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**THESIS**

**SOCIETAL ATTITUDE CLUSTERS TOWARD ENERGY AND**

**ENVIRONMENTAL POLICIES**

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Η Άννα Αικατερίνη Μιχαλοπούλου βεβαιώνω ότι το έργο που εκπονήθηκε και παρουσιάζεται στην υποβαλλόμενη διπλωματική εργασία είναι αποκλειστικά ατομικό δικό μου. Οποίες πληροφορίες και υλικό που περιέχονται έχουν αντληθεί από άλλες πηγές, έχουν καταλλήλως αναφερθεί στην παρούσα διπλωματική εργασία. Επιπλέον τελώ εν γνώσει ότι σε περίπτωση διαπίστωσης ότι δεν συντρέχουν όσα βεβαιώνονται από μέρους μου, μου αφαιρείται ανά πάσα στιγμή αμέσως ο τίτλος.

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# Chapter 1: Introduction

## 1.1 Introduction

Climate change is a major challenge of the modern era. Anthropogenic activities through the industrial development are the main contributors to Earth's climate alterations. The industrial revolution integrated fossil fuels consumption system, is being instrumental for the atmospheric concentration of greenhouse gases and simultaneously responsible for the greenhouse effect which causes an amount of impacts that threatens the viability and the proper functioning of natural and human systems as well.(Diaz.,et al 2019).

Governments , by designing and implementing policies and long-term climate ambitious goals, aiming in the mitigation and the transitioning into a lower-carbon energy system. Concretely , after the Paris Agreements some of the top emitters as China and EU intensified their efforts to become carbon neutral, by orchestrated and coordinate the majority of their elementary components. Contrariwise International Actors as US doesn't always complies with the International climate directions, and follows a reversal policy path full of ups and downs that wobbling the climate energy transitioning regime .

As it will be ascertain in the present thesis policy-making facilitate such a complex and multilateral process by combining a range of factors shaping and affecting the final policy outcome. Culture and the social perception of climate and policy-making consists a core factor on the implementation or the rejection of a policy.

The current Thesis will be attempt toward the Cultural theory of Risk , to portray the different perceptions and attitudes regarding the application of energy and climate policies alongside with the authority interaction. Certainly this will be achieved through the examination and comparison of relevant surveys.



## **1.2 Structure of the thesis**

The structural corporation of the current dissertation follows a certain path. Inaugurate, in Chapter 2, introduced toward the literature review the Cultural theory of risk a Socio-Anthropological theory, which attempted to be combined with institutional and political core cues. For this purpose are presented in this chapter, the International Climate and energy negotiations and actions, the instruments of Energy and Climate Policy, and lastly conducted a brief overview of the Energy and Climate Policies of three great Powers as China, the United States, and European Union. Chapter 3, concerns the methodology, which in particular presented a systematic literature review. Chapter 4 is about the results, the comparison, and analysis of the different social and cultural groups regarding the institutions and Government Actions on climate and energy. Lastly, Chapter 5 , is about the conclusion and future research directions on future researchers that might be conducted.

## **Chapter 2: Literature review**

### **2.1 Cultural theory of risk**

When we refer to attitudes and perceptions of social clusters in correlation to Environmental and energy matters, the approach it is been made toward the Cultural Theory of risk in order to proceed the contribution of cultural factors into policy-making (Adger et al.2009).The theory has been developed in the 1970s, as a result of an evolutionary era where political and non events occurred, by affecting the societal clusters.

Cultural theory of risk is a Neo-Durkheimian institutional theory (Turner, 1990; Tansey,2004), which first developed in anthropology as a mean of depicting the risk perception ideas, judgments of danger, pollution and threats (Thompson, Ellis & Wildavsky, 1990). It reveals the social construction of individuals beliefs, worldviews and actions in connection to social group they belong. Individuals have a specific risk perception in the environment around them, and a certain way of life, that engages socio-politics with ecology. (Douglas & Wildavsky, 1982; Thompson et al. 1990; Douglas, 1997;Thompson & Rayner, 1998).The theory is used as a tool in order to explain the perceptions, attitudes, actions and environmental beliefs, in association with the global climate change and the policy preferences as well (Jones, 2011;Leiserowitz, 2006; Poortinga, Steg, & Vlek, 2002; Steg & Sievers, 2000). Cultural theory provides a conceptual model, known as “Clumsy solutions”, in order to meet policy solutions by combining and matching pluralities in institutions (Thompson et al., 1990; Hartmann & Hengstermann, 2014).

Douglas was the broacher of the cultural theory, with an important contribution to the cosmology and risk perception analysis. As it looms toward her ethnographic work, in her first steps in Purity and Danger (Douglas, 1966), primitive societies perceive the danger, threat and risk in association with the blame. Each society has a different perception of danger. That implies a politicization of risk as a mean of bonding, coherence and trust inside the social group. The “forensic

model of danger”, as she called it in order to describe the process of risk and danger in simpler or primitive societies, didn’t apply and wasn’t viable in industrial societies for too long (Douglas, 1992; Boholm, 1996).

From this point with the contribution and collaboration of other scholars achieved the construction and the formalization of the CT (Douglas & Wildavsky, 1982)

Douglas and Wildavsky in 1982 introduced the grid/group typology as a result of formalization of her early work ideas and perceptions on hazard and pollution.

Cultural theory built up in a fourfold typology that stems from a two different sociality axes: grid and group typology (Gross & Rayner, 1985). By grid is referred to the individual’s choices which are forced by their social status, and Group reflects the level of solidarity among the members of society (Thompson et al., 1990. Hartmann, 2012).

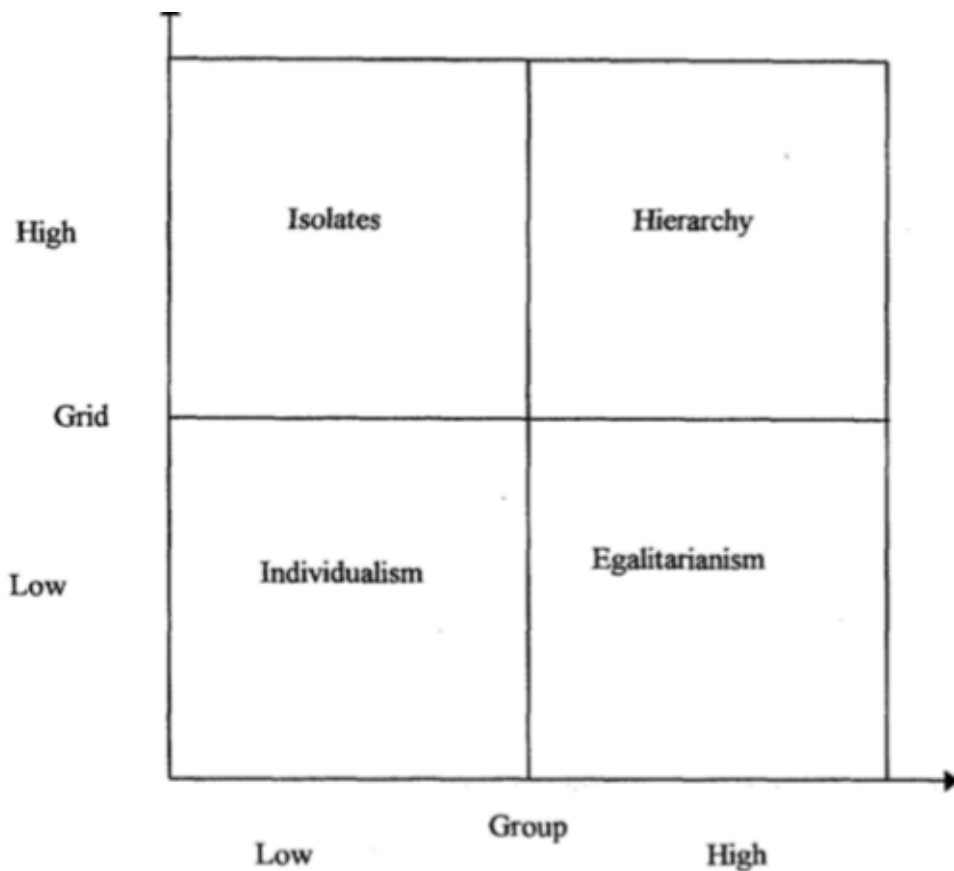


Figure 2.1

The theory's typology formed and evolved and also expanded from the narrow field of risk and applied in other scientific terrains too (Tansey & O'Riordan, 1999). There are four biases of organize and perceive the social relations, the solidarities which are Individualism, Egalitarianism, Hierarchism and Fatalism (Thompson et al., 1990). Through the cultural theory, and with this fourfold typology, we understand why these relations become political, and how each of those solidarities follows climate policies.

In Hierarchy, high grid /high group, they have normative consecutive powers, in many cases they control the world as they have an institutional establishment. Their fear is a world without institutional order. In this case, Environment and nature is stable until significant issues occurred. After this point, experts are those who will set the environmental limits determine the risks and ensure the related regulations.

In Individualism, low grid /low group, people are self-focused and atomistic and they promote ego-focused organizations. Their fear is the loss of personal freedom, usually belong to the right-wing, and the risk associates with the environmental intervention as long as it gives them profits, as they believe in the authority. They believe that nature has the ability to recover itself. Institutions that work the grain of the market is what society needs.

In Egalitarianism, low grid /high group nature is fragile and ephemeral. Their fear is an injustice world. Their political stands in left-wing and they tend to risk and promote changes in the environment, as well as they reject the authorities, government and institutions. They are prone not to take risks in the matters relate to natural systems. Only in the case that this choice indicates benefits for the future generations, lastly they believe in equality between people. The resolution of environmental problems settle in voluntary. This group describes them self's as "*core ecologists*".

In Fatalism, high grid/low group. The fourth category projects a nihilist perception where man is untrustworthy. They perceive the world as an unfair place with nothing can be alter. As a result there is a no better future in nature. Everything is left to the fate(Caputo, 2008)

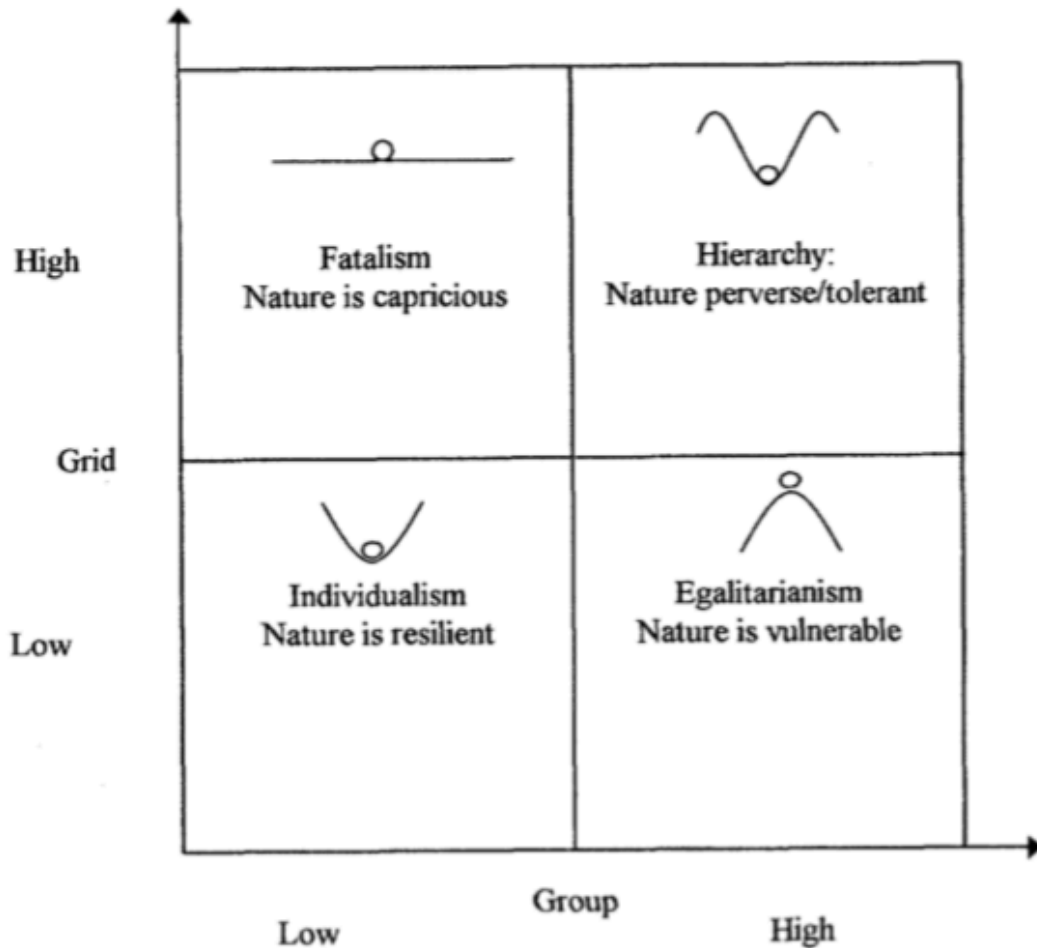


Figure 3. Myths of humans and nature.

Figure.2.2

Source : Tansey, J., O’riordan, T. 1999, *Cultural Theory and Risk : a review*, Health and Risk Society

### 2.1.1 Measurements

A number of studies have been conducted in order to measure the theory. The initial effort was made in 1990 by Dake and Wildavsky (Dake, 1990, 1991, 1992; Dake & Wildavsky, 1990, 1991), who developed survey research in order to operationalize and measure the worldviews. Dake, (1990,1991), attempt to develop tools to measure the theory, by borrowing measuring tools form

psychometric paradigm .More sophisticate approaches of this measurement attempted to be used in other studies too ( Marris *et al.*,1996, 1998) , Palmer (1996).

Dake by focusing on the three worldviews, hierarchism, egalitarianism, and individualism, excluded fatalism, consider those three worldviews capable to predict political changes. This validity of this approach is considered incomplete and problematic as it ignores the fundamental base of CT, as it doesn't demonstrate scale reliability (Marris, Langford, & O' Riordan, 1998; Rippl, 2002;Kahan, 2012).

### **2.1.2 Implications**

Cultural theory has a number of normative imputations. As it deflates the factor of individuals free will, nor it took into account other theories and circumstances, which might affected individuals posture (Douglas, 1992). It is highlighted that typology is static, it doesn't depict the flow/the dynamic process of life changes (Rayner, 1993). Moreover, the typology is not an analytical tool. Many scholars consider it as an heuristic (Tansey, 2004;West et al., 2010;Malsch et al., 2012). The efforts to quantify the CT, have transformed it into a psychological theory perception with a focus to individuals rather than in the society (Tansey, 2004). In this point to be added, the basic problematic with cultural theory is located in the limited numbers of applications of the theory, the majority attempts to operationalize the CT, facing issues in survey research (Swedlow , Ripberger, Silva Jenkins-Smith ,2016).

The risk perception considered, something more complex than just the proposed categorization, and even more the social roles and the social organizations comprise a complex system (Renn et al., 1992; Sjoberg 1997).

## **2.2 International climate and energy policies**

Energy has a key role in social development and in economic growth. Fossil fuels are the core of energy systems as they possess a dominant role on global energy demand and are the main contributors to the CO<sub>2</sub> emissions. In 2018, according to IEA, the largest amount of energy consumption was from fossil fuels, oil 10% coal and 16,2% natural gas and only 11% of nuclear energy and biofuels 10.2% respectively.<sup>1</sup>

As a consequence of the intense rise of global energy demand, climate change has become a major challenge of the era. The consequences of the intensive use of fossil fuels are responsible for the depletion of natural sources, the rise of global temperature and a severe amount of impacts on natural and human systems as well (IPCC 2007). Under those circumstances, a range of international actions and policies developed in the elapsing of time.

At this point, will be present a literature overview of international climate policies and actions, as those transpired from the 1970s until Paris Agreement Era. Therefore, I considered sagacious to make a division into four era phases, to illustrate the escalation, purport and processes of each period by including the central actors, agreements, political and environmental outcomes and generally main events that occurred, for each period. Grading is done has the following order: the pre-1990s period, 1990s-Kyoto Protocol era, the Post Kyoto time that exceeds from 2000 to 2008 and lastly the Period from Copenhagen to Paris Agreement.

### **2.2.1 The pre-1990s era**

The pre-1990s, was an early almost fetal period for environmental actions and policies. It was not until 1979 when the climate and environmental awareness shifted for the first time from the

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<sup>1</sup> IEA, Global share of total final consumption by source, 2018. Available at: <https://www.iea.org/reports/key-world-energy-statistics-2020/final-consumption>

scientific to a Political degree through the First World Climate Conference (WCC-1) in Geneva (Thuestad-Isaksen, 2020)

The outcomes of the conference were the establishment of the World Climate Programme (WCP) that incorporates the World Climate Data Programme (WCDP), the World Climate Applications Programme (WCAP), World Climate Research Programme (WCRP) and the World Climate Impact study Programme (WCIP) (Potter, 1986). Practically constitute climate services responsible to deliver and coordinate the scientific research in association with climate matters and alongside to bridging the scientific climate research with the international terrain (Vaughan, Dessai, 2014).

A concatenation of conferences followed as Villach (WMO, 1985), and Toronto (WMO, 1988). In the Toronto conference the main subject was a call to the Governments rally in order to boot the negotiations on atmosphere protection (WMO, 1988). In the turn of the decade, in 1988 the IPCC an institutional Intergovernmental body established by the World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP). IPCC's mission is the provision of scientific services, by assisting in the policy-making processes through the furnishing of, information, reports, assessments to governments in order to improve or formulate the relative climate policies contexts (Hulme, Mahony, 2010). Additionally, a year later in 1989, The Climate Action Network, established, as a result of environmental NGOs alliances, in essence comprise a network in approximately over 130 countries that promotes sustainable actions aiming in addressing climate challenges, and promoting the political dialogue in civil society at the UN climate talks (Duwe, 2002). In conclusion, this period feature is the formalization of Political, environmental, and societal instruments, that creates a fertile ground, for the mobilization and dispersion of coherent climate and policy objectives in all vital and structural parts of a state.



## 2.2.2 1990S -FROM RIO TO KYOTO

The 1990s, was a decade of intense geopolitical, economical, societal and environmental transformations. Significant events, as the end of cold-War by the fall of the Soviet Union in 1991, the War of Kuwait, and a sequence of incessant internal structural transitioning processes in the EU, are some of the events which affected and shifted the balance of power and created a new context by arising new challenges (Gerges, 1993; Kassim, Menon, 2004; Harrison, 2004). Simultaneously, climate processes and actions continued unabated. The IPCC (1990) published its first Assessment Report, by warning for the climate change consequences and emphasizing the need for international actions and cooperation.

Two decades after the Stockholm Declaration of 1972, in Rio took Place the UNCED (1992) known also as “Earth Summit», which for the first time put forward the sustainable development and the need for balance among social, economical, and environmental fields in order to make feasible the plan for sustainable development.<sup>2</sup> More specifically the key points of the conference were:

- Rio Declaration
- Agenda 21
- The convention of the Biological Diversity
- The Ocean Resource Meeting
- Framework Convention on Climate Change

The treaty, didn't implement any binding commitments, but it set the foundries and attributed to the organization of the international climate strategy, also it ratified and entered in to force in 1994. (Gupta, 2014)

A year later High importance was the first COP (UNFCCC, 1995), that led to the Berlin Mandate, the outcomes extracted by the meeting where the formalization of an ad hoc committee

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<sup>2</sup> The primary results of the UNCED conference, were the Agenda 21, a program aiming in the design of a strategic plan in order to become feasible the sustainable development in the 21<sup>st</sup> Century.

known as Ad Hoc Group on the Berlin Mandate (AGBM), responsible to negotiate the protocol and other legal instruments, but most importantly prepared the ground for the Kyoto conference.

In 1997 in COP3 held in Tokyo led to the adoption of the cornerstone of International climate policies, the Kyoto Protocol (UNFCCC,1998) that entered into force in 2005. Kyoto Protocol, was the genesis of climate policies adoption, as for the first time implemented binding Green House Gas reduction targets, focusing on the industrialized countries and highlighted the need for mitigation efforts and continually required more intensive efforts from the States side. The protocol entailed three flexibility mechanisms :

- Clean Development Mechanism (CDM),as it defined in article 12 of the Protocol, gives the approval to the Annex B countries to financial layout into reduction emission projects in developing countries.
- Joint Implementation (JI) , as interpreted in Article 6 of the Protocol , Annex B countries promoting emission reduction projects in other developed countries so as to be able to achieve emission reduction units (ERUs) .
- International Emissions Trading (IET) , as it set out in Article 17 of the Protocol ,allows the Annex B countries to provide (AAUs) by selling it to other countries that have exceeded their emission limit .

Due to those instruments the protocol provided Countries, with helpful means to achieve the goals of emissions demands and also endorsed businesses to aligned with the required objectives. (Zakkour et al., 2014; Liu et al., 2016)

### **2.2.3 2000s Period**

A few years after the Kyoto adoption, governments arose an amount of political and technical frictions concerning Protocol's operation (Desai, Lacasia, Vincent, 2003).Videlicet, in 2000, held in Hague Netherlands the sixth Conference of the Parties, with the aspiration to perfect the Protocol

rulebook ,and enforce the main countries to ratify it.(Grubb, 2001). Contrastingly the negotiations led to failure. The rupture originated to the participants incompetence to reach an agreement. As a result the negotiations had to be postponed and finally carried on with the Bonn Conference in 2001.The COP6 in Bonn had a positive outcome as it induced to the Bonn Agreement which led to the Marrakech Accord, that in essence comprise a turn of the Bonn Agreement into a legal text in order to consummate the BAPA. (UNFFCC,2002; Dessai, Schipper, 2002).

Considerably important for this period, were the UNFCC COP11/CMP1 in Montreal (UNFCC, 2005) and the COP14/CMP3 (UNFCC, 2007) in Bali .Montreal was the first meetings of the parties after the ratification of the Kyoto Protocol. Montreal climate conference (COP11) ,marked the beginning by which protocol entered into force. Montreal's Action Plan, set the ground for further actions so as to extent Kyoto's duration after the 2012 that would be expired.

In Bali Indonesia took place the 13<sup>th</sup> conference of the parties of the United Nations Framework Convention on Climate Change (UNFCCC) and the 3<sup>rd</sup> meeting of the parties (MOP3) that ratified the Kyoto Protocol. A Great importance's conference as spots the beginning of a new era of negotiations concerning the post 2012 period. Concurrently the same year the IPCC's 4<sup>th</sup> Assessment published in 2007 ,that enhanced the negotiations toward its scientific results by directing the political and environmental orientations, of the processes took place in the conference.

The Main formal outcomes of the conference were the Bali Action Plan, the objectives included negotiations on the greenhouse emissions for the post Kyoto period. In total, the content of the conference included, the Bali Road map which in the deed is a document that includes the Bali action Plan which provides full range of actions and objectives in fields that concerns technology, mitigation, adaptation, finance and common vision (Clementon,2008). Yet, Bali Action Plan had many frictions, firstly US denied to joining in any kind of binding commitment ,adequately China and India arose objections over the reconsideration of some parts of the final text. .Flaws of the plan were, Firstly it hadn't any explicit reference related to emissions quantitative targets especially for

the developed countries. Secondly dismissed and didn't include in the final text, as EU proposed target for the reduction of emissions 25-40% until 2020 compared with 1990s levels as regards for the industrialized countries (Williams, 2008). Conclusively this period of time was full of re-classifications in the climate negotiations and actions regime, as it evolved through the withdraw of US from the Kyoto Protocol in 2001, and the reversed climate followed in the following negotiations.(Buchner et al., 2002) Conclusively, this period portray an intense effort to stabilize and empower the climate edifice which foundations set throught the Kyoto Protocol.

#### **2.2.4 From Copenhagen To Paris**

A year after the global economic crisis of 2008, and the bankruptcy of Leeman Brothers, created an unstable economic and financial climate affecting the global economy and the proper functioning of the financial, social, and political system (Johnson, Mamun, 2011). In 2009 took place in Copenhagen COP15, which also included the 5<sup>th</sup> meeting of the parties (MOP5) of the Kyoto Protocol. Although the expectations over reaching an agreement on Copenhagen were high the upshot was diametrically adverse, as the parties failed to reach a post-Kyoto binding agreement.(Dimitrov, 2010). To compensate this gap promoted as an alternative the Copenhagen Accord, which was a political rather a legal text. The content of the Accord determines the objectives of the climate regime. Acts as a dike on the impacts deriving from the anthropogenic activities with a special caution on the greenhouse gas emissions cuts, especially for the forestry in order to achieved the world temperature below 2 degrees Celsius compared to 1990s. In a continuance of Bali Action Plan enhanced the long-term for cooperative action, which objectives also included Financial Assistance to the developing countries help them to achieve mitigation, toward the raise of a 100 billion USD from the developed countries. The organization and management of the funding would be achieved toward the establishment of the Copenhagen Green Climate Fund (CGCF) (Kypreos, 2012). The outcome of the conference was a non binding agreement

,and generally outlined as failure due to ambiguity to determine specific emission targets, and specify the percentage of fund contribution for each developed country. The Accord was drafted only from five countries China ,US , India , Brazil and South Africa .National contradicted financial interests displaced the ecological targets. More specifically EU, made efforts for a legally binding agreement and committed to reducing emissions by 20% until 2020.From the other hand ,US had a callus attitude, to join in any binding legal emission target. (Seveyn et al., 2011)

After Copenhagen, the conferences that followed sown the seeds for the Paris Agreement. Toward the creation of new legal contexts, enched the mechanisms of supports to the developing countries, by endorsing the establishment of Green Funds, also promoted market-based mechanisms which operations concerned cost-effective emissions diminution.(Paolo, 2020).

Toward the Paris Agreement, launched a new period in climate and political negotiation,. Paris Agreement is based on the principle of self-determination by setting the goals and enhancing the objectives of sustainable transition and zero-carbon for all ,it also makes a call to National Governments to submit their own National Determined Contribution(NDC). According to Article 2 of Paris Agreement the goal is to, keep the global temperature rise for this century well below 2 degrees Celsius over pre-industrial levels and enhance the efforts to limit the temperature increase even further to 1.5 degrees Celsius(1,2).<sup>3</sup>

In contrast to, the negotiations and agreements of previous years, the Paris Agreement, paid attention to the importance of the national and domestic climate policies, by endorsing the countries formulate their own climate mitigations policy programs .Moreover, it took into consideration and dismissed the separation between developed and developing countries as it had been established the previous years. In essence the agreement is the legal denaturation of the Copenhagen Accord. The

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<sup>3</sup> United Nations (UN). Paris Agreement. 2015. Available from: [https://unfccc.int/sites/default/files/english\\_paris\\_agreement](https://unfccc.int/sites/default/files/english_paris_agreement). [Accessed: 30 September 2019]

agreement set into force in 2016, toward the ratification from the majority of the countries ,195 in total (Streck,Von Unger, Keenlyside, 2016) . As will be seen in the next section, the main Actors as EU and China show dedication and innovative reformative position in the targets of the agreement, by formulating pertinent policies and measures.US from the other side withdrawal from the Paris agreement in 2017, by imposing the National economic interests first and sidelining the crucial environmental matters (Diaz-Rainey et al., 2021)

### **2.3 Instruments of energy policy**

The formulation of a national climate, energy policy and strategy is an analytical and complex process, where it is permeated by a number of components. The criteria that shape, endorse and are responsible for the acceptance or the rejection of a policy are economical, social, cultural, political and ecological (Goldthau,2016).

National governments employ a range of policy instruments which are divided into three classes: based market instruments , Regulatory administrative instruments and Voluntary Agreements and Strategies (EEA,2006) .Regulatory administrative instruments, contain an aggregate of regulations, standards ,directives responsible to form a context that provides a certain flexibility in the private sector. Voluntary agreements and strategies instruments, comprise means by which industries and governments enter into bilateral agreements, aiming in conformity and emission reduction. A complication of these bilateral agreements can arise due to reverberation of the contradicting interests among governments and enterprises.

Market-based instruments,(MBI) , are regulations that are aggrandizing the posture of industries toward market signals, able to reform their agendas as well as to maneuver the desirable environmental upshots. Market-Based Instruments are divided into three categories price-based ,quantity based and market-Friction. In the priced-based, the goal is been pursued is the behavioral

change through the reformation of prices in the market, so as to be achieved this goal ,the main instruments that have been employed are emission charges, deposit-refund system, subsidies ,non-compliance fees,etc. The quantity-based MBI, also known as cap-and trade systems, according to this practice the Government quantifies the limits of permit emissions, by specifying the rights and the obligations. The means conscript for this purpose include, trade permits offset schemes, trade emissions, trading schemes.

Lastly , the Market friction instruments concern the reformation of private markets by using instruments as labeling, information disclosure , research and education programs , etc.

(Stavins, 2000; Parag, Strickland, 2009; Whitten, Van Bueren, Collins, 2003)

## **2.4 Policies and social acceptance**

Social acceptance consists an important factor in energy policy and in the development of innovative solutions ,as it is a dynamic procedure rather than a static feature (Brohman , et al., 2007).

Governments often fronting dilemmas between the efforts to address climate change and confront public opinion by choosing the proper policies . (Shapiro, 2011). Against the backdrop of factors attributing on the shaping of policies are socio-demographic, socio-economic , geographical, political orientations, the structure of energy system and psychological tendencies as well (Rya ,Splash, ,Drews,2011; Poortinga and Aoyagi, 2013;Van den Bergh ,2015; Linde 2020). Toward several surveys which have been conducted revealed and identified as motley components capable to affect a certain operation or the rejection of a policy ( Ribeiro, et al.2013; Chung, Kim,2018;Douenne, Fabre,2020).

To conclude, a significant of interest fact is that the innovative national climate policies combined with a hodgepodge of factors as economic growth , upgraded institutional and educational level and generally innovative policies. (Jänicke,2005;Huber, 2008).

## **2.5 China's energy policy**

China's energy transition, out from an almost fossil fuel rooted regime to a green eco-reconstructed edifice comprises a complex multi-year process, with a deep apprehension of the energy challenges and of the rapidly arising corrosive problems.

The Chinese State orientation has always fluctuated and focused on economic recovery, employment and production growth, rather than tackling the social problems of previous decades and the problems regarding environmental pollution. Thus, the production line model of China's , which traits encircled around the intensive use of fossil fuels especially coal had a serious impact on power consumption, given the fact that the consumption in proportion with Chinas recourses couldn't any longer be even, balanced and meet the constant rising demands. (Huang,2014; Zhang, Andrews-Speed,2010)

Chronicle, the members of the international community that has contributed to serious environmental problems are the economically developed countries, due to the intense industrialization and production of energy from the burning of fossil fuels. Under the current circumstances, the economically developing countries also bear a significant share of responsibility, which, by prioritizing the economy over the protection of the environment, have become significant sources of global pollution. Thus, there is now a redistribution in terms of the share of responsibility corresponding to each state.

In particular, the economically developed countries, under the United Nations Framework Convention on Climate Change and the 1997 Kyoto Protocol, had committed themselves to achieve specific objectives of reducing the impact of their global warming activity; therefore, they have included environmental protection in their economic policy. By contrast, the economically



developing countries, due to their minimal contribution to global warming, had not made any binding commitments under the Kyoto Protocol. As a result, the acceleration of their economic growth, which is based mainly on industrialization, has reversed the share of responsibility of the member states of the international community. In the light of recent international conferences on climate change, economically developing countries, recognizing that their economic policies have contributed to the aggravation of the environmental crisis, are now committed to achieving specific goals of reducing greenhouse gas emissions. atmosphere, through their shift to renewable energy sources.

China is one of the economically developing countries whose energy and economic policies are based on intense industrialization and dependence on the burning of fossil fuels, especially coal. With the implementation of "Five-Year Development Plans", China has set the conditions for reducing its energy footprint on the planet by integrating the environmental dimension in all aspects of its social and economic policy. Its shift to renewable energy sources is a transition to a new model of development, which in addition to environmental and economic incentives, is necessary for an additional reason: the protection of public health from the effects of air pollution, and in particular the photo-chemical cloud. (Hu A. G., 2016)

China's economic growth is directly linked to its energy dependence on fossil fuels. A move to new energy sources would jeopardize economic stability and create an imbalance in its increased energy needs. In the first stage, the Chinese government, through the Five-Year Development Plans, took decisive measures to promote the use of natural gas with the goal of upgrading air quality. In the second phase, it focused on the production of energy from non-fossil fuel sources, and in particular renewable energy sources. To achieve this goal, it adopted additional new technologies and undertook the construction of all the necessary infrastructure for the implementation of the project. In particular, Chinese companies manufacturing wind power turbines and solar panels ensure that their energy needs are met nationally and that their products are exported to countries that have

equally integrated renewable energy sources into their energy policy (Haifeng, 2014; An-Gung, 2016).

The 13th Five-Year Development Plan sets the following goals for the period 2016-2020 in the context of addressing environmental challenges: reduction of carbon consumption by 58%, otherwise by five million tons by 2020, reduction of energy intensity by 15%, a reduction in carbon emissions of 18% and an increase in the share of non-fossil fuel energy by 15% by 2020 and by 20% by 2030. An important step towards implementation The above objectives are, firstly, investments in renewable energy sources (RES), amounting to 2.5 trillion yuan (\$ 367 billion), and secondly, the two-year suspension period for the approval of any project based on the production of energy from the burning of fossil fuels. At this point, it should be noted that the Chinese authorities, in the context of the previous Five-Year Development Plans, with the goal of reducing carbon production and consumption, had adopted, through the implemented state policy, energy management and energy-saving measures in the industrial sector. (Feng W., Haitao Y., Shoude L., 2010)

Sources: The Eleventh Five-Year Plan for Renewable Energy Development (March, 2008); the Mid- and Long-Term Plan for Renewable Energy Development (August, 2007).

Renewable Energy	2005	Goal for 2010	Goal for 2020
Electricity (MW)	113,580	205,875	
Hydroelectric (MW)	110,000	190,000	300,000
Grid-connected wind (MW)	1260	10,000	30,000
Distributed wind (MW)	250	75	
Solar (MW)	70	300	1800
Biomass (MW)	2000	5500	30,000
Biogas supply (million M <sup>3</sup> )	80,000	19,000	44,000
Household biogas (million M <sup>3</sup> )	18,000	15,000	30,000
Livestock farm biogas (stations)		4700	
Biogas from industrial effluents (stations)		1600	
Heating			
Solar water heaters (million M <sup>2</sup> )	80	150	300
Geothermal heat, etc. (1000 tce)	2000	4000	12,000
Solar cookers (1000 stations)		1000	
Fuel			
Bio-ethanol (1000 tons)	1020	3000	10,000
Bio-diesel (1000 tons)	50	200	2000
Solid biomass fuel (1000 tons)		1000	50,000
Total (1000 tce)	166,000	300,000	

Figure 2.1

Source: Feng W., Haitao Y., Shoude L., (2010)

The fact that campaigned for joint implementation of the 2030 Agenda during its G20 presidency has certainly - if not exclusively - diplomatic reasons. China's own breathtaking development from a developing country to second strongest economic power in the world and the self-image associated with inertially, conduce to as well.

In the country , profile of the “G20 Agenda 2030 Action Plan to implement the 2030 Agenda, China only repeats what it had already published in its "position paper" beforehand. It still refers to itself as a developing country and emphasizes that “great importance is attached to the implementation of the 2030 Agenda”. Instead of talking about sustainability goals, there are nine main areas called: eradication of poverty and hunger, maintenance of economic growth, further development of industrialization, improvement of social security and social services, ensuring equality and justice, protecting the environment, Measures against climate change, efficient use of resources and improvement of government action. It also says the 13th Five-Year Plan, the trend-setting, but quite general planning document for the economic and social Development from 2016 to 2020, should match the medium and long-term national goals with the Combine the goals of the 2030 Agenda. There is also talk of a coordination mechanism for implementation. This includes 43 government agencies. Like this one Mechanism looks like, but is not described in detail. In addition to its national efforts, China declares in the “position paper” that it is during his G20 presidency for the implementation of the UN Sustainable Development Goals (SDGs) in G20 politics. Furthermore, China plans to intensify the dialogue to go with non-G20 countries. The activities of the G20 to implement the SDGs should correspond to the expectations and needs of the developing countries in each case, it says in Paper. It is true that the United Nations will play a leading role in the implementation of the SDGs confirmed and they want the G20 implementation process with that of the UN Connect the guided process. China wants to work with the UN on this. In which However, the form this should take remains open. China has also set up its own development fund for South-South cooperation. President Xi Jinping had him with him 2015 UN summit announced with \$ 2 billion in initial assets. In May of 2017 at the first Belt and Road Forum, China announced the increase in the fund another billion USD. So far, however, little specific information can be found find out how this fund is operated, which projects have been and are being financed and whether and how reports are also being made about them to the UN.(Tambo et al.,2019; Van Soest et al, 2019)

As announced in the position paper and in the country self-presentation of the G20 action plan, China put forward a comprehensive “National Plan” in September 2016 Implementation of the 2030 Agenda for Sustainable Development”. In addition to The plan repeats the reflection on one's own development experiences and successes in the first part more general and abstract «principles» and «guiding principles» for implementation. In the chapter on the “overarching implementation approaches”, among other things, described how the link between the implementation of the 2030 Agenda and national development strategies are to be achieved.

In the extensive final chapter of the National Implementation Plan, a distinction is made the «position paper» no longer mentions just nine main areas, but rather each of the 17 sustainability goals assigned to corresponding national goals, projects or tasks. The plan comprises a total of 169 points. Since the reform and opening-up policy, China has and can pursue a development agenda to show impressive successes. It is therefore not surprising that many of the economic, social and ecological goals of the current five-year plan to bring the UN sustainability goals into connection. However, the driving forces are less the UN than China's own national interests.

The plan remains relatively vague, however, with information on the specific institutional structure and the definition of responsibilities for the implementation of the plan. The one already mentioned in the position paper is repeated, but not in more detail described coordination mechanism for the implementation.

Local governments can be held accountable at all levels of administration. The annual reviews of progress made in the implementation of the five-year plan and its associated local or sectoral sub-plans are also to be reviewed at the same time as the implementation of the 2030 Agenda. For the achievement of goals the government authorities assigned via the coordination mechanism bear the responsibility that can also be held accountable for it. As potential conflicting goals, for example between environmental protection and economic development, should be balanced out, such as the

quality of goal achievement in the case of non-quantitative ones goals are measured, or what consequences threaten if they are not achieved, is, however not clear.

The National Plan states that China wants to diligently and effectively engage in systematic evaluations both at international and regional level and «the central role of the UN high-level political Forum on Sustainable Development supports . Using specific instruments procedures or obligations for monitoring and periodic review for, however, in the National Plan, does not provide any progress in implementation or the degree of target achievement information. The decisive drivers for Chinese climate and energy policy are national Nature. China itself is severely affected by the effects of climate change. China Air pollution calls for solutions. The intended restructuring of the economy has not only ecological or climate-related, but above all economic reasons. Not becoming completely dependent on fossil energy imports and own energy security is another motivation for the planned expansion of renewable energies.

So, the question seems less whether China's international contributions and commitments are to reflect climate protection and sustainable energy policy in national politics, rather, what specific goals are being pursued and how these are to be assessed. The most important quantitative targets that China has planned for the end of June 2015Submitted climate protection contributions to the UN by 2030 (INDC) were:

- By 2030 at the latest, China's emissions should have peaked, and one wants to “make best efforts” to reach the peak earlier.
- Increasing the share of non-fossil fuels (including hydropower and nuclear energy) from 12% in 2015 to 20% in 2030.
- The CO<sub>2</sub>
- -Emission intensity per unit of GDP should be 60–65% of GDP by 2030 from 2005 will decrease.

- The forest stock is to be afforested by 4.5 billion cubic meters compared to 2005 become.(Wang, Yuan, Lu ,2020 )

There was little surprise in China's INDC. Had already in November of the previous year

China and the USA announced their climate targets after 2020 in a joint declaration. China had not committed itself to an upper limit for emissions in its climate contribution. There were also no binding reduction measures after 2030. Both countries put another joint declaration on climate change in autumn 2015 once after. President Xi Jinping and President Obama announced that they would sign the Paris Agreement and support the implementation of the agreement and the fight wanting to work together against climate change. China also announced that it plans to introduce a national emissions trading system in 2017. Furthermore, the country made financial commitments of RMB 20 billion.(Qu , Shi, Zhang, Liu, 2020)

## **2.6 United States Energy Policy**

The United States of America does not have a comprehensive national energy policy (Bamberger, 2004). Nonetheless, the examination of energy policy decisions reveal the emergence of patterns (Tomain, 1990). Since the Industrial Revolution, the regulation of the energy sector seeks to control both the production and distribution of energy, which is an undeniable social necessity. Of course, these patterns do not justify the use of the term “energy law” to the period prior to the mid-1970s. Later on, there will be a reference to the events that prompted the flurry of legislative activity in the 1970s constituting the beginning of the U.S. energy law. At the outset, it may be observed that there is a continuous effort to balance between private energy industries activity and public energy regulation (Clark, 1987).

Supreme Court's opinion in *Munn v. Illinois* dating back in 1887, is considered to be the beginning of energy regulation in the United States.<sup>4</sup> In this opinion, the existence of "natural monopolies" was recognized, thus establishing a major principle in energy law (Kitch and Bowler, 1978). It was equally ruled that the exercise of market power could be restrained by government price-setting, initiating the governmental authority for energy decision-making and policy-making (McKenna, 1990). Taking into account the local and regional basis of energy production, it is quite sensible that this decision-making was first made at the local, and later on at the state level.

It was during the first two decades of the 20<sup>th</sup> century that modern energy industries, energy markets and federal energy regulations started to emerge (Phillips, 1988). The United States transformed from a low energy society to a high energy one, resulting in an increased need for regulation that smooths gross social and economic distortions. Of all energy resources, oil was the first and only one in these years to be partially concentrated. In 1911, Standard Oil controlled 64% of the oil market.<sup>5</sup> Still, in 1919 thirty-two entities controlled 60% of oil's production (Clark, 1987). In the same period, a pattern of federal energy regulation emerged, that persisted for many years to come, up until the first decades of the 21<sup>st</sup> century. Federal energy regulations were characterized by their tendency to react to market conditions and mirror the specific industries being regulated. This resulted in a non-coordinated, non-comprehensive treatment of energy industries.

Advancing in the Roaring Twenties, which are identified as the period from 1920 to 1933, the main evolution in the energy sector was the end of coal's prominence as the American energy supplier, which yielded this status to oil. Socio-economically, not everyone profited from such a development. Most notably, coal miners lost their jobs, moved to other professions or energy sectors where others had already more experience, or at best had their wages reduced. Also, mine operators lost their market shares and faced reduced demand due to the cutthroat competition. However, this turn was in general favored. Accordingly, the common law developed the rule of capture: oil belongs

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<sup>4</sup> *Munn v. Illinois*, 94 U.S. 113 (1876).

<sup>5</sup> *Standard Oil Co. of New Jersey v. United States*, 221 U.S. 1 (1911).

to the person who captures it (Williams, Maxwell and Meyers, 1979). Such a rule greatly encouraged the production of oil, but it also promoted waste, as producers captured as much as they could before others did the same.

In view of these developments, the Federal Oil Conservation Board (F.O.C.B.) was instituted in 1924, being one of the first federal regulatory agencies to operate in the U.S. The primary issues of F.O.C.B.'s work were waste, declining reserve estimates and price instability (Carisle and Giebelhaus, 1985). In short, the Board favored governmental controls in the direction of waste reduction and price stability (Pierce, 1989). However, these measures were a form of oil industry protectionism, and did not entail curbing production. Consequently, the F.O.C.B. regulatory efforts resulted in great benefits for the major oil companies.

On the eve of the New Deal, U.S. energy industries kept on operating on the pattern already established. The New Deal itself achieved to federalize the regulatory structure. Namely, this federalization meant regulating interstate energy sales. However, it did not result in an alternative, more comprehensive form of energy planning. Rather, it was an adaptation to the nationalization of the energy markets. Therefore, the New Deal did not manage to alter the pattern already established.

Nonetheless, the federal oil policies developed during this period were essential and undeniably original in their form and extent. Most importantly, President Franklin Delano Roosevelt's economic philosophy of industrial revitalization through market stabilization and business support influenced heavily the energy sector as well. In this context, the Connolly Hot Oil Act, as well as the Harold Ickes's Petroleum Allocation Board and his Plan and Coordination Committee were put in place with the primary objective to regulate production (Armentano, 1990).<sup>6</sup> However, these efforts failed to apply in the long-term, as new oil production flooded the market in 1937-1938.

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<sup>6</sup> Panama Refining Co. v. Ryan, 293 U.S. 388 (1935).



On the other hand, the problems of the coal industry continued during the New Deal. This sector was plagued by overcapacity, underemployment and poor working conditions of miners, as well as chaotic pricing. However, New Deal coal policies attempted to increase wages and promote job security, not accepting the declining fortunes of the coal industry (Ackerman and Hassler, 1981). This resulted in a labor-sensitive coal policy that totally failed to address the real capital problems of the industry, or the need for production curbing to reflect the market demand.

In the decades that followed World War II, there were four major developments in the energy sector. In the first place, the coal industry found a new market that serves as its largest customer until the present day: electric utilities. Secondly, the natural gas industry deteriorated. Moreover, the oil industry went from surplus to shortage, because of the governmental policies regulating domestic production and foreign imports. Last but not least, the commercial nuclear market was first established.

Regarding the coal industry, there were once again exclusively policies that indirectly influenced the operation of the relevant sector. More specifically, in this period the regulations protecting miner health and safety, as well the environment, were successfully applied, resulting in an increased cost of doing business.<sup>7</sup> Therefore, although coal prices were not governmentally set, the whole coal business was significantly more expensive than other energy sectors.

In relation to the natural gas business, the language of the Natural Gas Act is quite straightforward: producers are exempted from federal regulations, where interstate pipelines are regulated.<sup>8</sup> Taking into account the intent of the Act to protect consumers, this distinction proved a great failure, thus justifying pro-market advocates (Kalt and Schuller, 1987). In practice, prices being not regulated resulted in distributors passing through to consumers the entire production and acquisition costs (Tussing and Barlow, 1984). Before this deadlock, it was once again the Supreme Court that offered the solution. At the first stage, in 1947 it was ruled that producers affiliated to

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<sup>7</sup> Black Lung Benefits Act of 1977 and Surface Mining Control and Reclamation Act of the same year.

<sup>8</sup> Natural Gas Act, 15 U.S.C. § 717(b) (1982).

interstate pipelines were possible subjects of the federal regulations.<sup>9</sup> The reform was concluded in 1954, when it was decided in *Phillips Petroleum Co. v. Wisconsin* that producer prices could be lawfully subjected to federal price setting.<sup>10</sup>

However, the effects of the Phillips ruling could not be managed in a productive manner. The Federal Power Commission (F.P.C.) was unable to administer the workload of thousands of individual producers applying for ratemaking hearings. This way, the individual cases were first addressed with area rate-making, and later on with national rate-making (Shapiro, 1965). Once again, this led to new problems, as the federally regulated natural gas prices were kept down, while intrastate prices increased, thus creating a dual natural gas market. The Natural Gas Policy Act of 1978 (N.G.P.A.) intended to unify the dual markets, but pipelines continue to present regulatory problems.<sup>11</sup>

The Carter Administration (1977-1981) produced a great number of energy legislation and policy planning. Essentially, there were four major energy developments during President Jimmy Carter's tenure. First of all, the energy administration was centralized in the cabinet level with the establishment of the Department of Energy [D.o.E.] (Byse, 1978). However, the D.o.E. was not capable of designing a comprehensive national energy policy, because of the distribution of decision-making responsibilities among several branches and agencies of the federal government, as well as due to the fragmentation of authorities within the Department's chain of order (Aman, 1980).

Second, the National Energy Act of October 1978 countered the country's dependence on foreign oil, promoted the use of coal, modernized utility ratemaking and encouraged the establishment of a new electricity market.<sup>12</sup> The third important event was the passage of the Crude Oil Windfall Profits Tax, intended to decontrol oil prices, thus increasing domestic oil production.

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<sup>9</sup> *Interstate Nat. Gas Co., Inc. v. FPC*, 331 U.S. 682 (1947).

<sup>10</sup> *Phillips Petroleum Co. v. Wisconsin*, 347 U.S. 672 (1954).

<sup>11</sup> See also: Natural Gas Wellhead Decontrol Act of 1989.

<sup>12</sup> The National Energy Act consists of five pieces of major legislation: the National Energy Conservation Policy Act, the Powerplant and Industrial Fuel Use Act, the Natural Gas Policy Act, the Public Utilities Regulatory Policies Act, and the Energy Tax Act.

Finally, the Energy Security Act of 1980 was the result of President Carter's moral equivalent of war rhetoric.<sup>13</sup> Most importantly, this Act attempted to initiate a transition to renewable resources such as solar, biomass and geothermal steam.<sup>14</sup> Overall, the long-scale policy described above was not successful (Gordon, 1979). The attempted centralization failed not only because of the market's resistance, but also due to the D.o.E.'s shortcomings. Also, the transition relied too much on the market to signal the move to other resources, something that never happened at that point in time.

In light of the regulatory failures of Carter's cabinet, President Ronald Wilson Reagan's Administration (1981-1989) responded with large-scale private-sector-friendly, supply-side deregulation. In fact, a great part of Carter's policies was simply reversed. However, Reagan's initiatives were also to achieve little. Loosening of oil prices was only a temporary, rather symbolic measure.<sup>15</sup> Moreover, the projected dismantling of the United States Synthetic Fuels Corporation failed, because the market was unable to support the synfuels programme at costs competitive with oil and natural gas on the market.<sup>16</sup> Then, one of the most declaratory steps was the plan for the abolishment of D.o.E. from President Reagan's cabinet. At first hand, the inability of achieving almost total energy deregulation may be viewed as the result of federal government's bureaucracies. Looking deeper into the facts of the situation, there is a great similarity with Carter's failures. Reagan's over-reliance on the market and under-reliance on government support violated, just as Carter differently did, the dominant model in U.S. energy policy dating back to the Roaring Twenties.

In the decades that followed, there have been several Energy Policy Acts, namely in 1992, 2005, and much regulatory production was carried out in the 2007-2009 period. Namely, Energy Star

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<sup>13</sup> See President Carter's Address to the Nation on July 15, 1979.

<sup>14</sup> The Energy Security Act also consists of several pieces of legislation including: the Defense Production Act Amendments, the United States Synthetic Fuels Corporation Act, the Biomass Energy and Alcohol Fuels Act, the Renewable Energy Resources Act, the Solar Energy and Energy Conservation Act, the Geothermal Energy Act, and the Acid Precipitation Act.

<sup>15</sup> Executive Order No. 12,287.

<sup>16</sup> See an example of a programme of unacceptable financial performance in: United States General Accounting Office, *Fact Sheet on Synthetic Fuels: Status of the Great Plains Coal Gasification Project*, November 1987, Section 2: Great Plains operating and financial performance.

is a programme founded in 1992, promoting energy efficiency. The programme makes sure that information on products and devices energy consumption is being provided, on the basis of standardized methods. Another key element in almost all of the aforementioned policy milestones was the provision of grants and tax incentives for the development of the renewable energy industry (Bartlett, 2006). However, these initiatives touch upon issues that are very important, but not address directly the problems of the current operation of the U.S. energy production and marketing. It is in this regard that the federal energy policies have been criticized as being dominated by crisis-mentality thinking (Grossman, 2013). Indeed, most of the times it is about individual solutions addressing critical shortcomings, with no ambition to establish a stable system of rules that will combine the governmental support of Research and Development (R&D) with wide scope for private sector initiatives and self-regulation (Hamilton, 2015).

The United States refused to endorse the Kyoto Protocol (signed 1997, effective 2005), which was an international treaty committing state parties to reduce greenhouse gas emissions. The American government preferred to let the market adjust itself to CO<sub>2</sub> reductions. On the contrary, President Barack Obama's Administration (2009-2017) adopted a more aggressive energy policy, with reforms including the taxation of emissions to the end of their reduction, as well as the encouragement of clean, renewable, sustainable energy development. In 2017, President Donald Trump ceased the country's participation in the 2015 Paris Agreement on climate change mitigation, but in 2020 President Joe Biden (then-President-elect) proclaimed the resume of U.S. membership in the Agreement.

## **2.7 Europe's energy policy**

The inception of European energy policy commenced in 1951, with the establishment of the European Coal and Steel Community (ECSC, 1951), in Treaty of Paris, along with the European Atomic Energy Community (Euratom Treaty 1957), that established in the Treaty of Rome in 1958 in

order to be promoted the formalization and the development of a common market for the uses of atomic energy.

Until 1972 before the upcoming energy crisis of 1973-1974 and the oil shock of 1979–1982, the European energy policy was about coal mining matters. Due to the energy crisis, the Commission of the European Community (EC) together with European Council and the Council of Ministers promote the efforts for research and developments (R&D), in order to strengthen the energy security toward finding new sources of energy by diminish the curb oil dependence. (Maltby, 2013)

EU agenda in the 1990s transformed as climate change shifted into the center of the interest (Skjaereth, 1994; Morata and Solorio, 2012). The transform/changes in Energy policy in EU made toward the European Commission's consideration on fitting the single European Act, into the electricity and gas sector<sup>17</sup>. The main legislative instruments by which the EU has brought about this change was achieved through three energy single electricity market directives 1996 (96/92/EC) that opened the energy market, 2003 (03/54/EC) and 2009 (09/72/EC). Furthermore in 2001 renewable electricity directive (2001/77/EC) and the 2009 renewable energy directive (2009/28/EC), had a significant impact on the electricity demand call especially for renewable electricity sources.

According to the Article 4 paragraph 2 of the Treaty of the Functioning of the European Union (TFEU), included energy policy among the fields of shared competence between the EU and the Member States (Dyduch, j, 2015). In 2015 the European Commission adopted it and made the transition into a low carbon economy (Zajackowska, 2018).

In November of 2018, the European Commission adopted the "Clean Plan for All" strategy, aiming to a prosperous, modern, competitive and climate-neutral economy by 2050<sup>19</sup>. It was preceded in 2016 by the European Commission the "*Clean Energy for All Europeans*" Communication by posing three main objectives, that gave Priority in the energy efficiency, and

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<sup>17</sup> Energy Policy Research Group, University of Cambridge, Cambridge, UK

<sup>18</sup> (COM/2015/080)

<sup>19</sup> Communication from EU Commission COM (2018) 773 final / 28.11.2018, entitled: "A clean planet for all. A European, strategic, long-term vision for a prosperous, modern, competitive and climate-neutral economy."

second matter was the advancement of EU into a global leader in renewable energy and Lastly it is proposing the target consider the provision and fair deal among all the consumers.<sup>20</sup> The communication referred to energy poverty as a major challenge for the EU as a whole, rooted in low-income and energy-efficient housing. Afterward , followed by Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, with the binding overall target at Union level for 2030 that the share of energy from renewable sources will be at least 32%.<sup>21</sup>

In 2019 The European Commission has adopted a Communication [COM (2019) 640] on the European Green Deal, that establishes the framework for a new development policy in Europe, based on ambitious climate and environmental objectives, such as achieving EU climate neutrality by 2050 in an efficient and equitable manner. The initiative is a continuation of the process based on the unified National Plans for Energy and Climate, that regulated by Regulation (EU) 2018/1999 (2018) on the governance of the Energy Union and climate action.

The European Green Deal comprises an integral part of the Agenda 2030 and of the Sustainable Development Goals. Additionally is a new development policy aiming at the “Eu transforming EU”<sup>22</sup>.

EU is a Pioneer in a global level on climate actions , in order to achieve mitigation, even in an era with global challenges like COVID-19. EU submitted long-term strategy, in order to become climate neutral by 2050, through the adoption of a number of legislative proposals concerning transportation, land use, forestry, emission control and other fields, with the aim of achieving the determined targets.<sup>23</sup>

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<sup>20</sup> Communication from the EU Commission COM (2016) 860 final / 30.11.2016, entitled: "Clean energy for all Europeans".

<sup>21</sup> Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources

<sup>22</sup> United Nations Agenda 2030: Signed in September 2015, at the United Nations General Assembly, by countries from around the world. It includes 17 Sustainable Development Goals (SDGs), following the agreement of the leaders on a specific "list of actions for people and the planet". World leaders are committed to ending poverty, protecting the planet and ensuring peace and prosperity for all people. The EU has been one of the pioneers and is fully committed to its implementation.

<sup>23</sup> COM/2020/80 final Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND THE COUNCIL establishing the framework for achieving climate neutrality and amending Regulation (EU) 2018/1999 (European Climate Law)

To conclude important Climate Policies , have been adopted among EU countries. Namely Significant performance and establishment of Pioneering climate actions, holding Nordic countries such as Sweden, by having a low-carbon intensity and aiming to diminish the greenhouse gases (GHG) and achieving the decarbonization of the Transportation Sector by 2050(Skytte,Bramstoft,2017). Accordingly Norway is on the same wavelength, with Sweden, as perusing to improve energy security, renewable energies ,and green energy use. Moreover Norway has a significant natural gas reserve, and a Long term law in hydro power sector, for managing the sources and aiming in security and environmental protection. (Milka Tommila,2010)<sup>24</sup> . Denmark, green cheque, higher taxes are a part of achieving green transition, aiming in achieving fossil-fuel - free by 2050,the process includes a complex of policy tools ,as higher taxes, outright bans .etc<sup>25</sup>.

Iberian Countries, also have a leading performance in energy and climate policies by implementing a sequence of green actions. Scilicet, Spain has set a plead of that kind of policies, as law for the decarbonization of the economy by promoting the RE<sup>26</sup>, and Transposition of Building<sup>27</sup> , and the most recent action is about the NECP long term strategy aiming in the decarbonization by transforming the transportation sector till 2050 .Namely some of also Portugal's salient climate regulations are ,the establishment of an environmental fund<sup>28</sup> ,a law that concerns Green fiscal rules<sup>29</sup>, and law which in essence comprise insurance against the climatic impacts that might be affect the agricultural domain<sup>30</sup>.

Additionally, Switzerland has an exemplary action in the energy and climate domain. The latest energy strategy of Switzerland is the ES2050.This policy package is an ambitious strategy aiming in the transition to a low-carbon economy. Climate Policy concerning the post-2020 period aims in the

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<sup>24</sup> G.B.S.T.a. A. Miika Tommila,Energy Policies of IEA Countries Norway 2011 Review,2010

<sup>25</sup> Nordic Council of Ministers .a socially sustainable green transitioning in the Nordic region , an analysis of the inequality-creating effects of the green transition and the opportunities to promote a socially sustainable green transition Available at : <https://norden.diva-portal.org/smash/get/diva2:1506058/FULLTEXT01>

<sup>26</sup> Royal Decree Law 15/2018

<sup>27</sup> Directive 2018/844

<sup>28</sup> Decree-Law No. 42-A/2016

<sup>29</sup> , Law No. 82-D/2014

<sup>30</sup> Decree-Law No. 162/2015

reduction of Greenhouse gases (GHG), decarbonization of transport sector and reformation of nuclear plan regime.(IEA,2017)

France, in 2019 adopted Law by which procuring the emissions reductions as a part of the Paris agreements commitments, which includes a range of measures for the Energy Efficiency of buildings , emission reduction on the Electricity energy supply sector<sup>31</sup>

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<sup>31</sup> Law No. 2019-1147 of 8 November 2019 Regarding Energy and Climate



## **Chapter 3: Methodology**

### **3.1. The research question**

In this section, we attempt to analyze our steps in developing our research question, which has been our cornerstone in developing the present study.

First, we decided to conduct a systematic literature review to carry out this study, as it is a very useful tool in acknowledging any gaps in literature, regarding the topic we are interested in. While we were conducting our search, following the protocol described in the next chapters, we found papers that examine the effect that Culture has on the opinion of society on the implementation of a policy, the effect that the cultural background of the local governments' arguments on a specific policy proposal has on public's opinion, and thus the success or failure of the policy.

However, we spotted some serious gaps in literature, when it comes to decision policy making, regarding energy and climate energy policies at a state level. So, analyzing USA's and China's and EU framework about energy policy and climate change, we decided to identify how the establishment of a state-level or union-level independent authority, would, firstly, improve the protection of the environment and secondly, how it would influence the perceptions and attitudes of individuals, regarding the agreement on energy and climate policies.

By Cultural Theory of Risk, we refer to the Douglas' theory, which she and her team developed in the late 20<sup>th</sup> century, as an alternative metric to measure risk perception. Specifically, Cultural Theory views risk as a social and dynamic process, while other state that the perception of risk is related to the opinions of a person.

In her study, she classified the different types of risk perceptions, following a typology, which classifies four lifestyles or worldviews, as described in Chapter 2. Table 1 shows their characteristics (McEvoy J., Gilbertz S., Anderson S., Ormerod K.J. and Bergmann N., 2017).

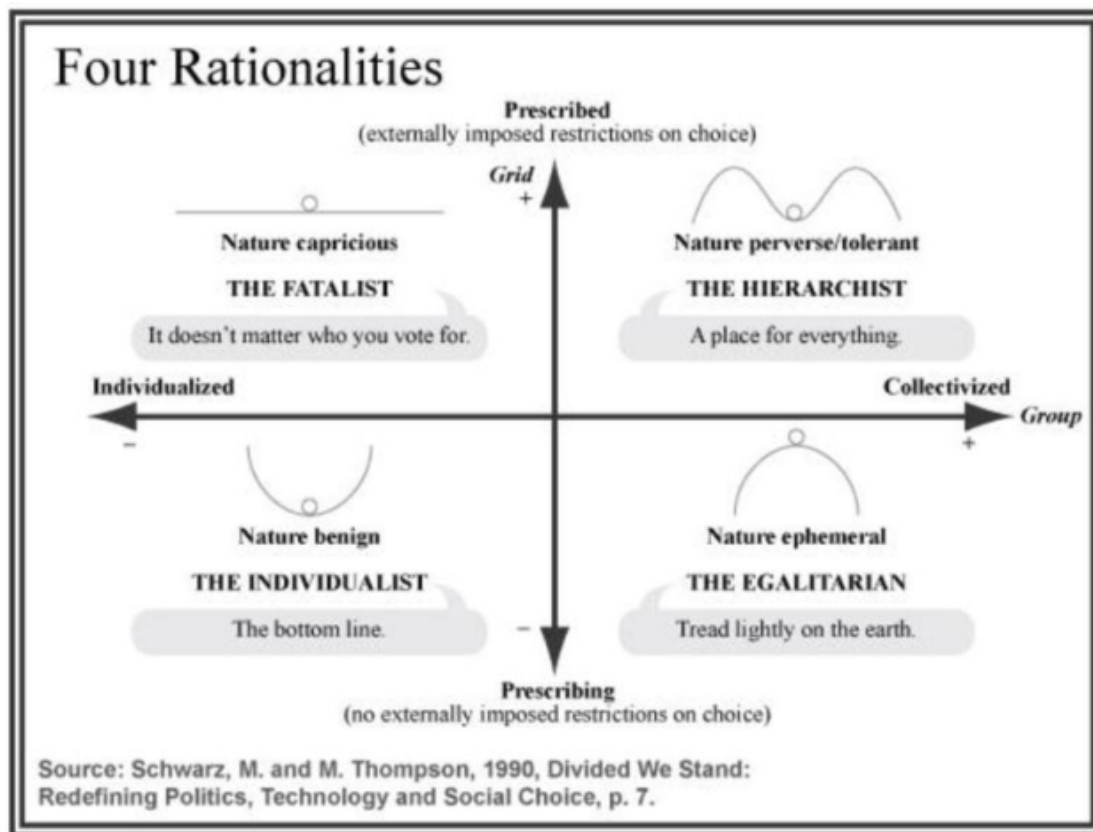


FIGURE 3.1

Source: Scharz M, Thompson M(1990)

### 3.2. Protocol

To answer the above research question, we conducted a systematic literature review. We chose systematic literature review as our methodology, as it helps to identify, evaluate and finally, interpret all available research concerning a specific topic or research question.

As a result, it is a very helpful tool to spot any gaps in the available literature, to help a researcher form a research question, while providing a framework to carefully develop new research.

We decided to follow the PICO (Population, Intervention, Comparison, Outcome) protocol to carry out this study, as we wanted to guarantee an unbiased manner to summarize the existing literature on the topic we examine.

The PICO protocol answers the following questions:

- What are the characteristics of the Population?
- How do we wish to Intervene?
- What is the Comparison or alternative to the intervention?
- What are the possible Outcomes?

In this study we attempted to comprehend the characteristics of the local societies using Cultural Theory of Risk as a heuristic, in order to identify and predict their possible reaction to a pro-environmental, and more specifically, energy policies decision implementation.

### **3.2.2. Search strategy**

To conduct this study, we chose 5 surveys. We used electronic databases such as, ResearchGate, Google Scholar, and Web of Science, three databases, which are widely used by researchers to search for published studies, because of their wide scientific acceptance and their large databases, which cover many topics, from medicine to history.

We first chose that our working language would be English, so we only search for articles that were written in this specific language. Then, wanted to ensure, that the results that our search would bring, would be relatable to our research question, so we used the keyword “social”, “culture”, “cultural theory”, “environment”, “behavior”. We excluded any keywords that were relatable to other sciences, such as “medicine”, “engineering”, “history”, “literature” etc., using the word “not”. We used the word “and” between our keywords as well to narrow the results deriving from our search. We chose some articles, because their title seemed to match our topic, and then we read the

abstract of each article and we included those studies that seemed more relatable to our research question.

Finally, the acceptance of the final articles was completed with the use of Cohen Kappa statistics, as well as the quality of each study. More specifically, each study was evaluated based on bias, is the tendency of the results to be systematically removed from the "real" results, the internal validity, i.e., the degree to which the design and conduct of the research reduce the likelihood of systematic error. and external validity, i.e., the extent to which the effects observed in the study can be applied outside the study. Table 2 shows the steps followed, as proposed by Saunila M. (2019) and Table 3 shows their characteristics.

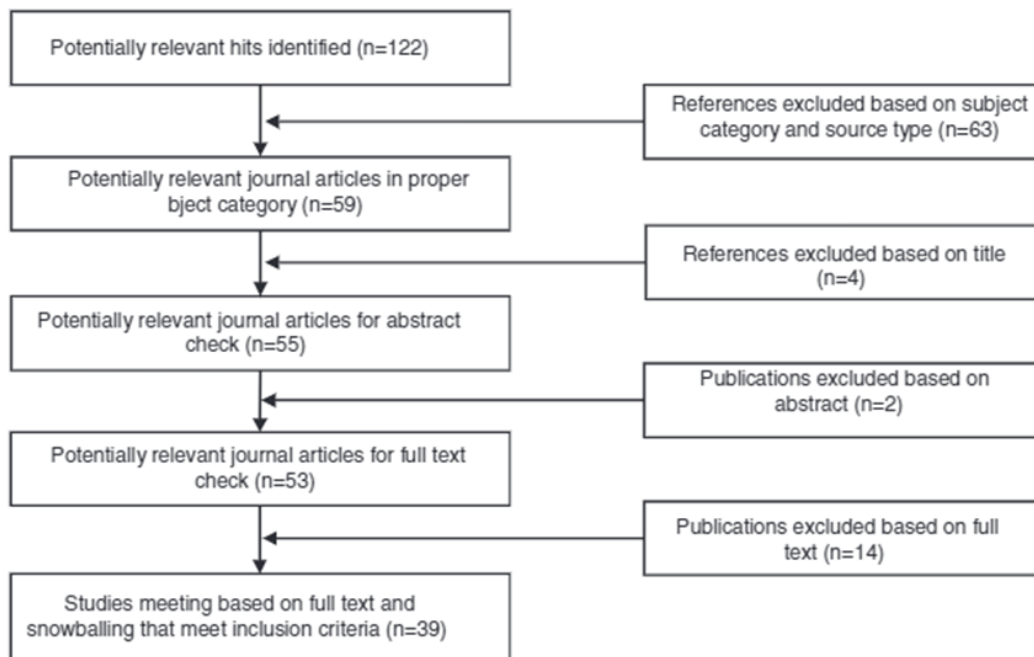


FIGURE 3.2

Source : Saunila M. (2019)

<i>N</i>	<i>YEAR</i>	<i>RESEARCHER</i>	<i>DATA BASE</i>	<i>JOURNAL/INSTITUTION.</i>	<i>YEARS EXCLUDED FROM SEARCH</i>
1	2010	West J., Bailey I. and Winter M.	Google Scholar	Energy Policy	1990-2009
2	2016	Graaff S	Web of Science	Energy Policy	1990-2015
3	2017	Ruzol C., Banzon-Cabanilla D., Ancog R. and Peralta E.	ResearchGate	Global Environmental Change	1990-2016
4	2018	Tumlison C., Button D. E., Song G. and Kester G. III	ResearchGate	Energy Policy	1990-2017
5	2020	Zheng J., Jiang M. and Yuan M.	Google Scholar	Zhongnan University of Economics and Law	1990-2019

TABLE 3 1

### **3.4. Study quality assessment**

To ensure the quality of the above articles, three inclusion/exclusion criteria were defined for their selection for the preparation of the present study. The first criterion concerns the language in which articles are published in the respective scientific journals, and only English or Greek were selected.

The second inclusion/exclusion criterion was based on the relevance of these studies to the topic of this paper, namely, innovation in software companies and its measurement models. The relevance of the studies was decided based on the title and the summary. It is worth noting that the criteria chosen to assess the relevance of the articles to the subject of the present study are the following:

- Include articles related to business administration, software engineering, economics, and computer science, and exclude articles related to chemistry, engineering, medicine, education, etc.
- Include an article that discusses or possibly discusses, any of the following: definition or determinants of innovation or metrics or frameworks for measuring innovation. However, he excluded an article that presents inventions or discusses the use, application, and evaluation of inventions.

If it was not possible to evaluate the title and the summary of the article, then the introduction, as well as the conclusions of the research, were considered. If we still had doubts about the relevance between our research and this article, then it was defined as "doubtful".

Finally, the third inclusion/exclusion criterion concerns the control of whether the relevant selected studies discuss the basic concept of innovation and its measurement. To have access to the full text of the publications we have connected electronically, where required, creating an academic profile, based on our capacity as university students. The criteria used are the following:

- Full text is available
- The article deals with the definition of culture, environment, energy policy

- The article describes one or more methods to measure culture
- The article compares two or more existing methods to measure culture
- The article analyzes or evaluates an existing method to measure culture

Table 3.2 shows the inclusion/exclusion criteria, as proposed by Edison H., Ali N., Torkar R. (2013):

Quality assessment results.	
Inclusion/exclusion criteria	
1	Is the aim of the study clearly explained?
2	Is the presented methodology/approach clearly stated?
3	Are the threats to validity of the study analysed?
4	Is an appropriate definition of innovation provided?
5	Is there empirical evidence provided in the study?

TABLE 3.2

: Source: Edison H., Ali N., Torkar R. (2013)

### 3.5 Quality thresholds

Based on the CRD guidelines, we have developed the following study protocol of selected articles, to guarantee at least the quality of our research, which proposes the design of a hierarchy, based on the characteristics of each study. The following table lists the CRD Results Hierarchy:

Level	Description
1	Experimental studies (i.e. RCT with concealed allocation)
2	Quasi-experimental studies (i.e. studies without randomisation)
3	Controlled observational studies
3a	Cohort studies
3b	Case control studies
4	Observational studies without control groups
5	Expert opinion based on theory, laboratory research or consensus

However, in the present study, the hierarchical structure of CRD is not very helpful, as, although the above appears suitable for software engineering studies, or clinical trials, it is not suitable for qualitative methods.

Based on the above, we set up more detailed quality control, based on some quality tools. These are the discriminatory choice, i.e., the systematic differences between the compared data concerning the subject, the discriminatory performance, i.e., the repetition of studies with different researchers, the discriminatory measurement, i.e., the systematic difference between the data in the way of verifying the results and the discriminatory exception, i.e. the systematic differences between the comparative data concerning discrepancies or exceptions of data from the study sample.

### **3.6. Publication bias**

At this point, it is necessary to estimate the publication bias, which is a system error and may be since:

- Most journals are often biased in their publications, in terms of survey results.
- Because of this, researchers are more likely to send for review their studies to journals, which lead to results, to which journals lean-to.
- The writing language plays a crucial role in research, as the results that may be pro a specific topic are written in English, and, therefore, are more easily accessible to researchers.
- Studies that result in positive findings are more likely to be identified during the systematic review process
- In addition, it is possible for a study that results in a positive result to be published in more than one journal, and this increases the chances that this study will be selected for the extraction of the systematic review.
- Finally, we should not ignore those studies, which have been completed and are not published for various reasons, for example, because they were funded by a company, that the study's result tailor-made for the stakeholders' benefit, or the appropriate funding was not found to support it.



## **Chapter 4: Results**

### **4.1 Surveys related to cultural theory of risk**

At this point, we will examine the existing literature that studies the influence of cultural theory on individuals' environmental awareness and risk tolerance.

It is of great significance to highlight that most of the researchers have used quantitative methods to measure the above relation.

Firstly, Graff S. (2016) tried to understand the reasons behind why the arguments for a nuclear renaissance have been proven to be a failure. It is a fact, that most the global population face nuclear power with suspicion, because of the way it was used in the past decade, which was mainly as a weapon or as a means of threat and demonstration of power by countries. However, politician and local governments try to educate people about the benefits of nuclear energy, but most of it is in vain.

She explains how the nuclear debate shifted from a means of destruction to a means of alternative energy source. The advocates of nuclear energy support that as climate is changing, it is a political challenge to find alternative and environmentally friendly sources of energy. Furthermore, because of the political imbalance in Russia and Middle East, politicians are afraid that energy sources will run short, and they need a new source of energy to maintain the status quo.

Specifically, she states, that despite the fact that the arguments used by advocates for a nuclear built up were promoting alternative solutions to never ending global problems, such as energy production, they reflected the underpinning of a hierarchical while the public opinion reflected the views of an egalitarian. According to Cultural Theory, these two cultural types are in constant conflict in a society, and as a result, the advocates' efforts to convince the public to agree on a nuclear renaissance would be in vain to begin with.

Furthermore, Ruzol C., Banzon-Cabanilla D., Ancog R. and Peralta E. (2017) attempt to combine two methods, Social Network Analysis and Cultural Theory, in order to interpret the unsuccessful water pollution management, applied in the case study of the Calumpang Watershed in the Philippines.

Their reasoning in combining these two methods is that the first one, Social Network Analysis, provides the tools to assess network structure while the latter, Cultural Theory, explains management outcomes minutely. More specifically, network analysis was conducted to compare the government (local government and government agency) and non-governmental (pig and poultry cooperatives, academe, funding corporations, NGOs), when it comes to resource sharing and cooperative activities. They applied descriptive methods to visualize their results and they also used statistical models, such as multiple regression model, to understand the underlying causes of their results.

Furthermore, they combined Cultural Theory with Network Analysis to understand the relation between the two examined above mentioned "parts" of the society, using the "group" dimension structure.

They concluded that the local government's failure in water pollution management implementation adheres to the fact that, despite the local government's arguments being a cluster of an hierarchist and an egalitarian view, their egalitarian positions failed to reach the social network.

In addition, West J., Bailey I. and Winter M. (2010) studied how cultural beliefs can influence individuals' perspectives and, therefore, provide information to the governments, regarding environmental policies and especially, renewable energy reforms implementation strategies.

Their methodology was based on previous surveys, that studied environmental debates. Thus, using Cultural Theory as a heuristic device, they used quantitative methods on focus groups to achieve a better understanding of people's worldviews and particularly, their opinions on renewable energy. The data were chosen from three communities, from different geographical regions and the researchers made sure that there was diversity regarding their demographic characteristics.

Finally, they concluded that there is a range of options a policy maker can choose from, to form economic incentives, that may assist in triggering more positive feelings in larger sections of the public towards renewable energy. Finally, theoretical approaches (Machiavellian approach, Cultural Theory) or segmentation techniques might be handy to identify sections of the public that are more likely to be pro-environmental adaptations and, thus, tailor incentives and measures to them.

Tumlison C., Button D. E., Song G. and Kester G. III (2018), examine individual-level factors that shape renewable energy and energy efficiency policy adoption decisions, using Cultural Theory, while combining rational choice.

Specifically, they used Grid-Group Culture Theory, which was first introduced by Douglas and her team in 1982 to add to their study sociopolitical components.

Utilizing empirical methods, they found that cultural values, and particularly those of egalitarianism and individualism, significantly influence the above-mentioned policy preferences, with egalitarians showing higher levels of support for alternative policies, regarding renewable energy efficiency, while individualists showed lower levels of support towards these kind of adaptations in policy.

Lastly, Zheng J., Jiang M. and Yuan M. (2020) examine the relation between environmental risk perception and pro-environmental behavior. Using empirical methods, they examine the impact of cultural bias on environmental risk perception and behavior.

Using the Grid-Group Theory as a theoretical background, they used an existing survey that was conducted from 2015 to 2016, in addition to interviewing 8084 students from 152 universities in 30 provinces across China to achieve a large scale of data. Furthermore, on these data they used three multiple regressions:

$$Behavior_i = \alpha_0 + \alpha_1 Culture_i + \sum_{k=1}^n \alpha_2 Control_{i,k} + \mu_1$$

$$Perception_i = \beta_0 + \beta_1 Culture_i + \sum_{k=1}^n \beta_2 Control_{i,k} + \mu_2$$

$$Behavior_i = \delta_0 + \delta_1 Culture_i + \delta_2 Perception_i + \sum_{k=1}^n \delta_3 Control_{i,k} + \mu_3$$

Their results indicate that risk perception plays a crucial role, regarding the relation between egalitarian culture and pro-environmental behavior, and that an individual's views about environmental policies are not only influenced by their environmental risk perception, but also by their cultural worldviews.

## 4.2 Results

To achieve a better understanding of the above mentioned results of the surveys we examined, we categorized them according to the model used in the respective research, to be able to reach safe conclusions. The following table presents the results of the studies as well, which we will analyze and compare.

<i>YEAR</i>	<i>RESEARCHER</i>	<i>METHODOLOGY</i>	<i>MODEL</i>	<i>RESULTS</i>
2010	West J., Bailey I. and Winter M.	Quantitative Analysis	Focus Groups	Policy Makers need to promote economic incentives
2017	Ruzol C., Banzon-Cabanilla D., Ancog R. and Peralta E.	Quantitative Analysis	Water Quality Analysis/Multiple Regression	Egalitarian positions failed to reach the social network.
2018	Tumlison C., Button D. E., Song G. and Kester G. III	Quantitative Analysis	Ordinary Least Square (OLS) Linear Regression	Individualists showed lower levels of support towards policy adaptations, while egalitarians showed higher levels
2020	Zheng J., Jiang M. and Yuan M.	Quantitative Analysis	Multiple Regression	Environmental risk perception and cultural worldviews influence an individual's

				views about environmental policies
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*Table 4. 1*

First of all, we can safely conclude that egalitarian views are favorable to plain people. This is obvious in three survey's results (Graff, Ruzol C., Banzon-Cabanilla D., Ancog R. and Peralta E., Tumlison C. and Button D. E., Song G. and Kester G. III). Their methods are also quite similar, except Graff's, so we can safely say that their results are legit.

Furthermore, West J., Bailey I. and Winter M. resulted in the fact that Policy Makers need to promote economic incentives to assist in triggering more positive feelings in larger sections of the public towards renewable energy. This contradicts with the results the other surveys examined. Firstly, egalitarians show distrust in bureaucracy and experts, have a strong sense of social solidarity, favor participatory and democratic processes. Thus, creating economic incentives may not be an effective way to persuade them, but rather it would probably persuade a hierarchical, who shows trust in bureaucracy and authority and privilege expert knowledge and favors structures and rules.

Finally, Zheng J., Jiang M. and Yuan M. confirm all the above theories as they conclude that environmental risk perception and cultural worldviews influence an individual's views about environmental policies.

### **4.3. Data extraction**

To achieve classification and extraction of the data, we selected the most important quantitative studies and categorized them according to the model used in the respective research, to be able to reach safe conclusions.

<i>YEAR</i>	<i>RESEARCHER</i>	<i>METHODOLOGY</i>	<i>MODEL</i>	<i>RESULTS</i>
2010	West J., Bailey I. and Winter M.	Quantitative Analysis	Focus Groups	Policy Makers need to promote economic incentives
2017	Ruzol C., Banzon-Cabanilla D., Ancog R. and Peralta E.	Quantitative Analysis	Water Quality Analysis/Multiple Regression	Egalitarian positions failed to reach the social network.
2018	Tumlison C., Button D. E., Song G. and Kester G. III	Quantitative Analysis	Ordinary Least Square (OLS) Linear Regression	Individualists showed lower levels of support towards policy adaptations, while egalitarians
				showed higher levels
2020	Zheng J., Jiang M. and Yuan M.	Quantitative Analysis	Multiple Regression	Environmental risk perception and cultural worldviews influence an individual's views about environmental policies

TABLE 4. 2

Considering the results from the table above, it is easily understood that risk perception, not only is a dynamic process, which develops through social interaction, but also it has great impact on the decision-making process of a government.

However, most of the surveys show that, when it comes to the implementation of an alternative pro-environmental proposal by a local government, people are often against it, and especially those with views of an individualist. That is why, the decision makers should form incentives tailor made to those with individualist views, as those with egalitarian views are more likely to be persuaded by the advocates' arguments.



## **Chapter 5: Conclusions**

### **5.1 Application of research**

In the present study, we attempted to analyze the USA's, China's and EU's framework regarding energy policies. Then, we introduced Cultural Theory and we continued with the presentation of studies, which use Cultural Theory as a heuristic to determine the effect that Culture has on societies, regarding local government's decisions on energy policies. Considering the above, we aim to provide a cornerstone to other researchers, starting from the analysis of the three countries and continuing to our quantitative results, in order for them to find a common ground to start their research from.

Furthermore, we hope that the present study will be proven helpful for local governments as well, that seek the best solutions in the decision-making process, regarding the implementation of innovative or alternative pro-environmental solutions, while considering the culture type of most of the local population. The latter is mostly neglected by policy makers, which plays a crucial role in the success (or not) of the implementation of the policy decision. We finally, propose the creation of an independent, union-level or state level institution, with environmental policy making and implantation responsibilities, as we have proven it would be more favorable to public's opinion.

### **5.2 Limitations**

The main limitation of the present research is the methodology, which was chosen for its elaboration. Since the articles were found based on three search engines (ResearchGate,

GoogleScholar, ISI Web of Science (WoS)), it becomes clear that their results are likely to be limited and therefore not lead to safe conclusions. Lastly, we have not carried out quantitative research, based on empirical findings, thus, we examined existing surveys and compared their results, which leaves a greater probability for an error in our results.

### **5.3 Future research directions**

For the elaboration of this study, we followed the methodology of a systematic literature review. As stated above, we hope that our research is a cornerstone in future research related to the effect that Culture has on the opinion of society on the implementation of a policy, the effect that the cultural background of the local governments' arguments on a specific policy proposal has on public's opinion, and thus the success or failure of the policy.

We have described our methodology and step by step research, in order to assist future researchers, who wish to elaborate on the topic and examine even further the effects of Culture on public opinion and more specifically, regarding pro-environmental policy implementation.

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