The Role of Artificial Intelligence in the EU's Green Growth Discourse: Sustainability Notion or Utopia?

A Critical Discourse Analysis

Bachelor Thesis

Laura Empl
s2011751
Public Governance across Borders

3rd July 2019

1st Supervisor: Dr. Ringo Ossewaarde
2nd Supervisor: Dr. Minna van Gerven-Haanpää
University of Twente, Enschede (NL)
Westfälische Wilhelms-Universität, Münster (D)

Word Count: 15140

Abstract

The overall aim of this research is to answer the main research question: *In what ways does the EU envision the prospects of Artificial Intelligence in its green growth discourse?* This is done by means of a critical discourse analysis. The green growth discourse generated and circulated by the EU and relevant stakeholders with a push for innovation leaves space for the problematic of being technological solutionist and digital utopian. Therefore, this critical discourse analysis aims at uncovering the myths behind the leading concepts presented as green growth, technological solutionism and digital utopianism. To do so, the embeddedness of AI in this discourse is investigated in terms of the expectations attached to it, how it is supposed to function and what are the future scenarios that are envisioned to be achieved by AI.

Index

List of Abbreviations

AI	Artificial Intelligence
CDA	Critical Discourse Analysis
CEPS	Centre for European Policy Studies
EC	European Commission
EPSC	European Political Strategy Centre
EU	European Union
OECD	Organization for Economic Co-operation and Development
SET	Strategic Energy Technology Plan

1. Introduction

As an attempt to resolve the most acute challenges of the 21st Century, these being sustainability, technology and growth the EU alongside several stakeholders engages in a green growth discourse. Consumption behavior and resource depletion have come to the point where current economic growth and resource utilization can no longer sustain. Green growth tries to simultaneously accomplish economic growth and environmental sustainability. It should actuate investments and innovation that can foster the achievement of initiating both economic growth opportunities and sustainable development (Song et al., 2019). Accordingly, there has been a push especially by the European Union for new technologies and innovations. In 2018, a coordinated plan on 'Artificial Intelligence (AI) made in Europe' was presented by the European Commission (EC) promising to develop secure and ethical AI while benefitting from the technology to the fullest. In the sense of the sustainability crisis, the EU envisions AI at least partly as a solution. In several objectives and policy goals of the EU, AI can be found as the technology behind smart grids. These show one way in which AI can be applied to the sustainable energy transition such as improving the storage of and demand for renewable energy through distributed energy grids while creating market incentives by means of dynamic pricing and trading (Herweijer, 2018). Just as with green growth, AI and its potential areas of use are left very vaguely in research as well as in practice.

Subsequently to the financial crisis in 2009, the political discourse around green growth emerged and was circulated by the EU and fundamental stakeholders. The transition from unsustainable to sustainable development seems to be marked by the notion of 'rearticulation' which enables policy-makers to reassemble concepts of progress and innovation without directly conflicting with growth (Ferguson, 2015).

In the green growth discourse, it is predicted that technological innovation will revolutionize the decarbonization of the economy. The situation of crisis is simplified in terms of problems and solutions and further composed to create conditions that favor technological innovation for the sake of environmental sustainability and ensure economic growth as in win-win results. The green growth discourse in itself is highly paradoxical as growth that is environmentally sustainable and socially inclusive without making compromises of any kind does not seem feasible. Nevertheless, as a solution technological innovation should be embraced as an enabler of these high ambitions.

In addition, the green growth discourse is coined by technological solutionism. This concept is a bias in itself as despite the wasteful nature of technological innovations, they are displayed as the answer to unsustainability (Kuntsman & Rattle, 2019). The technocratic approach to crises has furthered discourses of technological solutionism in which disruptive and innovative alterations will have favorable outcomes in terms of technological, social and economic revolutions (Taffel, 2018). The habit of directing financial, intellectual and social capital towards the development of ICTs, in order to solve problems which have not been defined as such yet is typical for solutionism. It generally addresses a problem by grasping the solution before having considered all uncertainties. Especially in politics, facets of human life are constructed as problems which in their nature are not at all problematic (Tonkinwise, 2014).
The green growth discourse is further prone to be digital utopian. The future-oriented vision of the goals set in the green growth discourse manifests the features of a utopian goal which entails a friction between the visualization and attainment of the goal. Its momentary nature underlines the wish for achieving the unexplained by means of what is hidden in the familiar (Bait et al., 2016). Digital utopias avoid permanent concepts of the future and seek a discourse of potentiality. Enormous expectations are attached to new technologies for having the capability of improving human life in general (Dickel & Schrape, 2017). The approaches of utopia and dystopia presume that ICTs have become indispensable, in other words they will become the standard in either a beneficial or unfavorable sense (Russo, 2018).

The character of the green discourse has been analyzed in previous literature. Building on this, the novelty of AI as embedded in the green growth discourse is emphasized in this thesis. Even though the use of AI, also with regard to the utilization of the exact wording is quite a new phenomenon, it comes with a vast belief attached to it. Its potential is forced to be embraced, despite the lack of knowledge on how this potential should be used and problems it is envisioned to solve. Its function is enlarged to a global extent, with the capability to resolve crises of all kinds. Nevertheless, the reformulation of solutions to economic, environmental and social issues in terms of AI is highly mythical which stimulates the blurring of reality. By adding the subject of AI to the characteristics which have already been investigated in terms of the green growth discourse, new answers will be provided. The extent to which the green growth discourse can be illustrated as solutionist and utopian will be specified. The research gap entails what can really be expected from AI as a universal solution. The issues at stake are highly technocratized, while the real problems are of a political kind, raising the impression of policy-makers hiding behind technology while a politicization of the problems is needed for the EU to live up to its standards.

Since the sustainability crisis is such an acute issue, the investigation of solutions proposed in order to counter it especially by policy-makers has a great societal relevance. The crisis does not only entail environmental degradation but also issues of economic and social kind. Thus, existing answers have to be investigated and evaluated. Moreover, a far-reaching approach towards its resolving has to be developed not least by means of extensive research.
Having explored the scientific gap regarding the EU's green growth discourse and the role of AI in this matter, the following main research question was developed:

In what ways does the European Union envision the prospects of Artificial Intelligence in its green growth discourse?

To answer the main research question and to guide the research, three sub questions have been developed. The first sub question (SQ1) investigates theoretical expectations: *How do technological solutionism and digital utopianism expect the EU's green growth discourse to develop?* In order to attain understanding of the current state of the art of the research that has been accomplished on the green growth discourse, it is important to depict the expectations that emerge from it. Subsequently, it can be investigated to what extent the expectations have been met or contradicted until the present day. Furthermore, an outlook of how the green growth discourse will develop over time can be derived from these expectations as well. The second sub question (SQ2) concerns the relevance of AI in the EU's green growth discourse: *In what ways is AI crucial for the evolution of the EU's green growth discourse?* The use of AI is highly interesting with regard to its newness. This question investigates to what extent things that have already existed have been reformulated in terms of AI to make use of the rhetoric of potentiality. As there has been a race for AI by the EU only recently, it makes the topic even more relevant. The third question refers to the labelling of AI and thus as a technological solution to the sustainability crisis: *In what ways is AI labelled as a solution to the sustainability crisis in the EU's green growth discourse?* This question examines how the embeddedness of AI embodies the solutionist and utopian character of the green growth discourse. It focuses on the blurry reality of AI serving as a universal solution to undefined problems.

2. Theory

The following section aims at theorizing the research question, serving the hermeneutic research approach projected. The scholarly debates and academic discussions outlined in this section will subsequently provide the three main concepts guiding the research, namely green growth, technological solutionism and digital utopianism. This chapter is sought to create understanding of the technology-sustainability nexus. Furthermore, theoretical expectations are derived from existing literature in order to guide the analysis.

2.1 Green growth

Green growth can be understood as a concept believing that the environment and economic growth cohere. It is widely understood as a solution to both the climate and the financial crisis. Its emergence can be traced back to 2009 when this policy concept was encouraged globally and by several organizations such as the Organization for Economic Co-operation and Development (OECD) and the World Bank alongside its representation in conference reports as for example of the G20. The concept of green growth goes beyond the existence as a buzzword as it is already followed by specific policy recommendations and can be found in strategies such as 'Europe 2020' introduced by the European Commission (Blaxekjaer, 2012). The definitions of green growth vary but generally it aims at being environmentally friendly and thus minimize the environmental footprint whilst being socially inclusive (Stoknes & Rockström, 2018).The paradoxical nature of green growth especially with regards to technology is scrutinized by John Dryzek in terms of whether 'going green' and 'going smart' go hand in hand or rather contradict each other. It is underlined that the environment is often used as an instrument to recommence the economy alongside increasing the quality of life of society as a whole. A dominant rhetorical notion stated as 'we can have it all' can also be found in the Europe 2020 strategy, speaking of mutually achieving smart, sustainable and inclusive growth (Gazzola & Onyango, 2019).

According to Smulders et al. (2014) defenders of green growth argue that policies to decrease the deterioration of the environment and natural resources can succeed in attaining environmental sustainability beyond the loss of economic growth and might on the contrary even encourage growth. Generally, this scenario is expected to have a negative outcome, with the exception of believing in the possibility that technological development can be maintained and that renewable resources will be put in the place of finite resources. In the case that an economy transitions to renewable resources from an economy that used such a high amount of resources unable to be continued in the future, a burden will be imposed on growth at least in

the short run. Included in green growth policy is the goal for advanced economies to be less reliant on fossil fuels and thus a change to renewable energy sources all in light of climate change. This transition is by nature a progressive issue, challenging policy in terms of timing and pace of it. The impact that technological innovation can have for the adoption of natural resources has to be taken into consideration when looking at green growth. Regarding productivity spill-overs from capital to energy these can only be expected when contemporary supplies also entail an increased energy efficiency. These objectives are very theoretical and underline the research gap regarding technological innovation as an initiator of green growth (Smulders et al., 2014)

As Ferguson (2015) outlines, sustainable development is disapproved due to its lack of preciseness which raises three questions. The first one concerns the issue of what should be preserved. Secondly, the way in which this should take place and lastly in whose interests this should happen. This also depends on the viewpoint, for instance when comparing environmentalists and businesses. The latter usually prioritizes maintaining profits while environmentalists have the preservation of the environment in mind. Sustainable development itself suffers from a deficiency in policy precision, since both of the words "'sustainable' and 'development' largely remain floating signifiers" (Ferguson, 2015: 18).

In Stegemann & Ossewaarde (2018) it was discovered that in European policy papers, the hollow expression of sustainability is regularly defined as a driving force for green growth. It is further stated that the way of utilizing the concept of sustainability reflects the approach towards decreasing greenhouse gas emissions while rejuvenating the economy after the financial crisis by the EC. In connection to the environmental field, the indication of sustainability is rather exceptional (Stegemann & Ossewaarde, 2018).

Concluding, existing literature has found that green growth exists beyond a phrase as it can be found in strategies as for instance Europe 2020 by the EC. The conflicting nature of green growth in addition to the question of 'green' and 'smart' being able to cooperate has been exposed in previous research. The idea of 'we can have it all' in terms of achieving all the goals intended in green growth simultaneously has been observed particularly in EU strategies. Also, policies for environmental protection are envisaged to encourage growth. Nevertheless, it clearly appears that a transition to a renewable resources-based economy will undermine growth at least in the short run, underlining that the notion of 'we can have it all' cannot be appropriate. Moreover, technological innovation is predicted to be an enabler for green growth even though this is still highly theoretical and in need of extensive research. Sustainable development as a part of green growth lacks precision also in terms of policy where

'sustainable' and 'development' stay hollow expressions. This has especially been observed in policy papers by the EU and it thus expected to be observed in chapter 4 of this thesis.

2.2 Technological solutionism

Sean F. Johnston (2018) outlines the technological fix as a part of technological solutionism. In order to uphold our contemporary lifestyles and to improve our day-to-day lives the use of technological solutions is no rarity. The modern culture is highly characterised by this. This often leads to present-day issues being encased and appealed to in reduced technological terms (Johnston, 2018). Dating back until after World War II, the understanding of technology as a universal provider of answers gained popularity but also criticism for example by a group named *Technocracy Inc.* They pointed at problems such as inefficiency and the inability of government officials. The 'cure-all' nature of the technological fix was highly disseminated by Alvin Weinberg, who mentioned that a prosperous society was achieved by progress in energy technology and automation rather than social systems. Apart from its success after the war, technological advancement especially in software technologies has gained increased support in the present day (Johnston, 2018).

From an institutional standpoint, this solutionism can be found for example in environmental queries. These technological fixes, introduced by governments and similar actors however, also bring societal concerns with them contesting the argument started by Alvin Weinberg. Criticism to Weinberg's notion encompasses the naivety and narrowness in approaching complex problems. This reductionism entails the risk of excluding minorities and disregarding the negative side effects that a technological fix could have on those. Further criticism by Arne Naess, points out that it tends to uphold the status-quo, favouring present socio-economic circumstances. He introduced the *shallow economy,* criticising the technological fix as simplistic and inadequate. Furthermore, it can be underlined that the notion of the technological fix would only survive in an elitist environment. The discrepancy between technocrats, experts, government-assigned working groups of engineers and the rational society could not be overcome (Johnston, 2018).

Moreover, the work of Evgeny Morozov: *To Save Everything, Click Here: The Folly of Technological Solutionism,* further criticizes the enthusiasm of embracing digital technology to safeguard freedom and democracy (Schüll, 2013). Equally discussed are buzzwords such as „smart" and „innovative" or „disruptive" in light of what information technologies could achieve, in such a way that a technologically literate elite will profit from it instead of globally spreading freedom, democracy and productivity (Taffel, 2018).

Kuntsman & Rattle (2019) point out that technological innovations are illustrated as the enabler for sustainability even though the inheritance of the 'techno-fix' in these innovations is denounced in literature, respecting unforeseen consequences. Moreover, these potential aftereffects are commonly buried under the advantages when they happen to be observed. To a very less extent, digital solutions are interrogated as such in terms of their impact on the environment (Kuntsman & Rattle, 2019).

In Dryzek (2013), the theory of ecological modernization is explained as a way to rearrange the economic and political structure of advanced countries. This should happen by means of assistance by the government and convenient technological mediation in order to serve the environment through economic growth (Dryzek, 2013). Despite the lack of empirical evidence for technological innovation to be able to resolve the environmental crisis, policy makers benefit from the technocratic character that marks the discourses of sustainability as Mol & Spaargraren (2000) discuss. Making use of these discourses' pragmatic nature, prevents policy makers from having to initiate a shift in essential political and economic institutions of the contemporary society (Mol & Spaargraren, 2007).

In summary, from this literature review of technological solutionism and its evolution from post-war until present-day, it is to be expected that solutions such as technological fixes will not be adequate measures to address complex political or environmental problems due its reductionist approach. The need to depend on technology for the environment while disregarding the effects it might have on it is expected to mark the green growth discourse. Furthermore, technological fixes might lead to the exclusion of minorities and foster technologically literate elites. The contemporary society is marked by technological solutionism where the reduction of problems in technological terms is very common. This reductionist approach is highly exclusive and tends to maintain the status-quo with regard to socio-economic conditions. Due to the disparity between technocrats, experts and ordinary society, the technological fix is anticipated to solely survive in an elitist environment. It is further criticized that freedom and democracy will not be secured by embracing technology. In order for technological innovation to remain an enabler for sustainability the unforeseeable consequences it could have are usually ignored. Furthermore, evidence for technological innovation to be able to deliver on resolving the environmental crisis is missing. Nevertheless, the pragmatic and technocratic nature of the discourse encourages policy-makers to stick to the status-quo instead of reorganizing the economic and political systems of developed countries for ecological modernization.

2.3 Digital utopianism

To a certain extent, utopias are a way of implicitly criticising the contemporary society or in other words the status-quo. They can be understood as present futures which are seemingly within sight but impossible to reach. Their actual realisation is not a necessary factor for a utopia to be powerful it is rather about its performance capability in the present (Dickel & Schrape, 2017).

The concept of digital utopianism underlines the high relevance of Artificial Intelligence in this research, more specifically its use in so-called "smart grids". Smart grids produce a promising future vision, enabling a clean energy transition, energy security, reduced carbon emissions, renewable resources, green innovation and jobs. Especially the EU envisions the smart grid implementation as an enabler for the European industry in terms of research, market and export which subsequently will provide jobs and secure global technological leadership. Additionally, the smart grid has been widely discussed in terms of sustainable development. The integration of ICT into electric transmission and distribution networks is envisioned to reduce carbon emissions and increased use of renewables. Hence, it becomes quite evident for policy-makers to appeal to such a technology that could possibly resolve one of the most acute societal threats, namely climate change (Muto, 2017).

In light of climate change, the electricity sector can be named as the most polluting, producing the most greenhouse gases of all sectors and relying heavily on fossil fuels. This problem is to be solved by the smart grid. Often, this is linked to digital utopianism, more precisely the belief that digital ICT will revolutionize matters of human concern favorably. Furthermore, it can be connected to the scholarly debate that started after the Internet was made accessible. Digital utopianism has encountered critique in terms of tending toward technological determinism and a naïve understanding of politics. Gabrielle Hecht introduced the notion of the *technopolitical regime* which consists of artefacts, experts, organizations, policies and paradigms that simultaneously produce technical and political power. Downsides of the smart grid include various trade-offs for the sake of economic efficiency, especially regarding cybersecurity (Slayton, 2013).

Federica Russo (2018) examines technological determinism that is present in both utopian and dystopian approaches. Furthermore, the contradictory reactions towards technology being either extraordinary benefits or destructive outcomes are investigated. Both views presuppose that the inclusion of technology puts life and society on a course that has to be followed. Because of the normative aspect of technologies, by their very nature they are political and ethical. ICT's have an impact on social relations, more specifically the way that they are used

in politics and how vice versa they are the target of political decisions. She exemplifies a reconsideration of the connection of technology and science as a way to counter technological determinism. In modern-day times, science and technology make up a group of procedures, combining intelligence and actions with technological processes, embedded in complicated socio-political contexts. The technological transformations that can be witnessed today are defined to be epistemological and ontological as they are able to change the environment beyond the political and existential spheres (Russo, 2018).

In Bait et al. (2016) the variety of understanding and utilization of the concept of utopias is acknowledged. The "myth of progress" (Bozzi, 2016: 43) is still a highly supported concept in light of the existence of utopia in human fantasy. A concept of utopia as proposed by Key Blochian underlines the momentary nature of utopias. It is an attempt to achieve a goal set in the future by means of unrealized potential within the now. A movement without a goal that is marked by intransitivity denies the verbalization of specific goals and rather encourages the revision of these goals in an infinite method of coming closer. As several thinkers have pointed out: "The enlightenment that is to liberate man from myth itself takes on the oppressive qualities of myth; the tools man creates to replace slaves begin to enslave him" (Bozzi, 2016: 49). When mediums exceed their actually foreseen purpose, they become repressive (Bait et al., 2016).

The existing literature leads to the expectation that a utopian approach towards the inclusion of AI in the green growth discourse is in the interest of policy makers. The feature of an undefined goal that has to be reached in an ever-adapting progress raises the question to what extent the embeddedness of AI is envisioned to but also will actually provide results. In comparison to technological solutionism, digital utopias embody a critique of the status-quo. However, a utopia does not have to be reached in order to be successful in its function due to its temporal nature. As the technology behind smart grids AI is envisioned by the EU to be the answer to climate change. Even though, AI is foreseen to enable a clean energy transition, digital utopianism tends towards technological determinism and ignorant understanding of politics. This technological determinism is represented in both utopian and dystopian concepts. Disregarding the outcome of being either beneficial or damaging the dependency on technology creates a path dependency for society from which it cannot deviate. Furthermore, utopias live from the "myth of progress" (Bozzi, 2016: 43) as well as of their temporal nature. Commonly, the goals that are to be achieved are left very vaguely in their formulation. The tools for the attainment of such a goal are at risk to become oppressive if they surmount their initial aim which in this case can be applied to AI.

In conclusion of chapter 2, the first sub question SQ1 has been answered. The reproduction of the state of the art in research on green growth enabled the formulation of theoretical expectations which will guide the analysis in chapter 4.

3. Methods

The aim of this chapter is to provide an outline of how the data analysis is conducted. Firstly, the research design chosen and its relevance for the issue at stake is plotted. Secondly, it is explained how and why the cases were selected. Thirdly, it is clarified how the data was selected and collected. Lastly, the operationalization and analysis of the data is further explained.

3.1 Research design

The following section is dedicated to the description of the research design chosen to answer the research question. How research is conducted, generally refers to the research design (Babbie, 2007). In Keller (2015) it is outlined that in research, the establishment and development of the world by a detailed use of indications and the fundamental orders or rules for the creation of meaning underlying those relate to theoretical outlooks that can be attributed to the term of 'discourse'. A discourse analysis, nevertheless, entails a research perspective on specific research targets which are known to be discourses rather than a particular method. Currently, discourse analyses are usually accepted as qualitative, hermeneutic or interpretative viewpoints. The relevance for discourse analyses has increased with enhanced hybrid phenomena. These cannot be categorically assigned to nature, society or technology. Discourse analyses therefore have the social significance to pursue a steady meaning and to try to associate it to one of the categories mentioned above (Keller, 2015).

Narrowing down the focus of discourse analyses and for the aim of the research, the critical discourse analysis (CDA) is further explained by Keller (2015). In CDA, the link between "linguistics and critical analyses of language use, ideologies, and social (de)formations as well as with social science perspectives in more general terms" (Keller, 2015:14) is examined. The usage of language is the action and processing of an intent at the same time, their relationship is thus dialectical. It is a process that can be defined as social but also socially controlled. The discourses and the social structures that specify the context operate jointly as conditions and effects. In other words, discourses are created by the world but simultaneously compose the world (Keller, 2015).

The research design of this thesis is a critical discourse analysis, based on policy papers by the EU and stakeholder position papers. In other words, it concerns policy documents and position statements from generally everyone that could be involved in the sustainable energy transition. This design is the most accurate method to answer the main research question which investigates the green growth discourse by the EU as a network involving stakeholders. More

specifically, in what ways this network envisions the use of AI in this discourse as either solutionist or utopian. As Van Dijk (1993) outlined, a CDA serves the purpose of uncovering power relations. More specifically it focuses on power and dominance garnered in institutions and elites and the resulting social inequality. Insofar, a CDA is a suitable approach for unmasking social inequalities that might result from the power excision and thus the discourse built by the EU and its stakeholders in light of finally resolving climate change. It is questionable at what price this innovation will come and whether it is only exploited as a means to serve the technologically literate elite and economic growth. In line with a CDA a hermeneutic approach was chosen as such research concentrates on textual analyses.

The text documents under scrutiny in this research consist of policy documents by the EU such as the Europe 2020 strategy introduced by the European Commission (EC) as well as of position statements of various stakeholders such as Business Europe. The latter is one of the most influential promoters for growth and competitiveness at the European level. Since it has issued for instance a strategy paper on AI in 2017, it provides data that will be needed for the analysis. A CDA as a research design has several advantages. Since climate change and thus the sustainability issue touched by green growth is discussed globally and encompasses a variety of positions towards it, it makes sense to not only look at the EU Organisations in isolation but to also include stakeholders which add to the EU's discourse to mirror this diverse discussion. This could in turn also be seen as a disadvantage of this method since it does not give in-depth insight into one specific position.

Having clarified the research design, it is furthermore important to outline the structure of this thesis. After outlining the problem addressed in this research, the theory section provides theoretical expectations resulting from existing literature from which the main concepts are derived. These are then operationalised into features in order to be made measurable. From the features developed, a number of keywords are logically derived which will enable the analysis of the selected data. The results from the analysis will be applied to the theoretical expectations and interpreted in line with these expectations and whether they are met.

3.2 Case selection

This section outlines the case selection for the research. To highlight the relevance and fit of the selected case, a short background for both green growth and AI is provided. Next, the respective relevance for the EU is outlined and finally how green growth and AI are intertwined. As a reaction to the financial crisis in 2009 that has washed away both economic and social advancement, the EU outlines priorities with a vision of Europe's social market economy for

the 21st Century. The priorities consist of smart, sustainable and inclusive growth all being part of the notion of green growth. This vision further includes a more resource-efficient, innovative and greener economy while encouraging a high-employment economy. It is crucial for the EU to achieve the goals outlined in the priorities to recover from the 2009 crisis but in such a way that returning to a pre-crisis situation is avoided. With intensifying global challenges, the EU also has to embrace climate and resource challenges. Accordingly, there has been a push for AI by the EU only recently, with the goal of "AI made in Europe". The development of such technologies on the basis of European values should occur in a way that is beneficial for both the people and the environment. The intention to use AI for sustainable growth and energy efficiency can be found in the EU's green growth discourse as well, more specifically for the use in smart grids. By means of smart grids a more resource efficient, greener but also more competitive economy is pursued to be promoted.

3.3 Data collection

In this section it is outlined how data was collected in order to conduct the research. The research is based on qualitative data and strengths and weaknesses of this data collection method is discussed. The qualitative data consists of documents such as policy papers and strategies and the affiliated progress reports outlined by the EU as well as position papers, conference reports and similar documents of stakeholders involved in generating the green growth discourse. The size of the data set and thus the number of documents covers a total of 26 documents, while 14 of these documents were published by Institutions of the EU and 12 were issued by various stakeholders. The size of the individual documents varies, according to their type for example when comparing a policy paper by the EC like Europe 2020 that contains around 40 pages and a factsheet on AI by the EC that only consists of two pages but is of high relevance as well. Generally, the documents are similar concerning their scope. The papers were selected on the basis of their suitability for the problem at stake. Criteria for the selection are that the papers originate from actors with a certain amount of power and influence in the EU and what goals for instance are set regarding sustainability or technological progress. Within the limits of this thesis, the selected documents incorporate the highest diversity of standpoints feasible to serve the goal of presenting the different ways in which AI is represented by different actors in the green growth discourse. To depict where such a document could come from and what it could look like, a policy contribution by Bruegel which is a European think tank with a focus on economic policy is shortly introduced. In this contribution they outline that the EU faces a growth and productivity deficiency in the long run and make propositions on how to

counter this deficiency in respect of green growth. This document has a size of 20 pages and is thus also suitable in terms of scope. Since it is mostly powerful actors that drive the green growth discourse it is reasonable to critically analyse the documents that are provided by such actors.

A list of the documents investigated in the analysis is provided in the appendix. Even if the main green growth discourse started after the financial crisis in 2009, the timespan of the dataset was extended to the year 2006 until the present day. This is the case, because the analysis of the discourse to a large extent includes the issue of reformulation regarding technology. The topic of technological solutions to sustainability issues has been discussed before the notion of green growth emerged.

3.4 Data operationalization and analysis

The following section outlines how the data and thus the most crucial concepts will be operationalized and measured in the research. In order to do this, a coding scheme is introduced. The three main concepts of this research, namely green growth, technological solutionism and digital utopianism are translated into distinctive features which are then again fanned out into keywords. The features attributed to the concepts are illustrated in Figure 1.

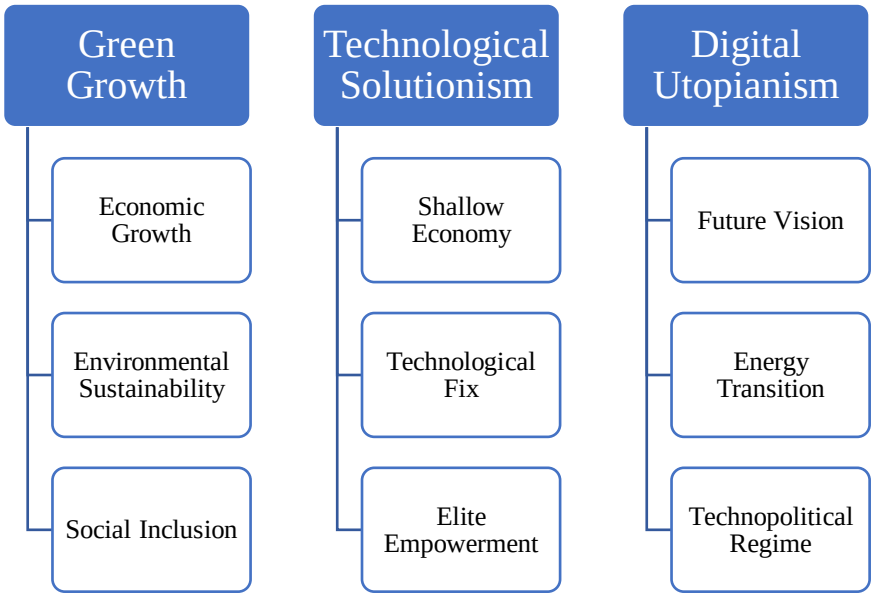

Figure 1: Features of the three main concepts

In Figure 1, the insights from literature provided in the theory section of this thesis are specified and can later on be measured. As this thesis is a textual analysis, this coding approach guided by the three leading concepts will enable the data collection. The features of the three main concepts were derived from the theory section of this thesis. For instance, the feature of Economic Growth is investigated with regard to what extent AI is a part of it in the documents analyzed. This feature was chosen since economic growth is an essential part of green growth and because previous literature has proposed that economic growth is given priority over sustainability. Moreover, economic growth incarnates what has to be changed in terms of becoming environmentally friendly. Furthermore, the feature of the technological fix was chosen under the concept of technological solutionism in order to investigate whether the green growth discourse shows signs of using technology as a solution. In other words, to find out what problems AI is envisioned to solve and how that should happen. In addition, the future vision was chosen as a feature of digital utopianism. As previous research suggested, technology is visualized to be part in the building of Europe's future which will be a green and welfare Europe. Based on the features of the main concepts, a variety of keywords is logically derived to further enable the data analysis. A table illustrating these keywords or in other words the coding scheme is provided hereunder.

In order to be able to manage data and thus minimise its complexity for the sake of its evaluation, the type of data analysis is crucial (Flick, 2014). By detailed analysis of the linguistic characteristics of a text using particular tools, it is possible to cast light on how discourses are activated textually and arrive at, and provide backing for, a particular interpretation (Jørgensen & Phillips, 2002). In this case, qualitative data in the form of policy documents by the EU and position papers by various stakeholders are analyzed with the help of a coding scheme. For instance, a range of keywords following the features of the main concepts guiding this research have been derived. Over the course of the research, the Keywords have been slightly adapted in order to serve the aim of this thesis. For the feasibility of the data analysis the Qualitative Data Analysis & Research Software ATLAS.ti was used. The documents were coded according to the keywords developed from the features of each concept (cf. Figure 1). As can be seen in Table 1, some of the keywords end with an asterisk (*). This is the case, because in order to include words in ATLAS.ti that could have various endings such as technology, technological and technologies the correct ending has to be substituted by an asterisk. This is exemplified as for instance: technolog*.

The documents were coded and sorted by means of code groups. These code groups are equal to the three concepts with their features (cf. Figure 1). With the help of the code groups,

three tables were generated providing a clear overview of the results. These tables can be found in the appendix.

Table 1

Keywords used for coding of documents

Concept	**Features**	**Keywords**
Green Growth	Economic Growth	technolog*, Technology, Artificial Intelligence, AI, green, green growth, Green Growth, artificial intelligence
	Environmental Sustainability	Smart, sustainable*, renewable*, resource efficiency, eco-innovation, green
	Social Inclusion	Minorit*, vulnerable, inclusive*, employment, poor, unemployed
Technological Solutionism	Shallow Economy	Simplistic, inadequate, solution*
	Technological Fix	Contemporary, improvement*, energy technology, reduction, fix, solve, technolog*, solution*, dependen*, belie*
	Elite Empowerment	Literate, Expert*, technocratic, status-quo, disruptive, smart, ICT, AI, artificial intelligence, elite*

Digital Utopianism	Future Vision	Welfare, green, Europe, build, future, expectation*, vision*, utopia*, envision
	Energy Transition	Energy, electricity sector, greenhouse gases, smart grid, artificial intelligence, ai, gas, coal, transition*, change
	Technopolitical Regime	Leadership, international, global, partnership, strategic

3.5 Conclusion

Concluding, the relevance of the research design of a critical discourse analysis was accentuated in addition to a justification of the cases selected for the research.
Furthermore, the course of how the data analysis takes place and how the data for the analysis is collected was explained.
After having outlined the methodological approach for the data analysis, the next chapter displays the results achieved by it.

4. Analysis

4.1 Introduction

In the analysis section, an insight into the EU's green growth discourse is developed. Firstly, the newness of AI as embedded in the green growth discourse is investigated. This consists of an examination of how the EU seeks to establish a link between AI and green growth. With regard to the newness of including AI in matters of economic growth, environmental sustainability and social inclusion it is further looked into the extent to which things that have already existed have been reformulated in terms of AI and brought back into the discourse as new. Secondly, a feature that seems to deeply mark the character of the green growth discourse is under scrutiny. In order to find out whether the green growth discourse is actually coined by technological solutionism, it is examined on the one hand what kind of problems AI is supposed to solve and on the other hand how this should take place. This will shine light on whether the application of AI to numerous problems is only done because of the contemporary approach of having to depend on technology without clearly defined guidelines. Since technological solutionism entails a reductionist approach, its featuring of the green growth discourse would be quite contradictory as issues tackled by it include problems of a political kind and sustainability issues which cannot be reduced to technical terms. Lastly, a second feature that is expected to mark the green growth discourse is digital utopianism. The role of AI in the green growth discourse is utopian. It functions as a drive as it seems to be within reach; however, its capabilities are nowhere near to actually translate into results. Moreover, it comes with enormous expectations attached to it. The future vision of the EU as a sustainable welfare state foresees AI to be a fundamental ingredient in building such a future. While examining the utopian nature of AI in the green growth discourse, its wasteful and dystopian side is taken into consideration as well.

4.2 The EU's green growth discourse

The green growth discourse as it is circulated by the EU as a network including stakeholders addresses the issue of decoupling economic growth from environmental degradation. In a number of documents such as strategies, reports, policy papers and position statements both by Institutions of the EU and stakeholders such as the Organization for Economic Co-operation and Development (OECD) and the Centre for European Policy Studies (CEPS) it is highlighted how economic growth that is sustainable and inclusive can be achieved through the use of AI. The idea that the application of AI to nearly any issue that marks the 21st Century is supported by both the EU and influential stakeholders. Even though the embeddedness of technology and especially AI in the green growth discourse is a new phenomenon, despite AI having been on the plate since the 1970s, there seems to be mutual understanding in the international scene that AI needs to be part of the discourse. The strong support to include AI in the green growth discourse by a great number of influential players raises high expectations. The political discourse circulated by the EU seems very promising. By means of technocratization, highly political problems are buried under the ontological priority that is given to technology. The reformulation of issues in terms of AI is highly mythical, which is why this research seeks to unravel the myth to the extent of what can actually be expected from AI. Furthermore, as derived from chapter 2 the application of AI to whichever issue at stake without having to compromise especially in the green growth discourse gives rise to the notion of 'we can have it all'. In order to unravel the myth of AI as it is circulated in the political discourse of the EU, it is important to reconstruct and understand how the EU seeks establish a link between AI and green growth. Due to the importance of understanding this linkage for the further course of the thesis the first part of the analysis will look at the representation of AI in the green growth discourse.

As a first measure, it was investigated to what extent AI is represented in documents both by the EU and relevant stakeholders. The analysis of a total of 26 documents showed not only that AI plays a part in nearly all of the documents investigated but also that there is great convergence between the EU and its stakeholders regarding the inclusion of AI. This interesting observation can be retraced in Table 1 in the appendix which shows that the relative percentage of citations found in connection to AI make a total of 43,88% in documents by the EU and a total of 56,12% in documents by stakeholders. Thus, this first observation not only confirms the embeddedness of AI in the green growth discourse but also that its use is very similar and balanced when comparing the Institutions of the EU and its stakeholders. The main goal of this first section was to prove that the EU does seek to include AI in the green growth discourse.

However, this is not the only issue at stake. In addition, it is investigated how much attention each of the three main goals of the green growth discourse is given, meaning economic growth, environmental sustainability and social inclusion. As a first indication, table 1 in the appendix gives an overview of the representation of each goal in the documents under scrutiny. It appears that with regard to environmental sustainability and social inclusion the extent to which both are represented varies between the EU and its stakeholders. While environmental sustainability is given more speech in documents by the EU with a total relative percentage of 59,30% compared to 40,70% in documents by the stakeholders, social inclusion is covered more widely by the stakeholders with a total relative percentage of 61,20% compared to 46,75% by the EU.

Already in 2006, the European Commission set out a Vision and Strategy for Europe's Electricity Networks of the Future (European Commission, 2006). As the energy sector is known to be the most polluting, it is important to assess what measures can be taken in order to provide for a sustainable change of this sector. Since the inclusion of renewable energy sources in the distribution and storage is part of this change, the implementation of technology to foster innovation in this respect is of high interest. In order to make energy grids smarter, the use of AI in this respect seems very promising. In this strategy paper, the use of AI is not yet specifically linked to the wording of green growth due to its publication previous to green growth strategies. Nevertheless, it is referred to sustainable development and environmental sustainability which can be achieved by the use of smart grids. Notably, the foreword of the strategy paper ends with the expectation:

"to see the activities of the platform leading to greater energy sustainability in Europe and beyond" (European Commission, 2006: 3).

Moreover, the need to embed new and smart technologies in already existing electricity grids as it is common for the concept of green growth and underlines its existence beyond a buzzword (Blaxekjaer, 2012) as can be derived from the theory chapter further becomes apparent:

"Current grids have served well but will not be adequate in the future: grids must ensure secure and sustainable electricity supplies throughout Europe, take advantage of new technologies and comply with new policy imperatives and changing business frameworks." (European Commission, 2006: 6).

Notably, the wording AI has not been used in the document from 2006, underlining that the race for 'AI made in Europe' (European Commission, 2018) had not been relevant until

recently. Nevertheless, the technology that will make the grid smarter is known to be AI. It is thus interesting that the wording had not been used before in order to make the transition to smart grids more appealing.

Another striking point in the European Technology Platform Smart Grids Vision and Strategy (2006) is the connection of research and innovation to economic growth, social development and environmental protection. This connection is similar to the goals that can be found in the green growth strategies of Europe 2020 (European Commission, 2010), namely economic growth, environmental sustainability and social inclusion. The 'we can have it all' character (Gazzola & Onyango, 2019) of the green growth discourse that is circulated today can thus already be found in a strategy dating back to 2006 as:

"research and innovation will improve the sustainability of the EU, leading to win-win solutions for economic growth, social development and environmental protection" (European Commission, 2006: 14).

In 2017, the European Commission published a document on the progress of the Strategic Energy Technology Plan (SET) which was launched in 2007. The smartening of the grid has evidently taken place for more than ten years by now. On the one hand, it is quite surprising that their development has not gained a lot of attention, an example for a use case will be provided in the course of this paper. On the other hand, the wording AI cannot be found in the progress report either. However, the progress report summarizes that there has been work done in this issue, for the sake of accommodating renewable energy sources in forthcoming infrastructures:

"Initially, EU research efforts focused on smartening the grid. They looked at introducing smart metering and innovative architectures for active distribution networks, capable of balancing power generation and demand in real time. Other important research areas tackled better grid monitoring and network observability for optimum maintenance, as well as efforts for more integration of renewables into future infrastructures." (European Commission, 2017: 45).

Following the financial crisis in 2009, the European Commission in 2010 published the Europe 2020 strategy for smart, sustainable and inclusive growth. This year also marks the beginning of the usage of the wording 'green', mostly in technologies but also sustainability and the economy. The Europe 2020 strategy seems very ambitious in terms of the number of problems it seeks to solve at once. Naturally, the resilience of the economy is targeted as the

strategy emerged after the financial crisis. However, this strategy aims at far more than just strengthening the economy. The way to go has to be sustainable in all regards. Besides economic growth and technological leadership with a focus on green technologies, environmental protection should not fall behind just as social cohesion. As the theoretical expectations proposed, the green growth discourse as it is put in place by the EU is highly imprinted by the notion of 'we can have it all' (Gazzola & Onyango, 2019):

"Sustainable growth means building a resource efficient, sustainable and competitive economy, exploiting Europe's leadership in the race to develop new processes and technologies, including green technologies, accelerating the roll out of smart grids using ICTs, exploiting EU-scale networks, and reinforcing the competitive advantages of our businesses, particularly in manufacturing and within our SMEs, as well through assisting consumers to value resource efficiency. Such an approach will help the EU to prosper in a low-carbon, resource constrained world while preventing environmental degradation, biodiversity loss and unsustainable use of resources. It will also underpin economic, social and territorial cohesion." (European Commission, 2010a: 16).

Furthermore, the EC published an Energy Roadmap 2050 (2012) which repeatedly calls for the need for further development of the smart grid. It highly encourages more research in this field to keep up with the times. Also, it is linked to the decarbonization of the economy which can to an extent be translated into becoming more sustainable. As Smulders et al. (2014) pointed out, the economic benefits that are presumed, however will be preceded by a burden imposed on growth at most in the short run. This drag on economic growth is usually ignored. Still, the paper does not make use of the wording AI but it seems that the wording 'smart' has become more popular.

"Technology is an essential part of the solution to the decarbonization challenge. Technological progress can yield significant cost reductions and economic benefits. Establishing energy markets fit for the purpose will require new grid technologies. Support should be given to research and demonstration at industrial scale." (European Commission, 2012: 13).

On the one hand, renewable technologies are depicted as cost intensive making them seem to be a less attractive solution. On the other hand, the Energy Roadmap 2050 appeals to the need for investment in research for these technologies, to be able to reap their benefits in the long run.

Leaping forward to 2018, the European Political Strategy Centre (EPSC) by order of the EC published 10 trends reshaping climate and energy. In this document the wording AI finally makes an appearance. Apart from smart grids having developed and been invested into increasingly since 2016, AI is now used as a term that is part of this development. One of the trends clearly shows the amount of investment that has been dedicated to the development of digital electricity structure globally which indeed includes the development of smart grids. It is further mentioned that development in this area has been on the plate for quite a long time, but a noticeable increase in such investment has only taken place recently:

"The energy sector started integrating digital technologies as early as the 1970s to make grid management and operation more efficient. Today, the pace of digitalisation in the energy system is accelerating. In 2016, global investment in digital electricity infrastructure such as smart grids – which use digital technologies to enable two-way communication between utility providers and customers – amounted to 40 billion euro. This was almost 40% higher than investment in gas-fired power generation worldwide (30 billion euro)." (European Commission, 2018a: 12).

Subsequently, the EC released a reflection paper in January 2019. It is clearly stated that the EU seeks to become a crucial player in the development of AI, despite its shortfall when compared to China or the USA. The use of AI for the sake of environmental protection is though linked to increased productivity, blurred with the use of AI in various sectors which underlines the theoretical assumption of not having to compromise. Notably, AI has just come into place but is already associated with huge potential for a broad range of practice. On the one hand, an issue at stake seems to be the ethics of AI that still need to be developed. On the other hand, there is no discussion yet about law and politics of AI. Significantly it is first being referred to economic benefit and lastly to environmental protection:

"Artificial intelligence is an area where the EU is lagging behind China and the United States. The EU needs to catch up quickly to reap the economic benefits and at the same time take the lead in shaping the necessary new ethics that should accompany this new technology. This way the EU can help ensure that artificial intelligence is a net benefit to people's lives and work. By being able to process large amounts of data instantaneously, artificial intelligence has the potential to significantly increase productivity in many areas, such as healthcare, energy, agriculture, education and environmental protection." (European Commission, 2019a: 22).

Another paper by the EPSC focuses on Europe's Sustainability Puzzle (2019). On the one hand it thumps the need for change through innovation. Even if technological innovation is forced to be taken into consideration in the green growth discourse, the impact that this innovation will have on it is still highly theoretical (Smulders et al., 2019). Since green growth is often reformulated into sustainable growth, the aim to link innovation and sustainability becomes evident in this document:

"Innovation-powered change is and will remain one of the main ingredients for a sustainable transition – both in terms of technology and social systems. Indeed, given the scale and urgency of the challenges, innovation will both have to be more disruptive than incremental, and more systemic than technological. The type of transformation needed to avert ecological and social breakdown is one that fosters cumulative impacts across society and the economy – not just a set of discrete innovations making gains in one area while backtracking in others" (European Commission, 2019b: 16).

On the other hand, it scrutinizes drawbacks of too much development and innovation. Even though it is crucial to consider the disadvantages and to shine light on every aspect of innovation and technology, it seems quite contradictory to require radical increase in innovation to succeed in sustainable transitioning while upholding that:

"Even where innovation is taking place, it can fail to translate into socially or environmentally sustainable outcomes. For one, obsolescence is a direct result of innovation, as new products emerge to replace old ones that are outperformed. The more innovative (and wealthy) an economy becomes, the more economic obsolescence accelerates, and the more resources are consumed, and waste generated." (European Commissison, 2019b: 16).

Additionally, in 2019 the EC published the paper Clean Energy for all Europeans. Not only does it tackle the issue of social inclusion which is one of the goals of green growth to a large extent but also it places it in connection with AI. The aim is to make the energy market more accessible to consumers by means of smart metering. On the one hand, it seems promising with regard to fulfilling the goals set in the green growth discourse on the other hand it could be seen as yet another promise under the notion of 'we can have it all' (Gazzola & Onyango, 2019):

"From enhanced digitalization, to smart grids and smart appliances, passing through the Internet of Things, new batteries and storage systems: all these new technologies are creating ample opportunities for European citizens to participate and benefit from the energy markets." (European Union, 2019c: 13).

Lastly, the issue of environmental sustainability and its linkage to AI is covered by

CEPS. In February 2019 they published a report on AI with regard to ethics, governance and policy challenges. In this report, it is acknowledged that environmental sustainability is oftentimes not prioritized over economic benefit. Furthermore, it highlights the contradictory character of AI very precisely, underlining that AI itself can be a harm to the environment. In this case, the carbon footprint of AI serves as an example. This is rather paradoxical both to some of the statements made above, arguing for AI to help decarbonize the economy but also the statement made by CEPS itself, mentioning that AI can practically even solve the problems it may cause:

"Environmental sustainability is an often-neglected aspect of AI development, and can be approached from several angles. One of them relates to AI's carbon footprint, which seems to be controversial. The global energy consumption of data centres has been estimated at 194 TWh in 2014, which is around 1% of annual global electricity consumption, i.e. more than the electricity consumption of several EU member states. Data centre consolidation, outsourcing and cloud computing are helping to keep energy consumption in data centres flat, notwithstanding the increase of data and processing, as larger data centres tend to be more efficiently designed and managed. The solution to this problem seems to be rooted in technological developments, and in particular in AI. GPUs, TPUs, new protocols and AI solutions can dramatically improve energy efficiency." (Renda, 2019: 40).

Furthermore, the notion of 'we can have it all' (Gazzola & Onyango, 2019) that is spread in the green growth discourse is relativized to the extent that the application of AI which is still left quite broad that:

"there is no single, easily specified set of milestones or achievements that can be easily associated with AI development. That said, AI can be essential to almost any mission that may be set by the European Commission" (Renda, 2019: 110).

Having analyzed the role of AI in strategies and reports by the EU and its stakeholders, it becomes evident that the aspiration to link AI and green growth has been prevailing for more than ten years. However, this only became apparent after investigating the extent to which the wording AI has been reformulated until recently.

4.3 Technological solutionism

After having investigated that the EU aspires to link AI and green growth, a characteristic that seems to mark the green growth discourse will be examined. It is assumed that the discourse is technological solutionist. In order to find evidence for this assumption, a reproduction of how the EU seeks to establish a link between AI and green growth is performed. It is thus examined on the one hand what type of problems AI is expected to solve and on the other hand how AI is supposed to solve said problems. That means, if the green growth discourse proves to be technological solutionist the application of AI is solely considered because there is a need to depend on technology and to believe in it. Thus, it is embedded in the discourse, but it is still unclear how. Even if AI is considered to be part of the solution it might be uncertain what sort of problem it is supposed to solve. Additionally, technological solutionism is a bias in itself. The assumption that any problem can be solved by means of technological innovation is of reductionist nature which makes it hardly applicable to the problems outlined in the green growth discourse. In other words, the sustainability crisis will hardly be resolved by the application of technology alone. Apart from this, it is investigated to what extent the green growth discourse furthers elite empowerment since the issue of AI is highly complex and might not be appreciated beyond the technologically literate elite. The contemporary society seems to be led by the cure-all nature of technology which enhances technological solutionism.

To provide a first overview of the findings, table 2 in the appendix surprisingly shows that elite empowerment is represented to a larger extent in the stakeholder documents with a total average percentage of 61.39% compared to 38,61% in the EU documents despite the fact that social inclusion was covered more extensively by the stakeholders. Moreover, there is nearly equal prove that the reductionist approach of technological solutionism is inadequate to address the issues of the green growth discourse. Moreover, the table shows plenty of evidence for the presence of technological solutions in the documents of both the EU and the stakeholders with a total number of 1758 of citations.

The notion of sustainable development is typical for the contemporary society and often interconnected with the technological fix. Johnston (2018) has discovered that the modern culture is deeply marked by the tendency to depend on technology in various problems. Furthermore, the fact that the technological fix can only survive in an elitist environment is highlighted since it is encouraged by economically strong and influential stakeholders. This in turn is criticized to the extent that these contributors are prone to uphold the status-quo. Moreover, it is usually addressed by the privileged elite. This has been observed in a paper by the OECD in 2008:

"We hear the term "sustainable development" in high-level discussions; we see it in political platforms and on corporate websites. More and more universities have programmes covering the field. Indeed, sustainable development has become a kind of conceptual touchstone, one of the defining ideas of contemporary society." (OECD, 2008: 24).

As a problem, the OECD outlined the future of the energy crisis. Already in 2008, the solution to this problem was pinpointed to be technology. However, the wording technology is left at that with no further explanation on how or what kind of technology exactly will provide a solution to the energy crisis:

"guidance for decision makers on how to bridge the gap between what is happening and what needs to be done in order to build a clean, clever and competitive energy future. The analysis demonstrates that a more sustainable energy future is within our reach, and that technology is the key." (OECD, 2008: 76).

In the Europe 2020 strategy (2010) it is highlighted that investment into technology is crucial. The issues at stake vary and stretch over several sectors. The technocratic character of the green growth discourse as observed by Mol & Spaargraren (2000) enables policy makers to avoid the implementation of fundamental changes regarding political and economic systems and thus allows them to maintain the status-quo (Johnston, 2018). The development of new products by means of technological innovation is presented as a solution to problems with a global scope:

"information and communication technologies and ensuring that innovative ideas can be turned into new products and services that create growth, quality jobs and help address European and global societal challenges." (European Commission, 2010a: 14).

In the Energy 2020 strategy (2010) by the EC, a clear tendency towards the belief in depending on technology became evident. In this case, a lack of technological advancement is displayed as a reason for the EU not to accomplish its goals in its strategy until 2050. Apart from the technological dependency, there is quite a clear issue at stake, namely the problem of decarbonization. However, the exact type of technology that should provide the solution is not defined precisely. Since the smartening of energy grids supposedly plays a role in decarbonizing the electricity sector, it can be deduced that AI is included:

"Without a technological shift, the EU will fail on its 2050 ambitions to decarbonise the electricity and transport sectors. Given the time scale for the development and dissemination of

energy technology, the urgency of bringing new high performance low-carbon technologies to the European markets is more acute than ever." (European Commission, 2010b: 15).

Furthermore, it seems that the belief in technology and the necessity to depend on the latter leads to scapegoating of those who do not embrace technological innovation. This is in contradiction with the work of Morozov, in which it is outlined that the dependency on technology alone will not be conducive (Schüll, 2013). This is outlined in the Europe 2020 strategy (2010) to the extent that the EU's lagging behind in growth internationally was caused by a lack of investment to further innovation and use of ICTs:

"Europe's average growth rate has been structurally lower than that of our main economic partners, largely due to a productivity gap that has widened over the last decade. Much of this is due to differences in business structures combined with lower levels of investment in R&D and innovation, insufficient use of information and communications technologies, reluctance in some parts of our societies to embrace innovation, barriers to market access and a less dynamic business environment." (European Commission, 2010a: 9).

CEPS (2019) is in line with the assumption above that specifically with AI Europe would miss out on the huge potential if it is not embraced. The issue here is not the application of AI as it is by far more defined than the term technology. The unexpected consequences that technology could have especially on the environment are not accentuated (Kuntsman & Rattle, 2019). However, it is not clear what problem it is supposed to solve apart from the sustainability crisis which has various facets. Thus, even if AI is insisted on to be embraced, it is not clear for which purpose:

"Failure to recognise and publicly promote the role of AI and its related technologies for a more sustainable future society would represent an enormous missed opportunity for Europe" (Renda, 2019: 111).

According to Business Europe, AI is highly important for the EU to preserve and strengthen its leadership in several issues. Accordingly, the EU should grasp the possibilities that AI can offer with regard to future challenges. As Dryzek (2013) examined, the assistance by the government for technological progress to benefit the environment through economic growth falls under the future challenges referred to by Business Europe. Repeatedly it is peculiar that the problem AI is supposed to solve is left very broad, while insisting on AI as an absolute must:

"there is a need for a coherent European approach to invest in AI to maintain our scientific and commercial leadership. To seize the opportunities offered by AI, Europe needs to enable technological progress, encourage the uptake of emerging technologies and address the potential challenges in a smart and future-proof way." (Business Europe, 2017: 1)

In the Strategic Energy Technology Plan (2017), the need for technology is underlined and depicted as indispensable. This time however, it is acknowledged that the technology fit for the purpose of decreasing greenhouse gas emission still has to be assigned through extensive research as according to Mol & Spaargaren (2000). There still seems to be no way around technology for the sake of environmental protection, although the technology appropriate to reduce greenhouse gases is not left as broad as the wording technology per se, but uncertainty in this concern remains:

"In the long run, new-generation technologies must be developed through breakthroughs in research if we are to meet the greater ambition of reducing EU GHG emissions by 80% by 2050" (European Union, 2017: 9).

A rather extreme example for the need to embrace technology and specifically AI is the conference report of Sustainable Europe 2030 by EPSC (2019). The potential attached to AI is stretched out to planetary dimensions. AI is believed to be anything and everything that will turn life into the better for everyone. Furthermore, AI is in this case not attached to a certain purpose nor is the problem it is supposed to solve outlined. It is given ontological priority in general without actually serving a concrete purpose or goal. This immensely underlines the assumption of the cure-all nature of technology that marks the contemporary society (Johnston, 2018):

"AI is not just one thing. There are many types and it comes in many sizes and there are many differences in the types of applications but also the types of philosophies behind it. I believe that, ultimately, taken as a whole, AI will have the ability to make machines more useful, which will enable us to create benefit for us, for people, for our society and for the sustainable well-being of all of the planet." (European Commission, 2019b: 20).

In 2019, the OECD developed principles for AI. In these principles it is outlined how AI can support the greening of the economy but also increase welfare and address global challenges. The reductionist approach towards global challenges in technological terms is typical for the present-day as outlined by Johnston (2018). On the one hand it plays into the

notion of AI being a universal cure without actual knowledge of what it can achieve for sure. On the other hand, it cannot be refuted that some of the potential attached to AI might prove to work out in future:

"Artificial Intelligence (AI) is a general-purpose technology that has the potential to improve the welfare and well-being of people, to contribute to positive sustainable global economic activity, to increase innovation and productivity, and to help respond to key global challenges. It is deployed in many sectors ranging from production, finance and transport to healthcare and security." (OECD, 2019: 3).

Another paradox of the green growth discourse but also of AI is illustrated in the fourth report of the energy union (2019). It emphasizes the support of technological solutions as the way to go in terms of the climate crisis which features elitist characteristics due to the exclusion of technologically illiterate parts of the population while assuring social inclusion without any exception. However, Johnston (2018) states that the discrepancy between technocrats, experts, government-assigned working groups of engineers and the rational society cannot be overcome:

"The strategy demonstrates how Europe can lead the way to climate neutrality by investing in realistic technological solutions, empowering citizens, and aligning action in key areas such as industrial policy, finance, or research – while simultaneously ensuring social fairness for a just transition and not leaving behind any region nor any population group." (European Commission, 2019d: 13).

Even if it seems to be more of an exception regarding the documents analyzed above, there do exist tangible examples of what problems AI can be the solution to. This is the case for the Horizon 2020 project examples (2018). The project InteGrid is tested amongst others with the goal of increasing consumer participation in the energy market, making it more inclusive but also to include renewable energy sources in the management of smart grids as they become smarter. Taffel (2018) after all indicates that firstly technologically literate elites will profit from such innovations:

"InteGrid already defined its use cases and three demos are currently starting. In Portugal, the project is engaging with energy consumers to see how to increase their participation in the energy system. The objective is also to foster the management of the distribution grid with a high share of renewable energy sources." (European Commission, 2018c: 21).

Overall, the analysis of documents by the EU and its stakeholders driving the green growth discourse shows distinctive features of a technological solutionist character. The cure-all nature to which the theory led was thus affirmed, notwithstanding a few concrete examples of how technology can solve issues of environmental sustainability, economic growth and social inclusion. In fact, the assumption that the solutionist character of the discourse in addition to highly complex technologies leads to elite empowerment can be withdrawn to the extent that social inclusion is given an ample amount of speech, taking into account minorities and their protection.

4.4 Digital utopianism

Lastly, the green growth discourse is not only marked by technological solutionism. It also features characteristics of digital utopianism. This entails a vision of the EU's future as a green and welfare Europe. The green growth discourse and AI being embedded in it are attached to enormous expectations. Furthermore, AI seems to be a fundamental ingredient in the building of this future, thus the role of AI in the green growth discourse can be described as utopian. The argument taken up in section 4.3 of too much innovation harming the environment can be elaborated into a dystopian and wasteful component. Technology in general has a huge price to pay and there are a number of examples of older ICT projects that have failed hopelessly. The utopian role of AI in the green growth discourse exists in that a decarbonized, greener and renewable future seems to be just around the corner, however it is intangible as technological innovation has not yet been developed enough to enable these future scenarios. To provide a first impression, table 3 in the appendix shows that a total number of 1081 of citations express the wish for a green, welfare Europe in the future. This wish is quite evenly spread amongst the EU and the stakeholders. Furthermore, it clearly appears that the energy transition is embedded in this digital utopian future. It entails the reduction of emissions and a sustainable energy transition all with the help of AI and smart grids. Moreover, a utopian approach is coined by determinism and naïve understanding of politics. The use of AI in this political discourse is highly technocratic. This led to the assumption that political power is gained alongside technical power. With regard to this, table 3 indicates that there might be the intention of building political power from technological advancement.

As the energy transition was expected to play a role in the future vision of the EU, the Energy Roadmap 2050 (2012), emphasizes the need to invest in the development of the energy sector. In a way, the supporting of the energy transition should be given priority as it is assumed to have spill-over effects to other sectors, making it irrelevant to act on those individually. As

Russo (2018) examined that technological process is also said to be more profitable with regard to the future:

"The year 2050 seems a long way off. Today, public deficits, jobs and pensions seem more important than future energy needs. Yet by investing in our energy system, we create jobs, businesses and prosperity. Less energy wastage and lower fossil fuel imports strengthen our economy. Early action saves money later." (European Commission, 2012: 1).

Furthermore, it is outlined that the long term has to be the first concern in the Europe 2020 strategy (2020). In the strategy, Europe is envisioned and undoubted to be able to deliver on the goals set for green growth, being economic, sustainable and inclusive. It is underlined that the EU has the capability to do so, however this could be challenged by the lack of actual technological innovation. In Russo (2018) it is delineated that the reaction towards technology is expected to be either extraordinary beneficial or destructive. The EU can be assigned to the former. Nevertheless, the path that the future of the EU is put on is thus predetermined by technology (Russo, 2018). Another point is the linkage to the creation of jobs which can be assigned to the future vision of a welfare Europe:

"To achieve a sustainable future, we must already look beyond the short term. Europe needs to get back on track. Then it must stay on track. That is the purpose of Europe 2020. It's about more jobs and better lives. It shows how Europe has the capability to deliver smart, sustainable and inclusive growth, to find the path to create new jobs and to offer a sense of direction to our societies." (European Commission, 2010a: 3).

Moreover, Europe is envisioned as a resource efficient Europe in the future. This foreseen shift can be assigned to the 'myth of progress' by Bait et al. (2016) since it is an attempt to achieve a goal set in the future which is meant to be realized by means of hidden potential:

"to help decouple economic growth from the use of resources, support the shift towards a low carbon economy, increase the use of renewable energy sources, modernise our transport sector and promote energy efficiency." (European Commission, 2010a: 4).

In the Europe 2020 strategy (2012), additional characteristics of digital utopianism can be found. In accordance with Muto (2017) smart grids generate a promising future vision as an enabler for a clean energy transition, reduced carbon emissions and renewable resources which makes it a favorable choice for policy-makers to decide upon its usage in the countering of the energy crisis. With regard to the smart grid, it is amplified that a 'European supergrid' should

be established. This should take place with a focus on renewable energy sources, with the intention of increasing connectivity. As the context is trans-European, the desire to become develop 'AI made in Europe' could be traced back to 2010:

"an initiative to upgrade Europe's networks, including Trans European Energy Networks, towards a European supergrid, "smart grids" and interconnections in particular of renewable energy sources to the grid (with support of structural funds and the EIB)." (European Commission, 2010a: 14).

Furthermore, the wording used at the High-Level Hearing 'A European union strategy for Artificial Intelligence' (2018) is highly digital utopian. With regard to AI, it is depicted as ever developing with a goal that keeps expanding. This has been discovered by Bait et al. (2016) in the sense that the denial to formulate a specific goal is typical for utopian concepts. It is even compared to "simple software programming" in the near future. However, all these scenarios that seem so near in reach are still not achieved or close to being achieved. AI is relativized to the extent that it is pictured to be an everyday technology in the near future despite its newness as a part of the green growth discourse. Moreover, it should not be attempted to restrict AI by definitions:

"what was recently unimaginable becomes increasingly commonplace, the goalposts for Artificial Intelligence keep moving. Today's Artificial Intelligence is tomorrow's simple software programming. In light of the ever-changing nature of what constitutes AI in the popular consciousness, if not in technical definitions, I think we should avoid general definitions that attempt to draw lines in the sand. Instead, we need to recognise that AI is a spectrum. It's a collection of methods and techniques for making computers more likely to achieve a goal." (European Commission, 2018d: 7).

In the conference report of Sustainable Europe 2030 (2019), the dystopian character of the discourse and more precisely the use of AI as a solution as it will certainly bring high costs with it, is not neglected. However, the contradictory nature of utopian and dystopian approaches cannot be dichotomous as traced by Russo (2018). One should not be overwhelmed by the progress that has been done in this issue over the past years.

Despite this, it seems quite common to use the technological advancement that has been achieved in the past as a positive outlook. Furthermore, this is also used as a reason to believe in the capabilities of technology to solve issues that are actually of political kind. With regard to the dystopian feature that cannot be neglected when looking at technology, it is only referred

to the potential risk of misuse which should be encountered by the development of ethical guidelines. According to Russo (2018) the nature of technologies is political and ethical:

"The technological progress we have made in the last 35 years is certainly cause for optimism. Hence, I am convinced that technology will prove crucial in tackling the biggest challenges of the 21st century – such as creating a healthy, sustainable world for everyone. But let's not be blind to the potential pitfalls: however incredible the potential of science and technology is, the chance of it being misused always remains. That's why we have to make sure we do not neglect the ethical side of the story." (European Commission, 2019b: 21).

Furthermore, the digital utopian facet of AI in the green growth discourse appears in the Sustainable Europe 2030 conference report (2019) and is referred to as disrupting the status-quo of the system. As Dickel & Schrape (2017) outline, the utilization of utopias acts as a critique of the status-quo. In this issue, AI is defined as such a disruptive factor:

"Today, several disruptive factors are challenging the stability of our social, environmental and economic systems. They include increasingly globalised and connected markets, the power and influence of technologies such as the Internet of Things and Artificial Intelligence, growing inequality, and the many social and environmental challenges, in particular climate change." (European Commission, 2019b: 10).

4.5 Conclusion

Following the analysis, a conclusion of the outcomes and general insights is provided. Regarding the first argument made, namely that the EU seeks to establish a link it was clearly proven that this ambition exists. Following this, it has also been discovered that the use of the wording AI has only become common recently, even though development in smart grids with regard to sustainable development has been researched and invested into for more than years until the present day. Thus, there has been some reformulation in this matter. This insight can be considered as an addition to the state of the art, since the embeddedness of AI as a wording in the green growth discourse is a recent phenomenon that has not been researched extensively. Thus, there has been some reformulation in this matter. The second argument, looking at the technological solutionist character of the green growth discourse was proven as well, to the extent that neither a concrete problem has been formulated nor a specific application of AI in general. It was oftentimes emphasized that technological innovation has to be embraced despite the lack of specialization of how exactly this will solve a problem. It can thus be said that there is no concrete knowledge yet of how the application of AI is supposed to solve issues of

numerous kinds. These findings are in line with what has been discovered in existing literature, with the additional knowledge of AI to be encouraging the feature of technological solutionism. Lastly, the argument that the green growth discourse and the use of AI is digital utopian was found to be true to the extent that Europe is envisioned to become a sustainable welfare state and that AI is sought to be an essential element in the construction of such a future. It is frequently relied on past technological advancements which paint a bright future with regard to the utilization of AI in terms of green growth. The wasteful character of AI which entails a dystopian notion is hardly considered, solely with regard to ethical concerns its use is usually questioned. The discovery of this digital utopian facet of the green growth discourse which is highly promoted by the potential which is attached to AI matches existing research on the paradoxical nature of digital utopias.

5. Conclusion

5.1 Answer to the research question

Finally, the main research question: *In what ways does the European Union envision the prospects of Artificial Intelligence in its green growth discourse?* can be answered. By means of the analysis I was able to develop key insights into the green growth discourse of the EU. There is evidence, that the EU seeks to embed AI in this discourse. However, the application of AI to sustainability issues could be traced back until 2006. Nevertheless, the reformulation and thus the use of the wording 'AI' has become popular only recently in accordance with the EU's strategy for 'AI made in Europe' established in 2018. Moreover, this analysis found that the green growth discourse is to a great extent technological solutionist and digital utopian as the existing literature has proposed. Even though the embeddedness of AI in the green growth discourse by the EU has proven to be true, the way in which AI should be applied is lacking, just as the formulation of a precise goal that is pursued by the utilization of AI.

5.2. Suggestions for future research

The insights developed are significant in relationship to what has been found previously. In general, the insights are in line with previous research concerning green growth. However, the two characteristics of technological solutionism and digital utopianism could be assigned to the green growth discourse by means of adding the field of AI to it. Building on the work of Ferguson (2015), it was pointed out that sustainable development suffers from a deficiency in precision. This concerns the what, how and for whom of the goals discussed in the green growth discourse but also in terms of policy. Furthermore, the green growth discourse features patterns that are typical for contemporary lifestyles as depicted by Johnston (2018). It was developed, that being obliged to depend on technology as a universal solution is a common facet of the green growth discourse. This includes the expression of criticism when technology is not embraced. Accordingly, Kuntsman & Rattle (2019) acknowledged that technological innovations are presumed to enable green growth, despite evidence developed in literature that these innovations encompass harms to the environment themselves. Building on this, it was found that the high energy consumption especially of AI is a known fact. Despite this unsustainable component of AI, it is believed to solve exactly this problem of vast consumption.

This thesis further builds on the work of Russo (2018) and the investigation of technological determinism which is encompassed in the feature of digital utopianism. By the constrained inclusion of technology, a path dependency for both life and society is created. The findings of

this thesis can moreover be applied to the "myth of progress" (Bozzi, 2016: 43) as the embeddedness of AI serves as a mean for the achievement of a sustainable energy transition. Whether this goal will ultimately be achieved however, does appear clearly from the analysis of the green growth discourse, leading to the result that the discourse is marked by digital utopianism. In contradiction to the work of Morozov, I came to the conclusion that his criticism of the enthusiasm regarding technology to safeguard freedom and democracy can be countered by politicizing the issues which are approached in a highly technical way at this point in time of the green growth discourse.

Due to the aim and the scope of the research, some limitations have to be pointed out. This entails, that some features of the three main concepts that could not have been neglected in theory could not be looked into in great detail. An example for this would be the feature of social inclusion which is one of the goals of the strategy for smart, sustainable and inclusive growth of the EC. Even though it is highly relevant for the green growth discourse it was not exclusively relevant for the aim of the research. However, in order to find out whether the green growth discourse is addressing the issue of social inclusion adequately should be investigated further in future research. Another issue at stake that would need further research is the problem of whether the green growth discourse will lead to outcomes that benefit the environment or if it is instrumentalized in order to expand international leadership for instance in technological development.

5.3 Practical implications for policy and governments

The leading United Nations platform 'AI for good' is a global summit for dialogue on AI. The 2018 edition was action oriented and focused on AI solutions that could have a great effect on the achievement of the Sustainable Development Goals. It was also looked at the role of governments in this issue. The question of how and whether governments and international institutions should utilize the resource of AI for advancement or rather ensure that private companies are able to innovate and progress for consumer advantage was addressed (Interntational Telecommunication Union, 2018). The analysis of this thesis has found that there is evidence of technocratization of problems that are by their nature of a political kind, prevailing in the EU. In order for the EU to live up to its standards, politicization of these problems is needed.

As Harcourt & Radaelli (1999) outline, in technocratic policy, expertise and information outweighs other resources. Typically, EU directives are incomprehensible even for educated citizens as they are highly technical and represent the deficiency of attributing importance to a

political matter in the policy-making processes of the EU (Harcourt & Radaelli, 1999). Issues of technocracy are pointed out by Khoo (2010) concerning its relation to politics which encompasses the power to make and implement decisions but also that it gravitates towards functioning in an environment that does not offer a lot of resistance (Khoo, 2010). To counter this technocratic approach towards green growth that is currently performed by the EU and as a first recommendation, I propose the politicization of the issues at stake. This politicization would establish the requirements for democratization of a society in addition to protecting the democratic society and thus making politics a public concern (Zürn, 2014). The politicization would thus, in the interest of green growth, from the very start act in the interest of the goal of social inclusion.

Regarding the implementation of the green growth strategy with a focus on environmental stability and technological innovation, I suggest two recommendations in terms of policy instruments. In order to attain environmental sustainability and a transition to an energy system that runs on renewable resources, carbon emission has to become less profitable. Therefore, I advise the introduction of a carbon tax that is high enough to ensure its effectiveness as environmental externalities cannot be left out of the picture. Simultaneously, the knowledge gap concerning technology with special regard to AI needs to be closed by means of subsidizing renewable technologies. Thus, I recommend assisting research and development by investments to ensure that the potential attached to and envisioned for such technologies to resolve the climate crisis can be translated into actual results to further counter the lack of preciseness in what can actually be expected from them.

References

Babbie, E. (2007). The Practice of Social Research (Fourteenth Edition ed.). Boston Cengage Learning

Bait, M., Brambilla, M., & Crestani, V. (2016) Utopian Discourses Across Cultures. Scenarios in Effective Communication to Citizens and Corporations. Peter Lang GmbH

Blaxekjaer, L. (2012). The Emergence and Spreading of the Green Growth Policy Concept. Earth System Governance. Retrieved from: http://www.earthsystemgovernance.org/lund2012/LC2012-paper370.pdf

Bozzi, P. (2016). Sex and the City: Berlin and the Utopia of a New Discursive and Visual Frontier in the Branding of the Creative Place. In: Utopian Discourses Across Cultures. Scenarios in Effective Communication to Citizens and Corporations. Peter Lang GmbH

BusinessEurope. (2017). Artificial Intelligence (AI). BusinessEurope. Retrieved from: https://www.businesseurope.eu/sites/buseur/files/media/position_papers/internal_market/2017-12-15_artificial_intelligence.pdf

Dickel, S., & Schrape, J.-F. (2017). The Logic of Digital Utopianism. Nanoethics, 11, S. 47-58.

Dryzek, J. S. (2013). The politics of th earth: environmental discourses (Bd. 3rd edition). Oxford: Oxford University Press.

European Commission. (2010). Europe 2020. eur-lex. Retrieved from: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF

European Commission. (2006). European SmartGrid Technology Platform. Vision and Strategy for Europe's Electricity Networks of the Future. Retrieved from: https://ec.europa.eu/research/energy/pdf/smartgrids_en.pdf Last access: 02.07.2019

European Commission. (2010a). Communication from the Commission. Europe 2020. A strategy for smart, sustainable and inclusive growth. Retrieved from: http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf Last access: 02.07.2019

European Commission. (2010b). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Energy 2020. A strategy for competitive, sustainable and secure energy. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0639&from=EN Last access: 02.07.2019

European Commission. (2012). Energy roadmap 2050. Retrieved from: https://ec.europa.eu/energy/sites/ener/files/documents/2012_energy_roadmap_2050_en_0.pdf Last access: 02.07.2019

European Commission. (2017). The Strategic Energy Technology Plan. At the heart of Energy Research and Innovation in Europe. Retrieved from: https://setis.ec.europa.eu/sites/default/files/setis%20reports/2017_set_plan_progress_report_0.pdf Last access: 02.07.2019

European Commission. (2018a). 10 Trends. Reshaping Climate and Energy. Retrieved from:https://ec.europa.eu/epsc/sites/epsc/files/epsc_-_10_trends_transforming_climate_and_energy.pdf Last access: 02.07.2019

European Commission. (2018b). Europe's Sustainability Puzzle. Broadening the Debate. Retrieved from: https://ec.europa.eu/epsc/sites/epsc/files/epsc_sustainability-puzzle.pdf Last access: 02.07.2019

European Commission. (2018c). Horizon 2020. Supporting Innovative Solutions for Smart Grids and Storage. Project Examples. Retrieved from: https://ec.europa.eu/inea/sites/inea/files/h2020_sgs_brochure_2018-web.pdf Last access: 02.07.2019

European Commission. (2018d). Report from the High-Level Hearing. 'A European Union Strategy for Artificial Intelligence'. Retrieved from: https://ec.europa.eu/epsc/sites/epsc/files/epsc_-_report_-_hearing_-_a_european_union_strategy_for_artificial_intelligence.pdf Last access: 02.07.2019

European Commission. (2019a). Reflection Paper. Towards a Sustainable Europe by 2030. Retrieved from: https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf Last access: 02.07.2019

European Commission. (2019b). High-Level Conference. Sustainable Europe 2030. From Goals to Delivery. Retrieved from: https://ec.europa.eu/epsc/sites/epsc/files/sdgconf_thinkpieces.pdf Last access: 02.07.2019

European Commission. (2019c). Clean energy for all Europeans. Retrieved from: https://publications.europa.eu/en/publication-detail/-/publication/b4e46873-7528-11e9-9f05-01aa75ed71a1/language-en?WT.mc_id=Searchresult&WT.ria_c=null&WT.ria_f=3608&WT.ria_ev=search Last access: 02.07.2019

European Commission. (2019d). Report from the Commission. To the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank. Fourth report on the State of the Energy Union. Retrieved from: https://ec.europa.eu/commission/sites/beta-political/files/fourth-report-state-of-energy-union-april2019_en_0.pdf Last access: 02.07.2019

Ferguson, P. (2015). The green economy agenda: business as usual or transformational discourse? 24(1), 17-37.

Flick, U. (2014). Sozialforschung. Methoden und Anwendungen Reinbek: Rowohlt Taschenbuch Verlag

Gazzola, P., & Onyango, V. (2019). Going green vs going smart for sustainable development: Quo vadis? Journal of Cleaner Production, 214, 881-892.

Harcourt, A. J., & Radaelli, C. M. (1999). Limits to EU technocratic regulation? European Journal of Political Research, 35, 107-122.

Herweijer, C. (2018). 8 ways AI can help save the planet. World Economic Forum. Retrieved from: https://www.weforum.org/agenda/2018/01/8-ways-ai-can-help-save-the-planet/

Interntational Telecommunication Union. (2018). AI for Good Global Summit 2018 Report Accelerating progress towards the SDGs. AI for Good An ITU Experience. Retrieved from: https://2ja3zj1n4vsz2sq9zh82y3wi-wpengine.netdna-ssl.com/wp-content/uploads/2018/12/SDGs-Report.pdf

Johnston, S. F. (2018). The Technological Fix as Social Cure-All: Origins and Implications. IEEE Technology and Society, 37(1), 47-54.

Jørgensen, M., & Phillips, L. J. (2002). Discourse analysis as theory and method. London, : SAGE Publications Ltd doi: 10.4135/9781849208871

Keller, R. (2015). Doing Discourse Research: An Introduction for Social Scientists. SAGE Research Methods, 1-4.

Khoo, B. (2010). No insulation : politics and technocracy's troubled trajectory. IDE Discussion Paper No. 236.

Kuntsman, A., & Rattle, I. (2019). Towards a Paradigmatic Shift in Sustainability Studies: A Systematic Review of Peer Reviewed Literature and Future Agenda Setting to Consider Environmental (Un)sustainability of Digital Communication. Environmental Communication, 13(5), 567-581.

Maria, D. (2019). Promoting sustainable and inclusive growth and convergence in the European Union. Bruegel. Retreived from: http://bruegel.org/wp-content/uploads/2019/04/PC-07_2019.pdf abgerufen

Mol, A. P., & Spaargraren, G. (2007). Ecological modernisation theory in debate: A review. Environmental Politics, 9(1), 17-49.

Muto, S. (2017). From laissez-faire to intervention: Analysing policy narratives on interoperability standards for the smart grid in the United States. Energy Reserach & Social Science, 31, S. 111-119.

OECD. (2008). Sustainable Development. Linking economy, society, environment. Retrieved from: https://www.oecd-ilibrary.org/docserver/9789264055742-en.pdf?expires=1562102342&id=id&accname=guest&checksum=0EAD1D1DD8EECDC0B53729517CAF6219 Last access: 02.07.2019

OECD. (2019). Recommendation of the Council on Artificial Intelligence. Retrieved from: https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449 Last access: 02.07.2019 Last access: 02.07.2019

OECD. (2017). Green Growth Indicators 2017. OECD. Retrieved from: https://issuu.com/oecd.publishing/docs/highlights_green_growth_indicators_?e=3055080/50218882 abgerufen

Renda, A. (2019). Artificial Intelligence. Ethics, governance and policy challenges. Report of a CEPS Task Force. Retrieved from: https://www.ceps.eu/wp-content/uploads/2019/02/AI_TFR.pdf Last access: 02.07.2019

Russo, F. (2018). Digital Technologies, Ethical Questions, and the Need of an Informational Framework. Philosophy & Technology, 31, 655-667.

Schüll, N. D. (2013). THE FOLLY OF TECHNOLOGICAL SOLUTIONISM: AN INTERVIEW WITH EVGENY MOROZOV. Public Books. Retrieved from: https://www.publicbooks.org/the-folly-of-technological-solutionism-an-interview-with-evgeny-morozov/

Slayton, R. (2013). Efficient, Secure Green: Digital Utopianism and the Challenge of Making the Electrical Grid “Smart”. Information & Culture: A Journl of History, 48, S. 448-478.

Smulders, S., Toman, M., & Withagen, C. (2014). Growth theory and ‘green growth’. Oxford Review of Economic Policy, 30(3), 423-446.

Song, M., Sean, R. F., Fisher, R., & Tseng, M.-L. (2019). Technology innovation for green growth and sustainable resource management. Resources, Conservation & Recycling, 141, S. 501.

Stegemann, L., & Ossewaarde, M. (2018). A sustainable myth: A neo-Gramscian perspective on the populist and post- T truth tendencies of the European green growth discourse. Energy Research & Social Science, 43, 25-32.

Stoknes, P. E., & Rockström, J. (2018). Redefining green growth within planetary boundaries. Energy Reserach & Social Science, 44, S. 41-49.

Taffel, S. (2018). Hopeful Extinctions? Tesla, Technological Solutionism and the Anthropocene. Culture Unbound, 10(2), S. 163-184.

Tonkinwise, C. (2014). To Save Everything, Click Here: The Folly of Technological Solutionism. Journal of Design History, 27(1), 111-113.

Van Dijk, T. A. (1993). Principles of critical discourse analysis. Discourse & Society, 4(2), 249-283.

Zürn, M. (2014). The politicization of world politics and its effects: Eight propositions. European Political Science Review, 6(1), 47-71.

Appendix

Table 1: Green Growth

	EU Cit: 3630 Doc: 14			Stakeholders Cit: 3918; Doc: 12			Sum
	Absolute	Row relative	Column relative	Absolute	Row relative	Column relative	Absolute
○ **Economic Growth** Cit =2319	1018	43,88%	23,76%	1302	56,12%	27,84%	2320
○ **Environmental Sustainability** Cit =1710	1014	59,30%	23,67%	696	40,70%	14,88%	1710
○ **Social Inclusion** Cit =665	258	38,80%	6,02%	407	61,20%	8,70%	665
Green Growth Cit = 4265; Codes =3	1994	46,75%	46,55%	2271	53,25%	48,57%	4265
Sum	4284		100,00%	4676		100,00%	8960

Table 2: Technological Solutionism

	EU Cit=3630; Docs=14			Stakeholders Cit=3918; Docs=12			Sum
	Absolute	Row relative	Column relative	Absolute	Row relative	Column relative	Absolute
○ **Elite Empowerment** Cit = 259	100	38,61%	4,39%	159	61,39%	7,35%	259
○ **Shallow Economy** Cit=402	235	58,46%	10,32%	167	41,54%	7,72%	402
○ **Technological Fix** Cut=1757	917	52,16%	40,27%	841	47,84%	38,88%	1758
Technological Solutionism Cit=2021; Codes=3	1025	50,72%	45,02%	996	49,28%	46,05%	2021
Sum	2277		100,00%	2163		100,00%	4440

Table 3: Digital Utopianism

	EU Cit=3630; Docs=14			Stakeholders Cit=3918; Docs=12				Sum
	Absolute	Row-relative	Column-relative	Absolute	Row-relative	Column-relative	Table-relative	Absolute
○ **Energy Transition** Cit=2995	1728	57,68%	30,76%	1268	42,32%	26,96%	12,29%	2996
○ **Future Vision** Cit=1080	600	55,50%	10,68%	481	44,50%	10,23%	4,66%	1081
○ **Technopolitical Regime** Cit=1594	794	49,81%	14,14%	800	50,19%	17,01%	7,75%	1594
Digital Utopianism Cit=4649; Codes=3	2495	53,67%	44,42%	2154	46,33%	45,80%	20,87%	4649
Sum	5617		100,00%	4703		100,00%	45,57%	10320

List of data

Business Europe. (2017). Strategy Paper. Artificial Intelligence (AI). Retrieved from: https://www.businesseurope.eu/sites/buseur/files/media/position_papers/internal_market/2017-12-15_artificial_intelligence.pdf Last access: 02.07.2019

Business Europe. (2019). European Business Views. On a competitive energy & climate strategy. Retrieved from: https://www.businesseurope.eu/sites/buseur/files/media/reports_and_studies/final_brochure_energy_and_climate_strategy_april_2019__update_20_june_to_fix_one_figure.pdf Last access: 02.07.2019

Darvas, Z. & Wolff, G.B. (2016). Bruegel Blueprint Series. An anatomy of inclusive growth in Europe. Retrieved from: http://bruegel.org/wp-content/uploads/2016/10/BP-26-26_10_16-final-web.pdf Last access: 02.07.2019

Demertzis, A., Sapir, A. & Wolff, G. (2019). Promoting sustainable and inclusive growth and convergence in the European Union. Retrieved from: http://bruegel.org/wp-content/uploads/2019/04/PC-07_2019.pdf Last access: 02.07.2019

European Commission. (2006). European SmartGrid Technology Platform. Vision and Strategy for Europe's Electricity Networks of the Future. Retrieved from: https://ec.europa.eu/research/energy/pdf/smartgrids_en.pdf Last access: 02.07.2019

European Commission. (2010a). Communication from the Commission. Europe 2020. A strategy for smart, sustainable and inclusive growth. Retrieved from: http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf Last access: 02.07.2019

European Commission. (2010b). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Energy 2020. A strategy for competitive, sustainable and secure energy. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0639&from=EN Last access: 02.07.2019

European Commission. (2012). Energy roadmap 2050. Retrieved from: https://ec.europa.eu/energy/sites/ener/files/documents/2012_energy_roadmap_2050_en_0.pdf Last access: 02.07.2019

European Commission. (2017). The Strategic Energy Technology Plan. At the heart of Energy Research and Innovation in Europe. Retrieved from: https://setis.ec.europa.eu/sites/default/files/setis%20reports/2017_set_plan_progress_report_0.pdf Last access: 02.07.2019

European Commission. (2018a). 10 Trends. Reshaping Climate and Energy. Retrieved from: https://ec.europa.eu/epsc/sites/epsc/files/epsc_-_10_trends_transforming_climate_and_energy.pdf Last access: 02.07.2019

European Commission. (2018b). Europe's Sustainability Puzzle. Broadening the Debate. Retrieved from: https://ec.europa.eu/epsc/sites/epsc/files/epsc_sustainability-puzzle.pdf Last access: 02.07.2019

European Commission. (2018c). Horizon 2020. Supporting Innovative Solutions for Smart Grids and Storage. Project Examples. Retrieved from: https://ec.europa.eu/inea/sites/inea/files/h2020_sgs_brochure_2018-web.pdf Last access: 02.07.2019

European Commission. (2018d). Report from the High-Level Hearing. 'A European Union Strategy for Artificial Intelligence'. Retrieved from: https://ec.europa.eu/epsc/sites/epsc/files/epsc_-_report_-_hearing_-_a_european_union_strategy_for_artificial_intelligence.pdf Last access: 02.07.2019

European Commission. (2019a). Reflection Paper. Towards a Sustainable Europe by 2030. Retrieved from: https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf Last access: 02.07.2019

European Commission. (2019b). High-Level Conference. Sustainable Europe 2030. From Goals to Delivery. Retrieved from: https://ec.europa.eu/epsc/sites/epsc/files/sdgconf_thinkpieces.pdf Last access: 02.07.2019

European Commission. (2019c). Clean energy for all Europeans. Retrieved from: https://publications.europa.eu/en/publication-detail/-/publication/b4e46873-7528-11e9-9f05-01aa75ed71a1/language-en?WT.mc_id=Searchresult&WT.ria_c=null&WT.ria_f=3608&WT.ria_ev=search Last access: 02.07.2019

European Commission. (2019d). Report from the Commission. To the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank. Fourth report on the State of the Energy Union. Retrieved from: https://ec.europa.eu/commission/sites/beta-political/files/fourth-report-state-of-energy-union-april2019_en_0.pdf Last access: 02.07.2019

European Commission. (2019e). Artificial Intelligence for Europe. Retrieved from: https://ec.europa.eu/digital-single-market/en/news/factsheet-artificial-intelligence-europe Last access: 02.07.2019

European Distribution System Operators. (2019f). E.DSO Response to CEER Consultation on Dynamic Regulation to Enable Digitalisation of the Energy System. Retrieved from: https://www.edsoforsmartgrids.eu/wp-content/uploads/2019/05/E.DSO-response-to- CEER-consultation-on-Dynamic-Regulation-to-Enable-Digitalisation-of-the-Energy- System_final.pdf Last access: 02.07.2019

OECD. (2008). Sustainable Development. Linking economy, society, environment. Retrieved from: https://www.oecd-ilibrary.org/docserver/9789264055742-en.pdf?expires=1562102342&id=id&accname=guest&checksum=0EAD1D1DD8EECDC0B53729517CAF6219 Last access: 02.07.2019

OECD. (2019). Recommendation of the Council on Artificial Intelligence. Retrieved from: https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449 Last access: 02.07.2019 Last access: 02.07.2019

Renda, A. (2019). Artificial Intelligence. Ethics, governance and policy challenges. Report of a CEPS Task Force. Retrieved from: https://www.ceps.eu/wp-content/uploads/2019/02/AI_TFR.pdf Last access: 02.07.2019

WEF. (2019a). Insight Report. Fostering Effective Energy Transition. 2019 edition. Retrieved from: http://www3.weforum.org/docs/WEF_Fostering_Effective_Energy_Transition_2019.pdf Last access: 02.07.2019

WEF. (2019b). Insight Report. Innovate Europe. Competing for Global Innovation Leadership. Retrieved from: http://www3.weforum.org/docs/WEF_Innovate_Europe_Report_2019.pdf Last access: 02.07.2018

WEF. (2018a). Insight Report. Fostering Effective Energy Transition. A Fact-Based Framework to Support Decision-Making. Retrieved from: http://www3.weforum.org/docs/WEF_Fostering_Effective_Energy_Transition_report_2018.pdf Last access: 02.07.2019

WEF. (2018b). Two Degrees of Transformation. Businesses are coming together to lead on climate change. Will you join them? Retrieved from:

http://www3.weforum.org/docs/WEF_Two_Degrees_of_Transformation.pdf Last access: 02.07.2019