13.1, 13.2, 13.3, 13.A and 13.B, and in the case of the last two they will be called in this work 13.4 and 13.5 respectively (find the targets in Appendix G) (UN, 2021).

But the principles that build the SDG13 are still strongly related to each other, the principle that guarantees acting with equality and the principle that developed countries should lead and help with financial support and knowledge transfer. On this regard, the UNFCC served well as a multilateral vehicle for international cooperation, from which resulted two landmark subsidiary agreements: the Kyoto Protocol 1997 (KP) and the Paris Agreement 2015 (PA) that is what SDG13 relies on (Leggett, 2020).

Within the scope of the UNFCC annual meetings, countries were committed to mitigate GHG emissions, to give reports on GHG emissions on a regular basis, regularly assess and review the new measures adopted by the UNFCCC. Although all countries should contribute to the reduction of emissions of polluting gases in the atmosphere, some countries had different perceptions about the costs and benefits of controlling and implementing it. When the Kyoto Protocol (KP) was adopted in 1997 the United States (US)

signed it but decided not to ratify it. Thus, the US, the larger emitter of greenhouse gases by then, did not commit to the protocol that entered into force in 2005 (Leggett, 2020). However, for those who ratified the agreement the following was established: “legally binding targets for 37 high-income countries and the European Union (EU) to reduce their GHG emissions on average by 5% below 1990 levels during 2008-2012. It precluded GHG mitigation obligations for developing countries” (Leggett, 2020, p. 4). Subsequently, before completing one year those countries compromised with their obligations.

Canada also withdrew the protocol and the impact of the withdrawal of such countries made the targets and principles of the protocol questionable. It also made countries question whether the efforts made by some nations really corresponded to the same efforts made by others, because indeed the reduction of emissions of polluting gases would not only benefit the countries that contributed, but also those that did not. From that, other countries also started questioning disparities on the agreement. While highest income countries were classified as “Annex 1” and had to make a larger abatement, higher investments and frequent reports , the lower-income countries classified as “non-Annex 1” were not under these obligations, but subject to mitigation actions that could be considered more nationally appropriated and had no deadlines as stated at the Copenhagen Accord of 2009 (Leggett, 2020).

The specific commitments and recurrent reports added together with strict deadlines led countries to search for another solution for keeping efforts towards climate change, but with some flexibility involved. Thus, another agreement arose - the Paris Agreement (PA) - to give flexibility aligned with the Parties capacity to accomplish the UNFCCC proposed targets. The flexible character of the agreement is due to the fact that some obligations, also called Nationally Determined Contributions (NDCs), are mandatory while others have recommendation aspects classified as collective commitments. The PA comprises five main attributes available in Appendix H (Leggett, 2020).

The PA can be considered therefore one of the greatest achievements for the UN that quickly entered into force if compared with the several debates that surrounded the KP.

Recognizing the three main treaties, the UNFCCC, the KP and the PA, we can thus say that there has been a considerable development in International Law regarding to Climate Change Policy. On the other hand, this contrasts with the practical developments of the last 30 years of negotiations. From 1990 to 2020, the world's temperature increased and has overpassed the limits set in the treaties. The 1988 IPCC scientific body invested time and effort to collect evidence and propose advice to combat Climate Change, but most of the goals set on the treaties are still to be accomplished. (Leggett, 2020).

The most recent IPCC reports are to be mentioned due to their relevance for recent Climate Change Policies: the 5th Assessment Report (AR5) and the 6th Assessment Report (AR6) (Kinley et al., 2020). In 2013, the AR5 was launched to give an overall review of Climate Change. In it, scientists observed its "Causes; Future climate change, risks and impacts; Future pathways for adaptation, mitigation and sustainable development" (Intergovernmental Panel on Climate Change [IPCC], 2014, p. 2). The document emphasizes that the temperature has increased over the years, being noticeable in all ecosystems, in the atmosphere and in the ocean. Moreover, GHG emissions have increased leading to concentrations of carbon dioxide in the atmosphere and all these problems have dramatically increased from 1950 to 2011. Despite all those problems, the report also indicates that "adaptation exists in all sectors" (IPCC, 2014, p. 95) and it involves trade-offs and requires investments. This is one of the reasons why the UNFCCC insists on pointing out that the policies should be led by high-income countries (IPCC, 2014).

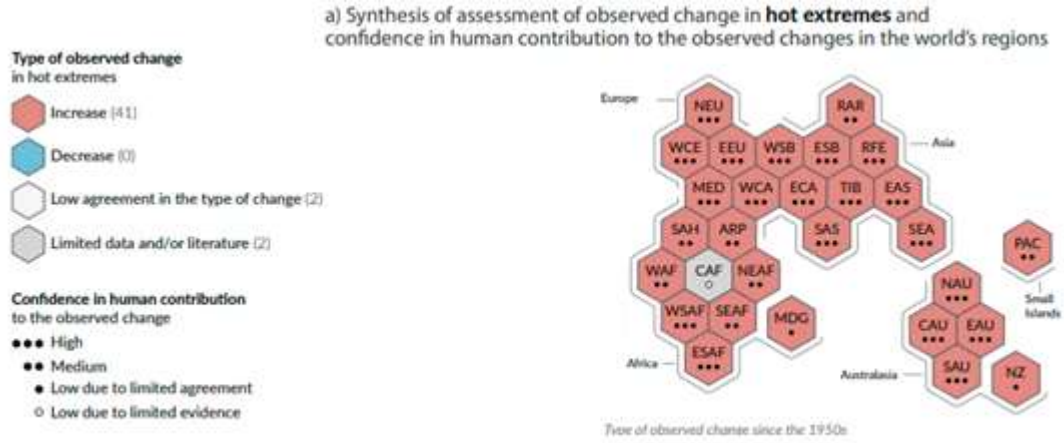
The IPCC is now producing its AR6, which will be completed in 2022. However, some results have already been published in 2021: The Working Group I report was the first installment of the AR6. It exposes that since AR5 the levels of GHGs in the atmosphere have only increased and no improvement has been noticed scientifically. The global surface temperature continues to increase, no noticeable restrain was identified and Earth gets warmer each decade, affecting oceans and all ecosystems. The report reaffirms recommendations of AR5 emphasizing the urge and importance to mitigate and adapt where "reaching net zero anthropogenic CO2 emissions is a requirement to stabilize human-

induced global temperature increase at any level" (IPCC, 2021, p.41). Scientists added that if emission reduction policies are reached, they should be incorporated with antiCOVID-19 spread measures. Also, despite the drastic changes in lifestyle due to the pandemic, it was not possible to notice expressive differences in the GHG emissions in 2020 (IPCC,2021).

Furthermore, the report has shown us that every continent is being increasingly affected by Climate Change. Different phenomena have been shown, such as, temperature increase (Figure 1), heavy precipitation (Figure 2), agricultural and ecological damage (Figure 3), besides other incidents (IPCC,2021). The published report has assessed these effects in macro regions from 1950 to 2021 and the findings revealed that not only low-income countries are being affected, but also high-income countries. For instance, macro regions such as the European Union and its Member States (MS) are suffering with the changes. In the Figures below it is possible to notice that: (i) the European Union has been having "hot extremes" and there is high confidence they have been human-induced; (ii) this macro region was also much affected by "heavy precipitation", although there is low confidence in human contribution due to limited agreement between scientists; (iii) Western and Central European countries and the Mediterranean are strongly suffering from "agricultural and ecological drought", but Eastern Europe has not been so much affected by that (IPCC, 2021).

Figure 1

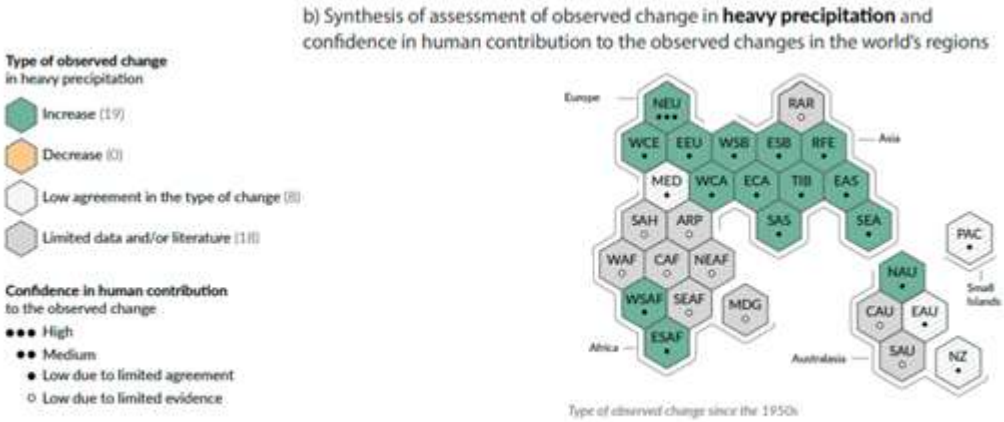
Synthesis of assessment of observed change in hot extremes and confidence in human contribution to the observed changes in the world's regions



Source: Adapted from Intergovernmental Panel on Climate Change, 2021.

Figure 2

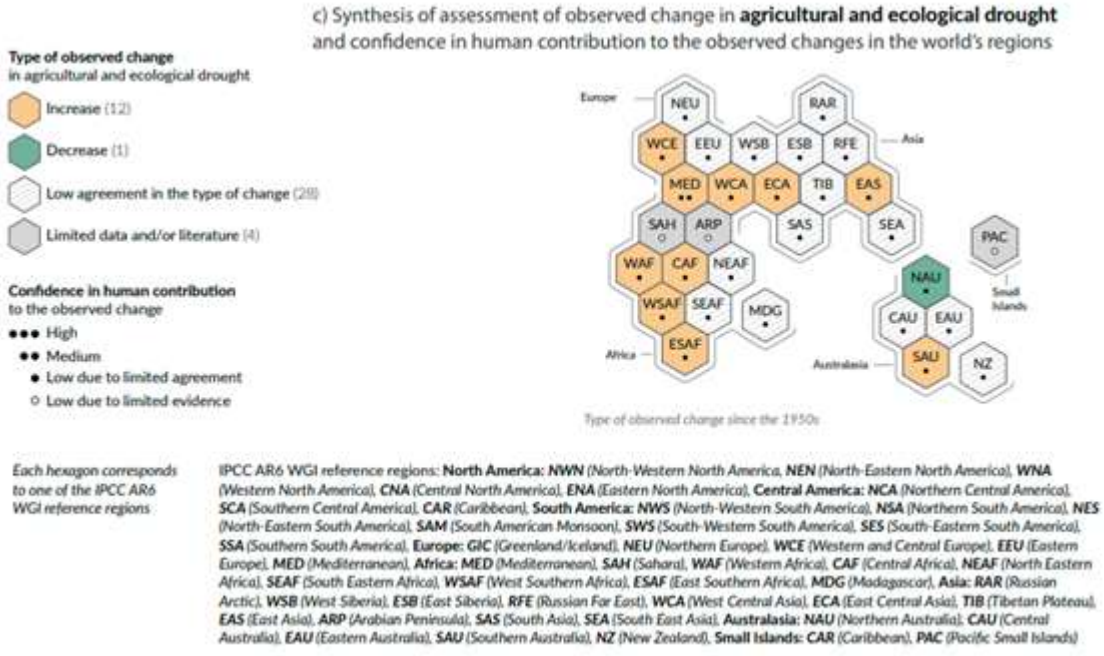
Synthesis of assessment of observed change in heavy precipitation and confidence in human contribution to the observed changes in the world's regions



Source: Adapted from Intergovernmental Panel on Climate Change, 2021.

Figure 3

Synthesis of assessment of observed change in agricultural and ecological drought and confidence in human contribution to the observed changes in the world's regions



Source: Adapted from Intergovernmental Panel on Climate Change, 2021.

Authors such as Kinley et al. (2020) point out that many times the problem itself cannot be solved if we focus only on civil society lifestyle changes, neither only in businesses adaptations. The biggest part of the initiative must come from governments. They recognize that private businesses have made considerable efforts in order to mitigate and adapt but policymakers still prioritize politics and election results over their responsibility with the environment in the international treaties. Thus, the results of the last IPCC reports show much of the impact coming from the lack of political action. The main failure of governments in relation with the Climate Change duties is not to do any integrated work with local and national governments, civil society, and business. Furthermore, high-income and developed nations are not giving enough support to low-income and developing nations (Kinley et al., 2020).

In October 2021, the UNFCCC produced a report regarding the 26th Conference of the Parties (COP26) held from October to November of 2021.They observed that although the emissions of GHGs have increased throughout the years, with Russia and Japan at the forefront of pollution, 2021 has been especially positive for EU countries. The MS are ahead

with their contributions, mainly related to their 2020 agenda about the climate and energy package. Also, EU countries have developed well their mechanisms to reach the goal of a 20% reduction in emissions, they committed to limit GHG emissions in International Aviation, in International Maritime transport, besides being one of the only members of G20 to increase their mitigation ambitions after submitting their NDCs at the end of September of 2021[3]. Furthermore the European Commission committed that EU will add up 4 billion euros to their annual contributions to achieve the 100 billion dollars of annual collective contributions proposed on the 13.A target of SDG 13. (Moosmann et al., 2021)

From the legal character of international treaties and from everything that has been mentioned before, it follows that it is of every country's concern and interest that the Paris Agreement and the SDG 13 need to be accomplished. To make sure that efforts are being made to reach these goals, measuring, and comparing countries' performances towards sustainable development is useful and important. This can be used as a tool for governments to better allocate their resources, seek partners for improving techniques and to make pressure for better changes. (UN, n.g.f).

[3] Besides the EU, other G20 countries also increased their mitigation ambitions such as: Argentina, Canada, South Africa, United Kingdom and United States particularly if compared to their 2016 contributions (Moosmann et al., 2021).

2.3. Indicators and the SDG 13

Given the five targets that compose the SDG 13, on this research in order to measure and monitor the performance of the EU countries towards each target, the indicators seek to show the effectiveness of the SDG13 goal to identify the level of performance of countries regarding the targets from 13.1 to 13.5[4]. Determining baselines they will show how countries have performed over time and if the agenda has or has not been undertaken satisfactorily. (McCarthy et al., 2012).

There are indicators that show adaptation and mitigation, (an adaptation indicator in this context shows how a country is dealing with the climate change effects on its territory). Target 13.1 contains adaptation indicators for example, and it counts with loss indicators that show how vulnerable countries are more or less adapted to the climate change effects, while in the case of 13.3, 13.4 and 13.5 also composed by adaptation indicators, they show how countries are adapting to the new demands of climate change positively, with financial contributions, innovations or political actions. In the case of target 13.2 mitigation indicators are allocated showing how countries are being able to reduce the risks where the target it to minimize the externalities and consequently reduce climate change environmental losses.

The research counts with composite indicators, and for their elaboration it was necessary to make a survey of the information contained in the Eurostat, EEA, UNFCCC, The Lancet and The World Bank websites. The indicators therefore will be static which reflects average levels over a period of time. Target 13.1 represents the time range from 1980 to 2020 showing the losses countries had in this time range, for target 13.2 the indicators work with the time range from 2005 to 2020 when data is available and from 2005 to 2019 when 2020 data is not available, target 13.3 refers only to 2020 as reference only, 13.4 refers to 2018 and 2019 (since 2020 data was not available for most countries) and 13.5 counts with the year of 2017 and the year of 2020. In the following chapter it is possible to see in detail the structure of each target and its indicators.

[4] Available in Appendix G.

Chapter 3

The AF Method and the MCAI framework

To assess the performance EU27 and EU regions and MS in relation to their commitment to the UN Climate Change Agenda (UN SDG13), we use the Alkire-Foster (AF) method (Alkire & Santos, 2010a; Alkire & Foster, 2011; Alkire et al., 2018). The AF method is a double-cut counting method developed to measure multidimensional poverty. However, the method can be used for other purposes (Pereira et al., 2018). In this work, we will use it to assess and compare EU Member States (MS) regarding the UN SDG 13 – Climate Action.

The method has been developed by researchers of the Oxford Poverty and Human Development Initiative (OPHI) at the University of Oxford, to measure poverty based on what households are more deprived and analyzing their deprivations in three dimensions: education, health, and standard of living. In each dimension, a set of partial indicators is used. For example, in the Health dimension, nutrition is one of the two partial indicators used. Partial indicators assume the value of 1 or 0. The value is 1 if the household shows to be deprived (when compared with the cutoff level considered) and 0 otherwise. An individual composite poverty score is generated for each household, giving the same weight to each of the three dimensions (1/3), and the same weight to each partial indicator within each dimension. The so called Multidimensional Poverty Index (MPI) is a group measure corresponding to the product of the share of the households that is considered multidimensional poor (when compared to a cutoff level) and the average composite poverty score of these households (Alkire & Santos, 2010b).

What in the case of the MPI is called ‘dimension’ in this work will be called ‘target’. The UN SDG13 goal is analyzed in four dimensions or targets. As with the MPI dimensions, each SDG13 ‘target’ will have more than one partial indicator (Alkire & Santos, 2010b) Each partial indicator will be 1, if the country's performance is satisfactory (when compared with

the cutoff level considered), and 0, otherwise. Missing values will be set equal to 0,5, which is the cutoff level considered and the best guess, when no information is available. UN SDG 13.4 and SDG 13.5 targets are merged into a single target, to have more than a partial indicator associated with the target. Like in the MPI framework, each partial indicator has the same weight within each target. Therefore, when measuring the composite score produced for a country or MS, partial indicators may enter with different weights in this score. That happens because the number of partial indicators considered per target varies.

The adopted framework makes it possible to construct a group composite measure alike the MPI for the EU 27 as a whole and for each European Region, corresponding to the product of the proportion of MS that have a satisfactory performance (when compared with the cutoff level considered) by the average composite score of those MS . We call this group measure Multidimensional Climate Action Index – MCAI:

$$MCAI = H \times A \qquad (1)$$

H- Proportion of MS with individual composite score higher than 0,5,
A- Average intensity of MS with individual composite scores greater than 0,5

Alkire and Foster (2011) show that this measure is possible to understand in a more democratic manner due to its intuitive calculation.

The adopted MCAI framework considers four targets and 14 partial indicators, as illustrated in Appendix I.

We describe next the MCAI targets and partial indicators considered:

a. Target SDG13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries (2 partial indicators weighted equally at 1/2):

• Economic losses from climate-related extremes in Europe (Euros Per Capita): shows the vulnerability of a country with climate-related extremes in terms of economic losses per capita (European Environment Agency [EEA], 2022). It will be more vulnerable if the economic loss surpasses the economic loss average in all EU 27 countries which is equal to 847,78 Euros per capita.

• Losses from climate-related extremes in Europe (Losses in Fatalities per thousand inhabitants): shows the vulnerability of a country with climate-related extremes in terms of life losses per thousand inhabitants, over the total population measured in 2020 by the World Bank (EEA, 2022). It will be more vulnerable if the number of fatalities surpasses the fatalities average in all EU 27 countries which is equal to 0,18 fatalities per thousand inhabitants.

b. Target SDG13.2 Integrate climate change measures into national policies, strategies, and planning (7 partial indicators weighted equally at 1/7):

• Average CO2 emissions per km from new passenger cars (Eurostat, 2022a): all countries provided sufficient information for measuring the average of this indicator, with the exception of Romania, Croatia, Bulgaria and Latvia. A country will have satisfactory performance when reaching or overpassing the average percentage reduction of Average CO2 emissions which is – 33%.

• Greenhouse gas emissions under the Emission Trading System (ETS) Mt CO2 eq. (EEA, 2021a): according to the 2020 Climate & Energy package in 2020 the target was for the emissions from ETS sectors to be 21% lower than 2005, based on the data range that was available this target was recalculated proportionally for the year of 2019, resulting in 19,6% and rounding to 20% (European Commission, n.d.a). A country has satisfactory performance when achieving a reduction equal or superior to 20%.

• Greenhouse gas emissions under the Effort Sharing Decision (ESD) Mt CO2 eq. (EEA, 2021b): according to the 2020 Climate & Energy package in 2020 countries had to follow individual targets (Available in Appendix J) for sectors under the ESD. The national emission reduction targets were set as annual targets until 2020 compared to 2005, their targets were planned according to the country's national wealth (*Decision 406/2009/EC*, 2009). Based on the data that was available this target was recalculated proportionally for the year of 2019 individually for each country, a country will have satisfactory performance when achieving a reduction equal or superior to its national emission reduction.

• Greenhouse gas emissions intensity of energy consumption. Index, 2000=100 (Eurostat, 2022b): all countries provided sufficient information for measuring the average of this indicator, the country will have satisfactory performance when reaching or overpassing the average percentage of intensity of energy consumption reduction which is – 16%.

• Final Energy Consumption Mt Oil eq. (Eurostat, 2022c): according to the 2008 Climate Action and Renewable Energy' Package in order to achieve the EU's 20% energy efficiency target by 2020, the countries had their indicative national energy efficiency targets (Available in Appendix K), these are individual targets in terms of absolute level of energy consumption that countries should have achieved by 2020. When achieving the final energy consumption target or having consumed less energy than targeted countries will have satisfactory performance (*Directive (EU) 2018/2002,* 2018).

• Number of NDCs submitted by year (United Nations Framework Convention on Climate Change [UNFCCC], n.d.): according to the Paris Agreement, each signatory country has to successively submit their Nationally Determined Contributions (NDC´s) which aims to inform their mitigation, adaptation and support measures (UN, 2022). Countries which have anticipated themselves more to submit their NDC's apparently show to be more concerned and prepared for the measures and adaptations needed. For this reason and as the earlier submission, in the case of the European Countries happened in 2016, those which submitted on this year will have a satisfactory performance.

• Share of renewable energy in gross final energy consumption by sector (Percentage %) (Eurostat, 2022d): following the 2020 Climate & Energy package for 2020 countries have to follow individual targets (available in Appendix L) for share of energy from renewable sources in gross final consumption of energy. (*Directive 2009/28/EC*, 2009). When a country achieves the targeted percentage or overpasses its target having a bigger share of renewable energy than what was demanded, it will have satisfactory performance.

c. 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning (2 partial indicators weighted equally at 1/2):

• New registrations of electric vehicles in Europe (Battery and Plug-in Hybrid electric cars) (EEA, 2021c): one of the biggest emitters of greenhouse gases is the transport sector, this indicator shows the response of vehicle users in Europe to new electric or hybrid. The fact that there are new electric and hybrid vehicles registered demonstrates the degree of acceptance of the people who use them causing positive impact on the environment (EEA, 2021c). Considering that leading the population to consume these cars or incorporating electric mobility in the society is an important indicator for this target, a country will have a satisfactory score when achieving or surpassing the average percentage share of new electric cars registered between the EU 27 MS equal to 8% in 2020, the MS country may have 0 when its score goes below 8%.

• Population covered by the Covenant of Mayors for Climate & Energy signatories (Population covered by the Covenant of Mayors for Climate & Energy signatories) (Eurostat, 2022e): this indicator provided by the Eurostat is part of the SDG and the European Green Deal, the indicator shows how the Climate Change topic can be integrated to domestic policy and for this to happened it requires education awareness of the societies (EU, 2011). The Covenant Mayors for Climate & Energy is a platform that promotes engagement and networking between the signatory cities (World Health Organization [WHO], 2021). It is also responsible for disseminating information about this topic and to promote awareness (Climate-ADAPT, n.d.). A country will have satisfactory performance when achieving the EU 27 MS average of the percentage proportion of the total population of the country in 2020 that is covered by the Covenant of Mayors for Climate & Energy. The EU average resulted in the 7%, when scoring below this number the country may have unsatisfactory performance.

d. Target SDG13.4 Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 . All sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible & Target SDG13.5 Promote mechanisms for raising capacity for effective

climate change-related planning and management in least developed countries and Small Island developing States, including focusing on women, youth and local and marginalized communities (3 partial indicators weighted equally at 1/3):

• Contribution to the international 100bn USD commitment on climate related expending 2018 (Eurostat, 2022f): this indicator shows which countries contributed or not following the 2018 overall average contributions from 25 European countries to this international fund in terms of the percentage of their own GDP of 2020. All countries provided sufficient information for measuring the average contribution with the exception of Cyprus and Bulgaria. Countries that achieve or overpass the average which corresponds to 0,035% of their 2020 GDP, have satisfactory performance.

• Contribution to the international 100bn USD commitment on climate related expending 2019(Eurostat, 2022f): as the previous one, this indicator shows which countries contributed or not following the 2019 overall average contributions from 25 European countries to this international fund in terms of the percentage of their own GDP of 2020, all countries provided sufficient information for measuring the average contribution with the exception of Cyprus and Bulgaria. Countries that achieved or overpass the average which corresponds to 0,040% of their 2020 GDP, have satisfactory performance.

• Government engagement in health and Climate Change (The Lancet Countdown, 2021) : Mentions of climate and climate & health made by national governments in the UN General Debate in 2020: this indicator developed on the *The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future* (Romanello et al., 2021) measures how engaged in the Climate change debate the country is. It also shows that countries can bring subjective topics to the discussion table. Since health and Climate Change can affect all developed and least developed countries, small islands and developing states, it is from every countries concern that this topic should be interest of discussion in the UN General debate, so meeting the commitment of the Paris Agreement to promote the human sustainable development, the indicator shows how many times countries addressed health and climate change in the year of 2020 in the United Nations

General Debate (UNGD) (Romanello et al., 2021). An average between the EU 27 MS was calculated based on how many times each country has mentioned the subject in the UNGD 2020 and the average mentions equals 4. A country will perform satisfactorily on this indicator when achieving 4 more than 4 mentions.

The MCAI framework partial indicators are based on the analysis of documents and international treaties such as the Paris agreement and the Kyoto Protocol. The search for the availability of suitable data was explored on the European Commissions' website. Most of the targets are linked to 2020 climate & energy package created in 2007 and incorporated into the legislation in 2009, which is part of the European Commission's action towards the goal of being a climate-neutral economy by 2050 (EU, 2022b). The MCAI framework mainly uses data from the website of international agencies, organizations or scientific magazines namely: European Environment Agency (EEA), Eurostat, United Nations Framework Convention on Climate Change (UNFCCC) and The Lancet.

More available and accurate data are needed to make a more precise estimation on these countries' performances. The lack of data regarding few indicators brings limitations to a more precise and wide research. The lack of information regarding countries engagement excludes the possibility to include important dimensions of the countries' efforts, such as developed countries social and political efforts on promoting climate change awareness and adaptations in less developed countries and their societies.

Chapter 4

Results and Analysis

All EU 27 Member States (MS) were analyzed using the MCAI developed framework presented above. The MCAI framework applies the AF method, the same method applied by the MPI framework. The latter was developed to analyze poverty in countries around the world (Alkire & Santos, 2010b). The former was developed to analyze climate action in EU 27 MS. Tables in Appendix M show the average scores of the MCAI individual partial indicators[5] for the EU27 MS, and in Appendix N for the four European regions as classified by the EU: Southern Europe, Western Europe, Northern Europe, and Central and Eastern Europe respectively. (EU, 2022a)

From the 27 MS analyzed only 14 have a general satisfactory individual composite score, which is given by the weighted average of the target composite scores for each country, which are a weighted average of the partial indicators considered within each target. A MS individual composite score exposes how good the country performs in general in all four targets considered of the SDG13 goal. We got 15 out of 27 MS (56%) achieving satisfactory results in terms of climate change action (SDG13 goal).

The average EU27 MS achieves 0,51 on its composite score, confirming the fact that there are more satisfactory contributions than non-satisfactory contributions in the four dimensions. This result is reinforced with the H score: the proportion of MS with a satisfactory composite score (higher than the benchmark 0,5) which is 0,52. From all MS that performed well regarding their composite score, the A score yields the average intensity of how well they have performed: it is equal to 0,62. Finally the MCAI score for the EU 27 MS is given by the product of H by A - MCAI = H x A - and is equal to 0,32, which is below 0.5. This mainly reflects the fact of H being low, as the product of two numbers between 0

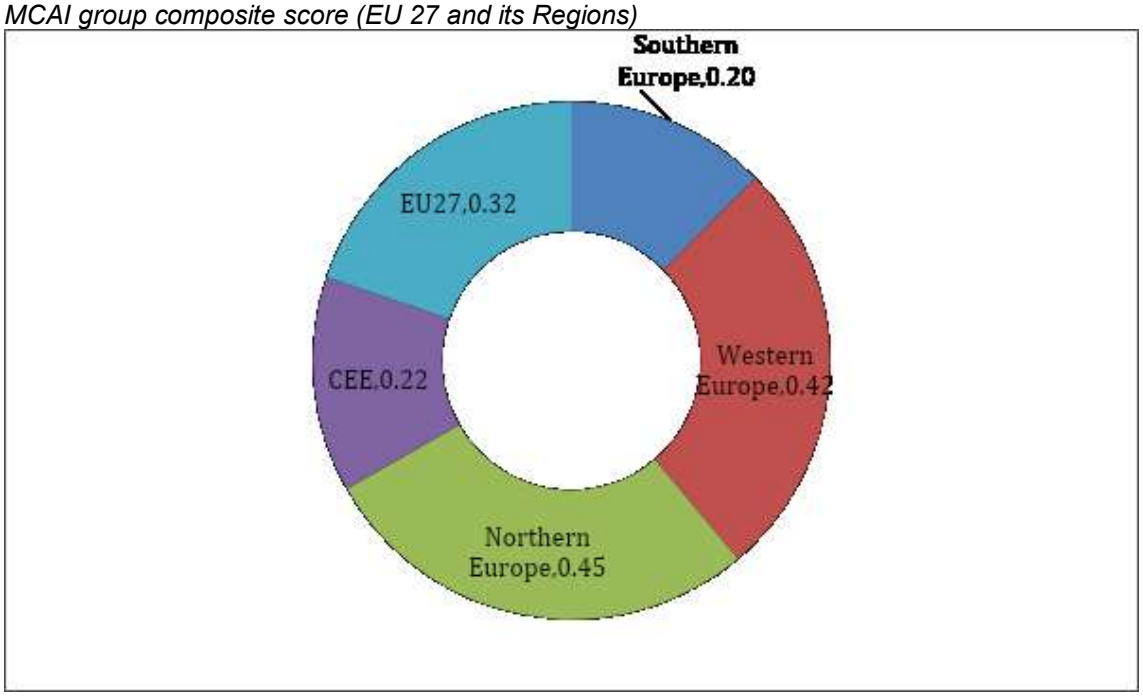
[5] Indicators in Appendix I.

and 1 is always lower than the smallest number of the product, which in this case is H. A good MCAI score implies both a high H and a high A.

To get a better territorial view on where most of the contributions are coming from, the EU27 MS were divided in four groups based on the European regions division by the EuroVic, namely: Southern Europe, Western Europe, Northern Europe, and Central and Eastern Europe (EU, n.d.f). The MCAI performance of these regions is compared between themselves and with the performance of the EU 27.

Figure 4

MCAI group composite score (EU 27 and its Regions)



Note. MCAI results by European Regions an EU as a whole.

Table 1

MCAI group composite score (EU 27 and its Regions).

Region	MCAI
EU27	0,32
Western Europe	0,42
Northern Europe	0,45
Central Eastern Europe	0,22
Southern Europe	0,20

Note. MCAI = H x A

Source: Author

The UE 27 poorest performance on the MCAI score comes from Southern Europe MS, but the MCAI score of Central and Eastern Europe MS is considerably close to that. Southern Europe shows a lower performance when compared to the other three regions and

the EU27. This happens because the MS of this region perform badly on the indicators of vulnerability of the SDG13.1 target. Southern Europe MS seem to be more vulnerable to climate-related hazards and natural disasters. A bad performance on this indicator also shows that these MS need more support to get over these obstacles. Central and Eastern Europe MS have their worse results when it comes to education awareness on climate change mitigation (SDG13.3 target). This shows that these MS are failing so far on promoting this target in their institutions and societies. As the numbers show, both regions have similar results in terms of the MCAI, but they struggle in different dimensions as the MCAI framework allows us to see (Table 1 and Figure 4).

Table 2

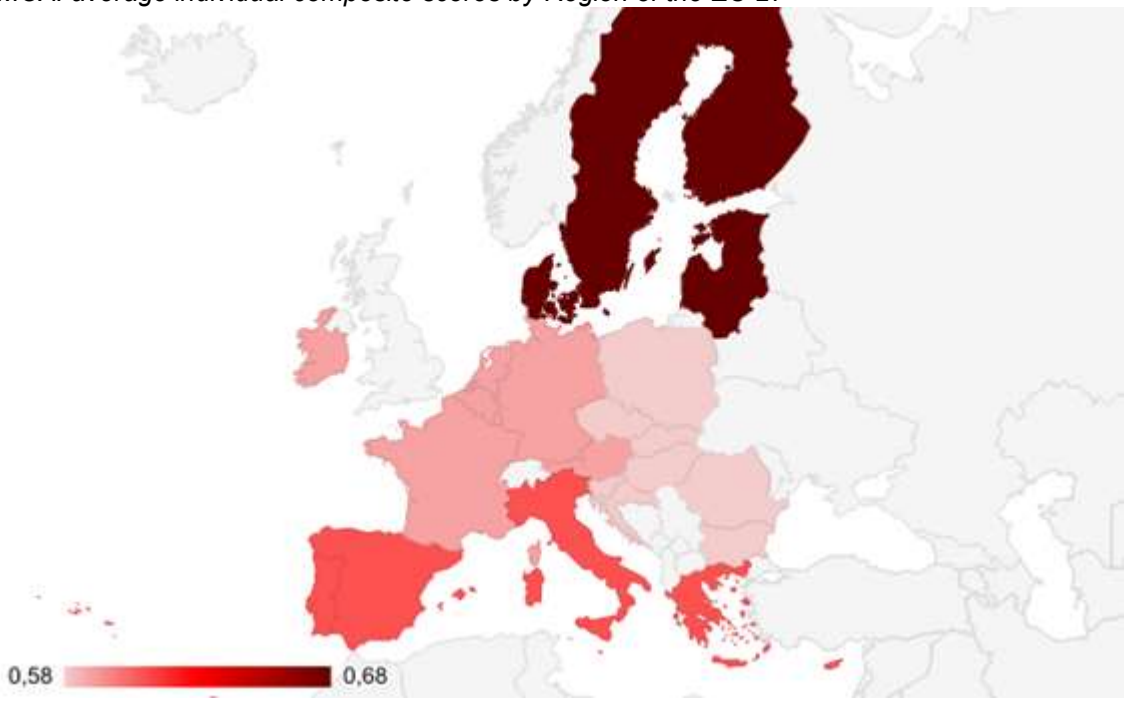
MCAI average individual composite scores by Target and Territory (EU 27 and its Regions)

SDG 13 Targets	Southern Europe	Northern Europe	Western Europe	Central and Eastern Europe	EU27
13.1	0,33	0,92	0,36	0,92	0,61
13.2	0,79	0,73	0,59	0,62	0,67
13.3	0,50	0,25	0,64	0,08	0,35
13.4+ 3.5	0,54	0,47	0,68	0,32	0,40

Source: Author.

The EU27 best MCAI regional score performance comes from Northern Europe followed by Western Europe. Northern Europe is comparatively performing better if compared to the three other regions and the EU27. The highlight of Northern Europe performance concentrates on the SDG13.1 target, where Northern Europe average score is 0,92, which shows a considerably low vulnerability and therefore to be a region with less losses related to climate-related hazards and natural disasters. The opposite happens to Western Europe, where the worst performance is concentrated on the 13.1 target (0,36) and the best performance is centered on the SDG13.4 + SDG13.5 target (0,68). These numbers show that the two regions which lead the performance perform differently regarding their best and worst target average scores. These means that these regions may require different support to improve in terms of the SDG13 (Table 2 and Figure 4).

Figure 5
MCAI average individual composite scores by Region of the EU 27

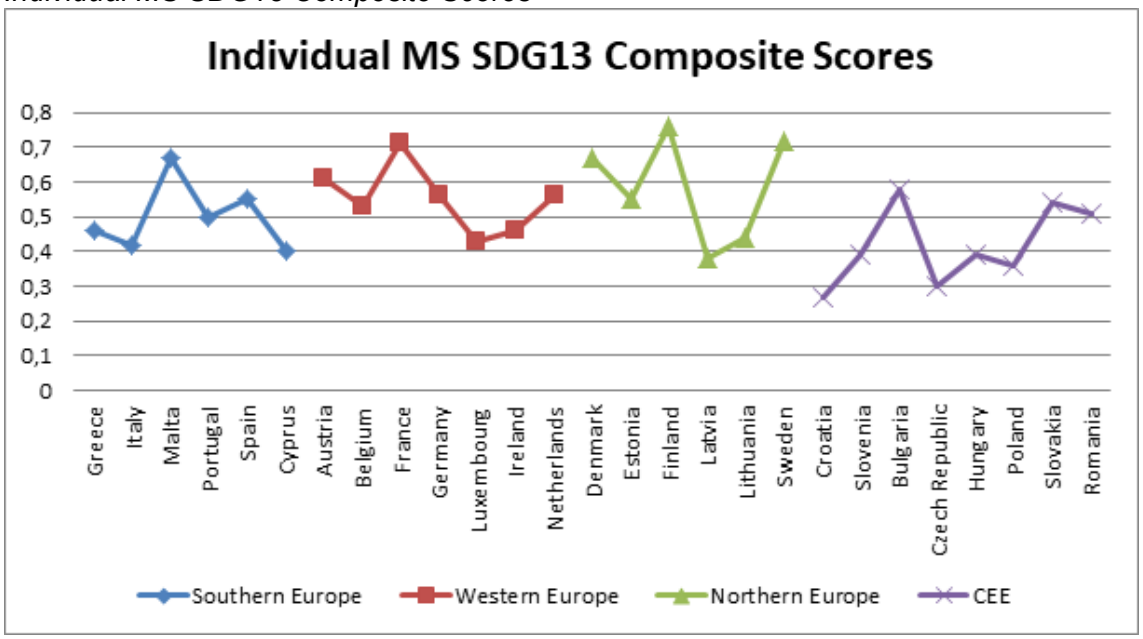


Source: Author.

The SDG13 average performance intensity scored by each region is also greatest in Northern Europe (0,45). The best region in terms of performance as measured by the MCAI, Northern Europe, also has the greatest average performance intensity. If compared to the EU27 that has about 0,62 of average intensity, Northern Europe shows to be superior with 0,68. In the case of Central and Eastern Europe it has the lowest average performance intensity, which does not match to its position on the board with respect to the MCAI scores, as the worst position belongs to Southern Europe.

In other words, the MS of Central and Eastern Europe that performed over or equal to 0,5 on the SDG13 composite score have worse performances than the ones which performed over or equal to 0,5 on the SDG13 composite score in Southern Europe. Figure 5 above shows these results and it is possible to find how the intensity of regions performances spread around Europe geographically, where the darker color represents where satisfactory performances are more intense and as lighter the color gets less intense the satisfactory results are.

Figure 6
Individual MS SDG13 Composite Scores



Source: Author.

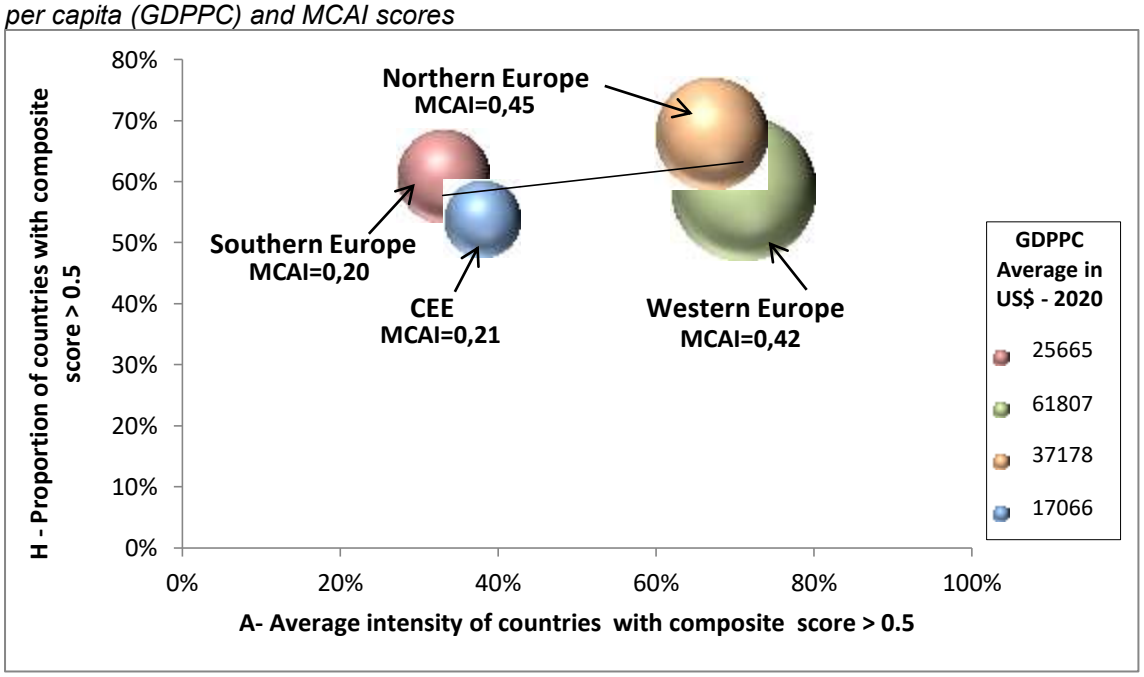
The MCAI framework reveals a great variation in SDG13 composite scores by MS within the same European region (Figure 6 above). The leader of the board, Northern Europe, has Finland with 0,76 as its SDG13 composite score and Latvia with about 0,39 (a 0,37 score difference). This shows how unequal the efforts can be distributed within the same region, to improve the region performance. The lowest individual MS SDG13 composite score in Northern Europe (0,39 in Latvia) has a 0,09 score difference with the corresponding score in Croatia or Czech Republic both (0,30). The latter are the MS with the lowest SDG13 composite scores from the region that had the least satisfactory average MS composite score performance - Central and Eastern Europe. The difference between the best and the worst performances from Northern Europe MS is higher than the difference between the worst performance from Northern Europe and the worst performance from Central and Eastern Europe (Figure 6).

The region with the best performance on the MCAI is also one of the most unequal or with 0,33 variance in terms of MS contributions. The difference between the best and the worst individual MS composite score performance is the highest in Northern Europe (about 0,33), whereas in the case of Western Europe (second best performance on the MCAI) this difference is considerable low (0,28) reaching almost the same number as Southern Europe

(0,25) the lowest, while Central and Eastern Europe has the highest variance between the best and the worst member state performance (0,38). Figure 6 also allows us to see that Western Europe and Southern Europe have more homogeneous contributions among MS than the two other regions analyzed.

Figure 7

Bubble Chart Showing Relationship between the Components of MCAI by region, H and A, and GDP per capita (GDPPC) and MCAI scores

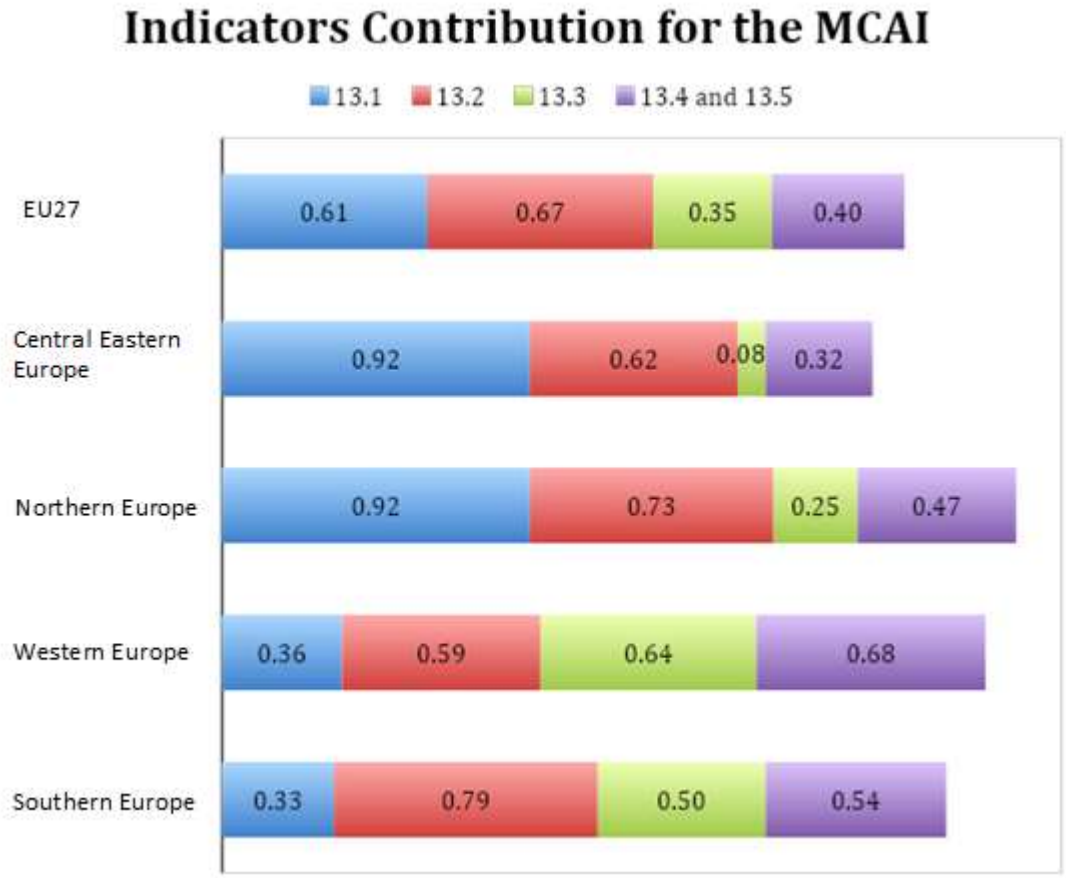


Source: Adapted from the World Bank Group, 2022.

The performance of the European regions varies together with their average GDP per capita. Figure 7 shows that the regions were divided in two extremities, one with the higher GDPPC and the other with the lowest. The sizes of the bubbles represent the magnitude of average GDP per capita. The regions with the highest average GDPPC (or bigger bubbles), Western Europe and Northern Europe, are also the ones performing better regarding the MCAI score and vice versa for regions with the lowest GDPPC (or smaller bubbles), Southern Europe and Central and Eastern Europe. The proportion of individual MS with composite score higher than 0,5 in low, GDPPC ranges from 33% to 38%, and average intensity of these MS ranges from 51% to 54%. In the case of the proportion of MS with composite score higher than 0,5 in higher GDPPC regions, it ranges from 67% to 71% presenting an intensity that ranges from 59% to 78%. This explains the fact of the tendency line being slightly positively sloped (Figure 7).

Figure 8

Targets Contributions for the SDG13 Average MS Individual Composite Score (EU27 and its Regions)



Source: Author

The composition of the SDG 13 composite score differs among regions. Low performance on “13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries” (a vulnerability indicator) contributes the most to a low performance of Southern Europe and Western Europe, whereas low performance on “13.3 improve education, awareness-raising, human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning," contributes the most to a low performance of Central and Eastern Europe and Northern Europe. This regional heterogeneous structure illustrates how targets of the SDG13 may play different roles in each European region. They can largely contribute to the regional MS average performance, such as target SDG13.2 does to Southern Europe, or they can dramatically damage the performance, as it does target SDG13.3 in Central and Eastern Europe (Figure 8).

Comparing the regions average MS composite score performances with the EU27 average MS score performance, we can find that: Central and Eastern Europe and Northern

Europe show a better performance on target SDG13.1 than the EU27. Northern Europe and Southern Europe show a better performance on target SDG13.2 than the EU27; Western Europe and Southern Europe show a more satisfactory performance on target SDG13.3 than the EU27; and finally, for the target SDG13.4+SDG13.5, Northern Europe, Western Europe, and Southern Europe show a better performance than the EU27. This comparison helps us to see that even if the region has not achieved the best performance on the board between all regions it might have performed better than the EU27 in some other aspects and/or on specific targets.

These findings are important to get specific insights of the way that the EU27 is walking towards achieving the UN SDG13 Goal. It is important to highlight the weakest and strongest points of the countries, regions and of the EU as a whole, for policymakers to take into account the targets and indicators that need the most attention. It is clear, however, that there is more to be explored from the data collected and it is possible to go deeper in the analyze of the links between the developed MCAI framework results and variables such as GDP, Education, Political institutions, and other, which certainly should be explored in the future.

Chapter 5.

Conclusion

How is the European Union 27 (EU 27) and its regions and Member States (MS) performing on the UN 2030 Agenda's Sustainable Development Goal 13 – Climate Action? To answer this question, the Alkire-Foster (AF) method was applied, allowing the development of the Multidimensional Climate Action Index (MCAI) framework to assess the performance of the EU 27, its regions and Member States on the UN 2030 Agenda SDG 13 and its 5 targets.

Results show that:

- The EU27 as a whole has a satisfactory performance on its average composite score (0,51) but a relatively low performance on the MCAI (0,32). It means that overall on each target, the EU27 has performed satisfactorily generating a score over 0,5 on its average individual MS composite score. However, when considering the proportion H of MS with individual composite score higher than 0,5 and the average intensity A of the scores of these MS, the product MCAI = H x A shows to be inferior to 0,5. Besides the EU27, all the European regions considered present unsatisfactory performance on the MCAI.
- The European's poorest performances on the MCAI come from Southern Europe and Central and Eastern Europe MS, although the difference is minimal (about 0,01). Southern Europe has the lowest performance when compared to the other EU regions and the EU27. The target that contributed the most for it to underperform was the SDG13.1 target on vulnerability, showing that the MS of this region are most vulnerable to climate-related hazards and natural disasters. On the other hand, Central and Eastern Europe MS are struggling more on the 13.3 target, showing that the MS of this region are underperforming on promoting social political awareness regarding Climate Change.
- The European's best performances on the MCAI come from Northern Europe and Western Europe. Both regions perform better than the EU 27 but Northern Europe

outperformed all other EU 27 regions. Its worst performance was also related to the 13.3 target, showing that the MS of this region still has to improve its education, and awareness on climate change mitigation, adaptation, impact reduction, and early warning. In the case of Western Europe, this region underperforms on the 13.1 target, which shows also some degree of vulnerability related to the Climate Change adversities and its consequences.

- Northern Europe, besides outperforming on the MCAI also has a higher average individual MS composite score intensity than the other regions and the EU27. On the other hand, the lowest average individual MS composite score intensity is found in Central and Eastern Europe.

- Average individual MS composite scores reveal great variation within each European region. It is possible to observe that the best average individual MS composite score comes from a region with high variance region in terms of MS contributions, in Northern Europe, where the highest average individual composite score comes from Finland (0,76) and the lowest from Latvia (0,39). The region with highest variance in terms of MS contributions is Central Eastern Europe.

- Northern Europe also has the highest average individual MS GDPPC, and the tendency line shows that the higher GDPPC average the better the performance on the MCAI. But it is not a rule or a relation of cause and effect, since Southern Europe has a higher GDPPC average when compared to Central and Eastern Europe, but underperforms or performs equally on the MCAI.

With the research findings it is possible to confirm or not its initial hypotheses: H1- the EU 27 will perform satisfactorily as a whole; H2- European regions with higher average GDP per capita will outperform; H3- the latest EU region (Central and Eastern Europe) will be the worst performer; H4- The region most exposed to Climate Change (Southern Europe) will have the worst performance.

H1 is confirmed regarding the average individual MS composite score performance but rejected regarding the MCAI performance. The EU27 has a satisfactory performance on its average individual MS composite score but an unsatisfactory performance in regards to

the MCAI. It is possible to see that more than half of the 27 EU MS (15 countries) scored equal or over 0,5, but considering variable H and A product, the MCAI shows an unsatisfactory performance. That happens mostly because its performance in H (0,52) is lower than the performance in A(0,62). Nonetheless the problem in the EU27 is that individual MS composite score performance spoils the MCAI performance of the territory under analysis.

H2 is confirmed. Northern Europe and Western Europe regions have the highest average GDP per capita and also have the best average MS composite score performances and the best MCAI performance. In sequence, the third highest average GDP per capita and third highest average MS individual composite score are found in Southern Europe and the lowest average GDP per capita and worst performance on average individual MS composite score is found in the Central Eastern Europe. Regarding the MCAI, for these two last regions the difference is small and Central Eastern Europe slightly outperforms when compared to Southern Europe. Therefore, it is not possible to affirm that the MCAI follows the average GDP per capita, because is two regions the MCAI score performances are almost the same. However, it is possible to affirm that the MCAI is greater for the European regions with the highest average GDP per capita because it does not follow the order where Western Europe should have the higher MCAI and Central Europe should have the worst MCAI.

H3 is confirmed regarding the average individual MS composite score performance but rejected regarding the MCAI performance. The latest EU region (Central Eastern Europe) performs worse on its composite score if compared to all the other regions and the EU27. However, its performance on the MCAI was slightly better or equal to Southern Europe. Central Eastern Europe has an unsatisfactory performance of the proportion of MS that score over 0,5 represented by H (0,38). What lifts the index up is the more satisfactory performance of its average intensity represented by A (0,58). Nonetheless, it is not possible to affirm that this region has the worst performance on the MCAI, as its MCAI score is similar to the one of Southern Europe.

H4 is confirmed regarding the MCAI performance but rejected regarding the average individual MS composite score performance. Southern Europe gets the worst score regarding its MCAI but still very similar to the one of Central and Eastern Europe. It is also right to say that the region is the most exposed to Climate Change showing the lowest score from all regions on the vulnerability target in the EU27. Thus, this region is the most exposed to climate-related hazards and natural disasters in the EU27. On the other hand its average individual MS composite score (0,54) is higher than the one from Central and Eastern Europe (0,50). Overall, the proportion H of MS with composite score > 0.5 for Southern Europe (0,33) is worse than for Central and Eastern Europe (0,38), while the average intensity A of these MS is higher for southern Europe (0,61) than for Central and Eastern Europe (0,58).

The research has some limitations such as missing data for a few UE27 individual MS partial indicators. Missing data was fill with the value 0,5. Nonetheless, a sensitivity analysis was made with two tables representing the missing data with 1,0 and as 0,0. Individual and group composite scores do not show to be very sensitive to changes in the missing data.

Another struggle was due to the lack of objectives on the targets that compose the SDG13 goal, mainly on targets SDG13.4 and SDG13.5. These are targets with a scarce range of indicators.

Finally, finding data related to countries greenhouse gasses emissions for the year 2020 on was a challenge. Most MS goals that related to partial indicators needed to be adapted to the horizon 2019 in order to be measurable, since the source (EEA) did not provide the information for 2020.

Besides all difficulties exposed before, the research was concluded and there is still a range of possibilities to be explored. MS could be explored more individually and deeply. It is also possible to investigate deeper the relation between GDP per capita and MS score performance. The AF method made possible to see that the score performance of MS are heterogeneous and it would also be interesting for future research to analyse what are the

nature of these heterogeneous performances on each MS or regions. Overall the EU27 MS still have to develop their SDG13 score performance under the optics of the MCAI framework, and the information presented here can be useful for policy makers to allocate better their efforts towards the most vulnerable points of this serious and current topic that affects or will affect the lives of everyone living on this planet - Climate Change.

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Appendix

Appendix A

Sustainable Development

The concept of sustainable development (SD) is not recent. It has been mentioned in many ways and it takes different narratives to be introduced in political discussions. The topic has been raised because it is unavoidable to talk about growth and true development, without mentioning the costs and impacts on planet Earth. Environmental problems have been present in political discussions for several decades. By the late 1960s they were already a concern of the United Nations (UN). . Environmental degradation and the depletion of natural resources were already evident and placed on the table for discussion by UN Member States, assuming the same importance as topics such as economic stagnation, arms race, and the fast population growth (Meadows et al., 1972).

In 1972 the Club of Rome published The Limits to Growth report, which raised the discussion of different problems that economic growth was bringing to human society. The group of educators, humanists, scientists, economists, industrialists, founded in 1968, got together with the intention to discuss and to create understanding of economic and social problems that were concerning members of the society who were addressing the problems humanity could face in the long run (Meadows et al., 1972).The group intended to bring up these topics to the political arena and incentivize policymakers to take actions towards long term problems, as well as to the general public that should start to be conscious about their consumer behavior and lifestyle (Meadows et al., 1972). In 1968 Aurelio Peccei and Alexander King founded what would become an international organization but that started as a small group of people from different fields of study, concerned about the future of mankind. These individuals brought to examination: “poverty in the midst of plenty; degradation of the environment; loss of faith in institutions; uncontrolled urban spread; insecurity of employment; alienation of youth; rejection of traditional values; and inflation and other monetary and economic disruptions.”(Meadows et al., 1972, p. 10).These problems, called the "World Problematique” (Meadows et al., 1972, p. 10) were linked and it would be

impossible to solve one without touching the other, thus, they should be treated as a whole and not as single items.

The Limits to Growth from 1972 report, was commissioned by group to Professor Dennis Meadows and his MIT team of researchers. It presented to the Club and the world that the limits of mankind's economic growth were directly related to the following fields: “population, agricultural production, natural resources, industrial production, and pollution” (Meadows et al., 1972, pp. 11-12). Those fields, associated with several considered trends of concern like fast industrialization, massive population growth, widespread malnutrition, depletion of non-renewable resources, and a deteriorating environment, could lead the world to a growth stagnation over the next hundred years (Meadows et al., 1972).

However, the same report also recognized that these trends could be stopped or at least reduced on some scale to allow for some growth for the society as a whole. For this to happen, policymakers and the population should focus on an ecological and economic balance to promote stability. At that point the debate on SD was finally opened which gives a long-term global perspective of how humanity should behave throughout its development (Meadows et al., 1972). The concept of Sustainable Development can then be explained as a “state of global equilibrium” (Meadows et al., 1972, p.24) where “basic material needs of each person on Earth are satisfied and each person has an equal opportunity to realize his individual human potential.”(Meadows et al., 1972).

The sooner policy makers incorporate SD as crucial, the more likely they are to be successful. The Club of Rome began to look in the early 1970s the same as the UN have been looking in the 2000s: a model of development that could be sustainable - without imminent collapse - and capable of supplying basic material resources to the people (Meadows et al., 1972). Now the Club of Rome is a formal organisation of individuals that discuss the future of humanity (The Club of Rome, 2021).

The Brundtland model of SD also asserts that natural resources are basic for human activity and if they are ruined then everything else is ruined. The negative narrative here is the vision of nature as an asset for human civilization, a way to reach growth and

development. However, nature exists on its own and it is self-sufficient. Mankind has occupied a position of management of nature in this narrative, when in fact nature manages people's lives and it is a precondition to the existence of life. For this reason, it is undeniable to consider what *Our Common Future* calls “ultimate limits” (Meadows et al., 1972, p.122): restraints that stop growth in a manner that it becomes impossible to push industrial development further, when growth is neither possible nor desirable (Meadows et al., 1972).

In this discussion it is included the perception of “ecological footprint” (Baker, 2016, p.12) which is important to point out the impact of people, companies, cities, states and countries at any level in all ecosystems and that was also approached in the Rio Earth Summit in 1992 (Baker, 2016).

In 1972, the year of publication of The Limits to Growth, the UN promoted the Conference on the Human Environment, in Stockholm, Sweden. It was considered by many scholars as the starting point of international cooperation on environmental issues. One of the outcomes of the conference was the *Declaration of the UN Conference on the Human Environment*, or Stockholm Declaration, with 26 principles that cover many of the points previously discussed regarding SD and covered the global nature of environmental problems. The Declaration generated by the conference is also called an Environmental Manifest and the series of principles within it were in general related to the actions of mankind towards its habitat, rights or duties of mankind in relation to the environment and the finite nature of natural resources (UN, 1972). Nonetheless the Conference also led to the formulation of the United Nations Environment Programme (UNEP)[6] an organization created to coordinate global action towards sustainability and preservation of ecosystems (Boudes, 2014).

A summit held in 1992 called the UN Conference on Environment and Development (UNCED) also known as Rio Earth Summit (or Rio 92) continued the discussions held in 1972 regarding the notion of SD. Following the Brundtland Report, what the UN would refer

[6] Find the definition of UNEP in Appendix B.

to when addressing SD was delimited. Moreover, there is a subtle transition from the Development point of view, in which countries finally recognize that development is not a matter of economic power, but it is human life in concomitance with the conscious use of natural resources (UN, 1992).

The outcome document of the 1992 UNCED the called *Rio Declaration on Environment and Development*, pointed out 27 principles that reaffirmed the 1972 *Declaration of the UN Conference on the Human Environment*. The discussed principles were wide, and some the improvements were seen in the concept of SD[7].

With Rio 92 the concept of SD definitely entered the international political agenda, it established a new worldwide partnership "through new levels of cooperation between States, the key sectors of the societies and people" (UN, 1992, p.1). With the support of 179 political leaders, countries recognized that they needed to adapt to the new principles in order to reach Sustainable Development (UN, 1992). However, this agreement was the result of two decades of efforts by the UN to reach a consensus on human socio-economic activities on the environment since the first Human Environment Conference in 1972. It has made SD a reachable goal through the Agenda 21, a plan of action for the transition toward SD in the XXI century. Besides the Rio Declaration and Agenda 21, other important outcomes from UNCED, were the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity and the *Declaration on the Principles of Forest Management*. (UN, n.d.a).

Following the Rio Earth Summit, carrying the same philosophy of the *Rio Declaration* and the *Brundtland Report*, the Millennium Summit of 2000 came to consolidate what had been discussed in the previous negotiations. The three days of negotiation at the Summit in New York generated the *Millennium Report* and it was up until 2000 the largest meeting ever made by the organization. A total of 189 UN Member States adopted the *Millennium Declaration* containing the eight Millennium Development Goals (MDGs). These eight goals carry the legacy of 28 years of negotiations and consist of many of the principles mentioned

[7] Find the new principles Appendix C.

before (UN, n.d.b).A special attention to goal 7 which talks specifically about the environment, although they are all correlated at some level. Furthermore in 2002 the World Summit on Sustainable Development (WSSD) held in Johannesburg endorsed a *Political Declaration and Implementation Plan*[8] to monitor the implementation of the development goals (UN, 2002).

As the world developed, the Millennium Goals have improved; countries together with the UN have developed a set of new fronts to work on. In the 2005 World Summit countries made strong commitments to achieving the MDGs. The High-level meeting on the 2008 Millennium Development Goals, the 2010 Millennium Development Goals Summit and the 2012 United Nations Conference on Sustainable Development (also known as Rio+20), were important meetings used to reaffirm the importance to reach the goals though they also helped countries to recognize that the deadline was too short and the changes were wide and diverse (UN, n.d.g). In particular, the Rio+20 Conference happened to give practical guidance for countries to implement sustainable measures.

The political outcome document – The Future We Want – was built taking into account the Millennium Development Goals and new green economy policies. Moreover, a process to develop a set of Sustainable Development Goals (SDGs), building upon MDGs was launched (Hák et al., 2016). The conference moved the countries towards a commitment to sustainable development and preservation of natural resources through a 10-year framework of diverse programs related to responsible consumption and production (UN, n.d.f). It was also in this conference that the idea of indicators was suggested by the Colombia and Guatemala representatives. Their innovative idea was to assign to each goal several partial indicators that could be measured over time- This would also result in a better projection of how the goal will be achieved (Hák et al., 2016).

[8] See Appendix E for more details.

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Appendix B

The UNEP

It is an UN organization created in 1972. Its function is to follow, give technical assistance and also coordinate actions for the environmental preservation within the UN. Besides that, it works together with member states to incentivize cooperation between them as well as to guide scientific research and support the UN scientific community. It gives countries means to defuse information about environmental tendencies as well as it provides to private actors of the economy information about potential risk when dealing with Earth's natural resources (Mingst, 2020).

Appendix C

New principles presented on the *Rio Declaration on Environment and Development*

- Principle six recognizes that Developing Countries and most vulnerable States should be given priority when they need support for ecological initiative needs;
- Principle eleven focuses on the formulation of internal legislation for safeguarding the environment which should take into account the environmental context and the development context of the country;
- Principle thirteen recognizes that victims of pollution damage should have legal support;
- Principle sixteen refers the importance of the internalization of the environmental externalities by polluters;
- Principle eighteen refers the importance of international aid for those who suffer with natural disasters;
- Principle twenty highlights the incorporation of women representativeness to achieve SD;
- Principle twenty- two recognizes the vital role of native indigenous people and local communities in this SD approach (UN, 1992).

Appendix D

The eight MDGs

1) Eradicate extreme poverty and hunger;

2) Achieve universal primary education;

3) Promote gender equality and empower women;

4) Reduce child mortality;

5) Improve maternal health;

6) Combat HIV/AIDS, malaria and other diseases;

7) Ensure environmental sustainability;

8) Develop a global partnership for development (UN, n.d.b).

Appendix E

The implementation plan

The action plan aimed to show a practical direction of how to implement the goals previously set . The three decades of debate intended to focus on SD but giving a special attention in what regards “the urgent need to respond to the problem of environmental deterioration” (UN, 2002, p.2), the Rio Principles came to reinforce the idea of protection of the environment besides other social and economic concerns. Finally with the Agenda 21 also covered in Rio and the MDGs set next, Johannesburg came to certify that there are means to implement the Agenda 21 and the MDGs. (UN, 2002).

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Appendix F

17 Sustainable Development Goals

As stated by the UN (n.d.g) The 17 Development Goals of the Transforming our world: the 2030 Agenda for Sustainable Development are the following:

"Goal 1. End poverty in all its forms everywhere;

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture;

Goal 3. Ensure healthy lives and promote well-being for all at all ages;

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;

Goal 5. Achieve gender equality and empower all women and girls;

Goal 6. Ensure availability and sustainable management of water and sanitation for all;

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all;

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

Goal 10. Reduce inequality within and among countries;

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable;

Goal 12. Ensure sustainable consumption and production patterns;

Goal 13. Take urgent action to combat climate change and its impacts;

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development;

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;

Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.” (UN, n.d.h para.68).

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Appendix G

Target of the SDG13

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries;

13.2 Integrate climate change measures into national policies, strategies and planning;

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning;

13.A Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible; and

13.B Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities (Project Everyone, 2022).

Appendix H

Paris Agreement Attributes

1) To control GHG emissions and diminish global warming impact reducing temperature increase keeping it well below 2º Celsius;

2) GHG emissions reduction is mandatory for all in order to reach the first attribute and targets were set for countries but considering their limitations and giving flexibility for those who need;

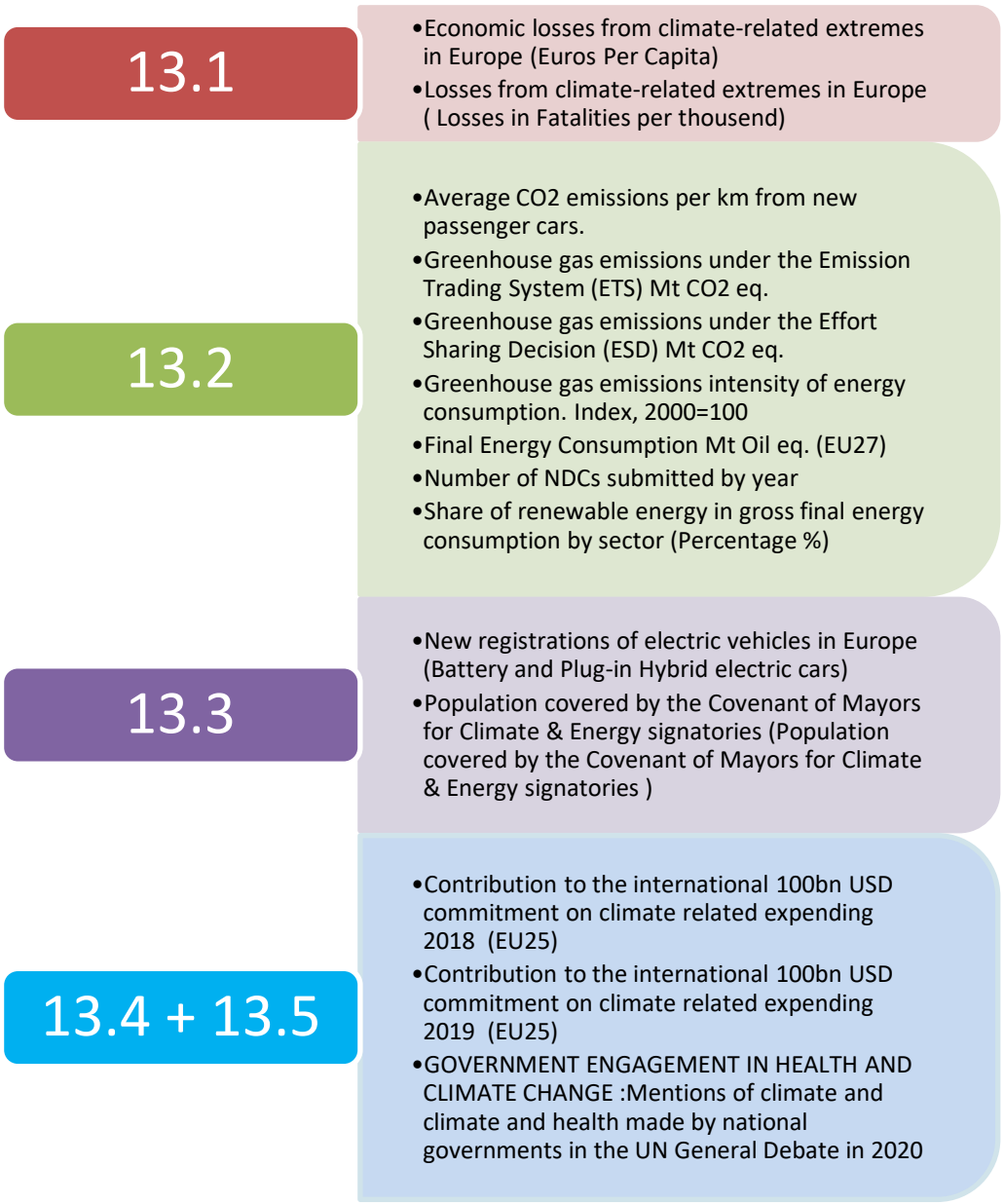
3) The agreement promotes reviews to ensure conformity and recommendations would be delivered instead of retaliate measures in case countries do not achieve effectiveness in their strategies;

4) Parties should show and communicate publicly adaptive measures to the climate change phenomenon; and

5) Parties should provide financial aid within the UNFCCC to fight climate change and the global warming phenomenon. This attribute is directed specially to high-income countries and its private or public institutions (Leggett, 2020).

Appendix I

The MCAI framework targets and partial indicators:



Indicator	Note.
13.1	from *Economic losses from climate-related extremes in Europe,* by EEA, 2022 (https://www.eea.europa.eu/ims/economic-losses-from-climate-related). Copyright 2022 by EEA;
	from *Population, total - European Union,* by The World Bank Group, 2020 (https://data.worldbank.org/indicator/SP.POP.TOTL?locations=EU) Copyright 2022 by The World Bank Group;
13.2	from *Average CO2 emissions per km from new passenger cars* by Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/sdg_12_30/default/table?lang=en). Copyright 1995-2022 by European Union;
	from *EEA greenhouse gases - data viewer,* by EEA, 2021 (https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer). Copyright 2022 by EEA;
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	from Final energy consumption, by Eurostat 2022 (https://ec.europa.eu/eurostat/databrowser/view/sdg_07_11/default/table?lang=en). Copyright 1995-2022 by European Union;
	from NDC Registry, by UNFCCC, n.d (https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx) Copyright 2022 by UNFCCC;
	from Share of renewable energy in gross final energy consumption by sector, by Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/sdg_07_40/default/table?lang=en) Copyright 1995-2022 by European Union;
13.3	from *New registrations of electric vehicles in Europe,* by EEA, 2021 (https://www.eea.europa.eu/ims/new-registrations-of-electric-vehicles) Copyright 2022 by EEA;
	from *Population covered by the Covenant of Mayors for Climate & Energy signatories,* by Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/sdg_13_60/default/table?lang=en) Copyright 1995-2022 by European Union;
13.4	from *Contribution to the international 100bn USD commitment on climate related expending,* by Eurostat, 2022 (https://ec.europa.eu/eurostat/databrowser/view/sdg_13_50/default/table?lang=en) Copyright 1995-2022 by European Union;
	from *Explore our data: public and political engagement,* The Lancet Countdown, 2021 (https://www.lancetcountdown.org/data-platform/public-and-political-engagement) Copyright 2019 by The Lancet Countdown.

Appendix J

Member State Greenhouse Gas Emission Limits Under Article 3

	Member State greenhouse gas emission limits in 2020 compared to 2005 greenhouse gas emissions levels
Belgium	-15%
Bulgaria	20%
Czech Republic	9%
Denmark	-20%
Germany	-14%
Estonia	11%
Ireland	-20%
Greece	-4%
Spain	-10%
France	-14%
Italy	-13%
Cyprus	-5%
Latvia	17%
Lithuania	15%
Luxemburg	-20%
Hungary	10%
Malta	5%
Netherlands	-16%
Austria	-16%
Poland	14%
Portugal	1%
Romania	19%
Slovenia	4%
Slovakia	13%
Finland	-16%
Sweden	-17%
Croatia	11%

Note. From *on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.* https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2009.140.01.0136.01.ENG#page=12. Copyright 1995-2022 by European Union.

Appendix K

Absolute Level of Energy Consumption in 2020 (MTOE) as Notified from Member States in 2013, in the NEEAP 2014 and 2017 or Annual Reports up to 2020

EU MEMBER STATE		
	Primary energy consumption	Final energy consumption
Austria	31.5	25.1
Belgium	43.7	32.5
Bulgaria	16.9	8.6
Croatia	10.7	7.0
Cyprus	2.2	1.9
Czechia	44.3	25.3
Denmark	17.5	15.2
Estonia	6.5	2.8
Finland	35.9	26.7
France*	226.4	137.9
Germany	276.6	194.3
Greece	24.7	18.4
Hungary	26.6	18.2
Ireland	13.9	11.7
Italy	158.0	124.0
Latvia	5.4	4.5
Lithuania	6.5	4.3
Luxembourg	4.5	4.2
Malta	0.8	0.6
Netherlands	60.7	52.2
Poland	96.4	71.6
Portugal	22.5	17.4
Romania	43.0	30.3
Slovakia	16.4	10.4
Slovenia	7.1	5.1
Spain	123.4	87.2
Sweden	43.4	30.3
United Kingdom	177.6	129.2
Sum of indicative targets EU28	1543.1	1095.8
EU28 target 2020	1483,00	1086,00

Note. From *Energy: Energy efficiency target* by European Commission. https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-targets_en. Copyright 1995-2022 by European Union.

Appendix L

National overall targets for the share of energy from renewable sources in gross final consumption of energy in 2020

	Share of energy from renewable sources in gross final consumption of energy, 2005 (S2005)	Target for share of energy from renewable sources in gross final consumption of energy, 2020 (S2020)
Belgium	2,2 %	13 %
Bulgaria	9,4 %	16 %
Czech Republic	6,1 %	13 %
Denmark	17,0 %	30 %
Germany	5,8 %	18 %
Estonia	18,0 %	25 %
Ireland	3,1 %	16 %
Greece	6,9 %	18 %
Spain	8,7 %	20 %
France	10,3 %	23 %
Italy	5,2 %	17 %
Cyprus	2,9 %	13 %
Latvia	32,6 %	40 %
Lithuania	15,0 %	23 %
Luxembourg	0,9 %	11 %
Hungary	4,3 %	13 %
Malta	0,0 %	10 %
Netherlands	2,4 %	14 %
Austria	23,3 %	34 %
Poland	7,2 %	15 %
Portugal	20,5 %	31 %
Romania	17,8 %	24 %
Slovenia	16,0 %	25 %
Slovak Republic	6,7 %	14 %
Finland	28,5 %	38 %
Sweden	39,8 %	49 %

Note. From *on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC*. https://eur-

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Appendix M

MCAI partial indicators for each of the EU27 MS

SDG 13 Targets	Belgium	Bulgaria	Czech Republic	Denmark	Germany
13.1					
a)	1	1	0	0	0
b)	0	1	1	1	0
Country 13.1 score	0,5	1	0,5	0,5	0
> 0.5	no	yes	no	no	no
13.2					
d)	0	0,5	0	1	1
e)	1	1	1	1	1
f)	0	1	1	1	0
g)	0	0	1	1	0
h)	0	0	1	1	0
i)	0	1	0	1	1
j)	1	1	1	1	1
Country 13.2 score	0,29	0,64	0,71	1,00	0,57
> 0.5	no	yes	yes	yes	yes
13.3					
k)	1	0	0	1	1
l)	1	0	0	0	1
Country 13.3 score	1	0	0	0,5	1
> 0.5	yes	no	no	no	yes
13.4					
m)	0	0,5	0	1	1
n)	0	0,5	0	1	1
13.5					
o)	1	1	0	0	0
Country 13.4 & 13.5 score	0,33	0,67	0,00	0,67	0,67
> 0.5	no	yes	no	yes	yes
Country Composite score	0,53	0,58	0,30	0,67	0,56
> 0.5	yes	yes	no	yes	yes

SDG 13 Targets2	Estonia	Ireland	Greece	Spain	France	Croatia
13.1						
a)	1	1	0	0	0	1
b)	1	1	0	0	0	0
Country 13.1 score	1	1	0	0	0	0,5
> 0.5	yes	yes	no	no	no	no
13.2						
d)	1	1	1	0	1	0,5
e)	1	1	1	1	1	1
f)	0	0	1	1	1	1
g)	1	1	1	1	1	0
h)	1	1	1	1	1	1
i)	1	1	1	0	1	0
j)	1	1	1	1	0	0,5
Country 13.2 score	0,86	0,86	1,00	0,71	0,86	0,57
> 0.5	yes	yes	yes	yes	yes	yes
13.3						
k)	0	0	0	0	1	0
l)	0	0	1	1	1	0
Country 13.3 score	0	0	0,5	0,5	1	0
> 0.5	no	no	no	no	yes	no
13.4						
m)	0	0	0	1	1	0
n)	0	0	0	1	1	0
13.5						
o)	1	0	1	1	1	0
Country 13.4 & 13.5 score	0,33	0,00	0,33	1,00	1,00	0,00
> 0.5	no	no	no	yes	yes	no
Country Composite score	0,55	0,46	0,46	0,55	0,71	0,30
> 0.5	yes	no	no	yes	yes	no

SDG 13 Targets3	Italy	Cyprus	Latvia	Lithuania	Luxembourg	Hungary
13.1						
a)	0	1	1	1	0	1
b)	0	1	1	1	0	1
Country 13.1 score	0	1	1	1	0	1
> 0.5	no	yes	yes	yes	no	yes
13.2						
d)	0	0	1	1	0	0
e)	1	0	0	1	1	1
f)	1	0	0,5	0	0	1
g)	1	0	0	0	0	0
h)	1	1	1	0	1	0
i)	1	0	0	0	1	1
j)	1	1	1	1	1	1
Country 13.2 score	0,86	0,29	0,50	0,43	0,57	0,57
> 0.5	yes	no	no	no	yes	yes
13.3						
k)	0	0	0	0	1	0
l)	1	0	0	0	0	0
Country 13.3 score	0,5	0	0	0	0,5	0
> 0.5	no	no	no	no	no	no
13.4						
m)	0	0,5	0	0	1	0
n)	0	0,5	0	0	1	0
13.5						
o)	1	0	0	1	0	0
Country 13.4 & 13.5 score	0,33	0,33	0,00	0,33	0,67	0,00
> 0.5	yes	no	no	no	yes	no
Country Composite score	0,42	0,49	0,39	0,44	0,43	0,39
> 0.5	no	no	no	no	no	no

SDG 13 Targets4	Malta	Netherlands	Austria	Poland	Portugal
13.1					
a)	1	1	0	1	0
b)	1	0	1	1	0
Country 13.1 score	1	0,5	0,5	1	0
> 0.5	yes	no	no	yes	no
13.2					
d)	1	1	0	0	1
e)	1	0	0	0	1
f)	0	1	0	0	1
g)	1	0	1	0	1
h)	1	1	0	1	1
i)	1	0	1	1	1
j)	1	1	1	1	1
Country 13.2 score	0,86	0,57	0,43	0,43	1,00
> 0.5	yes	yes	no	no	yes
13.3					
k)	1	1	1	0	1
l)	0	0	0	0	1
Country 13.3 score	0,5	0,5	0,5	0	1
> 0.5	no	no	no	no	yes
13.4					
m)	0	1	1	0	0
n)	0	1	1	0	0
13.5					
o)	1	0	1	0	0
Country 13.4 & 13.5 score	0,33	0,67	1,00	0,00	0,00
> 0.5	no	yes	yes	no	no
Country Composite score	0,67	0,56	0,61	0,36	0,50
> 0.5	yes	yes	yes	no	no

SDG 13 Targets42	Romania	Slovenia	Slovakia	Finland	Sweden
13.1					
a)	1	0	1	1	1
b)	1	1	1	1	1
Country 13.1 score	1	0,5	1	1	1
> 0.5	yes	no	yes	yes	yes
13.2					
c)	0,5	0	0	1	1
d)	1	1	1	1	1
e)	1	1	1	0	1
f)	0	0	1	1	1
g)	1	1	0	1	0
h)	0	1	1	1	0
i)	1	1	1	1	1
Country 13.2 score	0,64	0,71	0,71	0,86	0,71
> 0.5	yes	yes	yes	yes	yes
13.3					
j)	0	0	0	1	1
k)	1	0	0	0	0
Country 13.3 score	0,5	0	0	0,5	0,5
> 0.5	no	no	no	no	no
13.4					
l)	0	0	0	0	1
m)	0	0	0	1	1
13.5					
n)	0	1	1	1	0
Country 13.4 & 13.5 score	0,00	0,33	0,33	0,67	0,67
> 0.5	no	no	no	yes	yes
Country Composite score	0,55	0,39	0,51	0,76	0,72
> 0.5	yes	no	yes	yes	yes

Appendix N

Average scores of the MCAI partial indicators for the EU 27 MS, Southern Europe, Western Europe, Northern Europe and Central and Eastern Europe

SDG 13 Targets	EU 27
13.1	
Economic losses from climate-related extremes in Europe (Euros Per Capita)	0,59
Losses from climate-related extremes in Europe (Losses in Fatalities per thousend)	0,63
Country 13.1 score	0,61
> 0.5	yes
13.2	
Average CO2 emissions per km from new passenger cars. (EU24)	0,54
Greenhouse gas emissions under the Emission Trading System (ETS) Mt CO2 eq.	0,81
Greenhouse gas emissions under the Effort Sharing Decision (ESD) Mt CO2 eq.	0,57
Greenhouse gas emissions intensity of energy consumption. Index, 2000=100	0,52
Final Energy Consumption Mt Oil eq. (EU27)	0,70
Number of NDCs submitted by year	0,63
Share of renewable energy in gross final energy consumption by sector (Percentage %)	0,94
Country 13.2 score	0,67
> 0.5	yes
13.3	**0,00**
New registrations of electric vehicles in Europe (Battery and Plug-in Hybrid electric cars)	0,41
Population covered by the Covenant of Mayors for Climate & Energy signatories (Population covered by the Covenant of Mayors for Climate & Energy signatories)	0,30
Country 13.3 score	0,35
> 0.5	no
13.4	**0,00**
Contribution to the international 100bn USD commitment on climate related expending 2018 (EU25)	0,33
Contribution to the international 100bn USD commitment on climate related expending 2019 (EU25)	0,37
13.5	**0,00**

GOVERNMENT ENGAGEMENT IN HEALTH AND CLIMATE CHANGE :Mentions of climate and climate and health made by national governments in the UN General Debate in 2020	0,48
Country 13.4 & 13.5 score	0,40
> 0.5	no
Country Composite score	0,51
> 0.5	yes
Multidimensional SDG13 Index - MCAI	
H - Proportion of countries with composite score > 0.5	**0,52**
A- Average intensity of countries with composite score > 0.5	**0,62**
Multidimensional SDG13 Index - MCAI = H x A	**0,32**

SDG 13 Targets	**Southern Europe**
13.1	
Economic losses from climate-related extremes in Europe (Euros Per Capita)	0,33
Losses from climate-related extremes in Europe (Losses in Fatalities per thousend)	0,33
Country 13.1 score	0,33
> 0.5	no
13.2	
Average CO2 emissions per km from new passenger cars. (EU24)	0,50
Greenhouse gas emissions under the Emission Trading System (ETS) Mt CO2 eq.	0,83
Greenhouse gas emissions under the Effort Sharing Decision (ESD) Mt CO2 eq.	0,67
Greenhouse gas emissions intensity of energy consumption. Index, 2000=100	0,83
Final Energy Consumption Mt Oil eq. (EU27)	1,00
Number of NDCs submitted by year	0,67
Share of renewable energy in gross final energy consumption by sector (Percentage %)	1,00
Country 13.2 score	0,79
> 0.5	yes
13.3	
New registrations of electric vehicles in Europe (Battery and Plug-in Hybrid electric cars)	0,33
Population covered by the Covenant of Mayors for Climate & Energy signatories (Population covered by the Covenant of Mayors for Climate & Energy signatories)	0,67
Country 13.3 score	0,50
> 0.5	no

13.4	
Contribution to the international 100bn USD commitment on climate related expending 2018 (EU25)	0,25
Contribution to the international 100bn USD commitment on climate related expending 2019 (EU25)	0,25
13.5	
GOVERNMENT ENGAGEMENT IN HEALTH AND CLIMATE CHANGE :Mentions of climate and climate and health made by national governments in the UN General Debate in 2020	0,39
Country 13.4 & 13.5 score	0,54
> 0.5	yes
Country Composite score	0,54
> 0.5	yes
Multidimensional SDG13 Index - MCAI	
H - Proportion of countries with composite score > 0.5	**0,33**
A- Average intensity of countries with composite score > 0.5	**0,61**
Multidimensional SDG13 Index - MCAI = H x A	**0,20**

SDG 13 Targets	**Western Europe**
13.1	
Economic losses from climate-related extremes in Europe (Euros Per Capita)	0,43
Losses from climate-related extremes in Europe (Losses in Fatalities per thousend)	0,29
Country 13.1 score	0,36
> 0.5	no
13.2	
Average CO2 emissions per km from new passenger cars. (EU24)	0,57
Greenhouse gas emissions under the Emission Trading System (ETS) Mt CO2 eq.	0,71
Greenhouse gas emissions under the Effort Sharing Decision (ESD) Mt CO2 eq.	0,29
Greenhouse gas emissions intensity of energy consumption. Index, 2000=100	0,43
Final Energy Consumption Mt Oil eq. (EU27)	0,57
Number of NDCs submitted by year	0,71
Share of renewable energy in gross final energy consumption by sector (Percentage %)	0,86
Country 13.2 score	0,59
> 0.5	yes
13.3	

New registrations of electric vehicles in Europe (Battery and Plug-in Hybrid electric cars)	0,86
Population covered by the Covenant of Mayors for Climate & Energy signatories (Population covered by the Covenant of Mayors for Climate & Energy signatories)	0,43
Country 13.3 score	0,64
> 0.5	yes
13.4	
Contribution to the international 100bn USD commitment on climate related expending 2018 (EU25)	0,71
Contribution to the international 100bn USD commitment on climate related expending 2019 (EU25)	0,71
13.5	
GOVERNMENT ENGAGEMENT IN HEALTH AND CLIMATE CHANGE :Mentions of climate and climate and health made by national governments in the UN General Debate in 2020	0,62
Country 13.4 & 13.5 score	0,68
> 0.5	yes
Country Composite score	0,57
> 0.5	yes
Multidimensional SDG13 Index - MCAI	
H - Proportion of countries with composite score > 0.5	**0,71**
A- Average intensity of countries with composite score > 0.5	**0,59**
Multidimensional SDG13 Index - MCAI = H x A	**0,42**

SDG 13 Targets	Northern Europe
13.1	
Economic losses from climate-related extremes in Europe (Euros Per Capita)	0,83
Losses from climate-related extremes in Europe (Losses in Fatalities per thousand)	1,00
Country 13.1 score	0,92
> 0.5	yes
13.2	
Average CO2 emissions per km from new passenger cars. (EU24)	1,00
Greenhouse gas emissions under the Emission Trading System (ETS) Mt CO2 eq.	0,83
Greenhouse gas emissions under the Effort Sharing Decision (ESD) Mt CO2 eq.	0,42
Greenhouse gas emissions intensity of energy consumption. Index, 2000=100	0,67
Final Energy Consumption Mt Oil eq. (EU27)	0,67

Number of NDCs submitted by year	0,50
Share of renewable energy in gross final energy consumption by sector (Percentage %)	1,00
Country 13.2 score	0,73
> 0.5	yes
13.3	
New registrations of electric vehicles in Europe (Battery and Plug-in Hybrid electric cars)	0,50
Population covered by the Covenant of Mayors for Climate & Energy signatories (Population covered by the Covenant of Mayors for Climate & Energy signatories)	0,00
Country 13.3 score	0,25
> 0.5	no
13.4	
Contribution to the international 100bn USD commitment on climate related expending 2018 (EU25)	0,33
Contribution to the international 100bn USD commitment on climate related expending 2019 (EU25)	0,50
13.5	
GOVERNMENT ENGAGEMENT IN HEALTH AND CLIMATE CHANGE :Mentions of climate and climate and health made by national governments in the UN General Debate in 2020	0,44
Country 13.4 & 13.5 score	0,47
> 0.5	no
Country Composite score	0,59
> 0.5	yes
Multidimensional SDG13 Index - MCAI	
H - Proportion of countries with composite score > 0.5	**0,67**
A- Average intensity of countries with composite score > 0.5	**0,68**
Multidimensional SDG13 Index - MCAI = H x A	**0,45**

SDG 13 Targets	**Central and Eastern Europe**
13.1	
Economic losses from climate-related extremes in Europe (Euros Per Capita)	0,83
Losses from climate-related extremes in Europe (Losses in Fatalities per thousand)	1,00
Country 13.1 score	0,92
> 0.5	yes
13.2	
Average CO2 emissions per km from new passenger cars. (EU24)	0,17

Greenhouse gas emissions under the Emission Trading System (ETS) Mt CO2 eq.	0,83
Greenhouse gas emissions under the Effort Sharing Decision (ESD) Mt CO2 eq.	0,83
Greenhouse gas emissions intensity of energy consumption. Index, 2000=100	0,33
Final Energy Consumption Mt Oil eq. (EU27)	0,50
Number of NDCs submitted by year	0,67
Share of renewable energy in gross final energy consumption by sector (Percentage %)	1,00
Country 13.2 score	0,62
> 0.5	yes
13.3	
New registrations of electric vehicles in Europe (Battery and Plug-in Hybrid electric cars)	0,00
Population covered by the Covenant of Mayors for Climate & Energy signatories (Population covered by the Covenant of Mayors for Climate & Energy signatories)	0,17
Country 13.3 score	0,08
> 0.5	no
13.4	
Contribution to the international 100bn USD commitment on climate related expending 2018 (EU25)	0,08
Contribution to the international 100bn USD commitment on climate related expending 2019 (EU25)	0,08
13.5	
GOVERNMENT ENGAGEMENT IN HEALTH AND CLIMATE CHANGE :Mentions of climate and climate and health made by national governments in the UN General Debate in 2020	0,17
Country 13.4 & 13.5 score	0,32
> 0.5	yes
Country Composite score	0,50
> 0.5	yes
Multidimensional SDG13 Index - MCAI	
H - Proportion of countries with composite score > 0.5	**0,38**
A- Average intensity of countries with composite score > 0.5	**0,58**
Multidimensional SDG13 Index - MCAI = H x A	**0,21**