MODUL UNIVERSITY
PRIVATE UNIVERSITY VIENNA

Exploring the Compatibility of Economic Growth in Austria and the Worldwide Achievement of the SDGs

---

Master Thesis submitted in fulfillment of the Degree

Master of Science

in Management

Submitted to David Leonard, PhD

Nicole Taviv

11776358

Julia Pulai

1811056

Vienna, 21 June 2023

AFFIDAVIT

We hereby affirm that this Master's Thesis represents our own written work and that we have used no sources and aids other than those indicated. All passages quoted from publications or paraphrased from these sources are properly cited and attributed. In particular, we did not use any text generators or other paraphrasing tools. This thesis was not proofread.

The thesis was not submitted in the same or in a substantially similar version, not even partially, to another examination board and was not published elsewhere.

21.06.2023

Date

21.06.2023

Date

AUTHORS' STATEMENT

We, Nicole Taviv and Julia Pulai, mutually acknowledge that the thesis titled "Exploring the Compatibility of Economic Growth in Austria and the Worldwide Achievement of the SDGs" is the outcome of our collective work. We both contributed equally to the content and development of this thesis while researching, writing, and refining it.

For the sake of transparency and to highlight the distinctive efforts, we have labeled parts of the thesis with "1" or "2" to denote the author responsible for the particular section. The sections labeled with "1" were written by Julia Pulai and those marked with "2" by Nicole Taviv.

Moreover, it is important to note that some sections were written cooperatively by both authors. These sections are labeled with "1,2" as the authors contributed equally to the contents.

We stand behind the authenticity and integrity of our work and are pleased to present this thesis as a collective achievement, combining our knowledge and shared synergies.

ABSTRACT [1,2]

Since their inception in 2015, the UN SDGs have been heavily critiqued, with much scrutiny directed towards the apparent contradiction between SDG 8 (economic growth) and the environmental goals (Pradhan, Costa, Rybski, Lucht, & Kropp, 2017). While many promote notions of 'green growth', others point to our historical inability to decouple economic production from environmental impact at a sufficient rate to stabilize impacts, let alone reduce them. The almost uninterrupted growth of the global economy and most national economies over the past centuries has been accompanied by an almost constant decline in many environmental metrics, leading many to talk of impending crises. This paper does not tackle the relationship between growth and environmental impacts at the global scale, as many have done before, but instead investigates a single, small, European country: Austria. Specifically, we ask: Is economic growth in Austria compatible with the worldwide achievement of the SDGs?

Based on the literature, the authors formulated a deductive argument consisting of ten premises and leading to the conclusion that "economic growth in Austria is incompatible with the global achievement of the SDGs". The goal of the research was to determine whether the argument is both valid (the truth of the conclusion being fully established by the premises) as well as sound (the premises all being true). To this end, a variety of economists with perspectives ranging from mainstream to degrowth were engaged as participants in a Delphi process. Through an online platform, they were presented with the full argument and asked to reflect on its validity. In both the first and second rounds, all but one expert concluded that the premises, if true, unavoidably establish the truth of the conclusion. The argument, it appears, is valid.

The experts then reflected on each premise, in turn, and commented as to its truth value. The ten premises drew particularly on the environmental and inequality-focused SDGs to explore their relation to economic growth in Austria through the concepts of thermodynamics, decoupling, regulation, and redistribution and dependency. After the first round achieved 74% unconditional agreement across the premises, the authors considered the expert feedback and reformulated several premises accordingly. All expert comments were anonymously circulated to all participants, along with the authors' reflections and the revised argument in the second round, where the level of unconditional agreement across the premises reached 88%. Although only 36% of respondents in the first round and 45% in the second round unconditionally agreed with both the validity and soundness of the entire argument, the validity of the argument was supported by an overwhelming consensus (91%) and the truth of each premise by at least 82% of

respondents. On this basis, the authors conclude the argument to be both valid and sound: economic growth in Austria is incompatible with the global achievement of the SDGs. The important challenges for global institutions as well as national governments, who openly state their commitment to two incompatible objectives, are also explored.

ACKNOWLEDGEMENTS

We would like to take this opportunity to express our heartfelt gratitude to all those, who supported us in the process of completing this thesis. Without their help, guidance, and encouragement, this achievement would not have been possible.

First, we would like to thank our supervisor, David Leonard, PhD. His expertise, continued guidance and support, as well as passion for the topic throughout the entire process of completing this thesis have been invaluable. We are truly grateful for his commitment and dedication to our work since the very beginning. His feedback and input have consistently pushed us to excel and strive for improvement. The guidance has not only shaped this work, but also our personal development. David, thank you for being the best supervisor ever.

Next, and most importantly, we would like to thank our families immeasurably. Their patience and continuous encouragement, not only during this time but always are the reason for our achievements and who we are today. We are thrilled to see where our future paths will lead us. Knowing our families will always be there for us, is everything we will ever need.

And finally, we owe a special thank you to each other for the incredible teamwork and collaboration, that made this work possible. We have pushed and supported each other throughout the whole process, especially during long nights when we were at our lowest. By always keeping each other on track, we were able to achieve our goals unlike some frameworks presented in this thesis.

TABLE OF CONTENTS

Affidavit ..... *I*

Authors' Statement ..... *III*

Abstract ..... *V*

Acknowledgements ..... *VII*

List of Figures ..... *XII*

List of Abbreviations ..... *XIII*

1 Introduction *15*

1.1 Research Aim and Objectives **16**

1.2 Purpose Statement **16**

1.3 Structure of the Thesis **17**

2 Literature Review *18*

2.1 Agenda 2030 ..... **18**

2.1.1 Defining Sustainable Development 21

2.1.2 The 17 Sustainable Development Goals 23

2.1.2.1 Social 27

2.1.2.2 Environmental 31

2.1.2.3 Economic 33

2.1.2.4 Interactions 35

2.1.2.4.1 Synergies, Contradictions, and Gaps 35

2.2 Economic Growth on a Finite Planet **39**

2.2.1 The Economy and its Connection to the Environment 41

2.2.2 Planetary Boundaries 44

2.2.3 Ecological Footprint 49

2.2.4 A Finite Planet – Limits to Growth 51

2.2.4.1 Decoupling 53

2.2.4.2 Technological Challenges 56

2.2.5 Degrowth 57

2.3 Global Goals vs. Nationalized Governance Mechanisms **58**

2.3.1 Democratic Principles 59

2.3.2 Competition vs. Collaboration 60

2.3.3 Is Global Governance Needed to Achieve Global Goals? 62

3 Methodology *64*

3.1 Selection of the Research Design **64**

3.2 Data Collection 65
3.2.1 Delphi Process 65
3.2.2 Participants 67
3.2.3 Developing the Research Instrument 71
3.2.3.1 The Screening Question 72
3.2.3.1 Development of Argument 1 – 1st Round of Delphi 72
3.2.3.2 Development of Argument 2 – 2nd Round of Delphi 79
3.3 Method of Analysis 82
3.4 Evaluation of Methodology 84
3.4.1 Limitations 84
3.4.2 Ethical Issues 85
4 Results and Discussion 86
4.1 The validity of the argument 87
4.2 Premise 1 90
4.3 Premise 2 90
4.4 Premise 3 91
4.5 Premise 4 93
4.6 Premise 5 94
4.7 Premise 6 95
4.8 Premise 7 99
4.9 Premise 8 100
4.10 Premise 9 102
4.11 Premise 10 102
4.12 Soundness of the Argument 104
4.13 Conclusion on the compatibility of Economic Growth in Austria and the Achievement of the SDGs 107
5 Conclusion 108
5.1 Implications for Relevant Stakeholders 109
5.2 Limitations & Future Research 110
6 Bibliography 112
Appendix 1: Full Argument Round 1 126
Appendix 2: Full Argument Round 2 129

LIST OF TABLES

Table 1. THE 8 MILLENNIUM DEVELOPMENT GOALS. RETRIEVED FROM: (SDG FUND, 2023). .. 18

Table 2: List of Participants and Their Provided Professions. Own Creation. 69

Table 3: Responses in Premise 6, Suggested Regulatory Changes. Own creation. Data retrieved from Sawtooth. 96

LIST OF FIGURES

Figure 1: The Triple Bottom Line of Sustainability; Own Creation. Retrieved from: (Bahraini, 2021) 22

Figure 2: The Nested Sustainability Model; Own Creation. Retrieved from: (Purvis, Mao, & Robinson, 2019) 23

Figure 3: The 17 Sustainable Development Goals; Retrieved from: (UN, 2023) 25

Figure 4: Annual GDP change (%) in Austria, 1970-2021; Retrieved from: (The World Bank, 2023) 40

Figure 5: Welfare in an Empty vs. Full World; Retrieved from (Daly, 2015) 42

Figure 6: Planetary boundaries; Illustration by Julia Blenn (2022) 45

Figure 7: "The Wedding Cake"; a hierarchical structure of the sustainable development goals (Stockholm Resilience Centre, 2016) 48

Figure 8: Achieving the SDGs within the Planetary Boundaries and sustainable development after 2030. Retrieved from: (Rockström, Goluke, Stoknes, & Collste, 2018) 49

Figure 9: The Ecological Footprint; Retrieved from: (Global Footprint Network, 2023) 50

Figure 10: The Limits to Growth; Retrieved from (Daly, 2015) 52

Figure 11: The concept of decoupling; Retrieved from: (UNEP, 2011) 54

Figure 12: Presentation of a Premise in Round 1 81

Figure 13: Presentation of a Premise in Round 2 81

Figure 14: Excerpt of the collected data of round 1. Excel sheet retrieved from Sawtooth. 83

Figure 15: Ranking of the top regulatory changes proposed; Own creation. Data retrieved from Sawtooth. 98

Figure 16: Graph showing the results of both rounds, values in %; Own creation. 104

LIST OF ABBREVIATIONS

GDP – Gross Domestic Product

GHGs – Greenhouse gases

MDGs – Millennium Development Goals

SD – Sustainable Development

SDGs – Sustainable Development Goals

UN – United Nations

WHO – World Health Organization

1 INTRODUCTION [1]

The concept of economic growth, which is traditionally measured by real GDP, refers to the increase of production within a specific economy (McKinsey & Company, 2022) and is associated with increased consumption. Over time, economic growth has brought significant improvement to standards of living and assisted poverty reduction. Nevertheless, one must not forget that the world's resources are finite, which is seen by many scientists as incompatible with an ever-growing economy (Eisenmenger, et al., 2020). This means that only a limited quantity of natural resources is available to humanity, as many of these do not grow back at the rate they are consumed or do not grow back at all. This includes fossil fuels, land, freshwater, and also biodiversity. Economic growth has thus not only brought benefits to society by improving life through increased globalization and industrialization but has also brought economic, social, and environmental challenges.

The potential incompatibility between economic growth and sustainable development arises through the fact that economic growth promotes resource extraction and vast amounts of energy consumption to earn short-term profits. This process is accompanied by severe challenges and consequences for the environment. Environmental damage, climate change, societal inequalities, and unsustainable resource use practices are among the negative consequences (d'Arge & Kiichiro, 1973).

To address and combat these global challenges, international political effort is crucial. The most prominent political endeavor to achieve sustainable development is the Agenda 2030. In 2015, the UN introduced Agenda 2030 with its 17 Sustainable Development Goals (SDGs) with aims to, among other goals, end poverty in all forms. It envisages "*a world of universal respect for human rights and human dignity, the rule of law, justice, equality and non-discrimination"* (Council of Europe, 2023). This framework builds on the Millennium Development Goals (MDGs) which were in effect from 2000-2015 and expands on both their thematic and geographic reach (Sachs, 2012).

Given these goals to preserve finite resources while maintaining standards of living, current economic models focused on growth must be reassessed to ensure their compatibility with competing goals of environmental preservation and supporting social justice to move towards a more sustainable and inclusive future.

1.1 Research Aim and Objectives [1]

Despite the fact that the SDGs are a crucial framework to address the current economic, social, and environmental challenges, when analysing the interplay of the 17 goals, one can detect synergies as well as trade-offs, and even possible contradictions. One of the apparent trade-offs is created through SDG 8: Decent Work and Economic Growth. According to Eisenmenger et al. (2020) continued economic growth comes into direct conflict with achieving environmental goals. As mentioned previously the measure of economic growth is GDP, which counts the production output. Therefore, to achieve higher output, more resources are required, which creates a possible contradiction with the environmental goals and the reduction of resource use. Menton et al. (2020) argue that even if SDG 8 is redefined from 7% to 3% economic growth, resource use and emissions would still be too high to align with the Paris Agreement of limiting global warming to even 2 degrees. This raises the question of whether the SDGs as a whole are achievable based on contradictory elements and thus lays the ground for the guiding research question of this thesis. The paper including its literature review and empirical research targets to answer the following research question:

To what extent is economic growth in Austria compatible
with the worldwide achievement of the SDGs?

Various answers to this research question are thoroughly discussed in the literature review as well as within the scope of this study's empirical investigation. The purpose and structure of the paper are outlined in the next subchapters.

1.2 Purpose Statement [2]

The purpose of this thesis is to analyze the effects of a growing Austrian economy on the achievement of the SDGs worldwide. One can say that the aim of this paper is to provide a critical voice that questions mainstream narratives by adopting a holistic perspective on the SDGs to shed light on potential contradictions between them. Alternate ways of achieving sustainable development are presented, based on reducing inequality, both within and between nations, rather than on aggregate growth. Degrowth as well as mainstream economists, who make up the experts questioned in this thesis, are presented with a deductive argument consisting of 10 statements, that focus on the interplay between economic growth, reduction of environmental strains, and existing inequalities between and among countries. Through a Delphi method process, the researchers aim to get their expert opinions on the topic of the successful achievement of the SDGs. Based on their answers in the first round, the argument is adapted to reach a higher

level of consensus. The goal is to build a logical argument, which classical as well as nonclassical economists can find agreement on, to answer the research question.

1.3 Structure of the Thesis 2

The thesis is structured into five main parts. Following this introduction comes the literature review, methodology, results, and discussion section, as well as a conclusion.

The literature review covers three main topics: Agenda 2030 and the Sustainable Development Goals; the concept of economic growth on a finite planet; and the challenges of governance for global goals. First, as the SDGs form the context on which the research question is based, the chapter gives an overview of the origin of the goals as well as an in-depth exploration of the individual goals. Following this, the interactions between the goals are explored to give a holistic understanding of the framework. Next, the connection between striving toward economic growth and finite resources is studied, covering fundamental topics including planetary boundaries, decoupling, and degrowth. A general understanding of these topics provides the reader with the necessary information to understand the research instrument. The third and final part of the literature review includes a critical section about the functioning of global governance. Since the UN, which introduced the SDGs, does not have the authority to mandate their implementation by sovereign states, the question arises as to whether this structure is sufficient for the achievement of global goals.

The next section, methodology, includes an explanation of the chosen research method—the Delphi process—as well as a breakdown of the research instrument: a logical argument. Presenting experts with a deductive argument consisting of 10 statements leading to a conclusion, they are asked about the validity and soundness of the argument, as well as an explanation of their evaluation. These comments are later revised and used to adapt the argument for the second round of Delphi, as well as being circulated among the participants to promote mutual learning. The purpose of this method is to use experts' opinions to create a valid and sound argument, which achieves a high level of agreement among the participants.

Following the explanation of the methodology, the results and discussion section presents the reader with an analysis of the main results of both rounds.

The thesis concludes by summarizing the main findings, exploring their implications for various actors, addressing the limitations of the study, and proposing avenues for future research.

2 LITERATURE REVIEW 2

This chapter summarizes the literature related to three main topics. First, the Agenda 2030 and the subsequent SDGs are explored, as well as the interactions among the goals. Second, the topic of economic growth in the context of finite resources is investigated to provide an overview of the key concepts applied in the research instrument. Finally, given the lack of progress toward achieving the SDGs over the last eight years, the question of appropriate governance structures is addressed.

2.1 Agenda 2030 2

Climate change is raising numerous environmental issues – from increasing natural catastrophes to the loss of biodiversity on land and in the seas. In addition to environmental threats, global issues also include a rise in extreme poverty, hunger, and conflict. To counter these developments, the UN proposed a drastic need for transformation (United Nations, 2015a).

From 2000 – 2015, the 189 members of the UN at that time followed the Millennium Development Goals. The MDGs were mostly health-related and were comprised of the goals listed in Table 1.

TABLE 1. THE 8 MILLENNIUM DEVELOPMENT GOALS. RETRIEVED FROM: (SDG FUND, 2023).

1. Eradicate Extreme Poverty and Hunger
2. Achieve Universal Primary Education
3. Promote Gender Equality and Empower Women
4. Reduce Child Mortality
5. Improve Maternal Health
6. Combat HIV/AIDS, Malaria, and Other Diseases
7. Ensure Environmental Sustainability
8. Global Partnership for Development

By putting attention toward increasing human well-being overall, the MDGs framework was constructed of specific goals and targets, which were for the most part substantial. This has resulted

in overall positive progress during the 15-year period. McArthur, and Rasmussen (2018) state, that the MDGs have not only supported some improving trends but even accelerated them. Under this category specifically, falls the fourth goal, reducing child mortality. The authors estimate that an additional 20 – 30 million additional lives were saved during the active period of the MDGs, most of which are attributed to the survival of children above 5. Similar numbers have also been claimed by Chambers (2015). Another potential contributor to lives saved stems from the progress of goal 6, the combating of diseases, and goal 5, improved maternal health. Overall, the substantial progress of the MDGs is believed to be attributed to its clear vision of improving the well-being of the world's poorest. As a result, the goals share the same vision and are mostly concerned with factors contributing to the increase in global health and the well-being of the poorest. For this reason, goal 7, which did not directly address human health is the one with the major drawbacks. According to McArthur and Rasmussen (2018), there was little to no improvement made in promoting environmental sustainability during the period of the MDGs.

However, after the timeline had expired, and progress was still outstanding in many areas, the UN presented Agenda 2030. It included a guideline of 17 Sustainable Development Goals, extending the MDGs to achieve sustainable development on all three pillars: environment, society, and economy over the next 15 years. The highest priority is the eradication of extreme poverty and hunger, which is said to be fundamental in achieving the other goals (Dhahri & Omri, 2020). Only by solving this global challenge can member states work toward reducing inequalities, promoting inclusivity, peace, and gender empowerment. While these make up some of the social goals, the SDGs are also comprised of environmental goals, such as climate action, and economic goals, including economic growth (United Nations, 2015a). The addition of economic goals is the most important difference between the two frameworks with regard to the expansion of the Millennium Development Goals. As the focus has therefore widened, this raises the question of whether all of the SDGs should be considered as actual goals. Compared to the MDGs, which were mainly focused on one goal, namely increasing the well-being of the world's poorest people, the SDGs are oriented toward 3 areas. As they are based on the concept of Sustainable Development, which is further examined in the following section, the main objective, as stated by the UN is to overall increase human well-being (United Nations, 2023a). Therefore, any "goals", which merely support the achievement of the overall goal are criticized as being means to an end, rather than the end goal itself. This critique is, among others directed toward SDG 7 (*Affordable and Clean Energy*), and 9 (*Industry, Innovation and Infrastructure*). Rather than being goals, Elder, Bengtsson, and Akenji (2016) argue that these are merely potential means of supporting the achievement of the actual goals, namely the social goals which are specifically laid

out to reach the overall goal of increased human well-being. Consequently, this leads to the question of whether the social goals make up the only true goals of the SDGs, in contrast to the environmental and economic goals. Since the latter ultimately serve the purpose of contributing to the improvement of human well-being overall. Another example would be SDG 2 (*Zero Hunger,* social goal): most people will view eradicating hunger as a valid objective that is valuable in its own right and therefore a true 'goal', yet the same might not be true for SDG 8 (*Decent Work and Economic Growth*), among others. The question is whether one strives for economic growth for the sake of economic growth, in which case it is an end in itself and a true goal, or whether one only considers economic growth as a potential means of achieving the other 'true goals'. If the latter, then economic growth is not a goal and should be pursued only if it helps and abandoned if it does not.

True goals or not, Agenda 2030 aims to reach these goals and foster sustainable development through global partnerships, collaborations, and support from the global north to the global south. The UN is determined to reach the goals by 2030 by specifying measures and indicators, which serve as a guideline and can be integrated into national policies to encourage more sustainable practices. Its main objective is "*transforming the world*" (United Nations, 2015a, p. 5) and creating a space that is free of hunger, poverty, violence, and war: A world that thrives economically and promotes well-being, literacy, good health, and economic prospects for its citizens. It stresses the importance of living within our planetary boundaries, where the protection of biodiversity is a vital factor, at the same time as promoting economic growth.

Overall, Agenda 2030 claims to build a world through the SDGs, "*in which humanity lives in harmony with nature and in which wildlife and other living species are protected*" (United Nations, 2015a, p. 7).

The following sections investigate the fundamental framework on which the SDGs are built– sustainable development. Afterward, the individual goals are discussed, and their key points are elaborated.

As the goals are intended to balance environment, society, and economy, which together contribute to sustainable development, the goals too are interconnected. While they were formulated to reach the highest degree of synergies, contradictions among goals are also apparent. These dynamics are explored in Chapter 2.1.2.4. Considering the interactions, especially negative ones, the question arises as to whether the SDGs provide a framework that is feasible to achieve by 2030, or ever. Since the introduction of Agenda 2030 in 2015, the concept has been

met with much criticism about its implementability, which is also explored. However, to start, sustainable development is defined in the following chapter.

2.1.1 Defining Sustainable Development 2

As previously mentioned, the 17 Sustainable Development Goals were presented in 2015 as part of the Agenda 2030, succeeding the MDGS, which aims to build a more resilient community and environment, where collaboration is intended, rather than seeing it as a standalone challenge (United Nations, 2015b).

These goals are based on the concept of Sustainable Development (SD), hence the name. While Sustainable Development is usually associated with being first defined in the Brundtland Report of 1987, the initial thought was discussed 15 years before (International Institute for Sustainable Development, 2023). In 1972, in Stockholm, the United Nations Conference on the Human Environment was held. This marked the very first time that the environment was made the key issue being discussed in a leading conference. For this reason, the conference is also synonymous with being "The First World Conference on The Environment" (United Nations, 2023a, para.1). There, the importance of climate action was addressed and, for the first time, the interlinkage of three factors was outlined: economic growth, environmental pollution, and the overall well-being of humans (United Nations, 2023a).

Following this conceptualization, the publication of The Brundtland Report in 1987 included a definition of Sustainable Development, which is based on these 3 interconnected pillars (WCED, 1987). Here, SD was defined as the following: "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (WCED, 1987, as cited in Bossel, 1999, p.2). Through its future outlook, this quote introduces the notion of intergenerational equity and alludes to the balance of all factors that must be considered to attain sustainable development. It also suggests that potential tradeoffs may be required to provide for the "ability of future generations to meet their own needs" (WCED, 1987, as cited in Bossel, 1999, p.2). Those needs can be interpreted as the environmental security of a preserved ecosystem, tied to a resilient and inclusive society (Silvestre & Tîrca, 2018). Ensuring these future characteristics of our world may imply restrictions on the type and extent of human activities that can be pursued in the present day.

Scholars argue that the definition of SD is too vague and has reached an extensive amount of acceptance because of this. On top of that, the definition is argued to lack mentions of environmental aspects, such as planetary boundaries. Rather, it is considered to be an anthropocentric

model, which only sets the well-being of humankind as its main objective and rejects to acknowledge the well-being of other beings (Curry, 2011).

Initial conceptions depicted the three pillars of Sustainable Development standing side-by-side or as three overlapping spheres of concern. Such models are translated to the business context through the notion of a triple bottom line, including planet, people, and profit. These models usefully represent the interests of 3 major interest groups. It highlights the interlinkages between the spheres, yet also suggests the equal importance of all three factors, as seen in Figure 1.

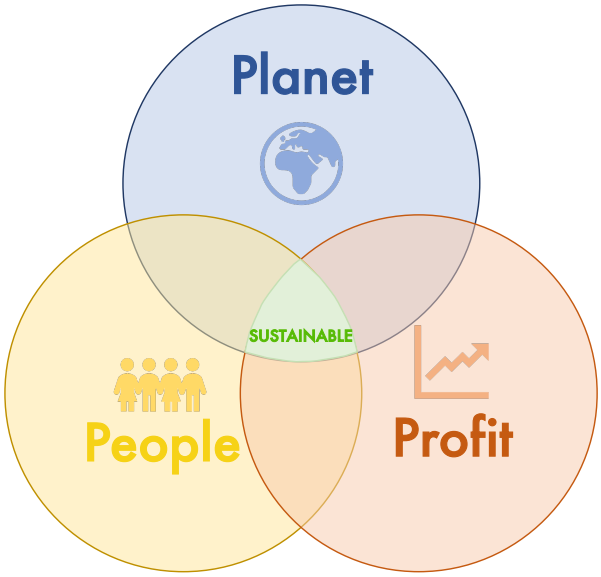

FIGURE 1: THE TRIPLE BOTTOM LINE OF SUSTAINABILITY; OWN CREATION. RETRIEVED FROM: (BAHRAINI, 2021)

Figure 1 shows the 3 main pillars of sustainability, which are: economy, society, and environment (in some instances referred to planet, people, and profit). This is especially relevant for policy-makers, as the successful implementation of this process requires consideration of all three sides, not primarily the economic, profit-oriented one (Silvestre & Tîrca, 2018). However, this balance does not come without tradeoffs. As mentioned in The Brundtland Report (1987), SD is working towards reaching an equal representation of all three factors, but also among nations. This requires strong economies to offer their resources to weaker ones in a collective effort to achieve global sustainable development, creating a tradeoff potential (WCED, 1987).

However, a fundamental flaw that SD and conceptions based on it fail to consider is the hierarchical relationship of the three spheres. While it is clear that all three aspects must be considered to attain and preserve sustainability, the equal weighting to each sphere/pillar as presented

in Figure 1 has also attracted considerable criticism. Some authors have pointed out that the model fails to acknowledge that the social aspect and the economy are merely subsets of a functioning ecosystem that requires a healthy environment (Imran, Alam, & Beaumont, 2011). This misinterpretation, as observed by many scholars, is not an accurate representation of the actual, nested relationship between the three systems, in which some of the systems are highly dependent on the proper functioning of the other systems, while some of the systems might do better in the absence the others, as shown in Figure 2 (Imran, Alam, & Beaumont, 2011).

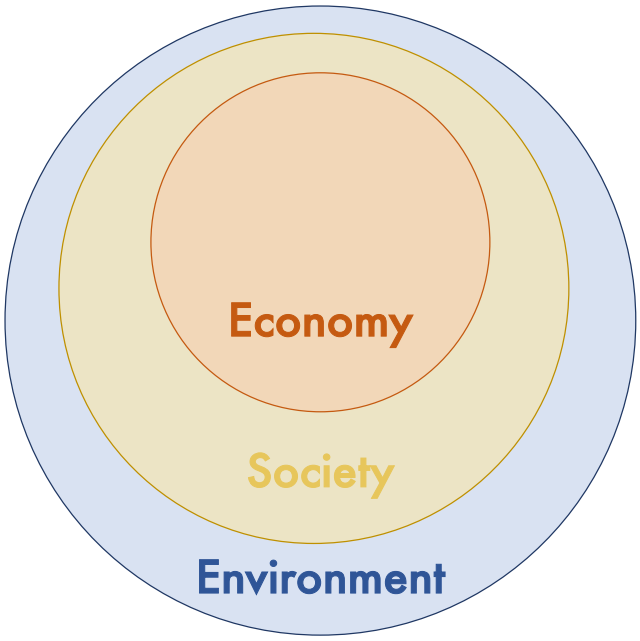

FIGURE 2: THE NESTED SUSTAINABILITY MODEL; OWN CREATION. RETRIEVED FROM: (PURVIS, MAO, & ROBINSON, 2019)

Specifically, there can be no society without a functional environment, and there can be no economy without a functioning society. Environmental integrity, on the other hand, would achieve higher levels without humans and their economic activities. This reality suggests that certain systems are more fundamental than others and, contrary to the notion of being paid equal attention, they should be prioritized. Models depicting these relations are shown in subsequent sections.

2.1.2 The 17 Sustainable Development Goals [2]

Having established the definition of the underlying theory of Sustainable Development, this next part looks closer into the formation of the actual Sustainable Development Goals. The main purpose of the SDGs is to create a sense of global collaboration and partnership when trying to build

a sustainable world. The vision statement states that the UN aims to shape a world, where neither hunger nor poverty, nor injustice or war are existent. By having defined five key principles, on which the SDGs are built, 17 goals with 169 targets were derived and were made effective on January 1st, 2016, for the member states of the UN (United Nations, 2015a).

The five categories and their main drivers are:

- *People*: ending poverty, and hunger while building an environment, which fosters equality and respect
- *Planet*: fighting degradation through practices, like sustainable resource management, consumption & production, as well as climate action
- *Prosperity*: encouraging economic growth to offer a living standard accompanied by prosperity and opportunity
- *Peace*: advocating for the worldwide implementation of peace, as war, and the lack of peace are not leading toward sustainable development
- *Partnership*: only through a global partnership and collective effort can the weakest, most vulnerable nations be helped, thus leading toward global sustainable development (United Nations, 2015a).

These five categories can also be grouped through the triple bottom line shown in Figure 1. Planet represents the environment, People, Partnership, and Peace the society, Prosperity the economy (United Nations, 2015a). Yet, all five are interlinked and can be assigned to other categories alike.

Having defined Sustainable Development, and the main categories the goals are based on, the next part will present the 17 goals in Figure 3.

FIGURE 3: THE 17 SUSTAINABLE DEVELOPMENT GOALS; RETRIEVED FROM: (UN, 2023)

Figure 3 lists the 17 goals and their logos. Each goal has a certain number of targets, and indicators, which are used to determine the progress made. This system, therefore, leads to a total of 17 goals, 169 targets, and 248 indicators (United Nations, 2023b). In contrast to the 8 MDGs, the SDGs not only include more goals but are also defined in much more detail through the inclusion of more targets and indicators. This theoretically allows for a clearer measurement of progress and action, rather than stating the goals alone (United Nations, 2015a). Nevertheless, this is also oftentimes a critique point of the framework. While some scholars praise the extension of the framework and the inclusion of more goals and targets compared to the MDGs, others critique its broad focus. Fostering structural change is claimed to be challenging as it is, thus, making it even more challenging for policymakers to commit to 17 goals, rather than 8 (Feeny, 2020). Additionally, the measurement of progress across the numerous targets is problematic. Dunning and Kalow (2016), who have analyzed the data availability of all 193 UN members, have concluded that not even half of the listed indicators are based on values that are regularly measured and backed up by an established methodological procedure. Roughly 42% of all indicators fall under that category, highlighting the challenge in monitoring potential progress.

In line with the framework of Agenda 2030, the SDGs have the target date of 2030. Those 17 goals target issues in all three major categories environment, economy, and society in an effort to collectively achieve sustainable development. While some argue the inclusion of broad goals

is a positive, other scholars share the opinion, that this makes the implementation of the goals even harder. Looking at the (lack of) progress made so far, it would also speak to the validity of the latter opinion. In a press release in March of 2022, the UN Secretary-General, António Guterres, expressed his concern about the achievement of the SDGs. According to the statement, progress is moving in the opposite direction (United Nations, 2022a). While some of it the UN attributes to the repercussions of Covid-19, or the invasion of Ukraine, scholars are again questioning the fundamental framework of the 17 goals, which fails to consider structural factors that need to be considered (Menton, et al., 2020).

Before looking into the individual goals and reflecting upon their main objectives, this part first looks into the possible division of the goals. While different models prefer to categorize the 17 goals into the three categories (environmental, social, and economic), the question remains whether this aligns with the nature of the goals. As was briefly mentioned above, not all goals can be classified as end goals. Rather, being derived from the SD definition by Brundtland (1987), the only definitive goals are social goals. Objectives such as Zero Hunger, No Poverty, Good Health, et cetera are factors of human well-being overall. Other 'goals' of the SDGs such as Climate Action, Industry, Innovation, Infrastructure, Decent Work, and Economic Growth are arguably worth striving for under the condition that they assist in improving human well-being overall. However, if pursuing these objectives proves detrimental to human well-being, either now or in the future, they should not be pursued, according to the anthropocentric SD worldview. As a result, these objectives are rather seen as (potential) means toward achieving the social goals, which target components of human well-being, such as safety, food, healthcare, education, and equality (Summers, Smith, & Linthrust, 2012).

The underlying factors contributing to human well-being were described and organized by Abraham Maslow (1943) in the hierarchy of needs. By listing 5 hierarchical levels, all of which encompass human needs, both this model and the Brundtland Report address the fundamental components of increasing human well-being. Although they have different origins, they share fundamental elements that link to the SDGs. This allows the context of the goals to be compared to Maslow's hierarchy of needs. The first layer refers to the physiological needs necessary for human survival. Those include among others food, water, and sleep. When referring to the SDGs, goals that fall under that category are SDG 1 (*No Poverty*), SDG 2 (*Zero Hunger*), SDG 3 (*Good Health and Well-Being*) SDG 6 (*Clean Water and Sanitation*). These goals directly address aspects that are critical to human survival.

The second layer, security relates to maintaining the bottom needs and sustaining access to those for future generations. While one could place SDG 4 (*Quality Education*), SDG 5 (*Gender Equality*), and SDG 8 (*Decent Work and Economic Growth*) under this category, other layers of this model allow a precise division of the remaining goals to be open for interpretation. Overall, all goals are aimed at enhancing human well-being and meeting the needs of the present and future generations, as defined in the Brundtland Report. The hierarchy of needs provides further insight into human well-being and allows for comparison.

The following section analyses the individual goals. As some argue that not all goals represent true goals, rather means, the categorization will be based on the question: which goals are directed toward human well-being (Elder, Bengtsson, & Akenji, 2016)? Those will be listed as goals. As the remaining ones can be viewed as (potential) means, they will be divided into economic and environmental means.

2.1.2.1 Social $_2$

This part explores the goals, which target the improvement of human well-being, and are thus labeled societal issues. Goals, which fall under this category are SDG 1, 2, 3, 4, 5, 6, 10, 11, and 16.

SDG 1: No Poverty. The targets of this goal include multiple aspects. As a main objective of this goal is directed toward eliminating extreme forms of poverty by 2030. According to a definition by the UN, this means living on a daily budget of $1.25 and less (United Nations, 2023g). Different organizations set higher floors when it comes to defining extreme poverty. The World Bank, for example, has increased its definition of a daily budget from $1.25 to $2.15 due to price adjustments over the years. In 2020 the world counted an increase of 700 million people, who fell under the $2.15 mark, which is more than 9 % of the world's population (World Bank, 2022). Others criticize the set poverty line by the World Bank as still being too low to deliver useful insights. Looking at the topic from a different angle, like defining the value based on a certain share of the world population, which lives below a specific budget, for instance. Around half of the world's population survives on $5.50 per day. Alston (2020), therefore argues for the adjustment of the poverty line, which leads to the question if the UN has chosen the most accurate measure. One major aspect of this goal is also to mobilize funds to further catalyze the achievement of this goal (United Nations, 2023g). However, as the share of people living in extreme poverty has been rising, while funds have been generated, this goal also calls for a new approach to managing funds, since progress is nonexistent, which shows that the most vulnerable are not benefiting from the monetary support (Alston, 2020).

SDG 2: Zero Hunger. The main objective of this goal is to "*End hunger, achieve food security and improved nutrition and promote sustainable agriculture*" (United Nations, 2023h, Title). Since the SDGs have come into effect in 2015, the annual number of people suffering from hunger has been rising. World events, like COVID-19, have only contributed to the rise of this number. This marks roughly 1 in 10 people being affected by hunger globally. The issue also entails children who are suffering from malnutrition and therefore hindered in their development (United Nations, 2022b). Climate change is also a factor which influences crop yields, and therefore, food security. Therefore, targets of goal 2 are characterized by aiming towards ending hunger, partially by supporting agriculture and strengthening its resilience towards extreme weather conditions, in order to ensure continuous food access to all. A focus on ending malnutrition is also mentioned. As ensuring access to food for all also entails a sophisticated food production infrastructure, technology, and supply chain, targets also touch upon generating financial resources to realize the agricultural potential of countries which lack the means to do so themselves (United Nations, 2023h). One aspect, which is not addressed in this section is efficiency. While the world is currently producing enough food to feed 1.5 times the world population, about 10% however, are still suffering from hunger (UN Environment Programme, 2020; Erdman, 2018). A serious contributor to the inefficiency of the supply chain results in food waste. As food is ordered at a higher pace than it is consumed, as well as a lack of appropriate distribution and storage capacities, around 30% – 40% of food is wasted (Erdman, 2018). While the targets are aspirable, and undoubtedly contribute to increasing human well-being, one might question the composition of this goal. It includes ending all forms of malnutrition, and hunger. At the current rate, the UN states, progress is nowhere near achieving the set targets (United Nations, 2023h). This raises the question about the orientation of the targets. Ending global issues but not including actions on how to do so, but rather generally touching upon some of the relevant aspects might be an explanation. Being a frequent critique point, the ambitious outlook makes the possibility of achieving this goal within the set time period incredibly low (Easterly, 2015).

SDG 3: Good Health and Well-Being. This next goal has gained much attention and significance since the outbreak of the pandemic. The overall aim of this goal is to improve overall health and ensure well-being for all people of all age groups (United Nations, 2023i). While other goals contribute to this, the UN has listed human well-being as a separate goal in achieving SD. Included in the objectives are also recent occurrences, like the effects of the pandemic. COVID-19 has put a massive strain on public health, economic activities, as well as well-being overall. As of 2023, the World Health Organization, (2023a) counts over 6,9 million deaths which are attributed to the outbreak. In addition to the overall goal of aiming to better health worldwide, this situation has created an urgent need to address SDG 3. Targets of this goal are directed toward a reduction of global maternity and children's death under 5 years. Additionally, SDG 3 includes targets for access to reproductive education, and increasing knowledge in this field by incorporating it stronger into public programs. Another significant aspect of this goal is targeted toward ending

epidemics, such as AIDS, tuberculosis, or malaria. On top of that, goal 3 purposes to strive toward universal health care. A vital task of this goal is the prevention of further outbreaks of disease. This is done through supporting vaccine research, as well as funding for disease prevention in vulnerable countries (United Nations, 2023i). As good health is a non-negotiable when aiming for the increase of human well-being, the approach of this goal, some argue, is again too ambitious to be realistically executed. Achieving universal healthcare for everyone is arguably not implementable. The Universal Health Coverage Index, which ranges from 0 to 100 has increased from 45 to 67 between 2000-2019. While this is a positive improvement, progress has worsened through the pandemic and requires a drastic improvement to potentially achieve this target (World Health Organization, 2023b).

SDG 4: Quality Education. After poverty and hunger, the next issue faced by the SDGs is education. In 2020, around 90% of children were attending primary school worldwide. Moving toward secondary school, this number drops to 66% (Statista, 2022). By not acting on this matter, around 300 million students worldwide are at risk of not having basic reading or math skills (United Nations, 2023j). To counteract this and "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (United Nations, 2023j, S. SDG 4, Title), the UN has defined the following targets. As a first step, ensure universal access to education for all children. This target is marked by its focus on gender equality, as well as the emphasis on higher education – up until university as well. Another major milestone is to ensure both numerical and alphabetical literacy among all children and focus on adults as well. However, education alone is not targeted within this goal. It is emphasized that transferred knowledge should revolve around sustainable development, gender equality, cultural diversity, and human rights, as well as a focus on nurturing a peace–oriented mentality (United Nations, 2023j).

SDG 5: Gender Equality. This aspect has been part of the previously mentioned goals in ways to decrease maternity mortality and encourage equal education. SDG 5 is thus a separate goal with an aim to "Achieve gender equality and empower all women and girls" (United Nations, 2023k, Title). Gender inequality is still prevalent in almost every aspect of life. Gender-pay gaps, political representation, access to education, and personal issues such as decisions on reproductive health and marriage are all topics which are addressed by SDG 5. It aims to protect young girls and women from violence and exploitation while strengthening their resilience, emancipation, and outlook towards an economically self-sufficient future. Being a separate goal is defined through the current progress regarding gender equality. If current efforts remain unchanged, the achievement of gender equality could take up to 286 more years (United Nations, 2022c).

SDG 6: Clean Water and Sanitation. Access to clean water and safe sanitation systems are serious issues, which are still prevalent in 2023. Only about ¾ of the world's population have access to clean drinking water, which leaves around 2 billion people who do not. Meanwhile, people who do have access to clean and safe drinking water are not free from the threat of water scarcity. Consequences are affecting basic needs, such as access to food, and posing life hazards

(UNESCO, 2023). This shows the necessity for a separate goal - SDG6. Its main objectives are to achieve access to clean, safe-to-consume, and affordable drinking water for all on a global level by 2030. Other targets are directed toward creating and improving sanitation systems (United Nations, 2023c). An accompanying root cause of water scarcity does not only lie on the technical side, where proper sanitation and spring systems are to be more accessible but also the way water is seen. As water has been regarded as an abundant natural resource, rather than a finite supply. This has led to an unresourceful usage of water, where consequences are now expressed and addressed in SDG 6 (Sadoff, Borgomeo, & Stefan, 2020).

SDG 10: Reduced Inequalities. The divide between the richest and the poorest is rising. Poverty is a significant issue addressed in SDG 1 and is susceptible to insecurity, and political unrest. Due to the pandemic, the share of poverty has been increasing. At the same time, the wealthiest people have also managed to increase their income. According to an Oxfam Report from 2022, the 10 richest men in the world have reportedly doubled their wealth as a direct result of the pandemic. As a result, inequalities have greatly increased over the past years (Ferreira, 2021). To put this into a global perspective: The richest 1% not only have more of the global wealth than the bottom 50% of the population, but capture twenty times their income – and this has been the case since 1995 (Ahmed, et al., 2022). This makes it a social issue, as the ever-increasing gap does not lead to a society which maximises overall well-being. Pickett and Wilkinson's (2010) seminal text *The Spirit Level* lays bare how economic inequality is associated with myriad social ills. Thus, the aspect of economic inequality, which is also understood as the disparities in jurisdictive discrimination, wage gaps, and inclusion, addressed in SDG 10 is regarded as a goal, rather than a means (United Nations, 2023q).

The first target is to constantly increase the "income growth of the bottom 40% of the population at a rate higher than the national average" (United Nations, 2023q). In line with the growth in income also comes the implementation of regulatory changes to attain equality in the fiscal category. A generally improved monitoring of the financial soundness of global financial institutions is also aimed for in target 10.5. Another matter focused on in this section is safe migration. Since this continues to be an unsafe pursuit, where 2021 counted the highest number of migrants passing during the process in over 4 years, SDG 10 aims to counter this issue. The root cause lies on the regulatory level, which is why the UN aims to improve migration policies to allow for safer and more responsible migration processes (United Nations, 2023q). Overall, goal 10 is aimed at reducing global inequalities, but also within countries. These are defined by wage gaps, access to fair judicial treatment, discrimination, and lack of inclusion overall.

SDG 11: Sustainable Cities and Communities. This goal originates from the continuous shift towards urbanization. As of 2023, more than half of the world's population is housed in an urban area. As the trend is increasing, so is the forecast for urbanization for 2050. By that time, it is estimated that around 70% of people will be living in cities (The World Bank, 2023). With migration of this magnitude, governors must consider increases in air pollution, waste, and greater

population densities (United Nations, 2023m). SDG 11 addresses these points. The first target is aimed at creating a safe living space for all, which is affordable at the same time. The dramatic recent increases in cost of living around the world demonstrate that this goal is not being achieved. The goal also includes reducing the number of people living in slums. As the density of the population in cities is projected to increase, the need for smart, reliable, and efficient transportation modes arises. While changes toward making cities smarter are intended, the UN also cares about sustaining cultural and natural heritage. Another aspect of Smart Cities is also its resilience regarding climate change and catastrophes, as well as living resourcefully, and inclusively within a society. This marks the key points addressed in SDG 11 (United Nations, 2023m). The aspect of providing protection and shelter for humans in the event of a crisis can be related back to Maslow's hierarchy of needs (Maslow, 1943). As safety is at its own level, thus crucial for human well-being, it is considered a social goal.

SDG 16: Peace, Justice, and Strong Institutions. Another fundamental aspect of living sustainably is to ensure safety across all areas, be it in the context of advocating for peace, inclusion, and tolerance, or just treatment for all, and the protection of children, and the vulnerable from violence, and exploitation (United Nations, 2023n). These aspects are touched upon in SDG 16. The targets are aimed to create a safer, less violent world as the amount of violence has been increasing. However, targets are also defined to address changes on a jurisdictive level, where equal and fair treatment is available to all. The support of transparent and strong national institutions in developing countries is also a central point of this goal. Overall, SDG 16 works towards strengthening national institutions worldwide, implementing fair and equal treatment and access to justice. On top of that, the most vulnerable in society are to be protected, and violence, trafficking, and exploitation against those ended (United Nations, 2023n). While some targets within this goal can be viewed as being a means to an end goal, like governance – which aims to contribute to better human well-being, the concept of this goal is to foster peace. This makes it a goal since this is regarded as a clear directive, characterizing it as a goal (Elder, Bengtsson, & Akenji, 2016).

2.1.2.2 Environmental $_2$

This next part will refer to the remaining "goals" as means. Since the true, social goals have been presented in the previous section, what follows are potential means to help achieve SD or increased human well-being (Elder, Bengtsson, & Akenji, 2016).

This part looks into the goals which can be categorized as environmental means. Out of 17 "goals", 3 can be grouped into this category: SDG 13, 14, and 15. Each means is based on a different focus:

SDG 13: Climate Action. Following the Paris Agreement (2015), where the inevitable catastrophes of global warming were stressed, a maximum increase in global temperatures of 1.5° above

preindustrial levels was fixed. Those consequences are defined by the UN as increasing sea levels, drought, as well as an accumulation of the frequency of natural disasters (United Nations, 2023d). To fall below this value, drastic changes are required, known as climate action. The first target aims to increase the alertness and resilience of countries in relation to natural disasters to minimize the damages as far as possible (Campbell, Hansen, & Rioux, 2018). Another important factor when it comes to the success of implementing proper measures to reduce the extent of climate change effects is to incorporate those measures into policymaking, and development of strategic plans. Specific measures are mentioned as indicators, for example: the number of total GHG emissions within one year. Overall, the targets are also focused on increasing universal education and awareness about climate change, its consequences, and how to react (United Nations, 2023d).

Reaching the goal is at the time not realistic, as the world is far off track to stay within the Paris Agreement. This leads to the question of whether the targets of improving awareness and integrating climate change measurements into policy planning are sufficient to be used as a guidance. The progress here also shows that more specific measures might be needed to accelerate the achievement of this mean.

SDG 14: Life Below Water. While SDG 13 covers Climate Action overall, SDG 14 focuses on protecting and conserving the marine ecosystem (United Nations, 2023e). As global warming is not the only reason for the destruction of diverse marine life, this goal was called into action. Over- and illegal fishing are serious causes threatening biodiversity below water. While this act devastates marine life, the root causes lie in missing regulations in this area. SDG 14 also aims to combat indirect causes, like pollution on land, which ends up at sea. Overall, the main goal is to protect, restore, and foster the sustainable usage of marine resources, while fighting the effects of climate change, exploitation, and pollution (United Nations, 2023e).

Looking at the individual targets, it is argued, that barely half are based on a significant scientific base. For example, while this SDG seeks to highlight marine pollution and microplastic, it lacks a universal assessment method, making it hard to measure and compare (Sturesson, Weitz, & Persson, 2018). Given the resources of the UN, as well as the involvement of numerous policymakers in the SDGs, one might have expected targets which are not only supported but also universally measurable.

SDG 15: Life on Land. Practices such as deforestation and agriculture have been contributing to the loss of biodiversity by destroying the natural habitat of many species, which are now at the threat of extinction. Currently, this number is at around 40,000. Agricultural practices also lead to land degradation, which makes useable, fertile land scarcer (United Nations, 2023f). These factors result in a threat to the ecosystem, and therefore require the need for a specific action plan, in this case, SDG 15. The main focus of this goal lies in the protection and restoration of degraded land. At the same time, it highlights the necessity for proper forest management and

policies to avoid the continued exploitation of land and the resulting loss in biodiversity (United Nations, 2023f). Yet, scholars point out fundamental issues among this mean. The lack of planetary boundaries is argued heavily. Addressing these environmental issues, but not integrating specific measures like the boundaries or concrete biophysical limits for polluting countries does not seem viable, according to Krauss (2022).

2.1.2.3 Economic $_2$

Having examined the environmental means and social goals, this leaves the third and last category: the four economic means proposed to help the achievement of the true goals.

SDG 7: Affordable and Clean Energy. Universal access to energy is not yet ensured. Especially in middle- and low-income countries, a constant energy supply is not guaranteed. This is largely problematic in health-related institutions, which strongly depend on a constant and reliable flow of electricity. Over 1 billion people are treated in facilities with no or unreliable access to electricity. This creates a strong demand for universal access to electricity, especially in healthcare facilities, making it a means to achieve better human well-being (World Health Organization, 2023). On top of that, by addressing the generation of energy, in some instances measured through contribution to GDP, it thus classifies as an economic means.

Looking at the targets of SDG 7, the first step is to attain collective access to electricity which is reliable and up to today's standards. Following this, the next target aims to increase the amount of renewable energy which is being generated. This is accompanied by improving energy processes to ensure a surge in efficient energy (United Nations, 2023l). When addressing cooperation specifically, SDG 7 focuses on researching the field of sustainable, renewable energy sources.

SDG 8: Decent Work and Economic Growth. With economic growth come many social benefits as well. Employment, the increase in living standards, economic stability, and the increase in human capital overall stem from economic growth (Mankiw, Romer, & Weil, 1992). As unemployment, child labor, and economic instability are current issues, SDG 8 aims to touch upon these specifically (United Nations, 2023o). This goal is also supported by "achieving full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value" (United Nations, 2023o, Target 8.5). Employment is also related to proper training. Thus, the aim is to strive towards increasing the proportion of young adults, who are either in training, or education. While promoting employment on the one hand, another fundamental aspect of SDG 8 is to protect and intervene in the unjust treatment of humans. This includes the elimination of modern-day slavery, child soldiers, human trafficking, and forced labor (United Nations, 2023o).

The first target, however, is economic growth: specifically to increase GDP by 7% per year in the least developed countries, while seeing economic growth in all countries. This is supposed to

occur through fostering innovation and supporting the development of new businesses to create more decent employment opportunities. This potential means is associated with comparably the heaviest criticism. The benefits of economic growth notwithstanding, it also brings damage that directly contradicts other goals and means, which will be closely examined in the following chapter. Most importantly, scholars argue that infinite economic growth is not sustainable, especially considering planetary boundaries and finite resources. Additionally, Frey (2017) argues that rather than contributing to achieving the overall goal of SD, this means might oppose progress in that area. While aiming to "*promote sustained, inclusive and sustainable economic growth",* implementation of sustainable practices is not guaranteed. Especially given the capitalistic tendencies of society, striving for both without fundamental structural changes remains unfeasible (Feeny, 2020).

SDG 9: Industry, Innovation and Infrastructure. This SDG sets to use technological advances to drive the achievement of social, environmental, and economic targets. Its main emphasis lies in creating an infrastructure which fosters economic development and well-being overall while being resilient and sustainable in nature. (United Nations, 2023p). Targets of this goal also include the development of industries toward more sustainable practices by providing more environmentally friendly processes and technologies, and an increase in innovation by supporting businesses in developing countries through access to financial support. Overall, joint support is to be assembled to implement resilient and sustainable infrastructure, especially in developing countries. By advancing research in the technological field, a more robust, inclusive, and sustainable infrastructure is expected to lead to a resilient infrastructure, where innovation is endorsed (United Nations, 2023p). While fostering innovation and infrastructure is definitely a means to support the increase in human well-being, it is definitely not aspirational on its own, making it a definite means. As a means, we should also consider alternative means of achieving the same goal, such as the use of simple existing technologies. The fact that such options are precluded by this SDG highlights the problem with mistaking means for ends.

SDG 12: Responsible Production and Consumption. The unsustainable consumption of finite natural resources has resulted in several consequences: scarcity is becoming increasingly serious, the vast amounts of waste created need to be managed, as well as the effect on advancing climate change, pollution, and loss in biodiversity (United Nations, 2023r). Consequently, the main objectives of SDG 12 are: to implement sustainable natural resource management and use, reduce global food waste to half by 2030, as well as manage hazardous chemical waste according to sustainable standards. On top of that, SDG 12 is striving to raise public awareness on the topic of sustainable development and integrate practices into national programs. The "10-Year Framework of Programmes on Sustainable Consumption and Production Patterns" is addressed at all nations, specifically to be led by developed countries and set an example moving toward sustainable development (United Nations, 2023r).

Concluding this section, SDG 17 "Partnership for the Goals" does not fall into any of the three categories. Its main purpose is to collaboratively mobilize the necessary funds to achieve sustainability, especially in developing countries. Together, investments, access to technological innovations, and scientific knowledge can promote the universal implementation of sustainability (United Nations, 2023s). Easterly (2015) remarks the contradiction of this "goal". On one hand, the previous 16 objectives are detailed points raised to be implemented by the UN member states. On the other hand, target 17.15 states to "*Respect each country's policy space and leadership…*" (United Nations, 2023s, Target 17.15). This results in the understanding that, even though the 193 member states have agreed to the SDGs, one objective is to let them govern as they please. The issue here not only lies with the lack of implementation but also a fundamentally flawed approach to respecting national policies versus efficiently targeting global goals.

2.1.2.4 Interactions 2

Having examined the Sustainable Development Goals by category, this part looks closer into their relations. Just like the environment, society, and economy are interconnected, so are the goals. While these interactions are intented to be positive, meaning that the achievement of one SDG positively influences the achievement of another, the correlation can also be negative. This entails that the pursuit of the achievement of one goal happens at the cost of the progress of another.

Positive interactions are referred to as synergies, while negative ones as antagonisms. These interactions strongly depend on the context of the specific goals as well. Factors like timeline, technological advancements, geographical relations, and governance all play into how the interconnection of two targets realizes. Overall, not all interactions are antagonistic, in fact, positive interactions outweigh the negative ones, some of which are analyzed in the following section (McCollum, et al., 2018).

2.1.2.4.1 Synergies, Contradictions, and Gaps 2

Synergies are defined as the pursuit of one goal positively contributing to the achievement of another target or goal. Most interactions between the SDGs are categorized as such.

Goals and targets within one pillar are more likely to have a positive relation toward one-another. Synergies among economic, social, and environmental goals can also be detected. Social goals, such as 1 (*No Poverty*), 3 (*Good Health and Well-Being*), 4 (*Quality Education*), as well as economic means 10 (*Reduced Inequalities*), and 12 (*Responsible Consumption and Production*) are an example for positive interlinkages.

Pradhan et al., (2017) have defined the top 10 synergies between SDGs. This shows the high compatibility of the goals 1 (*No Poverty*) and 3 (*Good Health and Well-Being*) with other goals. Out of the top 10, goals 1 and 3 make up 8 of the top synergies. This implies the importance of these two goals. *Eliminating poverty* (SDG 1) enables access to *Clean Water and Sanitation* (SDG 6) and *Quality Education* (SDG 4), which promotes *Gender Equality* (SDG 5) as well as *Reduced Inequality Between and Among Countries* (SDG 10).

Good Health and Well-Being (SDG 3) supports the *Reduction of Global Inequalities* (SDG 10). Having suffered from the effects of the pandemic on an economic but also social level between and among countries, the realization of SDG 3, which implies equal access to health care and treatment, further reduces inequalities in this field (United Nations, 2023i). SDG 3 also entails the dissemination of knowledge on the subject of reproductive health and healthcare services, which is also a key point of SDG 5 (*Gender Equality*), which advocates for universal access to reproductive health, and rights. Moreover, SDG 3 includes a target for the eradication of epidemics, some of which are water-borne. As a result, the implementation of sanitation systems, universal access to clean water as well as hygiene, which are highlighted in SDG 6 support the achievement of some of the targets of SDG 3.

Other synergies are a *Reduction of Inequalities* (SDG 10) through universal access to *Quality Education* (SDG 4). By making the pursuit of an education, or training publicly more attainable, global inequalities reduce. Through the realization of better access to education, especially in less developed countries, the gap between global education levels is starting to decrease.

This reflects the purpose of most of the social goals, as they are marked by key synergies. Highlighting the overall purpose achieving human well-being, and being based on most of the MDGs, which have been mostly successful, shows the structural distinction of those true goals.

Trade-offs on the other hand, which are created through antagonisms among goals are also present. These trade-offs are rooted in the growth-oriented outlook of the SDGs, which come at the cost of some goals. SDG 8 (*Decent Work and Economic Growth*) is mostly related to the contradictions. While economic growth is attributed to an increase in societal well-being overall, partly through better health, factors such as air pollution and an increase in waste also typically accompany this process. This ‘goal’ is associated with a negative effect on a total of 12 other goals, mostly social and environmental ones. Similar antagonistic effects are discussed for SDG 9 (*Industry, Innovation and Infrastructure*), which shows contradictions with nine other SDGs,

mostly the environmental (Pradhan, Costa, Rybski, Lucht, & Kropp, 2017). As industrialized countries are responsible for the significant usage of natural resources to achieve economic growth, their environmental strain is correspondingly high. Therefore, by seeking an increase in industrialization by 2030, the continuous dependence on natural resources is only expected to rise, thus hindering the achievement of the environmental SDGs. This has been recorded since the late 1950ies, which marks the beginning of the measurement of CO_2 levels in the atmosphere. It shows an increase in pollution levels in accordance with economic growth (Menton, et al., 2020). A reduction of resource use would lead to a reduction of economic growth, which implies effects on standards of living, unless accompanied by decoupling. Without absolute decoupling, the pursuit of *Economic Growth* (SDG 8) will ultimately result in more resources being used, even further deteriorating environmental integrity (Eisenmenger N. P.-T., 2020).

More specifically, target 8.1 aspires to GDP growth of 7% per year in the least developed countries (United Nations, 2023o), at the same time as complying with the Paris Agreement (2015) climate goal of staying below the 1.5°C threshold of global warming. However, as economic growth implies the usage of natural resources, especially fossil fuels within an industrialized economy, both goals cannot be met. A 7% increase is deemed too high. According to Menton, et al. (2020) an increase of 3% alone would be too fast to even stay below the 2°C threshold. This leads to the conclusion that SDG 8 strongly contradicts the achievement of the environmental SDGs, especially *Climate Action* (SDG 13), which foresees an "*integration of climate change measures into national policies, strategies and planning*" (United Nations, 2023d, 13.2).

By working toward economic growth, not only do GHG levels typically increase, but other environmental strains as well. Practices such as agriculture, stock breeding, deforestation, industrialization, and its resulting pollution of water, air, and land lead to a subsequent loss of biodiversity and thus a trade-off of SDG 6, 14, and 15 (Menton, et al., 2020).

The root cause of these contradictions between 'goals' is the conflation of means for ends, whether intentional or accidental. True goals are non-negotiable, whereas what constitutes an appropriate means is always up for debate. While the 'goals' were presented with equal importance and without any hierarchy, the reality shows the requirement of a functioning environment first, on which society is built, and lastly creating economic activity – within the planetary boundaries, which are explored in the following section. This highlights one fundamental inconsistency within the entire framework. The initial presentation ignores the nested connection of the categories, which is adopted by models presented lateron (Stockholm Resilience Centre, 2016).

As the contradicting nature of SDG 8 has now been established, this marks possible gaps as well as the opportunity for improvement. Kreinin & Aigner, (2021) have therefore proposed new targets for this goal, to make its achievement more sustainable in line with the other SDGs. A missing indicator according to the researchers is wellbeing. Not to be mistaken with SDG 3 (*Good Health & Well-Being*). In this case, well-being refers to a number of factors. Firstly, this refers to living within one's own means, which can be described as meeting "the needs of the present generation without compromising the ability of future generations to meet their own needs" (WCED, 1987, as cited in Bossel, 1999, p.2). Additionally, well-being is also extended to the "ecosystem and non-human animals" (Kreinin & Aigner, 2021, S. 300). The proposed target also gives importance to economic growth, however growing should be limited by staying within the planetary boundaries.

An additional measure defined, which could be included in SDG 8 is the "Dependence on economic growth" (Kreinin & Aigner, 2021, S. 301). This looks at the stabilization of economic welfare, while at the same time looking at its dependence on natural resources. This could determine the ability within one economy to degrow, without having social, or well-being as trade-offs.

When looking at which goals could be added in addition to the 17, a few suggestions have also been made in this regard. According to the WHO (2021), around 7 million people yearly suffer premature deaths as a result of air pollution. Clean air is not a separate goal, or target itself, rather it can be seen as an example of several targets. Such as 11.6, which aims to reduce the environmental strain produced by big cities, with a focus on improving air quality (United Nations, 2023m). On this account, Erik Thomson, (2019), as cited in (The Overpopulation Project, 2019) proposed the addition of SDG 18 – Clean Air. Since other goals are focused on Clean Water (6), Climate Action (13) Life Below Water (14), and Life on Land (15), the suggestion is to dedicate a separate goal for this issue. The proposal includes indicators, such as the reduction of air pollution – indoor and outdoor, as well as the inclusion of measurements for air quality, which serve as indicators.

Another gap in the goals was suggested as an addition to SDG 16 (*Peace, Justice and Strong Institutions*). Johan Karlsson Schaffer (2021), as cited in (The Overpopulation Project, 2019), pointed out the lack of several key points to add. The mention of effective institutions, as well as stronger governance in developing countries is present, however specific targets are missing (United Nations, 2023n). Such as the further implementation of democracy, as well as freedom

of speech and freedom to vote. While the approach of further extending SDG 16, the question persists on how practical that would be.

2.2 Economic Growth on a Finite Planet [1]

Economic growth is a key factor determining a country's standard of living and prosperity. The steady increase in the production of goods and services over a certain period of time results in higher incomes, better economic opportunities, and thus a higher standard of living for the individuals and nations as a whole (Mankiw, Romer, & Weil, 1992). The understanding of factors and dynamics driving economic growth has always been an area of interest for research to policymakers, economists, and scholars.

According to the Austrian Federal Ministry of Finance, economic growth is one of the central goals of the Austrian economic policy, which is built on a stability-oriented macroeconomic policy (Austrian Federal Ministry of Finance, 2023). Following the pandemic, the European Union is promoting a growth model among members with the main objective of economic growth and job creation (European Commission, 2021). Goal 1 of the US Treasury is to "promote equitable economic growth…" (U.S. Departement of the Treasury, 2022) and UK's prime minister, Rishi Sunak outlined the five key priorities for 2023, one being the "economy growing and creating better paid jobs" (Government UK, 2023). This clearly shows that governments around the world have the clear goal of growing their economies.

Economic growth refers to the quantitative increase in goods and services produced by an entity, such as a country (McKinsey & Company, 2022). The economic growth of a country usually implies that people and businesses in that country earn and spend more, thus increasing their standard of living. The gross domestic product (GDP) is used as the universal indicator to measure a country's economic growth or recession. The GDP refers to the sum of the monetary value of all final goods and services produced within a country in one year (Samuelson & Nordhaus, 2010, pp. 370-1). Economists distinguish between two different types of GDP, namely nominal and real GDP. These two are calculated slightly differently, as real GDP takes inflation into account, while nominal GDP reflects the raw figures, not adjusted for inflation (McKinsey & Company, 2022).

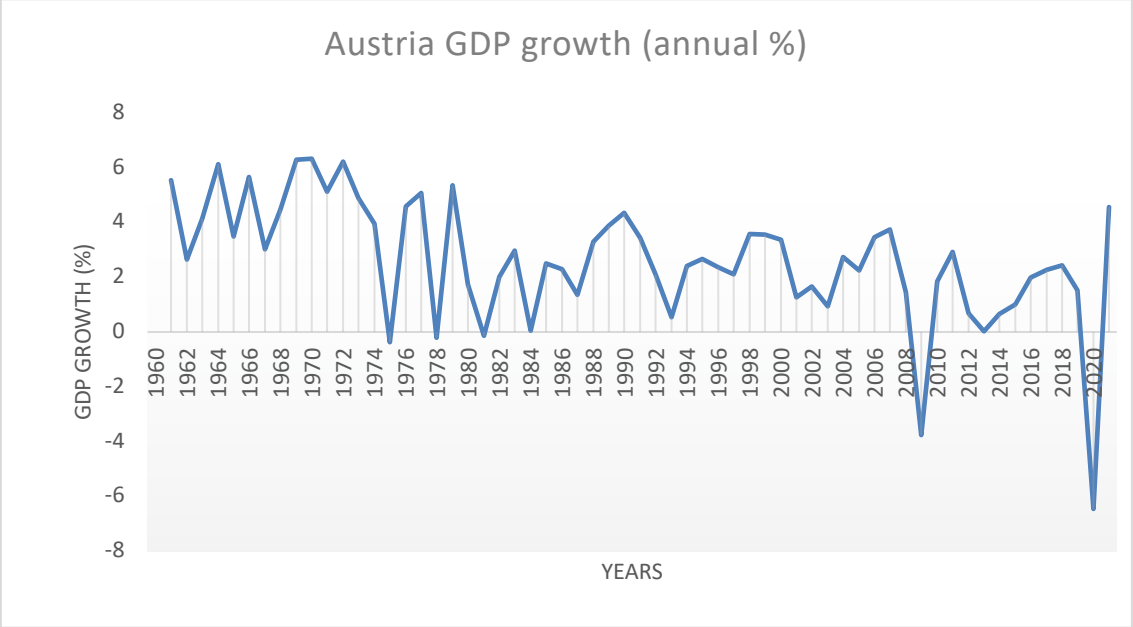

FIGURE 4: ANNUAL GDP CHANGE (%) IN AUSTRIA, 1970-2021; RETRIEVED FROM: (THE WORLD BANK, 2023)

Figure 4 shows that the Austrian government has been quite successful in increasing the GDP over the years after a few setbacks such as the world economic crisis in 2007 or the global pandemic in 2020. The blue line indicates Austria's GDP growth rate, demonstrating periods of expansion, characterized by positive growth rates, and phases of contractions, which are portrayed by negative growth rates.

Since the exponential economic growth after World War II, the world's society appears of the belief that growth is the natural solution to almost all societal problems, such as poverty, unemployment, or debt. The idea of ever-greater economic output has been promoted endlessly, which has led to the mindset that "growth" is one of the main goals of all human efforts. Politicians and policymakers promote this goal, even though companies tend to choose the cheapest means of production, which usually means outsourcing production to countries with lower environmental standards, thus damaging the environment, in pursuit of the goal of growth and increased profits (Vikramaditya, 2022). However, in recent years, concerns regarding the long-term prospects of economic growth have gained significant attention. Scientists have already pronounced warnings that living on a finite planet cannot sustain infinite economic growth. Such warnings are often ignored and disregarded by the majority of human mankind.

Yet, as mankind lives on a finite planet with finite natural resources, there is increasing recognition of ecological limits that demand a re-examination of the traditional concept of unlimited economic growth. According to Washington & Kopnina (2018), unlimited economic growth is

impossible. The relationship between economic growth and environmental sustainability will be explored in the following sections as well as the opportunities and challenges associated with pursuing sustainable economic growth. Furthermore, the principles of decoupling and degrowth will be elucidated in detail.

2.2.1 The Economy and its Connection to the Environment [1]

The economy relies on natural resources and energy inputs to function. Hence, one can say that the economy is closely linked to the natural environment. Yet, the traditional economic paradigm often treats the economy as a separate entity disconnected from the natural environment on which it depends (Mamedov, Movchan, Ishchenko-Padukova, & Grabowska, 2016). This is also the case when looking at Figure 1, which depicts the UN's SDG model with three interlocking rings. As criticised by Imran, Alam & Beaumont (2011), the economy should be regarded as a subset of the social environment and ecosystem rather than being equally weighted.

The ecosphere is the planetary system which consists of all living organisms and the environment they live in. Essential resources such as air, water, and biodiversity are the basis for life on this planet and a functioning economy. The economy is a human-made system, which depends on the resources provided by the ecosphere. Ecological economics examines the impact of humans on the world taking a systematic approach to foster the well-being of humans and nature (Costanza, 2010). This perspective is vital in order to get an understanding of how humans interacted with the environment in the past and how they will in the future. Furthermore, the concept of ecological economics considers the embedding of humans in the ecological system rather than separating the two.

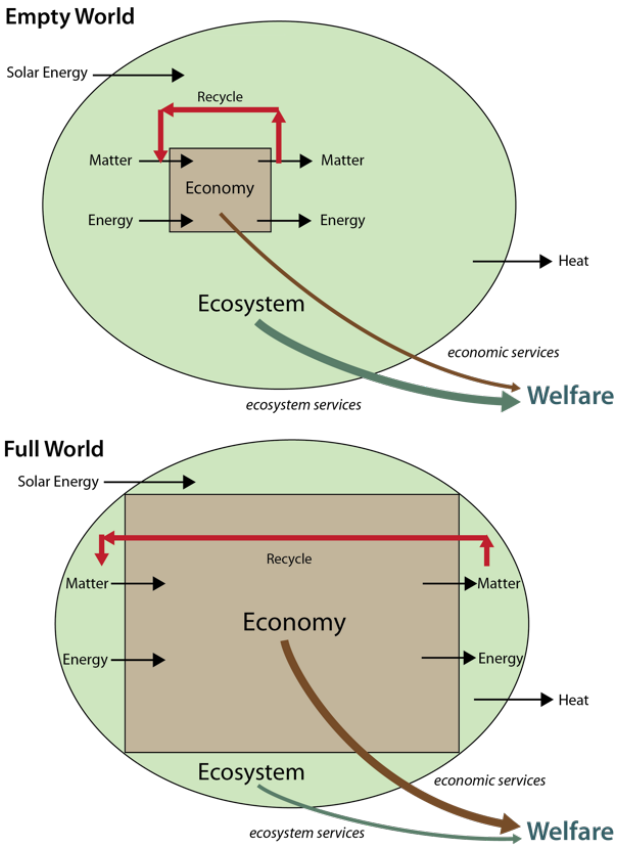

FIGURE 5: WELFARE IN AN EMPTY VS. FULL WORLD; RETRIEVED FROM (DALY, 2015)

Over the years, one can say that humanity has shifted from an empty world to a "full" world. The empty world contained a small human population with low per capita consumption levels. These days the world is inhabited by 8 billion people (Worldometer, 2023) consuming more per capita than any previous generations. The "full world" refers to the situation in which humanity uses all of the natural production produced in a year. Thus, the appropriation of natural resources exceeds the provision by the planet. Currently, the economy is so large that there is no longer the option for society to pretend that it inhabits a limitless ecosystem (Daly, 2015). Figure 5 shows the economy growing inside of the larger but finite ecosphere. As it grows, the economy absorbs ever more matter and energy from the ecosystem. Not only the human population but also the non-living population, including buildings, cars, and cellphones, has grown rapidly since the mid-twentieth century. Both types of populations need a metabolic flow for their reproduction and maintenance (Daly, 2015). The inflow of matter from the ecosphere includes energy, goods, or food. Outflow occurs when pollution, high levels of CO2, and different types of wastes, which can be classified as organic and inorganic are ejected (Korpilo, 2014).

In the empty world, humans had no significant impact on the ecosystem function as the consumption of materials and energy was too little and an ecological surplus existed. This has

changed with economic growth, as resource use now exceeds annual flows and eats into the natural capital of the planet, causing impacts like resource depletion and biodiversity loss, resulting in crises like world hunger, inequality, and climate change. Daly (2015) referred to this as "uneconomic growth," where the benefits of increased economic production are outweighed by the increasing social and environmental costs.

In Figure 5, one can see a green arrow which represents the ecosystem services. Ecosystem services refer to the interaction between animals, plants, and other inhabitants of an ecosystem. The interactions are complex but vital as humanity needs air to breath, water to survive as well as the plants to absorb human generated CO_2 emissions. Another example for an ecosystem service is the wind and rain needed for renewable energy systems. When looking at Figure 5 it becomes clear that with a growing economy, the ecosystem services diminish. Since the economy is highly dependent on ecosystem services, it can be said that the depletion of natural capital threatens the economy itself (Daly, 2015). Therefore, it can be said that the figure reflects how economic growth collides with finite resources and how the size of a sustainable economy is unavoidably limited by the ecosystem (Songer, 2019).

Eventually, the economy of a full world threatens irreversible events by overstepping planetary boundaries and therefore harming the long-term well-being of mankind. The principle of planetary boundaries will be discussed in detail in the next section. Finally, one can say that the illustration clearly shows that an increase in the human economy results in a decrease in the natural environment.

Another approach to connect the economist's perspective with the natural environment is environmental economics. Environmental economics differs from ecological economics in its different theoretical perspectives and its emphasis on different aspects of the interaction between the economy and the environment. While environmental economics focuses on the relationship between the economy and the environment, ecological economics, as previously mentioned, considers the economy as a subsystem of the larger ecosystem. Environmental economics can also be referred to as the study of cost-effective resource allocation, utilization, and protection (EPA, 2022). According to Borel-Saladin and Turok (2013), two neoclassical economists, environmental problems originate from the inefficient use of natural resources and the under-valuing of natural capital. The essential premise of this theory is that natural and man-made capitals are interchangeable (Bina & La Camera, 2011). One of the cornerstones of this view is that it is possible to achieve sustainable resource use and economic growth simultaneously. Because of its underlying assumption that there can indeed be a win-win solution for both the economy and

the environment, the so-called Porter hypothesis certainly deserves special attention (Porter & Van der Linde, 1995). However, the claim that the economy can grow with the environment being protected is challenged by Figure 5, as there is an apparent conflict between the preservation of the environment and the continued growth of the economy.

In summary, environmental and ecological economics approach the economic and environmental relationship from different perspectives but address environmental challenges and promote sustainable development. It is essential to engage with the perspectives and methods of both approaches and integrate them into policymaking for a more sustainable future. Moreover, to sustain the development of the economy within the finite biosphere new ways of thinking are required.

2.2.2 Planetary Boundaries [1]

Since the industrial revolution, the environment has been deteriorating as a result of the continuous utilization and exhaustion of natural resources (Fransen, 2021). The earth and its ecosystem were stable and intact for thousands of years. Now, scientists warn about the interconnected system's destabilization and the resulting consequences for future civilians. The planet has finite resources and capacity limits, which will be discussed in detail in a later chapter. These limits must be considered and respected to ensure the basis for future generations to meet their needs.

In order to ensure the stability of the planet, 30 international scientists, under the leadership of Johan Rockström, published the article "A safe operating space for humanity" in 2009 from the Stockholm Resilience Centre (Rockström, et al., 2009). This article gained importance by introducing "planetary boundaries of resilience" for nine key natural systems and processes. The so-called “planetary boundaries” have become a widely known conceptual framework that defines the thresholds in which human activity can operate to avoid irreversible environmental damage (APlanet, 2022).

Figure 6 illustrates the nine boundaries. The green circle in the center displays the quantitative growth levels in which humanity can thrive for many more generations. This is the so-called safe operating space. The orange bars indicate which planetary boundaries were exceeded in 2022 and by how much. The two areas in grey need more scientific research in order to be able to indicate the human impact for the specific category.

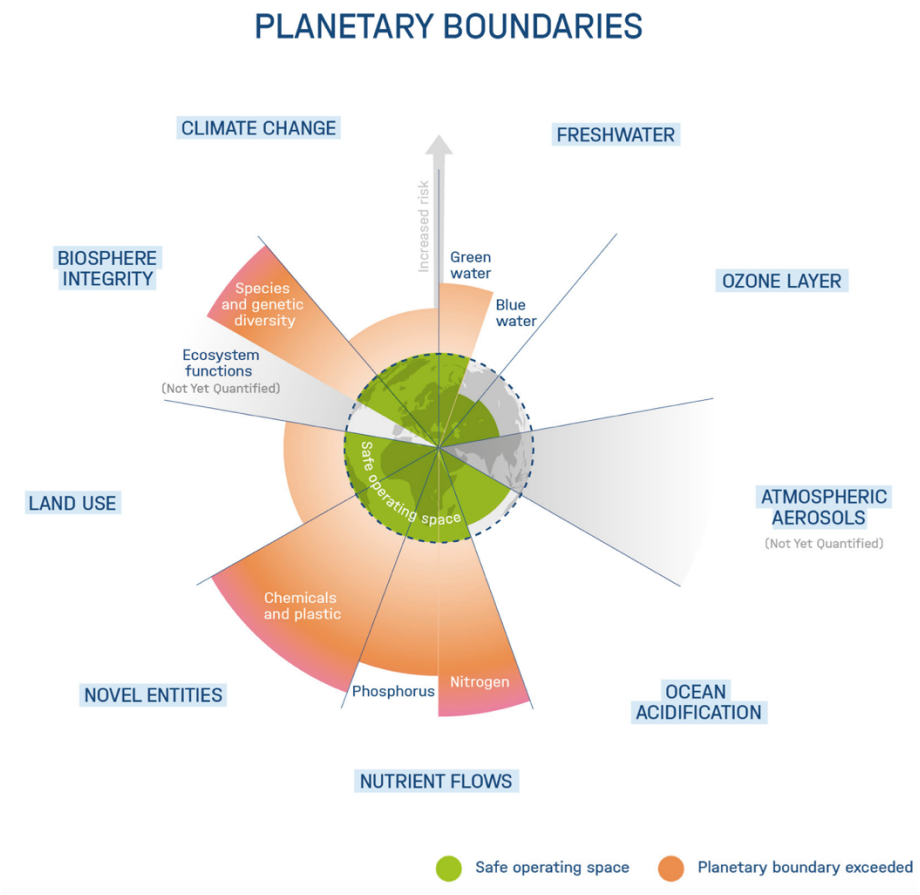

FIGURE 6: PLANETARY BOUNDARIES; ILLUSTRATION BY JULIA BLENN (2022)

The nine planetary boundaries are listed below with a short explanation:

1) Climate change: Climate change is accelerating due to rising concentrations of greenhouse gas emissions. The consequences are becoming noticeable to the world's population in the form of extreme weather events such as droughts or floods. The threshold of 350 parts per million (concentration of CO2 in the atmosphere) was exceeded in 1988 and has gone up to 417 ppm in 2020 (Asher, 2021).
2) Freshwater: This refers to the amount of water that is available to humans and plants. There are two types of freshwater. Water that originates from rain, evaporation, or ground moisture is called "green water", while water found in lakes, rivers, and groundwater is referred to as "blue water" (Krautwig & Krieger, 2022). Figure 6 shows that "green water" has been exceeded, resulting in global ground moisture levels changing to very dry conditions. The world's population must stop deforestation to maintain the water cycle and, most importantly, stop polluting surface as well as groundwater.

3) Ozone layer: The ozone layer is vital as it protects the earth from harmful ultraviolet radiation. When scientists discovered its thinning over the Antarctic, the Montreal Protocol was introduced in 1987 as an initiative to rebuild the Ozone layer and stop the consumption and production of chemicals that were held responsible (Velders, Andersen, Daniel, Fahey, & McFarland, 2007). Strict policies ensured that the boundary was not exceeded, and the ozone layer showed signs of recovery.
4) Atmospheric aerosols: This category refers to the amount of emitted air pollutants. Due to human activity in, for example, agriculture, transport, or also heating, aerosols are released into the atmosphere. These differ in their chemical composition and particle size, which can alter the water solubility in clouds as well as ocean circulation systems and further the climate (Andreae, 1995). In order to be able to tell if the atmospheric aerosol boundary was already exceeded or not, more scientific research is needed (Steffen, et al., 2015).
5) Ocean acidification: This category concerns the concentration of carbonate ions present in the oceans. Due to rising CO_2 levels, the oceans are absorbing too many emissions in their function as carbon sinks, leading to an increase in the pH levels, thus, acidification (Running, 2012). The acidification of the ocean water imposes a threat to marine life, particularly coral reefs and invertebrates whose shells are susceptible to dissolving in acidic conditions. However, the planetary boundary has not been exceeded yet.
6) Nutrient flows: The natural cycles of nitrogen and phosphor were profoundly altered by using them excessively in agricultural processes, which led these chemical elements to run off into neighboring ecosystems. This caused serious imbalances. The boundary was greatly surpassed.
7) Novel entities: Novel entities refer to harmful materials such as plastic, dyes, or other chemical substances which are released by human activity. Since these chemicals have not always been on the planet in this form, organisms are not adapted to deal with these xenobiotics and are, therefore, at the mercy of the negative effects on a large scale (Krautwig & Krieger, 2022). The established boundary has been exceeded for chemicals and plastics, as one can see in the illustration.
8) Land use: Land use refers to the size of the forest area. Changes from natural environments to agricultural land significantly impact the climate. Consequences include increased carbon dioxide emissions due to missing tropical forests and major disruption and losses in ecosystem functions (Gendre, 2022). The threshold has also been exceeded but not as majorly as in other categories.

9) Biosphere integrity: This category pertains to the amount of functional diversity present in ecosystems and the speed of extinction. As ecosystems are vital to survive, scientists are concerned about the rate of decline in plant and animal populations. This diversity loss in natural systems can be attributed to human interventions and has crossed the boundary. Regarding the functioning of the ecosystems, more data is still required in order to draw precise conclusions on future risks (Gendre, 2022).

Summarizing the planetary boundaries listed above, one can see that the majority of the categories are being pushed to their limits and beyond. Therefore, it is imperative that every citizen takes action and that governments adopt policies fostering sustainable development to ensure the planet's health for longer. Such policies will be discussed in a later section of this research paper. Even though it is time to take action now, the importance of updating the planetary boundaries and their indicators is vital in accordance with the latest scientific findings.

Having elucidated the planetary boundaries in detail above, it is crucial to highlight the connection between them and the Sustainable Development Goals (SDGs). According to Takeuchi (2022) the SDGs and their contents, which were developed in 2015, were influenced by the framework of the planetary boundaries, which was developed in 2009. The 17 SDGs fall under the following three main categories: biosphere, social and economic goals.

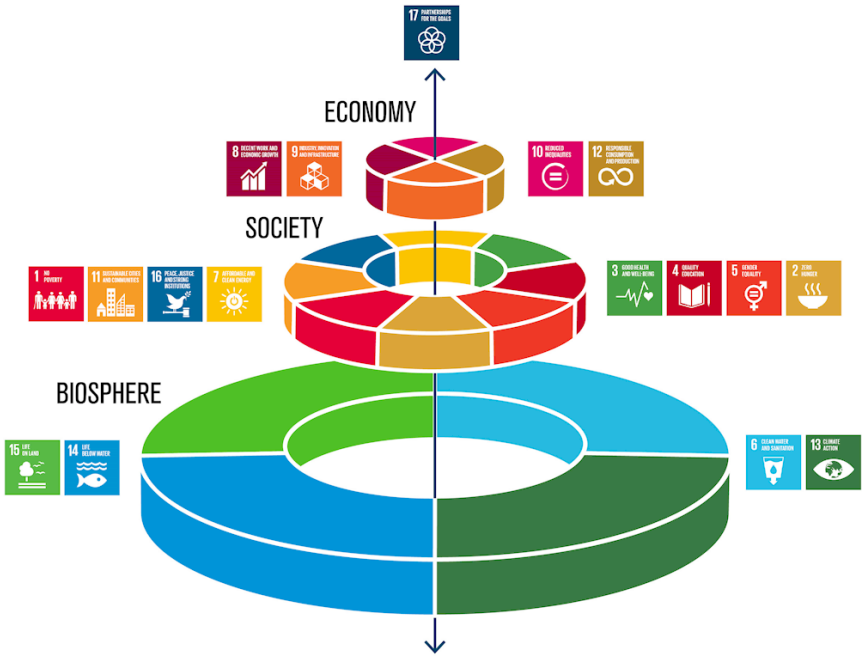

FIGURE 7: "THE WEDDING CAKE"; A HIERARCHICAL STRUCTURE OF THE SUSTAINABLE DEVELOPMENT GOALS (STOCKHOLM RESILIENCE CENTRE, 2016)

Figure 7 shows a diagram called "The Wedding Cake", which was developed by the Stockholm Resilience Centre, and displays the hierarchical structure of the SDGs. The relationship between the goals can be understood by recognizing the environmental goals as the foundation for the societal and economic goals. In turn, the concept of planetary boundaries is based on the concept that social and economic activities should be compatible with the biosphere's carrying capacity. Therefore, it can be concluded that these two frameworks are closely linked and that planetary boundaries led to a reinterpretation of the SDGs portrayed as "The Wedding Cake" model. The model highlights that the economic system and society are subsets of the biosphere which underlines the importance of its preservation (BMUV, 2021).

Moreover, linking to Chapter 2.1.2.4.1, the planetary boundaries are a tool for assessing synergies and trade-offs across SDGs. The debate of planetary boundaries involves a focus on the long-term stability of the Earth's system while considering notions of global growth and development by recognizing that some goals may be incompatible. For instance, promoting GDP growth may be incompatible with battling climate change unless accompanied by significant decarbonization of the economy in parallel. In summary, the SDGs are a roadmap for a sustainable future that must be achieved within the planetary boundaries, which represent the limits of our planet's resources.

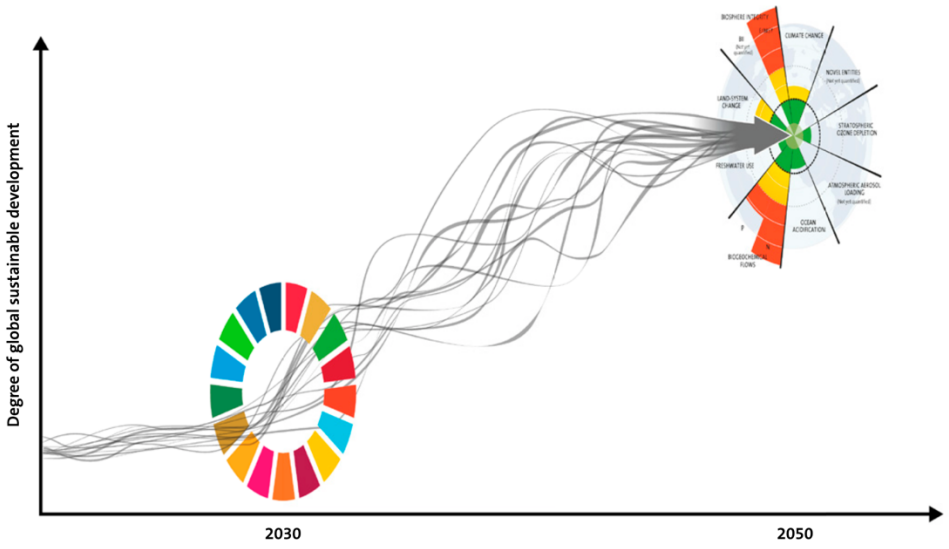

FIGURE 8: ACHIEVING THE SDGS WITHIN THE PLANETARY BOUNDARIES AND SUSTAINABLE DEVELOPMENT AFTER 2030. RETRIEVED FROM: (ROCKSTRÖM, GOLUKE, STOKNES, & COLLSTE, 2018)

As 9 billion people are projected to live by 2050, it becomes even more crucial to stay within the planetary boundaries. As the SDGs are built on achieving global sustainable development, they presume fundamental policy changes to achieve a drastic transformation in staying within the planetary boundaries. Since the SDGs are part of Agenda 2030, which are set to expire in 7 years, at the time of writing, the question arises as to what needs to happen after the period. New norms, policies, and values must be established to achieve a sustainable future that is within the planetary boundaries of an ever-growing population. Figure 8 shows the need for increased global sustainable development through the incorporation of drastic transformations considering the progress by the year 2030 of the achievement of the Agenda 2030.

2.2.3 Ecological Footprint [1]

Besides the planetary boundaries' framework, the ecological footprint is yet another important method that highlights impacts on the earths' biocapacity. It is used to measure the largely unsustainable extent of humanity's resource consumption (Global Footprint Network, 2023). The model measures how fast resources are consumed in production and other human activities, compared to how quickly nature can absorb the waste and how much bioproductive area is needed (Duro & Teixidó-Figueras, 2013). In simple terms, the ecological footprint makes a comparison between how much nature is used versus how much is available. This is illustrated in Figure 9. The concept can be applied to individuals, countries or on a global level. A biocapacity deficit occurs when a populations' ecological footprint exceeds the regions biocapacity (Global

Footprint Network, 2023). This means that the demand for producing goods and services exceeds the regeneration ability of the regions' ecosystems.

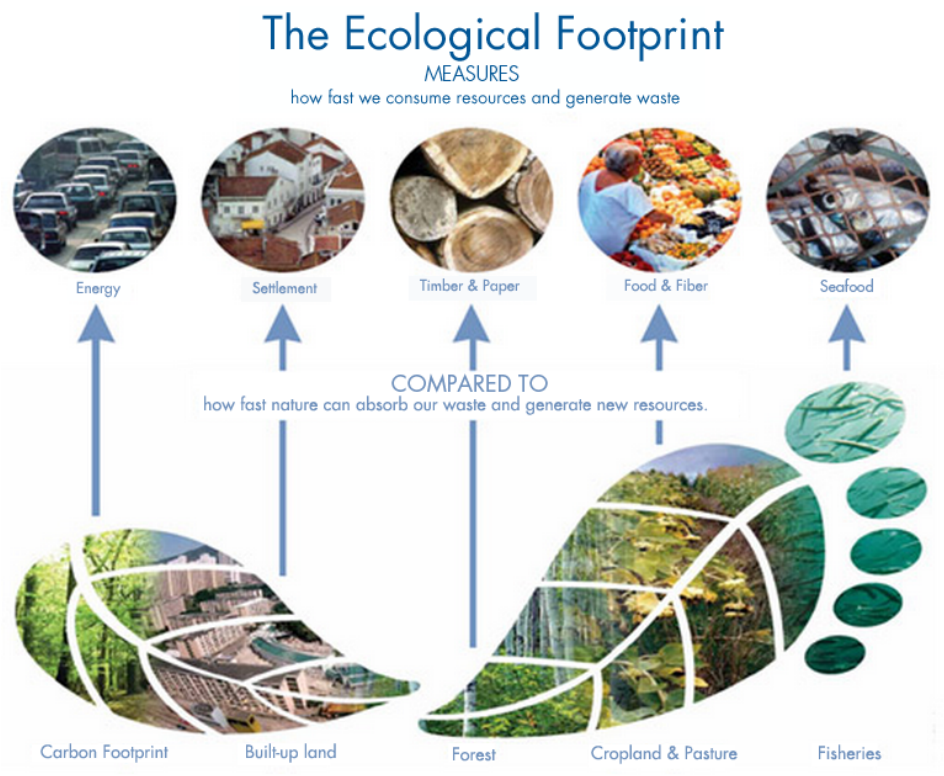

FIGURE 9: THE ECOLOGICAL FOOTPRINT; RETRIEVED FROM: (GLOBAL FOOTPRINT NETWORK, 2023)

The ecological footprint takes various factors into account such as carbon emissions, waste generation or water usage. As a rule, the footprint and biocapacity levels are expressed in global hectares (gha) as the unit. The homogeneous approach is used to highlight disparities between countries in resource consumption and the resulting environmental impacts. By comparing the available biocapacity to a countries' ecological footprint, it enables an assessment of whether a population is living within the ecological limits of the planet.

An equity problem occurs when considering only resource consumption and waste generation within a country, while neglecting the ecological limits and resources available globally. This approach fails to address the unequal distribution of resources and the cross-border interconnectedness of ecosystems worldwide. The ecological footprint addresses this by standardizing resources as global hectares (gha). Furthermore, some countries have proportionally smaller populations with respect to their land areas. To put this in relation, one can compare Austria with an ecological footprint of 6.02 and a biocapacity of 2.73 per capita to Australia with an ecological

footprint of 7.72 and a biocapacity of 12.64 per capita. This means that despite Australians consuming more per person, Australia has an ecological surplus and Austria has a deficit. In 2017 the world's average footprint was 2.77 with an average biocapacity of 1.60 global hectares (World Population Review, 2023). Now the question is whether Austrians should reduce their ecological footprint down to the world average, or even lower to the country's biocapacity, and whether Australians can increase their footprint to use their ecological surplus even though they already have one of the highest worldwide. This clearly shows that there is an inequality problem, which is that population and country size lead to disparities in resource consumption and environmental impacts. Perhaps both countries should reduce their per capita footprints down to the 1.6 gha that represents an equal share of resources for all people within the planetary boundaries?

Due to the fact that increased consumption in a rich country like Australia is incompatible with SDG 10 –reduce global inequalities– a more holistic and interconnected perspective is needed to move beyond the country-based approach. This includes mutual responsibility for sustainably managing resources worldwide while promoting international cooperation and collaboration. To ensure that all countries can achieve their development goals while staying within the planetary boundaries, it is necessary to promote sustainability and support resource-constraint in countries while moving towards a more comprehensive approach.

2.2.4 A Finite Planet – Limits to Growth [1]

The expansion of economies and the population worldwide poses a significant danger to the planet. Almost everyone, including the United Nations (UN), governments, and media, are propagating endless growth. However, one must consider that the Earth is a finite planet. Finite means the earth has a defined limit to support human activity (Meadows, Meadows, Randers, & Behrens, 1972).

As humans approach the Earth's limits, trade-offs become more apparent and often difficult to overcome. This, for example, applies to farmland. If lots of farmland is available, the population can grow without worrying about food supply. In today's world, valuable rainforest land must be cleared in order to have more land to grow food. This decision is a matter of choosing extremes. On the one hand, if the forest is not cut, people will starve, but on the other hand, the consequences for the environment are extreme as there is less ability to convert CO_2, accelerating climate change.

In fact, this shows that the planet cannot support endless economic and population growth. Haydn Washington (2015) states that overpopulation, overconsumption, and economic growth are the main drivers of 'unsustainability'. This refers to a situation where something cannot be maintained indefinitely (Moir & Mowrer, 1995). Global Institutions such as the World Health Organization (WHO) and the World Economic Forum (WEF) have pointed out that overpopulation and climate change account for human well-being's biggest threats (Vikramaditya, 2022).

As most people and organizations are still fixated on the idea of endless economic growth, it shows that they have not yet realized that humanity has already surpassed several ecological limits. Therefore, one can say that the constant desire for growth causes the current environmental crisis. In fact, humanity is depleting the biosphere by using up the available resources of the past, present, and future (Wijkman & Rockström, 2012).

Daly (2015) defined the limits of growth in a graph which is displayed in Figure 10. The graph shows on the one hand, the declining marginal utility (benefit) of the growth of the economy. This refers to the situation where satisfaction declines as more units are consumed. On the other hand, the increased marginal disutility or cost is displayed as the result of environmental sacrifice.

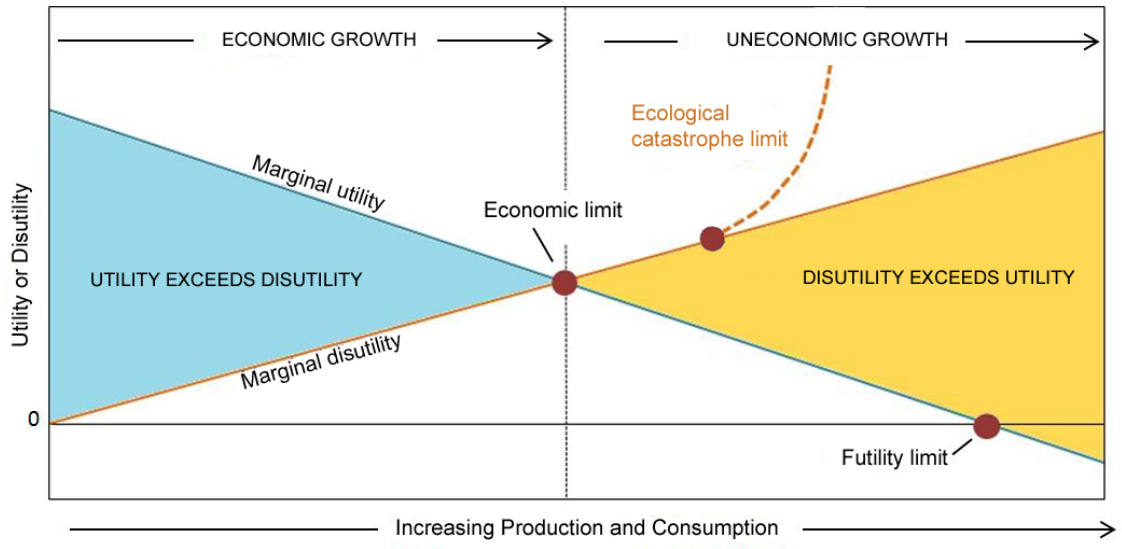

FIGURE 10: THE LIMITS TO GROWTH; RETRIEVED FROM (DALY, 2015)

Uneconomic growth occurs when production levels are increased to a point where the costs to well-being from the sacrifice of resources and ecosystem services used surpass the well-being received from the goods or services produced. Disutility refers to the cost incurred to withstand

rising production levels. This includes the loss of biodiversity, increased air pollution, and ultimately as a final consequence, climate change. Within the blue area, society enjoys the maximum net utility.

Daly (2015) distinguished between the three growth limits listed below.

1. The *futility limit* occurs when the marginal utility from producing and consuming goods and services equals zero. Even if goods and services are free due to no production costs, humans can only consume a limited amount. Thus, at this point, no utility is added with increased consumption. However, one must say that the majority considers this limit as far away. Additionally, neoclassical economists tend to reject this limit. Nevertheless, research suggests that once a certain point of economic stability is reached, also referred to as the "sufficiency threshold," happiness and well-being no longer increase with GDP (Kubiszewski, et al., 2013).
2. The *ecological catastrophe* may hit society sooner or later, resulting in a sharp increase in disutility, as shown by the dashed line on the graph. Climate change caused by the release of greenhouse gases as an output of economic growth could be the reason for such a limit when a tipping point is reached.
3. The *economic limit,* which is the most vital limit, occurs when marginal cost equals marginal benefit. Any further economic growth is viewed as uneconomic growth, as the costs exceed the benefits and it brings more harm than good. This limit occurs before the futility limit and before the ecological catastrophe. The question arises whether costs already outweigh the benefits of growth due to the extent of biodiversity loss, deforestation, dry wells and rivers, ocean waste, or excess carbon dioxide in the atmosphere.

In summary, one can say that on a finite planet with a growing human population and consumption, some compromises must be made. Repairing the planet demands the acceptance of people that, in reality, the economy cannot grow forever. Technological advances may shift these limits allowing further growth before reaching a limit. Moreover, "decoupling" has become well-known in recent years as it describes achieving continuous economic growth without causing further environmental damage. This idea will be explored in more detail in the following section.

2.2.4.1 Decoupling [1]

Decoupling refers to the concept where economic growth is delinked from resource use and environmental impact (Hennicke & Khosla, 2014). This means that the economy can continue to

grow without harming the environment. This can be achieved by utilizing renewable energy sources and more efficient methods to reduce the resources and amount of energy needed per unit of consumption. The OECD was one of the first international organizations to address decoupling in their policy paper titled 'Environmental Strategy for the First Decade of the 21st Century' and consider it one of the primary goals (OECD, 2001). Multiple dimensions apply to decoupling. These are absolute or relative; global or local; permanent or temporary, and sufficient or insufficient.

From a country and development perspective, decoupling can be relative or absolute. This is displayed in Figure 11. Relative decoupling happens when both variables continue to develop in the same direction but one of them at a lower rate. This is shown in Figure 11 as GDP grows much faster than resource use (Parrique, et al., 2019). In simple terms, even though resource use is increasing, the economy is less impactful per unit of GDP than it used to be. Absolute decoupling refers to the event where the two variables move in opposite directions. Figure 11 shows that increased economic activity results in less environmental impact when absolute decoupling is present. Victor & Jackson (2015) noted evidence for relative but not absolute decoupling.

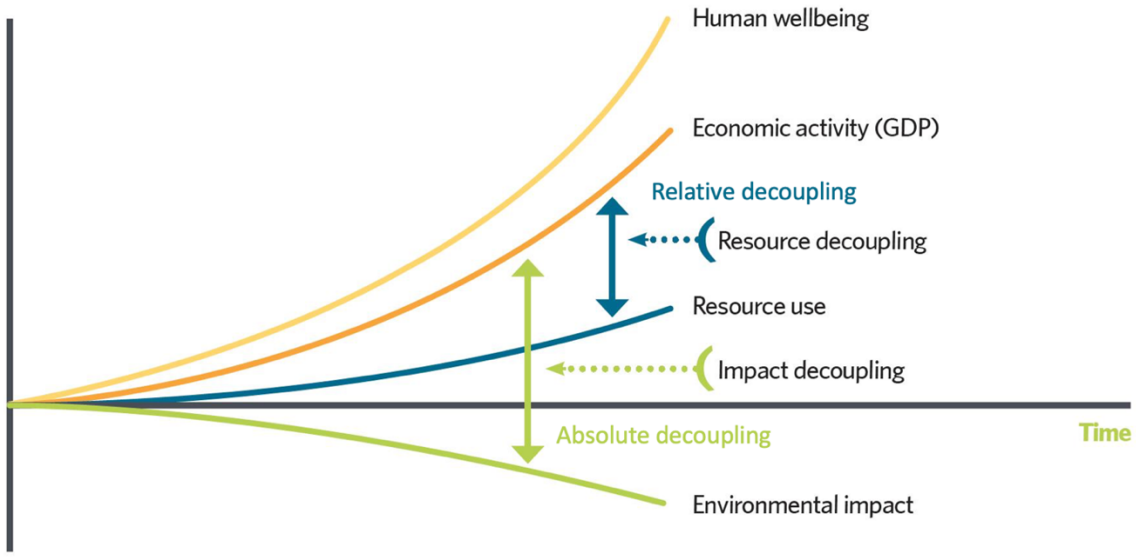

FIGURE 11: THE CONCEPT OF DECOUPLING; RETRIEVED FROM: (UNEP, 2011)

Furthermore, it is crucial to differentiate between resource and impact decoupling in the context of delinking economic growth from resource use and environmental impacts. While resource decoupling refers to the reduction of natural resources per economic activity, impact decoupling

is concerned with raising economic output while reducing environmental impact (Hennicke & Khosla, 2014).

In a globalized world, it is important to consider not only the correct geographical parameters, namely local or global, but also the right time period of decoupling. Local decoupling refers to the phenomenon when two variables decouple within a limited geographical area, while global decoupling occurs on a planetary level (e.g., global GDP decouples from total global emissions) (Parrique, et al., 2019). When decoupling happens on a local level, there is a possibility that environmental problems are shifted to another geographical region. Furthermore, economies must aspire to permanent rather than temporary decoupling to maintain sustainable development. Temporary decoupling is no reliable long-term solution as it ultimately leads to increased environmental pressure in the future after a temporary relief (European Union, 2020). Additionally, to successfully mitigate climate change, targets must be set and evaluated afterward if decoupling is sufficient to achieve them. Fedrigo-Fazio et al. (2016) set an example of a target being absolute decoupling within planetary boundaries.

To achieve decoupling, several strategic changes need to be made to promote, manage and enhance the transition towards a greener economy and acquire further scientific knowledge. For instance, this refers to knowledge of using materials efficiently and successfully creating a green business model (Balsvik, 2020). Additionally, it is vital to comprehend the interactions between humans and natural systems to implement appropriate measures needed for decoupling. Moreover, a strong policy framework must be worked out to guide the change by implementing binding targets, most importantly for countries and businesses (UNEP, 2011). Additionally, technological innovation is crucial as it contributes to a resource-efficient economy and modernizes industrial processes using fewer GHGs (Moezzi, 2023). These technological advances and challenges are discussed in the next chapter. Finally, regulatory changes might be necessary to realize absolute decoupling through technological advance while avoiding the rebound effect (Lange & Berner, 2022). Such regulatory changes may include various tax reforms, the enforcement of sustainable policies, strict GHG reduction targets or absolute limits and probable SDG laws with mandatory country specific goals (Vadén, et al., 2020).

In summary, to sustain economic growth and minimize environmental impacts, it is vital to achieve decoupling. In terms of the dimensions, this should be absolute, global, permanent, and sufficiently fast.

2.2.4.2 Technological Challenges [1]

Both the population and economic growth are consuming extreme amounts of energy, land, and water. This consumption pattern closely correlates with how the world's climate and natural environment have changed over time (MIT, 2014). According to Reilly (2015), the world's population needs significant improvement in technologies to increase efficiency. Reducing the human impact on the environment and using resources more efficiently to mitigate environmental change poses a major engineering challenge to those developing new technologies. The imposed challenge is to create new and alternative technologies which aim to produce minimal or no GHG emissions. Nonetheless, these technologies must be efficient enough to meet the world's global energy needs, which are constantly increasing with economic and population growth. As technologies become more efficient, often fewer costs occur in the production process, and therefore goods and services can be sold at a cheaper price. This, however, can result in the so-called rebound effect as it might result in increased consumption as people can afford more (Lange & Berner, 2022). Furthermore, technological advances are not exempt from challenges and limitations.

Firstly, as the planet is faced with finite resources, the scarcity of natural resources poses a major challenge to human mankind. Technological advances are able to improve efficiency levels and possibly sustainable alternatives. Yet, as demand continues to increase, gains can only compensate for the growing demand for consumption to a limited extent. Krausmann et al. (2017) argue that technological innovations are insufficient to counter resource scarcity challenges.

Secondly, technological advancements have contrarily led to significant environmental impacts such as habitat destruction, pollution, or also climate change itself. Thus, greener energies certainly also come at an environmental cost. An example of this is the construction and disposal of solar panels, which requires a significant number of resources and contributes heavily to pollution (Lenzen & Munksgaard, 2002). To evaluate whether the benefits surpass the drawbacks, one must critically assess the product life cycles and environmental implications.

Thirdly, introducing new technologies and advancements also brings new risks, unpredictability, and uncertainties. New technologies such as artificial intelligence (AI) or genetic engineering for crop modification not only raise ethical concerns but also social and environmental ones. Consequences might occur if such technologies are not used correctly with proper safeguards.

Finally, one can say that emerging technologies must be carefully assessed to ensure that they align with sustainable principles on the one hand but do not further amplify the challenges of a

finite planet on the other hand. To overcome the challenges addressed in this chapter, governments might have to introduce policy frameworks as well as provide a broad set of knowledge about the social, economic, and environmental context in which technology operates.

2.2.5 Degrowth [1]

Even though today's society is built around growth, several countries are facing difficulties in growing their economies after several backlashes like the Covid-19 pandemic or Russia's invasion of Ukraine. Furthermore, governments are recognizing that the attempt to revive their economies may not align with the goals of promoting human well-being and decreasing environmental damage as envisaged by the SDGs (Stuart, Petersen, & Gunderson, 2021) . This is the reason why researchers are advocating for an alternative approach called "degrowth" as a response to the unsustainable nature of the current economic system.

The socioeconomic and political framework of degrowth critiques the global capitalist system with the dominant belief in everlasting economic growth. It offers an alternative vision where social and ecological well-being is prioritized instead of overproduction, overconsumption, and excessive corporate profits (WEF, 2022). One of the main reasons and drivers behind this paradigm shift is the acknowledgment that the current economic system is both ecologically and socially unstable (Schneider, Kallis, & Martinez-Alier, 2010). To move away from such standards, it is vital to implement changes including, radical redistribution of resources, a downsizing of the global economy, and a transformation in collective values that promote solidarity, autonomy, and care for one.

Degrowth can be described as the process of reshaping societies towards a lifestyle that prioritizes environmental justice and the well-being of all individuals within the healthy limits of the planetary boundaries. According to Martínez-Alier (2012), degrowth proposes a direction toward a society prioritizing sufficiency, equity, and ecological sustainability. The urgency to adopt such a framework arises due to the acknowledgment that the planetary boundaries are mostly overshot, and the ecological footprint has surpassed the planet's regenerative capacity (Wackernagel, et al., 2002). Degrowth is therefore vital in order to move again towards more sustainable production and consumption patterns.

Additionally, to lessen the environmental stress, degrowth acknowledges the unequal distribution of resources and wealth within the growth-oriented economic system. Economic growth has not only benefitted people by lifting some out of poverty but also created many inequalities. To reduce those, it is important to promote localization efforts. Communities can build their self-

reliance and reduce their ecological footprint significantly by focusing on the production and consumption of local goods and services instead of relying on global supply chains. Localizing economies and fostering resilient communities is vital as they are stronger in times of crisis, and sustainable development is promoted.

Despite the fact that the concept of degrowth has gained momentum over the last couple of years, some challenges and criticism also need to be acknowledged and addressed. Firstly, critical voices argue that reducing economic output leads to job losses and, thus, decreased living standards due to economic stagnation (Van den Bergh, 2011). Secondly, the political feasibility of a degrowth policy is questioned. Powerful industries might not be interested in such a movement, which poses significant political obstacles to transitioning towards a degrowth paradigm (Whitehead, 2013). Thirdly, some critics see redistribution as a problem, stating that even though degrowth should aim to address inequalities, vulnerable communities may be disproportionately impacted through such redistribution arrangements (D'Alisa & Kallis, 2020). Lastly, as degrowth demands significant behavioral change, this might be difficult to implement on a large scale. Critics claim that societal values and consumer culture are deeply rooted in the current economic system which makes it very difficult to propose a shift towards non-materialistic values. The question is if consumers are willing to make the necessary lifestyle changes and voluntarily embrace the newly introduced degrowth principles (Kallis & March, 2015). According to Sam Alexander, a proponent of degrowth, people living in wealthy countries should change their lifestyles by consuming less, residing in smaller homes, and traveling less. He says that degrowth must not mean that someone is forced to live in a cage with only candles for light (WEF, 2022).

To sum this chapter up, degrowth represents an alternative to the existing paradigm of economic growth. Furthermore, the idea challenges the general thought that continuous growth is necessary for human-well beings and urges a conscious reduction in economic production and consumption. While the concept of degrowth proposes a strong vision for a more sustainable and equitable society, it also faces criticism regarding potential economic, political, and behavioral challenges.

2.3 Global Goals vs. Nationalized Governance Mechanisms [1]

The SDGs also known as global goals are a set of universal objectives that address economic, social, and environmental issues and ensure sustainable development worldwide. In order to achieve the Agenda 2030, collective action and collaboration is needed. This refers to countries, businesses, and individuals globally.

The nationalized governance mechanism refers to the system and process which a country uses to guide itself. This includes the policies, strategies and also taking control of privately owned companies to let them be controlled by the government (Molot & Laux, 1979). The effectiveness of nationalized governance mechanisms varies around the world due to diverse cultures and policies and therefore the success of achieving global goals also differs due to the different approaches taken. Even though each country worldwide should be driving sustainable development and implementing the SDGs into their policies and strategies, challenges such as limited political will and lack of understanding are common problems hindering the achievement of the goals. While the nationalized governance mechanisms should play a key role in achieving the global goals, several challenges hinder the progress. As already mentioned, lack of political will due to different prioritization or disinterest by political parties hinder the formation of the policies and institutional changes needed to achieve the goals. Furthermore, as the goals are interconnected with each other, they require a holistic approach which is often the opposite in ministries that often operate in silos. The approach of only focusing on specific issues without considering broader aspects are not in line with the global goals and might hinder progress instead of fostering it.

Furthermore, on a global scale, governments might lack skilled personnel as well as sufficient resources to be able to implement the SDGs. Sufficient resources also refer to their capacity to develop new tailored policies, monitoring the progress and intervene if needed. In addition, many countries lack political stability or have policies in place which are not compatible with the global goals. Often, short-term economic growth is put over long-term sustainability. Lastly, as the SDGs require significant financial resources governments may face constraints. If the resources are not well allocated or too little are available other sectors such as infrastructure development or education immediately suffer.

2.3.1 Democratic Principles [1]

As mentioned previously, when evaluating the progress of the SDGs to date, it will be concluded that there are still significant challenges to be able to achieve the goals by 2030. This raises the interesting question of why this is the case acknowledging that many countries have taken the SDGs into their political agenda. One reasons for the slow progress might be the modern democratic principles. The modern democratic principles put the interests of their own population first with little to no consideration for other countries. This principle reflects the concept of na-

tional sovereignty meaning that each country can govern itself by making decisions without external interference (Windsor, 2019). The well-being of their citizens and national development are clearly being prioritized.

In modern political dynamics, short-term goals are often put first by politicians and immediate concerns are being dealt with to secure the support of their voters. Especially in democratic systems, it often happens that two or more political parties collaborate but are confronted with diverse interests. This makes it difficult to achieve consensus and can result in the event of political deadlock and delays in decision-making processes. Hence, this is also one of the reasons why the focus is narrow and on national interests rather than global cooperation. Additionally, one must say that in modern democracies, short-term electoral cycles are common, making it difficult to implement long-term strategies as the newly elected party may discard previously implemented strategies or policies to meet the sustainable development objectives. Geopolitical dynamics also often pose obstacles to effective global governance, as collective action might be hindered by power dynamics. Moreover, political instability is also a major obstacle to long-term planning and the implementation of sustainable development initiatives.

In order to be able to achieve the global goals, significant changes regarding self-centered democratic principles must be undertaken. Countries must not measure each other on who has more economic growth but who makes more progress on achieving the SDGs. Global collaboration must be fostered within democratic systems. People must be educated and awareness needs to be raised regarding the importance of interconnectedness and shared responsibility. Individuals as well as communities must learn that the SDGs can only be achieved by pulling on the same thread. Moreover, governments must prioritize the integration of the SDGs in their policies over fostering unsustainable economic growth.

In conclusion, one can say that modern government structures are not appropriate for meeting the SDGs and must be altered in the near future to achieve Agenda 2030. Nevertheless, by addressing the factors that hinder global collaboration, democratic systems do have the ability to effectively contribute to the achievements of the SDGs if the correct values are prioritized.

2.3.2 Competition vs. Collaboration [1]

In order to achieve the SDGs both competition and collaboration play a remarkable role. It is important to distinguish between two levels. The collaboration and competition between businesses and between countries.

On the one hand, competition can foster the progress in reaching the global goals (Andreoni & Miola, 2016). This can be realized by working with incentives for governments, businesses, and individuals to develop sustainable solutions to achieve specific targets or goals. An example on the business level could be the competition on technological advances for cost reductions and increased effectiveness to accelerate the transition to clean energy. Companies with the best solutions may be rewarded with tax reliefs or similar. Competition between countries can be beneficial as it stimulates innovation as they seek to develop comparative advantages (Stiglitz, 2019). A downside of competition between countries is that it could result in a race-to-the-bottom scenario. In such a situation, countries might end up engaging in detrimental practices such as social and environmental dumping to gain a competitive advantage (Porter M. E., 1990). Furthermore, countries with greater resources and capabilities tend to win such competition over poorer countries. As a result, global inequalities may widen and the achievement of global goals on poverty reduction, equity and inclusive development is hindered (LSE, 2023).

On the other hand, collaboration is crucial for making progress and achieving the SDGs on a global level (Mariani, Trivellato, Martini, & Marafioti, 2022). Clearly, overcoming the challenges imposed by the global goals are complex and needs collaborative efforts. The advantage of collaborating includes the exchange of knowledge, resources, and best practices to achieve the best outcome as soon as possible. Furthermore, not only global collaborations between governments should be promoted but also between international cooperations especially in the private sector. Additionally, collaboration between countries is also crucial in order to address global problems such as climate change or peacebuilding. Joint efforts such as international agreements, knowledge sharing, and partnerships is important to foster trust and a greater understanding of how global problems can be solved together (United Nations, 2015a).

This shows that there is a synergy between competition and collaboration. Often the two approaches are regarded as two contrasts but in relation to the SDGs there is potential to complement each other. While competition is able to drive the progress towards achieving the goals, collaboration is vital to share any knowledge gained during the competition. This process fosters collective impact. For example, countries or businesses might compete against each other on new innovations to reach some SDG targets, but also collaborate with each other on issues where one of them knows more. Nevertheless, this must be in balance. Excessive competition might worsen the situation that the world is in right now. As everyone always wants more and economic growth is in the first place this often leads to inefficient resource allocation as well as

duplication of efforts when there is no collaboration. On the other hand, if there is no competition, the drive for innovation might not be present and therefore not enough efforts will be made to achieve the SDGs urgently.

The proper balance between collaboration and competition is set by the context of the goals themselves. Goals such as SDG 10 to reduce inequalities or also address global health crises may require more collaboration, whereas other goals need technological advancement to be achieved where healthy competition is beneficial. Furthermore, it must be ensured that competition is fair, transparent, and aligned with social, environmental, and ethical considerations.

2.3.3 Is Global Governance Needed to Achieve Global Goals? [2]

As globalization has been accelerating and so its effects on global operations, new structures have emerged. As a result, countries have become more interdependent, in an economic, but also social level. Trade agreements, and economics, politics are all growing past their national borders, connecting the world ever so strongly. This also leads to an increase in shared responsibility, regarding global issues, such as combating climate change (Wu, 2021). When targeting issues of such dimensions, national policies alone do not seem effective enough. For this reason, and in line with global interconnection, global governance comes into question.

Global governance refers to connecting the world on a politico-economic level. The main goal is to move away from national policies, which show differences based on the local culture, values, and jurisdiction and more towards a united, collaborative structure, which allows for the achievement of global goals (Wu, 2021).

However, the question is whether global governance is truly needed to reach global goals, such as the SDGs. Challenges, such as extreme poverty, and world hunger are not issues which can be solved in the affected areas respectively. These are undertakings, that require vast amounts of funding, which developing countries, that are mostly affected by these issues cannot provide (United Nations, 2023s). This serves as a global issue, which the UN looks to eradicate by 2030 (*No Poverty*) with a global, collective effort through the support of the global north.

Other global issues, like inequalities, climate change, gender equality, transparent institutions, and justice forms are also suitable to be subject to global governance. Only with a collective measure, and specific indicators, can individual governments create national policies to adhere to global governance (Biermann, Kanie, & Kim, 2017).

While these appear to be positive consequences of implementing global governance, it also comes at a cost. Traditional values, as well as individual characteristics of each nation are not integrated into the conceptualizing of global governance. With the pursuit of global policies these traditional values, as well as unique matters are not incorporated into the planning (Wu, 2021).

Another critique point regarding the further implementation of global governance is the disadvantage for developing countries. While they are to abide by the policies, they do not have much influence in defining them compared to the more developed countries (United Nations, Committee for Development Policy, 2014). It is acknowledged, that global goals require more commitment and international collaboration to achieve them. Otherwise, each nation puts its own interest on top, which are represented in national policies. Secondary is the integration of global goals into the policy planning. Therefore, global policies require a few fundamental necessities to make their implementation successful and ultimately lead to the pursuit of global goals (United Nations, Committee for Development Policy, 2014).

Firstly, it is crucial to note regional differences. It not only refers to the political situation, but also to its capacity to contribute to the achievement of the goals on a global level. This includes financial resources, the strain the specific nation is causing, and their national policies.

Global institutions are representing the interests of the entire world. This should also entail the inclusion of all parties involved in decision-making processes. They should have the following characteristics: transparent, democratic, and inclusive.

Lastly, not only is it important to strive toward the achievement of global goals, but rather national policies should be respected as well. Only by successfully following national policies, can stable national governments devote themselves to follow global goals (United Nations, Committee for Development Policy, 2014).

Whether this is sufficient to achieve global goals sets another debate. The aim should be to adapt national policies toward the achievement of global goals. If they are not prioritized by national governments, their achievement is not feasible and more unified governance would be required.

3 METHODOLOGY [1]

This chapter is an integral part of this master thesis as it outlines the research method used to investigate the extent to which economic growth in Austria is compatible with achieving the Sustainable Development Goals (SDGs) worldwide. This section will provide the reader with a detailed description of the research design, how the data was collected, the method of analysis and finally a detailed evaluation including any limitations and ethical considerations.

As mentioned in the introduction, the guiding research question of this thesis is: To what extent is economic growth in Austria compatible with the achievement of the SDGs worldwide?

The exploration of the literature review shows that a substantial amount of literature focuses on sustainable development and which shifts need to be made to maintain a safe living space. Nevertheless, one must say that there is lots of disagreement and discord between different groups of researchers and experts on the topic. Whereas mainstream economists insist on further economic growth and increased efficiency to maintain and improve living standards, degrowth experts advocate for a shift in social and environmental paradigms to achieve a more environmentally friendly and equitable world. In an attempt to bring the varying perspectives together, a deductive argument was created and distributed among mainstream economists and degrowth experts in a Delphi process with the aim of reaching consensus between the experts.

3.1 Selection of the Research Design [1]

Three different approaches can be taken to obtain the data needed for the research: qualitative, quantitative, and mixed methods (Creswell, 2014). Quantitative research deals with the collection and analysis of numbers and statistics, which are advantageous for large data collection purposes that allow general statements to be made. This type of research is most likely to be used in natural sciences or social studies to discover and evaluate patterns and trends of two variables (Rasch, Friese, Hofmann, & Naumann, 2006). Qualitative research focuses on collecting non-numerical data such as individual opinions and experiences of participants. Case studies, narrative research, ethnography, grounded theory, and phenomenological research are most frequently used when this method is applied. Consequently, this form of data acquisition aims to provide detailed insights into personal opinions and subjective experiences, often presented in the form of textual descriptions and interpretations (Vishnevsky & Beanlands, 2004). The mixed methods approach combines the two analytical techniques of qualitative and quantitative

data collection. By applying this research design, the researcher focuses on finding a perfect balance between the advantages and limitations of both approaches to provide a more holistic view of a complex topic that cannot be answered by a single method (Shorten & Smith, 2017). The researcher's choice which method to use is based and influenced by the target audience, the research problem as well as the researchers experience (Creswell, 2014).

To achieve the set research objectives, this research focuses on collecting qualitative primary data by conducting a Delphi process in the form of a series of questionnaires to answer the research question "To what extent is economic growth in Austria compatible with the achievement of the SDGs worldwide?" The participants in the Delphi process include economists with diverse viewpoints who may be able to provide insights into the relationship between economic growth and sustainable development.

3.2 Data Collection [1]

As mentioned above, the aim of this paper is to find a consensus among a range of experts, from mainstream economists to degrowth experts, on the question of whether or not economic growth in Austria is compatible with achieving the SDGs globally. As the chosen topic presupposes pre-existing knowledge about the subject, experts in the field can provide the most valuable insights and arguments that are crucial for answering the research question. As mentioned above, the data collection was conducted in the form of a Delphi process, as this is the most appropriate research method for this work, since there is no definitive answer to the question yet, as it is very controversial among different groups of experts. Moreover, a wide range of opinions can be assessed, whereas a single opinion of one expert could lead to a biased result. This method of data collection will be outlined in the next section.

3.2.1 Delphi Process [1]

The Delphi method is a research technique which is used for the purpose of finding consensus among a group of experts on a specific topic (Linstone & Turoff, 2002). The popular tool was invented and first used by the Rand Corporation in the 1950s as a forecasting technique for military purposes. The method gained popularity after some adaptation later on in the 1960s and 1970s in various fields such as business, tourism research, and health care (Dalkey & Helmer, 1963). This type of data collection tool is often used in various fields to address complex and ambiguous problems, gain insights into different opinions and viewpoints, and ultimately find valuable solutions. The goal of a Delphi process is to narrow down the diversity of opinions of the participating experts in order to move towards a common opinion. It is based on the results

of several rounds of anonymous questionnaires, often sent out by email to gather expert opinion and input, which are revised and circulated after each round (Hasson, Keeney, & McKenna, 2000). The last round of the Delphi process consists of a final statement in which the collected feedback and responses from the previous rounds are presented to the expert panel. This gives them the opportunity to revise their answers and provide additional clarifications and final assessments on the topic. The aim of this round is to reach a consensus between the different expert groups (Okoli & Pawlowski, 2004).

According to Fink-Hafner et al. (2019), there are several advantages and disadvantages of the Delphi process. One of the main advantages is the anonymity of the experts, which allows them to freely express their opinion and give unbiased feedback to the researcher. It also enables communication between experts in different geographical locations and with different backgrounds, as a face-to-face meeting is not required, allowing for a comprehensive and informed outcome. This also benefits the researchers, as they have fewer travel expenses and thus save money and time. Additionally, as the selected experts don't see each other, the discussions are also not influenced or dominated by one person's authority. Moreover, the technique is relatively easy to learn and use compared to other data collection methods.

Besides the numerous advantages, the method also has some disadvantages. These include, for example, the lack of transparency, which relates to anonymity, and the difficulty of verifying the credibility of the experts' answers. Furthermore, there is an overall lack of uniform standards and guidelines for the analysis and interpretation of the statements. This also refers to the process of selecting the right participants. It is vital to select appropriate participants to ensure a high-quality outcome. Moreover, if participants take longer than expected to answer the survey and provide their opinion, the discussion is slowed down and might therefore lengthen the process. This could be problematic for the researchers as they are at risk of falling behind schedule. Another drawback for a researcher conducting a Delphi study is that experts might drop out before the study is completed as multiple rounds are needed to reach consensus. As participants receive information on how the survey has been re-evaluated after a completed round, some experts might tend to adjust their answers to better match the other answers.

This research paper focuses on a Delphi process with a total of two rounds. The researchers gathered a total of 15 respondents in the first round and 11 in the second round. The exact approach will be elucidated in a later section.

Overall, it can be said that the Delphi method aims to form a group opinion on a specific topic by surveying selected experts in multiple rounds. The participants will we discussed in the next section. The ultimate goal is to reduce the diversity of opinions and after a set number of questionnaires arrive at a common opinion (Dalkey & Helmer, 1963).

3.2.2 Participants [1,2]

As previously mentioned, a group of experts was selected for the Delphi method who were asked to participate in the multiple rounds of distributing surveys with the aim to reach consensus amongst them. The target population is defined by common characteristics or beliefs which are identified by the researcher (Creswell, 2014). The goal is to get an in-depth understanding of their beliefs and experiences. Within the qualitative methodology, there are multiple approaches to sampling. The five most commonly used are convenience, snowball, purposive, and theoretical sampling (Gill, 2020). As the participants were selected by characteristics set by the researchers, which makes this a purposive sampling (Business Research Methodology, 2022). The main objective, based on the judgment of the researchers was to consider the different schools of economic thought, and thus try to get a sample as diverse and inclusive as possible.

When looking at the topic of the thesis, one can see that the evaluation process of the research question is of qualitative nature, making it challenging. It requires expert opinions of people who have been focusing their work and research on aspects of this topic during their careers. The target population of this study consists of active researchers and experts within economic fields, preferably with substantial knowledge of sustainability and the SDGs. Since the SDGs covers not only economic but also social and environmental aspects, a diversity of perspectives was sought. Input was sought from more mainstream economists, who typically focus on supply and demand, relating to the production and consumption of goods and services (Neck, 2022), with pricing being the language of the market. The primary flows concerning neoclassical economists are flows of money through the economic system. The input was also sought from ecological economists, who focus instead on the flow of materials and energy through the economic system. By looking at the economy in this way, the environmental impacts of economic activities are more apparent. This perspective leads some in this field to become degrowthers, defined as people who focus on shrinking economies in order to use less of the world's resources (Büchs & Koch, 2019).

Firstly, the mainstream economic experts. These cover researchers from WU Vienna, Modul University Vienna, the WIFO as well as the IHS. All units cover research institutions, which include

the analysis of Austria's economy. These provide the necessary components for finding mainstream economists for the interviews.

Looking at WU Vienna, for example, the researchers aimed to find researchers, which would be educated precisely and interested enough in participating in this research. The researchers examined the departments of economics, environmental economics, ecological economics, social change and sustainability, socioeconomics, economics of inequality, and international political economy. The next step was to find publications of experts in the specified research fields which are related to this thesis. Based on the listed research areas, researchers who focus their work on the interconnection of the SDGs, economic growth in Austria, prioritizing economic growth over sustainable resource usage in the SDGs, the economy–environment nexus, inequalities, and redistribution were contacted. Other than that the researchers looked for articles online by searching for synonyms including: economic growth, sustainability, political ecology, ecological economics.

The same method was followed for the remaining institutions. At IHS and WIFO inflation experts were selected. As well as researchers in the field of macroeconomics and European economic policy. However, this expert group did not result in a high participant share. While the researchers were persistent in sending out follow-up e-mails, the response was either absent or stated the lack of time availability of the individuals.

For the second group of experts, degrowthers were contacted. This is done by reaching out to the Degrowth Community in Vienna, researchers at BOKU Vienna as well as researching authors in Austria who published articles in the field of interest. The articles were primarily searched and found by looking for keywords like: decoupling, green growth, degrowth.

As the participants of the degrowth community in Vienna are active members there, finding experts in the field who have the necessary knowledge and expertise to participate in the Delphi process this unit was a primary point of contact. First, a general e-mail was sent to the official information contact: info@degrowthvienna.org stating the research project as well as the argument, with a request to forward it to the members. Although the organization contacted the researchers and expressed interest and support in finding suitable participants, it was difficult for the researchers to take further action because no personal email addresses were provided.

For BOKU, scientists at the Center for Global Change and Sustainability were contacted. As one of their 3 core areas is named SDGs and Grand Challenges, the researchers came to the conclusion that any scientist, especially senior ones would have the required knowledge and interest

to deliver valuable contribution to this research. The researchers from this institute were very collaborative and provided knowledgeable insights. In addition, after follow-up emails were sent, some of them still participated, which was difficult to achieve with the other group of experts due to time constraints as previously mentioned.

After having found the appropriate candidates, the experts were contacted via personalized e-mails, where their work was referenced and the relation to this research paper highlighted. Another integral part of this e-mail was also a brief explanation of each step of the survey instrument. It mentioned the meaning of the screening question, as well as the approach in which the argument would be presented. Apart from this, they were also informed about the procedure of the Delphi process, meaning that they would be contacted more than once. Additionally, it was also highlighted in the e-mail that the comments of each participant were anonymized before being shared with their peers, as well as the option to withdraw at any time.

The time frame for the first round ranged from February to April, while the second round took place in the months of May and June 2023. As the researchers anticipated a number of non-respondents, they have carefully selected 60 names to contact, with the aim to reach an appropriate response rate. As a result, the researchers have gathered 15 experts, who participated in the first round of Delphi, with one withdrawing after premise 7. Table 2 displays the professions, that the experts were asked to state at the beginning of the survey to sustain anonymity while monitoring any potential trends within the expert groups.

TABLE 2: LIST OF PARTICIPANTS AND THEIR PROVIDED PROFESSIONS. OWN CREATION.

Participant 1	Senior Scientist at ETH Zurich, Environmental Sciences and Ecological Economics
Participant 2	University professor, academic research in economics, econometrics, demography, applied statistics.
Participant 3	Postdoctoral researcher in sustainability and environmental politics and policy, PhD in Ecological Economics

Participant 4	Senior scientist (Post-Doc research) specializing in ecological economics and systems thinking
Participant 5	Junior scientist in sustainability science, just completed my PhD in Social Ecology
Participant 6	University Professor
Participant 7	Studied economics, worked as a university lecturer/researcher all my academic life. Specializations: regional economics and real estate economics.
Participant 8	PhD in climate science, researcher in the field of climate change impacts, adaptation and mitigation policy, and transdisciplinary approaches to science-society interaction
Participant 9	Post-doctoral researcher in economic policy, and socio-ecological economics
Participant 10	University professor and consultant advising businesses on economic decisions
Participant 11	Assistant professor, non-tenure track
Participant 12	PhD, Assistant Professor
Participant 13	I'm a master student in sustainability, who is interested in pursuing a career in research on sustainability.
Participant 14	Senior lecturer and researcher at University, Associate Prof.

Participant 15	I am a young scholar at BOKU, Vienna (PhD researcher, PostDoc from May 2023 onwards). In my research I assess the Socio-Economic Metabolism at the national or global level, i.e. the material and energy consumption of societies, how it developed over time, and which contributions to human well-being this resource consumption enables. In the course of my work I also investigated the relationship of the latter biophysical flows (materials, energy) to Gross Domestic Product (GDP). However, I am no economist and no expert in economics research.

Having analyzed the responses from round 1, which are specified in Chapter 4.1 the next step was adjusting and sending out the participation request for round 2. Moving into the second round, the same participants, who fully completed the survey in the first round, were contacted. The e-mail contained an individual link for each participant to bypass the screening question. The content and structure were identical; however, the survey ID was individualized for each participant. This way, the researchers knew exactly which experts completed the survey. Apart from the link to the survey, the e-mail also contained a brief instruction, like in the first round, where the structure and process were explained.

3.2.3 Developing the Research Instrument 2

Now that the individual fundamental elements of this research were elaborated: why the Delphi process was used, how participants were selected and the sampling itself, this part looks closer into the development of the research instrument. Here, each part of the survey and the decisions, which led to its creation are explained.

The instrument used in this research to conduct the Delphi process is a deductive argument, which can be grouped into two main parts. The first one includes 10 logically derived premises, which are arranged to ultimately lead and prove the second part: the conclusion (Besnard & Hunter, 2001).

To create this survey, the “Saw Tooth” software was used. As the results are saved there, they can be easily downloaded into an Excel sheet and later on, analyzed. Having presented the participants with a brief introduction, they were faced with the screening question. Following that, the argument was presented in full, including the conclusion to provide an overview and introduce the next answer option based on its validity. Next, each statement was shown individually, one after the other, and included 2 answer options: *unconditionally agree* or *disagree*. Rather than opting for the classical agree/disagree options, experts were asked if their agreement with each statement was truly unconditional. The purpose of this was to try and gain as much feedback for the creation of the survey for the next round as possible. Meaning, even the slightest disagreement should have led to the answer option *disagree*, which was followed with an open-ended question stating: *Please indicate why*. This gave participants the opportunity to state their full opinion and provide the necessary feedback to be incorporated in the next round.

3.2.3.1 The Screening Question 2

After the introduction, participants were faced with the first answer possibility: the screening question. The aim of this question was to group the participants into two equally sized groups with differing viewpoints, before presenting them with the argument directly. The screening question was the following: "Economic growth is an appropriate policy objective for Austria.” Here, respondents were asked to either agree or disagree with this statement. However, after the first few responses, the outcome was not as expected. Having aimed for a diverse sample, with experts from different research backgrounds, and viewpoints, the presumption was to receive different reactions to that question. Contrary to these expectations, however, almost all respondents including degrowthers, disagreed. This led to the conclusion that the wording was not precise enough to create a clear divide among the respondents based on their research field. For this reason, the original purpose of the screening question was disregarded by the researchers during the analysis.

Following this question, the next step asked about their profession. As the respondents would remain anonymous, they were asked to provide a “description of their professional qualifications and/or role”. This way, the researchers would have a suitable reference for each participant for the analysis without having to reveal their identities.

3.2.3.1 Development of Argument 1 – 1st Round of Delphi 2

After having presented participants with the screening question and asked about their professional description, the main argument was presented. Following the listing of all 10 premises,

two conclusions were derived and asked about individually – one for the short term and one for the longer term. The creation of these 10 premises and their theoretical basis will be covered in this section.

The **first premise** reads: *The world as a whole must reduce its negative environmental impacts if we are to achieve the environmental SDGs (13, 14, 15) and maintain a safe living space for humanity.*

The creation of this sentence can be traced back to the UN Climate Change Conference and the resulting Paris Agreement (2015). Particularly the first part of the premise, which revolves around reducing negative environmental impacts. As the fundamental aspect of the Paris Agreement is to reduce global emission levels and protect biodiversity and the ecosystem, this agreement was used as a basis for this premise. As the world is currently not on track to stay within the 1.5° global warming threshold, the reduction of environmental impacts is non-negotiable. SDGs 13-15 were chosen consciously, as they deal with environmental issues. SDG 13 is "Climate Action", which includes indicators like greenhouse gas emissions per year, aligning with the goals mentioned in the Paris Agreement (United Nations, 2023d). As the "integrity of all ecosystems, including oceans" (UNFCCC, 2015, p. 2) was explicitly mentioned in the agreement, this premise also includes SDG 14, which is focused on "Life Below Water", and SDG 15 "Life on Land" relating to "all ecosystems" (United Nations, 2023t).

A framework, which was used to develop this premise, particularly the second half is based on an article called "A safe operating space for humanity" (Rockström, et al., 2009). The scientist Rockström established together with 30 other scientists the framework of planetary boundaries as elaborated in Chapter 2.2.2 (BMUV, 2021). Living within these is important to preserve the finite resources on planet Earth to foster a safe living space for humanity. Therefore, the first premise includes two important aspects: firstly, the main elements of the Paris Agreement, as well as the framework of planetary boundaries.

The **second premise** reads: *Global economic growth – defined as the year-on-year increase in real global GDP – implies an increase in negative environmental impacts, unless it is accompanied by absolute decoupling at the global scale*.

As mentioned in Chapter 2.2 (Economic Growth), GDP is universally regarded as the measure of economic output. Real GDP is adjusted for inflation (Samuelson & Nordhaus, 2010), making it a measure of quantities, rather than prices. For this reason, this measure was used in this premise to describe economic growth.

When creating an additional output of economic productivity, a certain amount of natural resource input is also required (Eisenmenger, et al., 2020). Ceteris paribus, an increase in economic output also implies an increase in negative environmental impacts. Technological change, however, can alter the relationship between output and environmental impacts. Absolute decoupling involves separating economic growth from natural resource use to the degree that economic growth continues while environmental impacts are simultaneously reduced (Ward, et al., 2016). According to the definitions of the terms involved, this premise is tautological and should be agreed on by all economists. It was nevertheless considered important to include for the completeness of the argument and to introduce and define the key terms of economic growth and decoupling.

The **third premise** states: *In the short term, a given region (e.g., Austria) can achieve absolute decoupling through ONLY two approaches: a) shifting the sectoral composition of the region's economy towards industries with lesser impacts or; b) technological advances which increase technological efficiency.*

This premise is based on a few grounds. It looks into the possibility of decoupling, which was explained in Chapter 2.2.4.1. More specifically it specifies absolute decoupling, which aims to decrease environmental impacts while increasing economic growth. Firstly, the premise deals with a regional constraint. This is due to the fact that absolute decoupling is achieved much easier on a regional level than on a global level. The second constraint is targeted toward the timeframe. The statement stresses the achievement of absolute decoupling in the short term, as decoupling cannot be sustained infinitely due to the predetermined boundaries of finite resources (Parrique, et al., 2019).

The premise suggests two approaches, which would make regional absolute decoupling in the short-term possible. The first approach mentioned is the shift towards an economy, which results in fewer negative environmental impacts. This means that an active transition toward less impacting sectors is ultimately required (Parrique, et al., 2019).

The second approach revolves around relying on technological advancements. While this option requires a few conditions in theory, which are further discussed in premise 5, this statement focuses solely on the option of incorporating technological advances to achieve absolute decoupling (Parrique, et al., 2019). Therefore, technological advances can be used to foster absolute decoupling in the short term in a regionally limited economy, such as the Austrian. This entails

a stronger focus on efficiency, which would actively shift activities, and practices towards less impacting industries within an economy.

While the previous premise states both options, the next two describe them and ask participants about their agreement independently of one another.

Premise 4, therefore covers: *Approach a): Shifting a given economy's sectoral composition only amounts to absolute decoupling at the global scale if it is accompanied by a corresponding shift in domestic consumption patterns (to avoid the outsourcing of higher-impact production to other regions).*

When looking at absolute decoupling at the global scale and ways to achieve that, the consumption and production approach should be considered. Global trends mainly dictate consumption patterns. Therefore, a change in consumption patterns on a domestic scale, which is accompanied by a shift in the sectorial composition of the economy is necessary to foster absolute decoupling (Sanyé-Mengual, Secchi, Corrado, & Beylot, 2019). However, sectoral changes within an economy alone are insufficient, since environmentally harming practices can be outsourced, which decreases the impact in the exporting country, but not on a global level. This means that a change in consumption by promoting sustainable and responsible consumption habits is essential to achieve long-term sustainable development while minimizing environmental impacts. This successively leads to the achievement of absolute decoupling on the global scale (Moreau, Amarante De Oliveira Neves, & Vuille, 2019).

The next **premise, 5** looks into the second option to achieve absolute decoupling: *Approach b): Absolute decoupling through technological advance is theoretically possible in the short term, yet decoupling that meets Parique et. al.'s (2019) three criteria of being permanent, sufficiently fast, and global has never been observed.*

Parrique, et al. (2019) have established three criteria under which the successful execution of absolute decoupling can be measured: permanent, sufficiently fast, and global. As defined by the three criteria, it has never been observed on an empirical basis before. It should happen sufficiently faster than economic growth, be sustained over time, and occur globally to be referred to as absolute decoupling. This leads to the conclusion that this concept continues to be a theoretical framework at the time of writing. One explanation for this is the general consensus of the lack of empirical evidence to support absolute decoupling, however, this does not mean that it will not happen in the future (Sandberg, Klockars, & Wilén, 2019).

Premise 6 builds on the previous one and reads: *Regulatory changes would be necessary to realize absolute decoupling through technological advance while avoiding the rebound effect*.

While technological advances are one of the two possibilities to achieve absolute decoupling, a challenge is to maintain it. Achieving absolute decoupling has been recorded in a few instances, however, it did not sustain. More specifically, did it not occur globally, permanently, and sufficiently fast, as emphasized in premise 5 (Parrique, et al., 2019).

One of the biggest challenges to the realization of absolute decoupling is facing is the rebound effect. This explains the phenomenon, where technological improvements result in efficiency gains and decreased resource consumption, on the one hand. On the other hand, this creates an increase in demand, which ultimately leads to an offset of the previously created environmental benefits (Lange & Berner, 2022).

A solution to avoid the rebound effect is the implementation of regulatory changes on a structural level. These can range from carbon taxing and GHG reduction targets to fostering the adaption of renewable energy sources. By actively supporting the realization of regulatory measures that lead to an increase in resource efficiency, can absolute decoupling be accelerated (Parrique, et al., 2019).

Following the discussion of both possible approaches to achieve absolute decoupling, the next **premise, 7** looks at what would happen in case no changes occur: *Absent changes in domestic consumption (see 4) and/or regulatory reform (see 6), economic growth in Austria implies increasing global environmental impacts.*

As was highlighted before, economic growth is reliant on natural resources (Mamedov, Movchan, Ishchenko-Padukova, & Grabowska, 2016). As previously discussed, absolute decoupling is needed to preserve the planet's finite resources with an ever-growing population. This premise explores the event if neither changes in domestic consumption nor regulatory reforms are realized thus failing to reduce environmental impacts. Thus one can say that the premise highlights the need for the mentioned changes in order to mitigate the negative environmental consequences resulting from Austria’s economic growth. Consequently if no measures are implemented, this could slow down the process of achieving the SDGs or possibly be a reason for the failure to achieve the environmental SDGs (Menton, et al., 2020).

Having considered the options to achieve decoupling as well as what would happen in case those would not come into effect, the next **premise 8** explores the achievement of the environmental

SDGs on a global basis in respect of striving for economic growth: *The world could achieve the environmental SDGs, even as Austria grows its economy and its environmental impacts, so long as this regional growth is accompanied by a contraction of economic activity and consequent environmental impacts in other regions*.

Environmental SDGs, such as 13 – Climate Action are focused on reducing greenhouse gas emissions and would either require either economic contraction to relieve negative environmental effects or decoupling in a given region (United Nations, 2023d). However, when looking at emissions on a global level, this statement explores a third option: in order to reduce the global environmental effects, Austria would also be required to follow one of the two options. However, could the environmental SDGs be achieved even if Austria is growing its economy and negative environmental impacts? A potential solution to achieving the environmental SDGs while sustaining economic growth in Austria is a global economic contraction, which leads to a reduction of environmental impacts in other regions. This means that the remaining world must offset the emissions generated by Austria's economic activity through economic contraction and a reduction in environmental strains. This can particularly be related to the comparably low share of Austria's economy on the global scale, which amounts to 0.3% of the global GDP (World Economics, 2023). Therefore, one can say that any reduction of negative environmental impacts on a global scale automatically leads to a compensation of Austria's economic activities due to its small share on the global scale. Thus, creating compensatory relationships among countries in an effort to collectively achieve the environmental SDGs.

When looking into the practice of fostering economic growth in one country and contraction in another, in order to offset environmental impacts, as mentioned in the previous premise, inequality comes to mind: specifically, the increase in global inequalities. Addressing this issue, SDG 10 was outlined to: "Reduce inequality within and among countries" (United Nations, 2023r). By promoting economic growth in one region, while disregarding other, oftentimes less developed economies, a further increase in global inequalities is generated (Bourguignon, 2018). This issue as well as a possible alternative to counteract this trend are addressed in **premise 9**: *Economic growth in Austria and economic contraction in other regions (most of which are poorer than Austria) implies a widening of global inequalities and consequent failure to achieve SDG 10, unless accompanied by massive (sufficient, appropriate, effective) redistribution from the global north to the global south*.

The premise is based on the fact that global wealth is not evenly distributed. Since the richest 1% of the population owns more wealth than the poorer half, this poses a distinct problem

(Ahmed, et al., 2022). The proposed solution is a massive redistribution. This agreement aims to create a flow from the global north – meaning the most developed countries, which experience economic prosperity, political stability, and minimal population growth towards the global south – being developing, countries with a rise in population that rely on support from the global north (Odeh, 2010).

Therefore, in order to counteract the further gap in global inequalities, a massive redistribution is required. This has to be done in a manner, that is sufficient in terms of redistribution levels, like resource reallocation. One way this could be accomplished is by reducing the dependencies of the Global South on the Global North, ultimately reducing power imbalances that also affect trade, which is an example of reducing inequalities between countries (Labonté, Schrecker, Packer, & Runnels, 2009). Depending on the need of the specific region, redistribution must be appropriate, sufficiently large, and effective to be successful in decreasing global inequalities.

The final **premise, 10** deals with the consequences of a potential redistribution arrangement mentioned in premise 9. It would not only lead to a reduction in global inequalities but also create new dependencies that are inconsistent with several SDGs (Higgs, 1994). The premise reads: *The dependencies created through such a redistribution arrangement, however, would fail various targets of SDGs 9, 10, & 11*.

Providing aid to governments in an effort to strengthen their economy and make them, therefore, less dependent on the global north, oftentimes has the opposite as a resulting byproduct. The inflow of monetary resources leads to financial relief on one hand but on the other hand, also creates a dependency on those funds. As less input is now required to reach a certain income, the willingness to earn this amount without external help rapidly declines, since funds are now available (Higgs, 1994). This creates a dependency of less developed countries on the provided aid to relieve global inequalities. These dependencies, however, would fail to meet various targets of SDG 9-11, which for example address the implementation of fiscal policies to result in a greater level of global equality (United Nations, 2023r).

Conclusions

The argument ends with 2 conclusions based on the previously shown 10 premises.

Conclusion 1: *In the short run, absent changes in domestic consumption (see 4) and/or regulatory reform (see 6), economic growth in Austria implies failure to achieve the SDGs on the global scale*.

As mentioned in premise 1, the world must reduce its negative environmental impacts in order to achieve the environmental SDGs. However, a decline in environmental impacts is related to economic contraction, unless decoupled. Premises 3-6 explore both options to achieve that, leading to premise 7, which states a decrease in environmental impacts while experiencing economic growth will not occur in the absence of the changes stated in premises 4 & 6. As a result, in the short run, economic growth in Austria, without the implementation of changes in domestic consumption and/or regulatory reforms implies failure to achieve the SDGs on the global scale.

After conclusion 1 was presented to the experts, they were asked whether the argument was valid or not. The answer options were: The argument is valid. Or The argument is not valid.

Conclusion 2: *In the longer term —as efficiency gains approach limits established by the laws of thermodynamics and once further shifts in consumption patterns are limited by biological imperatives— any economic growth in Austria implies failure to achieve the SDGs on the global scale*.

In summary, the researchers conclude that economic growth in Austria results in failure to achieve the SDGs in the long term. On the one hand, this conclusion is derived from the Laws of Thermodynamics, which imply that we cannot make products out of nothing, and we cannot recycle materials and energy indefinitely. This creates a limit on the reusability of natural resources and sets a natural limit defined by the Second Law (McMahon & Mrozek, 1997). Basically, we cannot produce without any inputs, so we can only decouple so far. On the other hand, while a shift in consumption was proposed as a solution for the short term, this strategy is not feasible in the long run, as a shift in consumption is also only possible to a certain degree, which is defined by biological imperatives. Without these options available, any growth would increase impacts, leading the SDGs to fail.

3.2.3.2 Development of Argument 2 – 2nd Round of Delphi $_1$

The development of the argument for the second round of the Delphi process involved a thorough analysis of the participants' comments of the first rounds. The gathered responses were all compiled in an Excel sheet which provided the researchers with a structured overview of the different viewpoints and expressed opinions. The goal of the second round of Delphi was to revise the premises in a way that potentially allowed the experts to find unanimous agreement.

This process started with sorting the comments according to recurring ideas and common themes. The researchers carefully considered the reasoning behind each point to understand

the underlying assumptions made by the participants. Furthermore, it was vital to understand why the experts could not unconditionally agree with the premises in Argument 1 and why comments were made. This may be related to in fact that, for example, the values or presumptions of the experts influenced the views or that some premises of Argument 1 were not formulated precisely enough.

The first change made to the second round was the elimination of the screening question. The main reason for this was that it did not fulfill the initial purpose of grouping the experts into two equally sized groups, namely economists and degrowth experts. After the first round, it became apparent that the experts largely agreed with the statement "Economic growth is an appropriate policy objective for Austria". Due to this, the question failed to effectively differentiate between the two expert groups which has made it redundant for the purpose of grouping.

In round two the experts were presented with a slightly different format in the Sawtooth software than in the first round. Whereas in the first round each premise was presented alone with the two answer options either being unconditionally agree or disagree this structure was revised in the second round.

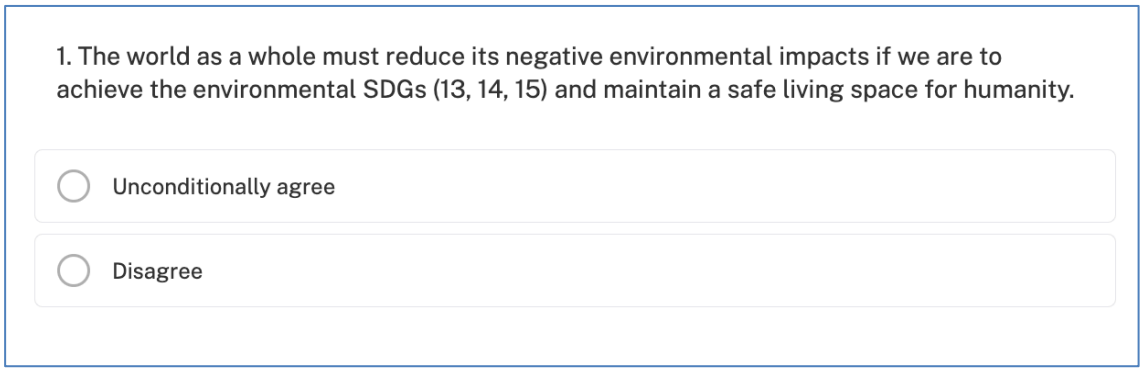

FIGURE 12: PRESENTATION OF A PREMISE IN ROUND 1

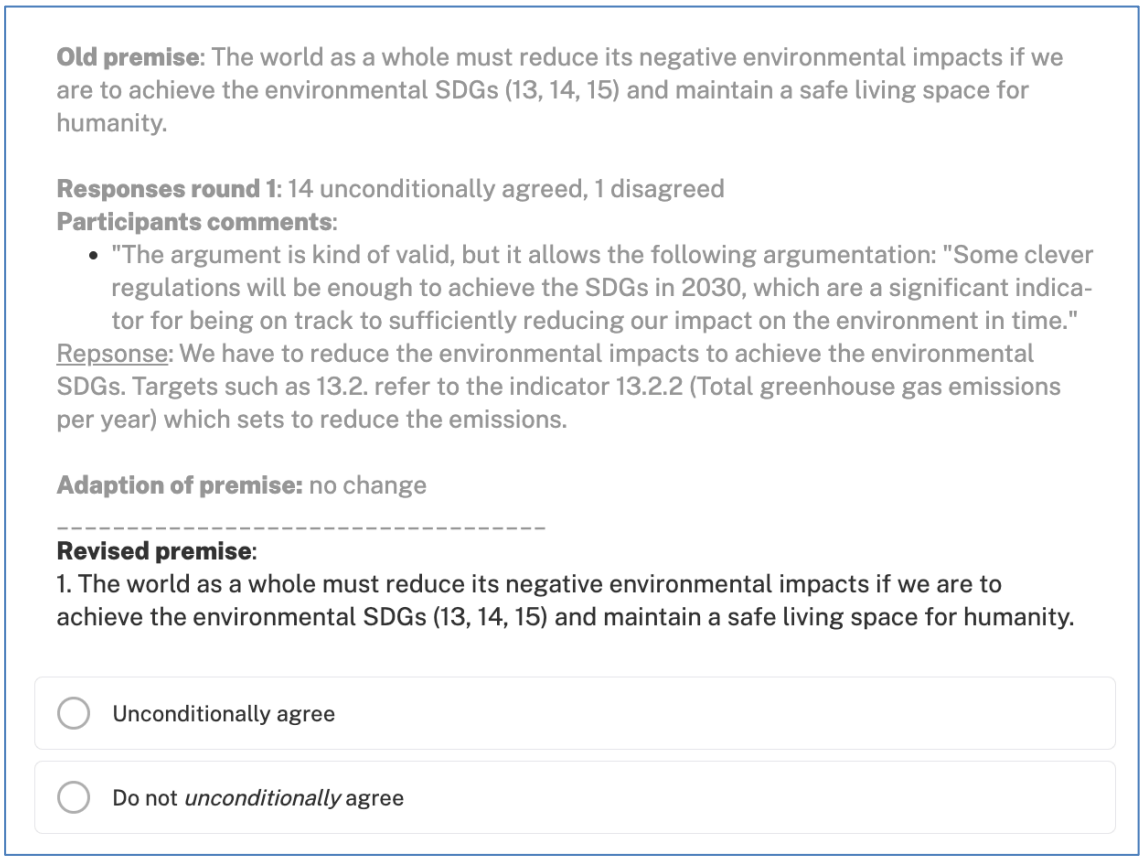

FIGURE 13: PRESENTATION OF A PREMISE IN ROUND 2

The two figures above show the changes made from round one to two. In the second round, the changes made were intended to provide the experts with more detailed information, thus improving the participants' understanding of the premises and giving them the opportunity to learn from each other. As presented in Figure 13, the experts were first presented with a recapitulation of the original premise of Round 1. This is important in order to ensure that all participants are familiar with the old statement to recognize the changes made in the revised premise. After the old premise, the responses received in the first round was shared with the participants to provide additional context and insight. This was divided into how many unconditionally

agreed and how many disagreed. In addition, the responses made by the participants were compiled and presented with a response from the researchers so that the other experts could gain valuable insights into the reasoning and argumentation of their counterparts. Lastly, to ensure transparency, the researchers provided an explanation of the adaptions made to the initial premise based on the comments received by the experts. This should address any concerns and explain the reasons the changes made. Following the review and original premise, the participants were presented with the revised premise. They had the option to either express their unconditional agreement or indicate that they do not unconditionally agree with the new premise. In that case, disagreeing participants were led to elaborate on the reason for their decision. Simultaneously they were asked to state a reformulation of the premise which would result in an unconditional agreement.

After the construction of the second argument was finalized, the revised premises and the provided comments were shared with the same experts who completed the survey in the first round. Another email was sent out explaining to them what the second round would look like and that they should carefully review and reflect on the changes made. This step is what ultimately creates the interchange of knowledge as not only disagreements are presented, but also the explanations as to why (Hasson, Keeney, & McKenna, 2000). Therefore, one can say that the second round of Delphi formed the basis for further constructive discussions hoping to reach an unconditional agreement among the experts with the argument.

3.3 Method of Analysis $_2$

After having described the development of both rounds of the argument, this part investigates how the data was analyzed. The chosen software for conducting the survey was Sawtooth. It allows one to view the statistic in a rather convenient way: either by question on the website itself or as an Excel sheet, where entries of all participants are recorded. Since there were several experts, who withdrew from the survey before completing it, the researchers were faced with quite a few incomplete responses. Therefore, after having gathered enough complete responses in round 1, the researchers downloaded one complete Excel file from Sawtooth.

The sheet was then sorted, and incomplete responses were hidden since they did not serve the purpose of this research. Most of the participants, who withdrew did so the question about their profession (this was before the presentation of the argument itself). Therefore, eliminating their responses did not remove any valuable data from the collection.

Time (hh:mm:ss)	Screening Q	Prof	C1	C1N	C2	C2N	Q1	Q1D	Q2	Q2D	Q3	Q3D	Q4	Q4D	Q5
0:32:22	1	Senior Scienti	1		1		1		1		1		1		1
1:09:52	1	University prc	1		2	- More than 2!	1		2	I do not disagr	2	It is difficult t(	2	This statemen	1
0:08:37	2	Postdoctoral	1		1		1		1		2	Shifting emiss	1		1
0:25:55	2	Senior scientis	1		2	Conclusion 2	1		1		2	People can ch	2	Depends on h(	2
0:48:08	2	Junior scientis	1		1		1		1		1		1		1
0:11:05	2	University Prc	1		2	In theory, stru	1		1		1		2	While overall	1
0:47:53	2	Studied econc	1		2	The Austrian e	1		1		1		1		1
0:24:49	2	PhD in climat(	1		1		1		1		1		1		1

FIGURE 14: EXCERPT OF THE COLLECTED DATA OF ROUND 1. EXCEL SHEET RETRIEVED FROM SAWTOOTH.

Figure 14 shows the cleaned-out sheet, which led to the next step of extracting of data to adapt the argument for round 2. The numbers indicate whether participants unconditionally agreed (1) or disagreed with each premise (2). In case of disagreement, the experts were then asked to provide a comment as to why. This can be seen under the columns of each question with the indicator "D" for disagreement. Now it was time to read through each comment of respondents carefully and determine, whether they would be included in the argument or not. This decision is individual for each statement and each comment. Some comments, which tried to disagree by disregarding an important measure in the statement, would therefore not lead to being included in the adapted premises. For example, one researcher pointed out that statements 2 & 7 would be incorrect if using GDP per capita as a measure, even though real GDP was stated explicitly. Comments like these are interesting to read, but miss the point of the argument. Therefore, comments of this nature were still communicated to the researchers in the second round but did not influence the construction of the premises.

Comments which highlighted ambiguities in a premise or which raised valid challenges to the truthfulness of a premise were discussed by the researchers and considered for changing the premises. Conclusion 2, for example, received 5 disagreements, where participants also pointed several issues out. After proper consideration, this led to the removal of one of the conclusions and an adaptation of the other. As such, the 10 premises in round 2 were followed by only one conclusion.

A similar approach was applied for the evaluation of comments for each premise. After having completed this step, the next task was to adapt the affected statements in such a way as to reach a higher level of consensus than in the first round. This process involved the simultaneous consideration of the comments relating to the individual premise, but also the role of that premise in the broader argument. The researchers therefore had to zoom in to focus on individual words and ideas relevant to the truth of the premise, and iteratively zoom out to maintain a holistic perspective on the validity of the argument.

In total, 8 out of the 10 premises were in some way adapted between the two rounds, as well as the conclusion(s). After this was done, and the argument was again considered valid and sound, it was inserted into Sawtooth and the link was sent out to the same participants from the first round.

3.4 Evaluation of Methodology

As previously mentioned, a Delphi process was chosen for this research to build consensus among different expert viewpoints on the developed argument. After round 1, the premises of the argument were revised and afterwards redistributed for another round of discussion. This evaluation aims to assess the limitations and ethical concerns of the methodological approach of conducting two rounds of Delphi.

3.4.1 Limitations

Besides the numerous advantages of a Delphi process mentioned earlier in this chapter, it is important to highlight some limitations that may have influenced the study. To start, the Delphi process relies on the knowledge and experience of the participants. Therefore, the selection of the experts is crucial. A limitation might arise during the selection process through the researchers, which may result in an underrepresentation of certain ideas or perspectives. It is important to ensure that a diverse and representative set of experts is selected to mitigate this limitation. Moreover, if experts are not sufficiently informed on the specific topics mentioned in the argument, the answers might lead to an unreliable conclusion (Fink-Hafner, Dagen, Doušak, Novak, & Hafner-Fink, 2019).

Another restriction that may have influenced the study was the time constraint. If more time was available, more rounds of Delphi could have been conducted, allowing the experts an extra opportunity to review the responses and adjust their opinions. Each additional round of Delphi strengthens the quality of the research instrument which is in this case the deductive argument. Furthermore, once the study has been conducted it is important for the researchers to interpret the results with caution, as they lack external validation through empirical data or objective measurements. The reason for this is that the Delphi process is solely based on the opinions and judgments of the selected experts. The outcome should be regarded as expert consensus rather than definitive truth. Another limitation of the selected research method is the availability of experts. As the study relies on the experts' opinion it is vital that they participate in all rounds. However, if an expert drops out in one of the rounds or only partially answers the survey, this may hinder the process of the study and affect the quality of the results obtained. In this study,

14 out of 15 participants completed the survey in the first round. One withdrew after the seventh premise.

After the revised arguments were sent to the 14 experts who completed Round 1, a total of 3 did not participate, leaving a total of 11 participants in the second round.

3.4.2 Ethical Issues [1]

In addition to the previously stated possible limitations to this qualitative research approach, the researchers must also address certain ethical concerns. These relate mostly to the confidentiality and privacy in regard to the personal data and answers of the participating experts. Since the findings will be discussed in the next chapter such questions must be addressed appropriately as part of the research process. The following steps outline the relevant precautions.

Firstly, before having sent out the personalized e-mail invitations to the participants, which included the link to the survey, the research instrument was submitted to the Institutional Review Board (IRB) at Modul University Vienna. After it was approved, the requests were sent out. The experts were all informed by e-mail about the purpose of the study as well as the process of the survey so that they were able to consent to their participation. This is crucial in order to provide the experts with the highest level of transparency about the process. Furthermore, they were told that the participation is non-binding and that they can withdraw at any time. Another important consideration is that the experts' responses remain only with the researchers were anonymized before being circulated for the next round of Delphi. This is vital for maintaining the participants' anonymity and protect them from any harm or negative consequences resulting from their participation. Finally, the experts were informed about how the data would be stored securely and eliminated after a certain period of time following the completion of the study.

All in all, one can say that addressing the ethical concerns by adhering to the ethical guidelines and principles, the researchers may conduct a Delphi study that respects the rights and welfare of its participants. Additionally, ethical considerations play a crucial role to ensure the validity and trustworthiness of the study as well as the overall integrity of the research process as a whole.

4 RESULTS AND DISCUSSION [1]

The research question asks, "*To what extent is economic growth in Austria compatible with the worldwide achievement of the SDGs?*"

If a deductive argument is both valid and sound, then the conclusion is true. Given that the conclusion(s) of the argument are expressed in negative terms, *"economic growth…*implies failure*",* the research is effectively testing a one-tailed hypothesis. This can be expressed more formally as a null and alternative hypothesis, whereby H1 is the conclusion of the deductive argument and H0 is its negation:

H0: "…economic growth in Austria *does not imply failure* to achieve the SDGs on the global scale."

H1: "…economic growth in Austria *implies failure* to achieve the SDGs on the global scale."

As always, the null hypothesis is being tested and can be rejected if the argument is found to be both valid and sound. Therefore, this results section addresses these criteria. First, the validity of the argument is addressed by focusing on the results of the two Delphi rounds related to the conclusions. Then, each premise is addressed, in turn, to establish its truth value.

In each of these sub-sections, the reader is first presented with the results from the first round of the Delphi process, including direct quotations provided by participants. In this light, the reformulation of the premise/conclusion for the second round is discussed, where applicable. The results obtained in the second round are then presented. Finally, the researchers will provide an answer to the guiding research question of whether economic growth in Austria is compatible with the worldwide achievement of the SDGs or not.

As already mentioned in a previous chapter, 15 experts participated in the first round of Delphi contributing their different perspectives and knowledge. This sample size provided the experts with valuable contributions and insights and created a comprehensive basis for the second round. In the second round, 11 experts continued their engagement in the Delphi process and further contributed to the refinement and consensus-building based on the results of the first round. The implications of this change in the sample are discussed later.

4.1 The validity of the argument

In the first round, participants were presented with the full 10 premise argument, and then asked to comment on the validity of each of two separate conclusions. To ensure a clear understanding of the task, the instruction reads: "Please comment on the validity of the argument. That is, assuming the premises are true, is the Conclusion deductively justified?"

The second conclusion will be presented first, as it was ultimately deleted from the argument, leaving the discussion of the validity of the more relevant premise to conclude this section.

The second conclusion stated "In the longer term —as efficiency gains approach limits established by the laws of thermodynamics and once further shifts in consumption patterns are limited by biological imperatives— any economic growth in Austria implies failure to achieve the SDGs on the global scale."

Five out of 15 respondents decided on basis of the argument that the second conclusion is invalid. The primary reason for the rejection of the validity of the second conclusion was the missing definition for "long-term", as well as the impact of the Austrian economy being too small to generate changes on the global level. One disagreeing respondent stated: "*More than 25 countries in the world have achieved absolute decoupling of CO2 emissions and economic growth over the period 2005-2019…It is difficult to predict whether such a trend will become global and faster over the coming decades. The existing projections of world population imply negative population growth globally starting in the 2080s (UN projections) or earlier (IIASA projections), which means that income per person can increase with very limited (or no) growth in economic output, thus making decoupling much more likely and persistent over the coming decades. Population projections for Austria imply that negative population growth will prevail in a couple of decades, thus allowing for increases in income per capita with low (and even zero or negative) GDP growth, even keeping productivity constant (which is of course a crazy assumption).*"

This respondent is mistakenly referring to economic growth in terms of an increase in GDP per capita, despite the definition provided in the argument. As GDP per capita can rise even as GDP shrinks, it is clear that this notion of 'growth' is not what is meant by the argument. The researchers acknowledge that GDP per capita is a more important metric than GDP, as it relates to prosperity and bears some loose relation to well-being, but it is not a measure of aggregate size and therefore cannot be used to measure growth. Furthermore, the claim that certain coun-

tries have achieved absolute decoupling fails to consider the way this has been achieved –primarily through sectoral shifts, as addressed in premise 4– which amount to a displacement of impacts and not their aggregate reduction.

Another respondent raised some other critical points regarding the conclusion and individual premises. These were interesting to the researchers and were addressed correspondingly. The comments read as follows: *"- do we talk about the SDGs literally (as defined in the agenda 2030) or symbolically, i.e., the specifics of the agenda 2030 are not important; it's about growth, equality, the environment, etc. The former does not make sense if we talk about long term effects. I don't see why any of the points 1-10 support Conclusion 2. The thermodynamic argument does not need any of them. So which conclusion is supported by points 8-10? Conclusion 2 associates "Longer term" with the period of time after which efficiency gains approach the limits thermodynamics. That might be in 10 years, but more likely last as long as 50, 100 or more years. Green growth advocates will argue that we will have solved our negative impact on the environment by then."*

The next comment states: "*Conclusion 2 does not indicate whether changes in behavior or policies take place. If they change, economic growth may theoretically be possible while achieving other SDGs. It also lacks a definition of "longer term" (same actually holds true for "short term"). Given this lack of information, it is rather impossible to judge if the argument is valid or not."*

Similarly, the following respondent indicates: "*In theory, structural changes in the way products and services are provided may be possible that would allow such decoupling. This will not happen fast, but in the long run, this cannot be logically ruled out. Still, I agree that it requires major institutional/organizational changes in production and consumption patterns, and whether or not GDP grows under those conditions is probably not a very interesting question*."

As both comments highlight the missing definition of the "long term", as well as needed changes in consumption and production patterns, the researchers have strongly considered these points, leading to the removal of the second conclusion in the second Delphi round.

The first conclusion read "In the short run, absent changes in domestic consumption (see premise 4) and/or regulatory reform (see premise 6), economic growth in Austria implies failure to achieve the SDGs on the global scale."

As 14 out of 15 respondents agreed that the argument was valid, it suggests that there is a strong consensus among respondents regarding the logical validity of the argument.

One of the agreeing participants highlighted that "*Conclusion 1 is correct because it is tautological. Given that the SDG targets refer in many cases to the implementation of regulatory changes, absent these regulatory changes they will not be fulfilled by definition."*

The disagreeing expert argued "that *the argument is kind of valid, but it allows the following argumentation: "Some clever regulations will be enough to achieve the SDGs in 2030, which are a significant indicator for being on track to sufficiently reducing our impact on the environment in time. Thus, although several of the arguments try to expose the problems with green growth, conclusion 1 does not help to reject green growth in any way*."

The researchers somewhat disagree with this expert's understanding of the argument. The main assumption is that either regulatory changes and/or shifts in consumption are needed to achieve absolute decoupling in Austria. A lack of either or both results in an increase in negative environmental impacts. Furthermore, this ultimately creates dependencies, which as a result fail to achieve several goals. The researchers did, however, amend the conclusion by removing "In the short run" from its beginning. This change was similar to the removal of other temporal references from other parts of the argument due to comments from experts regarding their ambiguity and was also facilitated by the removal of the second conclusion, as discussed above.

After having adapted the conclusion for round 2, it read: "Absent changes in domestic consumption (see 4) and/or regulatory reform (see 6), economic growth in Austria implies failure to achieve the SDGs on the global scale."

This adaptation again resulted in only 1 disagreement; thus, the level of validity remained unchanged. The comment states: "*The argument is kind of valid, but Austria has a too small impact on the global scale to make a difference. Austria's GDP is only 0.47% of world GDP and its total biocapacity deficit makes up only 0.24% of the world's total biocapacity deficit (calculated from values on Wikipedia). The argument sends the right message, but Austria's impact alone is negligible. The same argument with USA, China, or the EU would be valid. They have enough impact to make a difference*."

As highlighted in one comment in Premise 10, Austria's influence on the global scale might seem insignificant. However, this does not take away from the negative consequences which result from economic activities in Austria. More importantly, the expert acknowledges that large countries cannot grow their economies if the SDGs are to be achieved. What they seem to miss, however, is that economic growth in a rich country like Austria but not in other (mainly poorer) nations, will widen inquality and therefore fail that SDG, even if not the environmental ones.

In evaluating the validity of the argument, researchers consider the conclusion that follows from the 10 premises, assuming they are true. In response to the question of whether the argument is valid or not, 91% of the respondents agreed, confirming that the conclusion is justified based on the assumption that the premises are true. Therefore, the researchers conclude that the argument is valid.

4.2 Premise 1 $_1$

In round 1, the experts were presented with the premise "The world as a whole must reduce its negative environmental impacts if we are to achieve the environmental SDGs (13, 14, 15) and maintain a safe living space for humanity."

The experts' responses showed a large consensus on premise 1 in the first round already, with only one expert disagreeing.

The respective participants' comment was: "*If the SDGs are seen symbolically, then yes. Otherwise, the achievement of the SDGs is merely a first step*." The researchers agree that the SDGs are merely a first step towards achieving a sustainable future and the SDGs while living within the planetary boundaries with an ever-growing population. In addition, researchers view the SDGs as a practical framework that serves as a compilation of means and goals for sustainable development.

As the comment was answered by the researchers and highlighted in the survey for the second round of Delphi, the premise remained unchanged. After finalizing the second round, the researchers found that there was full consensus among the experts. This signifies that the premise holds a high level of confidence in validity and reliability.

4.3 Premise 2 $_1$

In the next step, the experts were presented with Premise 2. It states as follows, "Global economic growth – defined as the year-on-year increase in real global GDP – implies an increase in negative environmental impacts, unless it is accompanied by absolute decoupling at the global scale."

For this premise, a notable majority of 12 experts unconditionally agreed with the premise, which demonstrates a strong consensus already. Yet, a total of three respondents disagreed.

The first comment reads, "*I do not disagree as such, the sentence is just uninformative. It literally says: "Global economic growth implies an increase in negative environmental impacts, unless it doesn't". What we know from the empirical literature is that economic growth (which I would define as increases in GDP per capita, and not in GDP) may or may not increase negative environmental impacts*." The participant would define economic growth using GDP per capita. However, the researchers have decided on generally applying the definition of real GDP in this argument. Moreover, the researchers agree that the statement is tautological, and therefore dismiss the following two comments made. The first comment being: "*It's not sufficient for decoupling to be absolute and global. It also needs to be permanent; sufficient in scale; sufficient in speed and apply to all environmental pressures. From the laws of thermodynamics and from systems ecology we can conclude that such a type of decoupling is at best wishful thinking and at worst a dangerous distraction if discussed/brought into the policy arena.*" And the second one: "*Is that absolute decoupling of every indicator? That's not possible. Thus, with global economic growth, at least some indicators will get worse. How can we weigh indicators against one another?*"

Considering the comments by the experts the researchers only highlighted that global economic growth is defined as the year-on-year increase in REAL global GDP as this was not clear to one of the experts for the second round of Delphi.

Following the completion of round 2, the researchers achieved almost full consensus among the participating experts with two exceptions.

It must be said that one of the experts did not disagree as such. The comment provided was "*do not disagree as such, however, would make more sense to consider GDP per capita*." The other one said: "*As remarked by another commentator - you should refer to real GDP PER CAPITA - only a per capita measurement can really tell you if the global population has become "richer" on average (it will, however, not tell you much about the distribution of income)*."

In summary, it can be said that decoupling is needed to make economic growth in the long-term sustainable and compatible with environmental well-being. However, since one participant mentioned using GDP per capita instead of real GDP, the researchers have decided to refer to economic growth as an increase in real GDP, as this is regarded as the universal measure of economic growth within a country.

4.4 Premise 3 $_1$

The third premise presented the participants with two approaches:

"In the short term, a given region (e.g., Austria) can achieve absolute decoupling through ONLY two approaches: a) shifting the sectoral composition of the region's economy towards industries with lesser impacts. **OR** b) technological advances which increase technological efficiency."

This premise had a lack of consensus among the experts. Eight experts unconditionally agreed with the premise whereas seven disagreed. This level of disagreement highlights the need for further discussion and exploration in order to reach a higher level of consensus in the second round.

One of the respondents argued that it is "*Difficult to understand what the short run is here…".* The researchers agreed with the comment and cut the phrase "in the short run" for the second round of Delphi. The next comment of an expert was: "*Shifting emissions to the Global South while keeping the profits would also make it seem as though Austria is decoupling when it is not*." One can argue that the region (Austria) is decoupling but the world is not (necessarily). It is important to highlight that this premise only deals with the region. The next comment reads "*In theory, higher prices of goods, like observed at the moment in Europe for energy carriers, can blow up GDP while at the same time contribute to savings in consumption that decrease environmental impacts.*" Here, it is essential to emphasize that, as earlier in the argument, real and not nominal GDP is meant. The next two comments made by respondents are not discussed in detail as they are captured by point a) of premise 4. This refers to the following two comments: "*Also re-structuring the demand-side could contribute to absolute decoupling. You might frame this as a shift in sectoral composition of GDP, depending on how sectors are aggregated and represented in economic accounts*" and "*People can change behavior in the short term. Technological advances can also occur through technological SHIFT not just efficiency.*" The last comment made for this premise is the following: "*Difficult. If I accept that it could work with enough technological improvements to increase efficiency, I would implicitly approve to the idea that economies can dematerialise; which I consider an incorrect understanding of what we know from thermodynamics, energy studies and systems ecology.*" Nevertheless, one must say that this premise deals only with theoretical concepts, later on practicality is explored. For this reason, no adaptations to the comment were made.

Based on the comments provided by the experts, the researchers decided to delete the clause "in the short-term" from the initial premise for it to only focus on a given region (e.g., Austria). This change results from a comment made regarding the difficulty of defining the phrase "in the short-term" in this particular argument.

After the second round was finalized, the researchers found that nine out of eleven experts agreed indicating a strong consensus. The dissenting experts' comments were "*well you could still simply have an economy-wide asset bubble which could, in the short term, look like absolute decoupling*" and "*This requires a proper definition of technological efficiency*." The first comment highlights, that economic indicators alone, such as an asset bubble, may not reflect true decoupling from environmental impacts in the short term. Furthermore, a clear definition of technological efficiency is needed for an accurate assessment of its impact on achieving decoupling. This could be stated as the following. Technological efficiency is the ability of technological progress to increase the output while minimizing the resource inputs thus minimalizing environmental impacts.

4.5 Premise 4 $_1$

The fourth premise goes in depth with approach a) and reads as follows: "Approach a): Shifting a given economy's sectoral composition only amounts to absolute decoupling at the global scale if it is accompanied by a corresponding shift in domestic consumption patterns (to avoid the outsourcing of higher-impact production to other regions)."

Ten experts unconditionally agreed and five disagreed with the premise. The disagreement underlines the need for further investigation to understand the reasons for the discrepancy in order to aim for higher consensus in round 2 with a well-revised premise.

The first comment made by a participant argues that "*This statement appears to be based on the assumption that technology is constant, which is not a good idea when assessing processes such as sectoral shifts, which take long spans of time.*" Nevertheless, essentially the technological changes in the form of advancements are addressed in Approach b) which is the next premise. The next two statements are valid and were taken into account by assuming that outsourcing usually goes to regions with lower environmental standards. They read as follows. Firstly, "*Depends on how efficient the now outsourced domestic industry has been in comparison to foreign industry. If it was less efficient than the foreign industry that displaces it now, it will lead to global absolute decoupling without a shift in consumption patterns*." Secondly, "*While overall generally plausible, I think this needs to be formulated in a more precisely defined manner to be logically fully convincing. For example, it might (in theory - how relevant this is in practice is a different matter) be possible that outsourcing reduces environmental impacts per unit product, e.g., if production is outsourced to regions with ample availability of clean renewable technologies (e.g., hydrogen from PV).*" Due to the fact that it was mentioned by one of the experts that

outsourcing does not necessarily imply negative environmental impacts, the researchers adapted the premise for the second round of Delphi which led to a more precise premise. The clause *"which typically have lower levels of regulation and lower environmental standards"* was added at the very end to clarify the assumed conditions for outsourcing.

The results and comments made provide a solid foundation for further exploration of the premise and allow the researchers to further investigate the disagreements to revise it to possibly reach consensus in the following round.

Thus, for the fourth premise, the change from the old premise to the revised one involved the addition of a clause highlighting the potential negative environmental impacts associated with outsourcing production to regions with lower levels of regulations and environmental standards. This was done as one respondent mentioned that outsourcing does not necessarily imply negative environmental impacts. In the revised premise the clause highlighted in italics was included "… (to avoid the outsourcing of higher-impact production to other regions, *which typically have lower levels of regulation and lower environmental standards*)."

After the second round was finalized, the level of consent increased significantly with only one respondent disagreeing anymore.

The participant who disagreed raised some interesting points. The comment reads as follows *"I think this is a bit complicated and crucially depends on the production that is of focus. Is the technology very different in different regions? Are there "clean(er)" or "dirtier" versions of it somewhere else (then it matters where it is outsourced to)? Is it always a polluting production process (than we need changes in consumption patterns, and it actually does not matter where it is outsourced to)?"* These are interesting aspects, which could be considered for future research and a possible further adaptation of the premise.

4.6 Premise 5 $_2$

The fifth premise deals with Approach B) and states that "Absolute decoupling through technological advance is theoretically possible in the short term yet decoupling that meets Parrique et. al.'s (2019) three criteria of being permanent, sufficiently fast, and global has never been observed."

The experts expressed strong agreement with Premise 5 as only one out of 15 experts disagreed. The expert who disagreed argued that "*This depends on the level of detail you are talking about.*

At aggregate perhaps, for specific sectors not so sure → wind and PV has the potential to do that in the energy sector." The researchers agree with this comment and therefore added the clause "on an aggregate level" at the end of the premise in order to keep this statement truthful. Like this, the premise focuses on changes on an aggregate level rather than on specific sectors.

Therefore, the adapted fifth premise reads: "Absolute decoupling through technological advance is theoretically possible in the short term yet decoupling that meets Parrique et. al.'s (2019) three criteria of being permanent, sufficiently fast, and global has never been observed on an aggregate level."

As a result, this statement has resulted in one disagreement in the second round. The explanation reads: "*While this is most likely true for the environmental challenges that matter today (GHG, biodiversity, ...), one might find evidence for this for local pollutions (drinking water quality, sulfur dioxide) - and FCWK pollution (ozone depletion) seems to be a notable exception at global level - that was solved sufficiently fast, permanently and at a global level*."

This expert provided the researchers with an interesting insight. In case of further adapting the argument, this comment is worth considering.

4.7 Premise 6 $_2$

The sixth premise states in the first round: "Regulatory changes would be necessary to realize absolute decoupling through technological advance while avoiding the rebound effect."

Looking at the respondents' reactions, 12 participants unconditionally agreed with the statement, while 3 disagreed.

Some participants argued that absolute decoupling alone is not sufficient, and neither are regulatory changes. However, the researchers highlight only the necessity to realize absolute decoupling, rather than asking if it is enough. The same is thought of in the other comment. Rather than asking about the efficiency of regulatory changes, the argument states that current regulations are not adequate to foster decoupling. One responded commented: "*I partially agree. However, I wonder whether regulation can capture all potential kinds of rebound?"*. This point addresses the phrase "avoiding the rebound effect". While the researchers believe that certain rebounds within certain industries can be avoided through the implementation of caps, this certainly does not encompass all kinds of rebounds. Another comment stated: "*If furnished with all necessary criteria it basically becomes a metaphysical endeavor that should not be subject to*

governance discussions. In short, it's a useless if not dangerous concept to pursue. Dangerous, because it suggests that the techno-fix is possible if we try hard enough and have the right regulatory changes." Experts had the opportunity to propose their top three regulatory changes in the next step, through an open-ended question asking participants to list their top three suggestions.

As three respondents disagreed with the premise, 12 experts were led to propose their changes, as displayed in Table 3:

TABLE 3: RESPONSES IN PREMISE 6, SUGGESTED REGULATORY CHANGES. OWN CREATION. DATA RETRIEVED FROM SAWTOOTH.

Suggested regulatory changes sorted by experts	
1.	- Taxing and regulating negative externalities in domestic production - Taxing and regulating negative externalities along the supply chain for imports (Lieferkettengesetz) (Supply Chain Act)
2.	- CO2 tax - R&D tax incentives - Incentivizing technology transfer across borders
3.	- You would have to regulate for sufficiency-based consumption levels - Reduce working hours drastically (in line with tech advances) - Social-ecological taxation
4.	- Eco-social tax reforms - SDG laws with mandatory goals (incl. severe consequences if goals are not met) - Improved technological standards/regulation
5.	- Sufficiency-oriented policy - Strict enforcement of absolute reduction targets on resource use and GHG emissions - Sustainable supply-chain policies
6.	- Socio-ecological tax reform, including trade-adjustments at borders - Massive changes in investment patterns in infrastructures resulting in denser settlements and prevalence of active and public transit replacing most private car use - Stop investment in new fossil fuel exploration and infrastructure
7.	- Taxing emissions or any other measure that makes goods with emissions (direct or indirect) more expensive - Corporate tax
8.	- Absolute limits/certificates for imported GHG equivalents - Carbon pricing - Quantitative GHG reduction pathways
9.	- Ideally move away from nonrenewable energy sources - Incentivise shifts to a more localized consumption - Enforce efficient carbon taxing

10.	- Carbon tax - Energy efficient standards - Adaption to renewable energy sources (Renewable energy mandates)
11.	- Progressive taxation of resource use/pollution - Adequate subsidies
12.	- Carbon and resource taxes - Trade regulations - Work time reductions

As some responses occur repeatedly, they were filtered out and presented in a multiple-choice list in the second round. This allowed respondents to choose their top 3 out of the most commonly mentioned regulations. However, before the list was presented, respondents were shown the adapted premise.

Having considered the responses, as well as the disagreement a modification was implemented. The adopted premise, therefore, reads: "*Regulatory changes would be necessary to realize absolute decoupling through technological advance while minimizing rebound effects*."

This premise has resulted in 10 unconditional agreements and 1 disagreement in the second round.

The comment left for disagreement was the following "*Emissions decoupling, but not materials*." The respondent differentiates between the decoupling of emissions and materials. While this is a valid issue raised, the premise deals with absolute decoupling on a conceptual basis. For future research, one might consider specifying the premise according to a area where decoupling is feasible, rather than addressing it simply as a concept.

Looking at the open question, it was derived from the most popular answers in round 1, now presented as multiple-choice, asking participants to choose their top 3. As the aim of Delphi is to include feedback from participants into the adaptation of the argument, this question was also derived from comments made in the first round. On the basis of the participants' input, the list shown in Figure 15 was constructed.

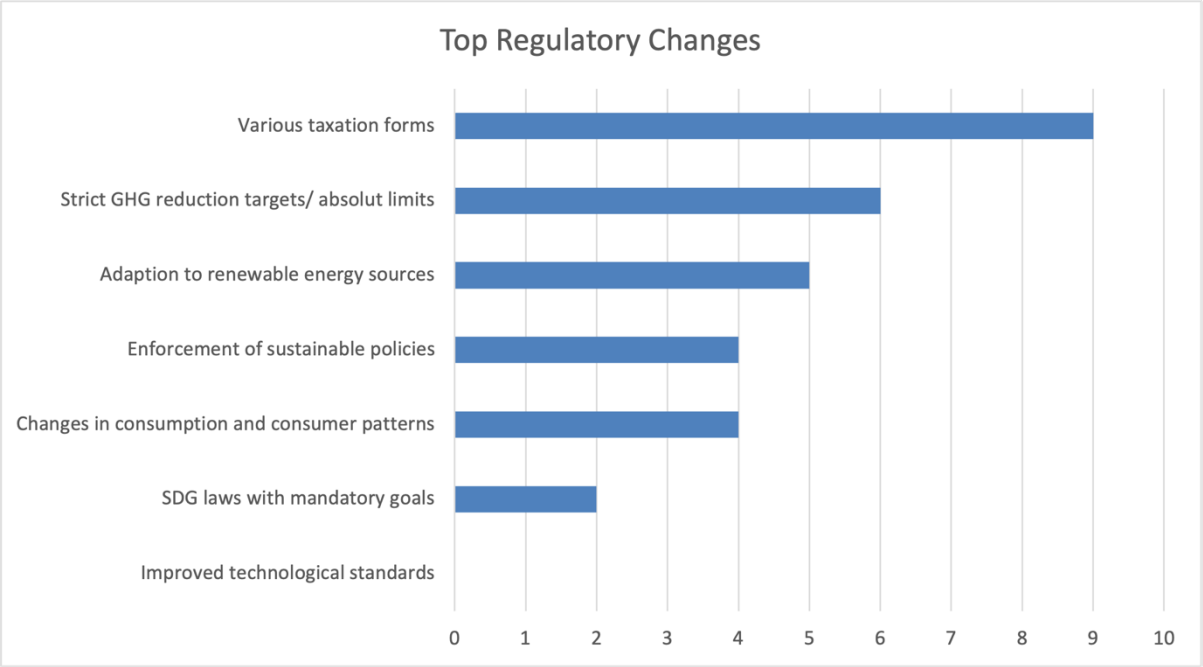

FIGURE 15: RANKING OF THE TOP REGULATORY CHANGES PROPOSED; OWN CREATION. DATA RETRIEVED FROM SAWTOOTH.

Figure 15 shows the frequency of the most selected regulatory changes. The graph clearly shows a favorite among the researchers. 9 out of 10 respondents to this question, marked the implementation of various taxation forms as one of their top choices. Looking back to the first round, suggested taxation forms included most commonly carbon as well as socio-economic taxes. Another form, which has been mentioned a few times was in relation to the supply chain. A few suggestions have been made in this respect – one through the form of the Supply Chain Act, another respondent stressed the overall need for increasing the sustainability of the supply chain in general, potentially through taxing.

The option with the second highest votes, 7, is about increasing stricter targets of GHG. This was mentioned in the scope of firstly, reducing the target usage of GHG altogether, and applying stricter enforcement hereby. Secondly, respondents suggested absolute limits for GHG emissions, as well as certificates for imported emissions. Overall, a clear decrease in emissions through regulations or limitations was stated, hence the second option in Figure 15.

The next frequently chosen option was the adaptation of renewable energy sources. This was suggested by moving away from non-renewable energy sources, as well as actively adapting sustainable energy options. This answer option received 5 votes.

In line with the adaption of renewable energy sources, a general enforcement of sustainable policies as well as a change in consumption patterns were both stated and ticked by 4 respondents each. Changing consumption patterns was raised in line with sufficiency-based policies.

Shifting the sectoral composition is a topic of premise 3. The main proposals for achieving this shift mentioned in the first round is moving toward more localized consumption and focusing more on sufficiency policies.

The next regulation, which was included in the second round was the proposed mandatory SDG laws, including mandatory goals. Since the underlying theme of the argument deals with the effectiveness of the SDGs and the practical lack of progress, one option proposed to potentially accelerate progress was the implementation of mandatory SDG laws. While this comment was not mentioned often in the first round, the researchers have decided to include it, as it touches on the fundamental topic of this paper. It was ticked by 2 respondents.

The last option to choose from was improved technological standards. As this comment has been raised in the first round and is also the subject of premises 3, 5, and 6. For this reason, this option was included in the list, which was not chosen by any respondent, however.

4.8 Premise 7 $_1$

Premise seven reads: "Absent changes in domestic consumption (see 4) and/or regulatory reform (see 6), economic growth in Austria implies increasing global environmental impacts."

This statement received 11 unconditional agreements and 4 disagreements.

One statement reads: *"In per capita terms, that does not need to be the case. Per capita CO2 emissions have fallen over the last 15 years and absolute decoupling takes place in countries with similar characteristics to Austria".* Since this comment refers to economic growth, which in previous statements has already been defined as the measure of real GDP only the comment was disregarded. Another comment questioned the impact of Austria by stating: *"Any measures in Austria cannot logically "imply" something at the global level. This statement does not make sense logically*."

The researchers consider this opinion; therefore, the statement was adopted to the following to emphasize changes in Austria alone: "*Absent changes in domestic consumption (see 4) and/or regulatory reform (see 6), economic growth in Austria, ceteris paribus implies increasing global environmental impacts*." Ceteris paribus highlights, that the statement is believed to be true if changes in Austria alone occur, with all other aspects remaining unchanged.

After having presented the respondents of the second round of Delphi with the adapted premise, the researchers achieved nearly full consensus, as only one expert out of 11 disagreed who already commented in premise 2 that GDP per capita should be considered.

The comment reads: *"Economic growth should be defined as real GDP per capita (for Austria, not global)."* As mentioned in previous sections, this argument uses real GDP rather than GDP per capita as its measure.

4.9 Premise 8 $_2$

The eighth statement reads: "The world could achieve the environmental SDGs, even as Austria grows its economy and its environmental impacts, so long as this regional growth is accompanied by a contraction of economic activity and consequent environmental impacts in other regions."

This premise generated 8 unconditional agreements and 6 disagreements.

At this point, one respondent terminated their participation, hence a total of 14, and not 15 responses moving forward. Some comments regarding the disagreements were: "*A contraction of economic activity and positive environmental impacts are not synonyms".* Or a preference for degrowth altogether: *"While economic growth and emissions are linked, the opposite is not necessarily true under current capitalist, growth-based conditions. Degrowth is still the best option, but we can also have economic decline with rising emissions, if there is an economic recession with increased poverty. So, I think this depends on a few things. Economic recessions could also lead to increased emissions i.e., through people experiencing poverty heating their homes with more polluting, but free materials. So, if there was economic contraction elsewhere, it doesn't mean that emissions would go down".*

As well as: "*This statement assumes full compensability and ignores tipping points, irreversible damage etc. The fallacy of the IPAT equation. It may be true for global pollutants like CO2. But there is many other impacts of economic growth: e.g. soil sealing, toxic substances,… Plus it ignores the political dimension that growth in income also inevitably affects power balances*."

One respondent stated: *"SDGs are nation specific, as far as I know, they cannot be traded among nations. So by definition of the SDGs that is not possible".* To that statement, the researchers have underlined, that while most indicators are not country-specific, they are proportional indicators – in relation to population, or land, for example.

One other respondent commented: "*Austria as a rich country must set standards and find development pathways less developed countries/regions find attractive and want to follow*". While the researchers agree with this comment, one should also consider the influence Austria has on the global scene. While yes, Austria is a rich country, others such as Germany, the US, or China, should be the ones to step into the leadership role and set an example for other countries to follow. Their actions would be impactful enough so that even if Austria were to act against these standards, it would not discourage other countries to do the same, as they would follow those countries in example positions.

Following these comments, the new premise includes an adaptation of the last part: "*The world could achieve the environmental SDGs, even as Austria grows its economy and its environmental impacts, so long as this regional growth is accompanied by a contraction of environmental impacts in other regions, which may restrict their economic growth rates*." This way, the causal link between economic contraction and reduced environmental impacts is removed, by highlighting that this *may* result in economic contraction.

This adaptation resulted in 9 unconditional agreements and 2 disagreements.

The two comments made by the disagreeing respondents stated, firstly: "*The lack of effort in reducing environmental impacts of a rich country with high per capita impacts will cause other countries and their politicians and populations to reduce their efforts as well. Therefore, I cannot agree unconditionally. This is a rather practical issue. In theoretical terms, I fully agree with the statement."*

This respondent raised a noteworthy point. It assumes that Austria, as a rich country should set a positive example for others to follow. While this argument was also raised in the first round, one could argue the impact of leading countries have in contrast to Austria. This should not imply an excuse for countries with smaller economies to opt against more sustainable practices, it simply questions which country is in the position to act as a pioneer in this case.

The second comment reads: "*Economic growth does not necessarily imply an increase in environmental impacts. Simply stating the result in a contraction of environmental impacts would have been sufficient."* An argument, which has also been voiced in the first round – economic contraction and positive environmental impacts not being synonyms. This respondent proposed a change to the premise. This suggestion could be taken into consideration for a further adaptation of the premise in a potential third round of Delphi. Since the majority has agreed with this

premise, increasing consensus in comparison to round 1, the undergone change is considered rather accurately.

4.10 Premise 9 $_1$

The ninth premise reads: "Economic growth in Austria and economic contraction in other regions (most of which are poorer than Austria) implies a widening of global inequalities and consequent failure to achieve SDG 10, unless accompanied by massive (sufficient, appropriate, effective) redistribution from the global north to the global south*."*

For this statement, 11 participants opted for unconditional agreement, while 3 disagreed.

While some comments again questioned the effects of Austria on global transformations, the following comment influenced the adaption of the premise: "*Economic growth is not a zero-sum game*." As economic growth in one region, and economic contraction in another are not substitutable, the new premise states: "*Faster economic growth in Austria than in other regions (most of which are poorer than Austria) implies a widening of global inequalities and consequent failure to achieve SDG 10, unless accompanied by massive (sufficient, appropriate, effective) redistribution from the global north to the global south*." By adding the term faster to the beginning of the sentence, the researchers now highlight, that inequalities are caused by a disproportionate increase in one region than in another, which are poorer countries in general.

After the adaption of the premise and the second round, there was only one participant that disagreed.

The participant revised the premise so that it would lead to an unconditional agreement for them as follows: "*Faster economic growth of a relevant share of the global north (e.g., USA, or EU) than in other regions implies a widening of global inequalities and consequent failure to achieve SDG 10, unless accompanied by massive (sufficient, appropriate, effective) redistribution from the global north to the global south*." It would be interesting taking this premise into another round of Delphi in order to find out if the other experts would also unconditionally agree with this newly phrased premise by one of the experts.

4.11 Premise 10 $_2$

Finally, this leaves the results of the tenth premise. Originally it stated: "The dependencies created through such a redistribution arrangement, however, would fail various targets of SDGs 9, 10, & 11."

This premise resulted in 9 unconditional agreements in the first round, and 5 disagreements.

Out of those 5 disagreements, one participant commented: "*Without knowing the details of such a redistribution arrangement, it is difficult to answer the question ...*" While this is a valid argument, the researchers argue, that any redistribution agreement would ultimately lead to failing the achievement of various targets. An example would be of SDG 10 (*Reduced Inequalities*). Specifically target 10.4.: "*Adopt policies, especially fiscal, wage, and social protection policies, and progressively achieve greater equality"* (United Nations, 2023q). Created dependencies could lead to an imbalanced distribution of resources. As a result, these policies are at risk of being ineffective, further promoting inequalities worldwide.

Another expert commented: "*This implies that redistribution takes place in a dependent setting. This is therefore a tautological argument.*" The researchers assume redistribution arrangements lead to dependencies. Theoretically, there might be a case of redistribution, which happens without creating dependencies, that the researchers are not aware of.

Other comments were: "*Needs more explanation; are SDGs symbolically or literally?".* And: "*Why SDG 9, 10, 11? and not others as well?*" The researchers assume that the distributions mainly threaten the increase of global inequalities, which are included in these goals. For this reason, the premise remains unchanged.

As the researcher did not undertake any changes to this premise, it was presented unchanged in the second round to the experts.

This time, the responses count 9 unconditional agreements and 2 disagreements.

One comment questioned the impact Austria has on the global scale by commenting: *"Again, Austria's impact is negligible*." While Austria's global share of GDP accounted for 0.3% in 2022, does not imply, that the effects are negligible (World Economics, 2023). While the impact on a world scale might not be comparable to the one of leading countries, one cannot deny the negative consequences of the created dependencies, thus setting back the achievement of several SDGs.

The second comment reads: "*Premise remains too vague*." As this was also an issue in the first round, the researchers have stated that they assume any redistribution arrangement to fail various targets of the SDGs. For this reason, the premise was not elaborated any further.

4.12 Soundness of the Argument [1,2]

The soundness of the argument refers to the truthfulness of its premises. A sound argument needs to have valid deductive reasoning in which all premises are true. In order to find out whether the experts consider the argument sound, they were asked whether they "unconditionally agreed", or not, with each of the 10 premises.

Having analyzed the responses of all premises and conclusions, the soundness of the argument can now be determined. The overall goal of the research instrument, and the second round specifically was to reach a higher level of consensus among the participants. Figure 16 depicts a comparison of the unconditional agreement percentage of each premise in rounds 1 and 2. Since the second round had fewer participants, the researchers decided to compare the outcome in relative numbers.

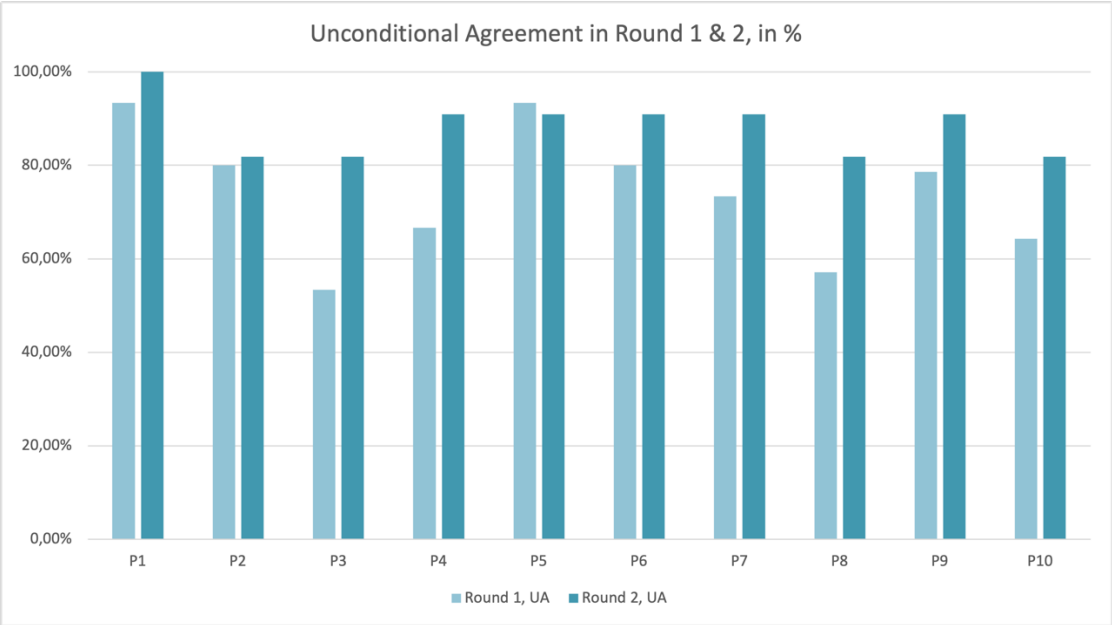

FIGURE 16: GRAPH SHOWING THE RESULTS OF BOTH ROUNDS, VALUES IN %; OWN CREATION.

The soundness of the argument is determined by the level of agreement on the premises in relation to a valid conclusion. According to the revised conclusion, 10 out of 11 participants agree that the conclusion is valid following the responses. When looking at the individual agreement level of each premise, Figure 16 shows an incline in all premises except for the fifth. While the absolute value of disagreement remained 1 in both rounds, the lower participation level leads to a relatively lower agreement score in the second round.

While premises 1 and 2 show a slight increase to an already high agreement, the biggest change can be seen in premise 3. Having had around 53% of respondents initially unconditionally agreeing, the adaptation led to an increase to 82% in the second round. Similar levels were recorded for premises 4, 8, and 10.

To summarize, the average unconditional agreement level of all 10 premises in round 1 was 74%. The adaptations succeeded in increasing the average agreement in round 2 to 88%.

Considering the increase in agreement, the question arises as to why this might be the case. The most optimistic explanation is that 1) the argument was improved from round one to two, and 2) that the experts effectively learned from each other, as is intended in the Delphi process. We believe that both of these dynamics provide at least part of the explanation. It must also be acknowledged, however, that the change might be partly explained by the diminished number of participants in the second round (11), from the first round (14). Attrition of this kind was previously discussed as a threat to the success of the Delphi technique. The question is whether the three participants who left the study at the halfway point were qualitatively different from the rest of the pool. As the screening question failed to distinguish mainstream economists from degrowthers, we can only look to the scores these experts provided in the first round.

Using the statistical software Jamiovi, a one-tailed, paired-samples T-Test was performed to test the suspicion that the three withdrawing experts (withdrawals) held systematically different views to the eleven participants that remained in the study for both rounds (other participants). The paired data was the average level of agreement in each group with each premise.

Paired Samples T-Test

			statistic	df	p
Withdrawals	Other participants	Student's t	-0.656	9.00	0.264

Note. H_a $\mu_{\text{Measure 1 - Measure 2}} < 0$

Normality Test (Shapiro-Wilk)

			W	p
Withdrawals	-	Other participants	0.881	0.135

Note. A low p-value suggests a violation of the assumption of normality

As the Shapiro-Wilk test showed no violation of the assumption of normal distribution of the differences, the Student's T-test was applied. The non-significant p-value of 0.264 allows for the

rejection of the hypothesis that the withdrawing experts had systematically lower levels of agreement than the other participants.

Descriptives

	N	Mean	Median	SD	SE
Withdrawals	10	76.6	66.6	16.1	5.10
Other participants	10	81.1	86.5	15.8	4.99

While the mean level of agreement across premises was slightly lower for the withdrawals (76.6%) than the other participants (81.1%), this difference was too marginal to dismiss as having occurred by chance.

As such, there is no reason to think that the changes in agreement between rounds were explained by attrition in the sample. Instead, this result is attributed to the improved soundness of the reformulated argument, as well as the learning process unique to Delphi, whereby the opinions of the experts were influenced by exposure to the comments of fellow participants as well as responses and explanations of the researchers.

One participant was particularly influenced by the provided responses, however opposite to the researchers' expectations. This respondent initially agreed with 5/10 premises, but other experts' comments on a particular premise caused him to disagree with another premise he originally agreed with. While this opposed the expectations of the researchers, the main purpose of Delphi was proven effective, as the comments were interacted with, as can be seen in this case.

Overall, the general increase of unconditional agreement among the premises leads to the conclusion, that the soundness of the argument has increased. Through the changes proposed by the participants, the researchers managed to construct a revised argument which reached a higher consensus, thus fulfilling the initial goal. While there is room for improvement in increasing consensus to an even higher level, participants have provided valuable insights to be considered in a potential further adaptation of the argument.

Given that the level of unconditional agreement across all premises reached 45% in the second round, with the level of unconditional agreement with each individual premise ranging from 82% to 100%, it can be said that the expert group as a whole recognizes the truth of all of the premises. As such, the researchers deem the argument to be sound.

4.13 Conclusion on the compatibility of Economic Growth in Austria and the Achievement of the SDGs [1,2]

Through the review of relevant literature and the analysis of empirical data, the importance of sustainable development has been highlighted and is shown to be a topic of great importance. The insights and comments given by the experts contribute to a deeper understanding of the complex interplay between economic growth and the SDGs. While economic growth brings several benefits with it, such as an increased average standard of living and, potentially, reduced poverty, the increased environmental strains and a widening inequality gap are seen as major adverse impacts.

In the first round, the researchers found that 36% of respondents both rated the argument as valid and unconditionally agreed with all premises, making the argument also sound. For these participants, the conclusion of the argument is true. In the second round, the percentage of respondents reporting the argument to be both valid sound increased to 45%.

For the researchers to draw a clear conclusion on the research question, the aggregate levels of agreement are more instructive. With an overwhelming consensus of 91% unconditional agreement among the experts, the argument is deemed valid: if the premises are true, then the conclusion is true. The overall level of unconditional agreement across the premises reached 88% in the second round. Agreement with each individual premise ranged from 82% to 100%. Given the strong support among experts for the truth of all of the premises, the argument is also deemed to be sound.

Hence, on the basis of the exploration of existing literature and the collection of empirical data, the researchers conclude that economic growth in Austria is incompatible with the achievement of the SDGs worldwide. The implications of this finding are explored in the conclusion.

5 CONCLUSION 2

This conclusion summarizes the main findings of the research and then discusses their implications for relevant stakeholders, as well as elucidating the limitations of the study and providing recommendations for future research.

The main objective of this thesis was to assess the relationship between economic growth in Austria and its effects on the achievement of the SDGs worldwide. To do so, the researchers first analyzed the existing literature on this topic, which included a dissection of the framework surrounding the SDGs, as well as various concepts on economic growth and its connection to resource usage, followed by an assessment of the importance of global governance in this specific case. The literature review showed inconsistencies with the SDG framework as a whole, as well as other points of criticism, alluding to the incompatibility of various SDGs. Striving toward infinite economic growth while only having finite resources is a contradiction in itself.

Based on the gathered information, a logical argument consisting of 10 deductive premises was constructed and then further developed through a two-round Delphi process incorporating input from experts representing a range of different economic perspectives. The aim of it was to create a valid and sound argument, which would answer the research question: *To what extent is economic growth in Austria compatible with the worldwide achievement of the SDGs*?

The results section reports that 91% of respondents unconditionally agreed that the final argument was valid. The researchers consider this to be sufficiently established. The level of unconditionally agreement with each of the individual premises ranged from 82% to 100%. As stated in the results & discussion section, a further adaptation of the argument by conducting a third round could lead to an even higher consensus level. Nevertheless, given the strong support among experts for the truth of each of the premises, the researchers also consider the argument to be sound. As the conclusion of a valid and sound argument is necessarily true, the clear answer to the research question is: *Absent changes in domestic consumption and/or regulatory reform, economic growth in Austria implies failure to achieve the SDGs on the global scale*.

Austria requires structural changes in order that its economic growth does not prevent the achievement of the SDGs. The experts also provided their input on the most necessary reforms. How this relates to the specific stakeholder groups will be elaborated in the following section.

5.1 Implications for Relevant Stakeholders 1

The findings of the study carry several implications for various stakeholders on different authority levels, from those with the power to influence the structure of Austria's economy, down to the individual consumer.

According to the experts, the Austrian government needs to implement several regulatory changes in order to achieve sustainable growth as well as work towards achieving the SDGs. The most mentioned regulatory change are various tax reforms. These include CO2 tax, taxing and regulating negative externalities in domestic production, corporate tax as well as those resulting along the supply chain for imports as well as social-ecological taxation. Halim & Rahman (2022) also found a connection between corporate tax and the SDGs. According to them, a higher rate of corporate tax plays a vital role in achieving the goals, especially in emerging economies. Due to the increased income, governments are able to allocate more funds toward sustainable development initiatives and environmental protection.

The second most frequently mentioned regulatory changes that should be implemented by the Austrian government are strict GHG reduction targets or absolute limits. The EU has set itself a limit that they want to reduce the total emission by 55% by 2030 (European Commission, 2023). This is crucial in order to mitigate climate change and also foster innovation towards greener technologies.

This leads us to the third most commonly named measure, being the adaption to renewable energy sources. On the one hand, this is a commonly named measure because it promotes a low-carbon economy. On the other hand, renewable energy sources such as wind, water, and solar increase energy security in times of energy crises, such as it occurred in 2022 such as the one that occurred in 2022 following the war in Ukraine.

Additionally, the Austrian government must provide general incentive programs that prioritize the principles of sustainability. This means that especially companies, which produce long-lasting high-quality products, need to be rewarded. This course would aim at the development rather than excessive growth of a consumer society. The goal must be to improve the quality of products and services so that they last longer instead of producing more.

As highlighted in the study, individuals have the potential to shape the market by making sustainable consumption choices. Referring to an implication for consumers, the experts stressed shifting the consumption habits of the Austrian population. This idea can be traced back to premise 4 which also stressed the importance of a shift in domestic consumption patterns in order to achieve absolute decoupling. Therefore, global institutions and national governments should pay attention to incentivizing sustainable products in order to drive the demand for

them. The experts also mentioned that shifts to a more localized consumption should be incentivized. Furthermore, as many planetary boundaries are already overshot, every individual should make conscious choices in their daily lives including reducing consumption, conserving resources, and supporting sustainable businesses. If the Austrian population switches from fossil fuels to renewable energy sources the environment would be less impacted. This would allow them to increase their consumption at a rate that offsets the reduced impact from consuming environmentally friendly products.

In summary, these effects are primarily aimed at the Austrian government and thus at politicians, and it may therefore be important to question the motivations and priorities of politicians in implementing the legal changes. Some politicians may prioritize short-term electoral gains to maintain their position over environmental concerns and related sustainability measures and policies. This mindset can therefore be traced back to the regulation of standard political terms so that politicians often focus on short-term measures that benefit themselves. Nevertheless, some political leaders and parties do feel committed to sustainability and advocate for the long-term interests of the country and the planet. As the issue of sustainable development gains momentum, this mindset may even resonate with a growing number of voters.

5.2 Limitations & Future Research [1,2]

This section explores the study's limitations and potential for future research arising from this research. While this paper provides valuable insights into the matter studied, it is crucial to identify limitations and potential areas of improvement to expand the knowledge and fill the remaining gaps.

Firstly, this study was limited by time constraints and resource availability. Future research using the Delphi method for this topic should consider engaging a larger sample and conducting further rounds, which might even lead to a deductive argument that allows full consensus. It would also be interesting to look at an even more diversified group of economists to see how their views on the topic might differ.

Secondly, it would be interesting to expand the methodological approach to the topic, which can be addressed using other qualitative methods, such as face-to-face in-depth interviews, which could provide further insights that are interesting for the study. A range of quantitative methods can also be applied, yet these are limited to analysing historical data, which may not provide clear guidance as to what we should expect of an unpredictable future. In addition, a concrete impact studies could be conducted to examine which SDGs are most threatened by

economic growth, in order to identify priorities for sustainable development initiatives and guide policy decisions.

Lastly, this study looked at economic growth in Austria and how that effects the achievement of the SDGs worldwide. Austria can be thought of as representative of developed European countries with a high standard of living and a disproportionately large environmental impact per head of population. It is expected that the same findings would result from the analysis of the research question in other similar countries. Indeed, the experts suggested the argument would be more true for leading industrialized countries. However, it is expected that the results would differ dramatically for other countries at significantly lower levels of development. In fact, the SDGs may not be accomplished (not even the 'real goals'), without economic growth in certain regions, particularly parts of the global south.

6 BIBLIOGRAPHY

Ahmed, N., Marriott, A., Dabi, N., Lowthers, M., Lawson, M., & Mugehera, L. (2022). *Inequality Kills.* Oxford: Oxfam GB .

Alston, P. (2020). *Center for Human Rights & Global Justice*. Retrieved May 2023, from Philip Alston Condemns Failed Global Poverty Eradication Efforts: https://chrgj.org/2020/07/05/philip-alston-condemns-failed-global-poverty-eradication-efforts/

Andreae, M. O. (1995). Climatic effects of changing atmospheric aerosol levels. *World survey of climatology, 16*(6), 347-398.

Andreoni, V., & Miola, A. (2016). *Competitiveness and Sustainable Development Goals.* Luxembourg: JRC Technical Reports.

APlanet. (2022). *The current status of Earth's nine planetary boundaries*. Retrieved May 2023, from https://aplanet.org/resources/the-current-status-of-earths-nine-planetary-boundaries/

Asher, C. (2021). *The nine boundaries humanity must respect to keep the planet habitable*. Retrieved May 2023, from Mongabay: https://news.mongabay.com/2021/03/the-nine-boundaries-humanity-must-respect-to-keep-the-planet-habitable/

Austrian Federal Ministry of Finance. (2023). *Budget & Economic Policy*. Retrieved May 2023, from https://www.bmf.gv.at/en/topics/budget-economic-policy.html#:~:text=Growth%2C%20innovation%20and%20full%20employment,of%20stability%2Doriented%20macroeconomic%20policy.

Bahraini, A. (2021). *Waste for Change: Blog*. Retrieved May 2023, from The Triple Bottom Line of Sustainability in Waste Management: https://waste4change.com/blog/the-triple-bottom-line-of-sustainability-in-waste-management/

Balsvik, J. (2020). *Green growth and decoupling as legitimation strategies.* Retrieved 2023 June, from https://www.diva-portal.org/smash/get/diva2:1443609/FULLTEXT01.pdf

Besnard, P., & Hunter, A. (2001). A logic-based theory of deductive arguments. *Proceedings of the National Conference on Artificial Intelligence, 128*(1-2), 203-235.

Biermann, F., Kanie, N., & Kim, R. E. (2017). Global governance by goal-setting: the novel approach of the UN Sustainable Development Goals. *Environmental Sustainability*, 26-31.

Bina, O., & La Camera, F. (2011). Promise and shortcomings of a green turn in recent policy 698 responses to the "double crisis". *Ecological Economics, 70*, 2308–2316.

BMUV. (2021). *Planetare Belastbarkeitsgrenzen*. Retrieved May 2023, from https://www.bmuv.de/themen/nachhaltigkeit-digitalisierung/nachhaltigkeit/integriertes-umweltprogramm-2030/planetare-belastbarkeitsgrenzen

Bourguignon, F. (2018). *Spreading the Wealth*. Retrieved May 2023, from IMF: https://www.imf.org/en/Publications/fandd/issues/2018/03/bourguignon

Büchs, M., & Koch, M. (2019). Challenges for the degrowth transition: The debate about wellbeing. *Futures, 105*, 155-165.

Business Research Methodology. (2022). *Sampling*. Retrieved May 2023, from Purposive sampling: https://research-methodology.net/sampling-in-primary-data-collection/purposive-sampling/

Campbell, B. M., Hansen, J., & Rioux, J. (2018). Urgent action to combat climate change and its impacts (SDG 13): transforming agriculture and food systems. *Current Opinion in Environmental Sustainability, 34*, 13-20.

Chambers, R. (2015). Retrieved May 2023, from For Those Who Doubted the MDGs, Trillions of Dollars and Tens of Millions of Lives Saved: http://www.healthenvoy.org/for-those-who-doubted-the-mdgs-trillions-of-dollars-and-tens-of-millions-of-lives-saved/

Costanza, R. (2010). *Management in Practice*. (Yale Insights) Retrieved May 2023, from What is ecological economics?: https://insights.som.yale.edu/insights/what-is-ecological-economics

Council of Europe. (2023). *UN Agenda 2030*. Retrieved June 2023, from The Agenda 2030 for Sustainable Development: https://www.coe.int/en/web/programmes/un-2030-agenda#:~:text=The%20UN%202030%20Agenda%20envisages,equality%20and%20non%2Ddiscrimination%E2%80%9D.

Creswell, J. W. (2014). *Research design: qualitative, quantitative, and mixed methods approaches.* Thousand Oaks, CA: SAGE Publications.

Curry, P. (2011). *Ecological ethics: An introduction.* Polity.

d'Arge, R., & Kiichiro, C. (1973). Economic growth and the environment. *The Review of Economic Studies, 40*(1), 61-77.

D'Alisa, G., & Kallis, G. (2020). Degrowth and the State. *Ecological economics, 169*, 106486.

Dalkey, N., & Helmer, O. (1963). An experimental application of the Delphi method to the use of experts. *Management Science, 9*(3), 458-467.

Daly, H. (2015). *Economics for a Full World.* Retrieved May 2023, from https://greattransition.org/images/Daly-Economics-Full-World.pdf

Dhahri, S., & Omri, A. (2020). Are international capital flows really matter for achieving SDGs 1 and 2: ending poverty and hunger? *Review of World Economics*, 731–767.

Dunning, C., & Kalow, J. (2016). *Center for Global Development*. Retrieved May 2023, from SDG Indicators: Serious Gaps Abound in Data Availability: https://www.cgdev.org/blog/sdg-indicators-serious-gaps-abound-data-availability

Duro, J. A., & Teixidó-Figueras, J. (2013). Ecological footprint inequality across countries: The role of environment intensity, income and interaction effects. *Ecological Economics, 93*, 34-41.

Easterly, W. (2015). The Trouble with the Sustainable Development Goals. *Current History*, 322-324.

Eisenmenger, N., Pichler, M., Krenmayr, N., Noll, D., Plank, B., Schalmann, E., . . . Gingrich, S. (2020). The Sustainable Development Goals prioritize economic growth over sustainable resource use: a critical reflection on the SDGs from a socio-ecological perspective. *Sustainability Science, 15(4)*, 1101–1110.

Elder, M., Bengtsson, M., & Akenji, L. (2016). An Optimistic Analysis of the Means of Implementation for Sustainable Development Goals: Thinking about Goals as Means. *Sustainability*.

EPA. (2022). *Environmental Economics*. Retrieved May 2023, from https://www.epa.gov/environmental-economics#:~:text=Within%20this%20discipline%2C%20environmental%20and,resources%20are%20developed%20and%20managed.

Erdman, J. (2018). *We produce enough food to feed 10 billion people. So why does hunger still exist?* Retrieved June 2023, from https://medium.com/@jeremyerdman/we-produce-enough-food-to-feed-10-billion-people-so-why-does-hunger-still-exist-8086d2657539#:~:text=The%20world's%20farmers%20produce%20enough,this%20excess%2C%20hunger%20still%20exists.

European Commission. (2021). *Economy and Finance*. Retrieved May 2023, from European Growth Model: https://economy-finance.ec.europa.eu/economic-and-fiscal-governance/european-growth-model_en

European Commission. (2023). *2030 Climate Target Plan*. Retrieved June 2023, from https://climate.ec.europa.eu/eu-action/european-green-deal/2030-climate-target-plan_en#:~:text=With%20the%202030%20Climate%20Target,40%25EN%E2%80%A2%E2%80%A2%E2%80%A2.

European Union. (2020). *Decoupling economic growth from environmental harm.* Brussels: European Parliament.

Feeny, S. (2020). Transitioning from the MDGs to the SDGs: Lessons Learnt? In S. A. Churchill, *Moving from the Millennium to the Sustainable Development Goals. Lessons and Recommendations* (pp. 343-353). Singapore: Palgrave Macmillan.

Ferreira, F. H. (2021). Inequality in the time of COVID-19. *International Monetary Fund, Finance & Development*, 20-23. Retrieved May 2023, from Inequality In The Time Of COVID-19: https://www.imf.org/external/pubs/ft/fandd/2021/06/inequality-and-covid-19-ferreira.htm

Fink-Hafner, D., Dagen, T., Doušak, M., Novak, M., & Hafner-Fink, M. (2019). DELPHI METHOD Strengths and weaknesses. *Advances in Methodology and Statistics, 16*(2).

Fransen, B. (2021). *What Are Planetary Boundaries, And Why Are They Significant?* Retrieved May 2023, from https://www.ecomatcher.com/what-are-planetary-boundaries-and-why-are-they-significant/

Frey, D. F. (2017). Economic growth, full employment and decent work: the means and ends in SDG 8. *The International Journal of Human Rights*.

Gendre, I. (2022). *All you Need to Know about the 9 Planetary Boundaries*. Retrieved May 2023, from greenly.resources: https://greenly.earth/en-us/blog/ecology-news/all-you-need-to-know-about-the-9-planetary-boundaries

Gill, S. L. (2020). Qualitative Sampling Methods. *Journal of Human Lactation*, 1-3.

Gingrich, S., Kušková, P., & Steinberg, J. K. (2011). Long-term changes in CO2 emissions in Austria and Czechoslovakia—Identifying the drivers of environmental pressures. *Energy Policy, 39*(2), 535-543.

Global Footprint Network. (2023). *Ecological Footprint*. Retrieved May 2023, from https://www.footprintnetwork.org/our-work/ecological-footprint/

Government UK. (2023). *Prime Minister outlines his five key priorities for 2023*. Retrieved May 2023, from https://www.gov.uk/government/news/prime-minister-outlines-his-five-key-priorities-for-2023

Halim, A., & Rahman, M. (2022). The effect of taxation on sustainable development goals: evidence from emerging countries. *Heliyon, 8*(12), e12279.

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of advanced nursing, 23*(4), 1008-1015.

Hennicke, P., & Khosla, A. (2014). *Decoupling economic growth from resource consumption.* Berlin: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Higgs, R. (1994). *Nineteen Neglected Consequences of Income Redistribution*. Retrieved May 2023, from Independent Institute: https://www.independent.org/publications/article.asp?id=1155

Imran, S., Alam, K., & Beaumont, N. (2011). Reinterpreting the Definition of Sustainable Development for a More Ecocentric Reorientation. *Sustainable Development*.

International Institute for Sustainable Development. (2023). *About: Sustainable Development*. Retrieved from Sustainable Development: https://www.iisd.org/mission-and-goals/sustainable-development

Kallis, G., & March, H. (2015). Imaginaries of hope: the utopianism of degrowth. *Annals of the association of American geographers, 105*(2), 360-368.

Korpilo, S. (2014). *Integrating the concept of urban metabolism into planning of sustainable cities: Analysis of the Eco² Cities Initiative.*

Krauss, J. E. (2022). Unpacking SDG 15, its targets and indicators: tracing ideas of conservation. *Globalizations*, 1179-1194.

Krautwig, T., & Krieger, A. (2022). *How we observe planetary boundaries*. Retrieved May 2023, from Helmholtz Climate Initiative: https://www.helmholtz-klima.de/en/planetary-boundaries

Kreinin, H., & Aigner, E. (2021). From “Decent work and economic growth” to “Sustainable work and economic degrowth”: a new framework for SDG 8. *Empirica*, 281-311.

Kubiszewski, I., Costanza, R., Franco, C., Lawn, P., Talberth, J., Jackson, T., & Aylmer, C. (2013). Beyond GDP: Measuring and Achieving Global Genuine Progress. *Ecological Economics, 93*, 57-68.

Labonté, R., Schrecker, T., Packer, C., & Runnels, V. (2009). *Globalization and Health Pathways, Evidence and Policy.* New York: Routledge.

Lange, S., & Berner, A. (2022). The growth rebound effect: A theoretical–empirical investigation into the relation between rebound effects and economic growth. *Journal of Cleaner Production, 371*, 133158.

Lenzen, M., & Munksgaard, J. (2002). Energy and CO2 life-cycle analyses of wind turbines — review and applications. *Renew Energy, 26*, 339–62.

Linstone, H. A., & Turoff, M. (Eds.). (2002). *The delphi method.* Boston, Massachusetts: Addison-Wesley.

LSE. (2023). *Inequality: Winners and Losers*. Retrieved June 2023, from https://cep.lse.ac.uk/_new/OUR-WORK/Trade/inequality/

Mamedov, O., Movchan, I., Ishchenko-Padukova, O., & Grabowska, M. (2016). Traditional Economy: Innovations, Efficiency and Globalization. *Economics and Sociology, 9*(2), 61-72.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *The Quarterly Journal of Economics, 107*(2), 407-437.

Mariani, L., Trivellato, B., Martini, M., & Marafioti, E. (2022). Achieving Sustainable Development Goals Through Collaborative Innovation: Evidence from Four European Initiatives. *Journal of Business Ethics, 180*, 1075–1095.

Maslow, A. (1943). A Theory of Human Motivation. *Psychological Review*, 370-396.

McArthur, J. W., & Rasmussen, K. (2018). Change of pace: Accelerations and advances during the Millennium Development Goal era. *World Development*, 132-143.

McCollum, D. L., Echeverri, L. G., Busch, S., Pachauri, S., Parkinson, S., Rogelj, J., . . . Riahi, K. (2018). Connecting the sustainable development goals by their energy inter-linkages. *Environmental Research Letters*.

McKinsey & Company. (2022). *What is economic growth?* Retrieved May 2023, from https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-economic-growth

McMahon, G. F., & Mrozek, J. R. (1997). Economics, entropy and sustainability. *Hydrological Sciences Journal, 42*(4), 501-512.

Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. (1972). *The limits to growth : a report for the Club of Rome's project on the predicament of mankind.* New York: Universe Books.

Menton, M., Larrea, C., Latorre, S., Martinez-Alier , J., Peck, M., Temper, L., & Mariana, W. (2020). Environmental justice and the SDGs: from synergies to gaps and contradictions. *Sustainability Science*, 1621 - 1636.

MIT. (2014). *Energy and Climate Outlook.* Cambridge, MA: Massachusetts Institute of Technology.

Moezzi, M. (2023). Decoupling energy efficiency from energy consumption. *Energy & Environment, 11*(5), 521–37.

Moir, W. H., & Mowrer, H. T. (1995). Unsustainability. *Forest Ecology and Management, 73*(1-3), 239-248.

Molot, M. A., & Laux, J. K. (1979). The Politics of Nationalization. *Canadian Journal of Political Science, 12*(2), 227-258.

Moreau, V., Amarante De Oliveira Neves, C., & Vuille, F. (2019). Is decoupling a red herring? The role of structural effects and energy policies in Europe. *Energy Policy, 128*, 243-252.

Neck, R. (2022). Neoclassical Economics: Origins, Evolution, and Critique. *The Palgrave Handbook of the History of Human Sciences, 139*, 1-40.

Odeh, L. E. (2010). A comparative analysis of global north and global south economies. *Journal of Sustainable Development in Africa, 12*, 338-348.

OECD. (2001). *OECD Environmental Strategy for the First Decade of the 21st Century.* Paris: OECD.

Okoli, C., & Pawlowski, S. D. (2004). The Delphi method as a research tool: an example, design considerations and applications. *Information & Management, 42*(1), 15-29.

Parrique, T., Barth, J., Briens, F., Kerschner, C., Alejo, K.-P., Anna, K., & Spangenberg Joachim, H. (2019). *Decoupling Debunked: Evidence and arguments against green growth as a sole strategy for sustainability.* European Environmental Bureau.

Pickett, K., & Wilkinson, R. (2010). The spirit level. Penguin Books.

Porter, M. E. (1990). *Harvard Business Review*. Retrieved June 2023, from The Competitive Advantage of Nations: https://hbr.org/1990/03/the-competitive-advantage-of-nations

Porter, M., & Van der Linde, C. (1995). Green and Competitive: Ending the Stalemate. *Harvard Business Review, 73*, 120–134.

Pradhan, P., Costa, L., Rybski, D., Lucht, W., & Kropp, J. P. (2017). A Systematic Study of Sustainable Development Goal (SDG) Interactions. *Earth's Future*, 1169 – 1179.

Purvis, B., Mao, Y., & Robinson, D. (2019). Three pillars of sustainability: in search of conceptual origins. *Sustainability Science*, 681–695.

Rasch, B., Friese, M., Hofmann, W., & Naumann, E. (2006). *Quantitative methoden.* Berlin, Germany: Springer.

Rockström, J., Goluke, U., Stoknes, P. E., & Collste, D. (2018). *Transformation is feasible: How to achieve the sustainable development goals within planetary boundaries.* Stockholm: Club of Rome from Stockholm Resilience Centre & BI Norwegian Business School.c

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F., Lambin, E. F., . . . Rodhe, H. (2009). A safe operating space for humanity. *Nature, 461*, 472–475.

Running, S. W. (2012). A measurable planetary boundary for the biosphere. *science, 337*(6101), 1458-1459.

Sachs, J. D. (2012). From millennium development goals to sustainable development goals. *The Lancet, 379*, 2206–2211.

Sadoff, C. W., Borgomeo, E., & Stefan, U. (2020). Rethinking water for SDG 6. *Nature Sustainability*, 346–347.

Samuelson, P. A., & Nordhaus, W. D. (2010). *Economics.* Sydney: McGraw-Hill Irwin.

Sandberg, M., Klockars, K. E., & Wilén, K. (2019). Green growth or degrowth? : Assessing the normative justifications for environmental sustainability and economic growth through critical social theory. *Journal of Cleaner Production, 206*, 133-141.

Sanyé-Mengual, E., Secchi, M., Corrado, S., & Beylot, A. (2019). Assessing the decoupling of economic growth from environmental impacts in the European Union: A consumption-based approach. *Journal of Cleaner Production, 236*.

Schneider, F., Kallis, G., & Martinez-Alier, J. (2010). Crisis or opportunity? Economic degrowth for social equity and ecological sustainability. Introduction to this special issue. *Journal of cleaner production, 18*(6), 511-518.

SDG Fund. (2023). *Who we are: From MDGs to SDGs*. Retrieved May 2023, from From MDGs to SDGs: https://www.sdgfund.org/mdgs-sdgs

Shorten, A., & Smith, J. (2017). Mixed methods research: expanding the evidence base. *Evidence-Based Nursing, 20*, 74-75.

Silvestre, B. S., & Tîrca, D. M. (2018). Innovations for sustainable development: Moving toward a sustainable future. *Journal of Cleaner Production*, 325-332.

Songer, K. (2019). *Conservation Biology: Concept Notebook*. Retrieved June 2023, from Full World: https://blogs.stlawu.edu/conservationbiologyconceptnotebook/?p=180

Statista. (2022). *Statista Research Department*. Retrieved May 2023, from Education & Science: https://www.statista.com/statistics/1212278/education-gender-gap-worldwide-by-level/

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., . . . Persson, L. M. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science, 347*(6223), 1259855.

Stiglitz, J. E. (2019). *People, Power, and Profits: Progressive Capitalism for an Age of Discontent.* New York: W. W. Norton Company.

Stockholm Resilience Centre. (2016). *Contributions to Agenda 2030 – How Stockholm Resilience Centre (SRC) contributed to the 2016 Swedish Agenda 2030; HLPF report.* Stockholm: Stockholm Resilience Centre.

Stuart, D., Petersen, B., & Gunderson, R. (2021). Shared pretenses for collective inaction: the economic growth imperative, COVID-19, and climate change. *Globalizations, 19*(3), 408-425.

Sturesson, A., Weitz, N., & Persson, Å. (2018). *SDG 14: Life Below Water.* Stockholm: Stockholm Environment Institute.

Summers, J. K., Smith, L. M., & Linthrust, R. A. (2012). A Review of the Elements of Human Well-Being with an Emphasis on the Contribution of Ecosystem Services. *Ambio*, 327–340.

Takeuchi, K. (2022). What is the "Planetary Boundaries" concept: Indicating the limits of the global environment. (Y. Kondo, Interviewer)

The Overpopulation Project. (2019). Retrieved May 2023, from The Missing SDG – what should be added?: https://overpopulation-project.com/the-missing-sdg-what-should-be-added/

The World Bank. (2023). *Urban Development*. Retrieved May 2023, from Understanding Poverty: https://www.worldbank.org/en/topic/urbandevelopment/overview#:~:text=Today%2C%20some%2056%25%20of%20the,people%20will%20live%20in%20cities.

The World Bank. (2023). *GDP growth (annual %) - Austria*. Retrieved May 2023, from https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2021&locations=AT&start=1970&view=chart

UN. (2023). *Teaching Guide And Resources: Sustainable Development Goals*. Retrieved May 2023, from https://www.un.org/en/sustainable-development-goals

UN Environment Programme. (2020, July 13). *News, Stories, Speeches*. Retrieved from How to feed 10 billion people: https://www.unep.org/news-and-stories/story/how-feed-10-billion-people

UNEP. (2011). *Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel.* Geneva: UNEP.

UNESCO. (2023). *Articles: Imminent risk of a global water crisis, warns the UN World Water Development Report 2023*. Retrieved May 2023, from Imminent risk of a global water crisis, warns the UN World Water Development Report 2023: https://www.unesco.org/en/articles/imminent-risk-global-water-crisis-warns-un-world-water-development-report-2023#:~:text=Globally%2C%202%20billion%20people%20(26,Water%20Conference%20in%20New%20York.

UNFCCC. (2015). *Paris Agreement.* Retrieved May 2023, from United Nations Climate Change: https://unfccc.int/sites/default/files/english_paris_agreement.pdf

United Nations, Committee for Development Policy. (2014). *Global Governance and Global Rules for Development in the Post-2015 Era.* United Nations Publication.

United Nations. (2015a). *Transforming Our World: The 2030 Agenda For Sustainable Development.* United Nations.

United Nations. (2015b). *SDG Knowledge: 2030 Agenda.* Retrieved May 2023, from Transforming our world: the 2030 Agenda for Sustainable Development: https://sdgs.un.org/2030agenda

United Nations. (2022a). *Press Release, Secretary-General*. Retrieved May 2023, from World Moving Backwards on Sustainable Development Goals, Secretary-General Tells Economic and Social Council , Deploring 'Fundamental Lack of Solidarity': https://press.un.org/en/2022/sgsm21196.doc.htm

United Nations. (2022b). *The Sustainable Development Goals Report.* New York: United Nations Publications.

United Nations. (2022). *Progress on The Sustainable Development Goals: The Gender Snapshot 2022.* UN Women and United Nations Department of Economic and Social Affairs. Retrieved May 2023, from https://news.un.org/en/story/2022/09/1126171

United Nations. (2023a). *Conferences: Stockholm 1972*. Retrieved May 2023, from United Nations Conference on the Human Environment, 5-16 June 1972, Stockholm: https://www.un.org/en/conferences/environment/stockholm1972

United Nations. (2023b). *Statistics Division*. Retrieved May 2023, from SDG Indicators: Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development: https://unstats.un.org/sdgs/indicators/indicators-list/

United Nations. (2023c). *Goal 6, Ensure availability and sustainable management of water and sanitation for all*. Retrieved May 2023, from Goal 6: https://sdgs.un.org/goals/goal6

United Nations. (2023d). *Goal 13, Take urgent action to combat climate change and its impacts*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal13

United Nations. (2023e). *Goal 14, Life Below Water*. Retrieved May 2023, from Conserve and sustainably use the oceans, seas and marine resources for sustainable development: https://sdgs.un.org/goals/goal14

United Nations. (2023f). *Goal 15, Life on Land*. Retrieved May 2023, from Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss: https://sdgs.un.org/goals/goal15

United Nations. (2023g). *Goal 1, End poverty in all its forms everywhere*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal1

United Nations. (2023h). *Goal 2, End hunger, achieve food security and improved nutrition and promote sustainable agriculture*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal2

United Nations. (2023i). *Goal 3, Ensure healthy lives and promote well-being for all at all ages*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal3

United Nations. (2023j). *Goal 4, Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal4

United Nations. (2023l). *Goal 7, Ensure access to affordable, reliable, sustainable and modern energy for all*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal7

United Nations. (2023m). *Goal 11, Make cities and human settlements inclusive, safe, resilient and sustainable*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal11

United Nations. (2023n). *Goal 16, Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal16

United Nations. (2023o). *Goal 8, Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal8

United Nations. (2023p). *Goal 9, Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal9

United Nations. (2023q). *Goal 10, Reduce inequality within and among countries*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal10

United Nations. (2023r). *Goal 12, Ensure sustainable consumption and production patterns*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal12

United Nations. (2023s). *Goal 17, Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals/goal17

United Nations. (2023t). *The 17 Goals*. Retrieved May 2023, from Goals: https://sdgs.un.org/goals

U.S. Departement of the Treasury. (2022). *Treasury Strategic Plan 2022–2026.* United States Department of the Treasury. Retrieved May 2023, from https://home.treasury.gov/about/budget-financial-reporting-planning-and-performance/strategic-plan/goals-and-objectives#:~:text=Goals%20and%20Objectives-,GOAL%201%3A%20PROMOTE%20EQUITABLE%20ECONOMIC%20GROWTH%20AND%20RECOVERY,economic%20resiliency%20for%20

Vadén, T., Lähde, V., Majav, A., Järvensivu, P., Toivanen, T., Hakala, E., & Eronen, J. T. (2020). Decoupling for ecological sustainability: A categorisation and review of research literatu. *Environ Sci Policy, 112*, 236–244.

Van den Bergh, J. C. (2011). Environment versus growth—A criticism of "degrowth" and a plea for "a-growth". *Ecological economics, 70*(5), 881-890.

Velders, G. J., Andersen, S. O., Daniel, J. S., Fahey, D. W., & McFarland, M. (2007). The importance of the Montreal Protocol in protecting climate. *Proceedings of the National Academy of Sciences, 104*(12), 4814-4819.

Vikramaditya, V. (2022). *The Limits to Growth?* Retrieved May 2023, from https://www.econlib.org/the-limits-to-growth/

Vishnevsky, T., & Beanlands, H. (2004). Qualitative Research. *Nephrology Nursing Journal, 31*(2), 234-8.

Wackernagel, M., Schulz, N. B., Deumling, D., Linares, A. C., Jenkins, M., Kapos, V., . . . Randers, J. (2002). Tracking the ecological overshoot of the human economy. *Proceedings of the national Academy of Sciences, 99*(14), 9266-9271.

Ward, J. D., Sutton, P. C., Werner, A. D., Costanza, R., Mohr, S. H., & Simmons, C. T. (2016, October 14). Is Decoupling GDP Growth from Environmental Impact Possible? *Plos One*, 1-14.

WCED. (1987). *Our common future: The Brundtland report.* Oxford: Oxford University Press.

WEF. (2022). *Degrowth – what's behind the economic theory and why does it matter right now?* Retrieved May 2023, from Economic Progess: https://www.weforum.org/agenda/2022/06/what-is-degrowth-economics-climate-change/

Whitehead, M. (2013). Degrowth or regrowth? *Environmental Values, 22*(2), 141-145.

Wijkman, A., & Rockström, J. (2012). *Bankrupting Nature: Denying our planetary boundaries.* London: Routledge.

Windsor, D. (2019). Economic Nationalism and Corporate Social Responsibility. In *International Firms' Economic Nationalism and Trade Policies in the Globalization Era* (pp. 217-243). IGI Global.

World Bank. (2022). *Understanding Poverty*. Retrieved May 2023, from Poverty: https://www.worldbank.org/en/topic/poverty/overview

World Economics. (2023). *World Economics Research*. Retrieved May 2023, from Austria: https://www.worldeconomics.com/Share-of-Global-GDP/Austria.aspx#:~:text=Austria%27s%20share%20of%20Global%20GDP%20in%202022%20was%200.3%25%20once,year%20and%20informal%20economy%20size.

World Health Organization. (2021). Retrieved May 2023, from 500 actions to take, including 82 measures to reduce both outdoor and indoor air pollution that can help prevent 7 million premature deaths worldwide: https://www.who.int/multi-media/details/500-actions-to-take-including-82-measures-to-reduce-both-outdoor-and-indoor-air-pollution-that-can-help-prevent-7-million-prematuer-deaths-worldwide

World Health Organization. (2023). *News*. Retrieved May 2023, from Close to one billion people globally are served by health-care facilities with no electricity access or with unreliable electricity: https://www.who.int/news/item/14-01-2023-close-to-one-billion-people-globally-are-served-by-health-care-facilities-with-no-electricity-access-or-with-unreliable-electricity

World Health Organization. (2023a). *WHO Coronavirus (COVID-19) Dashboard*. Retrieved May 2023, from Overview: https://covid19.who.int/

World Health Organization. (2023b). *Health Topics*. Retrieved from Universal health coverage: https://www.who.int/health-topics/universal-health-coverage#tab=tab_3

World Population Review. (2023). *Ecological Footprint by Country 2023*. Retrieved May 2023, from https://worldpopulationreview.com/country-rankings/ecological-footprint-by-country

Worldometer. (2023). *Current World Population*. Retrieved May 2023, from https://www.worldometers.info/world-population/#:~:text=World%20Population%20Clock%3A%208%20Billion,(LIVE%2C%202023)%20%2D%20Worldometer

Wu, Z. (2021). Chapter 6 The Impact of Global Governance on National Governance. In *Chinese Perspectives on Global Governance and China* (pp. 94–103). Leiden: Brill.

Appendix 1: Full Argument Round 1

Instructions by the researchers:

Dear respondent,

thank you for taking the time to participate in this survey which is part of the MSc thesis research being conducted jointly by Nicole Taviv, BA, (nicole.taviv@gmail.com) and Julia Pulai, BSc, (julia.pulai@gmail.com) under the supervision of David Leonard, PhD, at Modul University Vienna. Please use the email addresses to contact us with any questions or comments.

You are now part of a Delphi process that aims to reach consensus on the soundness of a deductive argument, which will develop based on the initial draft presented herein. We anticipate that no more than 3 rounds will be necessary; you are welcome to withdraw at any time, but we are confident that your interest in the responses of other experts will keep you engaged throughout the process.

Your responses will remain known only to the researchers and will be anonymized before they are circulated. We will ask you to provide a description of your professional qualifications and/or role for inclusion in the published thesis, but this will not be associated with your individual responses or any identifying information. By continuing you consent to having your data collected by the researchers and stored for the purpose of this thesis.

The survey consists of the following parts:

1. A single AGREE/DISAGREE screening question used to group you with like-minded respondents in the respective Delphi group.

2. The draft argument presented in full so that you can reflect on the *validity* of the argument.

3. The same argument presented premise by premise so you can comment on the truth of each premise.

4. Your opportunity to provide any additional comments or concerns.

The argument in full:

Screening Question: *"Economic growth is an appropriate policy objective for Austria.*

1. The world as a whole must reduce its negative environmental impacts if we are to achieve the environmental SDGs (13, 14, 15) and maintain a safe living space for humanity.

2. Global economic growth – defined as the year-on-year increase in real global GDP – implies an increase in negative environmental impacts, unless it is accompanied by absolute decoupling at the global scale.

3. In the short term, a given region (e.g., Austria) can achieve absolute decoupling through ONLY two approaches:

a) shifting the sectoral composition of the region's economy towards industries with lesser impacts or;

b) technological advances which increase technological efficiency

4. Approach a): Shifting a given economy's sectoral composition only amounts to absolute decoupling at the global scale if it is accompanied by a corresponding shift in domestic consumption patterns (to avoid the outsourcing of higher-impact production to other regions)

5. Approach b): Absolute decoupling through technological advance is theoretically possible in the short term, yet decoupling that meets Parrique et. al.'s (2019) three criteria of being permanent, sufficiently fast, and global has never been observed.

6. Regulatory changes would be necessary to realize absolute decoupling through technological advance while avoiding the rebound effect.

7. Absent changes in domestic consumption (see 4) and/or regulatory reform (see 6), economic growth in Austria implies increasing global environmental impacts.

8. The world could achieve the environmental SDGs, even as Austria grows its economy and its environmental impacts, so long as this regional growth is accompanied by a contraction of economic activity and consequent environmental impacts in other regions.

9. Economic growth in Austria and economic contraction in other regions (most of which are poorer than Austria) implies a widening of global inequalities and consequent failure to achieve SDG 10, unless accompanied by massive (sufficient, appropriate, effective) redistribution from the global north to the global south.

10. The dependencies created through such a redistribution arrangement, however, would fail various targets of SDGs 9, 10, & 11.

Conclusion 1:

In the **short run**, absent changes in domestic consumption (see 4) and/or regulatory reform (see 6), economic growth in Austria implies failure to achieve the SDGs on the global scale.

Conclusion 2:

In the **longer term** —as efficiency gains approach limits established by the laws of thermodynamics and once further shifts in consumption patterns are limited by biological imperatives— any economic growth in Austria implies failure to achieve the SDGs on the global scale.

Appendix 2: Full Argument Round 2

Instructions by the researchers:

Dear respondent,

thank you for taking the time to participate in the second round of this Delphi process which is part of the MSc thesis research being conducted jointly by Nicole Taviv, BA, (nicole.taviv@gmail.com) and Julia Pulai, BSc, (julia.pulai@gmail.com) under the supervision of David Leonard, PhD, at Modul University Vienna. Please use the email addresses to contact us with any questions or comments.

You are now part of the second and final round of the Delphi process that aims to reach consensus on the soundness of the deductive argument. You are welcome to withdraw at any time.

Your responses will remain known only to the researchers. By continuing you consent to having your data collected by the researchers and stored for the purpose of this thesis.

The second round consists of the following parts:

1. The revised argument is presented in full so that you can reflect on the *validity* of the argument.

2. The same argument is presented premise by premise, so you can comment on the truth of each premise. This will be presented as follows: old premise, participant's responses & revised premise

3. Your opportunity to provide any additional comments or concerns.

The argument in full:

1. The world as a whole must reduce its negative environmental impacts if we are to achieve the environmental SDGs (13, 14, 15) and maintain a safe living space for humanity.

2. Global economic growth – defined as the year-on-year increase in REAL global GDP – implies an increase in negative environmental impacts, unless it is accompanied by absolute decoupling at the global scale.

3. A given region (e.g., Austria) can achieve absolute decoupling through ONLY two approaches: a) shifting the sectoral composition of the region’s economy towards industries with lesser impacts OR b) technological advances which increase technological efficiency.

4. Approach a): Shifting a given economy's sectoral composition only amounts to absolute decoupling at the global scale if it is accompanied by a corresponding shift in domestic consumption patterns (to avoid the outsourcing of higher-impact production to other regions, which typically have lower levels of regulation and lower environmental standards).

5. Approach b): Absolute decoupling through technological advance is theoretically possible in the short term, yet decoupling that meets Parrique et. al.'s (2019) three criteria of being permanent, sufficiently fast, and global has never been observed on an aggregate level.

6. Regulatory changes would be necessary to realize absolute decoupling through technological advance while minimizing rebound effects.

7. Absent changes in domestic consumption (see 4) and/or regulatory reform (see 6), economic growth in Austria, ceteris paribus implies increasing global environmental impacts.

8. The world could achieve the environmental SDGs, even as Austria grows its economy and its environmental impacts, so long as this regional growth is accompanied by a contraction of environmental impacts in other regions, which may restrict their economic growth rates.

9. Faster economic growth in Austria than in other regions (most of which are poorer than Austria) implies a widening of global inequalities and consequent failure to achieve SDG 10, unless accompanied by massive (sufficient, appropriate, effective) redistribution from the global north to the global south.

10. The dependencies created through such a redistribution arrangement, however, would fail various targets of SDGs 9, 10, & 11.

Conclusion: Absent changes in domestic consumption (see 4) and/or regulatory reform (see 6), economic growth in Austria implies failure to achieve the SDGs on the global scale.