Creating a European Green Deal with the IPCC`s Special Report on 1.5-degrees

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Abstract

This thesis investigates how the IPCC`s Special Report on 1.5-degrees has been used to develop and legitimize the European Green Deals long-term vision for combating global warming. This is done by analyzing front-stage documents available, such as the European Green Deal Communication, A Clean Planet for All Communication and its accompanying in-depth document. By developing and using a conceptual framework consisting of concepts often used to analyze the science-policy relationship in climate change, the thesis analyze data collected from these documents through document analysis. The documents are understood as spaces where the SR15 acts and is made to act in specific ways. The SR15 is performative. The thesis aims to contribute to the literature on science-policy relationship in a post-Paris Agreement climate regime.

The thesis found that the EGD uses the SR15 as a reason for its existence. Through its analysis, the thesis identifies the role of the SR15 in formulating and validating strategies and goals is as an anchoring device. It is around the SR15 that the EGD and the long-term vision is created. Several aspects of the SR15, such as its key headlines, functions as boundary objects. There is a clear imprint from the SR15 on the EGD. The SR15 is used for allowing the EGD to frame climate change as an urgent challenge. Moreover, it allows the EGD to be framed as a necessary response to this challenge. Furthermore, a clear boundary is drawn between science and the resulting politics, thus presenting the European Green Deal as a policy initiative existing in a two-world perspective where science exists in its own sphere of authority. Without the SR15, the European Green Deal and its long-term vision would not be framed the way it is in its current state.

Key words: STS, Climate Change, Co-production, Science-policy, Anchoring Devices, Boundary Objects, Boundary Work, IPCC, European Union, European Green Deal, SR15

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List of abbreviations

IPCC - Intergovernmental Panel on Climate Change

EC - European Commission

EU - European Union

EGD - European Green Deal

SR15 - Special Report on Global Warming of 1.5- degrees

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INTRODUCTION

Science has an essential status in our society. Science often informs and validates politics; however, politics also shapes science (Beck, 2012a). This relationship between science and politics is complicated and abstract and is often a subject for scholars to discuss and analyze (Asdal, 2011; Callon et al., 2011; Latour, 2012). Climate change has become a global phenomenon, much because of the work of the Intergovernmental Panel on Climate change (hereafter IPCC) (Miller, 2004). The IPCC is one of the most powerful actors in climate politics (Beck, 2011), and the organization is vital in forecasting future worlds and creating them. By, for example, potentially making specific options more available and relevant than others.

In 2016 the Paris Agreement, an agreement within the United Nations Framework Convention on Climate Change (hereafter UNFCCC) dealing with greenhouse gas emissions mitigation, adaption and finance, was signed. Following this, the 2015 United Nations Climate Change Conference (UNCCC) called for a report on the possibilities of limiting global warming to 1.5-degree. This report, published on the 8 of October 2018, is called the Special Report on Global Warming of 1.5-degrees (hereafter SR15). Being prepared by 91 authors from 40 countries with over 6000 scientific references, it was delivered at the United Nations 48th session by the IPCC. The IPCC has delivered several Assessments and special reports throughout the decades, but the SR15 is the first report that arrives in what is viewed as the Post-Paris Agreement climate policy era (Beck & Mahony, 2017).

Science, especially the science assessed by the IPCC, has always played an essential role in formulating and creating climate policy (Guillemot, 2017). However, in this post-Paris climate policy regime, the IPCC's role and its science are undergoing a far-reaching transformation (Beck & Mahony, 2018). By ordering the creation and, for the first time, being explicit in what the scientists are to examine, science has been asked to perform a new role (Livingston, 2020). Therefore, the IPCC and the IPCC's publications are expected to be in more of a solution-oriented mode, instead of the more problem-oriented mode, the IPCC often inhabited (Beck and Mahony 2018). The possibility of limiting temperature rise to 1.5-degrees and how significantly different the consequences for the planet was when comparing a 1.5-degree and a 2-degree temperature rise were key headlines in the SR15.

Therefore, it is expected that policies written after the publication of the SR15 will, to some extent, be influenced or based on the key findings formulated by the IPCC Special Report

(Beck and Mahony 2017). In other words, it is expected that the IPCC would now, beginning with the SR15, contribute to the implementation and monitoring of policy initiatives rather than only providing evidence for climate change and what future to avoid.

Interestingly, several policy-initiatives have been presented by different political actors around the world. Some of these have been presented as "Green Deals," for example, the "Green New Deal" from political actors in the USA and the "European Green Deal" from the European Commission. These "green deals" have in common that they all lay out a positive plan and vision to combat climate change (B. Lahn, 2020). The European Green deal (hereafter EGD) was published after the Green New deal (hereafter GND) originated in the United States of America. However, there are several differences between the GND and the EGD (Lahn 2020). Rather than focusing on how climate costs can be minimized, the Green New Deal comes from the more radical left-wing environmental movement in the USA. The aim here is to connect a set of political questions to a vision for the new left-wing political groups in the US.

On the other hand, EGD is a set of policy initiatives that build on the EU's Long-term strategies (B. Lahn, 2020). With its marked oriented approach, the EGD is more ambitious towards emission scenarios and energy consumption and was called a "man on the moon moment" by EC leader Ursula Von der Leyen. The EGD has mostly been met with reverence and was overwhelmingly approved by the Parliament (EC, 2020). As a contrast, the US Government has had a resurgence of climate skepticism and has of the 4 of November 2020, withdrawn from the Paris Agreement (Beck & Mahony, 2018).

A focus and focal point in Science and Technology Studies are that governments can almost make no actions, whether it is action concerning public health or the climate, without appealing to science or a knowledge authority (Sismondo, 2010). Therefore, an exciting aspect of the EGD and its long-term strategy is its relationship to the knowledge provided by the IPCC's SR15. The role of science in politics is often used as an authoritative source and reason for political initiatives. The relationship between science and politics is, therefore, an interesting subject to examine. Research in the field of STS has often examined the science-policy relationship in climate governance (Jasanoff, 2004a).

Central for these studies is the idea that the reception of scientific evidence by the policymakers and the general public depends on how scientific claims are validated and rendered authoritative for use. Furthermore, what counts as scientifically valid and policy-relevant knowledge is argued to be dependent on specific criteria that are usually defined locally

(Beck, 2012a). Consequently, governments tend to justify actions by referencing scientific and technological knowledge that meets the criteria for the relevant governments (Sismondo 2010)—in this way, making the scientific knowledge the authority. The SR15 is interesting because not only is it the first IPCC report following the Paris Agreement, it is also the first report to be collectively produced by the three IPCC working groups (Livingston, 2020)

The thesis aims to contribute to the debate on the science-policy relationship in the post-Paris Agreement era. Therefore, it investigates how the IPCC`s Special Report on 1.5-degrees has been used to develop and legitimize the European Green Deals' long-term vision for combating global warming. In other words, aim to answer the research question: *how has the knowledge from the IPCC report (SR15) influenced, been used, and called upon in formulating and validating* ***strategies and goals*** *on mitigation to anthropogenic climate change in the European Green deals long term strategy for reaching the new 2050 goal?*

In answering the research question, the aim is to contribute to the debate on STS's science-policy relationship research. Furthermore, this thesis aims to contribute to the scholarly debate in STS and climate governance on the role of science in politics by examining the EGD's specific case. Furthermore, it is especially interested in the performative role of the SR15 in the EGD. In doing so, the thesis aims to uncover and discuss how the IPCC's knowledge is reframed, translated, and legitimized in the policy-initiative EGD.

The thesis is structured with firstly a context and background chapter. This chapter covers the climate target focus in the IPCC, and it lays out the background of the SR15 and the 1.5-degree climate target creation. Secondly, there is a theoretical chapter where the conceptual framework is established, and the relevant literature and research debates are presented. Then the method and approach of the thesis are presented. Lastly, the EGD and its long-term strategy are presented, examined and analyzed with a concluding discussion using the theoretical section's conceptual framework.

CONTEXT AND BACKGROUND

To frame a response to climate change, whether it is to mitigate or adapt to climate change, has represented a critical policy challenge in the 21s century (Randalls, 2010). One reason for this is the essential considerations that deal with cost, efficacy, and ethics. In a paper outlining the historical development of the 2-degree target to its adoption in the EU in 1996 and reaffirmation in 2007, Randalls (2010) describes how both policymakers and scientists have

debated several responses to the challenges of anthropogenic climate change. This has resulted in different ways of formulating and specifying what climate policies should look like. In other words, the focus of scientists and policymakers has changed and fluctuated over the decades. The aspects of the origins and history of the two-degree target have been well documented in Tol (2007) and Randalls (2010) and will not be repeated here. However, some aspects of these targets are relevant because they are descriptive of how the science-policy relationship has been historically in the IPCC and governmental institutions. Furthermore, it is necessary to understand why the policy-response to the SR15 is necessary and essential to examine. Thus, this section will examine these climate targets' aspects to understand how this thesis contributes to this discussion.

Developing climate targets

As discussed in Randalls study (2010), temperature limit targets, such as the 2-degree and 1.5-degree targets, became the policymakers' focus point when policy advice was reframed from focusing on emission reductions upon defining tolerable climate changes. What allowed for this were the specific ways in which scientific analysis of climate change was modeled. In short, when working to understand how sensitive the climate was to increased concentrations of CO2 and CO2 emissions, the concept of climate sensitivity became articulated (Randalls, 2010, p. 599). Climate sensitivity is the equilibrium temperature response to a doubling of CO2 concentrations in the atmosphere compared to pre-industrial levels. The climate sensitivity to a doubling of CO2 concentrations was estimated to be between 1.5-degrees and 4.5-degrees temperature increase. Climate sensitivity was a crucial element in the early Assessments of anthropogenic climate change (Van der Sluijs et al., 1998) and remained a focal point until the 1990s.

Moreover, finding acceptable levels of climate change became a viable research agenda, and therefore, the policy terrain shifted their discussion from controlling emissions to an arena where climate targets were actively discussed (Randalls, 2010). In the beginning, there were significant uncertainties around precisely what these targets were to be. Two targets materialized in European debates in the 1980s; the 2-degree above pre-industrial temperature target and the 0.1-degrees per decade as the maximum tolerable limit target. Conversely, it was scientists that made it possible to frame climate change targets like this. These were some of the first target-based approaches to climate change. A so-called "traffic-light system" also emerged in 1991, ranging from limited risk and damage represented as the color green to

significant societal disruptions and possible tipping points represented by the color red (Randalls, 2010). The boundary between amber, which represents extensive risk and damage, and red was associated with a 2-degree increase (Tschakert, 2015)

Therefore, in 1996, the EU declaration proposed the 2-degree target as the maximum allowable global temperature increase above pre-industrial levels (Tschakert, 2015). Consequently, the 2-degree target became the anchor in mitigation debates leading up to the Conference of the Parties (COP) in Copenhagen in 2009. Hoping that it may become a legal goal in a new climate agreement, the two-degree target was officially sanctioned as essential policy guidance (Tschakert, 2015). Thus, in Cancun at the COP16, parties agreed to reduce greenhouse gas emissions to keep the global average temperature below two-degrees, which then became the so-called long-term global goal (LTGG).

Despite implementing the 2-degree target, it has been a subject of partially severe criticism (Tschakert, 2015). Many Caribbean states stated as early as the COP15 in Copenhagen that the 2-degree temperature rise was unsafe as a threshold for their protection. Moreover, at COP16, the Alliance of Small Islands States (AOSIS) reiterated the claim and pointed to how even a 1.5-degrees target would undermine their communities' survival (Livingston, 2020; Tschakert, 2015). Thus, countries from the AOSIS and several least developed countries (LDCs) insisted on a need to consider lower temperature goals, with specific reference to a lower than 1.5-degrees LTGG (Tschakert, 2015). The AOSIS requested a technical paper on costs and benefits associated with limiting Warming to 1.5-degrees, which was opposed by Saudi Arabia and Kuwait.

As Tschakert (2015) described, parallel to the COP16 decision to use the 2-degree target as the LTGG, the parties decided to periodically review the adequacy of the target itself and the strategies and plans to achieve it. This resulted in an agreement to consider strengthening the goal, which would need to reflect the best available scientific knowledge. At the time, the scientific knowledge explicitly suggested the consideration of the 1.5-degree target. As the AOSIS and Least Developed Countries (LDCs) garnered more and more attention, they began to attract support from more powerful actors, one of the prominent supporters being scientists from the influential European Climate Foundation (Guillemot, 2017)

Consequently, during the period between the Copenhagen and Paris conference in 2015, the 1.5-degree target gained momentum politically and scientifically (Guillemot, 2017). Because of the consideration of strengthening the LTGG at the COP16, the Climate

Convention, with the guidance of the Subsidiary Body for Scientific and Technological Advice (SBSTA), created a "Structured Expert Dialogue" to bring together scientists and state-representatives (Tschakert, 2015). The purpose was to ensure the scientific integrity of the review process. This resulted in a submission of a 200-page report arguing in line with the AOSIS and LDCs that the 2-degree target would fail to save some countries, populations, and ecosystems.

The LTGG was ultimately strengthened in the Paris Agreement. Some saw the goal of limiting the rise to below two degrees, with further aspirations towards 1.5 as a diplomatic success story(Guillemot, 2017). Even if the 1.5-degree target is political, it is based on scientific research (Guillemot, 2017; Livingston, 2020). It has been described as a target that "pleased nearly everyone" (Guillemot, 2017, p. 5). For the countries that will suffer the most, it represents a bargaining chip. For developed countries, it meant successfully obtain signatures of these states without explicitly commit to financial compensations.

Moreover, in Paris, the COP21, the United Nations Framework Convention on Climate Change formally requested the Intergovernmental Panel on Climate Change (IPCC) to undertake a Special Report on 1.5 degrees. This was a compromise, as the states that did not want to include financial reparations in the agreement went along with the ordering of the SR15. At this point, the world was on track for a rise of more than 3-degrees, regardless of the Paris agreement (Guillemot, 2017).

Science-policy interactions post-Paris

The inclusion of the 1.5-degree in the Paris Agreement has been said to have "challenged the norms of science, and scientific assessment" (Livingston, 2020, p. 12). This was because it affected the research focus and interests of the scientific community. Therefore, representing a new type of relationship between science and politics (Beck & Mahony, 2018; Livingston, 2020). At the time of the COP21, few scientists had spent time examining a 1.5-degree target as it was not viewed as significantly interesting. Thus, it was the invitation from the COP21, which at the time was viewed as "unexpectedly concrete" (Livingston, 2020, p. 12), which made it a focus. In other words, the scientific community had not had this level of concrete policy relevance as a motivational factor in former special reports or assessments. This also resulted in the Special Report having a shorter timescale than any former IPCC reports (Livingston, 2020).

The change and consequences the construction of the SR15 report had on the scientific community has been explored in depth by Livingston (2020). For this thesis, it is the changing role of the IPCC and the uniqueness of the SR15 that is relevant. What about the SR15, and the IPCC is different from earlier, and why is that important? The IPCC's role had up until the COP21 been that of a hybrid organization, positioning itself between science and policy (Miller 2001). Moreover, the IPCC`s sees their reports as policy-neutral, policy-relevant but not policy-prescriptive (B. Lahn & Sundqvist, 2017)

Consequently, the IPCC gathered evidence of climate change, changing it from a local phenomenon to a global challenge (Miller, 2004), and identifying contributing factors and consequences. Before the SR15, the reports had primarily quantified the impacts associated with a given pathway or scenario (Beck & Mahony, 2018). These targets were expressed in terms of carbon budgets, concentrations, or global temperature change. The SR15, however, lays out, in a relatively straightforward and unmistakable term, what the risks are. Moreover, the scenarios are under real-world targets, such as 1.5-degree and 2-degree of warming. The SR15 represents a shift in this problem-mode to a solution-oriented mode (Beck & Mahony, 2017). The consequences of this in policy initiatives have been less explored.

The IPCC published the SR15 on the 8 of October 2018. It includes over 6000 scientific references, was prepared by 91 authors from 40 different countries, and was approved in Incheon, South Korea. In its Headline statements accompanying the report, the report's findings are summarized in four parts (IPCC, 2018). The first one is that as human activities are standing now, it is responsible for causing approximately 1-degree global Warming above pre-industrial levels. Furthermore, global Warming will, at this rate, likely reach 1.5 degrees sometime between 2030 and 2050. The second headline stated that there are considerable differences in the severity of long-term consequences between a 1.5-degree and a 2-degree temperature rise. Limiting warming to 1.5-degrees could reduce impacts on ecosystems and human health and well-being. A two-degree temperature increase would also exacerbate extreme weather, rising sea levels, and diminishing Arctic sea ice, coral bleaching, and loss of ecosystems, among other impacts (IPCC, 2018).

This is somewhat similar to the fourth headline in this document, which highlights the strengthening of a global response in the context of sustainable development and efforts to eradicate poverty. Climate temperature rise to 2-degrees would impact sustainable development, the goal to eradicate poverty, and reducing inequalities a lot more than if temperature rise was limited to 1.5-degrees. Lastly, the third headline describes emission

pathways and system transitions constituent with 1.5-degree global Warming. The key finding is that the SR15 modeling shows that for limiting global temperature rise to 1.5-degrees, the reduction of global net anthropogenic CO2 emissions would need to decline by about 45% from 2010 levels and ultimately reach net-zero emissions by around 2050. The 1.5-degree pathways would require rapid and far-reaching transitions in energy, land, urban and infrastructure, and industrial systems. These transitions are described as unprecedented in terms of scale but not in speed. Furthermore, all the pathways limiting global Warming to 1.5-degree projects the use of carbon dioxide removal (CDR) to some extent, but to what extends relies on how much the emissions have been cut by 2050 (IPCC, 2018)

These aspects are what are considered the central or critical statements of the SR15. In other words, this report lays out, in clear and unmistakable terms, the risks accompanying climate change. These are not presented under hypothetical scenarios that will never be realized, but under real-world targets of 1.5-degrees of warming and above that are still within reach for policymakers.

THEORETICAL SECTION

Literature review

The literature on the science-policy relationship emphasizes close links between the construction of climate science and climate policy (Jasanoff, 2004a; Livingston, 2020; Lövbrand, 2011). Some STS research has examined an aspect of science-policy interaction where it is argued that there are different understandings of how considerable the distance between climate science and policymaking should be. Some research on the subject has suggested an agreement between science advisers on a balancing act (Jasanoff, 2009). Here actors from both sides have reasons to keep science and policy close but not to close. The separation gains legitimacy for science, but it is only a front stage performance in practice. Thus, it is backstage the work to try to establish close interactions is happening. Science advisers are attracted to both separation and integration, and the clear separation is essential for the front stage aspect of the process. Moreover, some have argued that scientists and scientific institutions do boundary work due to their professional interests in maintaining scientific integrity and relevance, including enhancing their authority **(**Sundqvist et al., 2018, referring to Gieryn (1983)**.**

Research on scientific institutions, such as the IPCC, suggests that they have engaged in boundary work to maintain a boundary between science and politics (Beck & Mahony, 2018).

Thus, they are often examining how the IPCC positions themselves in the science-policy dynamic and what impacts and what is impacted by their position. As institutions such as the IPCC are seeking an ideal of political neutrality in scientific assessment and advisory processes, based on a clear-cut and stable boundary between science and politics, they can shape scientific communities' public performance (Beck & Mahony, 2018). However, research on this subject has shown how the dynamic is not clear-cut in practice (Guston, 1999). Boundary work is defined as the "ideological efforts by scientists to distinguish their work and its products from nonscientific intellectual activities" (Gieryn, 1983, p. 782). Thus, it can be viewed as an instrument used to maintain and protect the autonomy of science. Moreover, it is a means to gain control over issues and thus defend or maintain authority over scientific findings interpretation (Jasanoff, 1990).

Furthermore, as a result of these studies, the IPCC has been labeled a Boundary Organization, which means it has sought to achieve a hybrid identity combining science and policy (Guston, 1999). In other words, the IPCC actions to mobilize science for policy objectives and its links to both scientists and policymakers have labeled them a boundary organization. These boundary organizations engage in boundary work to protect their authority by using labels such as "science," "policy," and hybridity (B. Lahn & Sundqvist, 2017).

Moreover, the STS literature has pointed to the concept of Boundary Objects to understand how boundary work achieves stability over time (Star, 2010). In short, Boundary objects are work arrangements or tools that enable cooperation (B. Lahn and Sundqvist, 2017). These objects create possibilities or shared spaces for actors to act in complicated institutional settings (Star, 2010). In other words, these objects are usually created by boundary organizations such as the IPCC to be robust enough to maintain a common identity across sites and plastic enough to adapt to the specific needs of the sites (Star, 2010). These objects have been flexibly employed in different social worlds for different purposes. Temperature targets like 2-degrees or 1.5-degrees are examples of boundary objects with a foot in both science and politics and shape action in both worlds (B. Lahn & Sundqvist, 2017; Mahony, 2013; Randalls, 2010). Research on the science-policy relationship has often engaged in examining the boundary objects and their impact on policies. Authors often found them to be the main object in political and scientific controversies (Guillemot, 2017; Guston, 1999; Hoppe et al., 2013; B. Lahn & Sundqvist, 2017; Van der Sluijs et al., 1998). Consequently, the IPCC engaged in Boundary Work on the back of these controversies, to re-establish themselves as authoritative actors in the scientific community.

However, research done with a co-production perspective suggests that there are already close links between the making of climate science and politics (Jasanoff, 2004b; Livingston, 2020; Lövbrand, 2011; Miller, 2004). Research done by Lövbrand (2011), which examined the tight coupling between European climate science and policy, has showcased how knowledge-making practices have been incorporated into climate policy-making practices. Moreover, it examined how EU climate policy influences the funding, making, and interpretation of what is useful climate policy research. In short, the researcher's focus was, to some extent, guided by the notion that they wanted their research to be relevant for policy-makers. Thus, there was a closer link between researchers and the European policymakers than what was viewed as usual (Lövbrand, 2011). Furthermore, this knowledge-making practice tapped into the politics of climate change science. In other words, both the policies and knowledge were co-produced. Lövbrand (2011) argues that these factors help establish the climate as something governable. Thus, the research has simultaneously been informed by and informed understanding of the climate problem. Consequently, it informs how it is best governed.

Furthermore, research on climate science's co-production has shown how important aspects of climate change science, such as the climate targets, have been co-produced (Guillemot, 2017; Livingston, 2020; Tschakert, 2015). Thus, the research suggests that this co-production is a big part of creating science and policy. Even the creation of the IPCC as a global political order was the result of co-production (Miller, 2004).

One central theme for these studies is that the reception of scientific evidence by the policymakers and the general public depends on how scientific claims are validated and rendered authoritative for use. What counts as scientifically valid and policy-relevant knowledge is dependent on specific criteria that are usually defined locally (Beck, 2012b). Consequently, governments tend to justify actions by referencing scientific and technological knowledge that meets the criteria for the relevant governments (Sismondo, 2010)—in this way, making the scientific knowledge the authority. Thus, science is a result of a political process and maybe more relevant for individual political institutions. This thesis aims to take part in this debate by examining how knowledge and what knowledge from the SR15 is used as a justification for policies.

Moreover, most of these studies examine the relationship between science and policy in a pre-Paris Agreement climate regime. Several studies have argued that the IPCC is taking on a new role (Beck & Mahony, 2017, 2018; B. Lahn & Sundqvist, 2017), and as a result, the

political and scientific climate has changed after the adoption of the Paris Agreement (Beck and Mahony 2018). Thus, there is a fresh opportunity to examine the science-policy relationship in the post-Paris-Agreement climate. This thesis aims to be relevant by providing insight into how one leading governmental body, the EU, is framing and implementing aspects from the SR15 in its policy-initiative of the EGD. Moreover, contributing to the debate of the science-policy interaction, and at the same time, the debate of how IPCC science is now being performative in policies

Following in the footsteps of these studies on the dimension of the distance between science and policy are Sundqvist and colleagues (2018). They understand these debates as influenced by two ideal-type cases, a two world and a one-world perspective. In a two-world perspective, some argue that climate knowledge needs to be better communicated to policymakers. Here the scientific work is seen as existing in a separate sphere than policymaking. There is a gap between science and policy. This gap is what is seen as the cause of the lack of usable knowledge. Thus, the knowledge from the IPCC does not automatically lead to action. The gap is seen as a problem, where there is a gap between knowledge and action. The policy is too independent of science, while science insufficiently influences policy. Sundqvist et al. (2018) identify several solutions to this gap-problem, as reflected in the literature. Some scholars are blaming policymakers, and some are blaming scientists.

The one-world perspective sees science and policy as tightly coupled, which could result in a loss of "distinct spheres of authority" (Sundqvist et al., 2018, p. 457). The gap has been deliberately bridged by a hybrid organization such as the IPCC in the one-world perspective. Sundqvist et al. conclude that this has become a problem because the connection is seen as too tight. Thus, science is not independent. Science on climate is therefore assessed together with policymakers. Distance is understood as a level of independence, and in a one-world perspective, science and policy are not independent of each other. Therefore, scholars understand the IPCC as an organization seeking to achieve policy impact by creating a clear and unified message from the scientific consensus (Hulme & Mahony, 2010). Thus, resulting in a followed and implemented single policy path.

From the understanding of these two worlds, Sundqvist et al.(2018) have developed a typology. This typology is developed from the two ways of describing science and policy interactions. These two ways encourage different predominant ways of identifying interpreting problems. Thus, proposing contrasting solutions for improved science-policy interactions. The terms are used as followed: two descriptive perspectives, which see or emphasize the distance

between science and policy or their closeness. This closeness is approved or disapproved of; thus, there are four diagnoses described by Sundqvist et al. (2018). Firstly, understanding existing relations between science and policy matches the one-world perspective and is approved of. This is a desirable one-world situation. Secondly, in diagnosis 2, relations match the one-world perspective but are seen as undesirable or problematic. Diagnosis 3 understands the relationship as a two-world perspective, and this is disapproved of, thus being undesirable. Diagnosis 4, the relationship is matching the two-world perspective but is desirable.

The studies mentioned thus far have, with a few exceptions, been done in a pre-Paris Agreement governance regime. Research on the IPCC role and the science-policy relationship in the post-Paris Agreement governance regime has suggested that the scientific knowledge and expertise are undergoing a far-reaching transformation (Beck & Mahony, 2017, 2018; Livingston, 2020). Some research has argued that new forms of boundary work will develop at different levels within and around the IPCC (Beck & Mahony, 2018). However, so far, few studies have empirically investigated the degree to which these postulations hold true.

Therefore, in this thesis, the aim is to contribute to these debates on science-policy interactions in a post-Paris Agreement paradigm. Thus, to analyze and examine the science-policy interaction, several concepts will be used. The next section outlines what these concepts are and how they are to be used in this thesis

Conceptual framework

The first relevant concept to this thesis is the concept of co-production. This thesis is written through the lens of Science and Technology Studies (STS); thus, not engaging in the purification of concepts or false dichotomies (Sismondo, 2010). Instead, the concept of co-production will guide the analysis, as it offers a valuable and different perspective on political power by treating both the knowledge and the social as something produced by and for each other (Jasanoff, 2004a). The links between microsocial contexts where the knowledge about the environment are made, and macropolitical institutions that shape social and environmental change, is examined (Miller, 2004). As Lövbrand (2011, p. 227) states, the main interest in these studies is "how scientific representations of nature are produced, validated and used to give meaning to socio-political arrangements."

Moreover, there are several different analytical lenses of co-production, mapped out by Bremer and Meisch (2017). The lens that this thesis will use to analyze data is a descriptive interactional co-production lens. This lens is an analytical, interpretative, and descriptive tool

and may expose and challenge dominant narratives in climate governance. The interactional lens can analyze the interaction between universalized climate knowledge and local contexts of meaning-making. STS studies under the co-production can both problematize the relationship between science and political decision-making and raise fundamental questions about how decisions are represented and framed (Irwin, 2008). It can understand the implicit socio-cultural assumptions that exist and operate within these representations and framings, as Jasanoff (2004a) argues that scientific facts are dropped into contexts conditioned to produce distinctive cultural responses to scientific claims.

The second and third concepts applied to the analysis in this thesis are boundary work and boundary objects. STS scholars have argued that in understanding the science-policy relationship, science studies as an institution should be actor-oriented (B. Lahn & Sundqvist, 2017). It is from the actors' actions and practices that the studies should start. The concept of boundary work is such action or practice where these actors make demarcations between science, governance, and politics (Gieryn, 1983). Studies done under the concept of boundary work is examining how boundaries are drawn and with what consequences. Boundary work has usually been examined in relation to the IPCC and the boundary work the organization has engaged in after controversies (Beck & Mahony, 2018). However, this thesis looks to the framework of boundary work to analyze how the EC might engage in similar work. As a means to draw a boundary between themselves and the IPCC to perhaps but the science in its own sphere of authority.

To understand how boundary work achieves stability over time, the concept of boundary object is essential. Often described to be a creation of the boundary organization, the boundary objects have been thoroughly described and examined by Star (2010). For Star, it is essential to understand that even though objects may appear to be boundary objects, they often are not. As it is used as a tool for analyzing action and practices, boundary objects do not require a basic definition. However, boundary objects are often entities such as "standards," "guidelines," and "ideal types" (B. Lahn & Sundqvist, 2017). These ideal types are objects such as diagrams, atlas, and descriptions. They are entities that are often vague but good enough for those who use it. However, they have to create a shared space for different actors. It must be able to bridge the gap, as far as there is one, between science and policy. Thus, it must be robust enough to maintain its identity across the sites and plastic enough to adapt to the specific sites (Star, 2010). Examples of relevant boundary objects are climate targets (Hoppe et al., 2013; B. Lahn &

Sundqvist, 2017; Livingston, 2020), climate sensitivity range (Van der Sluijs et al., 1998), and the Bali Box (B. Lahn & Sundqvist, 2017).

The fourth concept used in this thesis is the concept of the Anchoring Device. It is defined by Van der Slujis and colleagues (1998, p. 312) as "highly aggregated and multivalent consensus knowledge constructs, interfacing between science and policy" and a "highly stable boundary object." For Van der Slujis and colleagues, anchoring devices are functioning to manage uncertainty, as they can constrain discourse by limiting drifting in the primary scientific case. The example they use is the aspect of climate sensitivity and its stability over two decades. Van der Slujis found that climate sensitivity functioned as a boundary object, but the climate sensitivity range was not stable and would often be used wrong according to climate modelers. Thus, it was a flexible interpretation of a common core meaning. It describes a boundary-object that tends to do nothing or to remain unchanged. It constrains the related policy discourse.

Furthermore, for Van der Slujis and colleagues, anchoring has a positive and vital effect because it creates a common ground where negotiation of positions beyond the immediate scientific question can be conducted (1998). Examples of this are negotiations over the assumed construction of a new collective social identity of global agency and responsibility that focuses on greenhouse gas controls or adaptation to project climate change effects**.** Without the anchor, the collective parties might not come together at all. Consequently, making it difficult to form any fundamental policy community.

In summary, to understand what role the SR15 has in the EGD, concepts such as boundary work, boundary objects, and anchoring devices will be used. The boundary work concept will be used to identify whether the EC works in a two-world or a one-world perspective. Thus, identifying if boundary work is done to maintain a boundary between science and politics would suggest a two-world perspective. Moreover, identifying successful boundary objects could suggest how successful the IPCC is as a boundary organization by making work arrangements that enable cooperation. Lastly, what the EGD uses as an anchoring device, would further contribute to understanding how boundary objects enable cooperation.

METHOD AND APPROACH

This section will outline the method and the approach taken to answer the research question. The thesis is under the academic field of STS. As shown in the literature review, STS can both problematize the relationship between science and political decision-making and raise fundamental questions about how decisions are represented and framed (Irwin, 2008). As this

thesis is interested in the relationship between science and politics, the main approach is to analyze policy documents from the EGD and, by using the conceptual framework, analyze SR15`s role in them. This will be done as the way of answering the research question: *how has the knowledge from the IPCC report (SR15) influenced, been used, and called upon in* ***formulating and validating strategies and goals on mitigation*** *to anthropogenic climate change in the European Green deals long term strategy for reaching their new 2050 goal?*

Moreover, these documents will be analyzed from an STS perspective, with the primary method being a qualitative document analysis. Qualitative methods are defined as scientific methods of observation that seek to gather non-numerical data. Qualitative research answers questions related to why or how things occur rather than how often it occurs (Sismondo, 2010). Research done with an STS perspective is empirical studies (Skjølsvold, 2015). Thus, seeking to anchor the theories in the empirical data. Furthermore, STS is not interested in engaging in the purification of concepts, thus avoiding dichotomies.

Therefore, to answer the research question, the data has to be collected. The data collected are documents from the EC. The main document is the Communication document published by the EC as the presentation of the EGD (EC, 2019). All Communication documents and accompanying in-depth documents are available for the public on the EU`s webpage. As the research question focuses on the EGD's long-term strategies, the EGD was examined to identify whether more documents present or propose long-term strategies. Two more documents were identified as the main documents in the EC`s long-term strategy by examining the EGD. These documents are described and examined in depth in the next chapter.

Moreover, as the EC has published a substantial number of documents under the climate action headline, there was a need to narrow down the selection to a limited number of documents to analyze. Thus, documents relevant to strategies and plans for mitigation to climate change after the SR15 were identified. Notably, the EGD Communication is relevant as this document is the primary Communication of the Deal. There are several other documents in the European Green Deal hierarchy (see figure 2), but these have been deemed not relevant to the thesis. These documents cover specific aspects under the EGD, which are not relevant to this thesis. Furthermore, several documents which might be interesting were either published late in 2020 or not yet published. Thus, making them unavailable for this thesis. Such as the strategies for an updated 2030 goal, which were published late in September of 2020.

Consequently, the documents analyzed in this thesis were referenced in the EGD as the underlying vision for the EGD's long-term strategies. In total, three documents have been identified as especially relevant for this thesis. To summarize, the relevant documents that will be analyzed in this thesis is the policy initiative named The European Green Deal Communication, The A Clean Planet for All, and its accompanying in-depth analysis.

Some ethical considerations are particularly relevant to this study. As the study uses data collected from policy documents and scientific reports that are publicly available, the primary consideration is to present and reflect on the data honestly and with integrity.

Document analysis - A description of the data analysis procedures

Documents have a fundamental position in the scientific and political world. They are created to be specific and concrete. In other words, documents are often constructed and written with a context and use in mind. The SR15 has been created in a specific way with a specific intention. This context and specificity, as other studies have demonstrated, "new." The results of similar documents have resulted in different outcomes. They have been actants in the climate change society by enabling and limiting particular agendas. This specific view on documents as actants enables us to study and analyze them more than just texts and words. Documents are here viewed as not only something purely textual and discursive but also something material. Therefore, document analysis that is being done in this thesis is different from methods called discourse or text-analysis (Asdal & Reinersten, 2020). Documents do not stand as something outside the world but take an active part in creating it. Thus, they do not just describe worlds but take an active part in constructing and enabling them. Politics are, to a degree, developed through different types of documents. These documents set the agenda and highlight cases that the governmental body views as important or unimportant. Therefore, aspects not mentioned in a political document are as essential as those present. Therefore, documents are an attractive and relevant study object.

Asdal and Reinersten (2020) present several suitable methods of doing document analysis. These are viewing documents as a place and a tool. Thus, the documents are understood as actants in themselves. Actants is a term used in STS which is used to describe how both human and non-human entities can act in relation to each other (Callon et al., 2011). In other words, the documents are treated as actors on a similar level to humans. Thus, the documents will be performative in their relation to the space they are in and their relation to other actants in that space. The documents are viewed as having agency (Sismondo, 2010).

Understanding documents as places enables understanding documents as a place where other documents, such as the SR15, can act. It can act on other aspects included in the space, but more importantly, it can be made to do something. These different documents are thus, different spaces and tools. Moreover, the language used in relation to the SR15 is essential to analyze as it can reveal what type of space and tool the document is. Is it a scientific or political language? What is the SR15 doing in the documents? Is it presenting, discussing, and claiming? Or is it stating and emphasizing? These types of analyses are important to understand what role the SR15 has in these documents.

In the next section, the data is collected and presented. This is done by reading through each document and extracting quotes and the context of the quotes, where the SR15 is referenced. This is done for each document. Furthermore, an explanation and description of each document and its content are presented at the beginning of each section. Then in the analytic section, the data is analyzed using the document-analysis method described above. Furthermore, the concepts presented in the conceptual framework chapter is used to describe and understand the SR15 role in the European Green Deal. Thus, answering the research question.

EUROPEAN GREEN DEAL AND ITS LONG-TERM STRATEGIES

In this section, the documents will be described, and relevant data will be presented in the form of quotes. The section is divided into two main sections, where each of the documents gets its own section. This is to organize and separate the documents as they are viewed as separate actors acting in a larger hierarchy of documents. The EGD is the policy initiative, while EGD Communication is the main document that leans on the other two documents. Together they make up the main ideas of the long-term strategies to achieve the EGD.

European Green Deal Communication

The European Commission launched the EGD Communication in December of 2019. The 24-page document, announced by the Commission's president, Ursula von der Leyen, was launched as a new growth strategy for the EU. EGD Communication reads like a list of promises and vows to transform Europe into a fair and prosperous society. The Communication has the added intent to improve life quality for future and current generations with a resource-efficient and competitive economy where there are no net emissions of greenhouse gases by 2050 (EC, 2019). Furthermore, it aims to decouple economic growth from resource use. Thus, the EGD

reaffirms the European Commission's ambition to make Europe a global leader and show global leadership in combating climate change by being the first climate-neutral continent by 2050. The task of tackling climate change is described in the document as "this generation's defining task." (EC, 2019 p.2).

The EGD has gone through several stages of internal debates. Both in a public event on the 28 of January 2020, and the published roadmap was open for feedback from the 9 of January 2020 to the 6 of February 2020 (EC, 2020). In total, the Commission received 926 replies from contributors, which included many European and national associations representing industrial sectors such as the power, automotive, and steel sectors, private companies, NGOs, and many EU citizens (EC, 2020 p. 3). Furthermore, seven member states and Norway had public authorities that contributed to the consultation of these aspects. The EGD is described as a "man on the moon moment" by the Commission president Ursula Von Leyen.

The data collected in this section is from the document called EGD Communication (EC, 2019). Firstly, the task of tackling climate change is described as an "urgent challenge" in the title of the introduction chapter of the Communication, which is named "Turning an urgent challenge into a unique opportunity" (EC, 2019 p2). The EGD Communication functions as a roadmap and a promise to react to this urgent challenge. Interestingly, the IPCC's SR15 is referenced as the source of information on this urgent challenge:

"The atmosphere is warming, and the climate is changing with each passing year. One million of the eight million species on the planet are at risk of being lost. Forests and oceans are being polluted and destroyed. The European Green Deal is a response to these challenges" (EC, 2019, p.2).

This reference is also the only one made to the special report in the entire 24-page Communication. However, the Communication comes from resolutions and reactions to examining strategies to achieve climate neutrality by 2050. In the European Parliaments resolution of the 14 of March 2019 on climate change, the EU objective of achieving the 2050 net-zero goal was endorsed and adopted (EC, 2020). Furthermore, the resolution of the 28 of November 2019, the Parliament declared a climate and environment emergency and stressed that net-zero greenhouse gas emissions were to be reached as early as possible and by 2050 at the latest.

The EGD Communication sets a primary goal: reaffirmation to make the EU climate neutral by 2050. This goal is defined as having a net-zero emission of climate gasses by the

year 2050, thus fulfilling the EU's commitment from the Paris-Agreement (EC, 2019). A plan for revisiting the 2030 goal is mentioned in the Communication. In September 2020, the Commission published a plan to achieve a reduction of 60% greenhouse emissions.

Moreover, the EGD promises to restructure the economy, and this restructured economy is promised to both grow and be socially just (EC, 2019). The EGD covers everything from housing to batteries and decarbonized steel, air pollution, and how to spread the vision of the EGD to other countries. All to respond to the "urgent challenge" presented by the IPCC special report. The main aspects of the EGD are summarized in Figure 1.

Figure 1. An overview over the main aspects of the EGD and the plan to transform the EU`s economy for a sustainable future (EC, 2019)

To reach its primary goal, which is a response to the urgent challenge, the EGD Communication references another Communication called "A Clean Planet for all – A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy" (EC, 2018a) The EGD Communication references the strategy like this:

"The Commission has already set out a clear vision of how to achieve climate neutrality by 2050. This vision should form the basis for the long-term strategy that the EU will submit to the United Nations Framework Convention on Climate Change in early 2020." (EC, 2019 p. 4)

Thus, according to the EGD Communication, the "Clean Planet for all" is the "clear vision" of reaching and achieving net-zero emission in 2050. However, the EGD stands as the front figure of EUs plans to achieve net-zero emissions by 2050. The plans in themselves are built up by a network of different documents, resolutions, and strategies that have appeared before and after the EGDs announcement. These other EGD documents are more in-depth and more focused on the transition's more specific aspects. Figure 2 visualizes the relationship between the documents. Underlined documents in Figure 2 are the ones that are analyzed and relevant to this thesis. As Figure 2 visualizes, the thesis is focusing on the long-term strategies under the EGD. This figure, though only presenting some major aspects of the EGD, shows where this thesis is focused. The focus is under the Long-term Vision aspect of the EGD. The difference between figure 1 and figure 2 is the fact that figure 2 is a representation of relevant documents, whereas figure 1 is a representation of the main aspects of the EGD whether they have accompanying documents or not.

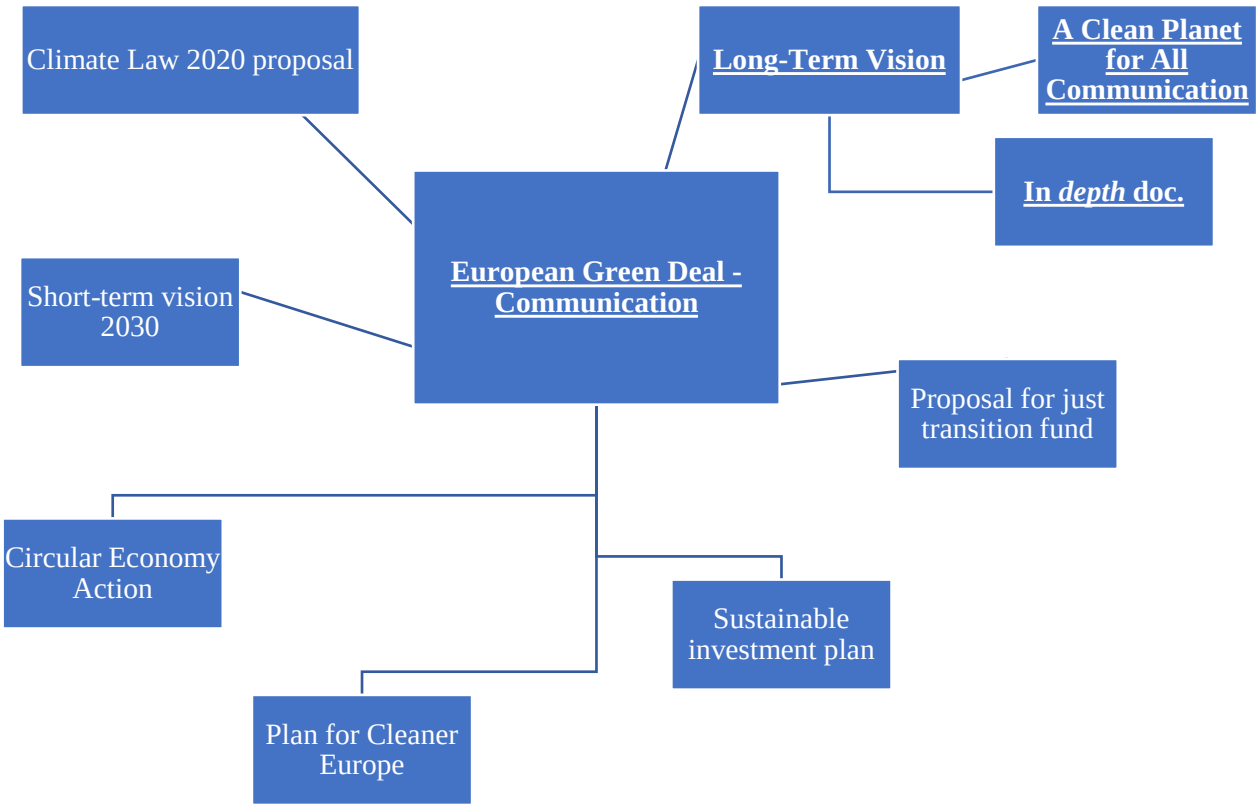

Figure 2. The hierarchy between relevant documents that make up the EGD. The underlined sections of the figure are what this thesis is focused on.

A Clean Planet for all – A European strategic long-term vision for a prosperous, modern, competitive, and climate neutral economy

The European Long-term strategy named "A Clean Planet for all – A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy for all" is the EU's vision for reaching net-zero emissions by 2050 (EC, 2019 p. 3), which arrived in 2018 on the 28 of November. The long-term strategy is a 25-page document that takes on its commitment to the Paris Agreement. This Communication is different from the EGD Communication. Where the EGD Communication lays out a roadmap of actions that are to be undertaken, the A Clean planet for all Communication is a confirmation of Europe's commitment to "lead in global climate action" (EC, 2018a p. 2). Moreover, it is meant to "present a vision that can lead to achieving net-zero greenhouse gas emissions by 2050" (EC, 2018a p. 2). This vision is towards a fair, prosperous, and green economy that will replace the

2011- Roadmap to a low-carbon economy by 2050. It states that a revision of the underlying analysis had become necessary following the adoption of the Paris Agreement. Moreover, it was necessary because of further reductions in the cost of renewable energy and storage technologies, as well as the publication of the SR15 (EC, 2018a)

Accompanying the "Clean Planet for All" Communication is an in-depth analysis carried out by the European Commission (EC, 2018b). This in-depth analysis explores how climate neutrality can be achieved by examining all the key economic sectors, such as energy, transport, industry, and agriculture. It also lays out what effect current policies will have and concludes that it will not suffice if the EU is to contribute to the Paris Agreements temperature goals (EC, 2020**)**. The in-depth document analyses a portfolio of scenarios for achieving the transition to net-zero greenhouse gas emissions by 2050. These scenarios are based on existing and emerging technological solutions, focusing on empowering citizens and aligning action in key areas such as industrial policy, the circular economy, finance or research, and innovation (EC, 2018b).

Moreover, it comes with a focus on ensuring social fairness for a just transition. All these aspects are also present, to some extent, in the EGD Communication but are examined in depth here. The assessments are claimed to build upon scientific literature and inputs from a wide range of stakeholders as well as integrated modeling, allowing to understand better the transformation of complex interactions between energy, industry, building, transport, agriculture, forestry, and waste sectors (EC, 2018b p. 370).

To summarize, the Clean Planet for all is two documents. One is the Communication document, and the other is the in-depth document accompanying it. The strategy's main conclusions are the new long-term objective of achieving a climate-neutral economy where greenhouse gas emissions reach net-zero by 2050 and where the remaining emissions are compensated by carbon sinks or storage (EC, 2018a). However, the documents do not mention concrete policies or sectoral objectives and do not address interim targets towards the 2050 goal, as the documents present a strategic "vision" for a climate-neutral EU. There are no detailed technical strategies present in the documents. Thus, comparing these documents to the EGD Communication, where an interim goal towards the 2050 net-zero emission goal is promised to be revisited, it becomes apparent that these documents are meant for different things are written under different contexts. The Clean Planet for all documents is the first response to the SR15. EGD Communication comes a year later. Moreover, it comes after the

aspects of the Clean Planet for All documents had been through several stages of resolutions, which has resulted in the EGD (EC, 2020).

Therefore, the Clean Planet for All has a different explicit relationship to the SR15. It is both nearer in time, as both were published in the fall of 2018. Moreover, the SR15 is referenced once in the EGD Communication and eight times in the 25-page Clean Planet for All Communication document. Furthermore, it is referenced over 30 times in the in-depth document with two sub-chapters dedicated to specific aspects of the SR15. This section focuses on this long-term strategy and the role of the SR15 by analyzing the "Clean Planet for All" Communication (EC, 2018a), with about 25 pages, before diving deeper into the in-depth document (EC, 2018b) accompanying the Communication.

A clean planet for all Communication

The first mention of the SR15 comes on the first page in the document's introduction. The whole of chapter one is an introduction to what the document is and why it exists. The chapter title is "the urgency to protect the planet," and in its third paragraph, there is a reference to the SR15 (EC, 2018a p. 2).

"The Intergovernmental Panel on Climate Change (IPCC) issued in October 2018 its Special Report on the impacts of global warming of 1.5-degrees above pre-industrial levels and related global greenhouse gas emission pathways. Based on scientific evidence, this ***demonstrates*** *that human-induced global warming has already reached 1-degrees above pre-industrial levels and is increasing at approximately 0.2-degrees per decade. Without stepping up international action, global average temperature increase could reach 2-degrees soon after 2060 and continue rising afterwards"* (EC, 2018 p. 2).

Thus, one of the main findings of the SR15 is presented and summarized in this section. The highlighted words in the quote are what the SR15 is said to be doing. Thus, this quote demonstrates several aspects, such as how global warming is human-induced and has already had impacts on the global temperature. Moreover, the SR15 is described as being "based on scientific evidence."

Continually, the documents present more specific consequences from the SR15. Different future worlds are presented, and the Communication sees the avoidance of above 3-degrees and 2-degree worlds as **necessary**, **possible**, and **urgent**. Again the highlighted words are what the SR15 is doing. The consequences of global warming are summarized in

Communication with a figure visualizing them (EC, 2018a p.3). These are the consequences for the European continent (See figure 3). Moreover, the SR15 is **confirming** these future worlds:

*"The IPCC report **confirms** that approximately 4% of the global area is projected to undergo a transformation of ecosystems from one type to another at 1C of global Warming, increasing to 13% at 2C temperature change. Irreversible loss of the Greenland ice sheet could be triggered at around 1.5C to 2C of global Warming. This would eventually lead to up to 7 meters of sea level rise affecting directly coastal areas around the world, including low-lying lands and islands in Europe."* (EC, 2018a, p2)

"This would also have severe consequences on the productivity of Europe's economy, infrastructure, ability to produce food, public health, biodiversity and political stability" (EC, 2018a, p2)

In the next chapter, several goals are presented, such as the 2050 net-zero emission goal. Moreover, it is made clear that the following strategies in the Communication are "meant to set the direction of travel of EU climate and energy policy" (EC, 2018a p. 3). Thus, it has the intention to frame what the EU considers as its long-term contribution to achieving the Paris Agreement temperature objectives in line with UN Sustainable Development Goals (EC, 2018a, p3). These aspects will further affect a more comprehensive set of EU policies. However, the Communication does not intend to launch new policies nor intend to revise the 2030 target.

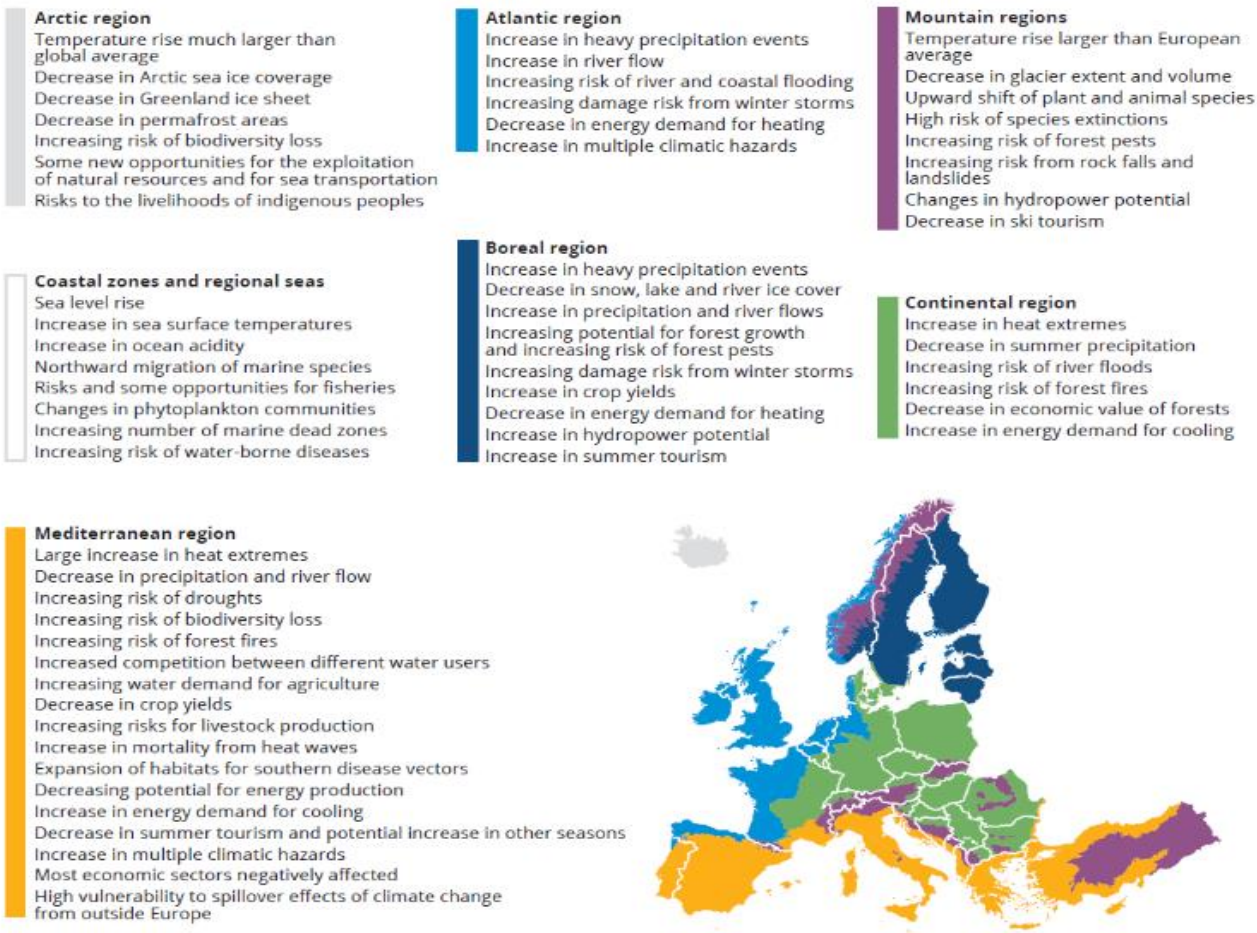

Figure 3. Climate change impacts in Europe as presented in the Clean Planet for All comm. (EC, 2018a p. 3)

"The IPCC report ***confirms*** *that the world needs to limit climate change to 1.5°C to reduce the likelihood of extreme weather events. It also* ***emphasizes*** *that emissions need to be reduced with far more* ***urgency*** *than previously anticipated. In order to limit temperature, increase to 1.5°C, net-zero CO2 emissions at global level needs to be achieved around 2050 and neutrality for all other greenhouse gases somewhat later in the century. At this point, any remaining greenhouse gas emissions in certain sectors need to be compensated for by absorption in other sector****s,*** *with a specific role for the land use sector, agriculture and forests. This provides an* ***opportunity*** *for the EU to step up its action to show leadership and reap the benefits of first mover advantage. This would require the EU to achieve greenhouse gas emissions neutrality by 2050*" (EC, 2018a p. 5)

In the quote above, the highlighted words are again what the SR15 is described as doing and what it is. Thus, the SR15 is very active in this section as it is confirming and emphasizing. Moreover, it confirms and emphasizes urgency. Thus, the SR15 is what is stating what the

challenge is and that it is urgent. The SR15 states that there is a need for the world to limit climate change to 1.5-degrees to reduce the likelihood of extreme weather. The current actions are understood as "not an option" (EC, 2018a p.5) by the EC if they are to achieve the goal of net-zero emissions and reap the benefits of the positive consequences of limiting temperature increase to 1.5-degrees compared to 2-degrees.

Moreover, the Communication states that this is an *opportunity* for the EU to step up its action to show leadership and "reap benefits" of first-mover advantage (EC, 2018a p. 3). Thus there is another reason for the EU to achieve greenhouse gas emissions neutrality by 2050. Continually, the following quote creates another strong link to the IPCC special report:

*"The IPCC report **provides** us with this encouraging message: limiting global temperature increase to 1.5-degrees is **doable**, **provided** we act now and coherently use every tool at our disposal."* (EC, 2018a p. 5)

*«The **strong scientific** basis of the IPCC report to decision makers across the globe for tackling climate change, modernizing the economy, promoting sustainable development and eradicating poverty has been duly taken into account by the European Commission when preparing this EU Strategy for long-term greenhouse gas emission reduction.»* (EC, 2018a p. 5)

The IPCC report is a report which "provides" the Commission with an "encouraging message." Namely, the ambitious goal of limiting global temperature increase to 1.5-degrees is "doable" or "provided" if they act now**.** Moreover, the SR15 is described as something with a "strong scientific basis" (EC, 2018a p. 5). As the report has a "strong scientific basis to decision-makers around the globe," several aspects have been "duly taken into account" by the EC in making and preparing the long-term strategy for greenhouse gas emission reduction.

Moreover, the Communication, therefore, has a strategy that "outlines a vision" of both economic and societal transformations required to reach the ambitious net-zero 2050 emission goal (EC, 2018a p. 5**)**. In other words, the fact that the Communication states that the strategy "therefore" outlines a vision is a reference to the information presented in the previous section. Thus, the section that states that the SR15 has an encouraging message that avoiding the consequences mentioned in chapter one is doable, provided they act with urgency and use every tool coherently, is why the Communication has outlined this vision. The references to SR15 in this chapter are a way of using science as a reason for political action. These significant

systematic changes are necessary to avoid the future that SR15 has proven with a "strong basis of scientific evidence" and so forth.

In these quotes, the language used to describe the SR15 as an entity with a strong science or with a strong basis of science. Thus, a boundary is being either reinforced or created by the EC. Moreover, it is the SR15 that **confirms**, **provides,** and **emphasizes** in the Communication**.** The EC is the one that reacts to the SR15.

Chapter three maps the relevant pathways for the transition to the 2050 goal. The analysis of 2050 pathways presented in both the Communication and the accompanying in-depth document is based on a reference scenario (EC, 2018a p, 6). This scenario is made up of only existing policies and targets for 2030. Thus, at the current rate, it results in 45% emission reductions by 2030 and 60% by 2050. Several ways of going beyond this reference scenario are formulated and modeled, each involving a different set of technology options (EC 2018a, p. 6). In short, the analysis finds that only a combination of these different pathways can achieve net-zero

After presenting and building the analysis of the different pathways with the main challenges incorporated, the Communication presents and examines seven main strategic building blocks for priority areas for joint action to accomplish decarbonization, which is also visualized in figure 4. Some of these building blocks are not relevant for this thesis as they have not referenced the relationship to the IPCC nor the SR15. The seven building blocks are summarized in figure 4. As represented by figure 4, these seven building blocks are extensive and cover every aspect of the transition to achieve the goals set out in the Communication (EC, 2018a, p 23)

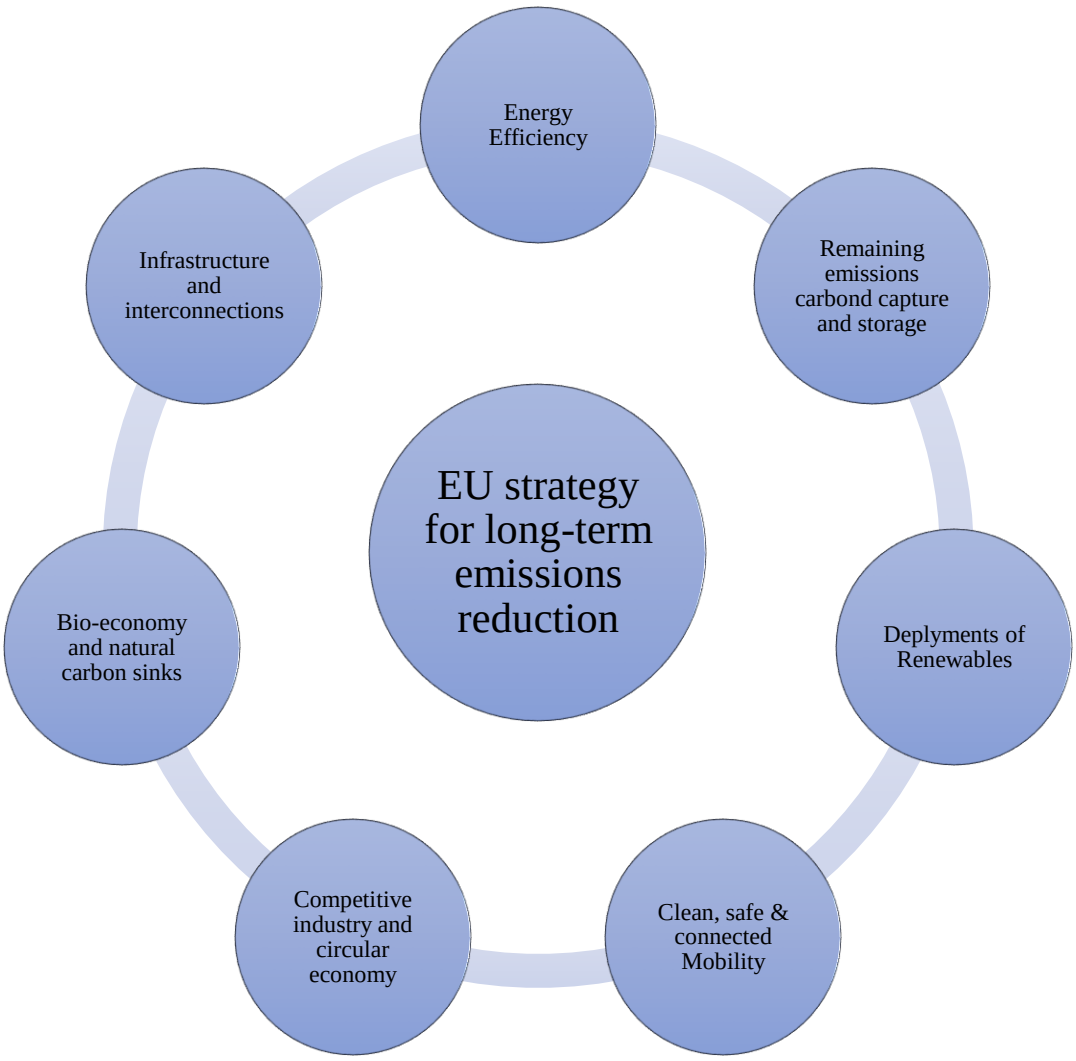

Figure 4. Seven joint action building blocks of the Clean Planet for All Communication (EC, 2018a)

However, the SR15 is relevant in the second priority area. This priority area is to fully maximize renewables and electricity deployment to decarbonize Europe's energy supply. Here the significant increase in renewable energy is presented as necessary in all scenarios calculated by the EC (2018a, p, 8). The EC calculates that the electricity supply that is fully decarbonized by 2050 must be supplied by approximately 80% from renewable energy sources. SR15 is referenced under this building block with this quote:

*"These transitions are **similar** to global pathways analyzed in the IPCC report."* (EC, 2018a p.9)

The transition that the Communication presents is how it needs to go from 50% emission-free energy to more than 80% by 2050. The energy is meant to come from renewables such as solar and offshore wind and 15% nuclear power. This is the pathway that is "similar"

to global pathways presented in the IPCC Special report. The SR15 is not referenced again in this chapter.

The fourth chapter lays out a plan for enabling the long-term transition economically. The special report is present here in the beginning. As the plan for investing in modernizing and decarbonizing, the EU's economy needs to be raised from 2% to 2.8% of the GDP. The summarization ends regarding how this is also "in line with the IPCC special report." The SR15 estimated that between 2016-2035 investments are needed in the energy system to be representing about 2.5% of the world GDP (IPCC, 2018). Thus, "in line with" then means that 2-2.8% is in line with the 2.5% from SR15. However, the Communication states that options such as a rapid transformation towards a circular economy and behavioral changes can reduce this need for additional investments (EC, 2018a).

In summary, the document's critical messages are that the net-zero emission ambition is **necessary,** especially in the global fight against climate change. When describing the ambition, the SR15 is referenced on several occasions. Moreover, these changes are also **possible**, as existing technology options can get them there. In other words, the EC frames the consequences presented in the SR15 is something that **needs** an **urgent** reaction.

Lastly, the EC frames this transition as **beneficial** for Europe. The new green economy is stronger and more modern than the current one (EC, 2018a, p.3). Furthermore, the Communication and, by extension, the Commission states its awareness of the **magnitude** of the challenge and states that "reaching this objective requires deep societal and economic transformations within a generation, touching every sector of the economy" (EC, 2018, p. 23)

A clean planet for all – in-depth

The in-depth document is exactly that, an in-depth document accompanying the shorter A Clean planet for all Communication. The in-depth document examines and lays out in-depth information about pathways and strategies for reaching the 2050 goal (EC, 2018b). It consists of seven chapters and has a total of 393 pages. Compared to the EGD and the A Clean planet for all, which both have approximately 20-25 pages, it is a massive document intended to cover a lot. In collecting data from this document, it is not necessary to include every sentence mentioning the SR15. Recall that what is essential for this thesis is the relevance of the SR15. This in-depth document is more complex and detailed than the two previous more political

documents. This is the EC's in-depth examination of available science and pathways for achieving their goals. Therefore, not every reference will be relevant to this thesis and thus not included. The focus is on what the SR15 is doing in this document. Thus, as the SR15 is not referenced in chapters 3 and 6, data from these chapters are not relevant to the thesis. Chapter 2 has some references to the SR15, but as this chapter mainly explores existing policies in the EU, it is unnecessary to investigate in depth. Chapter 3 covers similar aspects.

The in-depth document consists of seven chapters. In short, the first chapter is an introduction and context chapter. The context is as expected the publication of the SR15 and the signing of the Paris Agreement in 2016. Also included is how the EU should act to achieve the goals they have committed to in the agreement (EC, 2018b). The second chapter focuses on the EU's action to reduce GHG emissions and the transformation of its energy system. The third chapter lays out the expected impacts of current policies beyond 2030. Chapter four examines pathways for sectoral and economy-wide low carbon and energy transformations. The fifth chapter deals with cross-cutting factors such as sustainability, the role of finance, and air pollution benefits, to mention a few. The sixth chapter examines the role of different actors in achieving low carbon and energy transformation pathways. Thus, it examines the role of member states, regional and local authorities, and business and civil society.

The seventh chapter is a chapter of annexes**.** It has several subchapters where the first one is a synopsis report on consultation activities. The second subchapter details the methodology and modeling that are used. The third subchapter describes the EU's contribution to the Paris Agreement's temperature objective. The fourth examines the Global CO2 budget. Firstly, the global carbon budgets in light of the SR15 and secondly, the emission pathways in light of the SR15. Continually the remaining subchapter examines and describes aspects such as sectoral industry transformation, GHG pathways towards 2050, and the specificities of methane emissions and other short-lived climate pollutants.

To begin with chapter seven, there are several references and mentions of SR15 when describing results of individual attachments to consultations that six Member State governments (DK, FR, NL, PT, SE, UK) and NO submitted. Also, besides, 14 members of the Green Growth Groups submitted a joint statement. Thus, the EC states strong general support for the EU long-term strategy with a net-zero target by 2050 within this stakeholder group. Here a reference to the SR15 is made:

"*The need to build on and **take into account** the conclusions of the IPCC's Special Report on the 1.5C target was further **emphasized**. Moreover, several Member States further advocated for a revision of the consistency of the current 2030 target with the 1.5C temperature goal of the Paris Agreement and the EU's revised long-term target."* (EC, 2018b p. 308)

Also, under "non-governmental organization, platform or network," several stakeholders argued for the EU to set as its long-term target to attain net-zero emissions by 2050 (or earlier), considering the 1.5C target of the Paris Agreement. The SR15 is mentioned in this context:

"In this context many alluded to the (then forthcoming) IPCC Special Report on the 1.5C. Additionally, some stakeholders also advocated for a revision of the 2030 target." (EC, 2018b p. 308)

Thus, the SR15 already had a significant role for both the EC and the different Member States. Moreover, this in-depth document was written with an understanding that there was a need to build on and take into account conclusions from the SR15.

When collecting data from this document, there are several themes under in which the SR15 is referenced. Early in the document, it establishes a clear and direct link to the SR15:

Unless otherwise stated, references to IPCC in this document refer to the 2018 Special Report on Global Warming of 1,5c (EC, 2018b, p 14)

Moreover, it is often referenced similarly as it is referenced in the EGD and the Clean Planet for all Communications. This type of direct reference to the consequences found in SR 15 happens in chapter 1:

*The **message** from the recent Intergovernmental Panel on Climate Change (IPCC) report on 1.5C (SR15) is **clearer** than ever before."* (EC in-depth, 2018, p 13)

"If not managed well, these impacts will significantly compromise global human health and safety, development, economic growth, biodiversity, and can have an impact on migration flows and spur a downward global spiral of social fragility and conflict" (EC in-depth, 2018, p *13).*

This message is again one of the key headlines from the SR15. Namely, how humans have caused around 1-degree global warming and how "we" are already experiencing weather and climate extremes changes. As in the Clean Planet Communication, the consequences of

these changes are at the forefront. This type of link to the SR15 is also found in chapter 5 and especially subchapter 5.9. The references in this chapter are mostly concerning the findings from SR15 on impacts of climate change:

"The IPCC SR15 ***builds*** *upon existing knowledge on climate change impacts and adaptation and* ***paints*** *a clearer picture than ever before. Impacts of human induced global warning of 1-degrees are already being felt in the intensity and frequency of some climate and weather extremes. Furthermore, climate models* ***project*** *robust differences in impacts between the present, warming of 1.5-degrees and warming of 2-degrees, every half degree matter"* (EC in-depth, 2018, p *276).*

This reference uses SR15 to underline the importance of continued climate action. Not only today but also in the future. The following section of the chapter keeps going down the same path and uses SR15 as authoritative knowledge. As the highlighted words emphasize, the SR15 is performative in these sections. Similar to the Clean Planet for all Communication, but more thoroughly. Similar trends can be seen in quotes referencing SR15, such as:

"Regarding specific impacts, the SR15 ***concentrates*** *on* ***identifying differences between 1.5-degrees and 2-degrees*** *and finds several striking examples of pronounced drought risk increase, for example in the Mediterranean basin and the middle east. The report, in particular, c****alls for*** *both incremental and transformational adaption. In particular, it* ***notes*** *that a slower rate of sea level rise under 1.5C enables more opportunities for ecological and human systems to adapt "* (EC, 2018b, p. 276)

"While the SR15 is global in scope, impacts will not be spread evenly across the globe. The report ***highlights*** *that some regions are at greater risk of drought and precipitation deficit, while others face greater risks from heavy precipitation events. The report* ***suggests*** *a transition from medium to high risk of regionally differentiated impacts between 1.5C and 2C for food security"* (EC, 2018b p. 276)

In line with these references, two tables are made in the document with the SR15 as a source (see Figure 5). Both of the two quotes are especially important for the thesis. One key headline and aspect of the SR15 is precisely the difference between the 1.5-degrees and 2-degrees. The fact that this is mentioned and used in the in-depth document further suggests the impact of SR15 in forming these long-term strategies.

Table 22: Selected Climate Change Impacts to Natural Systems at 1.5°C & 2°C

	At 2°C	At 1.5°C
Extreme hot days	4°C hotter	3°C hotter
Sea level rise by 2100	around 0.1m more than at 1.5°C (less time to adapt)	0.26-0.77m
Ecosystems	13% of global land area changes from one ecosystem type to another	area at risk ~50% lower than at 2°C
Habitat Loss	18% of insects, 16% of plants and 8% of vertebrates lose over half their climatically determined geographic range	6% of insects, 8% of plants and 4% of vertebrates lose over half their climatically determined geographic range
Permafrost thawing	1.5 2.5 million km^2 greater than at 1.5°C	Woody shrubs encroaching into the tundra already at 1°C
Arctic Ocean	At least one sea ice-free summer per decade	One sea ice-free summer per century
Coral reefs	largely disappear (>99% loss)	decline by 70-90%
Fisheries Global annual marine catch (one model)	over 3 million tonnes lower	1.5 million tonnes lower

Greater risk at 2°C than 1.5°C is specified but not quantified[613]

- Droughts and precipitation deficits;
- Heavy precipitation events;
- Heavy precipitation associated with tropical cyclones;
- Larger area affected by flood hazards due to precipitation;
- Spread of invasive species
- Forest fires
- Marine ice sheet instability in Antarctica and/or irreversible loss of the Greenland ice sheet could be triggered around 1.5°C to 2°C of global warming
- Oceans (greater risk at 2°C spanning several impacts including species range shift and impacts of ocean acidification on marine species)

Note: Impacts above are attributed a confidence level of at least medium in the IPCC report's Summary for Policymakers
Source: IPCC Special Report on global warming of 1.5°C

Table 23: Selected Climate Change Impacts to Human Systems at 1.5°C & 2°C

	At 2°C	At 1.5°C
Populations exposed to climate-related risks and susceptible to poverty	Numbers affected expected to increase	Several hundred million fewer people affected than at 2°C by 2050.
Water stress	Additional 8% of world's population affected (based on year 2000 population)	Affects up to 50% less of the world's population compared to 2°C

Greater risk at 2°C than 1.5°C is specified but not quantified[613]

- Human health: heat-related morbidity & mortality, ozone-related mortality
- Vector-borne diseases (e.g. malaria, dengue): increased risk, shifting geographic range
- Crops (cereals, rice): reductions in yields and/or nutritional quality
- Reductions in projected food availability
- Risks to global aggregated economic growth
- Exposure to multiple, compound climate-related risks
- Greater adaptation needs

Note: Impacts above are attributed a confidence level of at least medium in the IPCC report's Summary for Policymakers.
Source: IPCC Special Report on global warming of 1.5°C.

Figure 5. Tables on the difference consequences in 1.5-degrees versus 2-degrees as presented in the In-depth document (EC 2018)

Also, in the first chapter, there are several references to a specific table in SR15. This is Table 2.4 (See Figure 6). The table is only referenced and not included. The table covers the emissions in 2030, 2050, and 2100 in 1.5-degree and 2-degree scenario classes and absolute annual rates of change between 2010-2030, 2020-2030, and 2030-2050, respectively (IPCC, 2018 p 119). The writers of the in-depth document describe it as recent science. The recent science is "Based on Table 2.4 of the Special Report on 1.5°C" (EC, 2018b, p15).

Continually, the chapter lays out the idea of limiting global Warming to 1,5C and how it would need "even greater, and more urgent, action." (EC, 2018b, p 16). This is in line with how the SR15 is referenced in the Communication documents. Here a 1.5-degree world is mentioned and what a typical projection is. The evidence for this 1.5-degree world and its typical projection is Table 2.4.

*"Limiting global warming to 1.5°C **requires** even **greater**, and more **urgent, action**. In a 1.5°C world, typical projections reach net zero GHG emissions by 2070, and become negative afterwards"* (EC 2018b, p16)

Table 2.4 | Emissions in 2030, 2050 and 2100 in 1.5°C and 2°C scenario classes and absolute annual rates of change between 2010–2030, 2020–2030 and 2030–2050, respectively.

Values show median and interquartile range across available scenarios (25th and 75th percentile given in brackets). If fewer than seven scenarios are available (*), the minimum–maximum range is given instead. Kyoto-GHG emissions are aggregated with GWP-100 values from IPCC AR4. Emissions in 2010 for total net CO_2, CO_2 from fossil-fuel use and industry, and AFOLU CO_2 are estimated at 38.5, 33.4, and 5 $GtCO_2\ yr^{-1}$, respectively (Le Quéré et al., 2018). Percentage reduction numbers included in headline statement C.1 in the Summary for Policymakers are computed relative to 2010 emissions in each individual pathway, and hence differ slightly from a case where reductions are computed relative to the historical 2010 emissions reported above. A difference is reported in estimating the 'anthropogenic' sink by countries or the global carbon modelling community (Grassi et al., 2017), and AFOLU CO_2 estimates reported here are thus not necessarily comparable with countries' estimates. Scenarios with year-2010 Kyoto-GHG emissions outside the range assessed by IPCC AR5 WGIII are excluded (IPCC, 2014b), as are scenario duplicates that would bias ranges towards a single study.

			Annual emissions/sequestration ($GtCO_2\ yr^{-1}$)			Absolute Annual Change ($GtCO_2/yr^{-1}$)			Timing of Global Zero
Name	Category	#	2030	2050	2100	2010–2030	2020–2030	2030–2050	Year
Total CO_2 (net)	Below-1.5°C	5*	13.4 (15.4, 11.4)	−3.0 (1.7, −10.6)	−8.0 (−2.6, −14.2)	−1.2 (−1.0, −1.3)	−2.5 (−1.8, −2.8)	−0.8 (−0.7, −1.2)	2044 (2037, 2054)
	1.5°C-low-OS	37	20.8 (22.2, 18.0)	−0.4 (2.7, −2.0)	−10.8 (−8.1, −14.3)	−0.8 (−0.7, −1.0)	−1.7 (−1.4, −2.3)	−1.0 (−0.8, −1.2)	2050 (2047, 2055)
	1.5°C with no or limited OS	42	20.3 (22.0, 15.9)	−0.5 (2.2, −2.8)	−10.2 (−7.6, −14.2)	−0.9 (−0.7, −1.1)	−1.8 (−1.5, −2.3)	−1.0 (−0.8, −1.2)	2050 (2046, 2055)
	1.5°C-high-OS	36	29.1 (36.4, 26.0)	1.0 (6.3, −1.2)	−13.8 (−11.1, −16.4)	−0.4 (0.0, −0.6)	−1.1 (−0.5, −1.5)	−1.3 (−1.1, −1.8)	2052 (2049, 2059)
	Lower-2°C	54	28.9 (33.7, 24.5)	9.9 (13.1, 6.5)	−5.1 (−2.6, −10.3)	−0.4 (−0.2, −0.6)	−1.1 (−0.8, −1.6)	−0.9 (−0.8, −1.2)	2070 (2063, 2079)
	Higher-2°C	54	33.5 (35.0, 31.0)	17.9 (19.1, 12.2)	−3.3 (0.6, −11.5)	−0.2 (−0.0, −0.4)	−0.7 (−0.5, −0.9)	−0.8 (−0.6, −1.0)	2085 (2070, post-2100)
CO_2 from fossil fuels and industry (gross)	Below-1.5°C	5*	18.0 (21.4, 13.8)	10.5 (20.9, 0.3)	8.3 (11.6, 0.1)	−0.7 (−0.6, −1)	−1.5 (−0.9, −2.2)	−0.4 (0, −0.7)	-
	1.5°C-low-OS	37	22.1 (24.4, 18.7)	10.3 (14.1, 7.8)	5.6 (8.1, 2.6)	−0.5 (−0.4, −0.6)	−1.3 (−0.9, −1.7)	−0.6 (−0.5, −0.7)	-
	1.5°C with no or limited OS	42	21.6 (24.2, 18.0)	10.3 (13.8, 7.7)	6.1 (8.4, 2.6)	−0.5 (−0.4, −0.7)	−1.3 (−0.9, −1.8)	−0.6 (−0.4, −0.7)	-
	1.5°C-high-OS	36	27.8 (37.1, 25.6)	13.1 (17.0, 11.6)	6.6 (8.8, 2.8)	−0.2 (0.2, −0.3)	−0.8 (−0.2, −1.1)	−0.7 (−0.6, −1.0)	-
	Lower-2°C	54	27.7 (31.5, 23.5)	15.4 (19.0, 11.1)	7.2 (10.4, 3.7)	−0.2 (−0.0, −0.4)	−0.8 (−0.5, −1.2)	−0.6 (−0.5, −0.8)	-
	Higher-2°C	54	31.3 (33.4, 28.7)	19.2 (22.6, 17.1)	8.1 (10.9, 5.0)	−0.1 (0.1, −0.2)	−0.5 (−0.2, −0.7)	−0.6 (−0.5, −0.7)	-
CO_2 from fossil fuels and industry (net)	Below-1.5°C	5*	16.4 (18.2, 13.5)	1.0 (7.0, 0)	−2.7 (0, −9.8)	−0.8 (−0.7, −1)	−1.8 (−1.2, −2.2)	−0.6 (−0.5, −0.9)	-
	1.5°C-low-OS	37	20.6 (22.2, 17.5)	3.2 (5.6, −0.6)	−8.5 (−4.1, −11.6)	−0.6 (−0.5, −0.7)	−1.4 (−1.1, −1.8)	−0.8 (−0.7, −1.1)	-
	1.5°C with no or limited OS	42	20.1 (22.1, 16.8)	3.0 (5.6, 0.0)	−8.3 (−3.5, −10.8)	−0.6 (−0.5, −0.8)	−1.4 (−1.1, −1.9)	−0.8 (−0.7, −1.1)	-
	1.5°C-high-OS	36	26.9 (34.7, 25.3)	4.2 (10.0, 1.2)	−10.7 (−6.9, −13.2)	−0.3 (0.1, −0.3)	−0.9 (−0.3, −1.2)	−1.2 (−0.9, −1.5)	-
	Lower-2°C	54	28.2 (31.0, 23.1)	11.8 (14.1, 6.2)	−3.1 (−0.7, −6.4)	−0.2 (−0.1, −0.4)	−0.8 (−0.5, −1.2)	−0.8 (−0.7, −1.0)	-
	Higher-2°C	54	31.0 (33.0, 28.7)	17.0 (19.3, 13.1)	−2.9 (3.3, −8.0)	−0.1 (0.1, −0.2)	−0.5 (−0.2, −0.7)	−0.7 (−0.5, −1.0)	-
CO_2 from AFOLU	Below-1.5°C	5*	−2.2 (−0.3, −4.8)	−4.4 (−1.2, −11.1)	−4.4 (−2.6, −5.3)	−0.3 (−0.2, −0.4)	−0.5 (−0.4, −0.8)	−0.1 (0, −0.4)	-
	1.5°C-low-OS	37	−0.1 (0.8, −1.0)	−2.3 (−0.6, −4.1)	−2.4 (−1.2, −4.2)	−0.2 (−0.2, −0.3)	−0.4 (−0.3, −0.5)	−0.1 (−0.1, −0.2)	-
	1.5°C with no or limited OS	42	−0.1 (0.7, −1.3)	−2.6 (−0.6, −4.5)	−2.6 (−1.3, −4.2)	−0.2 (−0.2, −0.3)	−0.4 (−0.3, −0.5)	−0.1 (−0.1, −0.2)	-
	1.5°C-high-OS	36	1.2 (2.7, 0.1)	−2.1 (−0.3, −5.4)	−2.4 (−1.5, −5.0)	−0.1 (−0.1, −0.3)	−0.2 (−0.1, −0.5)	−0.2 (−0.0, −0.3)	-
	Lower-2°C	54	1.4 (2.8, 0.3)	−1.4 (−0.5, −2.7)	−2.4 (−1.3, −4.2)	−0.2 (−0.1, −0.2)	−0.3 (−0.2, −0.4)	−0.1 (−0.1, −0.2)	-
	Higher-2°C	54	1.5 (2.7, 0.8)	−0.0 (1.9, −1.6)	−1.3 (0.1, −3.9)	−0.2 (−0.1, −0.2)	−0.2 (−0.1, −0.4)	−0.1 (−0.0, −0.1)	-
Bioenergy combined with carbon capture and storage (BECCS)	Below-1.5°C	5*	0.4 (1.1, 0)	3.4 (8.3, 0)	5.7 (13.4, 0)	0 (0.1, 0)	0 (0.1, 0)	0.2 (0.4, 0)	-
	1.5°C-low-OS	36	0.3 (1.1, 0.0)	4.6 (6.4, 3.8)	12.4 (15.6, 7.6)	0.0 (0.1, 0.0)	0.0 (0.1, 0.0)	0.2 (0.3, 0.2)	-
	1.5°C with no or limited OS	41	0.4 (1.0, 0.0)	4.5 (6.3, 3.4)	12.4 (15.0, 6.4)	0.0 (0.1, 0.0)	0.0 (0.1, 0.0)	0.2 (0.3, 0.2)	-
	1.5°C-high-OS	36	0.1 (0.4, 0.0)	6.8 (9.5, 3.7)	14.9 (16.3, 12.1)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.3 (0.4, 0.2)	-
	Lower-2°C	54	0.1 (0.3, 0.0)	3.6 (4.6, 1.8)	9.5 (12.1, 6.9)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.2 (0.2, 0.1)	-
	Higher-2°C	47	0.1 (0.2, 0.0)	3.0 (4.9, 1.6)	10.8 (15.3, 8.2) [46]	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.1 (0.2, 0.1)	-
Kyoto GHG (AR4) [$GtCO_2e$]	Below-1.5°C	5*	22.1 (22.8, 20.7)	2.7 (8.1, −3.5)	−2.6 (2.7, −10.7)	−1.4 (−1.3, −1.5)	−2.9 (−2.1, −3.3)	−0.9 (−0.7, −1.3)	2066 (2044, post-2100)
	1.5°C-low-OS	31	27.9 (31.1, 26.0)	7.0 (9.9, 4.5)	−3.8 (−2.1, −7.9)	−1.1 (−0.9, −1.2)	−2.3 (−1.8, −2.8)	−1.1 (−0.9, −1.2)	2068 (2061, 2080)
	1.5°C with no or limited OS	36	27.4 (30.9, 24.7)	6.5 (9.6, 4.2)	−3.7 (−1.8, −7.8)	−1.1 (−1.0, −1.3)	−2.4 (−1.9, −2.9)	−1.1 (−0.9, −1.2)	2067 (2061, 2084)
	1.5°C-high-OS	32	40.4 (48.9, 36.3)	8.4 (12.3, 6.2)	−8.5 (−5.7, −11.2)	−0.5 (−0.0, −0.7)	−1.3 (−0.6, −1.8)	−1.5 (−1.3, −2.1)	2063 (2058, 2067)
	Lower-2°C	46	39.6 (45.1, 35.7)	18.3 (20.4, 15.2)	2.1 (4.2, −2.4)	−0.5 (−0.1, −0.7)	−1.5 (−0.9, −2.2)	−1.1 (−0.9, −1.2)	post-2100 (2090 post-2100)
	Higher-2°C	42	45.3 (48.5, 39.3)	25.9 (27.9, 23.3)	5.2 (11.5, −4.8)	−0.2 (−0.0, −0.6)	−1.0 (−0.6, −1.2)	−1.0 (−0.7, −1.2)	post-2100 (2085 post-2100)

Figure 6. Table 2.4 taken from the SR15 (IPCC, 2018)

There are several references to the SR15 in sections where the EC is concluding with a need for updating the goals. Such as the two last references to SR15 in chapter 1:

*"The IPCC SR15 is also **clear**: scenarios with no or low overshoot of the 1.5C temperature objective, and lower amounts of net negative emissions, tend to be closer to zero GHG emissions globally by 2050."* (EC, 2018b, p. 17)

Therefore:

"It is now time to update the evaluation of the EU's possible contribution to global action, following the entry into force of the Paris Agreement, the adoption of legislation to achieve the 2030 Framework and new scientific evidence, as synthesized in IPCC Special Report on 1.5°C." (EC, 2018b, p. 17)

Thus, significantly higher reductions are needed to "be in line with the 1.5C objective" (EC, 2018b, p. 17). The scenarios examined rely heavily on net negative emissions later in the century. If the aim is to reduce the need for large net negative emissions, higher reductions must be considered earlier and in magnitude. Lastly, in this chapter, the EC states that the Assessment presented in this report is "in support of the development of the Strategy for long-term EU greenhouse gas emissions reduction per the Paris Agreement" (EC, 2018b, p. 17)

Moreover, as there are chapters in this in-depth document discussing more specific aspects of possibilities in tackling climate change, the references to SR15 are more specific to the report. Such as in chapter 4, which deals with energy supply, the SR15 is mentioned seven times. First, under the sub-chapter named "key carbon-free energy sources" (EC, 2018b p. 57**).** This chapter deals with carbon-free energy sources such as renewables and nuclear energy. Renewable is solar, wind, geothermal energy, tide wave, and other ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas, and biogases. It examines pathways and problems with different factors. SR15 is not mentioned in every renewable but is referenced when examining biomass. Biomass makes up half of all renewable generation and sees significant growth (EC, 2018b p. 58).

However, these aspects of the report are mostly being examined and explained. The SR15 is not doing much here. This is in stark contrast to when it in chapter 1 was both urging and emphasizing. Moreover, the SR15s inclusion of nuclear energy and CCS/CCU is also examined in this chapter, but again, the SR15 is questioned and examined. It is not taken for granted, and the SR15 is only one of many scientific references in these chapters. As the EU

Treaty allows the Member States to decide on its energy mix, the EC merely examines the member states' different options in this chapter (EC, 2018 p. 41).

*"It (nuclear energy) is expected to play a role at global level in mitigation scenarios. For instance**,** IAEA sees a possible doubling of global nuclear capacities by 2050, and IPCC sees similar increases in capacity in 2050 in 1.5C scenarios compared to 2010, albeit growing less fast than other zero carbon renewable energy sources." (p 59)*

The trend is similar when examining CCS and CCU and the statements in SR15:

"*Importantly, while these technologies currently lack incentives for large-scale implementation. CCS and CCU lie in the **critical path** for scenarios where negative emissions would be needed.*" (EC in-depth, 2018 p61)

CCS/CCU and carbon dioxide removal technologies are further discussed in a later subchapter of chapter four dealing with transition enabler, opportunities, and challenges. Here the IPCC report "indicates" that CDR is a part of the solution. They will have "an important role to play at the global level," and "developing and testing them as such in the EU would also, therefore, serve a global role." Again, the information from the SR15 and the different long-term options are discussed and explained.

Other aspects of the SR15 is discussed in chapter 4 and 5. Such as the role of investments and what the SR15 projects. In chapter 5, the role of finance is examined, and aspects of the SR15 are compared to other scientific findings. Moreover, chapter 5 also explains the role of science and innovation. Firstly, subchapter 5.4.1 describes General Purpose Technologies, which affect entire economies at the national or global level. This technology has the potential to drastically alter societies through their impact on pre-existing economic and social structures. These are technologies such as the Internet of Things, biotechnology, nanotechnology, artificial intelligence, robots, and information and communications technology. Innovations such as these are claimed by the EC to have the potential to contribute enormously to deep decarbonization but may have to be accompanied by behavioral changes, in particular, to combat the rebound effect. This is stated as being in line with what the SR15 highlights (EC, 2018b, p. 217).

There are several instances where specific aspects of the SR15 is being discussed in relation to other findings. The SR15 here is said to do things such as highlight, explore, employ and estimate. These references are in relation to aspects such as sustainability goals (EC, 2018b,

p. 271). and calculating carbon budgets and pathways (EC, 2018b, p. 334). These discussions and examinations are of aspects from the SR15 that are from the technical parts of the report. Thus, the in-depth document explores these aspects of the SR15, while the other documents do not. It is in the in-depth document that the EC gets technical. This is especially exemplified in the two subchapters of chapter 7 where emissions pathways and the carbon budget is explored in light of the SR15. These sections are highly technical. The SR15 is not confirming, nor is it emphasizing in these sections, but exploring and estimating. Thus, the in-depth document is a scientific space and a scientific tool. It is a space to discuss and explore possibilities for the challenge of global warming. Compared to the Communication documents, which are political spaces, and function more as a communication and presentation tool.

Lastly, the section titled emission pathways in light of the IPCC Special Report on 1.5C examines different scenarios, such as unlikely scenarios that see all anthropogenic GHG emissions immediately reduced to zero to describe how warming will be less than 0,5C. Thus it is necessary to consider which emissions reduction pathways are consistent with the remaining emission budget for limiting warming to well below 2C or 1.5C, including pathways that rely on negative emissions technologies to compensate for residual GHG emissions or correct temperature overshoots. Thus, the SR15 revised central estimates of the carbon budget is important and relevant since the revised carbon budget estimates of SR15 are based on "extremely recent literature". Thus, the section states that when these revised budget estimates are taken into account, new pathways may indicate that it is possible to remain consistent with well below two and 1.5-degrees while reducing emissions more slowly than AR5-based pathways indicate. However, the theme of urgency, "no grounds for complacency," are present in even these two technical chapters (EC, 2018b, p. 344). Even so, information from these two subchapters is similar to earlier chapters in the in-depth document.

Concluding discussion

This section includes the concluding data analysis and discussion. Here the collected data will be further analyzed by using the conceptual framework introduced in the theoretical section. Therefore, using concepts such as co-production, boundary work, boundary objects, and anchoring devices, the data will be explored to uncover what role the SR15 has in the EGD. Furthermore, the typology developed by Sundqvist et al. (2018) will be used to diagnose the case of the EGD. Thus, answering the research question *how has the knowledge from the IPCC report (SR15) influenced, been used, and called upon in formulating and validating* ***strategies***

and goals *on mitigation to anthropogenic climate change in the European Green deals long term strategy for reaching the new 2050 goal?* Thus, contributing to the debates presented in the literature review.

In document analysis, as described by Asdal and Reinersten (2020), the documents are viewed as tools and places. Moreover, the documents are understood as actants, which has specific ways of acting on the aspects they find themselves in. Also, the documents are understood as places where such action can happen. Viewing documents as places enable a understanding of documents as a place where other documents, such as the SR15, can act. It can act on other actors included in the space, but more importantly, it can, in a sense, be made to act. Thus, the SR15 is performative in these documents.

Furthermore, in STS the documents are viewed as tools. Thus, the tasks they are created to perform can be uncovered. For example, if the document is a scientific space, one can expect the document to act as a scientific tool. In other words, when understanding documents as tools, it is necessary to understand that a document can be tool which is scientific, political or both. The documents are created for a purpose.

Beginning with the in-depth document, this document was created to function as an in-depth analysis and synopsis of actions to combat the climate change challenge presented in the SR15. This is clear in its introduction, where these intentions were stated. This document is the technical and scientific document in the EGDs long-term strategies. Thus, the in-depth document can be understood as a tool for presenting, examining, and introducing scientific and political elements of the EGD. It is a highly technical document, which also makes it a highly technical and scientific space. Thus, it is not a surprise that the technical and more challenging aspects of the SR15 knowledge is presented in-depth here. The document is a space for science and different political actions to be examined. It is the document which is the most similar to the SR15. Therefore, it is a space that allows for technical scientific discussions.

Moreover, the A Clean Planet for All Communication document is the political summary of the in-depth document's conclusions. It is meant to function as a political tool. Therefore, it is written as a shorter presentation and communication of what the vision for the long-term strategies are. It is a political packaging of the in-depth document and, therefore, can be viewed as a political space. The most important aspects have traveled from the In-depth document into the Communication and been repacked to be more available and presentable to perhaps a broader audience. This is clear by factors such as the more available and specific

visualization of the consequences of climate change. By comparing figures 3 and 5, it appears that the information is translated from a technical language to a more colorful and less scientific visualization. It is, however, basically the same information. Furthermore, several references to the SR15 is not present in Communication. There are no discussions around technicalities or new science around the carbon budget. Nor is it evaluating any of these aspects. The language is not technical, and even its size as a 25-page document makes it more available than the 400-page in-depth document. Thus, appearing more of a front-stage document.

Lastly, the EGD Communication is the front-stage presentation of the main aspects of the EGD. It is formulated as a clear and collected presentation of the challenge, and the consequences of inaction, and then presenting the way the EU intends to react to the challenge of climate change. The SR15 is both important and useful for the creation and arguments in the EGD documents. As stated above, the EGD Communication were created and presented a year after the long-term strategies presented in the Clean Planet for all were published. However, the EGD Communication is not a focused document. It lays out a roadmap and expected milestones. There is a set plan in the EGD.

Moreover, it covers several topics in only 24-pages. It does not necessarily make many arguments, nor does it take the time to cover in-depth reasoning for its plans. These discussions have been made in other documents. Thus, it simply presents and communicates the EGD. The Clean Planet for All leans heavier on the SR15 than the EGD Communication, but the EGD relies heavily on the Clean Planet for All documents. This is made clear in the way the Clean Planet for all is described in EGD Communication as the "clear vision". The long-term target is, therefore, an established aspect of EGD Communication. EGD Communication is a presentation of action towards the transition towards the new economic system. It is the political repackaging of all the aspects discussed and examined in the Clean Planet for All and more. It is a broad political tool and space. In a sense, a series of short summaries of broader aspects are presented in a short and concentrated document. As it is, after all, a Communication, it reads like a list of promises. As the other documents, it does define climate change as a challenge, but this is done quickly and not delved upon as extensively as in the other documents. It appears as a objective truth.

These documents is the way that the EC chisels out its politics. A heavy technical in-depth document as an anchor, with shorter, more available political documents where the in-depth document's conclusions and main statements are repackaged to a political communication. This in-depth document is the scientific and technical space, where the

scientific discussions and examinations are done. In a sense, this is the way the EC uses both science and politics to create their final product, which in this case is the EGD. Thus, a way of co-producing their policy-initiatives with a strong scientific anchor in the in-depth document.

As it is understood what these documents are as tools and spaces, a further analysis with the conceptual framework is needed. The SR15 is present in the introduction in all three documents and has a position in the EGD. Moreover, it is vital for some of its individual parts. The data collected shows that the SR15 is part of the reason for these documents' existence. It is especially the data in the introductions of the Clean Planet for All and of the EGD Communication that suggest this. These documents exist because of a challenge. It is the SR15 that allows the specific formulation of this challenge as urgent. It is the IPCC that through the SR15 is confirming and emphasizing the urgency and the consequences of global warming, not the EC.

Thus, the SR15 is performative in these documents.. The data collected shows that there are similar references to the SR15 in all three documents. For example, in the Clean Planet for All documents, the SR15 demonstrates, **confirms, emphasizes, provides**, and **highlights** aspects such as consequences, the need to act with urgency, and how not enough is being done**.** These are verbs describing what the SR15 is doing. Moreover, what the SR15 is confirming is a need, which is to limit climate change to 1,5-degrees. Also, it emphasizes a need to reduce emissions with far more urgency.

Similarly, in the in-depth document, the SR15 has a **clear message**: which basically are some selected aspects from the headlines from the SR15 such as the difference between 1,.5 and 2-degree temperature rise and the need to reach net-zero emissions by 2050 to avoid the 2-degree temperature rise. The SR15, with its clear message and its confirmations and emphasizing's, allows the EC through the Clean Planet for all Communication and its accompanying in-depth document, to frame a challenge and a set of solutions as **urgent, necessary, and possible.** Without it, this framing and the use of these documents diminishes. This aspect of the SR15 presented in the introductions is not challenged by the EC in any of the three documents. Science is treated as truth. As shown in the data, the EC is referencing the SR15 as "recent science" and "strong basis of science". Describing the report as containing recent science is a typical language when engaging in boundary work (B. Lahn & Sundqvist, 2017). It is used to draw a boundary between what is science and what is politics.

Even in the in-depth document, the key headlines of the SR15 is not discussed critically or challenged. In contrast, the in-depth document has a more challenging language when examining the more specific aspects. Such as nuclear power and CDR. This is shown in the data collected from the in-depth document where these discussions are. Nuclear power, for example, is only mentioned in the in-depth document, which is a technical space and a tool for examining aspects such as the role of nuclear power. These elements are not present in the EGD Communication. As the EU allows member states to form their own energy mix, this aspect of the SR15, which clearly states that nuclear power has a role globally (IPCC, 2018), the EC draws a boundary between what is important globally and what is important locally. Here, it challenges examines the EU`s role in the global pathways. Thus, the in-depth document allows for and is intended to examine technologies and financial aspects of the EGD. The shorter Communication documents are not the place nor is it the time for that discussion. The consequences are stated as facts presented or confirmed by the IPCC through SR15.

The concept of anchoring device and boundary objects is relevant here. The EC depends on specific aspects of the SR15, such as some of the key headlines, to frame climate change as an urgent and significant challenge. The need for more extensive and urgent actions is because of what the SR15 is confirming and emphasizing. Therefore, the EC is constructing a response to the challenge. This response is these documents. It is around the SR15 that the political and social debate circles. The challenge and the need for action in the EGD are stemming from the SR15. Thus, the SR15 functions as an anchor for the EGD. Without the SR15, the EGD could never be framed in the way that it is framed. The challenge, the urgency of it and the fact that it is possible and necessary is all coming from the SR15.

To some extent, it could be that the SR15 is in itself an anchoring device. The whole EGD is built on the key headlines of the report. However, in closely examining the relationship between these documents, it appears that there are certain aspects of the report that are functioning more successfully as boundary objects than other aspects. Some aspects of the SR15 are present in the more scientific documents but not in the Communication documents. This is of course, caused to some extent by the nature of the documents, but another consequence is that it can reveal potential boundary objects. As boundary object are entities that can travel across sites (Star, 2010). If objects are present at every level of the EGDs long term strategy, it might be a boundary object. Thus, to identify a boundary object, it is necessary to do it in accordance with the conceptual framework established in the theoretical chapter. It should be an object which balances the line between stability and plasticity. Not changing to much as it

moves through the layers of the EGD. It should enable cooperation between these layers, and especially between the SR15 and the EGD. Boundary objects are work arrangement which is robust enough to maintain its identity, but plastic enough to adapt to the specific needs of the EGD.

Nevertheless, there are especially one example of a work arrangement in the in-depth document that does not function as a successful boundary object. The in-depth document references a specific table 2.4 from the SR15 at several occasions. This table, however, is not referenced in any other document. Thus, it is a good example of how something which is not a boundary object, even though it might look like one. The technicality of it, perhaps makes it unavailable for further use in the more political presentations such as the Communication documents. It is not something that enable cooperation between sites. Similar are the references to the sustainability targets, that are only really examined and explained in the in-depth document. These are part of the bigger plan, but it is not what the EGD is built around, thus not a boundary object nor is it its anchoring device.

Moreover, anchoring devices can be identified as a highly stable boundary object. As the data collected shows, it is predominantly a few aspects from the SR15 that are traveling through the different documents and remaining somewhat stable. These can be functioning as boundary objects. There are some already well-established boundary objects present in these documents, such as the 1.5-degree target and the 2-degree target (Hoppe et al., 2013; B. Lahn & Sundqvist, 2017). Furthermore, an aspect often repeated in the documents is the goal of reaching net-zero emissions by 2050. This goal is presented as a must for every scenario limiting global warming to 1.5-degrees (IPCC, 2018). Furthermore, it fits the description of a boundary object**,** as it is a work arrangement that enables cooperation between sites**.** This goal is of course, an aspect of achieving the 1.5-degree limit which is a boundary object on its own. Furthermore, an anchoring device should be what the EC can build everything around. This goal is mentioned several times and is a specific element that the in-depth document is gathered around. Yet, instead of these specific goals as a anchoring device, there is a stronger argument for the SR15 in itself as the EGD`s anchoring device. There are however several boundary objects present in the EGD, but these are not what the EGD is anchored with.

However, another argument can be made for key headline from the SR15 concerning the contrasting consequences between a 2-degree limit and the 1.5-degree limit as a successful boundary object. This key headline has been given significant attention in writing these documents. This is a clear imprint from the SR15 on the EGD. Furthermore, it fits the

description as an object that can create shared space for actors to act in complicated institutional settings (Star, 2010). Moreover, this aspect of the SR15 is also present in each document. These consequences is used as a reason for the EC to create new targets and examine different transition options.

Moreover, these tradeoffs have gotten significant space in the EGD, and in two of the documents have been visualized by several figures (Figures 3 and 5). Especially in the clean planet for all Communication where it has been translated from global consequences to local consequences for Europe. It is also these contrasting consequences that have been referenced in EGD Communication. Therefore, it appears that the EC has anchored their **reason** for pursuing the 1.5-degree limit in these contrasting consequences from the SR15. If the 1.5-degree world were possible but would not result in more catastrophic consequences than the 2-degree world, it would require different reasons for pursuing the 1.5-degree world. To limit global warming to 1.5-degrees requires more extensive and urgent actions. Thus, as the SR15 and its key headlines are framed as the source for the information of both the challenge of climate change and the urgency of it, the SR15 appears to be anchoring device. The SR15 is a highly stable work arrangement which is used flexible enough to be used both globally and locally, crossing multiple boundaries with ease.

The positive effect of anchoring devices was that it creates a common ground where negotiation of positions beyond the immediate scientific question can be conducted (Van der Sluijs et al., 1998). The anchoring to the SR15 does create the possibility to form a common ground where it is possible to discuss or negotiate positions beyond the knowledge constructs presented in the report. Without this anchor, it would be harder for the EC to form a common ground, and therefore, it can be argued that the EGD would not exist in its current form. Thus, it appears quite clear that the EC is using the SR15 as an anchoring device for its EGD.

Moreover, in anchoring itself with the SR15, the EC also draws a clear boundary between science and politics. Even in the in-depth document where scientific and technical aspects are discussed, the science framing as informative and "clear" is typical of boundary work. Interestingly, this type of boundary work is usually done by organizations doing knowledge creation, such as the IPCC and the EEA (Beck & Mahony, 2018). However, the EC does this type of boundary work as a political actor. It defines science as something "out there" that has informed and influenced them to create an updated long-term vision and a cohesive plan to transform several aspects of their economy and energy system.

Using the typology created by Sundqvist et al.(2018) the aspects of drawing boundaries and using boundary objects, the EGD can be placed under one of the four diagnoses. Thus, this case of science-policy interaction can successfully be placed under a two-world perspective or a one-world perspective. One of the conclusions made in a one-world perspective is that the gap between science and policy has been successfully bridged by a hybrid organization such as the IPCC. The science is not independent in this case. Resulting in a followed and implemented single policy path.

In a two-world perspective, science does not lead to action when it is seen as a problem. However, in this case, the science from the IPCC's SR15 is resulting in policy action. So in that sense, there is an ideal perspective on the two-world idea. As the EC is creating a clear boundary between science and themselves as a political actor. Here the science is independent, which does suggest that there is a gap. This gap is necessary for the EGD. The science is the authority on which the whole EGD is founded.

However, to be able to place this case in either a two-world or one-world perspective, the distance between science and policy needs to be identified. One way of understanding the distance is the level of independence the science has. The more independent it is from the policies, the greater the distance. In this case, it is the EC that, through its documents, describes science as an independent actor. Science can be presented as independent, but whether it is independent is another question.

Moreover, the case fits with the idea that there might be a usability gap. Producers and users are responsible for transforming useful information into something useable, which requires specific measures. However, as shown in other studies, there is a view that the IPCC has not accomplished this task successfully in the past (Haas & Stevens, 2011). Nevertheless, some research has suggested that the IPCC has entered a solution-oriented mode (Beck & Mahony, 2018), the knowledge they now produce can perhaps accomplish this. If it is consensus-focused, on the other hand, it fits better in a one-world perspective. The SR15 presents different pathways towards limiting temperature rise to 1.5-degrees; however, as seen in the data analyzed here, the EC policymakers' have gathered around specific aspects of the SR15. The EC is interested in having a two-world perspective, as this leads to distinct spheres of authority.

Whether this is a case of a two-world or one-world perspective is thus hard to diagnose. As discussed above, the EC is interested in having the IPCC science exist in its authoritative

sphere. This might be the reason the EC is so evident in describing the SR15 as science and even a strong basis and recent science. However, this might not be what is the case. It might only be a front-stage presentation. Thus, in reality, the IPCC seems to have been successful in creating science with a consensus focus that has, in this case, led to a strong policy impact. This would be because it has presented a clear and unified message emerging from the IPCC's scientific consensus. This consensus should then have to be followed and implemented in a single-policy path, which might be the case in this post-Paris Agreement climate governance regime.

Thus, it appears that through its boundary work, the EC is enforcing a two-world perspective. This appears to be ideal for them, as it allows the science to have authority and inform policy. They appear to view science and policy as two worlds. As they view this as ideal, they engage in boundary work to maintain the boundary or gap between science and policy. However, research on climate change knowledge argues that these aspects are co-produced (Guillemot, 2017; Livingston, 2020). Thus, there is tension here. In practice, the EC is somewhat right. The IPCC does work independently from the EC. In other words, the IPCC creates their reports and assessments, and the EC produces policies. They are seperate.

However, as research on co-production has shown, the EU has had a significant role in what the scientific focus is (Livingston, 2020). Without the EU and the AOSIS, the focus would not be on 1.5-degrees (Tschakert, 2015). Furthermore, without the focus on 1.5-degrees, the SR15 would not exist, and consequently, the EGD would not exist. Thus, the EU's reason to do boundary work to maintain the two-world perspective could be a result of the role science and the IPCC have in the EU. Even if it the view of science as an authority is a cultural one, it would be hard to argue that the SR15 has not been policy relevant in this specific case. It is the knowledge from the SR15 which is used to argue for a large policy initiative.

Moreover, as the SR15s role appears to be as an anchoring device, it is necessary to discuss how an anchoring device functions a two-world perspective. Anchoring devices function as an anchor in which, in this case, the EC can formulate and discuss strategies and proposals around. The main positive effect is that of enabling this anchoring effect. In a two-world perspective, an anchoring device would function as a device that arrives from another world. Thus, it is an anchor to the scientific world. As it is the in-depth document with the strongest link to the SR15, it is interesting to understand the EGD long-term vision as layered. Closest to its anchor is the in-depth document, which is a scientific and technical space. It is heavily anchored to the SR15, including tables and technical aspects of the SR15. This is

exemplified by for example, the focus on the highly technical table 2.4 (Figure 6). In a higher layer is the Clean Planet for All Communication and on the top is the EGD Communication.

As the SR15 arrives at the top layer, the EGD, it is not as visible as in the deepest layer. However, as the EGD Communication is a political space, it is only the most plastic aspect of the SR15, which has made it all the way to the top. Thus, aspects such as the net-zero by 2050, contrasting consequences, and the 1.5-degree target are the aspects that have made it to the top. This analogy is interesting, as it is on the surface that the storms are. Thus, the SR15 is the anchor that keeps the EGD steady. The political sphere is riddled with discussions and proposals. The SR15 stays still at the bottom, keeping the EGD anchored. However, there were several storms in creating the SR15. Thus, it is interesting that it is now used as an anchoring device for the EU`s climate policy.

REFLECTIONS AND CONCLUSIONS

The thesis aimed to contribute to the debate on the science-policy relationship in the post-Paris Agreement era. Therefore, it investigates how the IPCC`s Special Report on 1.5-degrees has been used to develop and legitimize the European Green Deals' long-term vision for combating global warming. The main object was to explore *how has the knowledge from the IPCC report (SR15) influenced, been used, and called upon in formulating and validating strategies and goals on mitigation to anthropogenic climate change in the European Green Deal's long term strategy for reaching their new 2050 goal?*

Using analytical tools from STS such as document analysis, boundary work, co-production, anchoring device, and discussing a two-world and a one-world perspective, political documents were analyzed. These were the EGD Communication and the long-term strategic vision A Clean Planet for All Communication and the in-depth document accompanying it. By analyzing these documents relation to the IPCC SR15, the thesis argues that the SR15 is used as an anchoring device by the EC for its EGD. In other words, it is the device that functions as an anchor for the strategies, policies, and long-term visions. Thus, the role of the SR15 in formulating and validating strategies and goals is as an anchoring device. It is around the SR15 that the EGD and the long-term vision is created. Several aspects of the SR15, such as its key headlines, functions as boundary objects. Thus, allowing the EGD to frame climate change as a urgent challenge. Moreover, it allows the EGD to be framed as a necessary response to this challenge. In other words, the thesis argues that the SR15 is used as

an anchoring device to enable the EC to set new goals and strategies in line with their own science.

In doing so, the EC is creating its hierarchy of documents to fulfill different roles. The documents are understood as spaces where the SR15 acts and is made to act in specific ways. The SR15 is vital for the construction and framing of global climate challenges as urgent and vital. Without the SR15, the EGD and its long-term vision would not be framed the way it is in its current state. Thus, the EGD presents the SR15 and the IPCC as an authority on knowledge creation existing in its own sphere. The EC is engaging in boundary work to anchor the report as an authority. The SR15 is science. It is coming from an authoritative sphere. Thus, to summarize, the role of the SR15 in formulating and validating strategies and goals is the role of an anchoring device.

As the role of the IPCC and its science is argued to go through a far-reaching transformation after the Paris-Agreement. It was expected to be in a more solution-oriented mode. The SR15 is the first published report in this Post-Paris Agreement era, making it the first report to be solution-oriented. How this will influence politics is, as of now, mostly theoretical. However, this thesis argues that the SR15 has resulted in policy response. Nevertheless, more research is needed on the subject.

Several green deals, climate targets, and policy initiatives have been debated and published in the last year. Such as the Green New Deal from the USA and Chinas net-zero by 2060 announcement is interesting research objects, to mention a few. If the SR15 and consequently the IPCC is to have influenced several of these, the argument for the IPCC as a solution-oriented organization would be more robust. Moreover, it would be relevant to research whether the SR15 functions as an anchoring device for any new policy initiatives.

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