

Pushing And Constraining Factors In Energy Policy-Making: Explaining The Choice For Nuclear Energy

By

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KOÇ ÜNİVERSİTESİ

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To my beautiful family

And

To my future self,

So that she always remembers,

...to ask questions,

...to work really hard,

...to chase her dreams

...to believe in herself,

and to struggle for saving the planet.

ABSTRACT

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With energy security concerns on one side, increasing pressure for proactive policies against the climate change on the other side, most countries struggle for managing their energy profiles in the most efficient way and include alternative resources into their energy mix. Among alternative resources, nuclear energy is one of the most contested resources, for which the striking divide between the opponents and proponents is deeper than in any other energy resource. Heated debates about nuclear energy content the intricate discussion of a variety of advantages and risks which applies to every country. However, the way these factors are interpreted changes significantly as revealed by states' divergent nuclear energy policies. Given limited number of studies about the causes and effects of civilian nuclear programs, the literature needs analytical frameworks about the patterns and interactions of major factors which lead to different nuclear energy policy preferences, in order to meaningfully interpret the global nuclear expansion or stagnation.

This study focuses on the underlying forces in energy policy-making from the stand point of nuclear energy. The research investigates the causal mechanisms regarding pushing and constraining factors in nuclear energy policy-making and targets to find out which elements are separately necessary or jointly sufficient to affect a state's nuclear energy policy. Moreover, the study seeks to answer how the risks and advantages of nuclear are transformed into a state's decision, by providing a deeper look at socio-political dynamics in the intersection of national and international levels. In order to decipher the complex mechanisms in nuclear energy policy-making, the study presents an analytical comparison of France, Germany and Turkey, with three different nuclear energy stories. The data is collected from the fieldwork conducted in these three cases via semi-structured interviews with high-level experts. The findings are based on a multimethod analysis using MAXQDA.

By offering an analytical mapping and a policy framework on nuclear energy policy-making, the research aims to contribute the literature on comparative politics, on public policy-making in the realm of energy and on understanding political aspects of low-carbon resources in the wake of global energy transition.

Keywords: Nuclear Energy, Energy Transition, Climate Change, Policy-Making, Energy Security



ÖZETÇE

Enerji Politikası Yapımında İtici ve Kısıtlayıcı Faktörler: Nükleer Enerji Tercihini Açıklamak

Seda Duygu Sever-Mehmetoğlu

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Günümüzde, bir tarafta enerji güvenliği endişeleri, diğer tarafta iklim değişikliğine karşı aktif politikalar için artan baskı nedeni ile, birçok ülke enerji profillerini en verimli şekilde yönetmek için mücadele etmekte ve alternatif enerji kaynaklarını sistemlerine dahil etmeye çabalamaktadır. Alternatif kaynaklar arasında nükleer enerji, karşıtlar ve destekçiler arasındaki çarpıcı uçurumun herhangi bir enerji kaynağından daha derin olduğu, en tartışmalı kaynaklardan biridir. Nükleer enerji ile ilgili hararetli tartışmalar, her ülke için geçerli olan çeşitli avantajlar ve riskler hakkındaki karmaşık faktörleri içerir. Bununla birlikte, bu faktörlerin yorumlanma şekli, ülkelerin farklı nükleer enerji politikalarının da ortaya koyduğu gibi, önemli ölçüde değişmektedir. Sivil nükleer programların nedenleri ve etkileri ile ilgili sınırlı sayıda çalışma bulunmaktadır. Bu sebeple, literatürde küresel nükleer kapasitenin genişlemesini veya küçülmesini anlamlı bir şekilde yorumlayabilmek için, farklı nükleer enerji politikası tercihlerine yol açan ana faktörler ve etkileşimleri hakkında analitik çerçevelere ihtiyaç duyulmaktadır.

Bu çalışma, nükleer enerji kapsamında, enerji politikası oluşturma altında yatan dinamiklere odaklanmaktadır. Araştırma, nükleer enerji politikası oluşturmada itici ve sınırlayıcı faktörlere ilişkin nedensel mekanizmaları araştırmakta ve bir devletin nükleer enerji politikasını etkilemek için hangi unsurların ayrı ayrı gerekli veya ortak olarak yeterli olduğunu bulmayı hedeflemektedir. Ayrıca çalışma, ulusal ve uluslararası düzeylerin kesişme noktasındaki sosyo-politik dinamiklere dair derin bir bakış sağlayarak, nükleer risklerinin ve avantajlarının bir devletin kararına nasıl dönüştürüldüğüne cevap vermeye çalışmaktadır. Nükleer enerji politikası oluşturmadaki karmaşık mekanizmaları deşifre etmek için, bu araştırma üç farklı nükleer hikayeye sahip olan Fransa, Almanya ve Türkiye'nin analitik bir karşılaştırmasını sunmaktadır.

Arařtırmada kullanılan veriler bu üç ÷lkede gerekleřtirilmiř olan saha alıřması kapsamında, ÷st d÷zey uzman ve yetkililer ile yapılan yarı yapılandırılmıř g÷r÷řmeler yoluyla toplanmıřtır. Sunulan bulgular verilerin MAXQDA kullanarak nicel ve nitel analizine dayanmaktadır.

N÷kleer enerji politikası oluřturma ÷zerine analitik bir harita sunan bu alıřma, literat÷re karřılařtırmalı politika, enerji alanında kamu politikası oluřturma ve k÷resel enerji d÷n÷ř÷m÷ kapsamında d÷ř÷k karbonlu kaynakların siyasi boyutunu anlamak ÷zerine katkıda bulunmayı amalamaktadır.

Anahtar Kelimeler: N÷kleer Enerji, Enerji D÷n÷ř÷m÷, İklım Deęiřiklięi, Politika Oluřturma, Enerji G÷venlięi

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Before my PhD, when I was working in corporate life for a global company, I was also part of a team aiming to increase the motivation and performance of the employees. Offering them an exclusive career coaching program was part of our strategy. Before launching the program, my manager had asked me to experience the coaching process first on myself. In one of the sessions, the coach asked me: “*what is the moment in your life when you felt the most successful and satisfied?*” As soon as I’ve heard the question, the very first memory that rushed into my mind was me, from a couple of months ago, opening the DHL delivery coming from the UK, and seeing the cover of the book inside, *Geo-Politics of the Euro-Asia Energy Nexus*, which included my very first book chapters, my first publications ever. The day I was asked this question was also the day I decided to quit my job and apply for a PhD.

Since then, since my academic journey started with this PhD, I never gave up working with the same enthusiasm, perseverance and passion that I felt when thinking about this memory. This dissertation has been a long effort to pursue this passion, and it would have been impossible to complete this journey without the support of many important people.

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As this research addressed energy policy-making, I would like to conclude by stating that, whatever the choices of the governments are, I wish with all my heart that they may be the most sustainable solutions for the earth, the greenest possible options for the consumption and may they prepare the best future possible for generations to come.



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ABBREVIATIONS

AKP	The Justice and Development Party
ANDRA	National Agency for Radioactive Waste Management (Agence nationale pour la gestion des déchets radioactifs)
ASN	The Nuclear Safety Authority (L'Autorité de sûreté nucléaire)
CDU	Christian Democratic Union
CEA	The French Alternative Energies and Atomic Energy Commission (Commissariat à l'énergie atomique et aux énergies alternatives)
EDF	Électricité de France
EU	The European Union
FDP	Free Democratic Party
IAEA	International Atomic Energy Agency
IEA	International Energy Agency
IRSN	Institute for Radiation Protection and Nuclear Safety (Institut de radioprotection et de sûreté nucléaire)
ITER	International Thermonuclear Experimental Reactor
MENR	Turkish Ministry of Energy and Natural Resources
MHP	Nationalist Movement Party
NGOs	Non-Governmental Organizations
NPP	Nuclear Power Plant
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
OECD-NEA	OECD Nuclear Energy Agency
OPECST	Parliamentary Office for the Evaluation of Scientific and Technological Choices (Office Parlementaire d'évaluation des Choix Scientifiques et Technologiques)
PPE	Multiannual Energy Program (Program Pluriannuel de L'Energie)

ABBREVIATIONS

SMRs	Small Modular Reactors
SPD	Social Democratic Party of Germany
TAEK	Turkish Atomic Energy Authority
TEAŞ	Türkiye Elektrik Üretim İletim AŞ
UN	United Nations



Chapter 1

INTRODUCTION

“It is not to see something first, but to establish solid connections between the previously known and hitherto unknown that constitutes the essence of specific discovery.”
(Selye, 1956, p. 6)

This research focuses on energy policy-making from the stand point of nuclear energy and seeks to explain which driving and constraining factors determine nuclear energy policy-making.

The art of policy-making is subject to severe intertwined challenges, keeping the decision-makers awake, the governments in alert, the markets volatile and human-beings insecure. The design of energy policy is further complicated, since policy-making process takes place under the pressure of uncertainties and major disruptive crises. Projections and calculations constantly change, nevertheless key concerns in the energy-climate nexus remain constant.

Energy security, with the ultimate targets of sustainability, competitiveness and continuous supplies, is at the core of national agendas, as an important component of national security in the 21st century (Banks 2007; Belyaev et al. 2002; Bent, Or & Baker 2002; Burger, Graeber & Schindlmayr 2008; Müller-Kraenner 2008; Nakicenovic, Grübler & McDonald 1998; Shaffer 2009; Shepherd & Shepherd 1998). States want to make sure that their economies are fully served with adequate energy sources to meet the needs of their industries, business and cities (Eerkens, 2010; Mouraviev & Koulouri, 2019). In cases where domestic resources are limited, the dependence on exported energy supplies especially concentrated to one single exporter significantly increase the countries' vulnerability. In order to manage increasing energy dependence on outside resources, most countries today feel the need to diversify their energy profiles. The diversification of energy routes and suppliers represents one dimension of this strategy. As another dimension, the diversification of the energy mix requires enriched energy

profiles including resources other than natural gas, oil and coal and brings alternative energy resources under the spotlight.

The search for alternatives in energy becomes even more important in reference to the efforts to mitigate climate change. The effects of climate change are already demonstrating themselves through unusual natural catastrophes which severely threaten human security in multiple fronts. Furthermore, climate change-security-conflict nexus (Baysal & Karakas, 2017; Crost et. al., 2018; Hunsberger et. al., 2018; Luft, Korin & Gupta, 2011; Work, 2019) jeopardizes world security by creating or deepening political instability which can lead to the militarization of strategic natural resources (Wilson, 2019) and resource disputes (Vesco, et. al., 2020) in already turbulent regions. Climate change can seriously increase competition over scarce resources and thus complicate peace agreements (Sever, Tok & D'Alessandro, 2019) increasing the risk of armed conflict (Ide, et. al., 2020).

Global energy routes operate as the blood vessels especially for the countries which are energy dependent. Most of the countries have to import their oil and natural gas supplies from turbulent regions or through energy transit routes which pass through conflict zones. Accordingly, political instabilities, regional conflicts or bilateral tensions in resource rich exporters or transit countries threaten energy dependent economies' energy security, increasing their vulnerability in the global arena. With this framework, energy security, more specially the uninterrupted energy supplies become tools for foreign policy and international policy bargains (Yılmaz & Sever, 2016). This reveals that delicate relationship between international level factors and domestic concerns for national security are highly enmeshed in the realm of energy policy.

Mitigating these risks requires a massive change in the energy systems (IEA, 2020a), because, 78 percent of the total greenhouse gas emissions increase from 1970 to 2010 is already proved to be caused by industrial processes and emissions of CO₂ from fossil fuel combustion (IPCC, 2014). To this end, the Paris Agreement has set the objective of pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, which rests on multinational action towards binding CO₂ reduction targets and a global

decarbonization.¹ The achievement of emission reduction targets entails a comprehensive and fundamental transformation of the energy sector from fossil based to zero carbon systems by the second half of this century (IRENA, 2020). The immediate call for this transformation on a global scale (IPCC, 2018), called the energy transition, includes strict measures such as decarbonization of the electricity system (Rogelj, et. al., 2015) or leaving the fossil fuels in the ground (Johnsson, et. al., 2020) in the long run. The achievement of a sustainable development track for the World necessitates a fast expansion of clean electricity production and requires 85 percent of global electricity to come from clean sources by 2040, compared with just 36 percent, today (IEA, 2019b).

“The future is electrifying” was the motto of the IEA, in its World Energy Outlook of 2017 (IEA, 2017), when global energy consumption was expected to increase by 18 percent by 2030 and 39 percent by 2050 (IAEA, 2017). The electricity was labelled as the “rising force” potentially making up 40 percent of the increase in world’s final consumption by 2040 (IEA, 2017). The coronavirus pandemic, however, has triggered a macroeconomic shock (IEA, 2020a), requiring an updated assessment in all these calculations: the global economy becomes 7 percent smaller and falls are expected as 5 percent in global energy demand and 18 percent in energy investment (IEA, 2020c). Nonetheless, the importance of clean and secure electricity supplies, as significantly highlighted by the pandemic too (Varro & Fraser, 2020), endures. Demand for electricity is still projected to outpace all other fuels by meeting 21 percent of global final energy consumption by 2030 (IEA, 2020c).

The concerns for energy security on one side, increasing pressure for proactive policies against the climate change on the other side, most countries struggle for managing their energy profiles in the most efficient. The outcomes of the interplay between sustainability, competitiveness and continuity of supplies affect the decisions on the composition of national energy mixes. Among alternative resources, the decision on nuclear energy remains puzzling, due to the controversies it brings forward through its advantages and risks.

¹ In case the international framework fails to come up with effective policies and the world fails to keep the emissions constant, by the end of this century, the global average temperature is expected to be 2.6–4.8 degrees Celsius (°C) higher than at present and sea levels are calculated to rise 0.45–0.82 meters (University of Cambridge et al., 2014).

The projections of IEA foresee an important role for nuclear energy in clean energy transitions, as illustrated in Figure 1.1. IEA underlines that the nuclear option needs to be open through new power plants and lifetime extensions for the existing nuclear fleet, and identifies that the biggest barrier to new nuclear construction is mobilizing investments (IEA, 2019b). However, this is a limited perspective underestimating fundamental dynamics in nuclear energy policy-making. Nuclear energy policy-making is a critical task, since it inherits not only economic dynamics, but also a political dimension at both national and international levels due to several challenges including but not limited to the public acceptance or global security in the context of the thin line between civilian and military purposes of nuclear power.

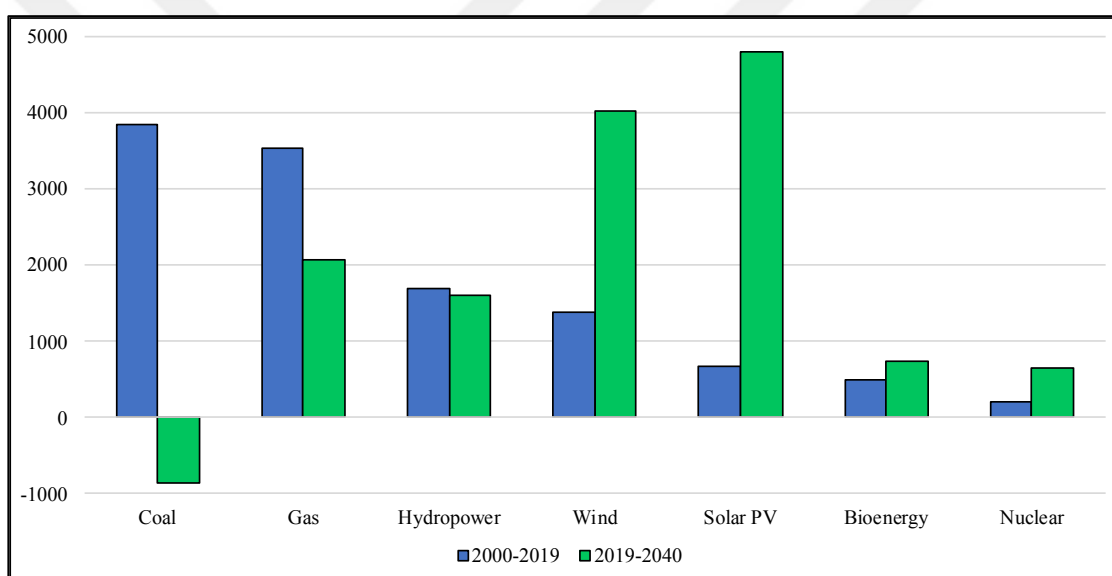


Figure 1.1. Change in global electricity generation by source in the Stated Policies Scenario, 2000-2040 (TWh)

(Adapted from World Energy Outlook 2020)

In August 1945, after Hiroshima and Nagasaki were attacked with atomic bombs by Truman Administration, the world was shocked by the “limitless horrors” they caused (Walzer, 2006, p. 269). Back then our contemporary discussions about nuclear power for civilian purposes would probably sound extraordinary and even unacceptable. With a striking contrast with the context of 1945, today, nuclear power remains at the center of major energy debates.

Since 1970s, especially following the oil crises, there has been a rising trend in global nuclear energy production. As a matter of fact, as a consequence of the Chernobyl disaster, the nuclear industry was expected not to survive with the same production trends. However, linking the disaster to the consequences of a “bad Soviet design” (Thomas, 2012, p. 13; Bradford, 2012, p. 152), the Western economies continued their efforts for technological innovations in the nuclear arena. Between 1990 and 2010, world nuclear energy capacity increased by 17.75 percent and electricity production from nuclear rose by 40 percent (WNA, 2016).

As the concerns for climate change and the search for alternative energy solutions were climbing towards the top of the global and domestic energy agendas, many experts started to question whether a nuclear renaissance was on the way (Bradford, 2012; Squassoni, 2009; Stulberg & Fuhrmann, 2013; Gourley & Stulberg, 2009; Goodfellow, Williams & Azapagic, 2011; Hayashi & Hughes, 2012; Thomas 2012). While the discussion of a nuclear renaissance was gaining pace, on March 11, 2011, a 9.0 magnitude earthquake was followed by a tsunami in Japan’s Tohoku region. Due to flooded emergency diesel generator system, the Fukushima reactors were overheated leading to a full meltdown and a release of serious amounts of radioactive waste. The accident was rated by the Japanese Nuclear Safety Agency with the same scale level of 1986 Chernobyl accident (Hayashi & Hughes, 2012, p. 2).

The Fukushima accident once again casted doubts on nuclear power, with regards to the safety of nuclear reactors. The reaction to the accident differed to a great extent, as some states started to reconsider and revise their nuclear energy policies. Some countries like Spain and Switzerland demonstrated their reluctance to continue with the nuclear while others such as China, Russia and India continued to decisively follow their strategies to diversify their energy mixes with nuclear.

As of 2020, with 442 operable reactors worldwide (WNA, 2020c), nuclear energy corresponds to 10 percent in the world energy mix for electricity generation, which makes it the second-largest source of low-carbon electricity after hydropower (16.2 percent)

(IEA, 2020). 30 countries generate nuclear energy (Figure 1.2.) and 11 currently non-nuclear states² revealed their interest in nuclear energy generation.

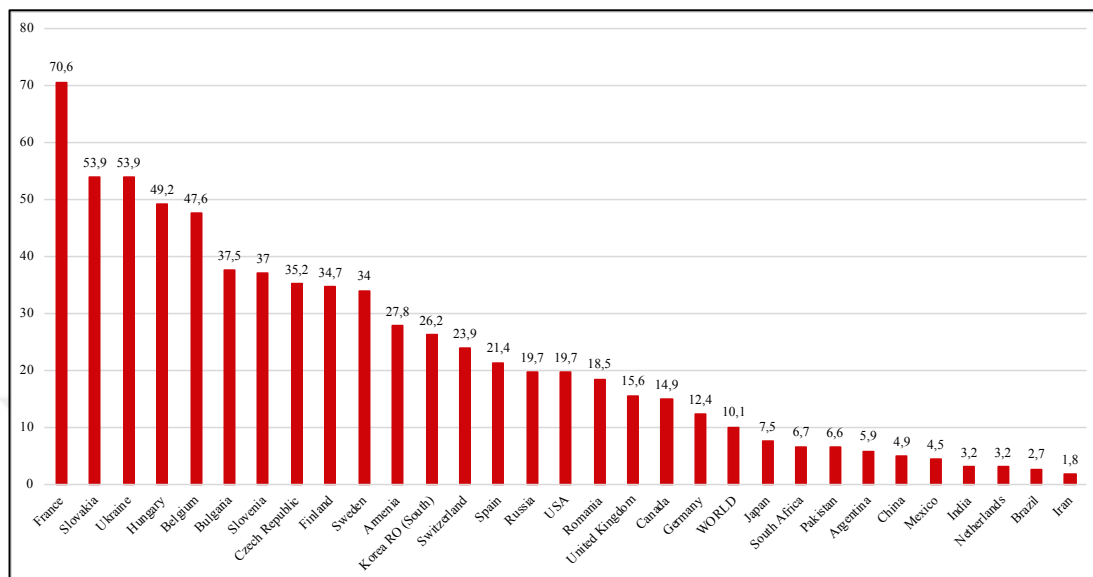


Figure 1.2. The share of nuclear energy in electricity production by country (%), 2019
(Prepared by the Author. Data Source: WNA, 2020c)

Despite heated debates and skepticism towards nuclear energy, certain countries still plan to expand their existing nuclear energy capacity. Currently, 52 reactors are under construction, 106 reactors are on order or planned and 325 reactors are proposed (WNA, 2020c). The figure below demonstrates the distribution of reactors that are being built, planned or proposed, offering important clues about the countries which will potentially dominate the nuclear energy generation in the future.

² These countries are: Bangladesh, Belarus, Egypt, Jordan, Kazakhstan, Lithuania, Poland, Saudi Arabia, Thailand, Turkey, Uzbekistan (WNA, 2020c).

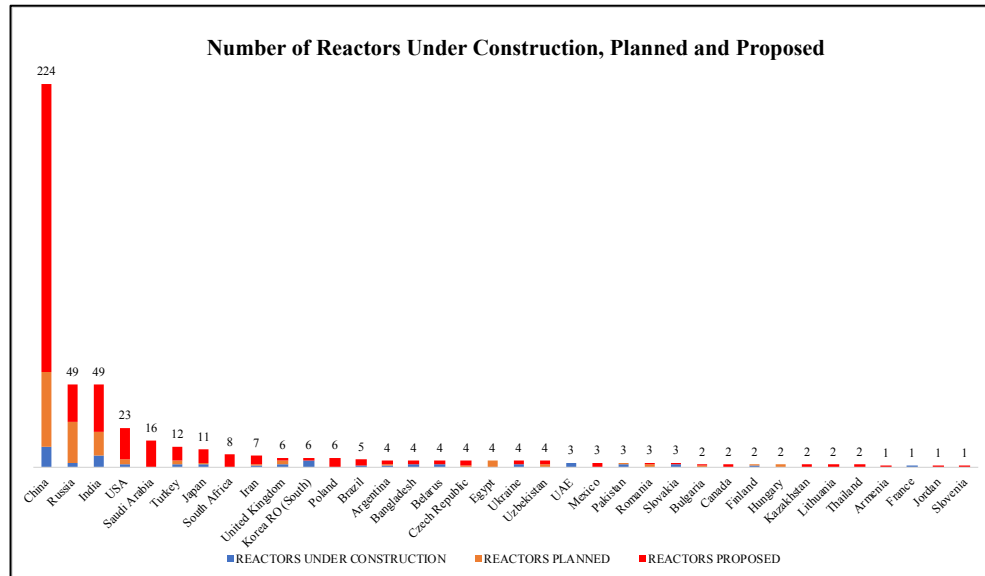


Figure 1.3. Future nuclear reactors, by country
Data Source: WNA, 2020c (Prepared by the Author)

Energy projections for a decarbonized world economy reveal the need of an 80 percent increase in global nuclear power production by 2040, together with substantial investments in efficiency and renewables (IEA, 2019b). Nevertheless, the possibility of a nuclear expansion or stagnation is very much dependent on the countries' preferences to engage in nuclear energy generation as well as their success in doing so.

Can nuclear energy be the ultimate resource that we are looking for decarbonization, if its weaknesses are overcome? We still do not know. Does a green future need nuclear power? It is subject to a hot debate. What path lies ahead of nuclear energy decisions for the future? This is a good question to start with.

1.1. Puzzle and Research Questions

Debates about nuclear energy content the intricate discussion of a variety of advantages and risks which usually only represent some scientific or mainstream “pro/con” arguments about nuclear energy generation which apply to every country. However, although the advantages and risks of nuclear energy are universal to a great extent, the way they are interpreted changes significantly: nuclear energy is one of the most controversial resources for which the striking divide between the opponents and proponents is deeper than in any other energy resource. This divergence is also reflected in some states' nuclear energy policies. To illustrate:

Germany decisively eliminated the option of new reactors and announced on May 30, 2011 that the existing ones would be phased-out gradually (The Guardian, 2011). Which dynamics led Germany to phase out the nuclear option?

France remained determined to proceed with nuclear even in the aftermath of Fukushima on the basis that the accident has “little or no relevance to them” (Thomas, 2012, p. 13). How different Fukushima disaster was processed in French decision-making processes that the nuclear option persisted? Why France continues with the nuclear?

Turkey, a non-nuclear country, has been communicating for a long time its ambition to include nuclear energy into its energy mix. Even after a nuclear-energy expert like Japan was hit by a nuclear catastrophe in Fukushima, Turkey maintained its commitment to construct nuclear reactors. Why is Turkey so determined for nuclear energy?

The variation in these different nuclear policy preferences is an interesting puzzle. Accordingly, this research project aims to explain energy policy-making from the stand point of nuclear energy by comparing the cases of France, Germany and Turkey. The research takes into consideration potential reasons why countries prefer to engage in nuclear energy generation and makes use of a variety of causes offered by the stakeholders for the promotion or rejection of nuclear energy.

Which factors constraint some countries for continuing with nuclear energy while letting others to persist with it? Similarly, which conditions allow non-nuclear countries to transform their motivation to actual nuclear energy plans? Following these questions, I target to examine major dynamics causing the variation in countries’ nuclear energy preferences. Accordingly, this research investigates the causal mechanisms regarding the pushing and constraining factors in nuclear energy policy-making and targets find out which ones among them are separately necessary or jointly sufficient to affect a state’s nuclear energy policy. Moreover, the study seeks to answer how driving and constraining factors are transformed into a state’s decision for nuclear energy, which so far remains as a big question mark in the literature since the discussions over nuclear energy has been limited with technocratic debates.

1.2.Motivation and Significance of the Study

In the initial years of my PhD, when my personal interest on nuclear energy has started to increase, I have suffered from two initial problems. First, there is a significant lack of objective resources in the literature. Most of the resources are very political, representing very different versions of why nuclear energy is the right or wrong way to generate electricity.

Second, the discussions are limited with pro or anti-nuclear arguments which overlook the mechanisms which transfer these arguments into the actual state decision. The policy-making dimension of nuclear energy is significantly limited as opposed to nuclear weapons. As Stulberg and Fuhrmann also state, “for scholars in the subfield of nuclear security, many of the interesting questions relate to why so few states are attracted to nuclear weapons, rather than to the causes or effects of civilian nuclear programs” (Stulberg & Fuhrmann, 2013, p. 10). I agree with Stulberg and Fuhrmann that in comparison with the studies on nuclear weapons proliferation and nuclear strategy, the “systematic analysis of the drivers of the spread of nuclear energy” remains very weak (2013, p. 9). The existing literature mostly gives us limited technical or descriptive overviews about nuclear energy generation. However, the literature is in need of analytical frameworks about historical motivations, patterns of behavior and strategic interactions (Bueno de Mesquita, 2009; Stulberg & Fuhrmann, 2013) which will shed light for future energy and environment strategies in the context of nuclear power. This is why I argue that we need to look deeper into the cases to see what really happens while this global energy transition takes place, in order to make informed projections over the role of nuclear energy in the national energy portfolios. My research is motivated by the necessity to decipher the political mechanisms for capturing the complex dynamics and key factors which will allow informed policy-making on nuclear energy.

This study aims to offer the literature a new approach to the future of nuclear energy by revealing the mechanisms and factors which will be determining the final decision regarding the role and share of nuclear in the energy profiles. Müller and Thurner suggest that “the actual political processes that lead to key public policy decisions are often complex and worth studying” (Müller & Thurner, 2017, p. 3). Sharing this perspective,

the research is motivated to focus on the complex process of nuclear energy policy-making in order to reveal how a number of factors interact in complex ways in different contexts and why nations make such different decisions on nuclear energy.

The novelty of this research's perspective on nuclear is to complement the existing technocratic debate on the advantages/disadvantages, technical or financial requirements of nuclear energy, with the "politics" of nuclear. This effort to "bring politics in the debate" comes with the detailed study of the story behind the decision to go nuclear or not. This focus on policy-making is the first significant feature of the research. The research offers a policy-making framework for nuclear energy which captures the interaction between national and international dynamics and combines them with the conventional debate on nuclear energy's advantages and risks. This is a linkage which did not receive adequate focus by the current literature.

The second significant feature of the research is its comparative approach. In order to build a theoretical model to capture the motivating and constraining factors for a country's nuclear energy decision, this thesis does not only grasp the global energy/environment dynamics but also by comparing the cases of France, Germany and Turkey with three different nuclear energy experiences, aims to reveal domestic puzzles in the decision-making process. The aim is to understand commonalities and differences across these cases. It is not a common approach to comparatively examine countries having different nuclear energy policies.

The third feature of the research concerns the collection of original data. The comparative study rests on the fieldtrip conducted in selected countries where both pro and anti-nuclear high-level experts from the industry, political parties, state authorities, scientific communities and civil society organizations in the energy field are interviewed. In this respect, the work is unique, because especially with regards to Turkey's nuclear policy, current literature remains mainly descriptive. None of the existing academic work contains the comparative, analytical analysis of high-level expert knowledge coming from the key figures related to the nuclear, energy and climate dynamics with such a broad spectrum ranging from businesses to government, from scientists to environmentalists. Furthermore, the incorporation of cross-country and cross-sector

insider perspective into the analysis is a novel approach in the field of nuclear energy, which does not only offer insights from within the decision-making mechanism, but also aims to serve in narrowing the gap between academia and policy-makers, in the realm of nuclear energy.

This study reveals that nuclear power is not only an energy dilemma. A question I often received during my presentations and discussions is “but why in such circumstances, under the risks of disasters and the economic burden, then, a country would want nuclear energy?”. It is not easy to come up with a plausible answer for this question solely relying on the cost-benefit calculations over the risks and advantages of nuclear energy. Consequently, this dissertation is an effort to contribute in illuminating the puzzle as much as possible.

Last but not least, it is important to underline that this study does not take a position with regards to nuclear energy. I would like to emphasize that one does not has to be a “pro” or “anti” nuclear to study nuclear energy. Throughout this research, my major responsibility as a social scientist has been to conduct objective research and offer reliable findings, so that my research can contribute to those who are interested in the nuclear debate to develop their own informed opinion.

1.3. Organization of the chapters

The organization of the chapters can be considered as two main clusters: one reviewing the research design, conceptual and theoretical frameworks and the other discussing the findings. As a novel perspective, the chapters are not organized by cases (i.e. France, Germany, and Turkey) or by a chronological order of major historical benchmarks. Rather, the chapters follow the pattern of a systematic classification of the driving, constraining and contextual factors. This allows, first of all, an efficient comparison across the cases with regards to their similarities and differences for each factor. Second, this classification reveals thematic linkages between the mechanisms examined by this research.

Chapter 2 offers a detailed discussion of the research design and methodology. I explain grounded theory approach and the reasons why it is appropriate for this research. I continue by clarifying the case selection and data collection process. In this chapter, I also share the details of semi-structured elite interviews, the interview sample as well as my fieldtrip experience, with the aim of contributing to the methodological dimension of the studies in the field of energy.

Chapter 3 carries out a comprehensive analysis of the current debates on nuclear energy. In this chapter, from energy security to public acceptance, from nuclear safety to proliferation, I review one by one fundamental issue areas which come to the fore in most of the discussions about nuclear energy. These issue areas are presented with different, even opposite perspectives from the literature, because understanding this debate is a prerequisite for reading the policy-making on nuclear energy. The chapter also presents the hypotheses to be tested. An important point to highlight is that the literature reviewed in this chapter is about the nuclear energy itself, not about policy-making on nuclear, which is already identified by this dissertation as a major limitation of the current literature. In order to address this gap, Chapter 4 reviews the limitations of nuclear energy literature from the perspective of policy-making and offers the ground for looking nuclear energy policy through public policy-making lenses. In this chapter I also offer my theoretical framework for nuclear energy policy-making.

Chapter 5 and Chapter 6 respectively focus on major driving and constraining factors, which lead or restrain the decision-makers in designing a pro-nuclear energy policy. Starting with Chapter 5, I discuss the findings of my research. Categorically divided factors reviewed in these chapters have emerged from the thematic and quantitative analysis of the interview content. These chapters comparatively reflect the perspective of stakeholders and their relative emphasis on different dynamics.

The model used in this research suggests that the nuclear energy policy-making takes place within the dynamic interaction between the global and domestic levels. Accordingly, Chapter 7 addresses the main contextual elements revealed by the analysis. Nuclear energy policy-making takes place within these dynamics.

Chapter 8 concludes the research with a final review revisiting the hypotheses and main take-aways from the analysis. It also offers insights for further research.



Chapter 2

RESEARCH DESIGN AND METHODOLOGY

This research focuses on nuclear energy policy-making with the aim of revealing major pushing and constraining factors, as well as main decision-making mechanisms so far omitted by the literature. As upcoming chapters will be studying in detail, the study is motivated by the fact that current state of literature in nuclear energy remains limited in explaining the variation in nuclear energy policy, or nuclear energy preferences, across different countries. To this end, my research design is constructed based on the combination of two major methodologies: grounded theory and comparative case study. This chapter explains, why these methodologies are preferred, how they are combined, how they serve to my research purpose and how they are put into practice.

2. 1. Grounded Theory

Grounded theory³ is a research method originally developed in sociology by Glaser and Strauss. In Glaser and Strauss' famous words, it is "the discovery of theory from data systematically obtained from social research" (Glaser & Strauss, 1967, p. 2), a discovery of emerging patterns, concepts and structures in data.

This method requires the researcher to interact with the data. The researcher's ability to give meaning to data, to understand what the data says, to separate out what is relevant and what is not, i.e. theoretical sensitivity, is an important component of grounded theory (Corbin & Strauss, 1990; Calman, 2014). According to Corbin and Strauss, sensitivity can be achieved through an in-depth literature review offering a rich understanding of the topic and through professional and personal experience offering an understanding of the events related with the topic examined. In this way, the researcher's background, knowledge and experience can enable him or her to see connections between concepts (Corbin & Strauss, 1990). The challenge here is to make use of the literature, yet not to get captured by it to a point that it affects our vision in reading the connections in the data (Becker, 1986b). This is important because the main purpose is to create analytic codes

³ For further information please see Bryant & Charmaz, 2007; Corbin & Strauss, 2008; Glaser & Holton, 2007; Glaser, 2001, 2003, 2005; Noble & Mitchell, 2016.

and categories developed *from* data, not by pre-existing categories, and then, to integrate these categories into a theoretical framework (Charmaz, 2006).

The path I have followed with the guidance of this method with regards to the collection and analysis of my data is illustrated in the figure below:

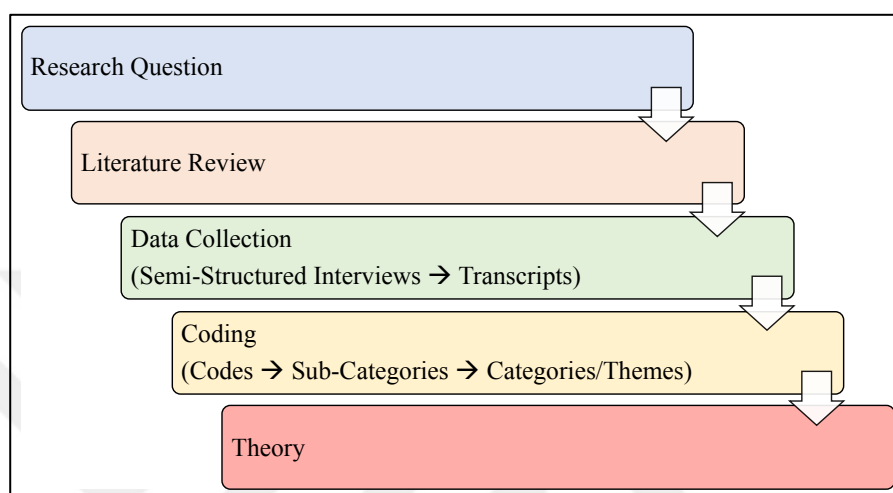


Figure 2.1. Steps of grounded theory (Source: Author's Compilation)

The logic behind grounded theory perfectly matched my desire to discover general patterns and hidden/overlooked factors in nuclear energy policy-making. The data collection and coding processes are further explained in the sections below. Nevertheless, before coming to these, a major challenge for conducting grounded theory in order to reach a comprehensive theory regarding nuclear energy policy-making, was to draw the boundaries for determining where to look for relevant data collection. It would be both interesting and fruitful to let the concepts and categories crystallize by themselves, yet to be able to see that, I needed to study on a meaningful dataset. To illustrate, one can think of conducting grounded theory as collecting seashells in order to classify them by number, shape or color to see their overall patterns. However, all of these features are subject to change depending on where you are looking: a beach where you might have many seashell options, deep sea where you would barely see if not reach the seashells, or a garden where you might find none. This is why it was crucial to support this methodology with case studies which would offer me relevant ground to collect my data and develop my theory. Moreover, I wanted to not only discover general patterns but also to see under

what conditions they are relevant and how they interact with each other in different contexts. This became possible with comparative study of three different cases.

2. 2. Case Study

In addition to grounded theory approach, my research follows a detailed, systematic analysis and structured comparison of three important cases. Many scholars identified comparative case study method as a useful strategy to get insightful information, to reveal overlooked variables and to come up with new conceptual frameworks (Brady & Collier, 2004; Mahoney & Rueschemeyer, 2003; Mahoney, 2007; King, Keohane & Verba, 1994; Bennett & George, 2005; Tarrow, 1995). In order to capture in-depth dynamics, in other words the “real story”, behind the decision/preference of nuclear energy, case studies are very instrumental. As George and Bennett state: “case studies, allow a researcher...to identify and measure the indicators that best represent the theoretical concepts the researcher intends to measure” (George & Bennett, 2005, p. 19) through in-depth examination of the causal mechanisms taking place in the selected cases. In a case study “we can look at a large number of intervening variables and inductively observe any unexpected aspects of the operation of a particular causal mechanism or help identify what conditions present in a case activate the causal mechanism” (George & Bennett, 2005, p. 21). Thus, case studies are strong in assessing whether and how a variable matters for the phenomena taking place. Conducting case studies is a powerful means in determining necessary or sufficient conditions for a certain outcome (George & Bennett, 2005, p. 25-26). The detailed examination of the cases can reveal the “conditions under which specified outcomes occur, and the mechanisms through which they occur” (George & Bennett, 2005, p. 31).

George and Bennett advice that in the design of a case study research, the researcher has to consider whether “there is a need for testing a well-established theory or competing theories” and whether the current state of the research on the phenomenon requires incorporation of new variables (2005, p. 74). Nuclear energy literature offers certain arguments on energy security, climate change or public opinion, as I will be discussing in detail in the next chapter. Nevertheless, these arguments remain limited in explaining variations across the cases, thus real causal factors remain as a question mark. Therefore, with this research, I will be first testing alternative arguments floating in the discussions

about nuclear energy decision, and second I will offer additional dynamics so far overlooked by the previous studies, as the result of my grounded theory. In that respect, referring to George and Bennett's different types of theory-building research objectives (2005, p. 74-76), my case studies will aim both "theory-testing" in order to assess the validity of competing arguments in the literature and "theory-building", since the cases will be compared with the objective to find new variables and mechanisms for developing a framework to explain nuclear energy policy-making and the observable variations across cases (George and Bennett, 2005, p. 77).

2. 2. 1. Case Selection

There are several reasons why I chose to study France, Germany and Turkey. First of all, each of these cases' individual stories with regards to their nuclear energy policy is very interesting and worth studying since they are crucial representatives of their own categories.

France is a good representative of countries which have been using nuclear energy since decades and which intend to continue to do so in future. The creation of a national nuclear research center, the Commission for Atomic Energy (CEA) represents the beginning of France's nuclear history, followed by the operation of its first nuclear power plant in 1956. Nuclear power in France accelerated in 1974, with the energy plan designed by the Prime Minister, Pierre Messmer. The plan also known as the Messmer Plan, targeted to launch thirteen new nuclear plants within two years (Hecht, 2009, p. 319), fifty before the middle of the 1980s, and 200 before 2000 (Brouard & Guinaudeau, 2017).

France currently uses 56 nuclear reactors and it is the world leader in terms of nuclear percentage in the electricity mix. Among nuclear energy generating countries, France's nuclear energy represents the highest share in electricity production: more than 70 percent of France's electricity comes from its nuclear power plants. In comparison to other resources, nuclear energy occupies the lion's share in France energy portfolio, as the figure below demonstrates. (WNA, 2020a).

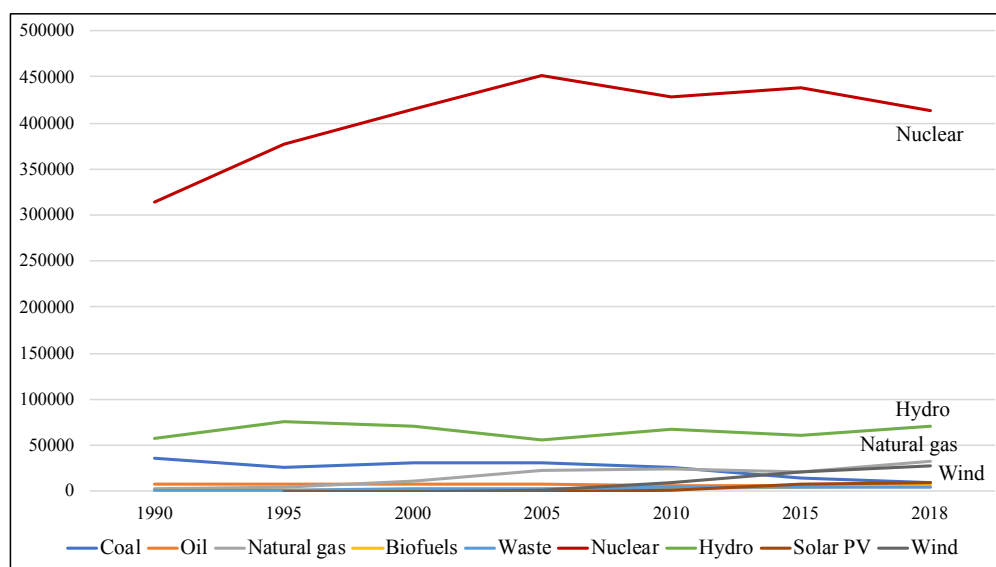


Figure 2.2 France's electricity generation by source, GWh
(Compiled by the author. Data Source: IEA, 2019).

France, declared as “the world’s largest nuclear power generator on a per capita basis” by Foratom (2012, 7), also occupies a leading position in worldwide research for the development of nuclear energy technologies. To illustrate, France is among the group of countries which formed the Generation IV International Forum, and focuses on the collective effort for research and development in terms of “the feasibility and performance capabilities of the next generation nuclear energy systems” implying France’s decisiveness concerning a nuclear future (Gen IV, 2010).

France is also selected as a case due to its persistence in nuclear energy generation. The Fukushima accident was not followed by any immediate change in nuclear energy policy in France. The country even provided extra investment for stress tests which cost around 170 million euro per reactor (Nuclear Energy Agency, 2012), to enhance the safety of its nuclear fleet.

In August 17, 2015 France accepted the Act on Energy Transition for Green Growth which offered a roadmap to mitigate greenhouse gas emissions and to boost green growth. The Act marked the target of reducing the share of nuclear energy to 50 percent of electricity production by 2025 (Gouvernement, 2015). In 2019, the country launched its Multi-Annual Energy Plan (PPE) which determined the priorities for meeting the targets of the Energy Transition for Green Growth Act. This action plan included the closure of 14 nuclear reactors and achieving a 50 percent share of nuclear electricity in the electricity

mix by 2035 (Ministere de la Transition Ecologique et Solidaire, 2019). Although PPE caused discussions over the future of nuclear energy in France, the French government made sure that PPE would not lead to any complete nuclear phase out and indicated that the renewal of the strategy for nuclear power facilities is always on the table (Ministere de la Transition Ecologique et Solidaire, 2019, p. 24). Several institutions, such as The French Nuclear Society (SFEN) have been recommending that maintaining nuclear power generation capacity is necessary in order to raise the share of electricity from low-carbon sources without an increase in the cost of electricity production (WNA, 2017a). Accordingly, PPE underlined that “the government will continue to examine different options available to ensure a long-term balance of supply and demand in the electricity system, in particular the option of building new nuclear reactors. This option will thus be kept open in order preserve the government’s decision-making capacity” (Ministere de la Transition Ecologique et Solidaire, 2019, p. 25).

Germany, on the other hand, stands out as a World example with its *Energiewende*⁴, i.e. its energy transition policy, with an extensive focus on renewables. It has become the forerunner of a massive energy transformation. Germany’s *Energiewende*, represents a transition to a low-carbon, non-nuclear energy mix. While the reactions to Fukushima accident varied by country, one of the most striking decisions came from Germany (Hayashi & Hughes, 2012, p. 7) as it planned a complete phase out of its nuclear energy power plants (Strahan, 2011). However, the decision came after a long struggle of the anti-nuclear movement in the country and through major policy fluctuations until the eventual phase-out.

In Germany, until late 1990s, although no new plants were built, the existing nuclear facilities were operating (Davidson, 2012, p. 2). In 2000, the coalition of Social Democrats (SDP) and the Green Party passed a legislation in agreement with four main energy companies in terms of limiting operational lives of the nuclear plants and gradually phasing out nuclear power by 2023 (Foratom, 2012, p. 11; Kıyar & Wittneben, 2012, p. 12). This step was considered as the foundation for *Energiewende* of Germany as the country had decided to fully exit from nuclear energy (Davidson, 2012, p. 2; World Energy Council, 2013, p. 24). However, in September 2010 Angela Merkel and her

⁴ For an interesting critique of Germany’s *Energiewende*, please see: Jeffrey Michel “Can Germany Survive the *Energiewende*?” available at <http://www.energypost.eu/energiewende-doomed/>.

coalition of Christian Democrats (CDU) and the Free Democratic Party (FDP) overturned the decision (Davidson, 2012, p. 2; Kıyar & Wittneben, 2012, p. 12) by extending the operational duration of the nuclear power plants by 12 years on average, beyond 2021 (Foratom, 2012, p. 11) to 2036 as a "bridge technology" towards "the age of renewable energy" (Strahan, 2011).

Right after the Fukushima accident, Germany decided to have “an exit from atomic energy by the end of 2022, including measures for a massive increase of onshore and offshore wind power, the accelerated expansion of the electricity grid, and more gas-fired generation capacity” (Radowitz & Hromadko, 2011). On May 30, 2011, Merkel announced that Germany would permanently close all its remaining nuclear power plants (Pidd, 2011) and added: “we believe that we can show those countries who decide to abandon nuclear power – or not to start using it – how it is possible to achieve growth, creating jobs and economic prosperity while shifting the energy supply toward renewable energies” (Davidson, 2012, p. 3). On 31 July 2011, with the Thirteenth Act Amending The Atomic Energy Act, Germany withdrew the licensing extensions and set down fixed end dates for the operation of nuclear power plants (The Federal Constitutional Court, 2016).

As Figure 2.3 shows, Germany’s electricity production has been dominated by coal and nuclear until 2011, when the final phase out decision was taken.

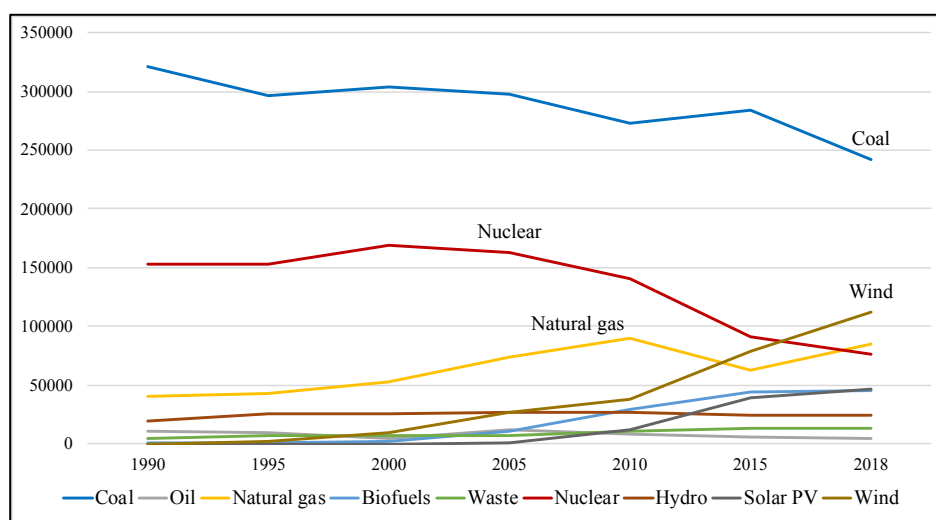


Figure 2.3 Germany’s electricity generation by source, GWh
(Compiled by the author. Data Source: IEA, 2019).

Energiewende is an ambitious energy transition policy and it could have been a case on its own with regards to decarbonization policies. Combined with nuclear phase-out, Energiewende has already started to change the outlook of Germany's energy profile bringing alternatives to nuclear power, such as wind and natural gas. A comparison of net installed capacity by resources between 2011 and 2019 is illustrated in the figure below.

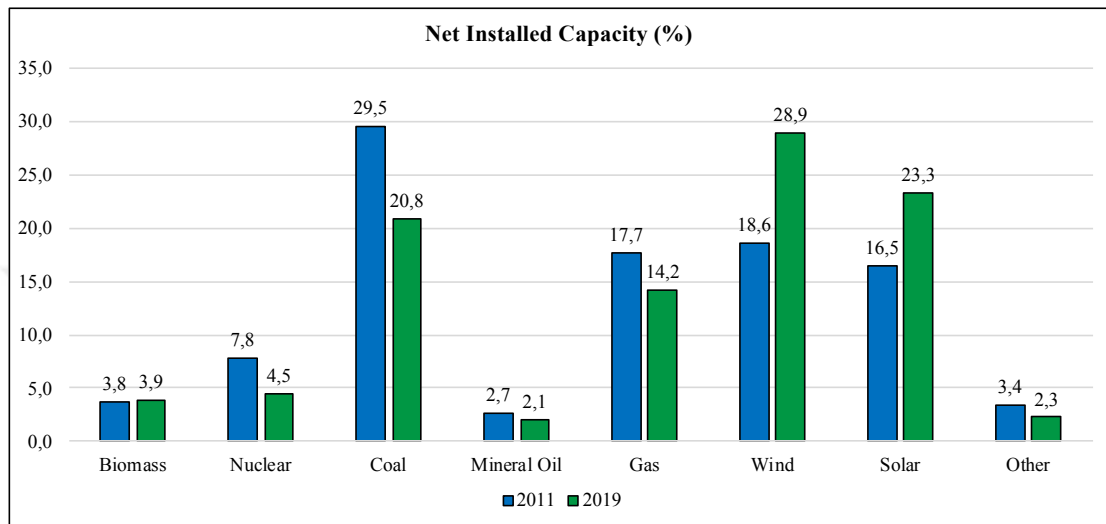


Figure 2.4 Net installed electricity generation capacity in Germany in 2019
(Compiled by the author. Data Source: AGEE, BMWi, Bundesnetzagentur in Energy Charts, 2020)

Germany's position against nuclear energy with nuclear phase-out decision, renders it my second case, as a representative of the countries which have been using nuclear energy yet which decided to take it out of the picture for the future. Germany currently has only 6 operable nuclear reactors, half of which is scheduled to shut down in 2021, and half in 2022 (WNA, 2019a).

Last but not least, Turkey is the final country selected for comparative case study. Turkey's energy mix does not currently include energy yet, and it is heavily dominated by natural gas and coal as the figures below indicate. However, by 2030, Turkey plans to have three nuclear power plants in action (Daily Sabah, 2017).

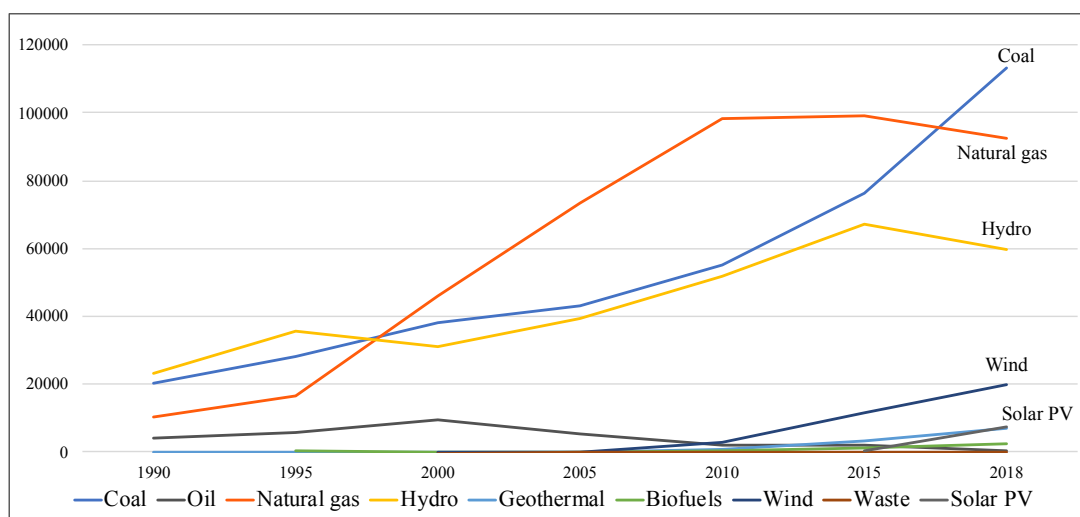


Figure 2.5 Turkey's electricity generation by source, GWh.
(Compiled by the author. Data Source: IEA, 2019)

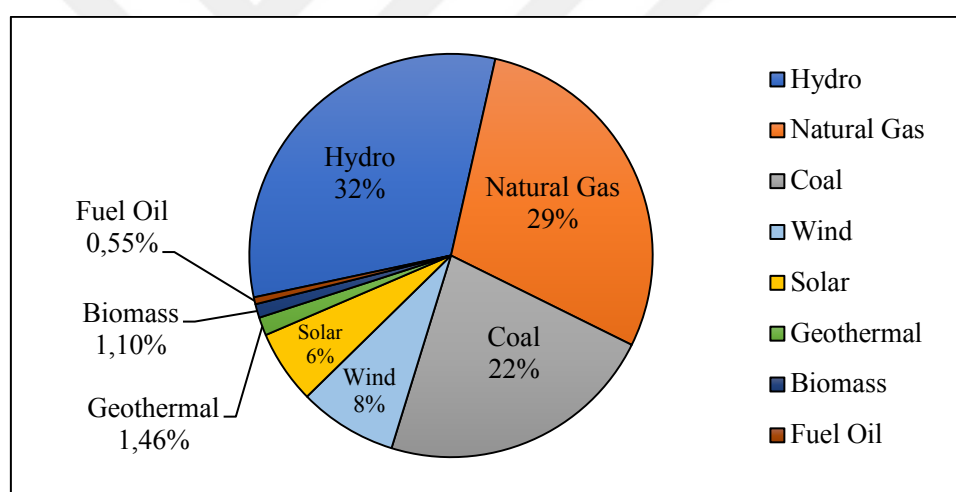


Figure 2.6 Turkey's installed capacity by resource type, 2019.
(Prepared by the Author Data Source: TEIAS 2019)

Turkey's fundamental energy strategy consists of diversification of exporters and transit routes, increase of energy efficiency, effective usage of domestic resources and increasing the share of renewable resources to minimum 30 percent by 2023, on the 100th anniversary of Turkish Republic when Turkey targets to be among the world's top 10 largest economies (Ministry of Energy and Natural Resources, 2014b, p. 6). The 2010-2014 strategic plan of the Ministry defines its mission as "evaluating the energy and mining resources effectively, efficiently, securely, timely and environmentally friendly and therefore reducing the import dependence and bringing the highest contribution into

the national prosperity” (Ministry of Energy and Natural Resources, 2010, p. 13). In this framework, the installation of nuclear power plants stands out as the major alternative to primary sources of energy, especially imported oil and gas (Kılıç, 2008; Uslu, 2010). Therefore, peaceful usage of nuclear energy is part of Turkey’s strategy to diversify its energy mix (Kibaroğlu, 1997) through domestic resources (MENR, 2015, p. 40).

Apart from the official strategies and targets determined for nuclear energy generation, Turkey’s overall nuclear discourse is very positive. The two major documents initiated by Ministry of Energy and Natural Resources namely “Nuclear Plants and Information about the Nuclear Plants to be constructed in Our Country” (Ministry of Energy and Natural Resources, 2014b) and “Nuclear Power Plants and Turkey” (Ministry of Energy and Natural Resources, 2014a) both represent positive aspects for the reasons why Turkey should engage in nuclear energy generation.

Turkey’s efforts to become a country producing nuclear energy has a very long history. Turkey’s nuclear energy story dates back to 1956 when the Atomic Energy Commission, which later was replaced by Turkish Atomic Energy Authority (TAEK)⁵ was established (Ministry of Energy and Natural Resources 2014a). Since 1956 several attempts⁶ for the construction of nuclear power plants have been put forward, yet they were not realized. Through subsequent calls for the bids and their cancellations (Stein, 2012), between 1972 and 1993, around 150 million dollars had been spent for the project work, consultancy fees, personnel costs, escalation and inspections (Milliyet, 2000). In 2000, the Council of Ministers under Prime Minister Bülent Ecevit cancelled the nuclear power plant bid planned for Akkuyu once again, and shelved Turkey’s nuclear energy plans for an indefinite time (Hürriyet, 2000a).

This has changed in July 2010 with the intergovernmental agreement between Turkey and Russia for the construction of the Akkuyu Nuclear Power Plant located in southern Turkey. In line with the agreement, Akkuyu is agreed to be constructed based on a Build-

⁵ On March 28, 2020 TAEK has been closed by a Presidential Decree and Turkish Institute for Energy, Nuclear and Mining Research (Türkiye Enerji, Nükleer ve Maden Araştırma Kurumu-TENMAK) is established as the responsible institution.

⁶ For a detailed list of nuclear developments in Turkey please see: Öner, F. 2011. “Energy Status and Peaceful Usage of Nuclear Energy in Turkey”, *Energy Sources* (6): 314-319 and Akçay, Behiye. 2009. “The Case of Nuclear Energy in Turkey: From Chernobyl to Akkuyu Nuclear Power Plant” *Energy Sources* (4): 347-355.

Own-Operate (BOO) System, with ROSATOM, Russia's state-owned nuclear power company, as the responsible firm. In parallel with the efforts for Akkuyu, preparatory work for a second plant in Sinop has been also taking place since February 2008. On May 2013, the proposal from a Japanese-French consortium led by Mitsubishi Heavy Industries (MHI), Areva, Itochu and Engie was accepted to build the reactors in Sinop. However, the process with Japan was stopped, since the latest feasibility study report and cost analysis were not compatible with the initial agreement, in terms of both costs and project calendar. Nevertheless, the nuclear power project in Sinop is still on the table as Energy and Natural Resources Minister Fatih Dönmez declared on September 28, 2019: "We will resume the nuclear project in Sinop; however, we don't know yet what country or which technology that will be with" (Daily Sabah, 2019). Moreover, although there have been no official developments yet, some state representatives pointed to İğneada as the location for the third power plant to be constructed. On August 2016, when the Agreement for Cooperation in Peaceful Uses of Nuclear Energy signed between China and Turkey was approved, the parties became "nuclear partners" (Republic of Turkey Prime Ministry 2016). This led some to conclude that the third nuclear power plant can be built by China. However, the details regarding the third nuclear power plant are still subject to official confirmation. Overall, Turkey targets to have a share of 10% nuclear energy in its installed power capacity by 2030 (Daily Sabah, 2017).

With its constant interest in nuclear energy, despite failed attempts to construct nuclear power plants, and targets to further build nuclear power plants in the near future, Turkey represents nuclear new-comers.⁷ Moreover, Turkey's Akkuyu Nuclear Power Plant is unique of its kind, as it is the very first nuclear power plant to be build based on BOO system, rendering the Turkish case even more interesting and puzzling: Article 5.4 of the intergovernmental agreement gives 51 percent of the project company established for the plant's implementation, operation and ownership, to Rosatom, i.e. Russia, a country which already stands for 47 percent of Turkey's natural gas imports in 2018.

My motivation for selecting France, Germany and Turkey as appropriate cases for comparison is due to the relative differences in terms of nuclear energy policy, i.e. the

⁷ Please note that some experts refrain from calling Turkey as a "newcomer" in nuclear energy due to Turkey's nuclear energy research which has already been continuing since several decades. However, here the term is used to represent *actual* generation of nuclear energy.

variation in the dependent variable of the study. If we are to operationalize nuclear energy policy-making as a dependent variable, I define it as a state's decision to engage in nuclear energy generation, to use nuclear energy in its energy mix or not. This requires a focus on both actual nuclear energy performance and on the potential nuclear energy capacity of the country in terms of its future reactor construction plans, for capturing the policy preferences in the long run. Accordingly, I measure this preference in a multi-dimensional way to capture both present policies and future projections, by employing indicators regarding current energy generation via nuclear power reactors and future plans signaling the commitment to nuclear energy in the medium and long run. The table below offers a summary of the indicators which demonstrate the status of nuclear energy in selected cases. The first part of the table captures existing nuclear energy policy by showing: the share of nuclear in electricity production, the number of reactors in operation (reactors which are connected to the electricity grid and which generate and supply electricity to consumers), nuclear capacity, generated nuclear energy, and nuclear units under construction, meaning first concrete for reactor is already poured. Other indicators aim to grasp the future plans of the country on nuclear energy. These are: Number of Nuclear Reactors Planned, Nuclear Reactors Proposed and the decision for Phase-out or not asking whether the country has agreed to a total nuclear phase out. Planned reactors refer to the number of reactors for which approvals, funding or major commitment are in place and which are expected to be in operation within 8-10 years. Proposed reactors represent the number of specific program or site proposals which are expected to be in operation mostly within 15 years (WNA, 2020).

Table 2.1 The indicators of nuclear energy preference

COUNTRY	CURRENT NUCLEAR ENERGY PERFORMANCE					FUTURE OF NUCLEAR ENERGY PRODUCTION		
	Numbers of Nuclear Power Plants in Operation	Nuclear Capacity (MW)	Nuclear Generation (TWh)	Nuclear Fuel Share (Percent)	Nuclear Reactors Under Construction	Nuclear Reactors Planned	Nuclear Reactors Proposed	Decision for Phase-out or not
FRANCE	56	61.370	382,4	70,6	1	0	0	NO
GERMANY	6	8113	71,9	12,4	0	0	0	YES
TURKEY	0	0	0	0	2	2	8	NO

Data Source: WNA, 2020c (Author's compilation)

As summarized in Table 2.1, there is an outstanding difference between the three countries' nuclear energy score cards. Interestingly, after the Fukushima accident, especially France and Germany engaged in almost opposite directions in planning the future of their nuclear energy. While Germany took the immediate decision of phasing out its nuclear power plants and affirmed that it wants to move towards renewable energy sources, France remained reluctant in taking a radical change to leave nuclear energy completely aside in its energy mix.

Ideally, in comparative case studies, it is very useful to locate the cases of concern in the schemes of most similar systems or most different systems designs. In the most similar systems design, the researcher attempts to select cases that are similar in all of their independent variables except one and differ in their dependent variable, while in the most different systems design, "the researcher selects cases that are dissimilar in all but one independent variable, but that share the same dependent variable" (George & Bennett, 2005, p. 50). In the realm of energy policy, given the unique circumstances of each country, which depend on their natural resources, wealth, political relations and national strategies, it is not an easy task to come up with a perfect fit for especially most similar systems design. Therefore, this study does not claim to fit its case selections into the strict framework of most similar or most different systems. On the other hand, it is possible to detect certain trends across the cases with their similarities and differences.

For all three cases, securing affordable energy supplies to meet growing demand and consumption of their growing economies is a legitimate concern. As the figure below illustrates, despite fluctuations, GDP per capita for all represents an increasing trend.

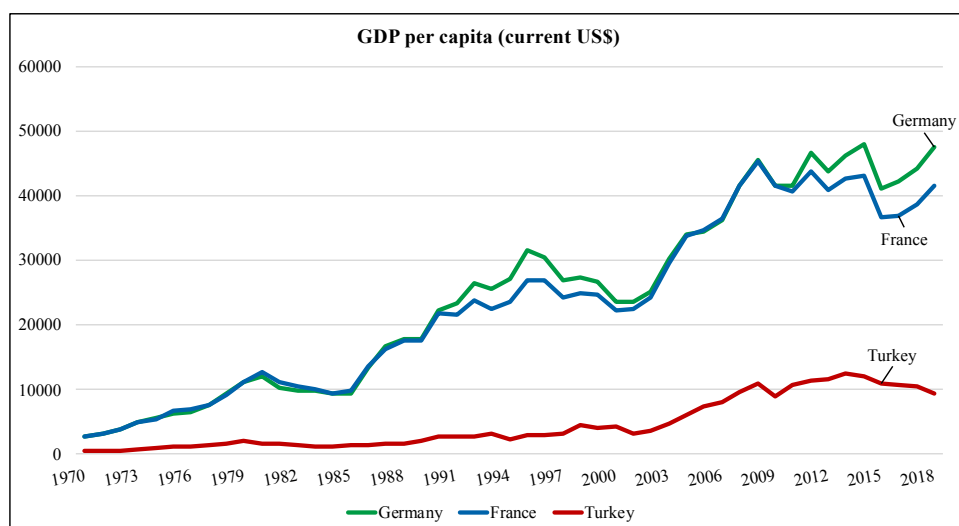


Figure 2.7. GDP per capita of selected cases.

(Compiled by the Author. Data Source: World Development Indicators, 2020)

Combined with the volume of their economies, France and Germany's primary energy consumption remains considerably higher compared to increasing consumption in Turkey. Although there are slight changes in their consumption levels throughout the years, France and Germany's energy consumption display similar trends and are closer to each other in terms of volume compared to Turkey (Figure 2.8).

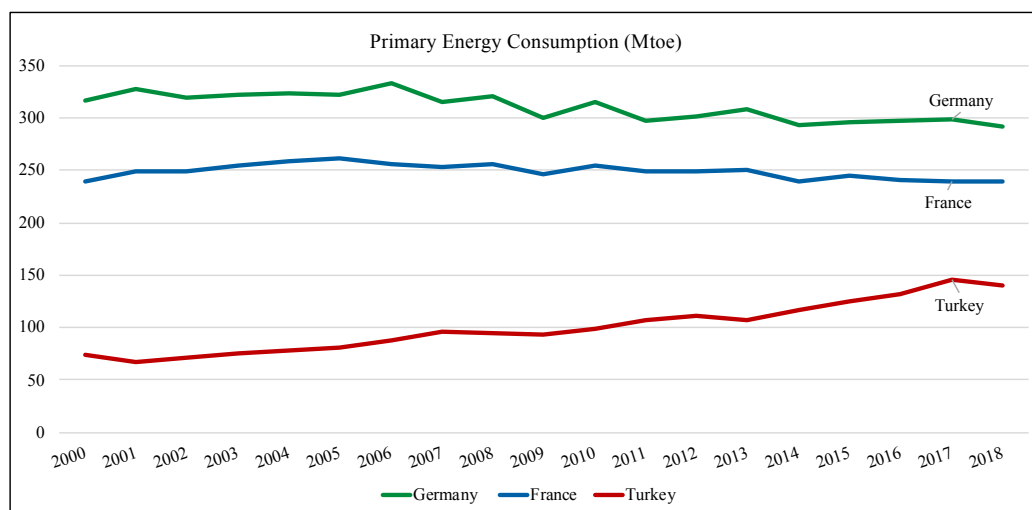


Figure 2.8 Primary energy consumption of selected cases.

(Compiled by the Author, Data Source: Eurostat, 2020)

Diversification of exporters to reduce external energy dependence is also another relevant concern for all my cases. All three countries suffer from a certain level of energy import dependency, and thus need to increase the share of national energy inputs into their energy

profiles. For the years between 2000 and 2018, France's and Germany's energy import dependence averages are 49,34 percent and 61,31 percent, respectively (Eurostat, 2020). Given that for the same period the EU average is 52,27 percent; both countries can be considered as having a mid-level of energy dependence compared to other members (Eurostat, 2020). On the other hand, Turkey deals with a higher energy import dependency, being 72,17 percent (Eurostat, 2020).

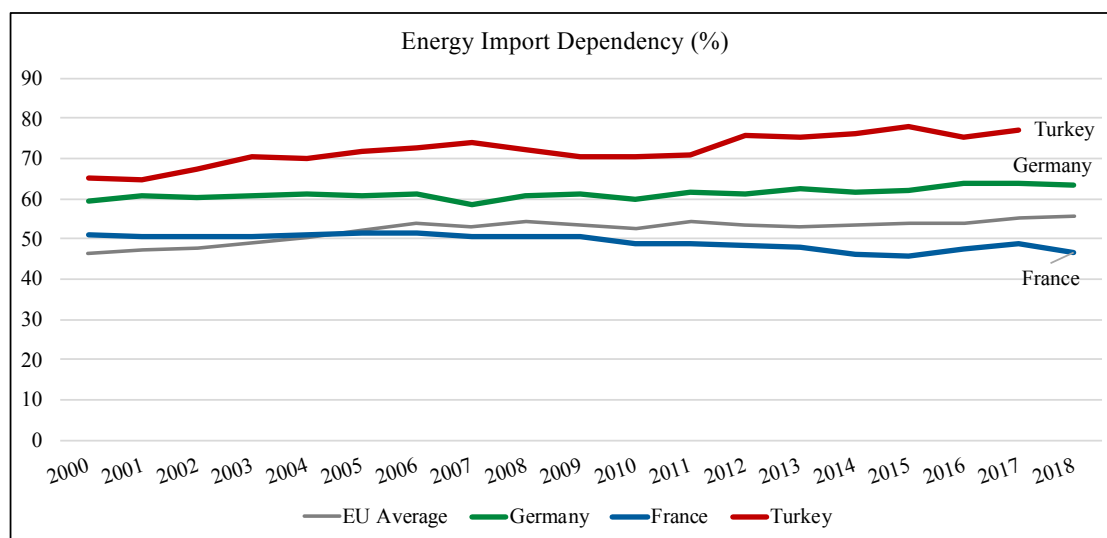


Figure 2.9 Energy import dependency of selected cases.
(Compiled by the Author, Data Source: Eurostat, 2020)

An additional critical common concern is climate change mitigation and decreasing greenhouse gas emissions. With the intention to reduce the reliance on conventional energy types such as coal, oil and natural gas, the development and consumption of alternative energy sources, i.e. resource diversification, is a key target to ensure French, German and Turkish sustainable development. This is further critical for France and Germany as a similarity as they are subject to EU-level policies in terms of energy and climate frameworks, in addition to their national strategies. Both France and Germany are the founding members of the European Union, which in the last few decades have been striving to create a common energy policy at the European Union level. In 10 January 2007, The European Union introduced the “Communication from Commission to the European Council: An Energy Policy for Europe”. In addition to all conventional targets concerning sustainability supply security and competitiveness, *An Energy Policy for Europe* presented “20/20 Package” aimed at “reducing greenhouse gas emission by 20 percent, improving energy efficiency by 20 percent and achieving a 20 percent share

of renewable energy and a 10 percent share of biofuels” by 2020 (Eurostat, 2009). On June 2011, France and Germany, through a joint act with the UK, improved this target one step further and called the EU to raise its emission reduction target to 30 percent by 2020 (European Commission, 2011). Both France and Germany were labeled as being among the “biggest emitters” of CO₂ in the Market Observatory Report for Energy (European Commission, 2008a, p. 10). The EU targets were further updated in 2018, for new targets for the year 2030 including: at least 40 percent cuts in greenhouse gas emissions (from 1990 levels), at least 32 percent share for renewable energy and at least 32.5 percent improvement in energy efficiency (European Commission, 2020a). Finally, in December 2019, the European Council endorsed the objective of making the EU climate-neutral by 2050, in line with the Paris Agreement (European Commission, 2020b). Accordingly, for both countries, being within the legal structure of the European Union is instrumental in terms of their energy preferences in that they are subject to the European Union energy regulations as well as energy strategies at the same level. France and Germany are subject to the same EU targets regarding energy dependency, energy security and diversification of the energy profiles.

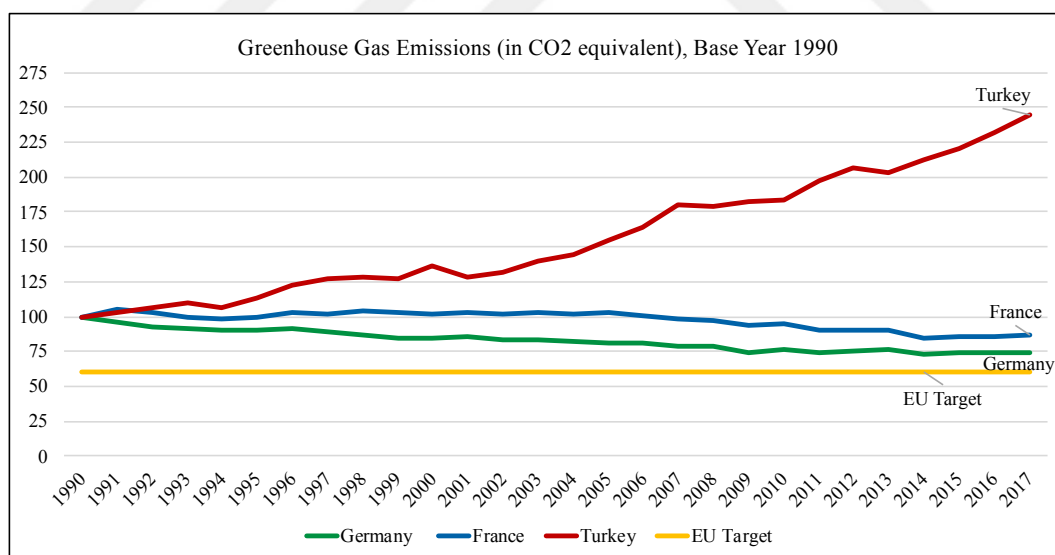


Figure 2.10 Greenhouse gas emissions of selected cases.

(Compiled by the Author. Data Source: Eurostat, 2020)⁸

⁸ Please note that while total greenhouse gas emissions of France are higher than Germany, this is not valid for per capita emissions. Germany's greenhouse gas emissions per capita is higher than France as noted in Appendix I.

With regards to greenhouse gas emissions, Turkey represents a total contrast with its ever-increasing emissions, as opposed to France and Germany's decreasing scores. Even so, neither France nor Germany has currently reached the EU target and are in need to further transform their economies to low-carbon models.

These variables are basic indicators, or even "catalog information" when we start to evaluate a country's energy policy. To a certain extent, they are eligible in partially analyzing the consumption, production or planning of energy supplies. The tabulated comparison of France, Germany and Turkey's performances in these indicators is presented in Appendix I. Presented figures and tables demonstrate a clear trend: France and Germany may constitute a pair having similar or very close trends versus Turkey as an outlier with completely different trajectories.

In a most similar systems design, it is critically important to capture a striking variance in the dependent variable as opposed to other control variables which should be similar, in order to reveal the real factor which causes the difference. As mentioned earlier, France and Germany's existing nuclear energy performances and their contradictory positions in future nuclear energy production show a significant variation. Despite their outstanding variation in their nuclear energy preferences, the brief analysis also revealed that France and Germany have similar trends in terms of some key indicators. Moreover, both France and Germany are part of the Euratom Treaty which creates "a specific framework and decision-making process for nuclear energy, defining specific tasks and powers of the Euratom Community" and also both are subject to the independent Euratom Supply Agency which is "responsible for monitoring the uranium supply situation in the EU (IEA, 2008, p. 34). This treaty is not only the basis for nuclear safety and radiation protection within the EU, but also it has received criticism for its tacit promotion of nuclear energy. This was due to some articles in the treaty, such as Article 1, which have presented missions such as "the speedy establishment and growth of nuclear industries" (Kıyar & Wittneben, 2012, p. 10). This gives both countries a strong legal foundation as well concerning their nuclear energy activities, strengthening their national laws with further, supranational rules and regulations. Nevertheless, these similarities are obviously not capable of explaining the variance of nuclear energy preferences (i.e. divergent positions), signaling that we need to detect a significant difference between the two cases.

Turkey, on the other hand, has its unique way. Compared to France and Germany, none of its indicators are similar. However, just like France, Turkey demonstrates a strict insistence and persistence in its nuclear energy policy. Can they be considered as most different cases? Remembering George and Bennett (2005, p. 50) who say that in most different systems design the researcher should select cases which share the same dependent variable yet which are dissimilar in all but one independent variable, I believe the comparison of Turkey and France with their similar approach to nuclear energy, can be considered as such. Accordingly, we need to detect a significant similarity between the two cases, which can explain their similar nuclear energy policies. This is where the grounded theory approach comes into the picture again, since my research's ultimate aim is not only to test existing variables of the literature but to find and reveal the omitted variables in nuclear energy policy-making.

2. 3. Data Collection

In this research, multiple data sources were used. In order to capture the context of my cases and to understand under which conditions the decisions were made, I have firstly conducted an extensive study of existing literature, archival documents, historical benchmarks, official state reports and statistical databases. It is important to note that, during data collection and analysis processes, as the following sections will be explaining in further detail, comparative case studies were supported by process-tracing to identify intervening processes, the causal chains and causal mechanisms between independent variables and the outcome of the dependent variable (George & Bennett, 2005, p. 206). In this regard, newspaper articles, political memories of decision-makers, official speeches or press statements were highly instrumental in getting insights concerning the chronology of the events.

My major objective while designing this research was collecting my own data for analysis. Because, as I have been going through the literature that is already out there about nuclear energy and its policy dimension, the information available remained limited in answering certain questions, or reflected the issue only partially both in terms of perspectives and concepts. I have considered it necessary to include what experts on the field have to say as being representatives of different stakeholders and even different views on nuclear energy as supporters or opponents. To this end, searching answers for

my questions from the very first hands, from the people who are actively involved in the issue and who experienced the policy making as part of their careers was a phase of my research to which I had looked forward. Accordingly, my research rests primarily on in depth, semi-structured elite interviews.

2. 3. 1. Fieldtrip and Elite Interviews

There are several reasons why conducting fieldtrip and elite interviews supported my research: First, there is a lack of primary sources on nuclear energy, therefore, elites' and decision-makers' real views on policy-making mechanisms and significant actors, remain obscure. Second, there is a lack of comparative studies in this research field, resources comparing elites' views not only in different countries but also in different sectors is almost non-existent. Third, most of the existing research tend to focus either on pro-nuclear or anti-nuclear perspectives as different clusters, yet this fieldtrip combines them and traces overall patterns. While it will be discussed in further detail in the findings section, seeing similar concepts to crystalize from experts from very different settings, backgrounds and even opponent views increased the credibility of my findings. I believe, what makes this study unique is its gathering of this wide pool of cross-country, cross-sector and cross-view participants, as this comparative way is not a common practice in the study of nuclear energy. Most of the literature either lack this insider expert view or focus either solely on the public opinion or a specific group of people as mainly supporters or opponents of nuclear energy.

In social sciences, conducting in-depth interviews is a widely used method for data collection (Keats, 2000; Rubin & Rubin, 2012). This method offers some distinctive advantages especially when “a researcher wishes to produce a work with textural depth as well as empirical strength” (Lilleker, 2003, p. 208). With elite interviews, we can get an insight into events and critical decisions which occur “behind closed doors”, away from the public or media. Moreover, we can have a better understanding of decision-making mechanisms and interactions among influential stakeholders and actors. Thanks to first-hand experiences of the elites we can have access to the political machine, as “interviews can provide immense amounts of information that could not be gleaned from official published documents or contemporary media accounts” (Lilleker, 2003, p. 208). Additionally, in-depth interviews with the elites and experts are more “exploratory and

qualitative, concentrating on the distinctive features of situations and events, and upon the beliefs and personal experiences of individuals. Interviews provide information on understandings, opinions, what people remember doing, attitudes, feelings and the like” (Vromen, 2010, p.258). This is especially instrumental in issues which include classified information, confidential policy processes or which are understudied in literature such as the case of policy-making on nuclear energy. Lilleker (2003, p. 213) rightly points out that “much of what occurs in politics is ‘off-stage’ and is either unrecorded or it is locked away under a 30 or 50-year rule and therefore inaccessible”. This creates a problem for research questions which beg answers that reveal more than what current literature or public discussions offers. I believe the situation on nuclear energy decision is a perfect example for this. The secondary resources and current reports circle around the same kind of arguments, leaving most of the puzzles about nuclear energy preference unresolved.

2. 3. 2. Choosing the Right Experts: My Sample

While accessing individual insights, first-hand accounts and rich depth of information which can potentially overcome secrecy are among the advantages of conducting elite interviews, major limitation of this data collection is generalizability due to its small N nature. Acknowledging this limitation, I have put considerable effort to partially overcome this by keeping the participants as diverse as possible. I have not only created a pool of experts who are pro/anti or neutral for nuclear energy but also conducting fieldtrip in three different countries allowed me to gather information from different sectors and policy settings. In this regard, even the contrasts in interviewees’ perceptions are worth noting in highlighting alternative perspectives as well as “different yet valid versions” of the story. Overlapping these offer a rich textured analysis (Lilleker, 2003, p. 212, 214).

Before starting my fieldtrip, I have prepared a list of potential interviewees through purposive sampling so as to create a database of experts in France, Germany and Turkey who are directly involved either in the decision-making processes or in the efforts to affect the decisions regarding nuclear energy. Detecting key persons and key institutions, putting an equal weight on pro/anti- nuclear sides was a real challenge. Nevertheless, through an in-depth research covering these three countries, my sample included prominent social figures, current or retired practitioners, informed third party observers,

significant interest group representatives, opinion leaders, experts and scholars corresponding to each of the categories demonstrated in my model in Chapter 4 (i.e., the industry, the civil stakeholders, the scientific community and political parties). Furthermore, key individuals from ministries and state agencies who are/ have been in service also have been listed. As a result, I have created a “nuclear people database” for my personal use made up of 245 representatives of key actors, with names, positions, e-mails, phone numbers and addresses. Although the number of identified individuals was high, due to potential limitations caused by time constraint, budget constraint and lack of individuals’ willingness to reveal information, the target set for the total number of interviews was around 15 to 20 per country. Some of the people in the database were already my contacts who are either important state, company or NGO representatives or who had volunteered to introduce me with key contacts. In this regard, I believe my personal involvement into Bosphorus Energy Club⁹, ICEC (Istanbul International Center for Energy and Climate) and International Nuclear Power Plants Summit was very instrumental in reaching relevant persons.

I have frequently followed-up energy and environment related conferences, both as a speaker and as a delegate, to have a broader perspective regarding both the actors in the field and major topics that dominated their agendas. This effort did not only allow me to acquire a quasi-field experience apart from the secondary literature, but also offered me a privileged access to the relevant networks. In these conferences and events, apart from my semi-structured interviews, I had the chance to meet critical individuals who contributed in my research through casual conversations, question and answer sessions and off-the-record debates. As these “casual” interviews were not systematically organized, due to ethical considerations and confidentiality, the data provided in those instances were not included in the data processed through the transcripts, yet were taken into consideration in the evaluation and conclusion processes. With the same reasons, those experts’ names are not included in the list of participants. Moreover, most of the meetings I have attended were based on the Chatham House rules, therefore the

⁹ BEC is an exclusive membership based international club made up of high level executives and state representatives in the energy sphere

information received in these occasions were not attributed to specific persons or institutions.

I did not intend for “name dropping” in my research, as the information acquired from the right people working in the right positions mattered for me more than offering a list of popular names. Still, I was more than lucky to have the opportunity to interview very critical figures who were very influential in shaping both their national and international policies in energy. Accordingly, each name in my list was the accurate person to offer me a different component of the story. To illustrate, among many other valuable experts, Fatih Birol (Executive Director/ International Energy Agency) and William Magwood (Director-General / Nuclear Energy Agency (OECD - NEA)) were very helpful in reflecting the global energy dynamics and nuclear energy market. Similarly, Mr. Rainer Baake (Former State Secretary at the Federal Ministry for Economic Affairs and Energy) was a key figure for Germany’s Energiewende and Merkel’s decision for nuclear phase out, he was extremely helpful for me in reaching other state representatives in Germany.

I did my best in reaching all the parties on equal terms, without favoring any specific perspective or without discriminating any group of actors. For reaching certain institutions I have used intermediaries. Following snowball technique, at the end of each interview, I asked the participants for their potential interviewee suggestions. At one point, suggested names brought me back to either the individuals I have already interviewed or already contacted. This gave me proof that I was contacting accurate actors. Once the same circle started for the interview content as well, i.e.: same points being repeated by very different experts from different fields, I have concluded my fieldtrip thinking that I have reached a meaningful and credible sample.

Of course, there are many other names who could be included into the list. For those with whom I did not have the opportunity to make an interview, I have used their declarations, reports and articles to reflect their perspective into the analysis. To illustrate, in Turkey, Prof. Tolga Yarman, Özgür Gürbüz or Ümit Şahin are outstanding figures who have a critical perspective on Turkey’s nuclear energy policy and who write a lot about it. Accordingly, their publications and interviews helped me a lot in incorporating a critical perspective into the evaluation, along with my interview results.

2. 3. 3. The Fieldtrip Experience

My fieldtrip experience was not limited with the interviews and it certainly included some traits which can be treated as important findings on their own regarding the attitude towards the researchers and the study of nuclear energy in France, Germany and Turkey. This was a very rewarding process, not only for my research but also for my personal development as a researcher. I strongly believe that the following take-aways from my fieldtrip experience can offer contribution into methodology studies and can be instrumental for other researchers' efforts. First, conducting a fieldtrip is a very time and money consuming process as the study is not limited with the "actual" travels and interviews, but also includes a preparatory process. This certainly improves the researcher's organization and research skills. Meeting experts, getting to know them in person, being able to ask the underlying dynamics of the events that we read from the media is a precious experience. However, it is also a difficult exercise as it is not replicable. As Lilleker highlights (2003, p. 210), under normal circumstances, the researcher can only have one opportunity to interview that person, meaning that preparation before the interview is extremely important. For each country, before the interviews I made sure that I know enough details about the nuclear history of the country and recent discussions taking place in the country on nuclear energy. I examined in detailed their nuclear policies and studied the chronology of major benchmarks in their nuclear energy experiences. The same research process was also valid for the institutions I have visited and for the background of the experts I have interviewed.

Second, not only our interviews were full of useful information, but also I have learned a lot in the technical aspect of nuclear from the very first hands. I had the opportunity to get into interactive conversations with experts from the global nuclear, climate and energy communities. Knowing the insider perspectives offered me an enlarged vision in evaluating global market trends and policy directions. Moreover, this enriched the context of my study together with semi-structured interviews.

Third, the overall research process highly improved my social skills such as networking and communication. I had to meet or contact hundreds of high-level experts and I had to work almost like a journalist to reach people currently or formerly active in decision making. This process certainly contributes to a researcher's personal traits such as

perseverance and patience, since getting inside the closed doors of decision-makers is very challenging. Most of the experts were surprised to see that reaching them was a result of my personal efforts and that I have been organizing and conducting this research on my own, without the guidance of any institution, network or research group. The ministers, government officials and political party representatives in Germany and France were highly approachable and very supportive. I have managed to reach most of them by only sending an email including my resume and research statement. For these two countries most of the high-level politicians and institutions replied back to my requests. Even in cases when they have rejected an interview, they either suggested new persons to contact or kindly commented on my research by motivating words. This revealed not only the importance attributed to science and researchers in these two countries, but also their support for analytical and objective research on the political puzzles regarding nuclear energy.

In this regard, in methodological terms, despite some disadvantages, such as small N research sample, irreplaceable individuals and researcher having only one shot for interview, for the researcher, conducting fieldtrip and elite interviews is a priceless exercise. In the light of my personal experience, another conclusion is the importance of global networks and non-academic platforms which bring together decision-makers from politics, industry or civil society. My personal engagement into this kind of initiatives, being the only PhD Candidate or Academician in most of them, helped me notice this gap between universities and decision-makers. Addressing this gap is especially relevant for controversial topics such as nuclear energy. By-passing cliché information found in the press or by-passing biased publications which offer contradictory arguments in line with the position of their pro or anti-nuclear authors, and reaching first-hand information from actual stakeholders matters a lot.

Ensuring the ethical aspect of the research, before officially starting my interviews, I applied Koç University Ethics Committee for Social Sciences Research for approval. I have contacted the interviewees via email. Together with my resume, the e-mails included a formal copy of the decision from Ethics Committee For Social Science Research and a form of consent to participate in the research. This form included basic information about the research, the purpose of the study and potential benefits to the society and literature.

It also highlighted the principles of confidentiality for the interviews and information given by the participants.

Arranging the interview schedules was extremely challenging as it involved several international travels, budget constraints and experts with tight programs. The research was constantly interrupted by subsequent elections and several political crises in my case countries. This highly influenced the availability of the experts in my sample.

Taking into account all of these factors, apart from the findings, even the fieldtrip experience in three different countries with such a variety of stakeholders allows me to make some observations based on the comparison of the processes. To illustrate, the turnout rate, speed and interest for my research and interview request was strikingly different across countries and sectors. Each country had its own dynamics and challenges for me: In France it was difficult to reach anti-nuclear experts, in Germany it was difficult to find pro-nuclear experts and in Turkey it was difficult to find experts willing to talk.

For Germany, the website of Bundestag and the official book on actors of *Energiewende*¹⁰ were very instrumental to determine the institutions and experts to contact. On the other hand, the real challenge in Germany was to detect and to reach representatives of the nuclear industry or pro-nuclear experts, as the whole country is very much concentrated on *Energiewende*. Nevertheless, this was crucial to have a balanced sample. In this regard, German representatives in the International Nuclear Power Plants Summit were my key contacts and they have guided me to find pro-nuclear politicians and industry members. Overall, my observation was that there is a pressing stress among German members of the nuclear industry regarding the future of their know-how, job security and electricity supply security. Interestingly, except in Germany, some very well-known environmental NGOs, whose names are kept confidential, never answered my requests for a meeting despite personal contacts, yet did continue to contact me to raise funds for their campaigns. This was very unfortunate as most of my pro-nuclear or industry contacts did highlight the lack of sincerity of these organizations in following their missions. While it is not appropriate to generalize such an argument with this experience, it was very surprising. On the contrary, the representatives from the industry or engineers in the

¹⁰ "Who is Who of the *Energiewende* in Germany" Federal Republic of Germany, Foreign Affairs, 2019.

nuclear field were more open to share information and tended to use every possible opportunity to properly express themselves with facts and reports. Consequently, the process was more than insightful for me.

In France the support from the CEA, The French Consulate as well as other state institutions which are involved in nuclear energy were extremely helpful and supportive. For certain institutions, especially for the ones known for their critical stance with regards to nuclear energy, such as “Réseau Sortir du Nucléaire”, I did not manage to interview their direct representatives, but I did interview some prominent figures suggested by them such as Corinne LePage, who is the Former Minister of Environment (1995-1997/ President: Jacques Chirac), and who is also a very important figure in France with her critical perspective to nuclear energy: Lepage had refused to sign the decree authorizing the relaunch of the Superphénix nuclear reactor due to its technical difficulties and had an open struggle with the Minister of Industry of the time.

The dynamics for Turkey were relatively different. First of all, as a foreigner, it was easier to question the policies in France and Germany, as it was for sure that I do not represent or have the intention to represent any specific interest group with my research project. In Turkey, people were more skeptical when I have approached them with an interview request. The willingness to participate in such a research project was less in Turkey, compared to France and Germany. However, this was understandable as the nuclear issues are thought to include critical information and are treated almost as a matter of “official secret”. To illustrate, some representatives I have met during the conferences were especially surprised about my questions on Akkuyu, saying “How do you know all of these? This is secret information”, although the information leading to my questions were out there, open to public and written on publicly open intergovernmental agreement with Russia. This was revealing that even for publicly available information on nuclear energy, some experts were not only very cautious but also were underestimating the knowledge of ordinary citizens.

My Turkish interviews had the highest percentage of confidential or off-the-record data among all and the lowest rate of reply for my meeting requests. It was extremely difficult to reach Ministry of Energy and Natural Resources, despite having direct contacts. In non-state institutions as well, some representatives were very reluctant to talk, stating that

interviews are only possible under special authorization by their management. Overall this attitude was understandable due to the political context of the country which has been restless for the last couple of years given the coup attempt, subsequent elections and regional turbulences. When the conjuncture was combined with the sensitivity attached to nuclear energy by official authorities, people's reluctance to talk on nuclear energy or on any government policy was obvious. Some of my Turkish interviewees also stressed this and declared that most of their colleagues felt under pressure. As the main purpose of this dissertation is not to create speculations but rather to offer a scientific and analytical perspective for nuclear energy decision, I was careful not to make the participant uncomfortable and I was never too insistent for interviews. In order to mitigate the gap, especially for the official perspectives, I have reviewed official reports, archives, speeches and press declarations from key decision-makers to reflect the official government discourse in the analysis.

2. 3. 4. The Interviews and the Questions

Most of the interviews took place in the institutions of the participants. This was very interesting on its own, allowing me to visit in person the institutions which have been shaping country and world politics in their own contexts.

I have put forward considerable effort to ensure the participants about my impartiality in the research. My role as a researcher is only to offer conclusions for the puzzle in my research, to create a discussion on nuclear energy and to highlight the mechanisms beyond the "pros and cons debate". My main effort has always been to produce a technology-neutral research output. Consequently, in my interviews, I have made sure that the questions reflected my impartiality and I did not reflect any impression showing agreement or disagreement with the interviewees' views.

The interviews were recorded with the consent of the participants. This was a critical advantage for me as it allowed me to completely focus on the conversation, as well as on the impressions, attitudes and reactions of the respondents. In the analysis process, the records helped me to have the exact transcripts so as to be examined via a data processing tool, i.e. MAXQDA. Although the interviews were recorded, during the interviews I had my reminder notes on specific benchmarks which made it easier for me to follow-up and

to intervene with additional questions. Taking notes during the interviews also allowed me not to interrupt the participants but still to go back to the important points once their answers are completed.

In this research, any information that is obtained in connection with the study and that can be identified with the respondent remained confidential and is disclosed only with the permission of the participant. I did not use the interviewee's name in any of the information unless I was given the permission. Due to these ethical considerations, and taking into account the confidentiality as well as sensitive information that is an inalienable part of the discussions on nuclear, I was very cautious in using the names and quotes in this dissertation. The majority of the participants accepted that they would be named and agreed to be quoted in the text. The names, titles, affiliations of the interviewees are listed in Appendix II, together with the interview dates. I have also assigned the participants random codes starting with "Expert G" for experts from Germany, "Expert F" for experts from France and "Expert T" for experts from Turkey. The numbers following these prefixes (e.g. Expert F-4) are not in order with the participant list in Appendix II. For cases where the participant accepted to be named on the list but not wanted to be attributed by name in the analysis, these codes are used as following chapters will reveal.

When interviewees offered "off the record" information, the recording was stopped. For the courtesy, this information is not written in this dissertation. These sections are not directly used, nevertheless, they have, of course, influenced my own knowledge about the topic and enlarged my vision during the analysis process and in the evaluation of the findings.

While the duration of the meetings varied in line with the schedule and availability of the participants, the average length was 60 to 90 minutes. Depending on the expert's background and willingness to share information, in some cases the interviews lasted for more than two hours.

The interviews included some general open-ended questions as well as country specific questions (see Appendix III), which were prepared prior the fieldtrip in line with the

literature review, the information gathered from official sources as well as from my conceptual framework.

I have started the interviews with general warm-up questions about the respondent's career, position and his/her institution's role with regards to energy and/or nuclear energy policies. The rest of the conversations were guided by the country specific questions throughout the interviews. As suggested in the "Strategies for Qualitative Interviews" by Harvard University, I tried to "follow the respondent and followed up new information that he or she brings up without losing sense" of the direction and purpose of the interview. This was a challenge for me as I had to limit my curiosity and eagerness to learn more on the details since each country's nuclear energy experience had specific puzzles, nuances and secrecies.

As the interviews were semi-structured, a casual flow was followed, giving most of the word to the respondents. I have tried to keep the questions general so that the individuals do not feel channeled towards certain positioning. These open and non-leading questions helped me to "get the interviewee to talk freely and at length, and to explore the width and depth of his or her views and experiences" (Ritchie et al., 2013; Kvale & Brinkman, 2014). This was especially practical as it made possible to disclose the "interviewee's views, interpretations of events, understandings, experiences and opinions" (Byrne, 2004, p. 182). The questions were simultaneously modified as the conversation continued and were accompanied by follow-up questions for clarification, further information or reality check. In most of the cases experts represented a different perspective or time period depending on their position, age or career path. In such instances the questions were further expanded. This was a fruitful strategy as it allowed the experts the freedom to bring their own proficiencies further into the discussion as Aberbach and Rockman suggest (2002, p. 674). It is critical to note that each interviewee shared his or her own opinions and the participants' declarations did not necessarily represent the views of their institutions.

Although the order of the questions was mixed, I made sure that in each interview all the questions were somehow addressed, unless the respondents brought up new dimensions. Indeed, these emerging new dimensions were the very purpose of the interviews as by the end of my fieldtrip I wanted to see emerging clusters of concepts and factors to establish

my grounded theory. In this regard, I am satisfied with the outcome of the interviews as they fulfilled this purpose.

2. 4. The Analysis

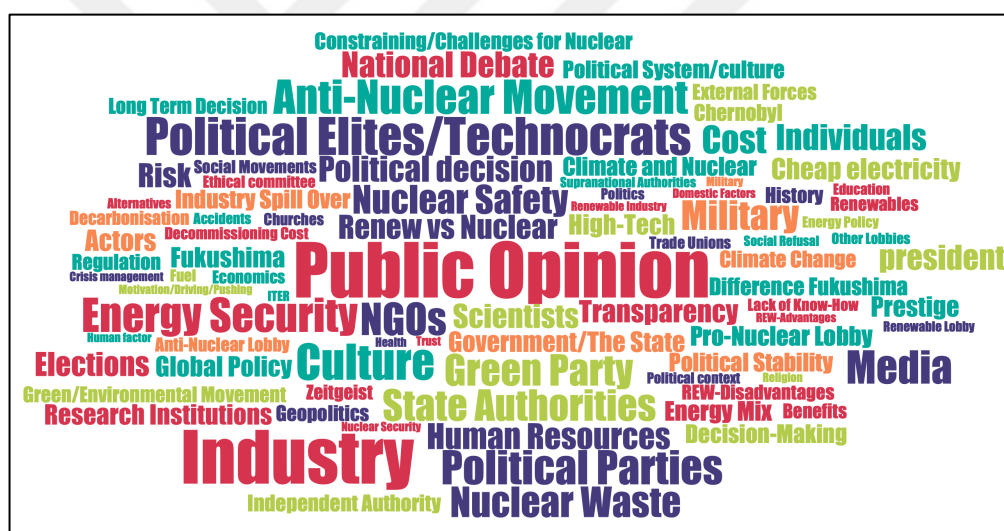
Diving into my data, my main target was to identify underlying rules, patterns, themes and regularities; challenge the assumptions (Scott, 2009, p. 4–5, Brinkmann, 2013) on nuclear energy policies which are taken for granted in the literature and to dive deeper to see what is lying underneath the iceberg regarding the interaction of factors. Following the principles of grounded theory approach, the analysis was based on codes or themes emerging from the study of the interview data holistically, and it aimed to explore the resonance of themes over different interviews (Vromen & Gauja, 2009). In this type of qualitative analysis, while looking for patterns and causal links within interview data, “theoretical ideas are explored in data, coded and then the theoretical idea is expanded based on the data, thus a ‘to and from’ process between data and theory” (Vromen & Gauja, 2009, p. 93) takes place. To this end, as the first step before the analysis, I have transcribed all the interview records. This was a very time-consuming process. Overall, the total amount of data to be evaluated, classified and analyzed was 2840 minutes, 553 pages, and 300.655 words.

Conducting in-depth interviews brings its own limitations and challenges in the analysis phase as well (Mosley, 2013). The access to experts’ personal experiences and perspectives requires a detailed and cautious evaluation of the data collected. The reason is that, first-hand information coming from the interviews reflects how the expert perceives a specific phenomenon, rather than the facts themselves (Silverman, 2011, p.168). The systematic reinforcement of the collected data through reality-checks is a must. To this end, “triangulation” is a useful tactic in order to provide cross-reference between primary sources such as, interviews, published first-hand accounts; and documentary sources (published or archival), with published secondary-source information available (Davies, 2001, p. 78). This offers crosschecks and verifies the collected data (Dale, 2006, p. 81). Accordingly, the content of the interviews was checked before the coding process.

Wolcott argues that the primary critical task in qualitative research “is not to accumulate all the data you can, but to ‘can’ (i.e., get rid of) much of the data you accumulate” (Wolcott, 2009, p. 39). This requires data reduction which means a “process of selecting, focusing, simplifying, abstracting and transforming the data that appears in written up field notes and transcriptions” (Miles & Huberman, 1994, p. 10; Halperin & Heath, 2012, p. 279). Since this is not an easy task given the immense amount of text, I have made use of a data analysis software.

The transcripts were coded using MAXQDA. MAXQDA is a software package for qualitative and mixed methods research and it is especially useful in grounded theory. It allows the researcher to create codes representing different theoretical or conceptual categories and to assign excerpts from transcripts, texts or articles to relevant codes. It is also instrumental in drawing conclusions from the data since it helps to visualize codings, their frequencies as well as the codes’ interactions.

Before coding, I have first read through the interview responses to see general patterns or themes among the participants. Even this initial process revealed some components of the dynamics with regards to nuclear energy decision (as factors, actors and concepts), which have crystallized across different interviews. Merging these emerging clusters with the main themes in the interview questions and my theoretical framework, I have created general codes. In line with the codes, I have assigned the interview content to “different categories according to the variable to which they relate” (Halperin & Heath, 2012, p. 280). Each time the interviewee mentioned a detail which related to one of the codes, that section was assigned to that specific theme. The codes did not represent specifically any positive or negative relationship in itself or with each other. In certain cases, the coding overlapped with other codes, which was interesting in seeing which factors are commonly referred together. Overall, the stages of data coding was quite parallel with what Corbin and Strauss (1990) suggested: it included “open coding” (which means line by line coding of key concepts and phrases by highlighting them, and moving them into subcategories and categories, which separates the data into conceptual components); axial coding (which identified the relationships and connections between the categories) and selective coding which identifies the grand categories in order to integrate into the grounded theory.



The analysis was very transparent with the help of MAXQDA. Using the interviews as the unit of analysis, MAXQDA counts for each sub-code, in how many of the interviews it occurs. By creating frequency tables and diagrams, the analysis answers the question “What percentage of cases (= interviews) mention the theme (= code) XY?”. The percentages show how large the percentage of interviews with the sub-code in question is. Similarly, using coded segments as unit of analysis MAXQDA shows how often a sub-code was assigned, meaning how many coded segments exist for this code. The results list how often each of the sub-codes was used across all of the interviews. This indicates

the trending topics in the nuclear energy decisions and the relative emphasis put on the theme within its category.

There are certain points to consider while evaluating these frequencies. First, the themes with the highest percentages in terms of references and frequencies are crucial in terms of the decision-making on nuclear energy. Moreover, the differences in the ranking of these across the cases of France, Germany and Turkey are also instrumental as they reveal distinctive features of the countries. Given their deep experience, each expert in the sample is a critical knowledge resource, as this is not a random sample and they are not an experiment group made up of ordinary citizens. This means that even a single code, affirmed by a single expert is a significant input. Accordingly, critical differences or hidden dimensions of the decision-making mechanisms may also rest on the themes with the least frequencies and each theme has to be considered in the overall process. Second, having a high frequency represents an extended discussion of that topic which might either stand for a really significant effect (for example: energy supply security) or can represent a critical discussion of that topic which can include a critique or disapproval from the experts. This necessitates the combination of these statistical findings with the content of the interviews in order to represent the whole story, which will be done in the upcoming chapters.

While I was very careful in balancing pro and anti-nuclear experts in my sample prior the interviews, in the analysis phase I did not assign any pre-defined categories to the participants, except their respective countries. Rather, I asked them broadly about their roles and experiences and while conducting the data analysis I have tried to examine their diverse and distinctive views with regards to pushing and constraining factors in nuclear energy preferences. Following Vromen and Gauja's (2009, p. 93) strategy, I have used "a generous number of quotes from the interviews to illustrate the categorizations and to incorporate the voice of the interview subjects". This allowed me to combine statistical results of the analysis with qualitative findings from my interviews.

2. 5. Conclusion

This chapter clarified the research design, case selection and methodology of this dissertation. The most interesting part of this research is no doubt the first-hand insights

from major experts. With this consciousness, I have put rigorous effort in the analysis of the interviews, as this chapter explained in detail. Each step of the data collection and analysis processes have been provided comprehensively so as to lay the ground for the discussion of the findings in the upcoming chapters.



Chapter 3

THE COMPONENTS OF NUCLEAR ENERGY DEBATE

Nuclear energy literature in social sciences has a very interesting character. As arguments over nuclear energy are very controversial, the standpoint of the resources and where we get the information from, is extremely important. Although the word “biased” would be an unjust generalization for the overall literature, it is not difficult to identify a pattern of “proponents versus opponents” trend in the studies, unless the resource is a reference source about the story of nuclear energy (Asimov, 1972), its history or about its major problems and current solutions to address them (Henderson, 2014; Ferguson, 2011; Bodansky, 2004). The discussions initially focus on the advantages and risks that come along with nuclear energy generation. Some researchers address the pro and cons debate itself, such as Elliot (2007) and Haney (2012) by putting forward both sets of views and arguments without taking any position. Others follow a more subjective perspective.

The efforts to enhance new range of reactor technologies are especially motivated by the perspective which considers nuclear energy as a remedy for the “predicted shortcomings in energy supply, energy security and climate change” (Kıyar & Wittneben, 2012, p. 9). The promotion of nuclear energy concentrates around decreasing energy dependence, meeting increasing energy consumption, adjusting electricity prices and decreasing emissions, depicting nuclear as a cheap, safe, secure, emission free source of energy (e.g. Apikyan & Diamon, 2009; Eerikens, 2010; Cadenas, 2012; Comby, 2001). In his strand of literature some scholars do not only review the benefits of nuclear energy, but also address numerous “misconceptions” and “misunderstandings”, which are “greatly exaggerated” in Herbst and Hopley (2007) and Cohen’s (1983) words.

On the other hand, critics highlight the risks and problems regarding nuclear energy such as: environmental risks in case of a radioactive leakage, health effects, waste management problems, low public acceptance, the cost of nuclear power plants, the traumatic memories of tragic nuclear accidents or nuclear weapons (Caldicott, 2006; Rosenkranz et al., 2010; Martin & McKillop, 2012). Some of these critics suggest that one of the most

puzzling questions about nuclear power is why it is still being pursued (Martin & McKillop, 2012, p. 6).

In such a context, the discussion of the advantages and risks of nuclear energy generation obscures the political dimension of the issue and distracts the attention away from the puzzle concerning the real drivers as well as barriers for nuclear energy policy. Nevertheless, a successful reading of pushing and constraining factors in the decision-making for nuclear energy requires a substantial knowledge of all these discussions since the arguments in the literature catalyze the dynamics and the debates in the decision-making process. Accordingly, in line with these “advantages and risks”, some major issues emerge, which should be addressed in the analysis of policy-making for nuclear energy production. This is why, this chapter overviews major components of the debate on nuclear energy to offer a solid basis for future analysis.

This chapter does not target to discuss technical dimensions of the selected issues and does not take a categorical position regarding nuclear energy, with neither a proponent nor an opponent stance. Consequently, I would like to replace the *advantages vs risks* debate with a categorization of major tenets of nuclear in a more objective fashion in the form of strengths, weaknesses, opportunities and threats of nuclear energy, as the figure below summarizes.

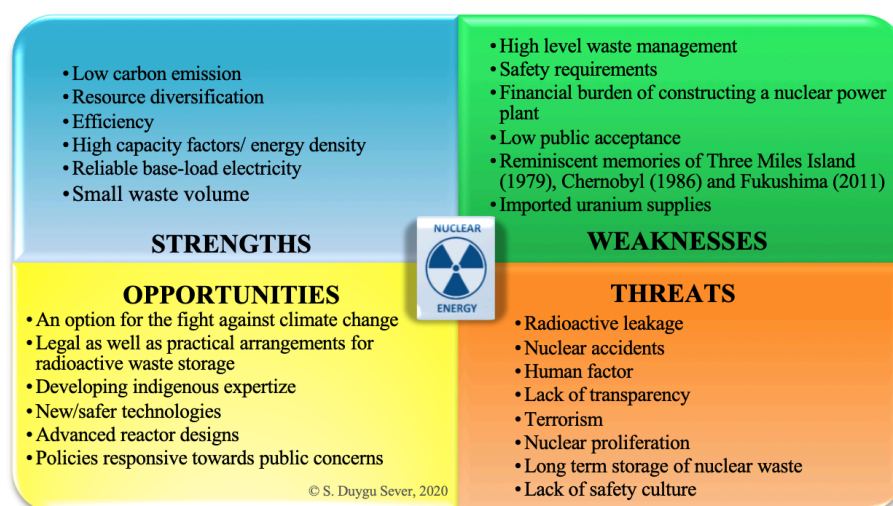


Figure 3. 1. SWOT Analysis of nuclear energy.¹¹

¹¹ The idea of a SWOT analysis is inspired by Prof. Yehia Khalil’s presentation “The Analysis of Fission Nuclear Power for Electricity Generation”. School of Forestry & Environmental Studies

3.1. Energy Security and Nuclear Energy

The concept of energy security is an *elastic* term (Yilmaz & Sever, 2016, p. 106), which does not have one comprehensive definition (Valentine, 2011). Indeed Sovacool (2011) detects 45 different definitions of energy security in the literature. Some offer simple definitions as “reliable and adequate supply of energy at reasonable prices” (Luft, Korin & Gupta, 2011, p. 44) or as “assuring adequate, reliable supplies of energy at reasonable prices and in ways that do not jeopardize major national values and objectives” (Yergin, 1988, p. 111 in Szulecki, 2018, p. 5). On the other hand, others such as the European Union use more comprehensive definitions so as to capture competitiveness, supplies and sustainability. Accordingly, energy security is defined as:

“Ensuring, for the well-being of its citizens and the proper functioning of the economy, the uninterrupted physical availability of energy products on the market, at a price which is affordable for all consumers (private and industrial), while respecting environmental concerns and looking towards sustainable development” (European Commission 2000, p. 2).

While the definitions are different and the meaning is usually left implicit (Szulecki, 2018, p. 4) or vague (Yergin, 2011), energy security’s tangibility and importance for not only our modern ways of life but also for a state’s independence in relation to critical energy supplies is certain. Energy security of a state is shaped by national political and institutional capacities as well as by national choices relating to military, economics and – increasingly – environmental security (Christoff, 2012, p. 218).

The lowest common denominator in all these different perspectives are ensuring the uninterrupted availability of energy supplies and decreasing dependency on imported fuels from uncertain foreign suppliers, which leads to the key strategy: diversification (Sovacool, 2011; Stirling, 2011). As a matter of fact, the diversification strategy has always been on the agenda. Even way back in early 1910s the necessity for diversifying resources was on the table (back then for oil). As Churchill told Parliament in July 1913: “On no one quality, on no one process, on no one country, on no one route, and on no one field must we be dependent. Safety and certainty in oil lie in variety and variety alone”

(F&ES), Yale University, 2016. The figure is my compilation from my literature review on nuclear energy, also available at Sever, 2020.

(Parliamentary Debates, Commons, July 17, 1913, pp. 1474–77 in Yergin, 2011). Interestingly nothing much has changed in the international arena with regards to energy games.

The first dimension of diversification concerns the fossil fuels as “both resource-rich and resource-poor nations need to gradually reduce their dependency on fossil fuels” (Mouraviev & Koulouri, 2019, p. 4). Not only individual states but also supranational entities have been emphasizing diversification of the energy mix as a major energy security strategy. To illustrate, the European Union (Birchfield & Duffield, 2011; Morata & Sandoval, 2012) has several Green Papers and policy recommendations (European Commission 2000, 2005, 2006a, 2006b) which direct member states to pursue diversification policies in their national energy mixes. The second dimension of diversification concerns suppliers. As Mouraviev and Koulouri (2019, p.2) state: “considering the fact that governments and political regimes change, and the depletion of fossil fuels accelerates, a certain country, particularly one that is resource-poor, will have to continuously deal with its dependency on other nations for the supply of energy resources”. Therefore, a valid foreign policy strategy includes managing the nation’s energy dependency¹² and vulnerability regarding its energy exporters (Yilmaz & Sever, 2016).

Engaging in nuclear energy generation is considered as an important tool for some states to diversify both their energy portfolio away from fossil fuels and as a way to consequently decrease the reliance on energy imports. Nuclear is not only depicted as a reliable base-load resource for electricity as often highlighted by several energy experts including Fatih Birol, the Executive Director of International Energy Agency (WNN, 2019b), but also as a high-density energy resource. The heat values (used to measure a fuel’s energy density), of major resources reveal the difference: crude oil 42-47 MJ/kg, natural gas 42-55 MJ/kg, black coal 23,9 MJ/kg, lignite 17,4 MJ/kg and nuclear 3900 GJ/kg (WNA, 2018a). To illustrate, one would need 163179 kg of black coal or 224137 kg of lignite to produce the same energy as produced from only 1 kg of enriched uranium.

¹² Eurostat defines energy dependency as “the extent to which an economy relies upon imports in order to meet its energy needs” and calculates the indicator as “net imports divided by the sum of gross inland energy consumption plus bunkers” (Eurostat 2015).

Similar comparisons are also available with regards to the space needed to produce same amounts of electricity from solar, wind and nuclear (Independent, 2009).

On the other hand, the promotion of nuclear energy as an effective resource to cope with dependence on exported energy resources inherits a trap that resource-poor countries should be cautious about: fuel and technology dependence on foreign suppliers. The security of uranium supplies and continuous flow of know-how transfer need to be ensured through carefully designed long-term intergovernmental agreements. The world's largest uranium reserves are located in Australia (30 percent), Kazakhstan (14 percent), Russia (8 percent), Canada (8 percent), Namibia (7 percent) and Niger (5 percent) (OECD, NEA & IAEA, 2018; WNA, 2017b). The production ranking among these countries is slightly different as opposed to their reserve shares. The share of these countries in world uranium supplies is as the following: Kazakhstan 40,5 percent, Canada 13 percent, Australia 12 percent, Namibia 10,3 percent and Niger 5,4 percent, Russia 5,4 percent (WNA, 2019c). With increasing interest to nuclear energy by countries such as China or India, uranium supplies are increasingly being guaranteed by long term agreements. As an example, on July 8, 2015, Kazakhstan's uranium mining company KazAtomProm had signed a contract with India's Department of Atomic Energy (DAE) to supply 5000 tons of uranium (World Nuclear News, 2015).

Some scholars signal a potential risk in uranium supply security, suggesting that high quality uranium deposits are already used when nuclear weapons programs peaked in 1940s and 1950s (Sovacool, 2010, p. 11) and that newcomers' interest in nuclear can cause a price volatility for uranium, which they consider as a disadvantage for nuclear energy compared to renewables such as wind, water, sun (Sovacool & D'Agostina 2010, p. 33). Nevertheless, World Nuclear Association declares that the world's present measured resources of uranium are enough to last for about 90 years (WNA, 2019e) and that known resources are "more than adequate" to satisfy reactor requirements until 2040 (WNN, 2019e). Moreover, uranium can be secured by contracts and can be reserved in required amounts. On the other hand, Nuclear Fuel Report: Global Scenarios for Demand and Supply Availability 2019-2040 highlights that "currently depressed uranium market has caused not only a sharp decrease in uranium exploration activities ... but also the curtailment of uranium production at existing mines" (WNN, 2019e). Consequently, in

case of a nuclear expansion, especially from Asia, how the uranium market will evolve, how the relations and trade among uranium suppliers and importers will develop and whether the magnitude of uranium trade/dependence will be large enough to influence these relations remain to be seen in the coming decades.

3. 2. Climate Change and Nuclear Energy

The targets of reducing carbon emissions and mitigating climate change are increasingly labelled as “game changers” in the energy field (Stulberg & Fuhrmann, 2013, p. 8). Along with supply security, the strongest arguments supporting nuclear energy rest in the realm of sustainability and energy transition discussions. Some consider the concerns about urgent threat of climate change and the need to de-carbonize as *the* causes or even “main drivers” (Kıyar and Wittneben 2012, p. 10) for the support of nuclear energy¹³ (Bradford, 2012, p.152; International Energy Agency, 2008; Strahan, 2011; Thomas, 2012; Coley, 2008; Miguel, Labandeira & Manzano, 2006; Ristinen & Kraushaar, 2006; Goodfellow, Williams & Azapagic, 2011; Hayashi & Hughes, 2012; Greenhalgh & Azapagic, 2009; Mecklin, 2017).

Diversification of the energy mix to address the climate change and environmental sustainability is identified as a catalyzer regarding nuclear energy expansion, since increasing the share of low-carbon energy resources in the energy mix is a crucial step towards limiting the greenhouse gas emissions. In the European Union, for instance, the fight against climate change has been a critical component of the discussion about nuclear energy (IEA, 2008; Thomas, 2012, p.16; Kıyar & Wittneben, 2012, p. 10; Bradford, 2012, p. 152). Some official EU reports stressed the necessity of nuclear in addressing climate change and ensuring the EU’s energy security (IEA, 2008, p. 10). The Commission advised that in case of decreasing the share of nuclear in Europe, other “supplementary low-carbon energy sources for electricity production” would be necessary since “otherwise the objective of cutting GHG emissions and improving security of energy supply will not be met” (European Commission, 2007a).

¹³ It is interesting to note that when it comes to public opinion, nuclear is rather considered as harmful to the environment due to waste.

At first glance, one can think that, compared to conventional fossil fuels, low-carbon nuclear power is promising in decreasing GHG emissions while also contributing to the energy supplies required to meet the rising energy demands. However, the arguments in the literature concerning the role of nuclear energy in climate change mitigation are not clear-cut. There are differing views on whether nuclear energy is an essential player in the fight against climate change and resource diversification. These arguments are made up of three major tracks: the connotation of nuclear energy as a clean energy source, nuclear energy as a misleading source in the fight with the climate change and nuclear energy as a clean yet unrealistic energy resource for climate change remedies.

According to the first perspective, nuclear energy is highlighted as an important component of strategies for diminishing greenhouse gas emissions, keeping energy profiles “clean” (IEA, 2020c; Brook & Lowe, 2010; Santos, Rosa, Arouca and Ribeiro, 2013) and offering a potential solution to the climate change (Busby, 2013; WNA, 2012). Nuclear energy is considered to already make a significant contribution to providing the world with clean electricity (WNA, 2019b). According to IEA:

“Nuclear power has helped to slow the long-term increase in emissions of carbon dioxide (CO₂) over the last half-century, particularly in advanced economies. Globally, nuclear power output avoided 63 gigatons of carbon dioxide (GtCO₂) from 1971 to 2018. Without nuclear power, emissions from electricity generation would have been almost 20 percent higher, and total energy-related emissions 6 percent higher, over that period” (IEA, 2019b).

The IEA goes on to stress that increasing the pace of decarbonization of electricity supplies and achieving a sustainable energy system will be more difficult without further nuclear investment (IEA, 2019b). The growing contribution of nuclear energy to sustainable development is also emphasized by IAEA (IAEA Bulletin, 2017).

In a documentary on nuclear power debate, *Pandora’s Promise* (2013), Steward Brand, the American environmentalist best known as the editor of the *Whole Earth Catalog*, asks: “in an era of climate change can you be an environmentalist and not be pro-nuclear?”. Indeed, he is not the only one to hold this view as in *Open Letter to Environmentalists on Nuclear Energy* (2014), 75 experts proposed that nuclear energy “must be deployed to

replace the burning of fossil fuels, if we are to have any chance of mitigating severe climate change”. Similarly, in Clean Energy Ministerial Conference, over 40 nuclear associations representing around 80,000 scientists stated the need “to commit to doubling public investment in nuclear-related R&D and innovation within the next five years” (World Nuclear News, 2019). Several important figures have been making statements endorsing the perspective that nuclear energy can be “the energy source that can save our planet from another possible disaster: catastrophic climate change” (Dr. Patrick Moore, co-founder of Greenpeace, in the Washington Post, 2006). They depict nuclear as the *only* realistic, near zero emission source, that can effectively replace fossil fuels and satisfy growing global energy demand while meeting demanding greenhouse gas targets (Dr. Patrick Moore in ENS World News, 2005; Sir David King, the UK government's chief scientific adviser from 2000 to 2007 in Adam, 2006; Luft, Korin & Gupta, 2011; Jeffrey Sachs in The Guardian, 2012). One of the most recent statements came from Bill Gates in Twitter:

“To prevent the worst effects of climate change, we need to reach near-zero emissions on all the things that drive it (agriculture, electricity, manufacturing, transportation, and buildings) by investing in innovation across all sectors while deploying low cost renewables. Nuclear energy is one of these critical technologies. It's ideal for dealing with climate change, because it is the only carbon-free, scalable energy source that's available 24 hours a day” (Gates, 2019).

This perspective, however, faces strong criticism. Critics state that climate change is abused as an excuse to render nuclear power plants acceptable, as part of a pro-nuclear “propaganda” (Şahin, 2014; Caldicott 2014). Indeed, some of these experts agree with the proposition that “nuclear needs climate change more than climate change needs nuclear” as the nuclear industry journal Nucleonics Week wrote way back in 1998 (in Elliot, 2007, p. 4). In the same vein, Kopytko and Perkins (2011) suggest that arguments supporting nuclear for climate are simplistic and misleading since nuclear energy cannot be a suitable mitigation measure.

World Nuclear Industry Status Report (2019) underlines that in the calculations over nuclear energy, “we must pay attention to carbon, cost, and time, not to carbon alone”, since the absence of greenhouse gas emissions cannot be sufficient to consider nuclear

energy as part of mitigation strategies against the climate change. In this regard, the report concludes that non-nuclear options can save more carbon per dollar, if the construction and operating costs of nuclear power plants are reinvested in renewables and energy efficiency (World Nuclear Industry Status Report, 2019, p. 15). Sovacool and D'Agostina (2010) hold the same position that energy profiles can be substituted with renewable energy resources and efficiency policies to reach a sustainable future. Helen Caldicott (2014, p. 40) even suggests that every effort to promote and catalyze nuclear energy industry is “stealing” from cheap and clean renewable energy production. Lovings agrees with this view by stating that “building new reactors, or operating existing ones, makes climate change worse compared with spending the same money on more-climate-effective ways to deliver the same energy services” (Lovings, 2019). Overall, according to this standpoint nuclear energy inherits high costs not only in terms of expenses for the construction and operation of the power plants but also in terms of environment, public health and welfare (Kopytko & Perkins, 2011). As a consequence, some claim that nuclear power plants need a quick phase-out policy in order to push the operators and energy industry for increasing their efforts in innovation in the development of sustainable and socially compatible energy technologies (Mez, 2012, p. 61).

Critics of nuclear energy strictly reject nuclear as an emission-free resource and warn that miscalculations about emissions can misguide the public opinion and decision-makers (Caldicott, 2014; Squassoni, 2009). This is because, as the argument follows, the reports prepared by nuclear industry about the contribution of nuclear energy in diminishing CO₂ emissions are presenting nuclear power plants' emissions lower than they really are to build a clean image for the nuclear energy. These researchers point to the fact that the production of the fuel required for the functioning of a nuclear power plant, especially the uranium mining phase, is based on conventional fossil fuel consumption. Consequently, when carbon emissions are calculated along all the lifecycle process including uranium mines, enrichment and decommissioning meaning the clean-up of radioactivity once the plant is closed, scholars such as Sovacool and D'Agostina argue that nuclear power is indeed one of the “costliest”, “capital-intensive, environmentally destructive, potentially unsafe ... and wasteful” resources (2010, p. 29).

In such a debate, the exact carbon emission of nuclear energy rests as an important puzzle right at the heart of this discussion. To illustrate, EDF, electricity producer, labels nuclear energy as one of the lowest carbon technologies “with a carbon footprint of about 16 grams of carbon dioxide-equivalent per kilowatt-hour of electricity generated (gCO₂e/kWh)” and declares that the figure includes a nuclear power plant’s total emission, from construction to decommissioning (EDF Energy, 2015). Similarly, CAsEnergy (2015) declares that “Nuclear energy has perhaps the lowest impact on the environment of any other energy source, as it produces zero carbon emissions”. Sovacool (2008b, p. 2954) on the other hand, reviews 103 lifecycle studies on the greenhouse gas emission for nuclear power plants. His examination reveals an outstanding disparity regarding lifecycle estimates of greenhouse gas emissions in the nuclear fuel cycle. The mean value for the total lifecycle of nuclear energy calculated by the analysis of several reports is 66,08 g/kWh and the actual operation of the nuclear plant accounts only for 11,58 g/kWh, which is usually the most cited section of the lifecycle while referring to nuclear as a clean energy. Similarly, Barnaby and Kemp’s (2007, p. 12) research finds out that the mean lifecycle emissions for nuclear ranges between 11 to 122 gCO₂/kWh. In fact, despite differences, these figures are still considerably lower than the mean emissions for natural gas (443 gCO₂/kWh), oil (778 gCO₂/kWh) and coal (1050 gCO₂/kWh) (Sovacool, 2008b). Furthermore, Warner and Heath (2012) suggest that median life cycle GHG emissions for nuclear could be as low as 9 to 110 gCO₂/kWh by 2050 which accounts for only a fraction of traditional fossil sources and which is comparable to renewable technologies. The variations in mean lifecycle emissions for nuclear are due to different operationalization of the lifecycle. While some calculations consider only the operation phase others include frontend (including phases such as uranium mining, milling, uranium enrichment and fuel fabrication), construction, operation, backend and decommissioning phases into their lifecycle definition (World Nuclear Association, 2011).

The third group of arguments put forward that the promotion of nuclear energy for climate change mitigation is simply unrealistic. While accepting that nuclear power is a potential solution to the climate change, some scholars such as Busby (2013, p. 125-149), think that it is unlikely that nuclear energy will play a major role in reducing global greenhouse gas emissions due to political and technical obstacles for the construction of new nuclear

plants and that concerns regarding climate change are not *singlehandedly* enough for a nuclear renaissance. In this framework, nuclear energy faces reservation in two main areas: scale and time.

In terms of scale, researchers underline the need for a considerable increase in the deployment of nuclear reactors across the world to have a significant effect as a climate mitigation technology (Kopytko & Perkins, 2011). They indicate that even if we accept the nuclear energy as a carbon-free resource, its promotion as a remedy against the climate change is still misleading given the financial and physical impossibility of constructing the amount of nuclear power plants required to limit the climate change to 2 degrees until 2050 (Şahin, 2014). Calculations reveal that to keep CO₂ emissions constant, 1000 new nuclear reactors have to be built until 2050, meaning that each year 28 new reactors have to become operational for 34 years. Given that only 34 reactors were completed between 2003 and 2013 (Şahin, 2014, p. 33), the results indicate that nuclear energy strategy has to be accompanied with complementary measures and resources, bearing in mind that this further requires flexibility for the NPPs with the capability to perform large and frequent load follow operations. Moreover, as Bunn (2015) states, “nuclear must become dramatically more attractive to governments and utilities than it was before Fukushima”, which is an important challenge.

With regards to time, in the absence of “a game-changing innovation that allows cheaper, safer nuclear power plants to come on-line much more quickly” (Squassoni in Mecklin, 2017), some suggests that non-nuclear options save more carbon per year (World Nuclear Industry Status Report, 2019, p.15): “New nuclear plants take 5–17 years longer to build than utility-scale solar or onshore wind power, so existing fossil-fueled plants emit far more CO₂ while awaiting substitution by the nuclear option. Stabilizing the climate is urgent, nuclear power is slow” (World Nuclear Industry Status Report, 2019, p.15). Today, existing nuclear fleet stands out as the second most important low-carbon source of electricity after hydropower, in terms of production. However, as International Energy Agency also confirms, the construction of new nuclear power plants is not on track with the sustainable development scenario. In 2019, 5.5 GW of additional nuclear capacity were connected to the grid and yet 9.4 GW were permanently shut down. This remains problematic since, for each year between 2020 and 2040, an average of 15 GW additional

capacity would be needed to meet sustainable development scenario. Currently, new nuclear capacity meets half of the requirements under sustainable development scenario (IEA, 2020b).

3. 3. Public Acceptance and Nuclear Energy

One of the oldest debates about nuclear energy concerns the question of public acceptance (for example, Otway, Maurer & Thomas, 1978) and anti-nuclear movements (Kitschelt, 1986). Indeed, positive or negative public opinion on nuclear has been an important component of decision-making, not only in the energy realm but also in reference to nuclear arms control. Many studies have indicated that public opinion indeed affected nuclear arms control policy between the years 1945 and 1980 (Graham, 1989) or public perceptions should be considered in the policy-making process (Ripberger, Rabovsky & Herron 2011; Herron & Jenkins-Smith, 2009).

Historically, the growth of nuclear energy was paralleled with an anti-nuclear movement among the public, especially starting in 1980s. Due to the risk of accidents which can result in radioactive leakages endangering the environment and human lives, nuclear energy faced strong opposition from the public. The opposition demonstrated itself as street protests, campaigns, human chains in all over the world, which in certain cases had resulted in violent conflicts between the public and the state authorities. In countries where plans for nuclear energy materialized and suggested reactor projects got transformed into actual construction schedules, negative public reaction to nuclear energy generation manifested itself through social protests as happened in Belgium¹⁴, Bulgaria¹⁵, Turkey¹⁶, France and Germany¹⁷ throughout the years. Certain countries reviewed their

¹⁴ For the details of Anti-Nuclear Protest in Belgium that took place on 25 April 2011 please check: http://www.dailymotion.com/video/xiehma_anti-nuclear-protest-in-belgium_news

¹⁵ An anti-nuclear campaign was carried in Bulgaria as “no to belene! beleNE!” on 27 August 2009. Further information is available at http://www.nuclear-heritage.net/index.php/Anti-nuclear_Movement_in_Bulgaria#References.

¹⁶ For some examples of anti-nuclear social protests in Turkey, please check: “Greenpeace stages anti-nuclear protest at Sultanahmet” at http://www.todayszaman.com/national_greenpeace-stages-anti-nuclear-protest-at-sultanahmet_273386.html or “No Nukes: Anti-Nuclear Activists Condemn Turkey’s Plans To Build Second Atomic Plant at <http://www.ibtimes.com/no-nukes-anti-nuclear-activists-condemn-turkeys-plans-build-second-atomic-plant-1239275>

¹⁷ On 25 April 2011, thousands of people gathered in France and Germany to ask end of nuclear power. Details are available at: <http://www.bbc.co.uk/news/world-europe-13188507>

energy policies in line with public opinion (Hayashi & Hughes, 2012). The case of Italy is a relevant example: in 2011, plans for nuclear power generation were rejected by a popular referendum in which more than 94 percent of voters opposed the government's plans for nuclear energy. Back then, Prime Minister Silvio Berlusconi evaluated the results by saying that “a will on the part of citizens to participate in decisions about our future that cannot be ignored” (BBC, 2011). The German phase-out decision is also highly associated with the long-standing anti-nuclear movement amongst the public, which urged policy-makers to respond to the will of the people after decades of struggles. Accordingly, public support is highly considered as one of the most important factors for the future of nuclear energy (Nguyen & Yim, 2018; Kıyar & Wittneben, 2012). As a matter of fact, right after Fukushima accident, “there has been a great deal of effort by some governments to re-assure the public and to be seen to be responding to the threat” (Thomas, 2012, p. 13). Some even claimed that the efforts of the European Commission to urge member states to carry out stress tests at their nuclear plants was a “public relations exercise” (Thomas, 2012, p. 14).

In this background, a considerable amount of literature focuses on public perceptions and individuals' acceptance of nuclear energy (some examples are from Wang & Kim, 2018; Schröder, J & A. Bergmans, 2012; Kim et. al, 2013; Pidgeon, Lorenzoni & Poortinga, 2008; Plight, Eiser & Spears, 1986) or on how public opinion on nuclear energy is formed/changed (Gamson & Modigliani, 1989; Goodfellow, Williams & Azapagic, 2011; Mulder, 2012; Schuman, Ludwig & Krosnick, 1986). Especially in the aftermath of Fukushima, the impact of the accident on public perceptions of nuclear energy and the influence of risk perceptions on policy support has received great scholarly interest with studies concluding that Fukushima had a negative impact on the acceptance of nuclear energy (Bauer et al. 2018; Siegrist & Visschers, 2013; Stoutenborough, Sturgess & Vedlitz, 2013). Major takeaways from these studies highlighted that: individuals' preconceived notions about nuclear energy influence their support for the promotion of nuclear energy (Stoutenborough, Sturgess & Vedlitz, 2013); people's prior beliefs and attitudes are very important for the interpretation of the accident (Siegrist & Visschers, 2013) and the more people are knowledgeable about energy issues, the more they are supportive of nuclear energy (Stoutenborough, Sturgess & Vedlitz, 2013), meaning that

more understanding of nuclear power could reduce public opposition (Zhu, Wei & Zhao, 2016). In a report published in 2017, Foratom has reached to a similar conclusion:

“Opposition to nuclear energy is often based on a lack of knowledge about how it works, about safety issues, radiation and the disposal of radioactive waste. But there is clear evidence that in countries where the debate on nuclear energy has been fair and transparent – Finland and the UK, for example – public support can be strong.” (Foratom, 2017).

Overall these evaluations boil down to the influence of the public acceptance on the nuclear development (Li et. al., 2013), as the existence of public resistance stands as one of the major challenges to the rapid expansion of nuclear power (Ramana, 2011). Scholars such as Koopmans and Duyvendak argue that public opinion or anti-nuclear movements are “able to successfully block or slow down the construction of nuclear power station” when they confront favorable conditions in the political context for framing the issue as problematic (Koopmans and Duyvendak, 1995, p. 249).

Since Fukushima disaster, public mistrust against nuclear has increased. This requires policymakers to be responsive to public demands, questions, and policy requirements, through inclusive and transparent processes. Ramana (2011) underlines that while people may have different motivations to oppose nuclear energy, the predominant concern is their perception that it is a risky technology and that they lack trust in the nuclear industry. Kim et. al (2014) also suggest that trust factor is effective in shifting public acceptance from opposition to reluctant acceptance.

3. 4. The Cost of Nuclear Energy

Is nuclear energy an economically viable option? In the optimism of the “Atomic Age” (Yergin, 2011), in 1954, the head of the Atomic Energy Commission Lewis Strauss’ declaration that nuclear energy would deliver “electrical energy too cheap to meter” (New York Times, 1954) had almost become a motto for nuclear power. Since then a lot of factors have changed bringing the cost dimension into the spotlight as one of the biggest constraints on nuclear energy growth (Bunn, 2015; Martin & McKillop, 2012). Recent World Nuclear Industry Status Report has even described the cost factor as a “slow-

motion commercial collapse” of the nuclear sector, “dying of an incurable attack of market forces” (World Nuclear Industry Status Report, 2019)

To begin with, nuclear power is a capital-intensive resource and the long timeframe for its construction is prone to unexpected delays and expenses (Sovacool, 2010; Sovacool & D’Agostino, 2010). 33 of the nuclear power units under construction are already reported to be behind schedule by several years (those in China included) and out of 16 units scheduled for startup in 2017, only a quarter were connected to the grid (Schneider et al., 2018, p.3). When increased safety requirements, deployment of new generation technologies, delays and increased construction costs are combined with global financial uncertainties (IAEA, 2017) as well as with efforts to decrease electricity demand in line with sustainability policies, the management of all of these risks while investing in nuclear power plants emerges as a vital challenge for the nuclear industry. Before the Covid-19 crisis, nuclear trade groups were expecting civil nuclear industry to generate around \$740 billion in sales of equipment and services for the coming decade (International Trade Administration, 2017). However, even before the pandemic, problems and miscalculations related to design, construction, additional safety measures as well as regulatory hurdles challenging the industry, were leaving companies with billions in cost overruns. The bankruptcy of Westinghouse in March 2017 is a relevant case, where the construction of two NPPs (one in Georgia and another in South Carolina) resulted in an estimate of \$13 billion in cost overruns (Hals & Flitter, 2017). As a consequence, nuclear energy has been following a scenario of underinvestment (Varro & Fraser, 2020). Additionally, the world’s operating nuclear reactor fleet is aging: Over 60 percent of existing units have been operating for 31 or more years, including 18.5 percent reaching 41 years and more (Schneider et al., 2018) In those cases, life-extension and decomposition costs emerge as other capital-intensive investment areas.

For nuclear energy, differing regulatory requirements, technical capacities and financial conditions lead to a wide range of overnight costs. Overnight costs include the direct construction and pre-construction costs of the owner (such as site licensing and the environmental testing), indirect costs such as engineering and administrative costs, and contingency costs. The initial investment costs also vary in line with reactor designs,

country specific project constraints (such as working rules, safety requirements, regulations) and economic conditions (such as labor costs) (IEA & NEA, 2015).

To have a perspective regarding the cost of nuclear energy in comparison to other energy resources, we make use of *levelized costs of generating electricity* (LCOE). LCOE is based on a levelized average lifetime¹⁸ cost approach which represents the costs at the plant level and does not reflect the costs for transmission and distribution. Table 3. 1 illustrates the findings of the analysis conducted by the International Energy Agency and the Nuclear Energy Agency. The table represents the overnight costs and net capacity across resources.

Table 3.1. Summary statistics for different generating technologies.¹⁹

Technology	Net capacity (MWe)				Technology	Overnight cost (USD/kWe)			
	Min	Mean	Median	Max		Min	Mean	Median	Max
Nuclear	535	1 434	1 300	3 300	Solar thermal (CSP)	3 571	5 964	6 072	8 142
Coal	605	1 131	772	4 693	Geothermal	1 493	4 898	5 823	6 625
Natural gas – CCGT	350	551	475	900	Hydro – small	1 369	5 127	5 281	9 400
Natural gas – OCGT	50	274	240	565	Offshore wind	3 703	4 985	4 998	5 933
Offshore wind	2	275	223	833	Nuclear	1 807	4 249	4 896	6 215
Solar thermal (CSP)	50	135	146	200	Biomass and biogas	587	4 447	4 060	8 667
Hydro – large	11	1 093	50	13 050	Hydro – large	598	3 492	2 493	8 687
Geothermal	6,8	62	27	250	Solar PV – residential	1 867	2 379	2 297	3 366
Onshore wind	2	38	20	200	Coal	813	2 080	2 264	3 067
Biomass and biogas	0,2	154	10	900	Onshore wind	1 200	1 911	1 804	2 999
Solar PV – large	1	19,3	2,5	200	Solar PV – commercial	728	1 583	1 696	1 977
Hydro – small	0,4	3,1	2	10	Solar PV – large	937	1 555	1 436	2 563
Solar PV – commercial	0,05	0,34	0,22	1	Natural gas – CCGT	627	1 021	1 014	1 289
Solar PV – residential	0,003	0,007	0,005	0,02	Natural gas – OCGT	500	708	699	933

Data Source: IEA & NEA, 2015 (Prepared by the author)

The findings of the analysis reveal that nuclear has the highest median for net capacity. On the other hand, the median cost for nuclear is higher than coal, natural gas or onshore wind. Moreover, the analysis also underlines that the cost of renewable technologies has a declining trend for the past five years, and that these technologies are no longer “cost outliers” (IEA & NEA, 2015). With regards technological trends in nuclear energy, IEA and NEA’s analysis suggests that for now small modular reactors (SMRs), an emerging

¹⁸ Expected lifetimes used as the default value for each technology are as the following: wind and solar plants-25 years, natural gas-fired CCGTs- 30 years, coal-fired power and geothermal plants- 40 years, nuclear power plants- 60 years and hydropower- 80 years. Source: IEA & NEA, 2015, p. 30.

¹⁹ CCGT: Combined Cycle Gas Turbines; OCGT: Open Cycle Gas Turbines; CSP: Concentrated Solar Power

nuclear technology, are expected to be on par with large nuclear in terms of total electricity generation costs. Nevertheless, the economics depending on realizing competitive advantages of SMRs through accelerated deployment of SMR prototypes, the number of units produced through serial production, optimized supply chains and the learning rates from factory assembly will be instrumental in lowering financing costs, which are subject to progress. On the other hand, lifetime extensions for the operating NPPs are also among the emerging issues which should be considered as additional factors influencing the overall cost. Once accepted by safety authorities, nuclear power plants reaching their initial design lifetimes will be subject to extensive refurbishment and safety upgrade programs which are costlier compared to the routine maintenance and therefore which will be a major capital investment (IEA & NEA, 2015, p.159-160). It is important to note that all the cost calculations are subject to changes depending on market-, technology- and country- specific conditions. As the IEA states, “there is no single technology that can be said to be the cheapest under all circumstances” (IEA & NEA, 2015).

The cost breakdown also reveals that the most vulnerable ring in the production chain is the construction and installation works which make up 61 percent of the capital costs. Table 3. 2 presents the capital costs for nuclear by distinguishing two broad categories: activities and inputs (such as labor, goods, and materials).

Table 3. 2. Breakdowns of the capital costs for nuclear energy.

Capital Costs			
By Activity		By labour, goods and materials	
Construction and installation works	61%	Equipment (steam supply system, mechanical, electrical and generating equipment, instrumentation and control system, software)	48%
Site development and civil works	20%	Labour onsite	25%
Project engineering, procurement and construction management	7%	Construction materials	12%
Design, architecture, engineering and licensing	5%	Project management services	10%
Commissioning and first fuel loading	5%	First fuel load	3%
Transportation	2%	Other services	2%
Total	100%	Total	100%

Data Source: WNA, 2016 (Prepared by the author)

As expected, the costs for the construction and installation works as well as related equipment constitute the highest share in the capital costs. On the other hand, the cost of fuel in both categories remains minor. This is striking when compared with fuel costs for other resources. For instance, for gas power plants, fuel costs constitute almost 80 percent of the total cost. Moreover, the prices of coal and natural gas are subject to fluctuating markets. This means that once the initial investment is there, the cost for nuclear energy is relatively stable (Global Relations Forum, 2013, p. 106).

In addition to the construction cost and time to receive plants' operating licenses, decommissioning costs and fuel management; the cost of high-level waste management and environmental consequences of radioactive materials (Brook & Lowe, 2010; Stulberg & Fuhrmann, 2013) are also considered by some as major causes that lead the countries to rethink their nuclear-energy policies (Bradford, 2012, p.151). Indeed, Barron and Hill suggest that high nuclear waste management costs reduce economic attractiveness of nuclear energy as a low carbon energy option (Barron & Hill, 2019, p. 15). It is, however, important to note that nuclear waste management costs are dependent on nuclear waste management strategy of the country (Barron & Hill, 2019).

Overall, World Energy Outlook finds that USD 1.42 trillion of investment would be required between 2019 and 2040 to get nuclear energy on track for the sustainable development scenario. This amount is 30 percent more than the current policy statements and global nuclear investments remain to be insufficient (IEA, 2020b).

3. 5. Nuclear Safety and Security

Nuclear safety and nuclear security constitute the most important dimensions of nuclear energy, as in case of a deficit in either of them, the cost and effects for human lives as well as the environment are beyond calculation, as Chernobyl accident proved in 26 April 1986. From management of high radioactive materials to terrorist attacks, cyber security, or risks concerning human health (Caldicott, 2014, p.40; Sovacool & D'Agostina, 2010), several issues are addressed in the realms of nuclear safety (Perin, 2005; Bunn & Heinonen, 2011; Kuske, 2017) and security, as crucial factors which can potentially affect the substantial growth of nuclear energy. The accidents such as Three Mile Island

(Walker, 2004), Chernobyl and Fukushima Dai-ichi power plant (Huenteler, Schmidt & Kanie, 2012) further highlight these risks and increase the concerns over nuclear energy generation.

The internalization and strict application of safety measures are very critical, especially in newcomer countries and new power plants: studies reveal that newly built nuclear power plants are often more prone to safety risks due to manufacturing defects and material imperfections (Sovacool, 2010, p.8-9). Sovacool underlines that throughout history “almost all severe nuclear accidents occurred with nuclear power plants only a few years old” (2010, p. 8). To illustrate a partial meltdown occurred three months after Three Mile Island Unit 2 had become operational in December 1978. In a similar fashion, Chernobyl disaster occurred on April 26, 1986 after less than two years the Unit 4 had become operational in August 1984 (Sovacool, 2010, p. 9). This increases the risk in especially newcomer countries, which may lack experience concerning nuclear safety or emergency situations. The transfer of technical expertise and safety controls both in the construction period and in the operation of the plant are thus crucial factors that the countries have to evaluate in the decision-making process.

Similarly, some scholars underline the human and organizational factors in nuclear safety (Rolina, 2013). In their study Papin and Quellien focus on the human performance and reactor safety stressing that safety analyst has to take into account the “human component” which can lead to pre-accidental errors during field operations or post-accidental errors which occur due to a “failure in a human task required to restore safety” (2006, p. 1113). Sovacool also suggests that technological innovations will always remain insufficient to eliminate the risk of human-caused mistakes in the nuclear power plants (Sovacool, 2010, p. 8). In his analysis, Bradford refers to the report of Kemeny Commission (appointed by President Carter for the investigation of the Three Mile Island accident) which states that “nuclear power is by its very nature potentially dangerous, and, therefore one must continually question whether the safeguards already in place are sufficient to prevent major accidents” (in Bradford, 2009, p. 3). Bradford underlines that “thinking that it is safe enough can be the worst enemy” (Bradford, 2009, p. 3), and he concludes with an ironic note: “After the accident at Three Mile Island (TMI), the Soviet Union sent a delegation to the TMI site. The delegation held a press conference. The TMI

design, they pointed out, was unique to the U.S. Nothing like TMI could occur in their country, and, of course, they were right. The Chernobyl accident was quite different” (Bradford, 2009, p. 2).

On the positive side of the coin, nuclear experts fully aware of these risks, strictly work on the regulatory framework with regards to safety measures. The regulation of nuclear safety falls within the area of responsibility of national governments. However, given the trans-border effects of the risks, in order to protect the people and the environment from harmful effects of radiation, a broad international consensus exists on radioactive waste management. The IAEA sets the standards for safety and security principles, with requirements and recommendations targeting every stage of the nuclear lifecycle (IAEA, 2018). Harmonization of these international standards with the national framework is important.

Another major challenge in this context relates to the problem of radioactive waste management (see Ferguson, 2011). In this realm, a range of topics including living with high risk technologies (Perrow, 1999), radioactivity and effects of radiation exposures (Bodansky, 2004), interim storage and long-term disposition technologies (Findley, 2010), nuclear waste disposal policies (Bodansky, 2004; Walker, 2009) both at the national and international level (Blowers, Lowry & Solomon, 1991), the governance (Brunnengräber et. al., 2018), management and public relations (Greenberg, 2013) of waste management has always received great interest in social sciences.

The mismanagement of high-level nuclear waste and improper waste disposal inherit the risk of having harmful effects on the environment and on human lives. The risks are relevant for both current nuclear plants and past radioactive activities. Even in closed plants, due to previous improper waste disposal or insufficient coverage of storage sites, the neighborhood may suffer radioactivity. What makes the issue more critical is the fact that nuclear waste has to be stored for many years, making it an affair for future generations as well. How to deal with radioactive waste is an important question that the global nuclear industry is working on to improve safe and proven solutions. Experts offer a scientific consensus that geologic disposal can provide safe management of radioactive

waste, pointing to the cases of Finland and Sweden which have successfully sited nuclear waste repositories with full support from the local communities (Bunn, 2015).

In terms of security, nuclear power plants are subject to several risks such as nuclear terrorism, military attacks on nuclear facilities, unintentional release of radiological material, theft of radiological materials, insider or outsider attacks targeting the reactor side (Allison, 2004; Cameron, 1999; Ferguson & Potter, 2005; Jenkins, 2008; Levi, 2007; Bunn, 2008; Ramberg, 1984). Nuclear Security Index of Nuclear Threat Initiative reveals that:

“Since 2016, risk environment factors (including political instability, ineffective governance, pervasiveness of corruption, and presence of groups interested in illicitly acquiring nuclear materials or in committing acts of nuclear terrorism) have deteriorated in 54 countries. Such deterioration has occurred at a time when well-organized, well-financed, and increasingly capable terrorist organizations are actively seeking the materials necessary to build weapons of mass destruction; additionally, cyber threats to nuclear facilities are rapidly expanding and evolving” (Nuclear Threat Initiative, 2018).

These findings are alarming, especially in an era of increasing interest in nuclear energy by developing countries in Asia or countries in the Middle East, a region already facing insecurities due to political and military turbulences. While the threats are valid for every nuclear energy program in the world, Sagan and Bunn highlight that especially in newcomer countries, organizational problems can result in loose security: “All of the cases of theft of nuclear materials where the circumstances of the theft are known were perpetrated either by insiders or with the help of insiders” (Bunn & Sagan, 2014). In such cases, insider threats put vital challenges for the nuclear security systems by providing intelligence regarding the weaknesses for a potential attack or sabotage including: information concerning the operation of nuclear power plants such as work schedules, facility plans, as well as safety and security precautions (Han & Çelikpala, 2016). Moreover, the theft of hazardous materials by criminal or terrorist groups also risk national security. Overall, nuclear power plants in a country can be considered as attractive targets by terrorist groups aiming to harm the country or to access sensitive materials (EDAM, 2015; Kibaroglu, 2015). These threats require complex security structures in line with international requirements and should be carried out through the guidance of global best practices, so as to cover not only the physical security of the

nuclear power plants but also to ensure cybersecurity (Han & Çelikpala, 2016) and to prevent human deficiencies causing insider threats. To sum up, informed, committed and responsible political engagement to alleviate safety and security risks is a central element of any national nuclear energy initiative (Global Relations Forum, 2013).

3. 6. Non-Proliferation and Nuclear Energy

The primary interest of this dissertation is the civilian use of nuclear power, i.e. the nuclear energy. Nevertheless, the nature of interest of International Relations in nuclear makes it necessary to touch upon the issue of non-proliferation even when the main focus is nuclear energy. The fact that nuclear technology was first used for military purposes (Baker & Stoker, 2015) inherently gives nuclear energy a critical status. The concept of “nuclear” in the arena of international relations theory, brings a vast literature about: Nuclear weapons, balance of power, arms competition (Mandelbaum, 1981) or military interstate rivalries (Walzer 2006); risk of nuclear proliferation (Campbell, 2004; Cirincione, 2007; Doyle, 2008; Mozley, 1998; Mueller, 2010; Quinlan, 2009; Reiss, 1995; Martin and McKillop, 2012; Ferguson, 2011, Bodansky, 2004; Hymans 2006; Rublee 2009; Sagan 2009; Potter & Mukhatzhanova 2010; Fuhrmann 2012b); consequences of the spread of nuclear programs²⁰ for the international security (Stulberg & Fuhrmann 2013) and countries’ real intentions about their nuclear programs and why states consider “crossing to the other side” (Campbell, 2004).

A critical strand of this literature has been evolving so as to examine nuclear power²¹ and nuclear weapons connections (Green, 2018), to understand the interlinkages between international commitments to civil and military nuclear infrastructures (Stirling & Johnstone, 2018) and to question if a nuclear power expansion is possible to achieve without the spread of nuclear weapons (Leventhal et al, 2002). The critics suggest that pro-nuclear experts are “downplaying these connections” despite their key, common technologies, notably uranium enrichment and plutonium separation by reprocessing

²⁰ India is an interesting example where the civilian nuclear assistance of the USA and Canada in 1974 later became the basis of its nuclear program in the 1990s (Stulberg & Fuhrmann, 2013, p. 3).

²¹ For legal aspects of the use of nuclear energy for peaceful purposes, please see: Black-Branch, Jonathan L. & Dieter Fleck (eds.). 2016. *Nuclear Non-Proliferation in International Law*. Heidelberg: Springer.

capabilities (Green, 2018). Some scholars underline that supply of nuclear materials, ionizing radiation and related security challenges for the safety of nuclear materials against theft and sabotage (Kibaroglu & Caglar, 2008) connect civilian nuclear power with nuclear proliferation and terrorism risks (Miller & Sagan, 2009). Therefore, the interlinked nature of nuclear power and nuclear weapons create security concerns in the international fora. On the other hand, others such as Miller report that:

“The historical record does not support the idea that nuclear energy programs increase the odds of proliferation. Out of more than fifteen countries that have sought nuclear weapons since the world's first nuclear power reactor came online in the mid-1950s, only five had ongoing nuclear energy programs prior to seeking nuclear weapons—Argentina, Brazil, India, Iran, and Pakistan” (Miller, 2017a).

In another study Miller concludes that contrary to conventional wisdom, nuclear energy producing states are not more likely to go nuclear compared to those without nuclear energy, because “nuclear energy programs attract monitoring that can detect weapons programs, and they make potential proliferators more vulnerable to nonproliferation sanctions” (Miller, 2017b).

At this point, with its three pillars (nuclear nonproliferation, nuclear disarmament, and peaceful use of nuclear energy) The Nuclear Nonproliferation Treaty (NPT) remains as the key cornerstone of the global nonproliferation regime (Udum, 2015) with the aim of promoting cooperation in the peaceful uses of nuclear energy while preventing the spread of nuclear weapons (Kibaroglu & Cağlar, 2008). The NPT is kind of a “bargain” where “non-nuclear states give up their rights to nuclear weapons in exchange for access to nuclear technology and the commitment that eventually no state will possess nuclear weapons” (Ülgen, 2011; Nassauer, 2010). Countries’ right to “develop research, production and use of nuclear energy for peaceful purposes” is protected as an “inalienable right” by Article IV of the NPT.²² However, due to the nature and historical

²² Article IV of the Treaty on the Nonproliferation of Nuclear Weapons (NPT) states:
 IV.1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty. IV. 2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. (Source: <http://www.un.org/en/conf/npt/2005/npttreaty.html>).

roots nuclear energy, as well as the NPT regime, all nuclear activities in the scope of “peaceful use of nuclear energy” automatically become an international issue, and become subject to rules and regulations under International Atomic Energy Agency (IAEA) safeguards (Udum, 2017; Ülgen, 2011). This requires all nuclear energy producing countries that are parties to the safeguard agreements, to be ready for inspection of their nuclear facilities by the IAEA and to report their planned nuclear activities (Udum, 2017).

In recent decades, there has been an increasing interest, especially by the developing countries, to access nuclear technology and to include nuclear energy into their energy portfolios. This increased the concerns of long-standing nuclear powers regarding their influence and control on nuclear technologies, relative to the new block of “newcomers” (Ülgen, 2011). Moreover, with increasing access to nuclear technology, the number of suppliers and growing global trade ties (Ülgen, 2011, p.137-180), as well as the control of this dual use has become even more important.

Some suggest that the increase in the number of nuclear countries represents new risks for world security through the expanded amount of nuclear material in the global market and the diffusion of nuclear technologies. Nassauer, for example, declares that

“with each nation joining the civilian nuclear club, there are additional places where nuclear materials need to be safeguarded, additional scientists and experts with specialized training and knowledge who can further develop the technology, as well as additional locations with installations vulnerable to terrorist attacks” (Nassauer, 2010, p. 44).

Therefore, the implementation of international regulations and control mechanisms remain vital for global efforts to control and govern nuclear activities.

On the other hand, concerns over security or potential dual usage of nuclear technologies do not remain limited to the newcomers. The threat of terrorist attacks by international terrorist organizations using nuclear and radiological material or targeting nuclear facilities remains high on the international security agenda going beyond state-level proliferation (Udum, 2017; Nassauer, 2010). Well-crafted laws and policies embedded in

a culture that inserts safety and security goals into the essence of nuclear programs (Poneman, 2019) emerges as a necessity.

3. 7. Discussion of hypotheses

This chapter briefly overviewed major issue areas which come to the fore in the debates about nuclear energy. While some of these topics such as energy security and climate change have been highlighted as major reasons why states engage in nuclear energy, their discussion also included several reservations and objections by the critics of nuclear power who underlined their concerns especially with regards to factors related to nuclear safety, security and proliferation. The chapter offered a general snapshot of these arguments since, the examination of the decision-making framework for pushing and constraining factors would be incomplete without this background. The content of this debate is rich, complicated and highly confusing due to immense information flow.

Some of the factors discussed above can be considered as constant factors, valid across all the countries. To illustrate, risks, regulations and requirements in the realm of nuclear safety and security are binding for all the countries which decide to engage in nuclear energy generation. On the other hand, others are subject to variations from country to country, depending on the states' special circumstances. These arguments float in the literature, in TV debates and especially on the internet. Nevertheless, the theoretical discussion of this debate in the context of its effect on policy-making is very limited, almost non-present. Consequently, some important questions remain unanswered, and these questions constitute the heart of this dissertation: Are the components of this nuclear debate operate as motivating or discouraging factors for a nuclear energy decision? If so, which arguments are more influential than the others, how and why? Are there are any other factors that are not discussed at all yet are totally influential in the policy-making?

The perspective of policy-making reveals a deficiency of the overall nuclear energy literature: the structural examinations and evaluations of risks and advantages of nuclear energy remain limited in answering the puzzle of decision making, as the next chapter will address in detail and will introduce a policy-making framework shaping nuclear energy preference. With regards to the driving and constraining mechanisms for nuclear

energy policy, I suspect that none of the components of the nuclear debate presented in this chapter are sufficient on their own for explaining the variation in nuclear energy policy across countries. This research suggests that these components of the nuclear debate only become meaningful or ineffectual through their transmission into the decision making. This means that the impact of these factors is highly dependent on how they are mediated by the policy actors depending on the national context in which the policy is designed. Therefore, the major hypotheses of this study are:

H1: The impact of the components of nuclear debate (as advantages or risks) on the policy-making is a function of their perceptions and interpretations by the policy stakeholders.

H2: Socio-political features of a country are influential in framing coherent narratives about nuclear energy.

In order to find out which factors are operating as the drivers and constraining mechanisms for nuclear energy policy, this research is motivated to follow the path of grounded theory, to let the interview data speak for itself. However, it is also vital to test some arguments from the literature to reveal the puzzle of nuclear energy policies and to check to what extent they explain the variations among different preferences.

The first concerns energy security. One can ask if there is a country in the world today which is not occupied with continuous energy supplies, or which may undertake the burden of not caring about its energy security. The answer to these questions is obvious. However, is the link between energy security and nuclear energy preference as obvious? I suggest that given the complex issue areas surrounding nuclear energy, the motivation to ensure security of supplies cannot fully account as the legitimate cause for a pro-nuclear energy policy. This implies that the pursuit of energy security is a necessary condition for a pro-nuclear energy policy, however, it is not the sufficient condition to explain the choice for nuclear. Therefore, I formulate the third hypotheses as following:

H3: Greater concern for energy security is a necessary, but not sufficient, condition to explain the motivation of a country to pursue nuclear energy.

Climate change is an urgent global problem and as discussed earlier, decarbonization is a strong trend shaping energy transition, therefore energy preferences of national states. The extensive review of the literature demonstrated that the role of nuclear energy in climate change mitigation is subject to clash of opinions. Still, reflecting on the potential role of nuclear in climate change mitigation as a low carbon resource, I would like to test to what extent decarbonization policies motivate nuclear energy preference:

H4: Higher policy-making concerns for climate change increase the likelihood that the goal of decarbonization will motivate a country's pursuit of nuclear energy.²³

As the relevant section examined in detail, public acceptance is depicted by some researchers as an important constraint on designing a pro-nuclear energy policy. But is it really the case? To what extent public opinion on nuclear energy affects the nuclear energy policies and the decision to engage in nuclear energy generation? While there is a variety of studies which offer descriptive analysis of public opinion on nuclear energy, the empirical questioning of the linkage between public opinion and nuclear energy policy-making remains weak in the literature. As our target is to address the puzzle of pushing and constraining factors regarding nuclear energy policy-making, I think controlling for constraining or facilitating effect of public opinion on nuclear energy is a necessity.

The first relevant question is whether public opinion is really taken into account by the policy makers? At this point, it is useful to borrow insights from the literature questioning the relationship between public opinion and policy making, in general. Traditionally an outstanding literature aimed to examine empirically the relationship between public opinion and policy-making especially in the context of foreign policy and security policies (Burstein & Freudenburg, 1978; Foyle, 2004; Graham, 1994; Holsti, 1996; Jacobs & Page 2005; Monroe, 1979, 1998; Page & Shapiro, 1983; Wlezien, 1996). For example, some scholars indicated the determining influence of public opinion on defense

²³ Here I would like to note two important points. First, the fact that a country does not prefer nuclear energy, would not mean that it is not concerned with decarbonization. Second, I do not assume a nuclear vs. renewable energy trade-off for reducing the emissions. Therefore, the existence or plans for renewable resources should not be considered as rivals against nuclear energy.

spending of USA (Bartels, 1991; Hartley & Russett, 1992). Erikson (1976, 35) argued that “the evidence tends to support the proposition that state legislators are rather responsive to public opinion”. Page and Shapiro also referred to the congruence between public opinion and policies by providing evidence that “public opinion is often a proximate cause of policy” since opinion changes can result in policy changes (1983, 189). Monroe suggested in his study that policy outcomes are consistent with the public majority preferences on 55 percent of his cases. The public opinion and policy consistency are greater when the issue is of highest public salience (Monroe, 1998). Rosenau (1961) referred public opinion as a “slumbering giant” (quoted in Ripberger et al., 2011, p. 893). Overall, this strand of literature concludes that crossing the line of public acceptability of a certain policy is considered to be potentially costly for policy makers (Ripberger, Rabocsky & Herron, 2011; Rosenau, 1961) and imply that public opinion has a constraining effect on policy decisions.

This theoretical background should be reconsidered in the context of nuclear energy. In line with the literature, we would expect that negative public opinion on nuclear energy holds countries back from producing nuclear energy. While negative public opinion can decrease the probability of a country’s engagement in nuclear energy generation, public acceptance or lack of public opposition can be an enabling factor for executing a pro-nuclear policy. In line with H1 and H2, this research suggests that anti-nuclear movement or public opinion are likely to remain ineffectual in policy-making without the enabling role of stakeholders with direct access to the decision-making. I suggest that this enabling role can occur through institutionalization of the public opinion and argue that in countries where public opinion and anti-nuclear movement have an institutionalized representation, their impact on nuclear policy increases, especially when the public opinion on nuclear is negative:

H5: Stronger institutionalized representation of negative public opinion and anti-nuclear movements increases the likelihood of constraining a country’s pursuit of nuclear energy.

3. 8. Conclusion

This chapter reviewed major issue areas and arguments concerning nuclear energy, labelled as the “nuclear debate” for the sake of practicality. The nuclear debate is a prerequisite for understanding the policy-making on nuclear energy.

The chapter also introduced the hypotheses which will be tested by this research. While some of the hypotheses concern the policy-making on nuclear in general (H1-H2), others (H3-H4-H5) target to test the impact of usual suspects, i.e. energy security, decarbonization and public opinion, on nuclear energy policy-making.

The ultimate purpose of this study is to reveal the real mechanisms of nuclear energy policies within the policy circles, independent from the nuclear debate which is taking place outside the decision-making mechanisms. Therefore, the grounded theory approach combined with experts’ interviews will be instrumental in testing the hypotheses. The driving and constraining factors to be identified from the findings of this research can be in total conformity with nuclear debate, can exclude some of the issue areas or include additional factors which are not voiced at all in the nuclear debate. The upcoming chapters will indicate which one of these suggested scenarios is valid.

Chapter 4

THE FRAMEWORK FOR NUCLEAR ENERGY POLICY

This chapter is dedicated to the description of my theoretical model. It first reviews the limitations of current literature on nuclear energy. Second, the chapter addresses the need to tackle nuclear energy policy as a public policy and accordingly, it studies the fundamentals of public policy-making. The last section focuses on my model and explains the framework in which I suggest a nuclear energy policy is constructed.

4. 1. Theoretical Discussion of Nuclear Energy Politics

The previous chapter exclusively examined the fundamentals of nuclear energy debate, as it reviewed current state of literature on nuclear energy. Even though nuclear energy's multifaceted dynamics touch upon several issue areas from economics to social movements, the in-depth study of nuclear energy has received limited attention in the social sciences, in the sense of being a public policy decision. Nuclear energy has been often being treated as a single, superficial chapter within energy politics in general or within a menu of energy resources. Limited number of studies addressed how the policy and preferences on nuclear energy emerged, and only a few addressed the theoretical tenets of nuclear energy politics. However, these existing studies are subject to several limitations which render them insufficient to grasp a complete picture of the dynamics regarding nuclear energy policy in our contemporary world. These major limitations can be summarized and exemplified as the following:

1. Focusing Solely on Proliferation

Traditionally, the study of nuclear power in the social sciences primarily focused on non-proliferation and not directly on the civilian use of nuclear power. Especially in the realm of international relations, talking about nuclear power rarely was reserved to the civilian nuclear power programs, and questioning the decision to “go nuclear” directly referred to the decision to make nuclear weapons. The relevant literature typically focused on

weapons capabilities, access to weapons-related technologies and on the link between energy and proliferation (Meyer, 1984; Sagan, 1996/97, 2010; Singh & Way, 2004; Jo & Gartzke, 2007; Barnaby, 2009; Fuhrmann, 2009; Kroenig, 2009a, 2009b; Findlay, 2011; Gourley & Stulberg, 2013, p. 21). Accordingly, in most of the studies, such as Müller's *How Western European Nuclear Policy Is Made: Deciding on the Atom* (1991), the "Nuclear Policy" equaled proliferation. Although Müller's edited volume aimed to unravel the complex nature of decision-making by focusing on the role and participation of the public in nuclear decision-making, the nuclear industry's influence and the administrative setting in selected countries, its comprehensive analysis remained in the context of security.

Similarly, *The Nuclear Tipping Point: Why States Reconsider Their Nuclear Choices* by Campbell et. al. (2004) concentrated on proliferation questioning why countries can go nuclear and why states reconsider their nuclear choices. The security dimension of nuclear energy is vital and highly connected with non-proliferation both technically and policy-wise. However, in the context of energy transition efforts which took over the world energy agenda, I suggest that there is an increasing need to decouple civilian and military dimensions of nuclear literature when examining the decision-making framework. Especially with new generation reactors, nuclear energy is now discussed among major alternative low-carbon resources. Therefore, the factors and motivations in the civilian and military spheres can be different.

2. *Treating "nuclear politics" as limited to public opinion, not the policy-making dynamics*

Another limitation of the literature on the politics of nuclear energy is that when scholars labelled their studies as addressing the political aspects of nuclear energy as Kiener did back in 1989, their major interest was public opinion. In 1991, when McCaffrey (1991) contributed to this strand of literature which addressed the politics of nuclear energy, his research as well, which was a single case study about the Shoreham Nuclear Power Plant, mainly evolved around political attitudes and public opinion along with the usual analysis of the economic factors and safety issues. Moreover, focusing on a single nuclear power plant remained constrained for generalizable conclusions about overall political dynamics

of nuclear energy. Other scholars such as Müller and Thurner (2017) stressed vital importance of public opinion and party politics in explaining policy reversals or policy stability in nuclear energy. Pioneering studies²⁴ in this field thus had a central focus on public opinion linking the issue with the literature on social movements. Nevertheless, even in most of such efforts, the anti-nuclear movement was studied as a case for the analysis of social movements. As the upcoming chapters will reveal public opinion and anti-nuclear movement are extremely important for nuclear energy policy-making. However, they offer only part of the story and there is a need to treat public opinion on nuclear not as a phenomenon on its own but as an input into the system of policy-making on nuclear.

3. *Being mostly descriptive*

Another limitation of the nuclear energy literature in social sciences is the lack of analytical approach, since some studies remained mostly descriptive in examining the historical evolution of nuclear energy. In such cases, a government's nuclear energy policy was described by major historical benchmarks, with statistical data on their energy profiles or with technical information on the nuclear power plans. Some scholars such as Vesely and Apostolakis (1999) did have an interrogative approach on this technical dimension. When Vesely and Apostolakis (1999) referred to the risk-informed decision-making for nuclear power plants, it was a novel perspective as finally decision-making dimension was on the table. Nevertheless, this study mainly targeted better management of nuclear power plants in the *aftermath* of nuclear energy decision, by focusing on technical mechanisms with regards to nuclear safety, by examining how resources can be better allocated, and by questioning how regulatory requirements can be made less burdensome. The authors left the question of how the decision was taken in the first place unanswered.

²⁴ The review of these studies is available in the previous chapter, in section 3.3 on Public Acceptance and Nuclear Energy.

4. *Focusing on Western powers or only nuclear countries with no cross-comparison*

An important feature of the previous studies is their predominant focus on the experiences of Western Powers (Müller, 1991) as European (Müller & Thurner, 2017) or North American countries, such as Britain, United States, France and Finland (Baker & Stoker, 2015). Moreover, the majority of the scholars concentrate only on the comparison of nuclear countries instead of making cross-comparison studies to track main differences between nuclear and non-nuclear states. The literature also currently misses the opportunity to learn from the comparative examination of nuclear energy producing countries with the ones who decided for a phase-out, such as Germany. The case of new global actors in the nuclear energy field is gaining increasing interest, yet currently the studies are dominated by single case studies or they are compared with their own peers in the category of newcomers (Sovacool & Valentine, 2010). To illustrate, Yi-Chong (2010) offers an extensive picture of the politics of nuclear energy in China with an effort to understand its nuclear development. Yi-Chong's study illuminates the economic, public opinion, and environmental dimensions of China's expanding nuclear energy program and it partially touches upon to the policy-making and major players as well. While this is an important contribution for the politics of nuclear energy its focus on single case of China limits the scope of its findings.

5. *Missing the interaction between different levels of analysis*

An outstanding tendency in the nuclear literature is to examine the decision on nuclear power only at the domestic level or the international level, without incorporating the interaction of different levels of analysis. A complete analysis of decision-making for the case of nuclear energy which is intertwined with the global energy dynamics and challenges together with climate change, should go beyond the domestic level factors and take into consideration the interplay of different levels of analysis.

6. *Adopting a political-economy approach which is too economic*

In the last decade, an important strand of literature which aimed to come up with more comprehensive approaches to the study of nuclear energy as a policy choice and as an

effort to bring the politics in, has been growing: the political economy of nuclear energy. In this vein, as an example, Baker and Stoker rightly argue that “we need to look at the interplay between actors in networks, the societies they are drawn from and the institutional arrangements that surround them” (2015, p. 7). Following this need, they target with their research the political economy of nuclear power. However, their approach mainly addresses the need for a better understanding of the limits to governance and they remain too focused on the cost factor in terms of economic costs, regulatory costs, construction and operating costs. Nuclear safety, waste management and sustainable fuel supply constitute the center of their political economy approach, but the lack of social dimension leaves the picture incomplete together with their unique focus on contemporary advanced industrial democracies.

Although these efforts are promising, the examination of political economy of nuclear energy does not bring us any further than major components of nuclear energy debate, and mainly evolve around the economics of nuclear power, as the example reveals. This cost-benefit calculations or political economy dimension, though offering some insight about the domestic dynamics of selected cases, remains incapable of explaining the variation among countries.

7. The Time Factor

The last major limitation of the majority of studies: the year factor. Major development and benchmarks in the nuclear history affected the course of the literature as well. After Chernobyl and (especially concerning the contemporary nuclear energy literature) after Fukushima disaster on March 11, 2011²⁵, the majority of the contributions made in late 80s, 90s and 2000s, turned out to be outdated in today’s political dynamics. Just like what the end of Cold War meant for Cold War scholars, especially Fukushima accident entered

²⁵ I also suggest that the Paris Agreement agreed on 12 December 2015 and opened for signature on 22 April 2016 had a similar effect on the policy dynamics with regards to low carbon resources including nuclear. However, as the threat of climate change was always on the table and the signature of the Paris Agreement is not an unexpected event as Fukushima, I did not include it here in the overview of theoretical approaches to nuclear energy.

into the scene as a shocking, unexpected event for some scholars, invalidating their evaluations.

4. 1. 1. Comprehensive Approaches to Nuclear Power Politics

To improve the limitations of the literature, more complex political structures have also been suggested by some scholars. To illustrate, Sovacool and Valentine (2010) offer a more comprehensive aspect of analysis in the form of “socio-political economy of nuclear”. This goes beyond economic calculations and public opinion debates and adds on policy-making dynamics by focusing on nuclear energy producers, such as China and India.

Sovacool and Valentine define socio-political economy as “the dynamic forces of state and society which influence the nuclear power industry” (2010, p. 3804). This definition suggests a specific interest on nuclear power industry, rather than the states’ nuclear energy policy but the fact that these scholars investigate the forms of social, political, and economic organization conducive to nuclear power expansion, naturally involves states’ decisions to expand their nuclear power plants or not. Accordingly, this approach highlights that the “complex interplay of social, economic, and political factors makes anticipating the scale and scope of nuclear power expansion difficult for both established and aspiring nuclear nations” (Sovacool & Valentine, 2010, p. 3804).

Sovacool and Valentine suggest that their analysis differs from previous scholarship on nuclear energy and political economy in that it is the “first study to explore the socio-political economy affecting nuclear power development in a predictive manner” regarding the future nuclear power expansion prospects (Valentine & Sovacool, 2010, p.3804). They argue that focusing only on the drivers of nuclear power expansion, such as energy security or climate change, does not offer the whole story and that there is a need for deeper exploration of socio-political dimensions behind these drivers. Therefore, their study envisions “influential social, political, and economic conditions interacting within a mutually constitutive, dynamically evolving environment”, and it argues that the governance is taking place within a complex, adaptive system that evolves “as influential variables within the system evolve” (Sovacool & Valentine, 2010, p. 3804). Sovacool and

Valentine's perspective brings a fresh approach into the study of nuclear energy policy. Moreover, their acknowledgement of the fact that the environment and the system are constantly evolving is important. However, their unique focus on nuclear expansion risks missing major insights which can be obtained from nuclear policy reversals such as in the phase out cases.

Indeed, this comprehensive look which considers the interplay of social, political and economic conditions, partially existed in the very early studies too, at the height of nuclear expansion in the early 1980s. For example Keck's (1981) book entitled as "Policymaking in a nuclear program: the case of the West German fast breeder reactor" covered all the major decisions in the West German fast breeder reactor (FBR) program and asked multiple important questions such as: "who took the initiative?", "what information on technical and economic matters was available to government?", "how did government justify the expenditure of public funds?", "did economic assessments made by the government prove valid in later experience?", or "what lessons does this experience suggest as to the effectiveness of government support?" (Keck, 1981). There is no need to say that since 1980s the world has become a very different place and no matter how comprehensive the approach is, the findings beg update.

One of the most comprehensive studies in the contemporary literature on nuclear energy is the edited volume by Adam Stulberg and Matthew Fuhrmann, *The Nuclear Renaissance and International Security* (2013). While the security dimension of nuclear power still overweighs in the book as the title suggests, the study offers insightful remarks on the politics of nuclear power. In this context, Gourley and Stulberg (2013) present a quantitative analysis of factors associated with nuclear power development in 150 countries in the 1950–2001 period. Although the period covered in the statistical analysis dates back to 2001, Gourley and Stulberg evaluate their finding in the Post-Fukushima context and ask highly relevant questions such as: "Are there characteristics shared by nuclear power generating states that distinguish them from non-nuclear energy states?", "Do historical commonalities hold for contemporary nuclear energy aspirants?", or "What are the implications for projecting the scope and scale of alternative nuclear energy futures?" (Gourley & Stulberg, 2013, p. 20). Gourley and Stulberg underline that the nascent scholarly debate over the drivers of nuclear energy acquisition needs systematic

analyses of general patterns across time, states, or regions, since “little is known about what motivates states to acquire nuclear power generation capacity beyond disparate statements by national leaders and governing bodies” (2013, p.21). Way (2013) suggest that this lack of information is due to the research strategies which are too much focused on the international level and which consider the states as a “black box” and argues that:

“There is also more to do in terms of identifying and understanding the domestic political drivers that help determine how factors such as strategic considerations, desires for influence, or prestige motivations play out in practice.... In statistical language, they assume that the relationship between these explanatory variables and the outcome of interest features the same slope for all states, across both space and time.” (Way, 2013, p. 169).

The theoretical framework offered in *The National Politics of Nuclear Power* by Sovacool and Valentine in 2012 (which is an updated version of their 2010 research after Fukushima) partially addresses this challenge. Sovacool and Valentine present a comparative, cross-national analysis on commercial nuclear power programs. They define their work as a comprehensive identification of the dynamic, multifarious factors which tend to facilitate support for nuclear power development (Sovacool & Valentine, 2012, p. 2). In their theory of socio-political economy of nuclear power, they identify common drivers that facilitate nuclear power development in the U.S., France, Japan, Russia, South Korea, Canada, China and India. However, due their exclusive interest on dynamics which facilitate the *support* of nuclear power, this study as well does not capture the cases with policy reversals. Although, Sovacool and Valentine concentrate on national politics, this does not prevent them to conclude that important developments within the political, economic, social and technological environment, more specifically the climate change and the Fukushima disaster (Sovacool & Valentine, 2012, p. 228), can influence national factors.

Last but not least, Müller and Thurner’s (2017) edited book *The Politics of Nuclear Energy in Western Europe* is one of the most recent studies which examines nuclear energy in a very comprehensive way. The study has an exclusive interest on nuclear energy policy reversals since the authors specifically concentrate on important decisions that have changed the policy status quo towards the direction of exit from nuclear energy (Müller & Thurner, 2017, p. 320). The book targets to understand why some of the

decisions were upheld and others reversed (Müller & Thurner, 2017, p. 2) with a particular focus on the political factors that drive these reversals. Müller and Thurner suggest that “it is the specific democratic linkage between civil society and politicians rather than technical or economic factors that determine nuclear energy policy” (2017, p.10). In this framework, the work mainly addresses important issues such as the public opinion, the political parties and their role in the system of government, and the electoral salience of the nuclear energy (although compiled evidence on voters’ issue salience with regard to nuclear energy is limited). They conclude that political parties follow a strategic position-taking, considering how they can serve their main party goals in the given historical situation, the changing context and in the complexity of the nuclear energy issue (Müller & Thurner, 2017, p. 320). The only downside of the study emerges as its unique focus on Western Europe which automatically excludes different political contexts.

From the examination of post-Fukushima literature on the framework for nuclear energy policy, we can deduce several points. First concerns Way’s criticism that new generation statistical works omit the domestic level. Way highlights that “powerful political factors will play a much greater role in the (potential) nuclear energy renaissance than many discussions allow” (Way, 2013, p.155). His point further strengthens my argument: The analyses neither at international level nor at the domestic level on their own can capture the whole picture and the interplay between different levels shall not be missed. Only a multi-level framework which combines domestic and systemic dynamics can properly address the nuclear energy decision-making. Second, the focus is slowly shifting away from the study of only Europe and/or North America, towards alternative regions, such as Asia. However, the approaches still remain limited with considerations of only nuclear expansion, or only nuclear policy reversals. Newcomers such as Turkey are left out of the analysis either because of their limited nuclear progress, or due to the researchers’ focus on specific regions. The literature can exclusively benefit from the comparison of nuclear policy preferences in different political settings.

Overall, the studies reviewed above give us a picture of what current literature offers us at the intersection of nuclear energy and politics. In such a context, I believe there is a need to look through different lenses, and to change the way we treat nuclear energy in the realm of social science. Nuclear energy policy, or energy-related decisions are a part of public policy. I suggest that merging socio-political dynamics with public policy and

applying policy-making literature to the field of energy inherits a constructive progress for the state of art. Public policy analysis targets to identify different components of public policy, such as instruments, problems, causes, consequences, laws, decisions or public concerns, and to understand the dynamics of policy-making through the links between different factors (Guy & Zittoun, 2016, p. 2-3). This approach significantly coincides with the fundamental aims of this dissertation. Accordingly, in order to look through public policy-making lenses, the following section rewinds the discussion to the basics of public policy analysis and paves the way towards my theoretical framework.

4. 2. Looking Through Public Policy-Making Lenses

The scope of definition for public policy varies among scholars depending on whether they perceive public policy in the narrow framework as a government activity, or in a broader framework which sees it as an output of the interplay of several dynamics. To illustrate, Thomas Dye describes public policy as “what government do, why they do it, and what difference it makes” (Dye, 1987, p. 2) or as “whatever governments choose to do or not to do” (1976, p. 1). Similarly, Peters refers to public policy as “the sum of government activities, whether acting directly or through agents, as it has an influence on the lives of citizens” (Peters, 1993, p. 2). Gerston’s definition builds on these perspectives with a further stress on the interactions. Therefore, public policy is the “combination of basic decisions, commitments and actions made by those who hold or affect government positions of authority. In most instances, these arrangements result from interactions among those who demand change, those who make decisions, and those who are affected by the policy in question” (Gerston, 1997, p. 7). Lindblom and Woodhouse on the other hand, explain public policy as “the complex set of forces that together produces effects called policies” (1993, 3).

The study of policy-making and public policy²⁶ emerged from the recognition that “traditional analyses of decisions were incomplete descriptions of political activities” (Gerston, 1997, p. 3). In the 1950s and 1960s, the dissatisfaction of some political scientists’ excessive focus on governing institutions (courts, legislatures, and executives)

²⁶ For a very comprehensive study of public policy with many dimensions please see Moran, Michael; Martin Rein and Robert E. Goodin. 2006. *The Oxford Handbook of Public Policy*.

triggered a strand in the literature, piloted by scholars (such as Lerner & Lasswell, 1951; Simon, 1957; Lindblom, 1959; Easton, 1953) who desired to understand broader political systems (Weible & Nohrstedt 2013, p. 125).

Today, with increased connections between national and international levels, increased access to information technologies and digitalization which distributed the ownership of information and knowledge among diverse actors and with increased number of societal, technical and economic challenges, the policy decision-making has become very complex. The dynamics and interdependencies in global networks and the decision-making power is also covered with uncertainties (Teisman & Buuren, 2013, p. 299). This acknowledgement has led to the understanding that “what comes out of government is as important as what goes in” (Gerston, 1997, p. 5; Easton, 1953). Scholarly interest has consequently increased the number of studies searching for frameworks, actors, models and dynamics regarding public policy decision-making processes both before and after a policy is set:

“As the relationship between society and its various public institutions have become more complex and more interdependent, the need has developed for more comprehensive assessments of what governments do, how they put their decisions into practice, and why they pursue some policy alternatives over others” (Gerston, 1997, p. 3).

The study of the literature on public policy making is not less complex than the public policy making itself, due to the generous diversity of perspectives and studies regarding the phases of policy-making, the actors involved in policy-making and the frameworks explaining policy-making. The following sections reviews these elements which contributed in the definition of this study’s theoretical framework.

4. 2. 1. The Stages of Policy-Making

According to Gerston, what makes public policy different from other approaches to the relationship between politics and government, is the process: “policy-making is a process”, Gerston argues, which is “dynamic and ongoing and, as such, is constantly subject to reevaluation, cessation, expedited, or even erratic movement” (Gerston, 1997,

p. 5-6). This process of policy-making is understood by several studies as a set of interrelated stages for policy development (Howlett & Giest, 2013). In this regard, the phase of agenda-setting has been a very popular strand in the study of policy making. The context of policy agenda-setting can include specific aims such as raising attention to the problem/issue (Green-Pedersen & Mortensen, 2013) or constructing the meaning of the issue by establishing/modifying the political discourse (Rocheftort & Donnelly, 2013). According to Green-Pedersen and Mortensen (2013), it is not possible to understand policy-making without understanding the agenda setting process as this is the phase where attention is directed on specific policy problems that need to be tackled with policy decisions. While some scholars such as Baumgartner and Jones (1993) or Zahariadis (2016) concentrate on the general patterns of agenda-setting in political systems, others such as Cobb and Elder (1983) and Kingdon (1995) aim to further explain how agenda-setting leads to policy decisions. In the agenda-setting process the issues can be raised by “the government with no necessary preliminary expansion from a publicly recognized grievance”, by “influential groups with special access to decision-makers without necessarily wanting it to be expanded and contested in public due to technical as well as political reasons” or by outside actors such as non-governmental groups by expanding the issues sufficiently to reach the public and formal agenda (Cobb et al., 1976). The agenda setting process is challenging in that the interpretation and prioritization of the issues are subjective:

“Although factual information helps to document a problem’s existence, rarely is there consensus about which facts are most relevant, how they should be assembled to create a picture of the whole, or what the implications are concerning those things government should, or should not, do in remedying a situation. Sorting out these possibilities may be likened to an exercise in collective political cognition, one rooted in opinion, values, and beliefs as much as objective analysis” (Rocheftort & Donnelly 2013, 189).

Just like the agenda-setting process, decision-making phase is another example which has also received high intellectual interest (Howlett & Giest, 2013; Teisman & Buuren, 2013). A great majority of the literature studies the rationality in policy decision-making (Andrews, 2007; Cairney, 2012; Griggs, 2007). Models focusing on pure rationality consider policy-makers as “neutral technicians or managers” with the ability to identifying and solving the problems in the most efficient ways (Elster, 1991). On the

other hand, other scholars such as Smith and May (1980) argue that this can be possible only in very specific circumstances where full information on all the options are available to key decision makers. Indeed, empirical studies have found that “political processes of bargaining and negotiation often outweigh rational deliberations and calculations of costs and benefits are subject to substantive and procedural limitations” (Howlett & Giest, 2013, p. 20; Simon, 1955, 1957). Accordingly, the policy outputs do not always maximize benefits over costs but rather they tend to “satisfy whatever criteria decision-makers set for themselves in the instance in question” (Howlett & Giest, 2013, p. 20-21).

Overall, studying public policy as a process is not limited to agenda setting and decision-making and it comes with the most commonly used “five stage model” (Howlett et al. 2009; Howlett & Giest 2013):

- First stage – “Agenda-setting”: The problem is initially sensed by policy actors and a variety of solutions are suggested.
- Second stage – “Policy formulation²⁷” (Howlett & Giest, 2013; Barberio, 2014; Araral et. Al 2013): Specific policy options are developed within government, the range of possible choices is narrowed by excluding infeasible ones, and efforts are made by various actors to have their favored solution rank high among the remaining alternatives.
- Third stage – “Decision-making”: Governments adopt a particular course of action.
- Fourth stage – “Policy implementation”: Governments put their decisions into effect (Pülzl & Treib, 2007, Birkland, 2010)
- Fifth stage – “Policy evaluation”: The results of policies are monitored by both state and societal actors (Vedung, 2006, Vining & Weimer, 2006, Bryner, 2006, Bouckaert & Halligan, 2006).

Methodologically, this approach to policy-making as a “staged, sequential, and iterative process” has been considered as a useful tool to cope with the complexity of public policy

²⁷ Studying the influence of discourses as a key factor which affects the policy alternatives in the policy formulation is also very common. For further details please see Schmidt (2006, 2010, 2011).

making by breaking it down into stages (Howlett & Giest, 2013, 24). However, taking the process as mechanical, sequential remains limited in answering important questions about the essence of the policies themselves such as: the number and type of relevant actors involved in the process, their motivations, or the exact order of actual policy development processes (Sabatier, 1991). Following this limitation, Forester (1984, 1989) argues that:

“The decision-making is affected by the number of agents involved in a decision, their organizational setting, how well a problem is defined, the information available on the problem, its causes and consequences, and the amount of time available to decision-makers to consider possible contingencies and their present and anticipated consequences” (in Howlett & Giest 2013, p. 21).

4. 2. 2. Major Actors In Policy-Making

Who makes public policy? Who are the key actors in the policy subsystems? What brings the actors together, how they interact, and what effect their interaction has on policy development is instrumental in understanding policy-making (Jordan, 1990a, 1990b; Jordan & Schubert 1992). Traditionally, the relevant actors for public policy-making were identified with an intertwined “iron triangle” (Lowi, 1969; Gais, Peterson & Walker, 1984) which is made up of the bureaucracy, interest groups and legislative committees. As the scholars’ interest in the study of public policy increased, this understanding, mainly addressing the American political system, has been modified with broader description of key participants in policy-making process. The president, state leaders and public officials are still critical components of policy-making. Gerston considers these public officials to be in the “unique position of placing issues on the public agenda...and direct them through the policy-making maze” (1997, p. 53). In that respect, elected officials operate as messengers for the public’s messages and priorities (Lindblom & Woodhouse, 1993), while public institutions work as “vehicles through which public policies are formulated and carried out” (Gerston, 1997, p. 10). Furthermore, the bureaucracy, the “collection of agencies designed to carry out relatively specific tasks”, actively engage in the public policy formulation: the bureaucrats, through their administrative tasks and actions can modify policies in the process of trying to implement it in cooperation with elected functionaries (Lindblom & Woodhouse, 1993, p. 59).

Nevertheless, “public policies are made via a complex political system” and it is not possible to understand their essence primarily by looking at the actions of the President, or elected and appointed officials (Lindblom & Woodhouse, 1993, p. 3). The policy making process is very complex, meaning that focusing entirely on the government officials is not fruitful. As Lindblom and Woodhouse rightly state, “politicians and bureaucrats often serve as lenses through which are refracted diverse pressures, ideas, questions, problems and policy options, emanating directly and indirectly from countless resources” (1993, p. 4).

Dahl (1956, p. 132) suggests that “prior to politics, beneath it, enveloping it, restricting it, conditioning it, is the underlying consensus on policy that usually exists in the society among a predominant portion of the politically active members”. In this respect, the “politically active members” can be collections of individuals “inside as well as outside the official boundaries of government” (Bonser et. al., 1996; Gerston, 1997). Actors who successfully bring potential issues into the public arena can become “agenda-builders” (Gerston, 1997). Thus, policy entrepreneurs can be both from inside and outside the government as long as they successfully take the opportunity to move their arguments and issues onto the formal governmental agendas (Kingdon, 1984). This means that not only state policy-makers but also non-governmental organizations, journalists reporting on the issue, academics researching in the same issue area or individuals from the general public with an interest on the topic can be relevant actors of policy-making (Sabatier, 1987; 1988). Accordingly, as the literature expands the circle of actors in policy-making, away from the government focus, the players increase as members of relevant policy networks (Coleman & Skogstad, 1990; Marin & Mayntz, 1991; Pross, 1992) so as to include regulatory agencies (Gerston, 1997), nonprofits (Bryce, 2012) or other unofficial actors (Birkland, 2010) as outside players other than the government, especially in the agenda setting process (Barberio, 2014). Occasionally, depending on the subject matter, multinational corporations, international governmental or non-governmental organizations, or the governments of foreign states, i.e. the international actors, can also involve in the policy-making (Haas, 1992).

In this context, some scholars in the literature focus on the interdependence between government activities and diverse forces such as political parties or public opinion

(Gerston, 1997, p. 4). This perspective automatically brings forward the question of whether the voters or citizens can be counted among the actors in public policy-making? As a response, Gerston points to the referendums or/and initiatives as policy-making tools. Accordingly, “in most cases, a referendum allows voters to decide on policies drafted by a legislature. This brings citizens into the policy-making process and also awakens national leaders to emergent issues” (Gerston, 1997, p. 14). Lindblom and Woodhouse link citizens’ involvement into policy-making through the broader concept of “voting” with the premise that the vote permits the citizens to authorize their candidates to become elected officials who make the policy. They argue that ideally, once elected, the officials interact and respond to the inquiries from their constituents and they “to some degree, tailor their policy commitments to suit voters” (Lindblom & Woodhouse, 1993, p. 35). While issue salience, the voting behavior and elected officials’ responsiveness to their voters is another discussion addressed by a different track of literature, since elected officials do have a role in policy-making as a result of an election process, then political parties as well has the potential to translate their voters’ perspective into public policy: “a strong political party is in a position to formulate a package of mutually supportive policy proposals” (Lindblom & Woodhouse, 1993, p. 40-41). The case of German Green Party will be very instrumental in illustrating the effect of a political party in setting the nuclear policy agenda in Germany.

The interplay of mass communication and political decision making (Koch-Baumgarten & Voltmer, 2010) has been another major interest for researchers in the domain of public policy. Iyengar and Kinder (1988), Lindblom and Woodhouse (1993), and Gerston (1997) highlight that the mass media is very instrumental not only in raising the awareness of the voters and policy-makers, but also in telling people what to think about and what to not think about. Consequently, scholars such as Soroka et. al. suggest that the mass media can help “set an agenda, which is then adopted and dealt with by politicians, policy-makers, and other actors” (2013, p. 204).

Business members or corporate executives are also considered to be leading actors in setting the agenda or leading the policies since they have the responsibility as well as the power to “organize labor force, allocate resources, plan capital investments, and undertake many of the organizational tasks of economic life” (Lindblom & Woodhouse,

1993, p. 7; Lindblom, 1977). The power of business companies does not only rest in their stock portfolios, investments and other economic activities but also in their employed labor force. The workers' (who are also potential voters) concerns about their livelihoods can be important assets for supporting specific policies enforcing the well-being of the sector and the companies involved (Barberio, 2014), especially when mobilized through labor unions.

The public policy is considered as the "result of interaction of powerful forces" (MacKenzie, 1986 in Gerston, 1997, p. 5). Another powerful actor outside the government settings is the interest groups (Wu & Knoke, 2013, p. 158). These groups can act as "information conduits for the formulation and advocacy of policy ideas" (Greenwald, 1977) and their organized interests can play "necessary and even pivotal roles in establishing the public agenda" (Gerston, 1997, p. 58). Especially when it comes to business interests, policy-makers "feel responsible for keeping the corporate sector satisfied with the state of business climate" (Berry, 1989). Individuals and private groups outside official government authorities, the elites (Domhof 1990), can seek to influence public policy through interaction with policy-making authorities (Truman, 1951, p. 52). Lindblom and Woodhouse (1993, p. 77) summarizes this by saying that these groups "blow the whistle": "Interest groups help form a feasible agenda by clarifying and articulating what citizens want; they help monitor the actions of government, providing feedback directly to responsible officials, as well as complaining to other officials; they serve as a crucial source of information" (Lindblom & Woodhouse, 1993, p. 79). Some private individuals with high public standing or strong business identity can equivalently contribute to interest group activities (Lindblom & Woodhouse, 1993, p. 74). In this context, Lindblom and Woodhouse (1993) focus on the socioeconomic and political inequality's translation into political inequalities. This results in the "existence of a decision-making elite, as a fact of political life" (Lindblom & Woodhouse, 1993, p. 9). Especially in specific issue areas such as energy, health, education or social rights, interest groups and professional associations from the concerned sectors can be counted among the examples. As very relevant examples, the cases of nuclear energy policies in France and Germany will indicate how these interest groups matter.

The interaction between different groups and the decision-makers involves a flow of information and knowledge. Often, groups of professionals produce “policy-relevant knowledge about complex technical issues” (Haas, 1992, p. 16). These knowledge providers can be from different disciplines; however, they are united by their “shared set who are from different set of normative and principled beliefs and shared causal beliefs, a set of common practices associated with a set of problems to which their professional competence is directed” (Haas, 1992, p. 3). These are called the epistemic communities (Haas, 1992; Dunlop, 2013).

One major challenge with regards to epistemic communities, is identifying them (Wright, 1997, p. 11). The distinction between epistemic communities, interest groups or policy entrepreneurs who think and act on socially relevant as well as politically significant issues can be difficult. However, epistemic communities are distinguished from interest groups and policy networks by their specialized expertise (Haas, 1992, p. 22). Epistemic communities are expected to influence policy-makers to formulate policy in line with their claims by “elucidating cause-and-effect relationships and providing advice on the likely results of various courses of action”, by “shedding light on the complex interlinkages between issues”, and by “helping to define the self-interest of states” (Haas, 1992). It is worth noting that the beliefs of epistemic communities are not immune to the experts’ personal, deeper socio-political belief and psychological motivations (Mitchell et al., 2007; Finlayson, 2004; Zelikow, 1994) and that national context can be significant for the experts’ policy preferences (Dunlop, 2013, p. 232).

As the legitimate producers of knowledge in the issue area at stake (Dunlop, 2009), epistemic communities are considered to guide the decision-maker learning, especially in technically complicated and uncertain instances, by their assumed control over knowledge production (Dunlop, 2009, p. 229, 290; Haas, 1992, Howlett & Giest, 2013). Dunlop assumes that in such complicated technical matters, the policy-making process becomes a learning activity rather than bargaining since the decision-makers’ preferences will not be as strict as in other cases (2013, p. 230). Nevertheless, for being able to persuade the decision-makers, the epistemic communities need to be politically proactive in order to navigate through the government networks and interact with other actors, including the interest groups as well as rival scientific groups (Dunlop, 2013, p. 230-234). This interplay between epistemic communities, interest groups and government players

has been the focus of many empirical studies and frameworks (for example, Dudley & Richardson, 1996; Elliott & Schlaepfer, 2001; Meijerink, 2005) such as the advocacy coalition framework, which will be addressed in the next sections.

4. 2. 3. Policy-Making Frameworks

As Barberio rightly states, “like policy itself, the study of public policy is not static” (2014, p. 64). The literature on public policy-making constantly evolves so as to meet the challenge of understanding complex stories behind policy decisions. As the policy-making became more and more complicated given the range of influences, the contemporary literature has built on the traditional approaches and came with more comprehensive frameworks.²⁸ Currently, there is a variety of models with their distinct advantages and limitations. Some models, such as the “state theory”, put the state at the center, considering it as the leading institution and key actor in the political processes (Jarvis, 2013, p. 59).²⁹ Other models expands this perspective and address institutions to set the rules and norms reducing the uncertainty and controlling the decision-making (North, 1990; Menard & Shirley, 2005; Schuyler-House & Araral 2013). Other versions focus on additional factors, such as the public, by debating on “what people want” and trying to explain “why politicians and the people who elect them do what they do, when they make decisions about what governments will or should do” (Whitford, 2013, p. 76-77). These models range in focus points and approaches as they can be based on rational choice theory deriving from economics and cost-benefit approach, on policy theories which are mainly concerned with policy outcomes with the classical categories of distribution, regulation and redistribution or they can be based on the processes of policy-making by distinguishing between the phases as discussed previously.

As opposed to frameworks which consider the policy-making as a linear policy cycle with specific phases “where issues become problems on the policy agenda; policy responses are formulated, adopted, and implemented; the out-puts and outcomes are evaluated; and,

²⁸ A framework is defined by Ostrom as “a set of general variables and relationships that should be studied in order to understand a particular phenomenon, but assigns no values to the variables and does not specify the direction of relationships between them.” (Ostrom, 2007, p. 26 in Schuyler-House & Araral, 2013, p. 116)

²⁹ According to this framework, the society in which the state is embedded offers the context for policy preferences (Nettl, 1968, p. 559–92; Przeworski, 1990; Therborn, 1986, p. 204–31)

occasionally, the policy is terminated” (Weible & Jenkins-Smith, 2016, p. 17), alternative approaches offer a more complicated image for the complex realities of public policies. To illustrate, policy network framework (Howlett et al., 2009; Smith, 1994; Howlett & Ramesh, 1998; Howlett, 2002a), provides an explanation to the complex relationship between multiple institutions, actors as well as ideas in the policy-making process by arguing that the “linkages between the actors serve as channels for communication and for the exchange of information, expertise, trust and other policy resources” (Kenis & Schneider, 1991, p. 41; Knoke, 2001, p. 65). Some scholars using this framework highlight the resource dependency (Benson, 1982; Rhodes, 1985), suggesting that in the process of policy-making, “the actors are ready to exchange or give up some resources in order to obtain resources which they do not have” or which are controlled by others (Compston, 2009, p. 7; Wu & Knoke, 2013, p. 158). The ultimate aim of this network approach is to reveal how the interaction between the actors in the policy-making influence the outcomes of policy decisions (Compston, 2009; Knoke, 2011). Compared to the technical analysis of policy-making processes, this perspective emphasizes the social dimension of policy-making (Wu & Knoke, 2013, p. 153).

The advocacy coalition framework (ACF) is also one of these approaches which brings the social dimension. The ACF, created by Paul Sabatier and Hank Jenkins-Smith in the 1980s (Sabatier, 1987, 1988; Jenkins-Smith, 1990; Sabatier & Jenkins-Smith, 1993, 1999; see Weible & Nohrstedt 2013) is a comprehensive framework which attempts to address more than one stage, such as agenda setting or implementation (Barberio, 2014, p. 63). It is a critique of “artificial distinctions between stages in the policy cycle” (Cairney, 2012, p. 201). Moreover, ACF also criticizes the top-down and bottom-up perspectives of the policy-making literature concentrated on the symbiotic relations between legislative committees, interest groups, and the government agencies, i.e. the iron triangle. Accordingly, ACF introduces an extensive number of players and it “broadens the set of subsystem actors essentially to include any person attempting to influence subsystem affairs, including government officials, members of the private sector and nonprofits, scientists and consultants, members of the media”, as well as the academics (Weible & Nohrstedt, 2013, p. 126). ACF challenges the idea that policy-making process is controlled by a small number of groups and government actors. Rather, it acknowledges the crucial role of policy networks (Cairney, 2012, p. 201). The

policymakers and administrative agencies can also be members of these networks yet their position towards the core idea or belief of the coalition is more moderate and even subject to change as response to major exogenous events such as elections (Sabatier & Jenkins-Smith, 1993b, p. 213-14). In this framework, the policy formulations emerge as the result of the interaction and competition of advocacy coalitions formed by these players. The variety of actors stands out as an important feature of ACF.

The second major characteristic of ACF is its focus on coalitions where actors are promoting their ideas, core values and beliefs within government (Cairney, 2012, p. 201). The assumption is that policies are translations of beliefs of the winning coalition or coalitions (Weible & Nohrstedt, 2013, p. 132; Pressman & Wildavsky, 1973). Accordingly, advocacy coalitions are groups of actors who share core beliefs about an issue at stake and, therefore, who work together in coalitions to coordinate their actions and to form alliances in order to “translate their beliefs into actual policies before actors with different belief systems can do the same” (Weible & Nohrstedt, 2013, p. 127-128). In this logic, policy-making emerges as the end result of the struggle between beliefs about how the world should work (Sabatier & Jenkins-Smith, 1993). The policy debates, competition and compromises among the coalitions to secure their preferred policy outcomes in line with their beliefs, take place within “subsystems” (Pressman & Wildavsky, 1973) where policy-making occurs. In order to affect “the decisions of government, the rules governing subsystem affairs, and subsystem outcomes” (Weible & Jenkins-Smith 2016, p. 17-18), coalitions design their unique strategies and they constantly adapt themselves to changing policy environment through policy learning so that their competitiveness endures (Cairney, 2012, p. 201). Both in the initial formation of belief systems and in their modification throughout the process, not only the experiences of policy actors but also scientific and technical information are instrumental. The ACF holds the view that scientific and technical information can inform political debates (Weible & Jenkins-Smith, 2016, p. 21; Jenkins-Smith, 1990; Weible, 2008; Montpetit, 2011) and even in cases where the views of the dominant coalition are stable, they can critically influence the policy brokers thus the policy outputs (Sabatier & Jenkins-Smith, 1993b, p. 219).

The ACF distinguishes between the policy subsystem, stable parameters around its environment and external events. The policy players are subject to stable and changeable

influences during the policy-making (Barberio, 2014, p. 63). The stable parameters represent “the context within which a policy subsystem is embedded” (Weible & Jenkins-Smith, 2016, p. 17-18). Sabatier and Weible (2007) identify these as the basic attributes of the problem area, the basic distribution of natural resources in the society, the fundamental socio-cultural values, the social structure, and the basic legal structure. External subsystem events on the other hand, include dynamic features such as the changes in socioeconomic conditions, changes in public opinion, in systemic governing coalition, changes in other policy subsystems (Sabatier & Weible, 2007) as well as policy decisions and impacts from other subsystems (Birkland, 2010, p. 298).

One major challenge for the researcher in using the ACF stands out as the ability to portray all of these traits. The ACF suggests that to understand “messy” policy-making process, the researchers need a long-term perspective which captures all the phases and changes (Weible & Nohrstedt, 2013, p. 125-127) and not only the point of decision (Cairney, 2012, p. 201):

“Policy processes are ongoing and today’s winners are often tomorrow’s losers. Sometimes debates between coalitions can last for decades; and explanations for coalition behavior, learning, and policy change can only be understood by understanding events of the past. Researchers studying policy processes therefore must take a long-term time perspective, often spanning a decade or more” (Weible & Jenkins-Smith, 2016, p. 21).

The long-term perspective also allows the researcher to identify benchmarking events that cause the phases and changes in the public policy. The role of critical junctures in policy-making has been vital to especially detect reversals or sharp modifications in policies. Triggering mechanisms further clarify the intervening effects of critical events.

Overall, the variety of actors, the emphasis on the beliefs and coalitions, the relevance of technical information, the interplay between the stable parameters, dynamic parameters and the external shocks, and its long-term perspective to the policy-making renders the ACF an instrumental framework for the study of nuclear energy policy.

4. 3. Triggering Mechanisms and External Shocks

Several scholars highlight the vital importance of critical events as giving the “push” to the policy-making process, by transferring the issues at stake to the policy-makers. Different labels are attributed to these events as “policy windows” (Kingdon, 1984, Birkland & DeYoung, 2013), “focusing event” (Kingdon, 2003), “external shocks” (Sabatier & Weible, 2007; Cairney, 2012) or “triggering mechanisms” (Gerston, 1997). According to Kingdon (2003) these events operate “like a crisis or disaster that comes along to call attention to the problem”. The event thus becomes a powerful symbol that increase the focus of the policy-makers and triggers a major policy change (Birkland & DeYoung, 2013, p. 177). On a similar fashion, Gerston defines triggering mechanism as “a critical event (or set of events) that converts a routine problem into a widely shared, negative public response” which, as a result, turns into a pressing political demand for change (1997, p. 23).

Triggering mechanisms or focusing events, build on the relationship between people’s perception of the problem and their demand for political action. Depending on the scope (the number of people affected), intensity (the perception by the public in the form of fear or anger) and time (Gerston, 1997) of the event, the impact of the triggering mechanism on the decision-making process can change. Gerston suggests that the impact especially takes place when “the psychological elasticity between what is and what should be is stretched out of its usual shape” (Gerston, 1997, p. 28). In such occasions, these events can redefine the problems and modify relevant policy options by penetrating into the political system and rearranging the process (Gerston, 1997, p. 25).

Another critical role for triggering mechanisms, apart from giving the initial push to the policy-making, is their ability to redistribute the assets between rival power groups or coalitions. Critical events, such as election of a different government or a socio-economic crisis, can affect the competition among different groups. Accordingly, the balance between players and the ability of actors in influencing the decision makers can change if and when they can successfully exploit “the experience of a major event to reinforce [their] position within the subsystem, largely by demonstrating that [their] belief system is best equipped to interpret and solve the policy problem” (Cairney, 2015). This can give way to even a minority group to advance within the decision process especially when the

confidence of the dominant actors is shaken (Sabatier & Weible, 2007, p. 204-7). Moreover, triggering mechanisms can result in major changes in actors' preferences when they are "forced to question the fundamental nature of their beliefs in the light of new evidence and/or one coalition's source of dominance is undermined" (Cairney, 2012, p. 201).

On the other hand, despite the fact that shocks or triggering mechanisms are considered as necessary conditions for major policy change, they may not be sufficient factors (Sabatier & Jenkins-Smith, 1993b, p. 219, 222), unless a competing group uses their skills to exploit the emerging window of opportunity by adapting their arguments to the emerging conditions. Indeed, 18 out of 80 studies on the role of exogenous shocks, examined by Weible et al. (2009) reveal that a major external event was an insufficient condition on its own for radical policy change (Cairney, 2015). Is this also the case for nuclear energy? As we go into the stories of my cases, it will be clearer that some triggering events have been crucial in shaping nuclear energy decisions. To briefly illustrate, in scope of energy politics, the oil shocks of 1973 and 1979, or in the specific context of nuclear energy Chernobyl and Fukushima disasters can be considered as relevant examples which operated as critical events. The oil shock was instrumental in France's desire to achieve energy security via nuclear energy or Fukushima accident taking place in Japan, had the capacity to change the course of nuclear energy agenda in Germany. However, whether these events were necessary or sufficient conditions is an interesting question which will be further discussed throughout this research.

For our purposes, what also renders triggering mechanisms further relevant in energy policy-making is that they can develop both in internal (domestic) and external (foreign) environments.³⁰ To illustrate, local or transnational, "when natural catastrophes take place, their suddenness and the subsequent chains of events can have major disruptive impacts on populations, social structures and economies" (Gerston, 1997, p. 30).

³⁰ It is critical to note that, in the context of ACF, the distinction between external and internal shocks, does not necessarily imply a national versus international dimension. External subsystem events can include any change in the features that are outside the policy subsystem such as changes in socio-economic conditions, changes in public opinion or changes in governing systems (Weible & Jenkins-Smith, 2016, p. 17-18; Sabatier & Weible, 2007) which can clearly still be in the national domain. For further explanation please see Sabatier & Weible, 2007.

Accordingly, economic crises, technological breakthroughs, social evolution, natural catastrophes as well as wars, indirect conflicts, economic confrontation, the growth of militarization have the potential to spill-over into policy changes in their local, regional or international environments if the consequences of the shock can cause the loss or depletion of a resource which can further critically affect future distribution of goods and values (Gerston, 1997). As a consequence, triggering events are apparent examples of the porous borderline between the domestic and international level, which brings the necessity to address levels of analysis for a proper framework on nuclear energy policy.

4. 4. Levels of Analysis

Last but not least, another important dimension to evaluate before coming up with a proper framework for nuclear energy policy-making is the issue of levels of analysis. Indeed, the levels of analysis problem is a classical discussion in the realm of international relations, especially in foreign policy analysis. From Waltz's (1959) *Three Images* addressing human behavior, internal structure of states and international system, respectively, to Singer's (1961) distinction between internal (or domestic) factors and external factors coming from the dynamics of the international system, many scholars addressed the linkages and interactions between domestic and international level in order to study the states' behavior (Putnam, 1988; Fearon, 1998; Risse-Kappen, 1991; Bueno de Mesquita, 2002; Hudson, 2005; Yılmaz, 2015). Rosenau (1980) even suggested a further categorization for the levels of analysis by identifying six level:

Individual → Role → Government → Society → Relations → World System

The selection of the level of analysis is in the discretion of the researcher. Accordingly, "in the physical or social sciences, the observer may choose to focus upon the parts or upon the whole, upon the components or upon the system... Yet the choice often turns out to be quite difficult" (Singer, 1961, p. 77). The reason is that different categories of explanatory factors at different levels, can vary depending on their relative potency (Ray, 2001). For example, the systemic level can offer a comprehensive and wholistic picture of the interstate relations through the observation of overall global patterns of interaction as well as the distribution of capabilities, resources and status of the actors. However, the

systemic level contains both advantages and disadvantages; “the former flow from its comprehensiveness, and the latter from the necessary dearth of detail” (Singer, 1961, p. 80). The national level, on the other hand, offers the chance to differentiate among the actors in the international scene and complements the systemic level of analysis by “richer detail, greater depth, and more intensive portrayal” (Singer, 1961, p. 89). The interaction between these levels is as important as their differences. Gourevitch (1978) studied the effect of international forces on domestic policies, which in turn influence foreign policy preferences. Similarly, the “two-level-games” of Putnam (1988) offered an interactive perspective between domestic and international levels on policy bargains among countries.

Although the majority of scholarly work with regards to levels of analysis addressed foreign policy-making, from individual level to the systemic level, each category revealed important sets of factors and actors with regards to policy-making in general. This brings the following question: How the levels of analysis problem relate to the public policy making and more specifically nuclear energy policy? As addressed in the previous section, to a certain extent the literature of public policy acknowledges the influences of exogenous shocks on public policy making. Nevertheless, any event outside the policy subsystem devoted to the issue at stake is considered as exogenous and does not necessarily imply an interaction between national and systemic level. In public policy the scholarly interest mainly concentrates on the national domain, trying to figure out the puzzle in the domestic processes. Still, there has been a growing interest on the international dimensions and dynamics of policy-making in order to understand global impacts on public policy (Perl, 2013, p. 54). This focus on the systemic level also brought the challenge of linking these factors outside national policy systems and subsystems within diverse governance systems. Comparative research addressing this challenge at the international level has been new to materialize (Gupta, 2014, Weible & Jenkins-Smith, 2016, p. 27).

In its simplest form, the energy security and energy choices are functions of national resources available to the countries and their capabilities to meet their energy demands domestically or through their international interactions in the global politics and markets. Thus, the interaction of domestic and international levels is a natural component of energy policy-making. However, when it comes to energy and especially nuclear, the

international relations literature still risks to remain too focused on the systemic level, missing the opportunity to enjoy the synthesis of different levels. In the same vein, Perl criticizes the international relations scholars by stating that: “While international relations scholars are perhaps more experienced in assessing how interactions across boundaries affect politics, they are also less inclined to extend these efforts to elucidating the internal workings of a policy subsystem” (Perl, 2013, p. 44). Especially, in issues, like energy security, which heavily affect the distribution of capabilities at the international level, the interactions among states at the international level in the forms of trade, conflict or cooperation render energy policies open to global dynamics. On the other hand, Perl is right in that, these international mechanisms or triggering shocks at the systemic level, such as the oil crises or disasters like nuclear accidents, are not sufficient enough to explain policy variations across countries.

Nuclear energy policy is a national decision however, it cannot be discussed separately from the distribution of capacities and resources or crises, like global warming, at the international level. Likewise, any framework which ignores relatively stable parameters, actors and dynamics at the national level would also remain incomplete. As a consequence, this research aims to address the multi-layered nature of nuclear energy policies in its framework and aims to contribute the literature of public policy-making by accessing domestic policy-making mechanisms with an international relations background.

4. 5. The Framework for Nuclear Energy Policy

This study is interested in finding major dynamics, similarities and differences among selected case studies in the context of nuclear energy policy-making. As covered in the sections on policy-making frameworks, there is a variety of models for conceptualizing and analyzing the policy-making processes. Similarly, although limited in number, there are diverse approaches to the politics of nuclear energy, as the theoretical discussion of nuclear energy policy revealed. Nevertheless, from a public policy-making perspective, the existing approaches to nuclear energy are subject to the limitations reviewed in Section 1, and therefore remain insufficient to singlehandedly explain the choice for nuclear energy generation across different national contexts and nuclear energy

preferences, since certain aspects of nuclear energy decisions remain unexplained and incomplete.

The decision to engage in nuclear energy is a public policy, however, it is not an easy and simple one: it comes with economic, social and environmental burdens as well as with a critical linkage to security and safety unlike other public policy decisions in the realm of energy. This research is designed with this perspective in mind, and building on the literature on public policy, it offers a tailor-made framework for nuclear energy.

The novelty of this framework is that it offers an integrated approach to the analysis of nuclear energy policy. First, it merges socio-political economy of nuclear energy with public policy-making by borrowing major tenets of public policy-making frameworks and combining them with current theoretical approaches of nuclear energy policy. The notion of triggering mechanisms is a vital example which will be further addressed in the upcoming chapters. Second, the model brings the levels of analysis into the picture. In that respect I agree with Gerston (1997, p. 8) who suggests that “public policy may be developed horizontally, or vertically”. Gerston states that:

“Commitments seldom are constructed by a single policy-making authority. In fact, for the most part, the system is characterized by carefully designed interdependence and joint decision making. Such cooperation is commonly required between policy-making institutions at the national level and is usually expected from comparable authorities at lower levels of government” (1997, p. 93).

I argue that this approach should be further expanded into the international level especially for the study of any energy resource. As a very basic example, national energy decisions today must include a cost-benefit analysis with regards to carbon emissions, given the emission reduction targets and commitments decided at the international level. Moreover, the crucial impact of the international level is especially valid for nuclear energy specifically due to non-proliferation regime.

In terms of the theoretical framework, it is instrumental to acknowledge that the technical advantages and disadvantages of nuclear energy, concerns regarding the country's national matters such as energy security or public opinion and the policy stakeholders

cannot be evaluated in the same ground. To be more precise, they belong to different “layers” that operate with their own dynamics and yet interact with each other. The Figure 4.1 summarizes this theoretical framework.

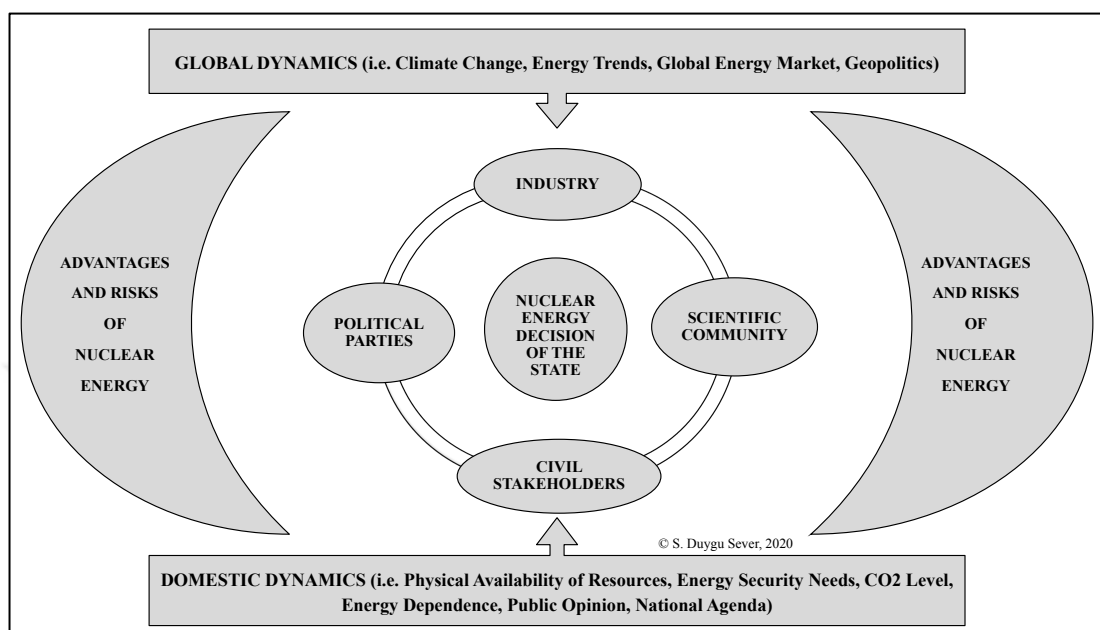


Figure 4.1: Framework for nuclear energy policy-making (source: Author’s Design).

In this model, I have placed the state’s nuclear energy decision right in the middle just like an atomic nucleus. A good point raised by Gerston suggest that:

“There is little concurrence among scholars on the framework of the public policy-making arena...On the other hand, one basic assumption that unites the scholars is the fact that government commitments and activities are vital for public policy. Without government involvement and direction, there is no public policy... Public policy issues gain their status when they reach the eyes and ears of government actors” (Gerston, 1997, p. 5,6,9).

With the same logic, the government and its nuclear energy policy, or nuclear energy decision rests right at the center of the model.

At the top of the figure, I have located the pressure coming from the global layer. This pressure is made up of both risks and opportunities for states to consider while they are designing not only their nuclear policy but their energy strategy overall. The dynamics in this category include but not limited to the challenge coming from the climate change and related intergovernmental decisions; new energy discoveries in terms of reserves,

technologies and techniques in the extraction, transport or storage facilities which affect the global energy game such as shale gas fracking or LNG trade; regional conflicts or bilateral tensions which endanger secure supplies from major exporters in an intended or unintended way so as to threaten the country's energy security; and any new development in the global scale that we cannot think of today.

Right in the opposite of the global dynamics, domestic dynamics are located. This offers another block of pressure coming from the national qualifications and features. These factors include, and again not limited to, the country's geostrategic location, demographics, economic features, energy profile, vulnerability level as a consequence of its dependence on imports of oil and gas, CO₂ emissions and INDC target in the context of COP 21. Security risks including terrorism, or other national elements such as the public opinion regarding the generation of nuclear energy are also included in this category as part of the domestic characteristics of the concerned country, constituting a scene for the evaluation of the nuclear energy decision.

On the left and the right of the model, just like two brackets which embraces the model, there are the advantages and disadvantages of nuclear energy. The reason why they are indicated separately is that they represent the scientific and mainstream facts about nuclear energy generation which apply to every country. The nuclear energy's low carbon emitting character, its efficiency, the safety requirements, the issue of waste management, risks regarding radioactivity are universal, although how they are interpreted differs from country to country. All the decision making with regards to nuclear energy, all the relations between the actors, basic presumptions of the interest groups' arguments take place within these brackets which represent nuclear energy's advantages and disadvantages.

How these factors coming from all four dimensions transform into pushing and constraining factors and diffuse into the center, i.e. the state's nuclear energy decision, is a function of the central layer, which is made-up of stakeholders.

When the literature moves further from the discussion of the advantages vs. disadvantages of nuclear energy, the conventional approaches to nuclear energy decision float among

selected factors from the global or domestic layers. Nevertheless, the layer of stakeholders surrounding the decision at the center is often neglected or considered simply as part of the domestic context. In the model, this layer is represented by the circle broadly categorized by civil stakeholders, political parties, the industry and the scientific community. While it is a real challenge to draw a strict line between different communities, the categories are not subject to any hierarchical ranking and their interaction is multi-dimensional.

The first group labelled as the “The Industry” represents the actors from the industry and energy sector. These include professionals working in the energy sector, the companies which materialize and run the actual energy projects, associations and lobby groups from the energy sector made up of individuals who earn their lives from the energy business. The members of this category do not only include the nuclear industry but also oil, gas, and renewable energy sectors as well and each target to collect the biggest slice in the market. This is an important point since different interests across groups within the industry are highly instrumental in the reading of global and national dynamics as well as perceptions of the advantages and risks of nuclear energy. The second group labelled as “The Scientific Community” represents the science society consisting of academicians, research, consultancy or training groups. Due to the level of informed knowledge in the individuals belonging to this category, I preferred to separate them from the civil society. The non-governmental organizations, think tanks, groups involved in environmental activism are classified as “Civil Stakeholders”. The anti-nuclear movement belongs to this category. It should be noted that the Civil Stakeholders are not limited with anti-nuclear perspective but also include pro-nuclear representatives as well, such as individuals from the Nuclear for Climate initiative. I have created the last group so as to include the political parties. The reason why this category is separated from the state is that some parties may not be eligible to take active role in the parliament yet their position is important for analysis as they have the potential to transmit the citizens’ view into the decision making.

These major groups of actors borrowed from the policy-making literature, have the potential to influence state’s decision in terms of nuclear energy generation. I argue that this is the layer where the real mechanisms of decision-making operate. In this layer, the

advantages and disadvantages as well as global/domestic dynamics are filtered through these different communities which possess different lenses for review. When the factors coming from the outside layers of the model penetrate into the core decision, they now become the interpretations/perspectives of the interest groups to be calculated by the state authorities. How these stakeholders interpret the signals coming from the outer layers? Which interpretations penetrate into the decision-making and affect the policy-makers? What is the interaction across different stakeholders? How the state itself interprets these layers? These are all critical questions to ask. I suggest the answers to these questions become the pushing and constraining mechanisms of policy-making on nuclear energy. Therefore, following this framework on decision-making, this study targets to offer a comprehensive approach for understanding the nuclear energy decision, and the comparative analysis of the semi-structured interviews with high-level experts who belong to the central, stakeholders' layer of the framework offer crucial insights for this quest.

4. 6. Conclusion

This chapter presented my theoretical framework and its background. The theoretical literature review revealed that, each framework in the realm of policy-making analysis look at the political phenomena through their own lenses. On the other hand, the political economy approach to nuclear energy mainly evolves around advantages and disadvantages of nuclear with an extensive focus on the economic factors. The lack of communication between these two lines of literature, risk losing sight of crucial dynamics such as the interaction between the actors, country-specific features or linkages between levels of analysis that may drive pushing and constraining factors for nuclear energy policy. Consequently, the motivation of my framework for nuclear energy policy-making has been to come up with an integrated approach that combines both public policy-making and political economy of nuclear energy.

Chapter 5

DRIVING FACTORS FOR NUCLEAR ENERGY POLICY

This chapter focuses on major driving factors which lead the decision-makers to design a pro-nuclear energy policy. It discusses major factors that emerged from the thematic and quantitative analysis of the interview content. The following twelve factors are not pre-prepared categories, rather they are synthesized results coming from the experts' views. The fact that the participants are from different countries, from different professional positions and hold different perspectives toward nuclear energy render the emergence of these common themes meaningful.

The Figure 5.1 illustrates major driving factors in terms of references by interviews.³¹ These results are calculated via MAXQDA, using the interviews as the unit of analysis. The calculation is basically based on the question of “what percentage of cases (= interviews) mention the theme (= code) XY?”. Accordingly, the graph illustrates in how many of the interviews each sub-code occurs, i.e. the percentage of experts touching upon that specific code.

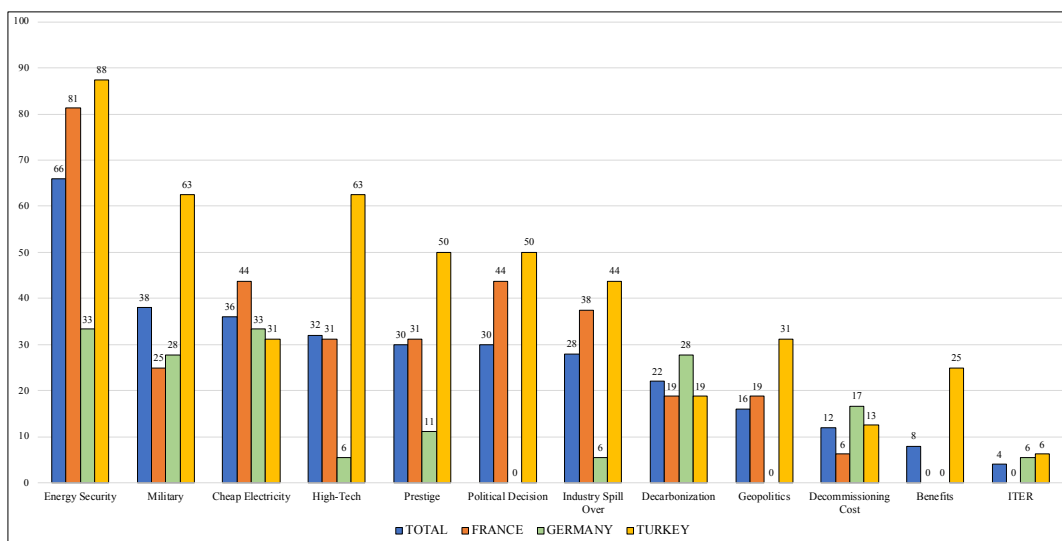


Figure 5.1. Major driving factors, by interviews (in percentages).
(Compiled by the Author).

³¹ The details of the results and the distribution of the codes by cases are provided in Appendix IV Driving Factors.

The graph includes the labels used in the coding process. The category of “energy security” corresponds to the motivation to ensure energy supply security. Normally the notion of energy security means continuous, sustainable and affordable supplies, however, to reach more precise conclusions, these categories are also distinguished from each other as “cheap electricity”, i.e. availability of affordable electricity, and decarbonization. To be distinguished from energy security, concerns with regards to national security were coded under “military” and they correspond to the motivation to increase national security capabilities via nuclear. The category of “High-Tech” includes the motive to become a high-tech country by excelling nuclear technology and sees nuclear energy as an entry way to high technology. The “prestige” category includes the presumption that nuclear offers prestige for the country. In a similar way, the category of “industry spill-over” includes the idea that nuclear energy has a boosting affect for the industry. The motivation to use nuclear as a political tool for the accomplishment of national agenda is coded under “political decision”. “Geopolitics” stands for geopolitical calculations. “Decommissioning cost” which is one of the most unexpected output among the drivers, concerns the motivation to postpone the decommissioning costs by extending the lifetime of nuclear power plants, the category is especially valid for countries which already have nuclear energy, rather than newcomers. “Benefits”, a category uniquely emerged from the case of Turkey, represents rent-seeking, the expectation to receive financial benefits from nuclear projects. Last but not least, “ITER” stands for the motivation to invest in nuclear energy for the sake of the development of new technologies and paving the way for ITER.

The figure below offers a demonstration of all the factors in line with their share in the overall discussion concerning the pushing factors for a pro-nuclear energy policy. Using coded segments as unit of analysis, the analysis shows how often a sub-code was assigned and the percentages correspond to the weight of the coded segments, relative emphasis put on the theme under the drivers category. As the figure clearly shows, although some primary concerns lead the discussion, the decision for nuclear energy is not motivated by a single factor, rather it is a combination of different motives. Moreover, the discussions in the rest of this chapter indicate that there is an intricate relationship between different factors and they are not separated by clear boundaries.

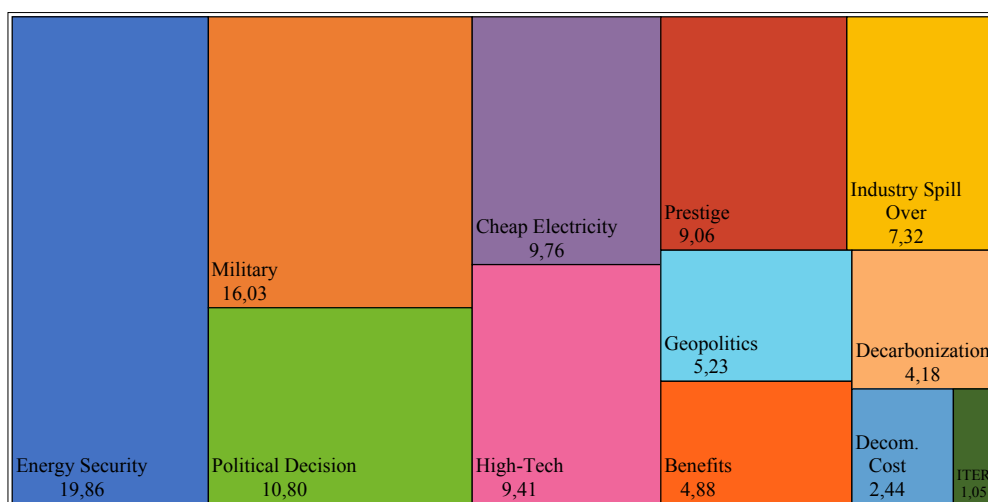


Figure 5.2. Major driving factors in relative percentage values, by coded segments
(Compiled by the Author)

A last remark before continuing the discussion is that in certain cases, the statement of a factor by an expert did not necessarily mean its endorsement, since the experts shared what they observed as a driving factor (based on their professional experiences or based on the discussion they have been taking part in), even when they did not necessarily agree with the suggested argument. In such instances, the reservations of the experts are also discussed in the relevant sections. I consider these reservations too, as valuable findings since, the policy-making processes will be highly influenced by the way the stakeholders perceive existing debates and transfer it into decision-making. To illustrate, as Germany has already decided to phase out nuclear, it was very important to filter these motivating factors through the lenses of experts coming from an anti-nuclear policy-making environment. Even though the motivating factors do not work for Germany anymore, the insights from German experts represented what initially drove Germany to have nuclear energy and what would have “normally” driven a country today to have nuclear. It was interesting to see how these motivating factors are filtered through the lenses of some anti-nuclear experts through counter-arguments.

5.1. Ensuring Energy Supply Security

The purpose of ensuring energy supply security is the usual suspect when it comes to the decision for any energy resource. Energy security has been covered by 66 percent of the interviewed experts and made up to 20 percent of the overall discussion regarding major

drivers of a nuclear energy decision. There is however, a striking difference between French and Turkish experts on one hand, who consider energy security as an important motivation for nuclear energy, with 81 and 88 percent respectively, and German experts on the other side among which only 33 percent discussed energy security with major reservations in the context of German nuclear phase-out decision.

For the German case, energy security corresponds to 19 percent of the motivating factors for nuclear energy. According to Expert G-17, not only for Germany but also globally, a strong driver for nuclear energy generation is to get access to safe, reliable and affordable energy production and distribution. Without any specific emphasis on nuclear, Expert G-9 states that all kind of energy technologies are needed to be used in order to supply efficient, sustainable and secure energy for the benefit of all people:

“From the 1920s, technologies and resources were quite different from what they are today, they have been evolving. So obviously how could we ever dare to exclude generally one technology and go for something else. Looking from an international perspective, each country has to decide for itself what is useful, what is particularly good for its energy supply in terms of security, sustainability and affordability”.

In this context, Rainer Baake, Former German State Secretary at the Federal Ministry for Economic Affairs and Energy (personal communication, 2016), explains that for a long time Germany has been building nuclear generators, because at that time, this was the perception of the government, the business leaders and the majority of the Germans who believed that they need an alternative resource to become more independent from oil producing countries: *“For them it was nuclear energy. And they didn’t listen to any objections!”*. According to experts from the industry, such as Expert G-6, due to energy intensity of the economy and the share of oil and natural gas which makes up to 60 percent in the energy mix, Germany is still very much in need of additional energy supplies. Therefore, for some, a potential scarcity in sufficient energy supplies and energy getting too expensive are still relevant threats for German economy:

“And some of the green future visions, are very easily throwing away this 60 percent, and say we’ll make it all renewables! Will that work? Nobody really knows. We don’t have storage for two weeks of no sun no wind in the winter. To have a safe energy supply, many questions are not yet solved” (Expert G-6).

Another representative from the industry, Expert G-18, shares the concern for the need of continuous and affordable electricity supplies, and highlights that the nuclear phase out decision might hamper Germany's energy security: *"They may think they are escaping from nuclear but they are not"*, he says, *"they are investing massively to find alternatives for nuclear. But a big part of that search for alternatives is now importing electricity through interconnections from France which produces electricity from nuclear. That is a bit ironic"*, he declares. Expert G-18 has a point. According to the Germany Energy Industry Association, BDEW, in June 2019, Germany imported more electricity than it exported, becoming a net importer for the first time since July 2014 (BDEW, 2019). In the same year, Germany imported 14,8 Twh electricity from France (Energy Charts, 2020a). However, for many experts this is considered as a transition period. As Expert G-10 explains, the nuclear phase-out is part of the energy transition: *"Nuclear power plants are not flexible. We need flexible plants for the times of no wind or no solar energy. In this regard, natural gas is a better option as a bridge technology. It can go hand in hand with renewables as it is flexible"*. In this regard, Viviane Raddatz's (Personal Communication, 2017) remark that additional renewables capacity added into the German energy system will compensate for the capacity lost by nuclear phase-out reflects the official German view: the lack of nuclear energy will not affect Germany's energy security. Furthermore, other experts, who are also critical of nuclear energy just like Baake, suggest that energy security was never the main issue in the nuclear policy. Craig Morris (personal communication, 2017) for instance highlights that when it comes to the promotion of nuclear energy, the independence and need for energy security is a *"joke"* since the uranium needed for nuclear energy generation is imported in the first place.

For France, the emphasis on the relationship between energy security and nuclear energy is stronger than in Germany. Among France's major drivers for nuclear energy policy making, energy security is the factor which was the most mentioned by the participants as France's motivation to engage in nuclear energy generation. Moreover, it also has the highest frequency among the coded segments since energy security corresponds 21,78 percent of the driving factors. As expected, according to French experts, one of the main purposes of nuclear energy generation is the production of electricity. Indeed, it is more

than “just” electricity, but “to *produce electricity without releasing carbon dioxide, without producing the waste which pollutes the atmosphere*” (Expert F-16).

Overall, when the experts are asked about what motivated France for its nuclear energy generation, they offer a variety of answers, such as the following:

- “*French Government launched the nuclear program to be independent in energy*” (Expert F-11)
- “*They wanted to give France some kind of strategic autonomy*” (Nicolas Mazzucchi, Personal Communication, 2018)
- “*They desired to be independent, to be to have energy to a reasonable price*” (Expert F-16)
- “*They wanted to become a significant economic state*” (Expert F-7)
- “*For Cheap, affordable and also reliable supplies*” (Nicolas Mazzucchi, Personal Communication, 2018)
- “*...to reduce the dependency of France to oil, for energy independence*” (Expert F-10, Dr. Laurent Turpin, Personal Communication, 2018)
- “*...to establish resilience in the production of electricity.*” (Expert F-3)

Although they use different words, all these experts mean the very same purpose: energy independence for France. “*One of the main ideas of General de Gaulle was the independence of France*” says Expert F-16, “*so nuclear energy solved this problem, gave France the independence in terms of energy*”. Nicolas Mazzucchi’s (Personal Communication, 2018) remark supports this claim: “*General de Gaulle decided that France has to be independent and for independence in the energy field, the only option was nuclear*”. Therefore, the motivation to compensate for the lack of national natural resources and the need for energy security was a major explanation, which could balance high investment amounts for the construction of nuclear power plants, in France.

The roots of French motivation linking nuclear energy to the ultimate target of energy independence rests in history. The big break in the history of French nuclear policy came in 1974, with the Messmer Plan. This decision was taken due to the oil crisis, which had heavily increased the price of oil. As France had no national energy resources, it was very difficult to resist this kind of a constraint. The crisis brought the question of “*how is it*

possible to be sure that in case of conflict you will be able to produce energy?” as Expert F-1 asks. Therefore, the real concern for France was to limit the level of dependence on imported resources, because it was considered as an “*urgent matter of security*”, as Expert F-2 explains and adds:

“We built the nuclear industry in France because of the will of General de Gaulle to become independent. Nuclear was not only important for military components such as missiles, submarines and so on, but because civilian nuclear industry was a way to get rid of the Arab World”.

The motivation first and foremost was to create a domestic energy resource to compensate the fact that France did not have any natural resources. The oil crisis made it clear that fossil fuels from the Middle East were not entirely reliable, while nuclear was a safer option to reach supply security. The launch of a nuclear energy policy thus fitted to the circumstances of the time, back in 1970s:

“I think it was essentially the fear of 1974. In 1974, France discovered that it was very vulnerable to the political decisions of the oil countries, OPEC countries. So, the decision was to have an industry that was completely independent from everybody else. That was the essential push. France needed to have a strong nuclear industry because it was the key to the energy independence. France has still very much the will to be a World power. And World powers cannot be dependent on another actor” (Expert F-15).

There are also others who disagree with this perspective. For example, Mycle Schneider, who is a prominent international energy expert and lead author of World Nuclear Industry Status Reports, argues that energy independence is an illusion told for 40 years, saying that “*it is complete nonsense, it is brain washing at every level, from the basic citizens to the president of the republic*” (Personal Communication, 2018). Expert F-13, although he is not as critical as Schneider, suggests that French nuclear energy program has indeed diverged from the initial plan and now creates problems for diversification, as the country is too dependent on nuclear. He argues:

“If you look at the way the French nuclear program was planned, I think that in reality, nobody thought that nuclear would have taken such a big part of electricity generation. It was not the initial dream. When the construction of those nuclear plants was prepared, the idea was that electricity consumption will continue to grow very fast. They thought at the end, they would probably

produce something like 50 percent maximum of electricity with nuclear”.

Along with supply security, an important component of energy security is diversification of resources. Today, given high share of nuclear energy in the electricity generation, France’s energy portfolio is not diversified enough:

“this is I think the crack of the French program, which is to recognize that perhaps having one energy source being such a disproportionately large contribution to your energy infrastructure, you can argue whether that’s a good idea or not. In France I think the conclusion is that they need to be more diversified.” (Expert F-4).

The recent decision for decreasing the share of nuclear energy in the French energy mix is partly related with this need for diversification. As Dr. Laurent Turpin, the Director of French International Nuclear Agency- AFNI, (personal communication, 2018) explains, the primary goal of French energy transition is not to lower the share of nuclear, but to increase the share of renewables: *“Of course you have to decrease something to increase the other!”* Dr. Turpin says. Therefore, it is important to note that, the French experts definitely do not evaluate this decision as a U-turn in nuclear policy, but rather consider it as a strategy to meet renewable energy targets under the European Union goals (Expert F-1). As a matter of fact, as Expert F-16 articulates clearly, *“it is unthinkable, impossible for France to give up on its nuclear energy policy”*.

The status of France and Turkey in nuclear energy are very different from each other as Turkey is a newcomer country. However, the two countries’ ultimate motivations under the domain of energy security are very similar to each other. Efficient, secure, timely and environmentally friendly management of the energy and mining resources is the fundamental energy strategy for Turkey, as 2015-2019 Strategic Plan clearly revealed (MENR, 2015, p.19). The diversification of the energy resources, exporters and transit routes, effective consumption of domestic resources increasing the share of alternative resources by 2023 are major components of Turkey’s energy strategy. In the Strategic Plan, nuclear energy was considered as an important base load power to meet the

increasing electricity demand and ensure energy supply security (MENR, 2015),³² and it was claimed that Akkuyu and Sinop will save Turkey from importing 16 billion cubic meters and from paying 7.2 billion dollars annually (Ministry of Energy and Natural Resources, 2014a, p. 11).

Consequently, among three cases, Turkey is the country with the highest share of experts (88 percent) referring energy security as a pushing factor. In Turkey, three major themes stand out in this category: meeting increasing demand for electricity with reliable supplies, diversification of the energy portfolio in the absence of national resources and diminishing Turkey's energy dependence on imported supplies.

“The era is changing, now, electricity is everything!”. Yılmaz Batıbay, a prominent nuclear expert from TAEK (personal communication, 2018) uses these words to stress Turkey's growing need for electricity. According to some Turkish experts (such as Prof. Dr. Niyazi Meriç, Prof. Dr. Haluk Yücel, Yılmaz Batıbay, İrfan Koca), Turkey's increasing need for energy, as a result of increasing population and a growing economy, renders nuclear energy a vital resource for Turkey's energy mix. One interesting observation comes from Prof. Dr. Niyazi Meriç who says that when refusing the choice of nuclear on the grounds that Turkey does not need it, people tend to think at the individual level and overlook Turkish industry in need of continuous electricity supplies, to develop. This is because according to some experts, people consider electricity as a “given” in their lives. Expert T-11 clarifies a similar point as following: *“They say they don't want nuclear. What are you going to do when your mobile is not charged? How will you get to your apartment if the elevator is not working?”*. With the same perspective, Expert T-4 states: *“I'm not sure whether there can be any source of energy which can make everyone happy, there will always be opponents and critics. However, what I'm sure of is that, in today's world no one would accept to charge their iPhone only once in a week!”*.

In this context, İrfan Koca, the former president of nuclear safety department in Turkish Atomic Energy Authority (TAEK) and former representative of Turkey at IAEA

³² It is interesting to note that back in 2015, the Ministry of Energy and Natural Resources had set the target for nuclear energy as 5 percent by 2020, which did not materialize.

(personal communication, 2018), suggests that some European countries give up on nuclear, because they do not need high amounts of energy anymore, since their economies have transformed from industrial societies to knowledge-based economies. Therefore, Koca explains, renewables would be sufficient to meet their energy needs. However, in the context of current generation capacities and technologies, renewables would not be enough for Turkish economy, meaning that coal and natural gas are the only remaining options. Nonetheless, for the former there are credible environmental concerns and for the latter import dependence is a vital challenge. As a conclusion, to meet the demand of Turkey's developing economy, nuclear emerges as a plausible option.

In the lack of domestic resources to meet the energy demand, dependence on imported resources increases. Between 2009 (35.856 million cm³) and 2019 (45.211 million cm³), Turkey's natural gas imports has increased 26 percent. As a matter of fact, Turkey currently imports 98,96 percent of its total natural gas supplies, while it covers only 1,04 percent through domestic production (EPDK, 2020). Among the importers, Turkey's highest dependence is on Russian gas, as Figure 5.3 illustrates.

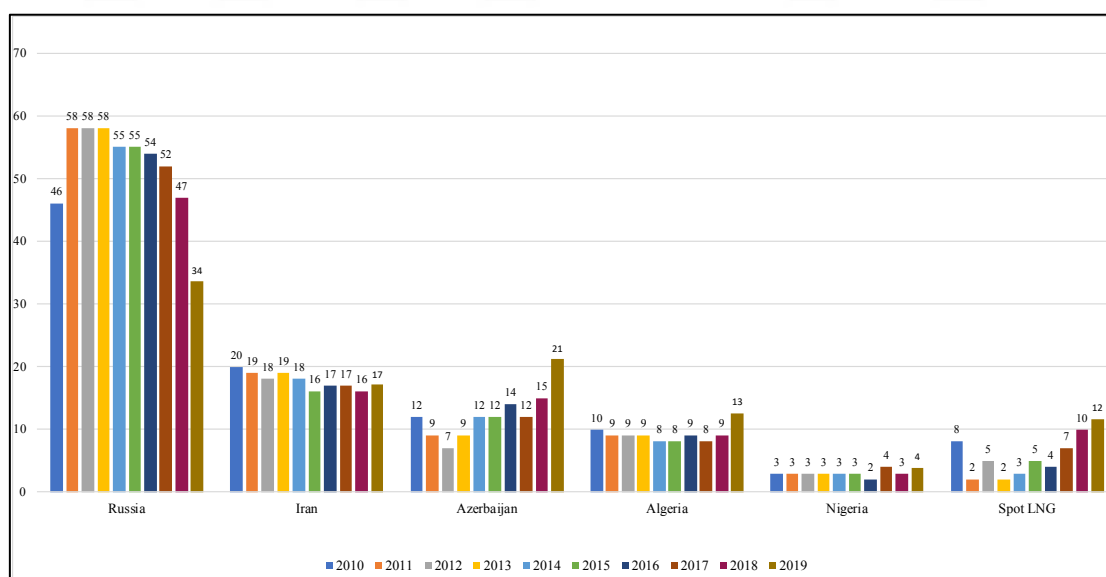


Figure 5.3 Turkey's natural gas imports by country, 2010-2019 (%).
Data Source: EPDK (Prepared by the Author)

Creating alternatives for imported oil and gas, diversification of the energy mix through domestic resources,³³ and effectively managing Turkey's vulnerable reliance on Russian and Iranian imports are official targets pursued by Turkish government (Ministry of Energy and Natural Resources, 2015, p. 17, 40). Turkey's high dependence on imported natural gas is a reoccurring concern among the experts (Prof. Dr. Haluk Yücel, Yılmaz Batıbay, Nilay Çubukçu, Expert T-13, personal communications, 2018). According to Expert T-7 this is partially caused by misguided natural gas policy in the post-2000 era:

“The construction of natural gas power plants is very easy, fast and cheap. You can easily build them almost like playing with Lego pieces. Once Turkish economy started to grow and the need for electricity increased, this fast and attractive solution seemed like a good idea for policy-makers, so Turkey constructed many natural gas power plants. However, back then, no one questioned the fact that the gas to be used in these plants was coming from abroad”.

Koray Tuncer who is the founder of Turkish Nuclear Industry Association (personal communication, 2018) underlines that today, a true nationalist who is aware of Turkey's realities would support nuclear energy as he or she would know that energy is one of Turkey's biggest vulnerabilities. Under current conditions, Expert T-10 notes, in which Turkey pays too much for imported natural gas, nuclear is considered as a “definitely” good alternative for natural gas. Nuclear is expected to decrease Turkey's import dependence on energy: once the nuclear power plant is completed, unlike in natural gas plants, the fuel input required for the NPP to work is only around 5 to 10 percent of the operation cost, affirms Expert T-13. Moreover, nuclear power plants do not require a continuous import of fuel, Erol Çubukçu, the president of Nuclear Engineers Society, adds, since required amount of uranium can be imported and stored to supply electricity for a long time period (Çubukçu, personal communication, 2018).

³³ On August 2020, President Recep Tayyip Erdoğan declared the discovery of 320 billion cubic meters (bcm) of natural gas, the largest such discovery in Turkey's history. Erdoğan underlined that this discovery will reduce Turkey's dependence on imported gas supplies and that the gas will be available by 2023 (Tokyay, 2020). Experts on the other hand underlined that the discovery shall be neither underestimated nor exaggerated, emphasizing that the target year of 2023 is not realistic given that the discovery, extraction and marketing of natural gas usually takes 10 years on average (Öğütçü, 2020). In this current picture, I do not expect the discovery to cause a short-term change in Turkey's reliance on gas imports.

A majority of the experts consider Turkey as energy poor and stress the need for diversification in the energy mix so as to make use of every possible energy option. In the absence of domestic oil and gas, Turkey does not have the luxury to give up on any energy resource. In this regard, for the case of Turkey, it is striking that none of the nuclear proponents rule out renewables out of picture. To illustrate, Expert T-14 highlights that: *“Turkey must evaluate every resource on equal terms. We need to make use of biomass, of hydro, wind...we have a huge untapped potential for solar. We cannot give up on nuclear either”*. However, these arguments hold the reservation that despite being vital resources for diversification, solar and wind energy are *“too much dependent on seasonal parameters, unlike nuclear energy available all the time”* (Expert T-13). Nilay Çubukçu, who is a prominent nuclear expert, also agrees:

“Renewables are also crucial for resource diversification. However, you need to have a reliable baseload resource that you can count on for the proper functioning of your industry. Will you shut down the factories when the wind is not blowing? Turkey does not have neither natural gas nor a good quality coal. If a country lacks natural resources to back up renewables, nuclear is necessary. Turkey absolutely needs nuclear” (personal communication, 2018).

Çubukçu is not alone in her remark that the confidence of having nuclear power for continuously supplying electricity for the economy is exclusive. As a resource, nuclear is depicted as a continuous, reliable, high capacity baseload resource (Irfan Koca, Expert T-13, Prof. Niyazi Meriç) which is available 7/24 with stable production without any voltage fluctuations (Expert T-3) since *“it does not stop in the rain, does not stop in the storm”* (Koray Tuncer, personal communication, 2018).

Although this research does not target a comparison of nuclear energy with renewable resources, it is important to state such a comparison was highly addressed by the participants during the interviews, in all three cases. To illustrate, similar to the Turkish perspectives presented above, Expert F-2 from France underlines that renewables cannot be *“sufficient”* to meet the need of emerging countries. He suggests that although gas and oil are to stay for a long time in the world energy mix, they will still have to be diversified with different sources of energy to alleviate concerns regarding import dependence and carbon emissions. Therefore, Expert F-2 says: *“You can dislike the nuclear industry but*

you have to keep in mind that it is going to be something that you can't avoid at all in the next 20 -30 years as the advantages of the nuclear are very obvious. We will need nuclear in the next decade because of the world's energy needs".

In the opposite front, there are three major objections to these arguments concluding that Turkey needs nuclear. The first concerns Turkey's significant potential for renewable resources. Prof. İnci Gökmen, a leading figure in Turkey's nuclear debate (personal communication, 2018) strongly believes that Turkey does not need nuclear to increase its energy production capacity, since combined with efficiency strategies, renewables would be enough once investments are allocated to increase installed capacity in wind and solar. The second objection concerns increasing energy demand. Oğuz Türkyılmaz states that he is ready to confront anyone who argues that Turkey needs more electricity and underlines that there is no need for nuclear energy in Turkey for that matter:

"They do not take into account that as electricity consumption increases, people's consumption preferences also change. The public consciousness for efficiency and sustainability has also been increasing. Therefore, their predictions are inaccurate as they make linear calculations. If Turkey uses its current electricity generation capacity more efficiently, and support its production with additional renewable capacity, it would definitely not need nuclear to meet the electricity demand" (Türkyılmaz, personal communication, 2018).

Arif Künar also thinks that energy demand projections do not reflect the reality, as the authorities foresee that the growth in the economy will be automatically matched with a growth in energy consumption. *"The authorities are not primarily concerned with producing more using the same amount of energy"* he says, referring to the lack of interest in efficiency policies and continues by suggesting that arguments concerning baseload power, increasing population and growing economy are only used to promote a need for nuclear energy:

"Since 1976, there are hundreds of academic articles written to argue that Turkey will remain in the dark unless nuclear power plants are built. Back then they did not assume that new technologies will emerge in natural gas, solar power or wind. Today, we are in 2018, we don't have nuclear and yet we are not in the dark!" (Künar, personal communication, 2018).

Last but not least, a major criticism concerns the management of the excessive dependence on imported energy resources through nuclear energy. Expert T-5 thinks that framing nuclear energy as a “national resource” is a misleading promotion strategy, since Akkuyu nuclear power plant is only an electricity purchasing agreement, rather than production of domestic energy due to the nature of intergovernmental agreement based on BOO (build, own, operate) model. The target to diversify away from imported natural gas supplies (i.e. from Russia) seems to be incompatible with the deal for Akkuyu which gives the 51 percent of the plant’s ownership to Rosatom according to Article 5.4. It is true that an approximate amount of \$20 billion dollars of Russian investment will further deepen the economic ties between Russia and Turkey. The Russian offer is also a commercially attractive deal as a solution for the high initial investment costs for nuclear. However, Akkuyu deal increases the energy-related reliance of Turkey on Russia. Although so far the geo-political divergences between the two parties did not heavily affect the project, the issue will remain as a potential risk under the bilateral relations shaped by the turbulent dynamics of the region (Yılmaz & Sever, 2016, p. 117). It is important to note that during the fieldtrip, when this concern was asked to the interviewed experts, the question remained unanswered.

5. 2. Availability of Affordable Electricity

Access to cheap electricity via nuclear energy is another driver revealed by 36 percent of the interviewed experts. The driver corresponds to 9,8 percent of the motivating factors. The French experts lead this category since 44 percent of them discussed how generation of nuclear energy made affordable energy accessible for France. Some of these experts expressed low-priced electricity as both a motivation for nuclear energy and an outcome of using it. The comparison of the electricity prices in France with the rest of Europe and specifically with Germany was a dominant approach among the French experts, especially those who are working in official government institutions:

- *“Today a French consumer is paying 70 percent less than in Germany for instance”* (Expert F-10, Expert F-14)
- *“Electricity in France remains as one of the cheapest in Europe, I guess is it THE*

*cheapest in Europe. We are having off the bill of the Germans, for example*³⁴
(Expert F-3)

- *“The French found that nuclear power is the way to get to energy independence and it is actually been a pretty huge success story in France. The French have enjoyed some of the lowest electricity prices in Europe.”* (Expert F-4)

It is important to note that some of the experts, such as Mycle Schneider, put a reservation to these statements. He argues that in France, which is “*the most nuclear country*” in the world in terms of percentage of production, 1 in 5 households is officially classified as “energy poor”: “*If it is cheap electricity, how is this possible?*” Schneider asks, and continues implying that the price factor is a misleading justification for nuclear energy: “*The point is that the price per kilowatt hour doesn’t give you an indication of how big the electricity bills the people have, because it depends on how much they need to consume*” (Schneider, personal communication, 2018). Indeed, according to the latest report of Energy Poverty Observatory in France, in 2018, 6,4 percent of the population was unable to pay their utility bills on time due to financial difficulties, as opposed to the EU average of 6,6 percent (EU Energy Poverty Observatory, 2020a).

Alain Bucaille from CEA on the other hand, offers a different perspective highlighting that the price factor is not a question of sociology but rather it is a matter of how people think, how they consider the problem and how they integrate (or not) the facts into policy making. Referring to Germany, he states:

“Today they say ‘we don’t care about the price of electricity that could be twice more than the existing one because we can afford it’ and you can have such an energy policy if you consider that in fact you don’t care about the electricity price. It is possible to define a policy that is totally compatible with climate change without nuclear. But in that case the political considerations are based on the premise of ‘we don’t care about the price of electricity’. This is really a political choice. In a country where the growth of the consumption is 5 percent per year, it is not possible to think like that”.

For Germany, referred by 33 percent of the experts and accounting for 23,8 percent of the coded segments in the motivating factors category, cheap electricity is the most

³⁴ It is true that the electricity prices in France are lower than in Germany. In 2019, for France the electricity price for household consumers was 0,19 EUR per kWh, while for Germany it was 0,29 EUR per kWh. However, France enjoyed 16th cheapest electricity price in Europe (Eurostat, 2020).

emphasized factor. Indeed, across the cases, Germany was the country where the issue was discussed the most in the context of motivations for nuclear energy generation. Expert G-8 says all the drivers for a nuclear energy policy come down to the cost. Nevertheless, this cost factor for Germany and the way experts are mentioning it, offers a complicated picture.

A very common argument which I have been hearing a lot during nuclear energy conferences, is as following: “when people are asked about nuclear energy in general, they might be against it, but when they are asked if they are ready to pay increasing electricity prices, their perspective for nuclear will change”. This is definitely not the case for Germany. German officials that I have interviewed state that German citizens would rather have higher prices than to have electricity from nuclear energy and that the support for renewable resources comes with the awareness that the choice is not the cheapest one.

On the other hand, German experts, who are coming from the nuclear industry underline that although German citizens are against nuclear, thus they are willing to pay more for electricity, they simply cannot. Dr. Ludger Mohrbach, who is an experienced professional from German nuclear industry (personal communication, 2017) declares that “*When it comes to private households, Germany is now the second most expensive country in the EU in electricity*” after Denmark (Eurostat, 2020) and he continues:

“The real problem for Germany is the energy poor³⁵. These are the households who are not able to pay their electricity bills anymore. With rising electricity prices, the number of these households has increased. They are switched off by the grid operator because they don’t pay the bills anymore. And that’s a political question”.

Although it is a political question, it seems puzzling to some German experts that it does not come out as an issue of discussion. “*Although the price of electricity has increased, nobody complaints against it. I don’t know why*”, says Expert G-17. Dr. Mohrbach also underlines that the electricity prices are not a public issue at the moment: “*You may ask*

³⁵ In Germany, 3 percent of the population was unable to pay their utility bills on time due to financial difficulties in 2018 and 17.4% of households spend a high share of their income on energy expenditure (EU Energy Poverty Observatory, 2020).

why” he states, and continues *“One explanation is that we have a working social system. The government is now trying to subsidize these households by social means”*. According to Dr. Mohrback, to enable these households to pay their electricity bills (who may have halted the whole subsidy system by not paying their electricity bills in the first place), the required money is collected from the middle-class people who can pay electricity bills, and thus who feel the financial load: *“There is some wind blowing in the wrong direction so to speak. But there is not much public opposition. You would not find many journalists for instance writing against high electricity prices”* he declares. However, Expert G-4, who has been working in the nuclear industry for years, warns that this is only a small fraction of the cost which is on the citizens’ shoulders yet, and adds: *“The largest part is yet to come so it will be interesting to see near future, how the perception changes and shifts”*.

For Turkey, the discussion has its own dynamics. Although, 31 percent of the Turkish interviews include the discussion of electricity prices among the drivers, content-wise, cheap electricity constitutes only 6,9 percent of the overall statements and the experts are polarized between two major arguments. On one hand, Koray Tuncer (personal communication, 2018) highlights the importance of nuclear energy by underlining that *“what made Europe ‘Europe’ is nuclear technology, more specifically, cheap electricity generated by nuclear”*. Yılmaz Batıbay (personal communication, 2018) also thinks that the need for affordable electricity supplies is a must for Turkey since a considerable amount of the household income goes to electricity. Calculations reveal that in January 2019, a standard electricity bill constituted 5,8 percent of the minimum wage in Turkey and that it has further increased to 8 percent by the end of the year (EMO, 2019). However, critical experts such as Oğuz Türkyılmaz (personal communication, 2018) underline that nuclear is not the solution to this problem since the price of electricity planned for Akkuyu is a financial loss for Turkey as opposed to renewables with decreasing prices. This second strand of argument therefore, claims that Turkey does not need nuclear energy since the “cheap electricity” factor is only a speculation. Indeed, the cost of electricity in the context of agreements signed for Akkuyu and Sinop has been an important subject of debate in Turkey.

In Article 10.5 of the intergovernmental agreement with Russia, TETAŞ (Turkish Electricity Trading and Contracting Company)³⁶ guarantees to buy 70 percent of the electricity produced from the first two units and 30 percent of the electricity produced from the third and fourth units for 15 years, starting from the operation date of each unit, for 12.35 cent/kWh (not including the value-added tax). A similar purchasing guarantee was also made for Sinop in the agreement with Japan: in the Appendix to the main text concerning the Electricity Purchasing Agreement, Article 4.b, had fixed the price to 10.83 cent/kWh (not including the value-added tax) for 20 years following the start date for each unit. Following the conclusion of these agreements, The Union of Chambers of Turkish Engineers and Architects has been raising concerns for the deal highlighting that the price was already 78 percent higher than the average electricity price calculated by TETAŞ for its 2013 report (TMMOB, 2015). A more recent report also reveals that the current price of electricity for 1 kWh, under state control, is around 4.5 cent, meaning that the price of electricity for Akkuyu is 2.5 times higher than current market price (TMMOB, 2018, p. 305). Therefore, many experts such as Türkyılmaz and Damar suggest that the fixed price in the nuclear deals sets a commitment at a potentially higher-than-market price for the years 2030-2040, especially in the light of decreasing prices of renewables through the introduction of new technologies in energy efficiency, storage and interconnections of electricity networks (Türkyılmaz, 2020; Damar, 2018).

Combined with my experiences during the interviews, these statements include some crucial messages underneath the words of the experts. First, some of the experts openly state that the concern for the price of electricity can create a more favorable environment for the pro-nuclear energy policy-making. For instance, Expert G-8 from Germany explains that prior to Fukushima, the conditions for nuclear energy were more favorable, since people were only thinking about the energy prices: *“back in 2010, high prices on all kind of fuels had been still very present. You have to see that in mid-2008, we had almost, or around 140 dollars per barrel of crude oil. Back then, the prices had been soaring and everybody was more aware of the need to have cheap energy”*.

³⁶ In 2018, the state-owned wholesale company TETAŞ merged into EÜAŞ (Electricity Generation Company). TETAŞ has ceased to exist and EÜAŞ has taken over the former responsibilities of TETAŞ.

The second take-away from the interviews is that the absence of nuclear energy seems to be associated with increasing electricity costs, especially in the case of a nuclear phase-out. To illustrate, in Germany experts from the nuclear industry raised high electricity prices as a major concern, while the experts from official institutions highlighted the willingness of their citizens to get nuclear out of the picture at all costs, including high electricity prices. This implied an acknowledgement that prior to the phase out decision, nuclear energy provided a cheaper option for Germany in terms of electricity and thus a *de facto* acceptance that the target of accessing cheap electricity can operate as a driver for nuclear energy generation.

Last but not least, as a newcomer country, for Turkey the cost of electricity offers a concrete disagreement among the experts. In this regard, the proponents of nuclear have been defending the argument that as a source of safe, continuous and relatively cheaper long-term electricity supplies, nuclear is a good option. Nevertheless, this chapter reveals that overall insights from the experts clearly implied other drivers as well, as Expert T-4 concludes: *“some consider the price of electricity high and the purchasing guarantee as problematic, yet in such agreements the price of electricity should not be the only criteria to check”*.

5. 3. Increasing National Security Capabilities

Since its early roots in the secretive Manhattan Project (1942-1946)³⁷, nuclear energy has been identified and recognized as having close ties with military purposes³⁸ (Duffy, 1997, p. 22). For some, the thin line between the civilian usage of nuclear and proliferation positioned the discussion of nuclear energy at the intersection of “energy security” and “national defense”. 38 percent of the interviewed experts argued that the motivation to support military capabilities through the development of nuclear technologies via nuclear energy, works as a driver in nuclear energy policy-making. Moreover, the analysis indicates that the decision for nuclear energy is 16,03 percent motivated by this factor,

³⁷ For more details on the Manhattan Project please see: Leslie R. Groves. (1962). *Now It Can Be Told: The Story of the Manhattan Project*. New York: Harper and Row.

³⁸ The discussion under Chapter 3 section 6 on “Non-Proliferation and Nuclear Energy” addressed this issue.

coming right after “energy security” as a driver.

In France, 25 percent of the experts view nuclear industry as a strong link between defense and energy sectors, since civil and military technologies in nuclear are very much enmeshed as Paul Dorfman, who is the founder of Nuclear Consulting Group, states (Personal Communication, 2018). Expert F-2, who is a prominent, high-level French expert on nuclear security, also supports this preposition as he argues that *“since there is almost no difference between nuclear military and nuclear civilian industries, it is very difficult to differentiate them from each other as some people would expect”*.

According to Mycle Schneider this enmeshed nature between nuclear energy and national defense originates in French nuclear weapons program which comes from French participation in the Manhattan Project:

“Basically, the political deal was that the French scientists³⁹ that have worked on the Manhattan project would walk away with the secrets on the nuclear weapons. And were basically free to use it. It was like a bilateral kind of, sort of agreement. And that’s what they did. The people that have worked at the Manhattan project were instrumental in putting together the French nuclear weapons program” (Schneider, personal communication, 2018).

France’s nuclear energy policy was intrinsically linked to its nuclear weapons program which started just after the Second World War. *“Defeated by the Germans, abandoned by the Brits”* (Expert F-2), the feeling of *“malaise of not wanting to be pushed around again”* (Dorfman, personal communication, 2018) in the international arena, France’s military ambitions in the Post-War era evolved around a strong desire for power and independence. General De Gaulle decided that France should carry on with nuclear research because it was the only way to prevent another attack against France from the Soviet Union. To this end, on October 18, 1945, the Commissariat à l’énergie atomique (CEA) was created and Frédéric Joliot-Curie (1900-1958), 1935 Nobel Prize awardee in chemistry (L’Humanité, 2015), was appointed as France’s first High Commissioner for

³⁹ Five outstanding French scientists contributed to the Manhattan Project, who later worked in different positions in CEA: they were Lew Kowarski, Hans von Halban, Bertrand Goldschmidt, Pierre Victor Auger, and Jules Guéron (Atomic Heritage Foundation, 2018).

Atomic Energy, responsible for scientific and technical matters (CEA, 2017; AtomicArchive, 2020).

As Expert F-2 explains, when the CEA was created in 1945 by General de Gaulle, the idea was certainly to develop the nuclear civil industry but was eventually to give France the ability to develop a nuclear bomb. Therefore, the French nuclear industry speedily took up the pace and developed quickly thanks to high amount of investments by the French state dedicated to nuclear industry for national defense (Expert F-2). The nuclear program in France thus developed based on two interrelated pillars at the same time: civilian and military. These two pillars belonged to the same world since it was highly difficult to divide activities in the nuclear industry into the categories of military versus civilian, and because very often, same scientists have been working on dual technologies used in both worlds.

For a long time, the CEA has been working for both the military and civilian worlds. The nuclear industry in France has been closely linked to the security of the state through the security of supplies for energy and for the development of nuclear propelled submarines. These dual research activities had created conflict of opinions even within the CEA so as to whether France should go nuclear or not: For instance, Frédéric Joliot-Curie was supporting peaceful usage of nuclear and was opposed to the idea that France should develop nuclear weapons.⁴⁰ Nevertheless, France's motivation was "*always a combination of both from day one*", as Schneider concludes (personal communication, 2018).

As of 1956, a "secret" Committee for the Military Applications of Atomic Energy was working to fulfill CEA's military mission. "*Why it was called secret?*" I ask Schneider. He responds that "*it had a completely military purpose, but it didn't have the name. It existed and it was known that it existed, but it didn't have a military name*" (personal communication, 2018). In fact, this military division within the CEA had started to conduct research on building a nuclear submarine and bomb design. The proposals for experiments regarding reactor and plant designs included technologies which could

⁴⁰ Two years after Joliot-Curie's death, in 1960 France tested its first atomic bomb in the Algerian Desert (Atomic Heritage Foundation, 2017).

enrich uranium to fuel nuclear weapons at a foreseeable future (Hecht, 2009, p. 77). In 1958, General de Gaulle created the Department of Military Applications, the DAM (La Direction des Applications Militaires, la DAM), within the CEA, to serve the defense and security interests of France through the development of nuclear weapons, nuclear reactors for naval propulsion and strategic nuclear materials (CEA/DAM, 2016). DAM was basically in charge of developing atomic bombs for the French government, and nuclear technologies were developed at the same time for both the civilian industry and for military purposes as explains Expert F-2, and continues: *“If you check out who is the real owner of the bombs in France, it is not the state or the Ministry of Defense. The actual owner of the bombs is the CEA”*.

By the late 1960s, France had developed its own reactors which were perfectly providing plutonium for both the weapons program and for power supply. *“Very early in the nuclear program they had thought about the breeder reactor. Because the breeder reactor was the ideal link between the civil and military. It was the ideal tool. So, the breeder reactor was a development they have been pursuing from the beginning”* clarifies Schneider (personal communication, 2018). In the same years, a struggle over reactor design, known as *La Guerre des Filières*, started to divide players in France’s nuclear arena over the choice on the type of reactor: *“The nationalist CEA wanted to pursue the gas-graphite system for political reasons, while the EDF wanted to switch to the light-water system for economic reasons”* (Hecht, 2009, p. 272). This divide partly emerged from the possibility that if the reactor type had changed, France could not only preserve its autonomy via nuclear but also could export reactors (Hecht, 2009, p. 273). In order to balance the cost of nuclear deterrence in France, building a nuclear industry which could be exportable to finance the whole nuclear system including nuclear missiles and nuclear weapons (Expert F-2) emerged as a fruitful strategy for France.

Today the French focus has tilted from the military dimension of nuclear, towards the civilian usage. The majority of the nuclear industry and experts in France serve to the civilian nuclear energy technologies, as Expert F-2 notes. Nonetheless he concludes that this nuclear capacity, the research and development on new reactors in the civilian industry became possible for France thanks to the research program serving the military

in the first place.

To sum up, the initial motives for the nuclear energy policy in France was highly driven by the aim to deter any country from attacking France, through nuclear capabilities. With this background, due to its linkage with national defense, the French nuclear industry is considered as a strategic asset which guarantees France's global position, according to experts like Expert F-2:

“France is a permanent member of the Security Council in the United Nations. A huge majority of French people are very much aware that we own our position in the world, thanks to a few factors and one of these factors is the fact that we’ve got a nuclear bomb and credible military capabilities which other countries (such as Germany), lack. When there is a war somewhere in Africa, or in Syria or in Iraq, we can have our boots on the ground, we’ve got French soldiers, special forces to fight against the terrorists”.

Although today French nuclear program has decoupled military and civilian spheres, this emphasis on France's military power and the understanding of “deterrence”⁴¹ which prevails among the high-level stakeholders in the decision-making mechanisms, makes France to hold on to its nuclear power.

A limited number of German experts raise a similar argument for the very initial phases of German nuclear energy policy, back in the 1950s: *“It was the time of the Korean War, the Soviet Threat was very present. So, it was like an issue of independence”* (Expert G-6). However, the idea is not supported by other experts who think that while military motivations can be a driver of a pro-nuclear energy policy, it is not the case for Germany. Rainer Baake (personal communication, 2016) for instance underlines that the target of proliferation can be an ultimate motivation in nuclear energy generation:

“Once you know the technology, you know how to handle it, the danger is that this knowledge of the technology can be misused in the military field. How did North Korea get the nuclear bomb? Through using civil nuclear energy. How did India get it? How did Pakistan get it? It was always investing in civil nuclear energy, and then using that technology to build the bomb. It would

⁴¹Expert F-2 says: “They say well now we don’t need nuclear bombs anymore because nothing is going to attack us. Well you never know, that is exactly what it is all about! Deterrence! But they don’t understand it.”

be an extremely dangerous World, if all of a sudden we would have a dozen more countries that have technology to build the nuclear bomb.”

The reason why this driver is absent in the perceptions of the experts is mainly because it operated as a constraint rather than a motivation for Germany by assigning nuclear the connotations of “war and disaster” in the light of Second World War, as the chapter on Domestic Context will be discussing in dept. Indeed, according to Rainer Baake (personal communication, 2016) this driver is one of the very reasons why Germany cannot have nuclear energy. Expert G-8 agrees with this point stating that nuclear never belonged to the German identity and that Germany always had a very skeptical stance on the military issues in the field of nuclear.

For Turkey, following energy security, the category of “military” has the highest percentage of reference with 63 percent of the experts. All of the interviewed experts stress that they do not support the idea of proliferation. However, experts such as Expert T-6 also underline the fact that the thin line between the military and civilian purposes of nuclear power, renders the issue highly strategic. The majority of the experts refrains from making bold statements, yet their common point is that, especially in the initial attempts to build an NPP in Turkey back in the 1970s, *“some people might have questioned whether this is the path towards nuclear weapons”* (Expert T7) due to a mentality which among some stakeholders which directly matched nuclear power with nuclear weapons. This motivation came with the expectation to be in the *“upper league”*, to be a powerful international actor or with *“the irrational idea”* in Expert T12’s words, at the background, that if Turkey can have nuclear energy, it can also develop nuclear weapons. Expert T12 thinks that especially in the pre-2000 period, the issue was at crucial importance for the members of military: *“high-rank military officials used to attend energy commission meetings in the preparations of Five-Year Development plans, because they were seeing the issue of nuclear technology as a matter of security”*.

Expert T9’s remarks also underline the delicate balances about this issue, as he explains the details from his memories, provided that the names remain off the record:

“In the late 1970s and 1980s, there was a radical, right wing

group of people supporting especially CANDU⁴², with a motivation to develop a nuclear technology program which can potentially lead Turkey to have its own national nuclear power. This was never openly stated and they had never voiced 'nuclear weapons'. But seeing Pakistan as an example of a Muslim country which developed its own nuclear program based on CANDU, some people in the policy circles had the ultimate dream of Turkey becoming a powerful country. For them this was more important than the energy security. These individuals have been trying to influence decision-makers. Yet, their efforts were wasted as the tenders have been cancelled".

In this regard, as Expert T15 clarifies, addressing nationalist feelings and linking nuclear technology with Turkey's position in the international arena was a common political argument used by those who thought that if some countries in the international arena have nuclear weapons, so Turkey should have too. Indeed, Expert T6 reveals that MHP used to openly declare that the importance of nuclear was way more than just the energy dimension. Some party representatives were more interested in the strategic dimension of achieving nuclear technology for Turkey to be used as a deterring liability for becoming a regional power. This political argument was occasionally used by some party members. Accordingly, the international balance of power was at stake in the evaluations over nuclear technology. To illustrate, the then Minister of Transportation Enis Öksüz from MHP had stated that if other countries have nuclear weapons when Turkey doesn't, others should destroy what they have. (Hürriyet, 2000b). Indeed, this line of arguments survived till present, as in September 2019, Turkish President Tayyip Erdogan criticized nuclear armed states and said "some countries have missiles with nuclear warheads. But (they tell us) we can't have them. This, I cannot accept. There is no developed nation in the world that doesn't have them" (Reuters, 2019). Erdoğan also highlighted the strategic

⁴² This statement makes more sense when considered in the context of the era, which was a time period when civilian nuclear technology developed by CANDU was considered as a dominant means of acquiring nuclear weapons capability (McKay, 1980). In a report from IAEA International Nuclear Information System (INIS) Archive, McKay stated: "countries could be cooking up nuclear bombs in their national kitchens. Among these 'threshold' nations are: Pakistan, Argentina, South Korea and Taiwan, all Canadian reactor customers...The CANDU, in the hands of a madman like General Videla of Argentina, or General Zia of Pakistan, is a bomb factory. And, they know it!" (McKay, 1980). McKay claimed that the original Pakistani plan was always to use a peaceful Canadian reactor, to imitate the Indian route to the bomb (McKay, 1980). These arguments of McKay, who is a renowned journalist, were severely criticized and rejected by several reactor physicists and nuclear expert groups including Canadian Nuclear Society.

deterrence of nuclear weapons with a reference to Israel's nuclear capabilities (Tanchum, 2019).

Turkey's intentions on nuclear weapons (Kibaroglu, 2013) has been a focus of interest for international security analysts. Especially, in the initial phases of Ankara's efforts for the peaceful use of nuclear power, above mentioned remarks and discussions overshadowed Turkey's attempts (Kibaroglu, 1997). In this discussion, it is therefore, crucial to underline that Turkey always demonstrated full commitment to the international nonproliferation regime. It became a member of the IAEA on July 19, 1957, signed the Treaty on the Non-Proliferation of Nuclear Weapons on January 28, 1969 and ratified it on April 17, 1980 (UN, 2019). The official Turkish position is entirely against proliferation of weapons of mass destruction (WMDs) and provides full support for non-proliferation initiatives. The country has a very clean record and an outlook in favor of a regional nuclear weapons-free zone, as well as an eventual global nuclear disarmament (Ülgen, 2011; Ülgen, 2012). In addition to the NPT, Turkey is also a signatory of the Comprehensive Test Ban Treaty, the Chemical Weapons Convention, the Biological Weapons Convention, and the Additional Protocol (INFCIRC/540) which expands the IAEA's rights of access to information and nuclear sites in the states for a fuller picture of such countries' nuclear programs, plans, nuclear material holdings and trade (IAEA, 2019). Furthermore, building on the view that "disarmament, non-proliferation of nuclear weapons and weapon control is of critical importance for global security and peace", Turkey's official position has been to pursue the ultimate goal of a world free of nuclear weapons, as declared by Foreign Minister Çavuşoğlu on February 25, 2019, at the UN's Disarmament Conference held in Geneva, Switzerland (Hürriyet Daily News, 2019). In this context, as a technical expert, Expert T13, highlights that it is impossible for Turkey, as a country which is a party to the international regime, to strive for nuclear weapons under current inspection and partnership mechanisms.

On the other hand, together with non-proliferation, Turkey is also strongly committed to the aim of ensuring the safe, secure and peaceful utilization of nuclear energy, standing against any efforts constraining the exchange of nuclear-sensitive materials in scope of energy production and countries' rights to the peaceful use of nuclear energy under Article IV of the NPT. In that regard, Turkey's major concern has been the fear that

international restrictions over accessing enrichment and reprocessing technologies for nuclear energy will hamper its nuclear energy program and will render nuclear-aspirant countries dependent on existing nuclear suppliers, which contradicts with the ultimate aim of increased energy independence (Ülgen, 2012). Although Turkey's interpretation of Article IV and its critical perspective regarding international efforts to limit nuclear-aspirant countries from accessing enrichment and reprocessing technologies for civilian purposes created disagreements with some of its Western allies (Ülgen, 2012), protecting its right to peaceful use of nuclear power and commitment to the IAEA safeguards remained at the heart of Turkey's nuclear diplomacy.

At this point a detail which came up during the interviews is noteworthy. In Turkey's nuclear agreement with Japan, the article regarding the extraction of plutonium from spent nuclear fuel and the enrichment of uranium had raised strong criticism leading the then Energy Minister Taner Yıldız to clarify that Turkey only wants to participate in some processes of nuclear fuel and that the agreement is uniquely aimed at all transactions to be used for peaceful purposes (Hürriyet DailyNews, 2014). Expert T6 thinks that the criticism was unjust as the clause in the agreement mainly aimed to preserve Turkey's rights coming from Article IV of the NPT. Similarly, Expert T7 also agrees that the cooperation in enrichment for nuclear fuel to be used in the nuclear power plant is a legitimate clause under the NPT, *“assuming that there is enough indigenous expertise to do that”*.

One very important conclusion from the analysis of three cases is that, in the discussion of nuclear, even as an energy resource, the perception of the link between nuclear technology and national security is very strong. Today, the nuclear energy policy is designed in a different context than the post-Second World War era, where civilian usage of nuclear power is completely distinguished from military purposes and governed under the non-proliferation regime. For any country, that wants to remain in the global governance system, going nuclear⁴³ would imply a global isolation. Nevertheless, a skeptical discussion which links directly civil nuclear and military nuclear together, persists. The argument is that if a country wants a substantive military structure, it might

⁴³ Please note that in the conventional international relations literature, “going nuclear” corresponds a country acquiring nuclear weapons.

also need a relatively substantive civil structure at the same time to have enough of people, enough laboratories enough technicians, and a reliable technical capacity in place (Stirling & Johnstone, 2018). France's nuclear history emerges as a relevant example: in the case of France, the lack of conventional resources was combined with its military ambitions, and in turn its strategic military ambitions meant its place in the world (Dorfman, personal communication, 2018). On the other hand, for Germany this factor operated as a hurdle for a pro-nuclear energy policy, since the connotation of nuclear technology with war catalyzed a strong anti-nuclear feeling among the public and in some policy circles which did not consider nuclear technology as an asset for German national security. For Turkey, despite allegations that this motive has been discussed behind closed doors in the initial years of Turkish nuclear strategy, being a strong proponent of the NPT regime, the "military" dimension of nuclear has rather left its place into the admiration of technology symbolized as a national prestige, as the following sections will elaborate in detail.

5. 4. Becoming a High-Tech Country

This factor is highly related with the assumption that, to be executed and developed, nuclear energy technology requires a technical maturity. In this regard, for some policy-makers stepping into the "nuclear energy world" is associated with the motivation and expectation that the country's technological capabilities will be enhanced, as argued by 31 percent of the participants.

This expectation is especially apparent for the case of Turkey. During the interviews, 63 percent of the Turkish experts discussed how the desire to achieve advanced technologies can be a motivation for Turkey's nuclear energy policy. Across the cases, Turkey has a significantly higher score: 13,2 percent of the pushing factors concern the motivation to become a "high-tech country" via nuclear, as opposed to France (5,9 percent) and Germany (4,8 percent) where the stress on this dimension is relatively minor.

Even in Turkey's Five-Year Development Plans, references to nuclear energy had started in 1968 with the Second Plan and until 1989, nuclear energy was depicted as a resource for the "future", a "priority" and a "grand" project (Republic of Turkey Presidency of

Strategy and Budget, 1963-2019; Sever, 2019). This understanding is also reflected in the views of several Turkish stakeholders as some of the interviewed experts demonstrate a clear appreciation of nuclear technology as the state of art, and emphasize nuclear technology as a means to accelerate Turkey's progress. To illustrate, Yılmaz Batıbay (personal communication, 2018) underlines that *"nuclear is a must for Turkey and Turkey has to get into this technology"*. Similarly, Expert T-13 also thinks that nuclear technology is one of the biggest technologies that has been contributing to humanity in different fields ranging from health to agriculture. Expert T-13 reminds that nuclear technology is not completely "new" for Turkey, as for more than 50 years the country has been using nuclear technology in health and agriculture and has been educating several nuclear engineers as well as experts working in the fields related to radiation. Building on this, others declare that a deeper engagement with nuclear technology is required for Turkey. Expert T-2, who is a government official, states that the decision on nuclear energy is on one hand related to energy, on the other it is related to technology transfer. Koray Tuncer's perspective also supports this argument: *"The answer for the question of why Turkey needs nuclear energy is not electricity, that's not the main point. The answer is technology!"* (Tuncer, personal communication, 2018). Each of these experts stress that their reference to "technology" does not imply nuclear weapons, that they are strongly against nuclear proliferation and that accessing nuclear technology should never lead to proliferation for Turkey. On the other hand, Expert T-4 believes that *"everyone would hesitate to confront a country that can develop nuclear technology on its own"*, and adds: *"when I say this, I mean that nuclear energy, nuclear technology, can strengthen foreign policy of a country. That's a motivation for Turkey"*. The logic of this argument goes as the following:

"Nuclear energy can upgrade the status of a country in the international fora because it offers the country a technology and security culture. In terms of labor force and production, it brings a quality boost. Achieving advanced technologies in nuclear or in space studies is good for the society as a whole, as it enlarges the individuals' vision and enhances their ways of thinking" (Expert T-4).

This idea of high-level technology transfer through nuclear energy and its follow-up effects on the overall development of the country is deeply rooted in the arguments of the proponent of nuclear energy in Turkey. Some even further elucidate this argument so as to explain Turkey's long struggle to build nuclear power plants, which has been

interrupted and delayed throughout the years. To illustrate, Expert T-16 believes that potential technology transfer to Turkey which would elevate the country is the reason why “*Nuclear Powers do not want Turkey to build nuclear power plants*”.

The idea of a potential technology transfer partly rests in the deal with Russia, concluded for Akkuyu, which allowed young Turkish engineers to receive higher education in Russia under nuclear energy specialists training program. The training basically aimed to educate Turkish engineers to work in Akkuyu NPP. Alexey Frolov, Managing Director for GR and International Cooperation of Akkuyu Nükleer Company underlined that “the target-oriented training program for Turkish Akkuyu NPP personnel is an important part of the Intergovernmental Agreement” (Akkuyu, 2020a). Since 2011, the special training program for Akkuyu has been in practice and since 2018 more than 130 Turkish engineers graduated from higher education in National Research Nuclear University MEPhI (Moscow Engineering Physics Institute). In 2020, the third group of 53 graduates has started to work in Akkuyu NPP construction site (Akkuyu, 2020a).

Some experts remain skeptical regarding the success of this “targeted specialist training for Akkuyu NPP”. For instance, Necdet Pamir (personal communication, 2018) thinks that these trainings are just some “*sweeteners in the deal*” to give the message that Akkuyu “*is a national project, producing domestic energy with local experts, which is not the case!*”. Similarly, Expert T-3, who is a government official believes that these trainings would not serve Turkey to develop a national nuclear energy technology, but only would supply Russia the required workforce to build and operate Akkuyu NPP with Russian instructions.⁴⁴ Consequently, these Turkish experts regret that nuclear technology transfer and the achievement of a high-level technical maturity in nuclear through Akkuyu will remain problematic for Turkey. As a matter of fact, the content of Akkuyu Agreement causes these experts to doubt that the know-how transfer is ever possible. Expert T-14 warns that with Akkuyu agreement, Turkey is not buying nuclear technology: “*Russians will bring their own technology. We will only watch and buy the electricity*” he says. Expert T-5 also makes a similar point:

⁴⁴ Expert T-3 specifically says that the Russian experts would not teach anything critical during the trainings and would only focus on: “*this button for this, that button for that...just to make students to memorize like a parrot...*”.

“What kind of experience will we gain with Russia's power plant here? Turkey will not gain any experience. Russia will make a power plant to sell us electricity. It would be the same thing if they had simply sold us electricity generated in any other country. Can it provide a technology transfer to Turkey? I don't think so. The Russians are very clear in that they will not involve us in the production of nuclear related equipment and in the construction of the nuclear island. We can take part in the construction of the buildings, the harbor or the breakwater but that's it. Don't expect anything more. Turkey would not learn nuclear technology from this project. In the short-run, there will not be a know-how transfer from Russia to Turkey”.

Additionally, Expert T-5 who is an experienced nuclear engineer asks “*Can Turkey become a country which export nuclear technology in the future?*” and continues:

“unfortunately not, because Turkey's mentality is different. That was an opportunity for Turkey but it is gone now. Take South Korea as an example. Back then, we started the same, we both had potential, but look how developed they are now in nuclear. Today they are successful in almost every industry: technology, electronics, automotive...South Korea had a vision and they were ready to make sacrifices to achieve their goals, they worked very hard. Turkey didn't do this. Culturally we always want to achieve great things in a very short amount of time, we only have words with no action. The policy-makers only want flashy projects to impress the voters. The rest is not important for them”.

These remarks are very important as it contrasts with the ultimate expectation of bringing nuclear technology to Turkey. Despite the expectation, the possibility of the failure of know-how transfer in Akkuyu should be included in the policy calculations and the ultimate purpose of Turkey becoming a nuclear technology producer needs to be backed up with additional strategies in designing Turkey's nuclear energy policy.

With regards to the achievement of high-level nuclear technology, France sets a relevant example for Turkey. Indeed, 31 percent of the French experts agree that access to high-level technology does operate as a motivation for a pro-nuclear energy policy. Expert F-16 explains that, as nuclear energy requires high level techniques, there is a possibility for the countries which are interested in nuclear energy to enhance the level of education, increase the number of their technical students, increase the number of jobs in the field of nuclear energy and in consequence there is a possibility to achieve very high skilled human capital which is vital for other industries as well. These experts imply that the

generation of nuclear energy does not only produce jobs that are dedicated for nuclear energy but also skills and expertise possible to be applied in other sectors.

Although this dimension of nuclear energy generation was not the initial push for the French nuclear energy program, it is important as a reason to *continue* to nuclear energy generation. “*If we stop nuclear and we don’t plan further reactors for the future, then we will lose our know how*” says Expert F-13, highlighting that they need to keep the industry working. As a matter of fact, during the interviews especially with the experts from official French institutions, I have noticed that this idea of possessing this high-technology industry is highly linked with the prestige factor. Expert F-2 proudly states that France’s nuclear technologies and its ability to develop very diverse industries in the nuclear field for about 70 years, explain why France is a leading country in nuclear and was chosen to host the development ITER.

The development and successful implementation of nuclear technology requires a strong industry, a culture of flawless quality among suppliers and education of indigenous experts. Accordingly, the access to nuclear technology, which is perceived to offer the possibility to strengthen the level of technical expertise and scientific progress, is an appealing motivation for newcomer countries to engage in nuclear energy generation. As Expert F-1 explains, this development may result in a new kind of economy: “*When you think about Vietnam, for example, you are considering it as a country with poor level of technology, but they will have nuclear energy, once they do so, they will go to another level*”.

The interpretation of this factor in the German front, offers a sharp contrast with France concerning the achievement of “high technology” through nuclear energy, since the time and technologies has changed. To clarify Viviane Raddatz (personal communication, 2017) offers very insightful remarks as she explains that, back in the 1950s, nuclear had a glamorous image of “*fantastic, future technology*”. She tells:

“It was like a big, real promise of a really bright future. I think the 50s were definitely a time where everybody really desperately wanted to try looking ahead. And all these things like nuclear energy, going to space, all these really fantastic scenarios of technological shiny future were really appealing to people

because the reality was rather bleak and looking back was not an option especially in Germany and Europe. So, everybody just dreamt of this shiny new future”.

Raddatz also offers a very striking example to illustrate the perception of nuclear back in those decades:

*“There used to be a small kind of nuclear reactor for children, and some kind of science game to build your own reactor as a family. This is what I always have in mind, it is really funny because it’s only just a symbol. For nuclear there used to be such a big promise that just doesn’t manifest itself anymore”.*⁴⁵

With the societal uproar in the 1960s, this fantastic, high-tech image of nuclear fell apart in Germany. All the technologies that represented the era was replaced with the discussion on how to form *societies*. The skepticism towards technology born in that era remained till today. As Raddatz highlights as well, one of the basic problems with nuclear for Germany is that its disadvantages are considered to be so huge and uncontrollable that its “high-tech” image does not work anymore: *“Having this kind of fantastic type of retro future idea about nuclear just doesn’t out weight the disadvantages, as it is way too expensive to do on a huge scale. And nobody is really getting it done anymore. It has just risks that we prolong into future generations for millions of years”.*

This perspective clearly explains why only 6 percent of the German experts addressed this factor, and it clearly does not operate as a motivating factor for Germany anymore. For Germany the development of a “high-tech” future is not associated with nuclear anymore. As a matter of fact, there are also experts in Turkey who share this same perspective on nuclear. To illustrate, Oğuz Türkyılmaz (personal communication, 2018) who stresses that *“there is no need for nuclear in Turkey and I am ready to discuss this on every platform with those who say it is needed”*, strictly criticizes this high-technology argument: *“Should I call this a passion, love or fetishism for technology? What’s the point of nuclear? High technology, they say. If you are passionate about technology, go work on genetics, work on robotics, produce panels, wind turbines!”*. Pointing to the

⁴⁵ The toy Viviane Raddatz is referring to is The Atomic Energy Lab set which was released by the A. C. Gilbert Company in 1950, available from 1951 to 1952 and sold for \$50 (equivalent of 520 dollars by today’s standards) The kit aimed to allow children to create and watch nuclear and chemical reactions using radioactive material. It actually included 4 uranium ores! For further information please visit the following video prepared by Atlas Obscura: <https://www.youtube.com/watch?v=zeyoJGqKbOQ>.

disadvantages of nuclear energy just like Raddatz, Prof. İnci Gökmen (personal communication, 2018) also offers a critical perspective, as she explains:

“The advantage of nuclear seems to be getting a huge amount of energy from a very small source. But do we really use this energy for the benefit of humanity? Unfortunately, what I have witnessed during my whole life was nothing but the side effects of nuclear: damage to the environment, damage to human health... There are surely some advancements in the medical industry with regards to the use of nuclear, but when it comes to the energy dimension, I cannot come with a good example. Because, when we evaluate a resource, we have to take into consideration the environment that we are a part of, not just for nuclear, but for everything else, including renewables. Energy generation should not be at the expense of the environment. The main point should be having energy supplies in an environmentally sustainable fashion”.

Whether nuclear has lost its charm as a “high-tech” future or to what extent an efficient technology transfer can really occur for newcomers are subject to further debate. However, the insights of some French, German and Turkish experts reveal that the bright call of nuclear energy promising a high-tech future for the aspiring country remains very relevant for nuclear energy policy-making as a potential benefit in the mid and long-term. Nevertheless, it is important to underline that the construction of a nuclear power plant via an international agreement does not automatically bring such a progress.

5. 5. Prestige for the Country

One of the most obvious messages I have received during my interviews in France is the image that French people are proud of their nuclear energy technology. This prestige or national pride factor is raised by 31 percent of the French experts, especially by those working in official institutions. Technological pride combined with the desire for national independence has been a driving force for France’s nuclear energy policy. As Gustafson also states: “Nuclear power both military and civilian, had become France’s signature accomplishment of the 1970s and 1980s, the comforting symbol of France’s role as a leading technology power” (Gustafson, 2020, p.97)

The way the experts interpret “having” nuclear energy very much supports this claim. Expert F-16 suggests that nuclear energy places a country at “*an upper stage*” compared

to others, since countries which have their own energy, which can produce their own electricity are considered to be different, to be rich and independent in energy and are in possession of a specific industry which is of very high quality. Nuclear energy is thus considered as a way to “*change the category of the country*” in the international arena, as argued by Expert F-1, who is a high-level representative in a French government institution. Consequently, “*having nuclear energy is also the possibility for a country to say that they are different and perhaps at higher level than other countries. It is a kind of prestige, and higher classification*”, as Expert F-16 concludes.

In this regard, the insights of the French experts reveal that for France nuclear has been instrumental in terms of preserving its international image. Expert F-2 thinks that although the French power in the international arena has been in decline after the 20th Century, “*the nuclear bomb and our position in the United Nations Security Council, are probably one or two last reminiscences of France being a superpower in the past and being a country having a say in the international stage*”. Therefore, the position of France on the international stage is still considered to be highly linked to its the nuclear industry and nuclear energy capabilities. It is even promoted as a reason why there is a limited number of people who are supporting anti-nuclear protests against the nuclear industry in France. Expert F-2 states:

“In fact, the nuclear power plants in France are aging. Actually, this is a good argument for people against nuclear industry. The costs to keep these power plants working is increasing a lot. But if we stop the nuclear industry, first, how we are going to replace the nuclear power plants, by what? Solar panels? Wind? And second, it will impact our position in the world. So, no. It is not going to work”.

Paul Dorfman (personal communication, 2018) rightly summarizes this factor by underlining that it all comes down to practicalities of nuclear that link international prestige, energy security and military: “*France wanted to be a rich nation, it wanted to be a nuclear power to sustain its military nuclear capacity, to have a seat in the table, a strategic seat to the table. French nuclear program and French sense of prestige or power or security, whatever it is, is hugely enmeshed*”.

In Germany, 11 percent of the experts referred to the prestige factor during the interviews. To illustrate, talking about the history of nuclear energy policy, Expert G-13 notes that

during the 1970s and early 1980s, there were a lot of plans and studies for building nuclear power plants, which were providing the idea that *“we just need nuclear power plants to become one of the strongest nations”*. Although obviously this idea is no longer valid for Germany, other experts such as Expert G-9 acknowledge that *“for many countries getting into nuclear and getting into this technology has some aspect of prestige, some aspect of stepping into the modern part of technology”*.

Developing a nuclear reactor is considered among few technologies in the world, such as sending a man around the earth or sending a satellite, which is acknowledged as a big industrial achievement or as a matter of international image. According to Nicolas Mazzucchi (Personal Communication, 2018) many countries, especially the emerging ones are trying to have nuclear energy not only because they need access to energy for a variety of purposes (such as increasing energy demand or need for water de-salination as in Gulf Countries) but also as a means to enhance their international image showing the world that they are able to develop and manage a nuclear power plant. Mazzucchi says: *“having a nuclear power plant, if you are an emerging country can give the message that ‘OK, I reached a certain level of technical capabilities, technical maturity’”*.

This approach is highly valid for Turkey. Half of the experts interviewed from Turkey indicates the prestige factor as a driver in Turkey’s nuclear energy policy-making. A very clear depiction of this factor, comes from a government official from Turkish Court of Accounts when he says: *“Should Turkey have nuclear technology? YES! Is it needed? That’s another issue”*.

Expert T-6 who has years of experience in the nuclear field explains that a nuclear power plant project, if completed successfully, is a prestigious and strategic accomplishment for any government: *“they can use it both in domestic and international politics by proudly saying I am a nuclear power country!”*. In a similar perspective, according to Expert T-10, due to its turbulent region, Turkey’s agenda is always busy with other urgent issues. Therefore, two topics never find their ways in the daily agenda: nuclear technology and defense industry. *“Neither the opposition leaders nor the public are aware of this factor”* he says, *“we still discuss whether we should have nuclear energy or not”*. He continues as the following:

“Turkey is a global PLAYER but Turkey is not a global POWER, because Turkey does not have nuclear power. Nuclear would render Turkey a global power, it will offer a sustainable leadership in the Islamic world. Currently, Turkey just has a temporary leadership position in the Islamic world. That’s why, nuclear should be on top of Turkey’s agenda. Turkey should set itself the target of constructing its own nuclear power plant by 2060 or 2080”.

This prestige factor faces criticism by several experts both opponents and supporters. While they disapprove it as a motivation, these experts acknowledge that this is a strong driver for Turkey’s nuclear energy policy. According to Oğuz Türkyılmaz (personal communication, 2018) the reason for Turkey’s *insistence* on nuclear energy is “*a fetishism, a desire to be in the nuclear club*”. Prof. İnci Gökmen (personal communication, 2018) expresses the same argument by suggesting that the decision makers think that “*powerful countries have nuclear so we must have it too, we have to be in the powerful, nuclear club too*”. Similarly, Arif Künar (personal communication, 2018) suggests that the driving force for Turkey’s nuclear energy policy is the mentality that those who have nuclear power are in another category in the international league and that Turkey needs to be in the same category: “*no one or no argument can destroy this understanding*”, he concludes. This strand of the argument claims that in the eyes of some informed Turkish experts, the decision-makers’ motivations have nothing to do with environment, climate, energy supply security nor economics. “*Turkey will be a nuclear power, nuclear will upgrade Turkey’s category in the international field. That’s the only concern*”, suggests Künar. Moreover, Expert T-5 underlines that nuclear energy is represented to Turkish citizens as a prestige project, which makes the questioning of the nuclear energy policy very difficult since giving up on nuclear option is reflected as a decision to give up Turkey’s prestige, in the mainstream political discussions. According to Expert T-9 and Expert T-5 the problem rests in the mentality of the decision-makers in the ruling part as they want nuclear power not because they think Turkey really needs energy, but because they are mainly concerned with “*fancy looking and fancy sounding prestigious projects*”:

“current Turkish government is determined to construct BIG projects (not only as nuclear power plants but as bridges, roads, big hospitals or airports), thinking that these projects can have an impression in the international arena. They think that big

investments would demonstrate Turkey as a powerful country which possesses advanced technologies” (Expert T-9).

The following observation of Expert T-5 who is a prominent nuclear expert in Turkey offers a vital concluding remark:

“Since late 1960s the idea of nuclear has been promoted to the public as a matter of national prestige and as a tool to show-off the world how developed Turkey is, and Turkey too has nuclear technology. Do we really need it? What will be the real advantages and risks of nuclear for Turkey? No one really cares about these questions”.

5. 6. Accomplishment of a Political Agenda

While none of the German experts referred to this category, 44 percent of the French experts and 50 percent of the Turkish experts revealed that nuclear energy policy is a political decision and political agenda of the decision-makers is instrumental as a driving factor. In fact, each and every category discussed under this chapter can fall into the calculations of political motives or can be part of the political agenda. However, the specific stress of these experts to nuclear being a “political decision”, is worth examining in detail.

Despite their different contexts, for both French and Turkish experts the notion of “political decision” crystallize around similar arguments and three slightly different yet relevant interpretations are exposed. The first interpretation links politics (as driver for nuclear energy) to the pursuit of a political agenda or motive. This is because some of the experts directly see “energy” as a political game and thus, political calculations driving energy preferences is a usual scenario for them. “*Energy is just like a poker game*” says one Government Official (Expert T-2) from Turkey, “*a poker player should always focus on his cards. As a player Turkey should focus on its options as well*”. Another Government Representative (Expert T-3) from Turkey also considers energy field as a “*complete power struggle*” and underlines that “*we cannot isolate it from politics*”: “*Energy sector cannot be liberal or environmentalist because energy is the fundamental trump card in the international power struggle*”. Accordingly, half of the Turkish experts think that Turkey’s nuclear energy policy is strictly driven by political motivations and that Akkuyu is a political project. According to Expert T-9, the main motivation of the

government is to become a regional power, as he adds: *“the decision to construct Akkuyu with Russia is probably motivated by the desire to strengthen relations with Russia or to have a leverage against the US”*. This interpretation is highly relevant with the driver on “geopolitical calculations”.

This understanding stands out as a common point with French experts who think that nuclear energy is first and foremost a political choice (Expert F-16) and the achievement of a political agenda is the only thing which can compensate high investment costs of NPPs (Expert F-9, Expert T-14). The political motive can emerge as a response to the pressures coming from national (such as consolidation of power) or international levels (such as international balance of power). In this case, the political motives can range between hard core security agendas or economic incentives. To illustrate, Expert T-10 from Turkey indicates that there surely is a political agenda which is driven by economics. He says: *“it is not politics that decides, capital decides on everything. Politicians are the triggermen of capitalism. Why did Putin and Erdoğan talked about tomatoes⁴⁶ in such an important meeting?”* and concludes that Turkey’s ultimate political motive for its nuclear energy policy is also driven by the economic concerns for energy. On the other extreme, Expert F-9, who is a prominent French expert, thinks that the political agenda of many countries such as Argentina, Brazil, South Africa, Libya, Algeria or Saudi Arabia, is to develop nuclear energy just to have the technology which can further developed into military capabilities: *“Pakistan succeeded in this”* he says, and continues: *“I never heard about Turkey. But I know Mr. Erdoğan, I am sure he is thinking that someday it could be useful”*.

Another interpretation of nuclear being a political decision concerns ideological reasons. Accordingly, political drive underneath the nuclear decision is ideological, only because the countries politically decided to use nuclear:

“One thing you really have to recognize about nuclear today, is that the global context for energy is much more political than it has been in the past. It is not simply a matter of countries choosing for their economic best interests or environmental issues, it really is a political matter. And it’s taken on almost an ideological taste to it. This means that the kinds of discussions we

⁴⁶ Expert T-10 refers to the high-level meeting between Erdoğan and Putin which took place on May 2017 as part of the normalization of bilateral relations (Cumhuriyet, 2017).

have with people from across many different countries, is not a discussion about the substantive technical facts, or the economic analysis for a particular decision, it is rather very political and it is going beyond the economic and technical issues, one might even say it ignores the economics and the technical.” (Expert F-4)

When this is the case, politics overrides technical facts in the decision-making process. Therefore, for some countries nuclear becomes a political or a social issue rather than a technical one. Expert T-4 who has been closely involved in Turkey’s nuclear energy journey, states that the decision for Akkuyu Nuclear Power Plant is a relevant example, since it was not based on technical inputs:

“it was a decision taken by the politicians and bureaucrats. Especially, the decision to construct the power plant with Russia and Russian technology...Back then, if we were asked, we could have worked on the pros and cons of this technology or on Russia’s nuclear safety culture to offer an input for the decision. As far as I have observed, the process was driven by the bureaucrats from the Ministry of Foreign Affairs who had no technical knowledge about nuclear energy” (Expert T-4).

Makoto Kanda, former president of Sinop Nükleer Enerji Ltd. (personal communication, 2018), emphasizes that this “politics over technology” approach causes one of the major difficulties in the decision-making processes for nuclear energy: *“In the case of a technical discussion we can explain the facts in detail”,* he says, *“but when it is about social or emotional dynamics, it is not possible to reach to a straightforward conclusion. Whatever the assessment we present, they might believe or not as it is completely up to them (the decision-makers). It is not easy and there is no short cut”.* This also politicizes the nuclear debate. In most European countries for example, the decision to build a nuclear power plant is not simply a regulatory decision, rather it is a political output, as Expert F-4 explains: *“It goes up the chain of decisions and ultimately either the legislature or the prime minister, somebody somewhere has to say OK we’re doing this! And that’s a political decision”.* He continues by giving US as an example where according to him the decisions are more de-politicized: *“it is a completely technical decision and once the regulator gives license, all the pieces are lined up and things go forward. You don’t have to ask president for permission to go. So, you never get that political burden”.* Accordingly, assigning the nuclear energy a political role can turn also

be problematic, as it would make the decision subjective, rendering the decision-making process complex and controversial.

5.7. Boosting The Industry

The expectation that the spillover effects of the nuclear energy generation into other industries with regards to quality, technical expertise and high-tech culture, accounts for 7,3 percent of the drivers of a pro-nuclear energy policy, as discussed by 28 percent of the experts.

In France, 38% of the experts highlighted this dimension. Accordingly, nuclear industry has multiple spillover effects: The first one concerns a holistic development or growth for the country. According to Experts F-3 and F-11, nuclear energy contributes to the development of the industry in the whole country due to the uninterrupted, affordable access to electricity. Moreover, it enables the development of the remote areas, especially where power plants are built.

The second spill-over effect as an appealing motivation to engage in nuclear energy concerns the promotion of a new industry. Expert F-16 underlines that nuclear energy industry is a very large one, which does not only consist of the construction of nuclear power plants to produce electricity but also includes other processes such as recycling of the fuel, separation and management of the nuclear waste. This also means the creation of high skill jobs. To illustrate, Dr. Laurent Turpin (Personal Communication, 2018) underlines that the nuclear industry in France includes more than one hundred thousand jobs in France. As a matter of fact, today nuclear energy is France's 3rd-largest industrial sector with 2600 companies, 200.000 non-relocatable jobs and 400.000 induced jobs in the country (Orano, 2020).

According to Expert F-16, for France when the policy was decided, nuclear energy did not only represent the possibility to have energy produced in France at reasonable prices but also the creation of high skill jobs which promoted skills in the society which can be used in other industries as well. Reminding the number of people working in the industry of nuclear energy and other usages of nuclear science in sectors like medical industries,

Expert F-16 believes that *“progressively, nuclear energy became a very important industry in France and it would be stupid not to use it!”*. To sum up, in France, as a country with years of experience in the field of nuclear, there is a certain kind of mindset which associates nuclear with “high-tech”, “hugely complex technologies”, or “highly skilled technical jobs” which both enforces the industry and also requires the continuation of the technical infrastructure/industry to remain alive.

For the case of Germany, the spillover effect of the nuclear industry has a very different meaning, as this factor does not really operate as a driver for nuclear energy preference anymore. As a matter of fact, with the phase-out decision, a big question mark emerged for those working in the nuclear energy field regarding the future of their careers. Although it is not a salient debate under the phase out decision, it is certainly a great concern for the German nuclear industry members. As Expert G-11 states: *“people who are especially working in nuclear power plants, are afraid of losing their jobs. They cannot easily say ‘oh yeah great I will find a new job in the solar organization or whatever’ due to their specific expertise. Those people are really worried for their careers”*. Another high-level representative from *Bündnis 90/ Die Grünen* (personal communication, 2017) explains: *“We try to convince them that there are a lot of new jobs being built, if the renewable energy production goes up, then, there will be a need for people working there”*. Furthermore, there will still be a need for the know-how of people working in the nuclear power plants because, when the NPPs are totally phased-out, Germany will still need those experts for deconstruction of the NPPs and for the search for a final storage to dispose high nuclear radioactive waste. The representative from *Bündnis 90/ Die Grünen* (personal communication, 2017) who actively took part in the phase-out efforts in Germany clarifies their approach as they tell the nuclear experts: *“it is not that once your nuclear power plant is shut down you will be completely unemployed. We’ll see what we can do with your knowledge and how you can still work but not for keeping the nuclear plant running but for closing it down”*. Therefore, the spillover effect is still there, yet this time it is in the form of exporting experts and jobs from the nuclear industry into the field of renewables and decommissioning activities.

In the light of insights from Germany and France, the remarks of the Turkish experts are closer to the understanding depicted in France. Overall, 44% of the Turkish experts discuss this factor as a motivation for nuclear energy generation in Turkey.

A majority of the experts focus on the preposition that “nuclear brings jobs” and therefore think that Akkuyu Nuclear Power Plant will create employment in the region or it will “*bring wealth to its neighborhood*” (Expert T-16). There are, however, reservations to this argument on two major grounds. First, it is considered as a short-term benefit sacrificing the future of the region. Expert T-1’s perspective falls into this category as he says: “*in a country with high unemployment rate, the possibility of new jobs can be attractive for the local people. In the short run Akkuyu might offer jobs for a few people, but, in the long run it might cause the entire region to lose out due to environmental destruction*” (Expert T-1). Second, it is considered as an unrealistic argument since the jobs available for the local people can be at minimum, only in non-qualified positions in supplementary services or construction work. Expert T-15 clearly rejects the “employment argument” by saying: “*They talk about employment. What employment!? We simple don’t have human capacity with relevant qualifications to fill these positions*”.

The employment is not the only expected spillover effect of nuclear energy for Turkey. Some suggest that with Akkuyu, the awareness in the public will increase, quality standards of production will enhance, and local enterprises will develop. In the interviews, Turkish experts, especially those working in or with the nuclear industry suggest that, nuclear energy generation is a technology which upgrades the quality, capacity and human capital of any country’s industry, indicating South Korea, Germany, France and Japan as examples. According to them, in such countries, the establishment of a nuclear industry comes with a spin off effect into other industries such as automotive or technology. It is important to note that in the short run, this expected development does not directly target nuclear technology, since in Akkuyu know-how will not come through the construction of the reactors or through the transfer of nuclear technology to be used in Akkuyu, but will be a result of partnerships through the supply chain regarding the construction of the overall plant site. İrfan Koca (Personal Communication, 2018) elucidates this point as the following:

“Let me tell this clearly: Akkuyu agreement is a power purchase

agreement, it is an electricity deal. Our program does not include nuclear technology transfer. Yet it includes some good faith in that the constructing company plans to buy certain non-nuclear components or equipment, such as pumps, valves, cables or construction materials from Turkey. Accordingly, the manufacturers of such products will have to improve their standards to meet the requirements”.

Manufacturers who aim to supply equipment or components to the nuclear industry are obliged to meet certain criteria with regards to safety and quality requirements, to render their products eligible. Once the manufacturers internalize these quality requirements and safety culture, their practice can and will spill over into other industries as well as companies:

“Nuclear energy has a spinoff effect. As the construction of a nuclear power plant requires high quality and safety equipment and components, your industry has to evolve in that direction. It might not happen in the construction of the first unit, yet unit by unit your industry would improve. If you follow a successful policy like Korea, by the 4th or 5th unit, your national input in the construction phase can reach 90% or more. This is a huge industry with great potential” (İrfan Koca, Personal Communication, 2018).

In this regard, these experts believe that the spillover effect will accelerate with time and the construction process for Akkuyu NPP will be a “wake-up call” for our manufacturers, as Prof. Şule Ergün (personal communication, 2018) defines it, to notice that they can take part in the nuclear energy industry. “*This is a 22-billion-dollar project and the Russians cannot bring everything from Russia. They will need cement, for instance!*” says Prof. Dr. Haluk Yücel (personal communication, 2017) who thinks that Turkish industry should get involved in the construction of the power plant. Once the industry becomes mature enough, this contribution as a supplier role can be even extended into other nuclear energy projects in Africa, Bangladesh or Pakistan, as Prof. Ergün (personal communication, 2018) suggests.

A very important point Prof. Ergün underlines concerning this industry spill-over effect is that the overall process of industry upgrade cannot be rushed. Accordingly, if the policy-makers want Turkey to acquire a technology culture, if they want Turkish firms to close deals and Turkish citizens to get jobs in the nuclear industry, they need to give the

firms, the technicians time to excel required jobs so that they can use their skills later on in other projects as well and make money. This should be the mentality if the purpose with nuclear energy generation is to upgrade Turkey's level of technology. Expert T-4 seems to agree with this remark as he says:

“Sometimes the politicians have to shut up! Of course, as decision-makers they need to calculate the pros and cons, yet in the execution process they need to leave the floor to the experts. They should take it slow to materialize the nuclear power plant project in the proper, safest way. Or any setback occurring out of rush might take away all the pluses and result in a feeling of guilt in case of a failure.”

5. 8. Decarbonization

The purpose of decreasing CO₂ emissions and decarbonization of the electricity production accounts for 4,1 percent of the drivers for nuclear energy. In total 22 percent of the overall participants referred to decarbonization as a motivating factor to engage in nuclear energy generation.⁴⁷ However, the relatively low percentage of this factor shall not be misleading as it does not represent whether the stakeholders consider climate change in their calculations for policy preferences or whether the purpose of decarbonization effect energy policy-making or not. With a sharp contrast to the “decarbonization” factor, the reference to the importance of climate change in shaping global energy dynamics and energy policies was very high as 61,1 percent of the German experts, 50 percent of the French experts and 44 percent of the Turkish experts discussed. This means that while the impact of climate change on the energy policy-making is acknowledged⁴⁸, nuclear energy's impact on CO₂ emissions as a low carbon resource is only considered as a side-advantage and not a primary motivation to prefer nuclear energy as opposed to its “rivals” (in the sense of attracting investments) in decarbonization, i.e.

⁴⁷ The distribution per case is as the following: 19 percent of the French experts, 28 percent of the German experts and 19 percent of the Turkish experts.

⁴⁸ It is worth noting that despite Energiewende which has increased climate change's issue salience in Germany, some policy-makers or voters still consider climate change as a rhetoric more than reality (Expert F-4) or a technical question far away from the people (Expert G-6). To illustrate Craig Morris explains that as per voters, the climate change is not a real driver. Because, he states, outside the climate bubble, people in the real world have other problems they have to solve today like unemployment, kids' education, economy etc.: “These are things that people want to fix now and the climate can wait” (Morris, personal communication, 2017).

the renewables. This is why, the results indicate that nuclear energy policy-making is not first and most driven by the need for decarbonization.

“Nobody prefers nuclear for climate change reasons” says Viviane Raddatz (personal communication, 2017). The reason why decarbonization cannot be the initial driver for nuclear energy generation, is firstly because it is a major, but relatively new argument that nuclear, as a climate friendly resource, is needed to combat climate change (Dorfman, personal communication, 2018). *“If you go back in time when the nuclear energy policies were launched”* says Michael Sailor from Öko Institut (personal communication, 2017), *“climate change was not an issue at that time”*. Alain Bucaille of CEA thinks that for years, the choice for nuclear has been driven by two major pillars: technical and economic considerations on hand, and geopolitical considerations on the other. However, he makes one reservation that the motivations are rapidly evolving with the circumstances of the era and “now” he adds *“there is an additional factor, that is the climate change”* (Bucaille, personal communication, 2018).

Today, climate change is a very effective driver for German energy policy (Expert G-10), as decarbonization is a major pillar of energy transition with targets for carbon reductions and renewable share in the energy mix.⁴⁹ However, nuclear is not a part of this strategy (Raddatz, personal communication, 2017) and in the first place none of these targets are set with the expectation that they will be achieved with the help of nuclear energy, as a high level representative from Rebecca Harms’ office explains (personal communication, 2017). On the contrary, in the light of an exclusive German emphasis on renewables in the discussion of decarbonization, nuclear energy is considered as a resource which would hamper the energy transition as in reality *“it doesn’t help climate efforts”* (Expert G-16), according to some high-level German representatives. Some argue this is because nuclear is difficult to combine with renewables, due to lack of flexibility of nuclear power plants. To illustrate, Rainer Baake explains that:

“There is a question of how do you run the power system is you want to decarbonize your power system, I mean no body has done

⁴⁹ Energiewende targets to transform the German energy system to become mainly reliant on renewable energy resources with minimum 60 percent of the final energy consumption and 80 percent of the gross electricity consumption, and to reduce GHG emissions by 80- 95 percent by the year 2050 (Kuittinen & Velte, 2018).

with 100 percent nuclear. If you have a high share of renewables, you need flexibility on the side of other generators, and nuclear energy is just not flexible. In a system with high share of renewables, you cannot achieve the flexibility that you need with nuclear as the base load” (Baake, personal communication, 2016)

Furthermore, some such as Mycle Schneider consider nuclear as *“the worst option you can get”* because it is not only amongst the most expensive resources if every phase of a nuclear power plant’s lifecycle is calculated, but also the slowest one due to political, financial and technical hurdles. *“We are always back to the time factor and it will always be there”* says Schneider, which remains critical under the urgent threats of global warming.

On the other hand, for Germany, a limited number of experts do acknowledge decarbonization as a motivation for nuclear energy. For instance, Dr. Ludger Mohrbach is certain that *“the whole problem of global warming can only be solved with nuclear, the solutions rest in nuclear”* (personal communication, 2017). Therefore, nuclear energy is considered as an absolutely fundamental component of the energy mix. Expert G-18 clarifies this claim underlining that while trying to decarbonize the economy, the stakeholders need to take into account all the technologies that exist today, on the grounds that countries cannot work in the *“world of theories”* under real market conditions. *“Because”*, he elucidates, *“if you are an energy supplier, you have to meet the demand of your customers who need power and who need to be certain that they will be supplied electricity when they need”*. This view point directly matches the perception of nuclear as a reliable baseload as opposed to intermittent renewables.

The famous German politician, Kurt Dieter Grill (personal communication, 2017) thinks that none of the energy strategies for decreasing CO₂ emissions would work without nuclear energy. He suggests that under normal circumstances, Germany will not get back to nuclear, however, when it comes to decarbonization, he thinks that the only option that Germany will have to reconsider is nuclear: *“There is, in the background, a discussion even by some scientists near to the Greens that, it might be necessary in 10 or 20 years to construct 5 to 7 nuclear power plants for decreasing the emissions and solving the CO₂ problem”*. In the same vein, Expert G-6, who is from the nuclear industry, also criticizes

Germany's policy:

“I think in Germany, we are not logical at all! We always say that we are rescuing the world with our technology, with Energiewende, etc... But on the other hand, the CO₂ emissions are not going down at enough pace. And if you see the CO₂ emissions or climate protection per capita in Germany and in France, France is much better. But we think we are the climate champions of the world. It is not really the truth. But the perception of the green camp just doesn't see this. So, if you would take climate protection really seriously, then of course nuclear power is good for climate. I think there are even some Greenpeace activists who are in favor of nuclear. Such as the founder Patrick Moore.”

For the case of France, 19% of the experts specifically referred to decarbonization as an advantage (rather than a driver) of having preferred nuclear energy for long years. Expert F-1 and Expert F-2 highlight that a pro-nuclear energy policy is needed to limit these gas emissions in the world. On the other hand, Expert F-4 declares that looking at the energy sector, France is the only developed country in the world, that meets the COP21 requirements for the energy sector. *“It is thanks to nuclear”*, he adds, and he critically warns: *“This on the other hand means that any move towards decreasing the share of nuclear, would automatically mean that the challenge would get harder. If nuclear plants are taken off the grid, and replaced with renewables, the emissions would go up”*. *“Thanks to nuclear”* as many put forward, France is considered as relatively advantageous for its carbon footprint and in reaching climate targets under EU requirements (Mazzucchi, personal communication, 2018). Therefore, the PPE which targets to decrease the share of nuclear from around 70 percent to 50 percent, so as to increase the contribution of renewables, will bring a challenge for France: *“France will need to figure out how it is going to be able to meet the climate goals, if it really reduces its nuclear capacity”* (Expert F-4). Alain Bucaille concludes that the climate change is a serious question which is very difficult to solve without any role of nuclear (personal communication, 2018), meaning that decarbonization remains as a pushing factor to maintain the existing nuclear policy, as opposed to dramatic changes.

For the case of Turkey, a limited number of participants link Turkey's nuclear energy policy with its decarbonization efforts. Experts such as Expert T-5 or Prof. Dr. Niyazi

Meriç consider nuclear energy as a successful tool to curb the emissions. However, others such as Necdet Pamir (personal communication, 2017), think that climate change or decarbonization arguments are rather used as a facade for convincing the citizens. He suggests that nuclear energy policy-making in Turkey is interested in “*doing business*” rather than “*fighting the climate change*”. Similarly, Prof. İnci Gökmen reminds that the overall production cycle of nuclear energy is not carbon neutral and thus if the real driver is to fight climate change, renewable resources as alternatives are more efficient (Gökmen, personal communication, 2018).

As a matter of fact, in Turkey, only official state documents specifically prepared for increasing public awareness on nuclear energy and some policy reports stress low carbon feature of nuclear energy (Ministry of Energy and Natural Resources, 2014, p. 26). Although the nuclear energy debate in the context of climate change and decarbonization is acknowledged by Turkish authorities, it is not very much emphasized in official strategies, despite the government’s pro-nuclear stance. In the official development and strategy plans, although international norms for combatting climate change and efforts for clean energy portfolios are clearly embraced by Turkey, emphasized policy options evolve around clean coal technologies, renewables, and energy efficiency, and yet nuclear energy is not stated among them. To illustrate with a specific example, Turkey’s Climate Change Action Plan 2011–2023 does not include any reference to nuclear energy in the energy section (Ministry of Environment and Urbanization, 2012). Similarly, the Strategic Plan 2015–2019 for energy refers to nuclear energy primarily in line with secure electricity supplies (Ministry of Energy and Natural Resources, 2015). Turkey’s Five-Year Development Plans (Republic of Turkey Presidency of Strategy and Budget, 1963–2019) are also framing nuclear energy under the common themes of uninterrupted, reliable, affordable and continuous energy supplies, through diversified resources and consider nuclear energy as part of energy supply security, with no reference to the environment, fight against climate change or to the emission levels of nuclear energy. These findings support Erol Çubukçu’s view that for Turkey, the supply security dimension of nuclear outweighs the policy agenda as Turkey’s primary concern, and that decarbonization of energy production comes as a “bonus” with it (Çubukçu, personal communication, 2018).

5. 9. Geopolitical Calculations

The delicate interplay between energy dynamics and geopolitical factors is no secret. To illustrate, Alain Bucaille, who was the special advisor to Anne Lauvergeon-CEO of Areva (personal communication, 2018), states: *“one should not forget that for decades geopolitics have been driven by the relations between the US and Middle East countries”*. He adds that, because of the revolution in shale gas and oil, the US doesn’t *“fear”* any more from anything that could happen in the Middle East and he concludes: *“the point that has changed the energy picture is the discovery of shale gas and tight oil in the US.”* (Bucaille, personal communication, 2018). Although geopolitics come to the fore mostly in the discussions concerning oil and natural gas, its importance is raised during my interviews on nuclear energy, as well. In total, 16 percent of the experts referred to this factor and revealed that the decision for nuclear is 5,2 percent motivated by geopolitical considerations. It is remarkable that this factor was not mentioned at all in Germany.

19% of the participants note that we should not underestimate the power geopolitics as an important driver for a pro-nuclear energy policy. *“When you speak about energy dependence, we speak about geopolitics. It is a matter of geopolitics”* says Bucaille (personal communication, 2018). According to this 19 percent, in reality, the question of nuclear is mainly geopolitical and partly economic, depending on the circumstances of the decade the decision-making is taking place. Schneider illustrates the case from France’s history:

“Guillaumat⁵⁰ is a wonderful example, it really is a personification of the whole story. He said: the job of the CEA is basically to put nuclear everywhere. And he meant that literally. Any application. So, whether it is military or civil it doesn’t matter. The reason was that nuclear has been used as a geopolitical tool since from the beginning” (Schneider, personal communication, 2018).

Another expert claims that, in most of the cases, the nuclear deals of today come as a “package” with additional conditions⁵¹ serving geopolitical considerations:

⁵⁰ Pierre Guillaumat was the Minister of the Armed Forces and then Minister responsible for Atomic Energy under De Gaulle. He played an important role in the development of nuclear energy in France, during his seven-year position as the government administrator of the CEA (Mendl, 1965, p.28).

⁵¹ Expert T-10 from Turkey also mentions a relevant point as he states: *“when we are trying to export an industrial machine for instance, despite the fact that we can produce it locally, the customer*

“No one must pretend that Akkuyu or Hinkley Point C are built for energy, electricity generation purposes, no, no. And what changed dramatically compared to the early period of second-generation reactors is that today, on an international level, there are no nuclear power deals anymore, there are package deals. So, for example, if Turkey agrees with Russia on Akkuyu. There surely is more in there: I am just guessing...natural gas supply for 20 years? Something about the relationship with NATO? Maybe something about weapons or Syria?” (Expert F-12).

Schneider seems to agree with this point as he also refers to Hinkley Point C as an example and asks: *“If you look at Hinkley Point C⁵², it is where the question of ‘why did they decide this’ doesn’t make any sense from any point. It just doesn’t make any sense. It is not about pro or anti-nuclear opinion, it doesn’t make sense!”*. According to these insights, having nuclear energy or international deals for nuclear power plants can operate as tools to accomplish geopolitical considerations which can include supporting the country’s position which the regional or international power balances or other strategic calculations which can serve international political interests.

Turkey offers an interesting case for the examination of this factor. According to some Turkish experts it is not easy to distinguish whether Turkey really needs nuclear for energy security or for strategic reasons. Some of the interviewees point to general dynamics of global politics and argue that if a country is located in a strategic geography, in a geopolitically critical region, its decision-makers might consider having nuclear technology not just for energy security but as a proof of the nation’s domestic capabilities, as a message to its neighbors and the world (Expert T-6). In this regard, Expert T-14 believes that Akkuyu is a specially designed project to protect the status quo and to tranquillize its region both for the sake of Turkey and for international actors:

“This is also important for Israel’s energy security, for Cyprus’ energy security, for Turkey, for Greece...for all the actors in the region. When the reactor is operational it will not only provide electricity for Turkey but also for these countries as well. You’ll see that the Russians will be selling them Akkuyu’s electricity. The deal is very much in the interest of Russia because they own the plant, it’s like their own soil.”

enforces the condition to import a certain component from a specific company from a specific country, as part of the deal. This is imperialism disguised in a new form.”

⁵² This nuclear power plant is located in the UK but interestingly, in the entire sample 38% of the experts referred it.

These perspectives view nuclear energy through the lenses of national security interests as a tool for the countries to increase their national assets in international power distributions for being an independent and strong global actor. *“Are there any countries which would not prefer nuclear!?”* asks Expert T-10, and continues: *“India, China...they are all building nuclear power plants, they MUST build them. Only a weak country, driven by international actors, would NOT prefer nuclear energy”*, adding emphasis on his words. Therefore, as Turkey *“by its nature is not a weak country, it needs nuclear power plants and nuclear technology”* (Expert T-10). Expert T-10’s perceptions on Turkey is exclusively based on the premises that Turkey is *“right in the middle of a burning region”* and its economy is vulnerable to the developments in its close neighborhood. Accordingly, for countries geopolitically located in turbulent regions, there is the perception that the calculation on whether the country needs nuclear energy should go beyond the energy demand/supply considerations and take the international balance of power into consideration. Expert T-10’s remarks offer a perfect demonstration of this view as he argues that unless a country has nuclear technology, it cannot *“have a seat on the table”* and will always be left out of the international game:

“Today all the dynamics concerning politics, economics or international relations are centrally coordinated from one single brain. However, it is also a fact that no plan can be executed in the Middle East without Turkey, either. Turkey is always in the picture. Still, it is very difficult for Turkey to have a say in the region unilaterally. Why? Because Turkey does not have nuclear technology. Moreover, despite nationalization efforts in the defense industry, the tanks I am using are not mine, the jets I am using are not mine, the fuel I am using in them are not mine...When you consider all of these, Turkey is a global player, not a global power. One has to know international politics, international market and global dynamics very well before having an opinion on whether Turkey should have nuclear energy or not”.

5. 10. Postponing Decommissioning Costs

It is interesting to see the decommissioning cost cover 2,4 percent of the discussion over the drivers of nuclear energy policy-making, since the cost of nuclear power plants in

every step of their lifecycle, is among the most discouraging factors for engaging in a pro-nuclear policy as next chapter will be discussing in further detail.

Shutting down a nuclear power plant comes with the burden of huge decommissioning and waste costs. Extending the lifetime of the current nuclear fleet postpones the decommissioning costs. Therefore, especially for the case of France, high decommissioning costs are provided as a motivation to extend the lifespan of nuclear power plants, and to continue a pro-nuclear policy. As a matter of fact, Expert F-7 underlines that in the discussions over PPE (Programmation Pluriannuelle de l'Energie) which aims to reduce the share of nuclear in French energy mix to 50 percent by 2035 as part of the energy transition strategy, the cost of decommissioning has been a crucial factor to shut down or extend the lifetime of certain nuclear power plants. Life extensions still require further investments for upgrading the reactors and enhancing nuclear safety measures, however that buys the country time to postpone the decommissioning, as Paul Dorfman explains (Personal Communication, 2018). Accordingly, France's nuclear investment plan called the "Grand Carénage", which allows EDF EUR45 billion (USD51 billion) to extend the lifespan of the nuclear fleet for 50 years, continues and is expected to be completed by 2025. (WNN, 2019c).

For the case of Germany, 17 percent of the German participants did touch upon the same issue yet it was rather addressed as a challenge ahead of German nuclear policy, i.e. the phase out, as indicated by Expert G-10. Similarly, Expert G-18 expressed that due to the big task of decommissioning and waste storage, Germany will not be able to get out of nuclear industry for several decades, despite its nuclear phase-out decision. This proves that, for countries where nuclear power plants are already in place, even when the political decision-making can reach to a policy output which aims to leave nuclear energy out of the picture, the decommissioning of the nuclear power plants locks down the country into nuclear in technical and financial terms.

For Turkey the discussions over decommissioning are non-existent as it is considered as a step far away since even the first nuclear power plant is not operating yet. Consequently, this factor currently is not a driver for Turkey. Still, some experts, such as Nilay Çubukçu (personal communication, 2018), stress the importance of "planning" in a nuclear policy

and address the issue emphasizing that although 60 years might seem a faraway deadline as the lifetime of a nuclear power plant, Turkey should start thinking about its roadmap with regards to every phase, including decommissioning. In this context the clause in the Akkuyu deal is instrumental, as for every kWh of electricity sold to Turkey, the agreement requires Rosatom to invest 0.15 US cents into two funds allocated for the management of nuclear waste (the spent nuclear waste can be shipped back to Russia for reprocessing) and decommissioning of the power station under the responsibility of Rosatom (Kumbaroğlu, 2011).

5. 11. Rent-Seeking

This factor has been only mentioned by the Turkish experts and it constitutes 9,7 percent of the drivers for Turkey. “Rent-seeking⁵³” and searching for financial favors during the agreement, construction and operation phases of Akkuyu Nuclear Power Plant, initially have been raised by a couple of experts as “out of record” information, as motivating factors for some decision-makers. As part of the ethical conduct of research I planned to leave these factors out of the analysis. Nevertheless, as my fieldtrip continued, the number of experts who openly stated that some decision-makers support nuclear energy in Turkey with a motivation to “benefit” from the project’s execution, increased. Therefore, the factor is added into the analysis as a motivation. Although these experts come from different professional backgrounds, their common feature is that they all object the argument that Turkey needs nuclear energy. It is important to note that their remarks are based on their professional and personal experiences and that their arguments do not target any specific institution or individual. The following arguments are the experts’ personal perceptions and opinion and therefore, they require further proof before any other discussion.

The claimed “side-benefits” as a motivation for engaging in a nuclear energy project concern two major groups of arguments. The first group addresses the availability of new employment and income opportunities in the plant site, which is also frequently mentioned for the case of France as a factor increasing local support for nuclear power.

⁵³ The exact word used by the experts is “nemalanmak” in Turkish.

According to some experts the expectation of such benefits increases the motivation for a pro-nuclear policy and for public support. To illustrate, according to Künar's personal evaluation, opponents are not welcome anymore in Akkuyu as the local people are all supporting the project: *"we used to visit Akkuyu a lot, to attend or organize anti-nuclear activities. Nowadays, it is not possible anymore as the locals are increasingly supporting the power plant"* (Künar, personal communication, 2018). Because, he thinks that with new jobs and new income opportunities such as restaurants or shops serving the Russian constructors, Akkuyu has become a "rent-site".

The second group of arguments implies more direct and monetary gains. Expert T-12 and Expert T-15 argue that the support for the construction of nuclear power projects aims to reinforce specific companies and that some businessmen or constructors strive to take advantage of the projects for getting extra payments. This problem of rent-seeking is also raised by Expert T-9⁵⁴ who explains:

"In big projects like this, at least 10 percent of the cost goes to beneficiaries. In a project like Akkuyu, with an estimated cost of 20 billion US dollars, 2 billion US dollars will go to someone, somewhere. But in a wind or solar project for 1000 megawatts, the rent cannot be high, so these projects are not attractive. The system is based on making big projects and thus making big hauls".

Expert T-9 is not alone in his concerns as Necdet Pamir as well points to the fact that Akkuyu NPP is not subject to auditing by Turkish Court of Accounts and to the lack of transparency in money transactions, about which journalists such as Çiğdem Toker often writes about. According to Toker, the money operations of the company which owns the NPP, and which will be financed with Turkish taxes, will be left in the dark (Toker, 2020) with an authorization to carry out capital and money operations through tax havens (Toker, 2019). The authorization given to the board of directors of Akkuyu was announced in the Turkish Trade Registry Gazette, dated 30 December 2019, as the "approval of transactions with legal entities established in off-shore areas and money transfer transactions from off-shore areas" (Toker, 2020).

⁵⁴ Expert T9 believes that the construction of Akkuyu NPP will be completed, the financial benefits will be shared, serious amount of money will change hands, and yet they will never press the start button, the plant will never start working.

The interviews reveal that, especially among the critics of nuclear power in Turkey, this kind of legal arrangements certainly give the experts the idea that “*everything is handled behind closed doors*” (Expert T1). Yet, this situation is not new and unique to the Akkuyu agreement with Russia. Expert T-15 explains that for every government in Turkey, The Ministry of Energy has been very important: “*To illustrate, during previous coalitions the Motherland Party (Anavatan Partisi, ANAP) would always want to represent the Ministry of Energy. Because energy and defense industries are the sectors with the highest share of unofficial revenues or side-benefits from the bids and investments*”. Indeed, there were rumors about corruption bribery in the tender for Akkuyu NPP (Yavuz, 2015). Right before June 25, 2000 when Prime Minister Bülent Ecevit announced the decision of the Council of Ministers to cancel Akkuyu NPP tender (Hürriyet, 2000), Mesut Yılmaz, ANAP leader and Deputy Prime Minister in the Council of Ministers had proposed to pay \$30 million to companies participating in the tender as a compensation in return for the expenses they made during the tender process. The proposal was rejected by TEAŞ on the grounds that such a payment has no legal basis (Milliyet, 2000). Both Prof. İnci Gökmen and Necdet Pamir refer to these allegations. Pamir even suggests that together with the risks of nuclear energy, these rumors of corruption were instrumental in Ecevit’s decision to cancel the tender.

5. 12. Paving the way for ITER and new technologies

An interesting perspective regarding the drivers of nuclear energy policy, comes from Kurt Dieter Grill, Former Chairman of the Federal Committee Environment and Energy of the CDU (1987 -2002) and Former Member of the German Bundestag (personal communication, 2017) who emphasizes that in the policy-making for nuclear energy, there is a need to combine technology and the vision that we want to achieve. In this context, he points to ITER (International Thermonuclear Experimental Reactor)⁵⁵, i.e. the nuclear fusion project.

⁵⁵ ITER is an ambitious energy project targeting to build the world's largest tokamak which is a magnetic fusion device designed to prove the feasibility of fusion as a large-scale and carbon-free source of energy. The Project takes place with the collaboration of 35 nations, including China, the European Union, India, Japan, Korea, Russia and the United States. Interestingly the word “iter” also means “The Way” in Latin (ITER, 2020).

It is important to note that Grill is also the chairman of German ITER Industry Forum (dIIF) which was established to ensure the participation of German research and industry to the development and construction of ITER and to offer a centralized source of information and consultancy for German companies interested in ITER (Ebbinghaus & Grill, 2007). According to Grill, technical solutions like ITER, are the “*only chance to save the biosphere and the world population*” which is expected to exceed the limits the earth can bear. He says “*only technical solutions can reduce CO₂ emissions*”. What Grill means with vision is therefore strongly related with the idea connected to the fusion: “*if you talk only about techniques you will lose the battle. You have to talk about the visions. The story, the vision behind the fusion is to make a way for the people for the human beings all over the world to solve problems in the raw material*” he declares.

The main message we get from his remarks, and his entire interview, is that, despite the phase-out of nuclear energy, this future vision for nuclear fusion as a potential solution, shall endure as a push factor for Germany to remain as a player in the nuclear field.

This factor is not mentioned as a driver for Turkey’s nuclear energy policy. However, it is still important that Prof. Yücel (personal communication, 2017) was the only expert referring to ITER Project regretting that Turkey is not part of it, despite the fact that “*it is the future’s technology*”, in his words. The lack of reference to ITER in Turkey is remarkable in the presence of a great motivation for being part of the high-tech nuclear club, of great expectations for an industry spill-over and of a pursuit of international prestige.

No experts in France referred the project as a driver (they rather consider it as a result of French expertise not as a motivation to pursue). Although the overall weight of this category is only 1,05 percent among the total content regarding the drivers of nuclear, the vision of a future world through innovative nuclear technologies is worth mentioning as a driver to get involved into nuclear energy for the state of art.

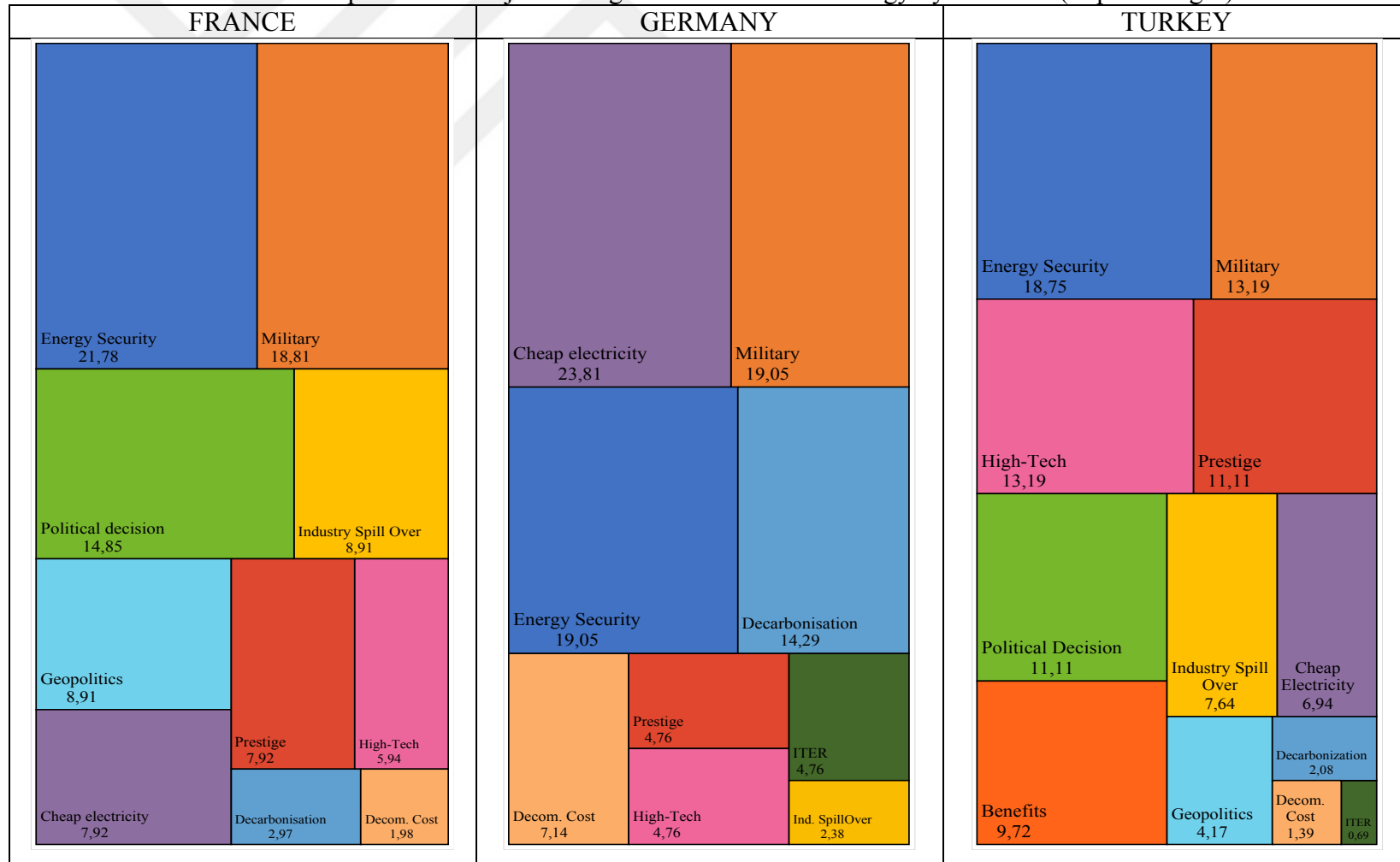
5. 13. Conclusion

Why does a country want nuclear energy? This chapter indicates that the answer to this question is not straightforward. The decision is rather a combination of several factors. Nevertheless, the analysis presented in this chapter still fulfills its primary purpose as it reveals that there is more than “energy” in the calculations over nuclear energy.

Although the factors are interrelated, some clusters emerged among the motivating factors. Accordingly, part of the motivation for nuclear comes from energy security concerns especially with regards to security of supplies and affordability. Interestingly, the motive to decarbonize the economy demonstrates a low profile according to the research results. Another cluster includes motivating factors which evolve around a perspective which sees the world through the lenses of realpolitik, mainly focused on distribution of power in the international arena. This involves drivers concerning geopolitical calculations, the pursuit of a political agenda and the motive to increase national security capabilities. Last but not least, another cluster concerns the development of the country by focusing on the spin-off effects of nuclear energy into the industry of the country and on the development of national expertise in technologies for “future”. The prestige factor is focused in the intersection of international balance of power and development motives.

The discussions revealed that underneath these factors, the drivers boil down to the “national interest”, how ever defined by the decision-makers of the concerned country. That makes nuclear energy a political decision, as voiced by many of the participants. Accordingly, the combination of significant factors and their relative importance in driving the decision-making process differs by the country’s national priorities as perceived by the decision-makers. This is illustrated in the following table (Table 5.1) which compares the combinations of drivers between France, Germany and Turkey. To conclude, what pushes a country to engage in nuclear energy is a complex menu of drivers, it is a package of interests which confronts constraining factors and national realities of the country in the decision-making process as following chapters address.

Table 5.1 Composition of major driving factors for nuclear energy by countries (in percentages)



CHAPTER 6

CONSTRAINING FACTORS IN NUCLEAR ENERGY POLICY-MAKING

This chapter focuses on major constraining factors which restrain the decision-makers to design a pro-nuclear energy policy. Just like the motivating factors, the following factors are the results of the thematic coding and quantitative analysis of the interview content. The following factors are not pre-prepared categories, they are outputs of the collective expert views. Figure 6.1 demonstrates constraining factors as distributed by their percentage of reference by experts. Appendix V includes detailed tables for each case study, which rank these factors in line with their frequencies by interviews.

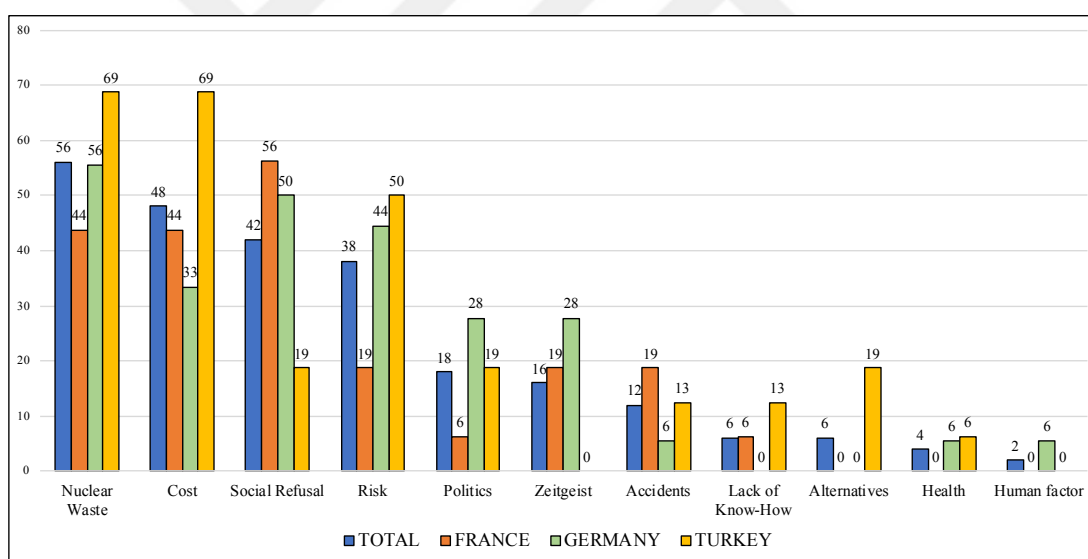


Figure 6.1 Major constraining factors, by interviews (in percentages).
(Prepared by the Author)

The graph includes the code names of the constraining factors, as used during the analysis. “Nuclear waste” and “cost” categories stand for the problems regarding the management of radioactive waste and the cost of nuclear power plants, respectively. Public opposition is coded as “social refusal” to be clearly distinguished from public opinion. The “risk” category represents the risks of operating nuclear power plants and “politics” corresponds to the political burden of undertaking these risks as identified by the experts. “Zeitgeist”

denotes the spirit of the age which is considered to be against nuclear power. “Accidents” category represents actual nuclear accidents as opposed to the risk of nuclear accidents, i.e. Three Mile Island, Chernobyl and Fukushima. The statements regarding the lack of technical and political expertise to execute a nuclear energy program are coded under “lack of know-how”. “Alternatives” stand for arguments which see resources other than nuclear as rivals. The effects of radiation exposure on human health are evaluated under the code “health” and the potential of human’s failure in the design is represented by the code “human factor”. The following figure demonstrates the weight of each factor in the overall discussion of constraining factors.

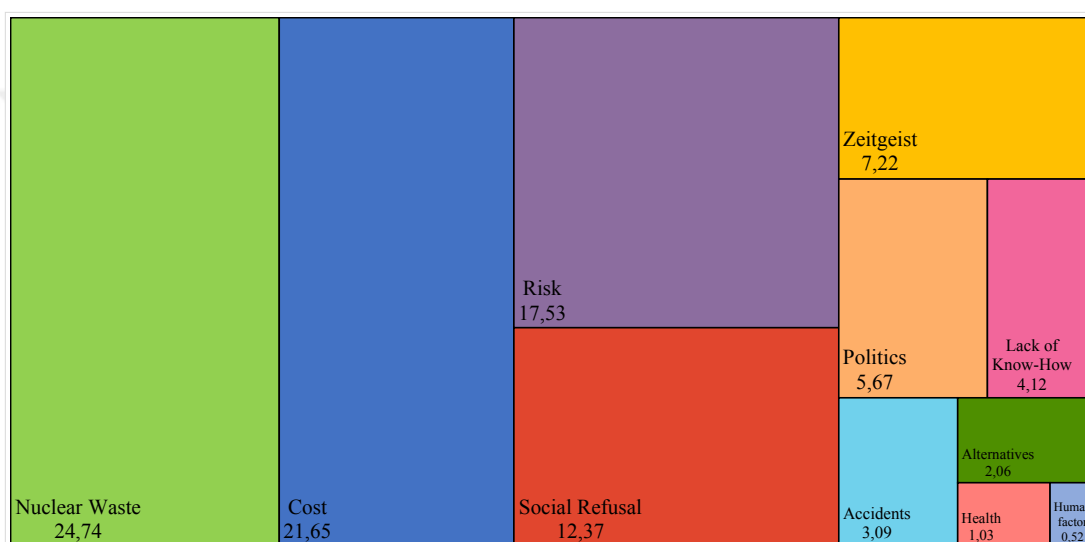


Figure 6.2 Major constraining factors in relative percentage values, by coded segments.
(Prepared by the Author)

6.1. Nuclear Waste

Within the research sample, 56 percent of the participants consider nuclear waste as a challenge. The results indicate that the decision-making on nuclear energy is 25 percent constrained by the issue of nuclear waste management. What renders nuclear waste management so problematic for the decision-making?

For the case of Germany, nuclear waste management represents the number one constraint in nuclear energy decision-making: 27,6 percent of the constraining factors concern nuclear waste and 56 percent of the experts think that nuclear waste operated as a factor in German nuclear phase-out. The arguments over nuclear waste management

have been significantly shaping nuclear debate in Germany and the management of high radioactive waste has always been a challenge for Germany (Expert G-3) since it also operated as one of the major roots causes public opposition to nuclear energy. As Expert G-16, a representative from the team of the prominent Green Party member Rebecca Harms, explains:

“this always caused very big demonstrations in the home region of Rebecca Harms which was decided to be a waste disposal site (Gorleben⁵⁶). Even the people who were not living in this particular area understood that there is no good solution for the problem of this dangerous waste. This always played a big role in the minds of the people while they didn’t want this technology”.

Now that the phase-out decision is taken, a major challenge that remains for Germany is the question of how to dismantle all the nuclear power stations and how to organize the waste management. Because, even though Germany is shutting down all its nuclear power plants, it still has the nuclear waste which has been accumulating as an output of nuclear activity of many years. “*The heritage of nuclear power*”, in Expert G-6’s words, remains in Germany.

Most of the interviewed experts, such as Expert G-16, think that Germany has still not managed to find the solution for highly radioactive waste. Rainer Baake (personal communication, 2016) also agrees that the waste problem is an “*unsolved*” issue. An important component of the waste management arguments used against nuclear energy in Germany concerns not only how the waste is stored now, but also what would happen to the waste in the next few thousand years, formulating the question as an issue of responsibility towards future generations:

“The waste will not affect me. The problem is going to be faced by the generations, a few thousand years from today. For the next ten thousand years the waste is probably safe. But I don’t know what’s going to happen in 200 thousand years and I will not be around until then. The waste is highly toxic for about one million years. We are talking about four times the span of human existence on this planet. How we are going to secure that there is

⁵⁶ Gorleben is considered as almost “the” birth place of anti-nuclear protests (Expert G11). It is a small village in the Lower-Saxony in Germany, which was chosen as an interim storage site for nuclear waste. The decision catalyzed immense anti-nuclear protests. When the search for a final storage site started in Germany, local people of Gorleben objected and wanted to be out of the list, arguing that Gorleben has a long history of protests. For a detailed discussion, please see Chapter 7.

no toxic danger coming from these storage sites? During all this time there can be complete climate changes, earthquakes, volcanic eruptions. That's the reason why nobody has found a solution yet. Nowhere on the planet, no one has a safe storage site for this highly toxic waste material yet" (Rainer Baake, personal communication, 2016).

On the other side of the debate, experts especially working in or with nuclear industry share the same view that *"the waste problem could be solved if we wanted to"* (Expert G-4). Some offer examples from alternative technologies that can be available in the near future such as *transmutation*, to reduce the amount of radioactive waste (Expert G-17). Others, such as Expert G-4 point out France stating how they can lower their waste up to 97 percent through reprocessing the spent fuel and thus have to deal with only 3 percent of waste in the repository, which is *"forbidden in Germany as part of the green decision and the ecological movement"* (Expert G-4). Expert G-2 from nuclear industry underlines that although the waste issue has been politically used as one of the major arguments against nuclear, it is a misleading argument since the claim that it is not possible to have a final waste repository is not right: *"We explore several geological options. For instance, Finland or Sweden are proceeding very fast with the final repository. They proved that in even rather difficult geological structures it is totally technically feasible to have final deposits"*. Similarly, Expert G-6 who is a technical expert, highlights that the image that nuclear waste disposal is not safe is a distorted claim and he tells about his official visit to the laboratory storage for final waste disposal in Gorleben, which has always been a political spot:

"for 20, 30 years we drilled to this salt mines and made research whether we could dispose the final waste into the salt mine. I have visited the place and seen the huge cast with the waste, standing right in front of me. Contrary to the public perception, to me, it gave a very well organized, very manageable and safe impression".

There is an important message from this discussion for Germany: nuclear waste is a constraint not because it is a technical problem (since the solution can be available through further research) but it is a political question. To illustrate, Expert G-17 explains that *"except in Finland where the final repository is under construction, in all countries, there is a big resistance to the search for a final disposal site"* and adds *"it is all about public resistance"*. Consequently, the search for a storage site is very difficult for

Germany since “*everybody says not in my backyard!*” (Expert G-11). Accordingly, Expert G-11 who is a representative from the Green Party, explains that the process needs to be conducted in close contact with social groups and citizens, through commissions in the parliament, established to bring together multiple representatives from parliamentarians, NGOs, universities and even churches to discuss the search for a final waste depository: “*citizens really have to be included in the discussion and they must be really addressed and informed very early in the procedure. Their opinion needs to be heard, they need to be invited to the debates and authorities must work together with the local public to find solutions*” (Expert G-11). Moreover, as Expert G-3 who is a representative from a German ministry underlines, the decision for a geological storage site is difficult for Germany as the country is more “*packed*” as opposed to larger countries, such as France where people are not living close to the repository sites. This leaves Germany very few options since “*no one wants to live near a dumping site*” as Expert G-10 states.

The insights from the experts reveal that the nuclear waste issue and public opinion on nuclear are highly intertwined in the case of Germany.⁵⁷ However, an interesting finding is that informed opinions of the experts differ from the general public regarding whether they would be comfortable living near a radioactive waste disposal site. For instance, Michael Sailer who was the CEO of Öko-Institut between September 1980 and 2019, who is an expert and consultant in reactor safety and radioactive waste management, and who is also one of the best-known proponents for the research concerning high level waste disposal in Germany states that his house is already 25 km away from the interim storage facility in Biblis (personal communication, 2017). Similarly, Rainer Baake also says he would be comfortable on the ground that “*the waste has to go somewhere!*” (personal communication, 2016). This emphasis on taking the responsibility for the produced nuclear waste is also present among other Green Party representatives of Germany. For instance, Expert G-11 who is a Green Party member clearly states: “*It is really our responsibility and we have to take care of our own waste at home. We produced this waste so we have to think about a solution for it*”. Nevertheless, in contrast with this view, in October 2019 an export of the radioactive waste to Russia has started, which was evaluated by some as a strategy to find “cheap dump for considerable amounts of nuclear

⁵⁷ Chapter 7 on contextual factors covers a detailed analysis for this point.

waste” (Wehrmann, 2019).

One last remark from the case of Germany is that, opponents of nuclear, especially the Green Party members are even against the research and development of future forms and types of alternative nuclear reactors. The research for final waste storage and nuclear safety is the unique form of nuclear related activity that is supported in Germany.

For the case of France as well, nuclear waste management is a “*big issue*”, as defined by Dr. Turpin (personal communication, 2018) and an “*important discussion*” (Bucaille, personal communication, 2018) since nuclear energy already accounts for 75 percent of the electricity production (WNA, 2020). In total, 44 percent of the French experts consider this as a challenge and the statements over the management of nuclear waste corresponds to 20,75 of the constraining factors discussion.

For many nuclear countries, every spent fuel is considered as waste subject to disposal, rather than a resource. On the other hand, in some countries such as Russia, Japan or the United Kingdom, the spent fuel is not considered as waste, and used nuclear fuel is reprocessed (WNA, 2018b). An important distinction of France from Germany, rests in reprocessing the spent fuel. France’s policy of recycling its spent fuel, brings an efficient supply of fuel together with a possibility to reduce the volume of radioactive waste (Krikorian, 2019). Therefore, France has to securely dispose only the waste resulting from reprocessing, which is in relatively smaller volume compared to the initial spent fuel, as explained by Dr. Laurent Turpin (personal communication, 2018). The National Radioactive Waste Management Agency, ANDRA (Agence Nationale pour la gestion des Déchets Radioactifs) reports that as of the end of 2018, France has a total of 1,64 million cubic meters of radioactive waste, consisting of 59,6 percent from nuclear power, 27,3 percent from research, 9 percent from defense, 3,4 percent from non-nuclear power industry, 0,7 percent from medical sector (ANDRA, 2020).⁵⁸

In France, the general principles for the management of this high-level radioactive waste,

⁵⁸ For a comprehensive study on radioactive materials, radioactive waste and their management methods please see ANDRA’s report on *National Inventory of Radioactive Materials and Waste*, which also includes a full annual inventory of all the radioactive waste present on French territory.

is set by the Waste Act of December 30, 1991 (Andra et al, 2013). The law also initiated a program to explore possibilities for final storage. Dr. Turpin describes this law as “*strange*”, because it was a law with a deadline: “*it was with a consumption date for checking whether we did good or bad, so that we could see the results of what has been done, take the good practices and manage the negative parts. It passed in 1991 and it has been revised and revisited every ten years*” (Turpin, personal communication, 2018). Apart from its role in French radioactive waste management policy, Dr. Turpin’s memories reveal that the way the law was to be reconsidered in time intervals, was also very instrumental in reconciling nuclear industry with opponents:

“it was the genius of a parliamentary member. His name was Christian Bataille.”⁵⁹ And everybody signed it. Even the opponents of nuclear said ‘ok we have nothing to object. See you in ten years!’ And again, and again the process was repeated” (Turpin, personal communication, 2018).

The law established a national framework based on strict regulations and principles governing radioactive materials and waste management principles in France. The law was updated, as expected, by 2006 Planning Act on the sustainable management of radioactive materials and waste (Act 2006-739 of 28 June 2006) resulting in National Radioactive Materials and Waste Management Plan which set new deadlines (Andra et al, 2013).

Its strong regulations however, does not make France immune to the discussion of whether a final disposal can be possible or not, just like the case in Germany. While some experts such as Paul Dorfman stress that the final disposal issue is still unresolved (personal communication, 2018), others such as Expert F-15 believe that “*with money the technics exist*”. This is also in parallel with the view of some German experts coming from the nuclear industry, who think that waste management can be technically handled as long as there is enough capital to bear the costs. However, similar to his German counterparts, Expert F-15 adds that it is difficult to explain waste storage projects to the public. In this context, rather than the nuclear waste itself, the perception of the waste and its storage by the public constitutes more of a challenge for the decisionmakers as highlighted by almost each French expert working with official governmental institutions. They explain that there is a fear about nuclear waste since a lot of people in general public

⁵⁹ This law is also known as “Loi Bataille”, the Law of Bataille, named after its inventor Christian Bataille.

think of it as terrifying, highly toxic, incredibly dangerous, as a waste to remain for millions of years, describing it in apocalyptic terms as “graveyards” (Expert F-4).

A common concern among the professionals of nuclear industry or representatives of state institutions is the need to communicate that the nuclear industry has been concerned with the waste since the very beginning of the French nuclear program. They underline that underline that a decision to build a nuclear power plant cannot be planned without deciding for every single step of nuclear lifecycle from generation to waste management. The message of “*we know eventually that there would be a repository to dispose the waste, and in the meantime we need to store it very safely and cost-effectively*” is often repeated. Accordingly, for them, nuclear waste is a technically manageable challenge in nuclear policy-making (Expert F-4), especially in the light of upcoming final disposal projects in Finland, Sweden and France. In this context, Expert F-4 indicates a political constraint, rather than a technical one, just like in the case of Germany:

“I think, we hear this often from the opponents that they think we don’t know what to do with the waste, we haven’t figured it out, it is like ‘we created this problem with no solution’ and it is not true. We have always known what to do with it, the technical aspect is I think is quite manageable. The real issue has always been more of a matter of internal politics and siting, as opposed to the technical capability for waste disposal” (Expert F-4).

Nonetheless, this political dimension of the nuclear waste management which is closely tied to public acceptance, motivates the French government for an immense effort by official institutions to interact a lot with local communities and to create debates, as Expert F10 explains. Together with strong regulations, this emerges as an important strategy to mitigate the constraint of nuclear waste in nuclear energy policy-making.

A final remark from the French case concerns the comparison of the waste management in nuclear industry and disposal of waste coming from other heavy industries. Several representatives from official institutions or from the nuclear industry hold the view that “*nuclear industry is safer than others*”. “*Because*”, Expert F-15 explains:

“we know the problem, we see it and we target to deal with the problem. We know how to solve it. Other industries produce, day and night, toxic waste which will remain eternally. And what do you believe, those industries do with them? They put them under

the earth!”

Interestingly, Expert F-4 raises a very similar point explaining that nuclear waste is much more securely managed than the waste that comes out of fossil fuel plants and he says: *“probably, even easier to manage than the waste coming out of factories making solar panels, which include lots of heavy metals and really dangerous chemicals that don’t decay at all, that stay toxic for all the time”* and he adds literally whispering: *“But nobody talks about that!”*.

Unlike two countries which make use of nuclear energy in their energy mix and therefore, which have to manage the nuclear waste, as a newcomer country, the management of nuclear waste in Turkey is not on Turkey’s immediate nuclear agenda since even the construction of the country’s first nuclear power plant is not completed. Still, it is interesting to see that nuclear waste corresponds to 25,3 percent of the discussion of constraining factors in the case of Turkey. Nuclear waste issue is discussed by 69 percent of the interviewed experts.

For the sake of policy-making, the dominant view is that *“radioactive waste issue is the Achilles tendon of nuclear energy”*, as identified by Prof. Şule Ergün (personal communication, 2018). Other experts such as Expert T-6 also believe that long term disposal of radioactive waste is the number one problem of nuclear industry, as there is no final disposal facility yet despite ongoing research projects. Prof. İnci Gökmen underlines that none of the current research projects on nuclear waste management can yet guarantee that the waste will be safe for thousands of years against any earthquake, water leakage or any extreme natural event that may occur due to climate change (Gökmen, personal communication, 2018). She also states this, as the reason why no country can currently find a radioactive *“graveyard”*: *“Radioactivity is like a genie in the bottle, once you let it out through nuclear reaction, you cannot put it back into the bottle until it decays in thousand years”* (Gökmen, personal communication, 2018). This perspective is very parallel to the discussion taking place in Germany, as also voiced by Rainer Baake.

On the other hand, there are also experts who are confident that the waste issue will not

be a constraint in nuclear energy policymaking for two main reasons. First, because the legal structure covering radioactive waste management is very strict. *“A country should be crazy not to establish a strong control mechanism for the waste management. It is a matter of international prestige and good reputation of the country”* says Expert T-2, who is a Turkish government official. Secondly, the required technical solutions will be available in the upcoming years to handle the waste which is already safely stored. Expert T-11 highlights that the physical amount of waste to deal with is very manageable unlike the image on the citizens’ minds which *“due to lack of information, suppose that there are tons of waste, just like coal piles waiting around, which is not the case”*. In the same perspective, Expert T-13 explains that from the beginning of nuclear era in 1950s till today, there has been no major accident or leakage in any waste management facility: *“The nuclear waste management is regulated under carefully designed laws. Furthermore, all nuclear countries, such as France or Germany, are very sensitive with regards to any anomaly that poses a threat”*. In order to highlight how strict the international control mechanism is, Expert T-13 refers to October 3, 2017 when several European institutions, which monitor atmospheric radioactive contamination, detected Ruthenium 106, which is a radionuclide of artificial origin. IRSN of France undertook the investigation and continued to monitor the level of ruthenium and searched for the origin of the releases (IRSN, 2017). Later, the cloud of radioactive pollution was reported to spread over Europe after an incident at a nuclear facility in Russia (The Telegraph, 2017).

In the discussion over safe management of radioactive waste, Necdet Pamir (personal communication, 2017) offers opposite findings with the experts cited above, as he mentions the example from Hanford Nuclear Site in Washington, when, in May 2017, a 20-foot-long portion of the tunnel used for storing contaminated radioactive materials collapsed and “take cover” status was declared for hundreds of workers in the tunnel (The Washington Post, 2017). *“All they could say was ‘RUN’ in the event of this accident!”* Pamir criticizes, and thus disagrees with the view that waste management is totally safe without any incidents reminding that the waste issue is not solved anywhere in the World yet.

In the Turkish context, the solutions for the waste issue seems to be attached to the global

technological developments for the final disposal of high-level waste. Expert T-7 believes that the waste issue should not be a problem for Turkey and Prof. Şule Ergün also thinks that there is considerable progress in Turkey so as to establish the legal and institutional grounds for waste management, which is also accompanied by academic work for potential technical solutions (Ergün, personal communication, 2018). However, one specific question raised by the experts concerns the waste management of Akkuyu Nuclear Power Plant. According to Article 12.4⁶⁰ of the intergovernmental agreement between Turkey and Russia, the nuclear waste management of Akkuyu Nuclear Power Plant will be under the responsibility of the project company, Rosatom (the spent nuclear waste can be shipped back to Russia for reprocessing). The question of “how?” emerges as the major concern among the interviewed experts independent from their “pro” or “anti” position for nuclear energy. Both Prof. Gökmen (personal communication, 2018) and Expert T-7 stress that how radioactive waste will be transported to Russia and via which route is not decided yet. Currently, the most certain information with regards to waste management of Akkuyu rests on the Article 10. 9 of the Akkuyu Agreement, which states that for every kWh of electricity sold to Turkey, Rosatom, will pay 0.15 dollar cent per kWh to the account for spent fuel and radioactive waste management. Although Expert T-6 who was part of the negotiation process, ensures that further details about the management of Akkuyu’s radioactive waste will be arranged via additional agreements, Necdet Pamir insists that the safety factor is still problematic:

“They said the oil trafficking is too dangerous and risky for the straits and for İstanbul, so they suggested Samsun-Ceyhan Project.⁶¹ Once Çalık Holding was selected to construct the project, at least four ministers made speeches about the importance of this project, about the straits and how they should be protected. So, I’m asking now. Is nuclear waste safe to be transported via the straits, our coastline, our islands? What is the difference?” (Pamir, personal communication, 2017).

Despite criticisms, the view that what really matters in nuclear waste is not technical solutions is agreed among nuclear experts from France, Germany and Turkey. However,

⁶⁰ For the complete text of the Article 12.4 please see the Agreement Between the Government of the Republic of Turkey and the Government of the Russian Federation on Cooperation in Relation to the Construction and Operation of a Nuclear Power Plant at the Akkuyu Site in the Republic of Turkey.

⁶¹ Samsun-Ceyhan oil pipeline was planned to offer an alternative route to bypass the straits of Bosphorus and Dardanelles, and to reduce the marine traffic. In 2005 Eni and Çalık Holding signed the agreement to jointly construct the pipeline. However, there was no concrete progress in the project.

a major difference of Turkey in this discussion is that, unlike in Germany and France where the real constraint is the political dimension of waste management, the experts underline ethical concerns in the context of Akkuyu agreement. Several nuclear experts, such as İrfan Koca, Makoto Kanda and Expert T-4 (personal communications, 2018) note that the waste disposal should be under the responsibility of the Turkish government since Akkuyu NPP is on Turkish territory. Expert T-4 says that it is an ethical responsibility for Turkey to accept that the waste is hers, instead of delegating Russian project company for waste management:

“I will have access to cheap electricity. My industry will be supplied with energy of good quality. Nuclear technology will be present in my territory. But I will tell the operator to take away the spent fuel. This is not the responsible, ethical way to handle the waste issue. The spent fuel is the responsibility of Turkey because WE will be causing that waste. From an ethical perspective, from high-level radioactive waste to any waste caused by our nuclear power plant, it should be our responsibility. All the policy-makers need to accept this and start planning solutions. It is not ethical to tell Russia ‘take away the nuclear waste under this international agreement and do whatever you do with it’”.

From a different point of view Expert T-15 believes that this is because the decisionmakers do not really care about the waste issue at all, with a reckless attitude. Several incidents with regards to improper management of the existing radioactive waste in Turkey seems to support this claim. Talking about her experience back in the Chernobyl days Prof. Gökmen offers an example: *“the contaminated tea was tried to be burned or even some tried to sell them! It is not possible to get rid of radioactivity by washing or burning. It can only decay through time and meanwhile it needs to be disposed properly”* (Gökmen, personal communication, 2018). Such examples offer vital illustrations of Turkey’s major deficiencies in waste management issue and unfortunately this case in the post-Chernobyl era is not alone.

Turkey is one of the exceptional countries having a nuclear accident in world scale, the 1999 İkitelli Accident, despite not having any nuclear power plants in its territory. This event was rated by INES Scale (The International Nuclear and Radiological Event Scale) as Level 3 “Serious Incident” out of seven levels (INES, 2020). The unfortunate story was caused by a company based in Ankara, licensed by the Turkish Atomic Energy

Authority (TAEK) to import, transport and re-export radioactive sources for the treatment of cancer patients through radiotherapy. In 1993, the company prepared its high-level waste so as to return it to the original supplier in the United States. The packages were controlled by TAEK, warning signs and transport labels were inspected, and the company was issued with the permit to export the packages. Instead of sending the packages to the original supplier, the company stored them in their warehouse between 1993 and 1998, without informing TAEK. When the warehouse ran out of space, the company sold the packages as scrap metal without informing the purchasers about the radiation hazard. On December 10, 1998 the junkmen who wanted to dismantle the “scrap” in the residential area of İkitelli in İstanbul, were exposed to severe high radiation. Following the media coverage of the event (such as Milliyet, 1999), a total of 404 people applied for medical control for radiation exposure (IAEA, 2000). It is important to note that the accident was right before 2000 when Ecevit decided to cancel the bid for Akkuyu. Is it possible to argue that the event was a factor for Ecevit to reconsider safety of radioactive waste and to re-evaluate the decision for nuclear energy? In the shadow of economic conditions of the era it is not easy to detect which other factors were operational in that specific decision. Therefore, this remains a puzzle due to the lack of sufficient archival documentation with regards to Ecevit and his political circle’s discussions on the issue.

Another example was in 2007, when Turkish Atomic Energy Agency reported the existence of radioactive material in Gaziemir, İzmir in a defunct, lead factory. The inspection process revealed that toxic waste was not sent for proper disposal and rather was buried on the site in order to save money (Radikal 2012; Sunday’s Zaman 2012).⁶²

Despite the criticism of some experts and examples of deficiencies in safe management of radioactive waste as reviewed above, for Turkey, the nuclear waste issue did not necessarily change Turkey’s national strategy to engage in nuclear energy generation. However, it still constitutes a great hurdle for the proper and safe execution of the nuclear energy policy. Evaluating the findings reveal that in the official perspective of Turkey, despite being defined as the “*Achilles tendon of nuclear energy*” the management of radioactive waste is considered as a global problem to be dealt with regulatory frameworks and future technological advancement. On the other hand, the execution of

⁶² For the detailed story please see Demircan (2016).

the existing regulatory framework does not offer a flawless record, bringing the risks of nuclear energy for Turkey into the picture, as upcoming sections will discuss.

6. 2. The Cost of Nuclear Power Plants

The cost of nuclear power plants is labelled by 48 percent of the participants and represents second (22 percent) major constraint against nuclear energy. The capital investment required for nuclear power plants is one of the major challenges for the nuclear industry, as stressed by Fatih Birol from IEA (personal communication, 2018). The cost of factor is identified as one of the “*biggest determinants*” (Expert F-4) of nuclear energy decision. Large cost overruns, schedule delays and prolonged construction periods (Expert F-4) make the decision-making further complicated when combined with the political risk since the construction periods go beyond any government, indeed covers several cycles of government depending on the country. Under these circumstances, getting a return over the 60 years on their investment, does not give the investors the confidence to invest “*enormous*” amount of capital upfront to build a nuclear power station (Wynn, personal communication, 2016). Furthermore, in most of the cases, each nuclear power plant project emerges as a tailor-made project, each with their own special circumstances, problems and challenges, which adds up on the construction costs (Erol Çubukçu, personal communication, 2018).⁶³

The cost of nuclear energy also highly relates with increasing safety measures. Makota Kanda explains why (personal communication, 2018). Kanda highlights that, especially in the aftermath of Fukushima, it is not possible to make any concession in safety so the need to compromise with any requirement coming from the regulators becomes inevitable. Expert F-1, a prominent member of the French nuclear industry clarifies that the new nuclear power plants are safer due to these new requirements. However, it is impossible to design out a nuclear accident, as Paul Dorfman underlines (personal communication, 2018). Therefore, the efforts for the enhancement of safety requirements render the design of nuclear power plants bigger and more complex which significantly increase the cost of construction (Dorfman, personal communication, 2018). Erol

⁶³ Erol Çubukçu and Paul Dorfman underline that this is why nuclear energy producers are working of small modular reactors (SMRs). However, Dorfman states that currently these models are also very un-economic (personal communication, 2018).

Çubukçu, notes that “currently, additional safety requirements are superfluous and their costs are extreme!” and considers this factor as a major reason for nuclear energy’s failure at the global scale (personal communication, 2018).

Mykle Schneider evaluates these developments as very threatening to the global nuclear industry, as he says: “forget about the anti-nuclear movement, the problem is economic at this point” (personal communication, 2018). Dorfman also shares a similar view, as he states: “nobody anywhere is building anything these days. Because the market will not allow it. If you go to the market, to the investors and say you want to build a nuclear reactor, they would respond ‘no way it is just too expensive!’” (personal communication, 2018). In this framework, Schneider explains that:

“the nuclear industry desperately needs vast public subsidy mechanisms to keep nuclear alive. It is really the question of maintaining the existing nuclear power plants. The world nuclear reactor fleet is aging rapidly, the renewal rate is very low. An old car cost more to keep it on the road than a new car” (personal communication, 2018).

These views of interviewed experts highly confirm the arguments discussed under the major components of nuclear debate in Chapter 3. The cost of building nuclear power plants and the current financial situation of nuclear industry is a huge question mark for any country designing or reviewing its nuclear energy policy.

France is no exception. While the cost factor is the second most cited factor referred by 44 percent of the experts interviewed in France, the cost of nuclear has the highest weight (23 percent) among coded segments which reveals its importance. This is a predictable result given recent financial problems of Areva, Orano and EDF (Patel, 2018).

Corinne Lepage, former French Minister of Environment, clarifies that in such circumstances, the view that nuclear energy is a very cheap and economic energy resource is rapidly dissolving for France: “today, people think differently and nobody speaks about the question of building new reactors. But the real question is on this point: what to do with old reactors?” (personal communication, 2018). This is a valid concern for France as most of its nuclear fleet is built to operate for 40 years and life extensions are costly.

In this regard, the nuclear power plants in France which are aging create two kind of constraints for French nuclear energy policy. First, the cost to keep the existing nuclear reactors work is increasing due to additional safety arrangements and second, this cost factor generates, in Expert F-2's words: *"a good argument for people against nuclear industry"*.

In fact, for France, lifetime extension of existing nuclear power plants is considered by the policy-makers as a strategy not only to avoid the huge cost of building new reactors but also to postpone decommissioning and waste costs of the existing ones. On the other hand, rocketing cost of nuclear combined with decreasing cost of renewables and enhancements in efficiency and storage technologies, highly influence the French energy policy-making process (Expert F-7) in the form of financial hurdles against nuclear energy.

In Germany the cost of nuclear energy is the fourth constraining factor. 33 percent of the interviewed experts, including especially representatives of the Green Party, state institutions and NGOs, underline that nuclear energy is not economic and is so expensive that it does not pay for itself. Expert G-10, a representative from one of the German ministerial institutions even suggests that in certain countries the cost factor is more influential compared to others and refers to the Swiss case: *"they decided to shut down nuclear not because the public opposition or protests. They closed it down for economic reasons. It is cheaper to close it, rather than keeping it running securely. It is cheaper not to have it!"*

According to the German perspective, nuclear energy needs high amounts of government subsidies and even when it is supported by the government, still the industry cannot get it done since it is not a reasonable economic choice to make anymore. Furthermore, To illustrate, Viviane Raddatz states:

"Even if you don't believe that its risky or dangerous, or you don't care about future generations having to deal with the waste, economically, it is still absolutely not a beneficial choice at the moment, unless they come up with something magical. There are much better options. Given all the dangers, all the risks associated with it, I think nuclear is not a competitive option"

compared to renewables in the long run” (personal communication, 2017).

Rainer Baake as well thinks that as the global energy market changes, nuclear energy remains more expensive than the alternative sources that they already have:

“we were actually pretty surprised when we found out that in Germany wind and solar worked best. Because we are not part of the sun belt of the planet, and there are certainly other areas that have much more wind than Germany. But strangely enough, the costs to produce electricity from these two resources came down so significantly that in very short period of time we have competitive prices now. Much cheaper than nuclear” (personal communication, 2016).

It is worth underlining that this point offers a significant clash with the “availability of affordable electricity” arguments which are stated as motivating factors for a pro-nuclear decision (see pages 122-127). Several French experts and some nuclear experts from Germany have implicitly argued that the cost of electricity will be a major problem for Germany in the absence of nuclear. This tension between the two strands of arguments is a good example of how the same topic can work as a constraining or motivating mechanism due to different perspectives by stakeholders.

With 69 percent reference rate, Turkey has been the case where the cost factor emerged as the first major constraint. As a matter of fact, this factor has been very visible in Turkey’s nuclear energy history. Although exploring the opportunities for using nuclear energy and constructing nuclear power plants has been in Turkey’s agenda for a long time, Turkey’s subsequent efforts to build nuclear power plants have failed until Akkuyu. During the interviews, the cost factor accounted for 27 percent of the overall context, as a reason for Turkey’s failed attempts. The cost factor was an important element in earlier annulments of nuclear energy bids in Turkey. Both Prof. İnci Gökmen and İrfan Koca believe that the economic reasons were the main obstacles in the earlier failed bids for nuclear power plants (personal communications, 2018).

Just like French and German experts, Turkish experts also highlight that high initial investment of nuclear and the lack of capital to meet the investment costs are among major hurdles to build a nuclear power plant. Accordingly, nuclear power plants are acknowledged as “*very expensive projects*” (Türkyılmaz, personal communication, 2018)

for newcomer countries. Expert T-6 underlines that it is very difficult for countries with low GDPs to afford a nuclear energy program and states that in such cases, most of the countries prefer importing electricity via interconnectors instead of generating nuclear energy in their homeland. However, he adds “...*but Turkey would not prefer such an option because we are an ambitious country so we want nuclear energy!*”.

Just like Rainer Baake, Prof. İnci Gökmen also believes that as safety precautions have raised the cost of nuclear, this created an opportunity for the investors to notice that the costs for renewables and efficiency technologies are decreasing, becoming more and more feasible and leading some countries to abandon nuclear power. In such economic conditions it becomes increasingly difficult to find investors for nuclear power plant projects for newcomer countries too. Expert T-8 explains that to construct a nuclear power plant, in addition to the equity investment, there is a need to cover the cost through finance from lenders. However, Fukushima accident has created a negative perception in the finance market and had a very negative impact on the motivation of lenders to invest in nuclear. In the aftermath of Fukushima, the lenders have been questioning if the nuclear industry can manage the risks such as costs, project extensions or other special circumstances: “*So now they are very conservative and have a negative view for all nuclear projects. It’s rather difficult to convince them over the success of any project*” (Expert T-8). Sinop Nuclear Power Plant project is a relevant example as Oğuz Türkyılmaz indicates that “*the fact that the biggest partner, Itochu walked away from Sinop proves that the project was never feasible. The calculations about the project cost were also wrong in the first place, since the initial 20-billion-dollar cost increased to 38 billion dollars*” (personal communication, 2018; Energy Portal, 2018).

High investment cost of nuclear energy on one hand, the lack of capital to construct a nuclear power plant on the other, though they have been significant constraints for Turkey’s nuclear energy strategy, they did not cause the policy-makers to completely abandon their decisiveness for nuclear energy. Nevertheless, as Expert T-7 summarizes the situation, despite the determination, “*Turkey simply do not have the money for nuclear power plants!*”. In this regard, the deal with Russia for Akkuyu which is based on Build-Own-Operate system, was a remarkable solution. Expert T-5 explains the deal as following:

“The Turkish government does not have the equity capital to construct a nuclear power plant. Accordingly, for Akkuyu to overcome the hurdles from financing the project, the government tried a new formula which was used for the first time in world nuclear energy history.⁶⁴ They said come and build the nuclear reactor and we will guarantee you to buy the electricity. This is a unique case in the world”.

According to Expert T-13, one of the major public misconceptions about Akkuyu deal was the view that it was based on a bid: *“As the host country, we basically said we want a nuclear power plant in our territory, we will give you the site and all the necessary licenses and we will buy the electricity. We basically said come if you have the money to do it, and only Russia has come”.*

The BOO model transferred the majority of the financial risks and responsibilities to the Russian project company, meaning that Rosatom is investing the capital required for the construction and operation of the power plant. This is considered to protect Turkish treasury against the costs of delays, as well (Ülgen, 2012), partially overcoming the cost factor from Turkey’s part. Rosatom State Corporation owns a stake of 99, 2 percent in this 20 billion US dollars project (Akkuyu, 2020b). Akkuyu agreement delegated Rosatom all the responsibilities concerning engineering design, obtaining the necessary licenses and permits, financing, construction, commissioning, operation, maintenance, waste management and decommissioning, and the training of Turkish staff, through the Project Company. According to Article 5.6 of the Akkuyu Agreement, in case Rosatom’s failure to master these requirements, the Russian Party will take on the responsibility to assure the fulfilling of its obligations under the intergovernmental agreement. Some analysts consider the agreement as a “good deal” and as an “an opportunity to transfer all major risks to the project company”, “in an era where parties are looking for innovative ways to share risks associated with the construction and operation of nuclear plants” (Atiyas, 2016). Some of the interviewed experts, especially working in the government institutions are also optimistic for the way the deal gave the initial push for Turkey’s nuclear energy strategy to build more nuclear reactors, just like Expert T-11 who thinks:

⁶⁴ John Kyun Park from the International Atomic Energy Agency’s Nuclear Power division evaluated the contract as following: “It is the first time in the history of nuclear power that this approach has been used. This method is very interesting because it solves two of the biggest challenges that newcomers face: financing and experienced operators” (Global Monitor, 2014).

“the ideal would be to build it by ourselves. Hopefully (İnşallah) that will happen too, slowly we’ll get there”.

On the other hand, other experts are more skeptical. For example, Expert T-7 is very hesitant when talking about the financial model of Akkuyu: *“as the host country we say ‘let’s pay nothing for the construction and let the constructing company invest all the capital cost’... I’m not sure whether this method can really work”*. Accordingly, for many, the target year 2023 for Akkuyu seems impossible since the project stumbles due to the financial crisis in the World markets and since even Russia might not have the financial resources to complete the project on schedule, as asserted by Expert T-5 from the nuclear industry. These economic setbacks are also valid for suppliers of the project. The impact of this financial conjuncture is highlighted by Expert T-12: *“at the beginning of construction plans, Turkish companies jumped into this opportunity like wrestlers on the field, just to be partners with Russia! Yet, later they left the field running when they’ve seen the financial burdens”*.

According to the critical perspective of the experts who think that the cost factor will be an actual constraint to materialize Turkey’s nuclear energy plans, several factors will render nuclear energy more and more expensive for Turkey. These include the global economic crisis, lack of investors, the decrease in energy demand, as well as the increase in the currency exchange rate. This highly relates to the purchasing guarantee clause in Akkuyu agreement which was also reviewed as a major criticism against the motivation that with nuclear energy Turkey will have access to affordable electricity. Arif Künar stresses that the cost of electricity coming from Akkuyu Power Plant is already 3 to 4 times the cost of solar or wind:

“The cost of renewables will be further decreasing in the upcoming years so the difference will be even bigger, may be up to 5 to 10 times until Akkuyu will be finished! This is neither sustainable nor affordable for Turkey given its current account deficit. According to my calculations with the 15-year power purchase agreement the electricity bill to be paid the Russian will reach 71 billion dollars. With only 10 percent of these 71 billion dollars we can produce more electricity, with less risk through energy efficiency and saving technologies” (personal communication, 2018).

As a result, according to this perspective, when renewable energy, energy efficiency and saving technologies will be optimized through electrification, smart buildings or electrical vehicles, the cost of electricity coming from nuclear energy will reach a point that Turkey will not desire to pay anymore, as it will not be able to compete with any other energy resource. *“What will happen then?”* asks Künar and continues *“even the bureaucrats who wanted nuclear energy in the first place will question why we are paying more and losing money. They will request the phase out of nuclear. This will be inevitable. So even if they complete the construction, Akkuyu power plant will not operate”* (Künar, personal communication, 2018).

6. 3. Public Opposition

As Chapter 3 addressed in detail, public opinion is one of the major components of nuclear energy debate. However, I suggest that the general concept of public opinion and public opposition inherit different meanings for the case of nuclear energy, because a country's general public opinion dynamics and the existence of a public resistance for nuclear are not the same. Furthermore, while negative public opinion can be a constraining factor in the decision for nuclear energy, we seldom see an opposite mechanism when public support exclusively drives nuclear energy policy: no country would engage in nuclear energy generation only because its citizens absolutely want it.

In the context of this research's results, in each country, 94 percent of the experts talked about public opinion. Public opinion was also revealed as the most important factor with 38 percent of the coded segments concerning national features in which nuclear energy policy-making is taking place. On the other hand, this extensive reference to public opinion did not necessarily consisted of views which see public opinion operating as a constraining factor. Therefore, in the coding process, I have created two different codes distinguishing between “the public opinion” and “public opposition”. Consequently, to measure the real impact of public opposition and to separate it from overall remarks on the domestic characteristic of public opinion across distinct countries, only the statements specifically referring to public opposition as a constraint for nuclear energy policy-making were coded to the category of “social refusal”. While this section only addresses the constraining effect of public opinion, the following chapter studies the issue in broader

terms, in the framework of national features. In this context, public opposition is mentioned by 42 percent of the participants and corresponds to 12,4 percent of the constraining factors.

In Germany, 50 percent of the interviewed experts, both from state institutions and German nuclear industry, addressed public opposition as a direct cause for Germany's nuclear phase-out decision. *"In the end it all comes down to public opinion, because we have democracy. You cannot do anything that is against public opinion"* this statement from Rainer Baake (personal communication, 2016) offers a good summary of the official discourse in Germany, with regards to the phase-out decision. According to the analysis results, public opposition ranks as the third major factor (with a 19 percent share) among the constraints for nuclear energy policy, that emerged from the interviews.

The dominant view is that the public, more specifically the organized public, civil society (Morris, personal communication, 2017) has been heavily campaigning to create a high pressure so that the politicians could no more ignore the wave of resistance and therefore, had to decide to phase out (Expert G17, Expert G11 and Raddatz, personal communication, 2017). The protests were remarkable since even the house of Chancellor Merkel was a venue for demonstrations. An important distinction of Germany regarding the constraining impact of public opposition on policy-makers is that it does not only concern policy-making on nuclear energy but also other components of Germany's overall energy policy. To illustrate, Expert G-6 points to increasing opposition from the locals against windfarms, and to the immediate impact of this opposition on decisions: *"Germany is full of wind turbines and now the governing Green Party in the northern region federal state, says that the opposition of the peasants outside is growing. So, they slowed down the windmill building, because of this opposition"*.⁶⁵ Given the role assigned to renewables in *Energiewende*, one would not expect this opposition to sentence the windfarms to the same faith of nuclear power plants in Germany, however, the case is still illustrative of the power of social opposition in German energy policy-making.

In France, public opposition emerges as the most cited factor by 56 percent of the experts interviewed in France as a potential factor which can affect policy-making and constraint

⁶⁵ For a recent analysis see Shankleman & Paulsson (2020).

a pro-nuclear policy decision. Moreover, content-wise, it is the third major factor after the cost of nuclear and nuclear waste.

The experts referring to this factor are all in agreement that social acceptance⁶⁶ matters, regardless of their view on nuclear energy or their professional backgrounds. On the other hand, two major approaches appear in the sample. First, some experts consider social opposition as a constraining factor due to a decrease in public support in nuclear after Fukushima and suggest that: *“there is a fight for the time being in France, between people supporting the nuclear industry and people against it”* as Expert F-2 states. According to these experts, there might be a connection between public opposition to nuclear energy and France’s decision to decrease its nuclear energy production to 50 percent by 2035. Expert F-7 thinks that this decision which, in his words *“everybody knew was impossible to attain”*, is a very big step for change and that France arrived at this point through a participatory democratic process. In this regard, Expert F-16 holds a similar view underlining that French decision-makers are incorporating the opinion of people and are taking into account their point of view and requests. This comment brings us to the second approach which acknowledges that social acceptability of nuclear can be a constraint not only for France but also as an international fact, which can hamper the future of nuclear energy. On the other hand, a common point in this group of experts who are mostly from governmental authorities or official institutions is that they consider social opposition as a matter of “responsibility” or accountability rather than an actual obstacle for French nuclear policy. Expert F-13 statements clarifies this view:

“the policy-makers know that they are under the eyes of the public opinion, through internet and all the tools. So, we can see that we have to do more and more work on how to introduce what we call “participation of the public” in the parliamentary process”.

Consequently, in France, according to the interviews and fieldtrip, public resistance to nuclear energy is not considered as a constraining factor so as to completely leave nuclear energy, but rather it is a challenge which is framed under the “credibility to the public”. French policy-makers are aware that they have responsibility to the public and their

⁶⁶ Please see Chapter 7 on the domestic factors for a detailed discussion of public opinion in France.

official discourse reveal that they offer necessary institutional tools⁶⁷ to address the public's questions and demands with regards to nuclear energy.

With a sharp contrast to France and Germany, in Turkey public opposition corresponds to only 3,6 percent of the constraining factors, ranking the 7th, and only 19 percent of the participants think that this is a constraint for Turkish policy-makers in designing Turkey's nuclear energy strategy. Prof. Şule Ergün and İrfan Koca who are both prominent experts in the field of nuclear energy underline that the nuclear energy policy should be shaped in line with public acceptance (personal communication, 2018). In line with this perspective, one would expect that if the public is completely against nuclear energy, Turkey would halt its plans to build nuclear power plants. As a matter of fact, in near history, in some European countries such as Austria, nuclear power was put into a referendum and rejected by the public, who eventually decided for the faith of nuclear policy (Pelinka, 1983).

In any case, *“without public awareness and acceptance you cannot be able to execute nuclear project in a successful manner”* says Expert T-8. Although prominent experts agree with this view, as the analysis results indicate, public opposition constitute no major weight among the constraining factors, despite the acknowledgement of its importance.

6. 4. Risks of Nuclear Energy

“The problem is what to do about something you don't know what to do with, i.e. a low probability high impact risk under the conditions of relative scientific uncertainty, in other words nuclear” says Paul Dorfman, the founder and chairman of Nuclear Consulting Group (personal communication, 2018). According to him, in terms of expertise and fundamental risks, there are still questions of great uncertainty regarding what really comes if an accident happens, what are the actual number of casualties. As a result of analysis, this factor of uncertainties under the form of fundamental risks assigned to nuclear energy, corresponds to 17,5 percent of the constraints in nuclear energy policy making, addressed by 38 percent of the experts. Nevertheless, the impacts of the risks and uncertainties of running a nuclear power plant are difficult and complex, especially since

⁶⁷ Please see next section for French institutions on nuclear safety.

their perceptions can change from country to country. An important finding of this research is that what countries consider as risks to constraint nuclear energy decision, and which dynamics can really operate as risks in specific national contexts differ across the cases.

“Technology can always fail” (Baake, personal communication, 2016). These words from Rainer Baake illustrate very well the perspective in Germany. Arguing that it is not possible to have one hundred percent of nuclear safety and that the effects of a nuclear meltdown in a highly densely populated country like Germany would be disastrous, Baake asks *“why take the risk?”* (personal communication, 2016). This emerges as one of the major reasons leading Germany to a nuclear phase out. Although it corresponds to only 15,5 percent of the overall discussion on the constraining factors, the “risks of nuclear” statements were raised by 44 percent of the experts in Germany. Some of these experts think that nuclear is too dangerous. To illustrate, Expert G-16, a Green Party member states: *“we were always told that Japanese engineers are the best and they are able to make reactors that withstand the strongest earthquakes. We were always told it is safe. Now we don’t believe this anymore”*. An important remark of Expert G-16 that catches attention concerns her reference to Angela Merkel⁶⁸, with a special emphasis on Merkel’s position as a scientist, a physicist, as if it was a sort of “technical approval” to her arguments: *“Merkel used to say that she always believed nuclear is safe and now, she is not so sure about it anymore!”* (Expert G-16). In this context, Craig Morris notes that Germany’s position on nuclear comes from a very informed understanding of what risk assessment is: *“we build the reactors and design them for certain cases, what happens if something else was wrong? Yes, it is not going to be a tsunami for Germany but it will be something else that we didn’t design the plants for”* he states.

A common point where critics of nuclear and proponent of nuclear energy in Germany reconcile concerns the invisibility of the risk. The invisibility of the risk, the fact that radiation itself cannot be seen but its consequences are only revealed in the cases of accidents, creates an emotional factor for the German public. Expert G-11 describes this feeling as the following:

⁶⁸ Merkel received a PhD in Physical Chemistry from the Academy of Sciences in Berlin-Adlershof. Her Dissertation was on quantum chemistry. Merkel ranked number one on Forbes’ World’s Most Powerful Women list in 2019 (Forbes, 2020).

“I think the fear is much bigger than any other risk of accidents or pollutants, because you cannot see the radiation nor the nuclear cloud. It is a danger that you can neither see nor control. You cannot grab it. You know that it is extremely dangerous but you don’t know if it is here or there”.

For Germany, these perspective on the risks of nuclear energy generation have been a crucial component of nuclear policy-making, especially because it is a society which “loves insurance” where people’s lives are “well structured, very foreseeable and not flexible”, in Expert G-4’s words.⁶⁹ Expert G-4 who is an energy expert with extensive experience in the nuclear industry, underlines that although nuclear industry takes nuclear safety as a priority so as to prevent any risks, nuclear power plants cannot ensure this expectation for “insurance” since in case of a nuclear accident the costs are too much to calculate. Expert G-6 also raises a relevant point which links the risks of nuclear with this factor of insurance. He states that this was a popular argument used by the Green Party. Some of the Green Party members had agreed to support nuclear power plants only if the industry would offer an insurance which would pay for a potential damage: “...and then everybody found out that no insurance would be prepared to pay the amount of money to cover every possible cost. Look at what happened in Japan!” In this regard, so as to highlight German position Expert G-6 tells an anecdote from a public debate which he participated a couple of years ago:

“A Green German parliamentarian addressed a French representative saying ‘you have your nuclear power plants in our border. It is OK as long as we can make an insurance agreement for that, if that’s not possible you should have to shut it down!’ The face of the French representative froze because nobody can really ensure to compensate for a nuclear power damage”.

The elements of “danger, unpredictability and irreparable damage” dominating the discussion of the risks in Germany, leaves the floor to a self-confidence for risk mitigation in France. The reasons why the risks of nuclear mentioned above are not at the top of the constraining factors list in France rest first, on a confidence on French nuclear industry’s technical expertise in risk mitigation and second on the regulatory authorities in France. According to the interview results, the risks of nuclear energy generation are not

⁶⁹ Please see Chapter 7 to learn more on the impact of societal dynamics on the perceptions about nuclear energy.

considered among the primary constraints for French policy-makers. The risks of nuclear energy are certainly acknowledged by the interviewed experts, the risks are to be taken into account while designing the policy, however, they are considered as issues with technical solutions rather than factors to restrict the decision for a pro-nuclear energy policy. Dorfman thinks that this might be because France is a nuclear power looking to the risks more through the lenses of strategy and security thinking that *“the nuclear holocaust has already happened in terms of bombs and weapon testing. And we are not dead yet! So, we can put a lid on the worst of your fears”* (personal communication, 2018). While this is an argument open for discussion, the interviews with the French experts rather point to a strong confidence in the French technical expertise in dealing with the risks of nuclear energy.

First of all, the perspective of the nuclear industry considers the risks as manageable as long as they are carefully incorporated into the design of nuclear power plants. Expert F-4 offers an example from the selection of the site underlining that it is one of the most important decisions regarding the construction of a nuclear power plant. A major lesson coming from Fukushima accident is the need to carefully study and understand the environment that the power plant will be operating. Accordingly, before starting the design of the nuclear power plant, the seismic risk and risks regarding flood, hurricanes or temperature extremes need to be calculated and incorporated into the design. Expert F-4 adds that when it comes to natural disasters wherever a nuclear power plant is decided to be built, it is possible to design a plant to withstand any range of natural disasters:

*“if you have a high earthquake zone you have to accommodate that, if there is potential for flood you have to accommodate that too and have to be prepared. You can build your plant to accommodate any kind of environment but you have to be smart about it. There are ways to do and these are things we know how to do, that’s just engineering and we are very good at that!”*⁷⁰

In this regard, Expert F-4’s example of Onagawa Nuclear Power Plant remarkable, as a

⁷⁰ A very interesting insight of Dorfman with regards to the perception of risks relates to the society structure. Sociologically, he relates coming to terms with uncertainty essentially with critical self-doubt which is considered by some societies as a problem, a weakness, or as a deficiency for being strong: *“The reality is exactly the opposite. Self-doubt is in fact a great strength and it is one of the things that may potentially save us. This ability of self-doubt is critically important especially in the context of the nuclear debate. What if...? The industry does have to have this perspective as opposed to the perspective of ‘I know’ ‘let me tell you how it would be’”* (personal communication, 2018).

positive example. Onagawa Nuclear Power Plant is a plant located in the north of Fukushima. The power plant was hit by the earthquake stronger than Fukushima, hit by about the same amount of water, the same size of a tsunami, and yet survived the disaster. IAEA Mission Report declared that the event was “the strongest shaking that any nuclear power plant has ever experienced from an earthquake” and concluded that the plant shut down safely (IAEA, 2012, p. 6). “*How did it do that?*” asks Expert F-4 and explains: “*the designers of the plant knew this is a place that tsunami can hit, so they designed the system with sea walls and special protection for the sea water pumps to protect them in case of a tsunami. The system worked perfectly well and the plant was fine*”.

In addition to the emphasis on the design of nuclear power plants, with regards to the management of risks and nuclear safety, the importance of regulatory authority is another point highly stressed by the French experts. Even for the case of Fukushima, some of the interviewed experts believe that “*the regulator was not doing its job*” and was ignoring some information that should have been acted on. Following the accident, several criticisms addressed Japan’s nuclear regulator, the Nuclear and Industrial Safety Agency for failing to review tsunami risk performance of the plant and ensuring compliance with international nuclear safety standards (Acton & Hibbs, 2012). In this regard, Fukushima is considered as a “*bad*” experience for the global nuclear industry. There is an agreement among the experts that in the aftermath of Fukushima, the French people understood more the problems which could arise in case of a serious nuclear accident and that this might create doubts about the future of nuclear energy. However, the representatives from the state institutions strictly underline that France’s national nuclear institutions are meticulously fulfilling their part in risk mitigation: “*Now that the risk zero do not exist, we have to deal with it more carefully. Citizens are conscious of this fact and want the state to take into account the request for the highest level of safety. Safety is a top, top priority for our nuclear program*” affirms Expert F-16. Two major institutions work in the realm of nuclear safety in France: The Nuclear Safety Authority (ASN), is an administrative authority established by the law of nuclear transparency and safety dated 13 June 2006. It is responsible for regulating nuclear safety and radiation protection in order to protect workers, patients, the public and the environment from the risks involved in nuclear activities. The Institute for Radiation Protection and Nuclear Safety (IRSN) is another industrial and commercial establishment which offers expertise on the latest

national and international scientific knowledge in the fields of nuclear and radiological risks. Both institutions are also in charge of informing the public⁷¹, and both institutions are independent (ASN, 2020).

In the interviews in France, the discussion over the risks related with nuclear focus more on their management, rather than their dangers. A more interesting finding however concerns what elements are categorized as “risks” for the case of France, since the risks associated to hamper the French nuclear energy policy are clearly different than the usual nuclear safety and security risks. With its high share of nuclear energy in its energy mix, “*putting all the eggs in the same basket*” and being too much dependent on nuclear energy, as identified by Expert F-13 and Expert F-16 respectively, are considered as the real risks of nuclear for France. Accordingly, the need for diversification combined with EU targets for increasing the share of renewables emerge as challenges against keeping the share of nuclear as it is. According to Mycle Schneider, French decision makers assume that if they increase the lifetime of nuclear power plants from 40 to 50 years, automatically they will be able to sell the electricity to customers. However, he warns that, in Europe, there is *already* a vast overcapacity especially since all the EU countries are building renewables (Schneider, personal communication, 2018). Therefore, the challenge for France evolves around the question of who will buy the electricity produced in French nuclear power plants.

As a conclusion, France faces difficult dilemmas regarding its nuclear program based on economic risks: on the one hand it wants to keep its nuclear capacity yet building new reactors and extending the lifetime of existing ones is expensive. This is partially caused by Fukushima and Chernobyl accidents which bring the question of beyond design basis, or “black swan” accidents or incidents into the nuclear industry. “*And these are largely every nuclear accident that has ever happened*” says Paul Dorfman and continues explaining:

“when you build a nuclear power plant you design it not to have any accident. But accidents by nature are accidental, they happen. So, they happen in ways you never would expect it to happen. That is why we call it an accident. In trying to design out

⁷¹ While the experts are confident about the safety of France’s nuclear fleet, 35 percent of the French population still think that risk of an accident is the strongest argument against nuclear power today, followed by nuclear waste by 23 percent (IRSN, 2020).

all of these accidents, these big nuclear reactors have become almost impossible to build due to their cost” (Dorfman, personal communication, 2018).

Consequently, this hurdle combining the risk factor with the cost of nuclear power plants emerges as a constraint for France for sustaining its nuclear capacity. Dorfman thinks that this combination creates a general fear among the nuclear industry that the French nuclear industry workers don’t believe in the future of the French nuclear industry. On the other hand, France faces the challenge of customers on the grounds that the demand will be lower than the electricity supplies from the existing nuclear fleet combined with additional renewable capacities.

Just like Germany and France, Turkey has its own dynamics too with regards to which factors are considered as “risks of nuclear energy” and how they operate as constraining mechanisms. The discussion of the risks in the context of Turkey mainly evolves around Akkuyu, either with regards to the selection of the plant site or with regards to the project itself.

Specifically, the location of Akkuyu has been the center of heated debates. Several prominent figures from Turkey’s nuclear scene such as Tolga Yarman offered extensive studies on the issue (Yarman, 2014). These risks are multiple for Turkey, such as risks of accidents-related radiation leakages, radioactive waste and storage problems, potential adverse effects on marine life, the challenge of protecting the nuclear power plant against terrorist attacks, and providing the safekeeping of highly strategic materials (EDAM, 2016; Yarman, 2014)⁷² or other environmental risks with potential impact on agriculture and tourism in the region (Yarman, 2014). Potential environmental impacts of nuclear power plants are presented as important arguments against nuclear energy and especially for the location of Akkuyu. For example, the release of the sea water used in the cooling of nuclear reactor back to the sea, is alleged to create high risk through an ecological chain reaction against the livelihood of biodiversity in the Mediterranean Sea (Yarman, 2014). As a response to these claims, Expert T-7, who has an active role in Turkey’s

⁷² For a very detailed analysis of these threats please see: EDAM, *Nuclear Security*, and EDAM, *Managing the Risks of Nuclear Energy: The Turkish Case*. (2016), http://edam.org.tr/wp-content/uploads/2016/01/edam_managing_nuclear_risks_report.pdf

nuclear energy policy, explains that such an effect is not technically possible and that the regulations in Turkey are quite sensitive about the rules covering environmental impact of nuclear power plants. As a matter of fact, Expert T-7 explains that Turkey takes Europe as a reference point: *“for instance in Japan nuclear power plants can heat the sea water up to 7°, because Japan does not have a restrictive rule on this. In Turkey it is not the case, the regulation is strict and clear.”*

Although Turkey takes Europe as a reference for regulations, some of these risks about Akkuyu are also underlined by the European Union. To illustrate, the European Parliament resolution of 14 April 2016 demanded the Turkish Government to halt its plans for the construction of the Akkuyu nuclear power plant, pointing out that “the envisaged site is located in a region prone to severe earthquakes, hence posing a major threat not only to Turkey but to the Mediterranean region as a whole” (European Parliament, 2016: 8). Necdet Pamir touches upon this point with a reference to Prof. Ahmet Ercan: *“Prof. Ercan has been examining 4000 years of the region’s earthquake history. He has been talking about tsunami causing thousands of deaths in history. This is a scientific fact. We cannot afford taking this risk.”* (personal communication, 2017). Pamir continues by underlining other Turkey specific factors such as terrorism, describing it as *“one of the biggest risks for the region due to terrorist organizations and ongoing conflicts⁷³ in the region”*, and concludes by saying that *“as citizens of this country, one saying that he does not care about any of these, would be an attempt to murder. The risk is on Turkey”* (Pamir, personal communication, 2017).

Another specific risk concerning Akkuyu includes the target year of 2023. The power plant is expected to operate in 2023, on the 100th anniversary of the Republic of Turkey. In my unofficial communications with Rosatom representatives in several platforms, their common discourse was that once all the regulatory permissions are completed they can

⁷³ For this aspect, the remarks of a prominent nuclear expert from France is remarkable as he says: *“I think a lot of people think that nuclear plants are vulnerable to some sort of attack. And I know enough about nuclear power plants to know that attacking one and doing any damage would be extraordinarily difficult. So that is not one of the things I lie up awake at night worrying about, I really don’t. I am much more worried about people attacking in refineries, in chemical plants, in trains and things like that than I do for nuclear power plants. Personally, I don’t think that security issues are a problem in the way that there should be a choice to not build the plant”* (Expert F-4).

finish the nuclear power plant by the target year 2023. However, given limited timeframe, some of the experts such as Expert T-6 think that rushing could be dangerous for such critical projects and indicate that it is important to advance carefully by working on every step meticulously: *“and that is the point where the local control mechanisms should work and supervise the project to avoid any risks”* he adds, as an answer to my question of whether the effort to meet the deadline would create any risk on the project. Regarding the project, the argument that VVR-1200 reactors to be used in Akkuyu are a new type of reactor whose operation performance is not tested, is also highly repeated by the critics (Expert T-15). However, experts such as Prof. Dr. Niyazi Meriç disagrees with this view on the grounds that Russians have already been using⁷⁴ this reactor type in a river border and that *“it will work even better in the sea water, in terms of the cooling”* (personal communication, 2017).

In addition to these general concerns over the risks of nuclear, some question marks directly address the operation and operator of Akkuyu power plant i.e. Rosatom. Necdet Pamir questions what would Russia do in case of an accident: *“Will it take out all its engineers and leave the country or take the responsibility?”* he asks (Pamir, personal communication, 2017). Others such as Prof. İnci Gökmen, have doubts about what would happen to the local people of Akkuyu neighborhood in case of emergency, warning that a comprehensive emergency action plan is required. In this context, one of the most critical points which differs from mainstream discussion of nuclear energy in Turkey and Akkuyu, comes from Expert T-6 who distinctively address third party liability for nuclear damage as a major constraint in nuclear energy policy-making.

The international regime for nuclear third-party liability consists of two major conventions⁷⁵. The first one is the Paris Convention on Third Party Liability in the Field of Nuclear Energy signed on 29 July 1960 (amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982) and OECD Nuclear Energy

⁷⁴ The first VVER-1200 reactor installed at Novovoronezh II Unit 6 started operation in August 2016 (Rosatom, 2020).

⁷⁵ For further information regarding supplementary conventions and protocols in the realm of multilateral agreements in liability and compensation for nuclear damage, please see OECD Nuclear Energy Agency at: <https://www.oecd-neo.org/law/multilateral-agreements/liability-compensation.html>

Agency is the depositary. The convention provides the legal foundation for “compensation for injury to or loss of life of any person, and for damage to, or loss of any property caused by a nuclear accident in a nuclear installation or during the transport of nuclear substances to and from installations” (OECD/NEA, 2020). The other is the Vienna Convention on Civil Liability for Nuclear Damage signed on 21 May 1963, for which the International Atomic Energy Agency (IAEA) is the depositary. The Vienna Convention as well aims “establishing some minimum standards to provide financial protection against damage resulting from certain peaceful uses of nuclear energy” (IAEA, 2020). Although the content of the Paris Convention and the Vienna Convention are in parallel, currently no country is party to both. In order to establish a link between the two conventions and to address any complications for cases where the operator of a nuclear installation and the state within whose territory that installation is situated are party to different conventions, Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention was adopted on 21 September 1988.

Akkuyu Nuclear Power Plant offers a perfect example since the country of installation, Turkey, is party to the Paris Convention, as of 10 October 1961 (OECD/NEA, 2020), while the operator, Russia, is party to the Vienna Convention. Russia signed the convention on 08 May 1996 and by 13 August 2005 the convention entered into force (IAEA, 2020). Accordingly, in case of an accident or incident, Akkuyu emerges as a typical case for the Joint Protocol, which Turkey signed on 21 September 1988 and which entered into force on 26 June 2007 (IAEA, 2019).

Expert T6 explains that regarding the compensation of damage in case of an accident, the responsibility of the operator is higher in the Paris Convention than in Vienna Convention:

“Turkey is party to Paris but the operator Rosatom, Russia, is party to Vienna. The problem is that Russia did not sign the Joint Protocol. Therefore, the question is how the damage will be compensated if an accident occurs in Akkuyu? What will be Russia’s exact responsibility? Russia would take Vienna as the reference, then its coverage would be less than Paris. There is a critical compensation gap here, creating a major problem for the Akkuyu agreement.”

Expert T6 underlines that this problem was also acknowledged by the decision-makers, and yet was disregarded by not addressing this gap in the Akkuyu agreement⁷⁶: *“They knew it, but in order to make it happen, Turkey made a compromise by accepting the responsibility”*.

Within all these heated discussions, a striking point about the risk factor is the reference of some experts to “*zombie reactors*” in Expert T-3’s words, in the close neighborhood of Turkey, in Armenia and Bulgaria. Expert T-11 working in a governmental institution explains that for many years, some of the Turkish people opposed having nuclear power plants arguing that they are dangerous despite the irony that all this time they were under the threat of Kozloduy in Bulgaria and Metsamor in Armenia.⁷⁷ Moreover, they were both old designs without a dome:

“...they are the most dangerous nuclear power plants in the world. Luckily they are both closed down. But I would still like to ask those people what were they protesting for? They should have protested those power plants in the first place! The danger was right next to us! These poor people, those greens didn’t even know about these. They either lacked knowledge or they thought that a radiation leak cannot pass through the customs without a visa!”
(Expert T-11).

For sure, Expert T-11 was being cynical. However, the attitude that some people are misunderstanding the risks of nuclear energy is present in other experts as well. To illustrate, Expert T-16 who is a specialist on nuclear technology, thinks that people don’t want nuclear energy because they think it will “*explode*” while he highlights that nuclear reactors cannot explode in a way that an atomic bomb does. Additionally, as a response to those thinking that living near a nuclear power plant is risky and so Akkuyu would kill tourism in the Mediterranean coast of Turkey, he states:

“Nuclear power plants represent no harm for their environment and we have many examples in France or Spain where many beaches and holiday destinations are located near nuclear power

⁷⁶ Article 16 of the Akkuyu agreement declares that “third party liability for nuclear damage, which may arise in connection with cooperation under this agreement will be regulated in compliance with the international agreements and instruments to which the Republic of Turkey is or will be a party and national laws and regulations of the Turkish party.”

⁷⁷ Metsamor nuclear power plant has been identified among the world’s most dangerous nuclear power plants (Lavelle & Garthwaite, 2011) due to its location in an earthquake zone and its ancient technology (VVER 440) constructed around the same time as Chernobyl in the 1970s, with no containment structure for the nuclear core in case of an accident (Mersom, 2019). Metsamor is located only 16 kilometers away from Turkey’s eastern border.

plants. Visiting nuclear power plant can itself be a source of tourism there is no point in making such noise and complaining!” (Expert T-16).⁷⁸

Building on this last remark, the personal experiences and insight from some Turkish experts reveal that the attitude of some policy-makers towards the risks of nuclear energy constitutes a constraining risk on its own. To illustrate, according to Türkyılmaz, “*the government cannot even stand to hear*” arguments indicating the risks of constructing a nuclear power plant in Akkuyu. He tells: “*Approximately 10 years ago in a conference, our colleague presented a research on the effects of a potential tsunami in the Mediterranean, with all the relevant graphs and calculations. He was almost accused of being a doomsayer by the government representatives*” (personal communication, 2018). As one of the most prominent figures of the radioactive contamination debate in Turkey in the aftermath of Chernobyl, Prof. İnci Gökmen must have experienced a similar reaction that she says:

“The truth must always be spoken, and despite everything the truth would come out. However, most of the time, the decisions stay behind and the actions are taken when it is too late. Meaning that it is not enough for truth to come out, but the timing of it and making the intervention right on time also matters. Take Chernobyl as an example, they only check the number of immediate deaths. But, what about the environmental cost, the health problems, all the crippled children?...it is a chain of disasters...” (personal communication, 2018).

Given reminiscent memories of the reactions by some politicians to the radioactive leakage from Chernobyl reaching Turkey back in the late 1980s⁷⁹, the image that the risks of nuclear are not taken seriously enough by the policymakers result in major concerns. Therefore, talking about the risks, the dissatisfaction with responses to their questions and concerns emerge as a common point for the Turkish experts who are critical about nuclear energy. To illustrate, Expert T-15 mentions that he was in the committee

⁷⁸ I have to note that later in the interview Expert T-16 contradicts himself. He suggests that external actors support lobby groups and anti-nuclear movement in Turkey in order to block Turkey’s nuclear energy strategy, and he offers the following motivation for such an attempt: “*Think of our neighbor countries...Who would want a nuclear power plant near its coastal area? In case of an accident their beaches and coast would be damaged too.*”

⁷⁹ As a response to the claims that a radioactive rainfall affected the Black Sea region in northern Turkey, famous for its tea and hazelnut crops as the main source of income, former President Kenan Evren stated that radiation cannot harm us and former Minister for Industry and Trade, Cahit Aral, drank tea in front of the press officially denying any danger of contamination (Pamir, 2015, p. 420).

visited by Rosatom in the beginning of Akkuyu project. He explains that in this closed meeting (of which he defines the main purpose as “*persuading*” the critics to become in favor of Akkuyu project) they have discussed the risks of building a nuclear power plant in Akkuyu. He declares: “*the Rosatom representatives’ main response to our legitimate concerns was ‘nuclear is OK, there is a nuclear power plant even near Putin’s Dacha’!*” and complains: “*Is this a scientific answer?*” (Expert T-15). Oğuz Türkyılmaz also agrees with this concern over the attitude towards nuclear safety and states that: “*the risk assessment has failed even in Japan as they couldn’t foresee the risk. As a country which cannot safely operate coal mines, we shall not engage in nuclear energy generation*” (personal communication, 2018).

On the opposite front, there are also some stakeholders who think that the risks associated with nuclear energy shall not constraint the policy. For instance, Expert T-3, who is a government official, thinks that risks are always present and that the risks of nuclear energy are not unique to Turkey, they are global problems and thus are not relevant arguments to remain outside “*the club of nuclear energy countries.*” Similarly, Expert T-5 also states that if we were to use the same safety criteria used for nuclear energy in aviation sector and avoid constructing planes, today not a single plane would be flying:

“How many planes have crashed till today, but the industry continues. If they would say it is too dangerous right from the first plane crash we wouldn’t have an aviation sector today. Therefore, each technological advancement comes with a price, this price includes accidents as well. The society needs to learn living with the risk factor. What matters is to learn lessons from the accidents and to properly manage the situation. To illustrate crisis management in Chernobyl was terrible, same applies to Fukushima as well. If you increase the safety costs to completely avoid the risk of an accident, it becomes too complex to deal with. This is the point we’ve reached in the nuclear industry. I think at one point someone will come out objecting to these excessive safety rules and say that’s enough!”

Overall, the risks discussed by the interviewed experts are in parallel with the existing discourse in Turkey. While the critics highlight those risks as reasons for Turkey to abandon its nuclear energy policy, the majority of the experts working in state institutions or in nuclear industry refute the claims with their own perspectives. To conclude, as Akkuyu Project continues and the official attitude of the Turkish government toward nuclear is stable, these concerns and indicated risks so far did not hold back Turkey’s

nuclear energy policy-making in the light of the motivations discussed in the previous chapter.

6. 5. Political Burden

18 percent of the participants, discussed how politics can operate as a constraining factor in nuclear energy decision. The content of the “political burden” includes a number of elements. The first, is the French perspective which considers nuclear as an important political decision. Dr. Laurent Turpin states: *“many countries, including Turkey, do not realize at the beginning how heavy is the political side of a nuclear power program”* (personal communication, 2018). This is because nuclear energy needs to come with a state vision and program which is not easy to execute. The design of this nuclear program includes several components such as coming to terms with key actors and factors including but not limited to public opinion, political parties, voters. It also necessitates, the embracement of principles such as *“the unspoken agreement not to use nuclear as a political weapon”* or *“having an honest civil service”* (Expert F-15). The willingness or the capacity to undertake such a program is very demanding:

“The main factor you have to keep in mind is that nuclear is not a box you buy and you put somewhere. It is a program. And it is a program that requires an infrastructure at the level of state because you need people that are able to inspect, to control to make rules for these installations to work. You need an education system that is able to provide the technicians and the engineers, capable of maintaining this installation. You need political stability because you cannot change course in the middle of the stream, you need to keep going. So, a country has to politically decide to go in that. It is extremely profitable but you have to prepare for it. I would say the main question to ask is ‘are we ready to create all the system for a nuclear program to work?’” (Expert F-15).

Apart from this understanding of nuclear as a holistic challenge that is not easy to succeed, it is also a very long-term achievement, and this is the dimension of political burden which is emphasized by the Turkish experts. To illustrate, Expert T-4 depicts that due to concerns of domestic power, the politicians tend to value more the projects or decisions with immediate positive impact onto their careers. Nevertheless, the success of a nuclear program cannot be identified within the political lifetime of a decision maker. Therefore, initiating a nuclear power plant project might not offer an immediate recognition, an

attractive political return to a decision maker who would like to be appreciated immediately. This can decrease the motivation of policy-makers.

The German perspective on this factor differs to a great extent as it rather concerns the political burden in case of a nuclear failure. If the usual suspects constraining a pro-nuclear policy (i.e. the nuclear waste, social opposition and the cost of nuclear) are set aside, a very common answer I receive to my questions regarding what really has driven Germany's nuclear phase out decision and what is the real cause of the decision is "*politics*". Most of the experts within the 28 percent who believe that politics is a constraining factor in nuclear energy decision, state that the energy policy in Germany is "*not technically driven*", "*politically motivated*" and claim that the phase-out decision is a "*political decision taken in a hurry*" and "*not fact oriented*". The fact that these experts are mainly working in or with the nuclear industry in Germany clearly demonstrates the resentment in the technical stake-holders as opposed to the official state position.

The fluctuations in the German nuclear policy has been already very much affected by the rivalry between political parties. Indeed, Expert G-6 states that as part of the initial phase out deal with the industry in 2000, there was even a statement from the Federation of German Industries which concluded that the deal would be accepted if politically undisturbed operation of nuclear power plants are assured. The nuclear industry accepted the phase-out, but required that politics will not further disturb the companies (Expert G-6). When the government changed in 2010, the decision was postponed in order to prolong the lifetime of nuclear power plants and after Fukushima the decision was reversed again with an immediate shut down for some reactors and an eventual phase-out for the overall nuclear fleet.

Expert G-17 personally thinks that after Fukushima there were no reasons to phase out: "*Because half a year before we had decided to extend the lifetime of the nuclear power plants and nothing happened in Germany between these two decisions, which could lead to phase out! Therefore, from my point of view it was only a politically driven decision, not a technical one*". What really happened between these two decisions? As also reminded by Expert G-18, for many years German citizens hardly accepted nuclear. The public and media support was not present. When Fukushima happened, it created a

platform for the anti-nuclear movement and for the media to ask “what if this happened in Germany?”. Although such an accident was not possible for Germany, the decision-makers did not want to take the burden of a potential accident in the wake of Fukushima.

The idea that Fukushima’s technical realities did not match the conditions of German nuclear fleet led some industry members to heavily criticize the decision. For example, Expert G-18 says: *“They forget Germany is not famous for its earthquakes or terrible waves! So, we can argue that it is an irrational decision but nonetheless, it is driven by politics first and foremost, costing a lot of money”*. Similarly, Expert G-9 offers an interesting critique declaring that *“sustainability means that I run a utility until it is done and not because it is political, that’s unsustainable for me in anyway”*. Last but not least, according to Kurt Dieter Grill the decision was political but not in a way that it should have been: *“In politics you have to think about the problems and identify solutions but you need also to think about the results of your solutions. The discussion we have in Germany is the discussion of rich people, not of poor people”*, implying the electricity prices for the middle-income citizens.

6. 6. Zeitgeist

Zeitgeist is one of the most interesting categories emerging from the interview results. Discussed by 16 percent of the total sample, zeitgeist corresponds to 7,22 percent of the constraining factors across cases. What does “zeitgeist” represent for nuclear energy policy making? German case offers a straight forward answer.

All energy-related discussions in Germany evolve around *Energiewende*, the energy transition, in which Germany has committed itself. The interviews are no exception. My fieldtrip and meetings with German experts reveal that the notion of energy transition is so much more than some decarbonization strategies or renewables targets for Germany. It is rather an idea for which all the actors feel responsible for. Accordingly, energy transition and the philosophy it represents clearly affect the zeitgeist. Expert G-6 explains that the “*mighty*” idea that Germany is “*building*” the energy transition is uniting people together. *Energiewende* is the topic everybody is talking about. Even energy intense industries in Germany are conducting research to decarbonize their production chains by

2050, despite the fact that it is “*too expensive*” (Expert G-6). As energy transition guides the way German energy strategy evolves, its component premises become almost the trends of the day. This includes the nuclear phase-out. As a result, Ludger Mohrbach, a prominent representative of German nuclear industry, states that nuclear remains only as a reflection of the past and the word alone produces antipathy (Mohrbach, personal communication, 2017). According to 28 percent of the German experts, the zeitgeist changing against nuclear energy accounts for 9 percent of the constraining factors in nuclear energy policy-making.

It is a fact that with the evolution of renewable resources and the worldwide motivation to realize transition to a low carbon future through sustainable development changed global energy dynamics. In the context of energy transition, just like in Germany, for France as well decarbonization is an important target. It is indeed one of the motivations for France to remain in nuclear energy production, though not one of a top priority as the results revealed in the previous chapter. Nevertheless, 19 percent of the French experts believe that the zeitgeist in which the energy transition is taking place, is increasingly rising against nuclear energy, and thus constraints decisions for a pro-nuclear energy policy. This is the fourth major constraint for France’s nuclear energy policy with a share of 17 percent.

The personal experience of Expert F-2, a high-rank official in a French institution, successfully summarizes the situation:

“More and more people, especially the youth, are against nuclear. That’s one of our problems. I take my own daughter for example, she is 20 and she is not in favor of nuclear at all. Because she has been in the middle of a zeitgeist, a global culture that is really against the nuclear industry. The notion of nuclear is something which is not well considered. They call nuclear as the industry of the past, something very dirty, linked to the nuclear bombs, linked to war and to Fukushima or Chernobyl. For them, the war against Germany, the World Wars are the history of the past, stories in the books of a long time ago and not realistic anymore to be taken into account. I am from the last generation who could hear the migrant fathers and great great fathers who fought during the first world war and the second world war. So, my views are different. But the young people do not realize that the position of France in the world, in United Nations security council is thanks to nuclear. The young generation cannot get the

context of why France values its nuclear program and builds nuclear reactors”.

According to both pro and anti-nuclear experts, who think that the zeitgeist is turning against nuclear energy, the perception of nuclear industry as something very “old fashioned” coming from the past is strongly growing among the young generations. Accordingly, this is considered in France, as a problem for the long-term survival of the French nuclear program. Therefore, the view that the French government need to take this change into account prevails among the stakeholders, especially since the European Union’s context for nuclear energy policy is also transforming due to Brexit. Expert F-2 explains that within the EU, a significant majority of the activities of Euratom have been performed by France and Britain. Accordingly, Britain has been a strong ally of France within the EU with regard to the support for nuclear industry. With Brexit, France will be *“a little bit alone in the European Union”* says Expert F-2 and adds: *“France is going to be confronted with some sort of isolation since German phase-out killed the support for the nuclear energy inside the European Union. Therefore, France will face more pressure decrease further the nuclear share”*.

How did this change in zeitgeist work against nuclear? Why especially in Germany, energy transition was matched with an anti-nuclear attitude, despite the fact that nuclear energy is a low carbon resource? Viviane Raddatz from WWF Germany thinks that the notion of energy transition comes from 1970s and is very much fueled by the idea that if Germany keeps using nuclear fuels then it will have to deal with the waste, for which there is no final space for disposal. Because the nuclear waste has been considered as extremely dangerous for nature, and since none of the citizens were willing to commit themselves to live near a waste repository, Germans started to think *“why should we keep doing this? We should really stop producing more of it!”* (Raddatz, personal communication, 2017). This mentality also coincided with the ideas of “Club of Rome” and “Limits to Growth”⁸⁰ acknowledging that what “we” do, as humans, with the planet, matters. The perspective suggesting that human beings are capable of destroying the

⁸⁰ The Club of Rome had its first major gathering in 1970 which united like-minded thinkers who shared a concern for the long-term future of humanity and the planet. The Limits to Growth was the Club’s first major study published in 1972, which confronted the urge for continuous material growth and the pursuit of endless economic expansion. (The Club of Rome, 2020).

planet fueled the energy transition (Raddatz, personal communication, 2017), replacing the former dominant mindset in the Western hemisphere which counted on technology to make “*everything possible*” to increase the quality of human lives (Expert G-17).

Kurt Dieter Grill, the Chairman of German ITER Industrial Forum and a former member of the German Bundestag, describes this changing mindset in line with his own political experience, telling that “*rationality shifted towards the triumph of feelings*” (personal communication, 2017). After the Second World War, in the 60s, “rationality” was the dominant paradigm, and yet it has changed:

“Big cities became one of the major problems of the world. In the 60s I had 220 villages with 50.000 people in my constituency. They then turned the villages into towns and cities. They couldn’t communicate with their people anymore, they couldn’t touch them, they have lost the connection. How can you govern 20 million people in a city? I think the birth of Greens was a reaction to this phenomenon. Therefore, in the 70s ‘feelings’ came into the scene. Back then, there was a famous campaign saying ‘small is beautiful’. Today, with the internet and the digital world we have a mix of rationality and feelings”.

The change in the zeitgeist, which according to some, undermines the image of nuclear leads the decisionmakers to face significant concerns with regards to public acceptance. When “rationality” and the faith in technology was the dominant paradigm, politicians considered nuclear energy only as a matter of a technical issue. They did not involve public perceptions of nuclear into their decision-making processes, and they actually thought they do not even need public acceptance in the first place, as explained by Expert G-17. This is obviously not the case anymore, especially in Germany and France. In a policy-making environment where the public wants to be consulted, and is very much influenced by the idea of energy transition without nuclear energy, carrying a pro-nuclear energy policy forward becomes highly challenging.

With a sharp contrast to the results from France and Germany, the zeitgeist is irrelevant for the case of Turkey, as none of the experts made statements to be coded into this category. This can be due to several reasons but an educated guess can come up with some possible causes. First, the Turkish decision-makers can be so determined to have nuclear energy in Turkey that they are not exposed to the constraint of this changing zeitgeist. Second, the phase where the “faith in technologies” and the admiration for

nuclear which is said to expire in Europe, can be still valid for Turkey. As a matter of fact, the discussion on Turkey's expectations to become a high-tech country via nuclear technology discussed in the previous chapter signals that the change in the zeitgeist has not reach Turkish nuclear policy-making yet.⁸¹

Overall, the image that nuclear energy is an “outdated” technology under the zeitgeist, creates a major problem both for global nuclear industry and the policy-makers.

6. 7. Actual Nuclear Accidents

The *risk* of a major nuclear accident is the most prominent concern among the risks of nuclear energy, as Section 4 explained. However, a *risk* of an accident is different than the *actual* accident, so are their impacts. Therefore, for this section, only the statements which specifically declared any of the major nuclear accident as “the” constraint are coded, which corresponds to 3 percent. This result shall not imply a minor role for Chernobyl or Fukushima in the past and future of nuclear energy. On the contrary, they operate as central phenomena in the decision-making. What is creating a constraint is the effect that these significant accidents caused on the dynamics listed in this chapter, which augmented the pressure coming from the public opposition, the probability of risk or the cost factor. To illustrate Expert G-17 suggests that with Fukushima the wave of resistance in the population as well as in the political arena increased so rapidly that it was impossible to ignore. This forced the decision-makers to phase out nuclear immediately as opposed to 2010 decision on life extension taken only a couple of months ago, also as opposed to technical experts' criticisms that there is no connection between Fukushima and Germany's decision.

Consequently, as a result of in dept examination of the interviews, and experts' insights, this research argues that Chernobyl and Fukushima are triggering or intervening mechanisms, rather than constraints on their own, as the following chapter will be clarifying in further detail. They are also the most obvious examples for the interaction

⁸¹ This reminds me the famous words of Marx and Engels in Communist Manifesto which starts by saying: “a spectre is haunting Europe”. Neither nuclear energy, nor energy transition are a “spectre”. However, it is a fact that when an “idea” grows in Europe, it also spreads to the world. Accordingly, an energy transition with or without nuclear energy is an important debate for the survival of nuclear industry.

between the international and domestic levels, proving the pressure coming from the international context in nuclear energy policy-making. Gareth Wynn right summarizes this as following: *“We are only as good as the weakest link. One nuclear accident somewhere in the world destabilizes the support of nuclear everywhere”* (personal communication, 2016).

Still, 12 percent of the experts see nuclear accidents as immediate constraints. For instance, Dr. Laurent Turpin indicates that the Three Mile Island accident of 1979, was a psychological shock that really affected the construction of nuclear power plants (personal communication, 2018). Similarly, Dr. Ludger Mohrbach thinks that *“everything was quite alright until Fukushima happened”* (personal communication, 2017). Moreover, Expert F-4 believes that Fukushima accident itself became a form of propaganda against nuclear that goes beyond reality. Expert T-13 from Turkey agrees with this view since he declares that:

“not a single person⁸² died in Fukushima because of the nuclear meltdown. The losses were due to the earthquake. But the public opinion did not see the case like that. Fukushima was exaggerated in that regard. There were more than 2000 dead in a thermal reactor next to Fukushima during the earthquake yet no one talked about them” (Expert T-13).

The reference to nuclear accidents as a direct constraining factor is limited in Turkey, since only a few experts, such as Expert T-13, thinks that Chernobyl’s legacy was also among the causes leading Ecevit to cancel the nuclear bid in 2000. To illustrate, Expert T-2 who is a government official, clearly states that nuclear accidents are irrelevant to policy-making and that if we are to account for their effect, rather than Chernobyl or Fukushima, Metsamor in Armenia constitutes a greater danger for Turkey. On the other hand, with a very different perspective, he adds that nuclear accidents have been used only as *“excuses”* for the *“incapability of previous decision-makers”* who failed to materialized the construction of a nuclear power plant in Turkey.

⁸² In September 2018 BBC News revealed that Japan has announced for the first time that a worker from Fukushima nuclear power plant died from lung cancer after suffering radiation exposure (BBC, 2018).

6. 8. Lack of Know-How

The lack of know-how or expertise in nuclear accounts for 4,12 percent of the constraining factors in nuclear energy policy making, and it is mentioned only by the French and Turkish experts. Obviously, such a concern has not been valid for France at the beginning, since its nuclear energy program was initiated by prominent technical experts of the time and by the founding members of nuclear science, as explained in the previous chapter. Throughout the years, the technical expertise that France combined with skills in the realms of regulations and institutions, strengthened France's nuclear capabilities. However, the issue concerns two major challenges that impedes policy-making and policy execution in nuclear.

The first point concerns countries with existing nuclear power plants. Expert F-4 underlines that many of the Western countries have built nuclear plants in the past. *"It has been so long since they have built nuclear plants that they are no longer good at it"*, he argues. Undertaking the construction of a nuclear power plant is a very complex process: it takes a lot of very good suppliers, a very established supply chain and good project managers. Nevertheless, a lot of nuclear countries, like France, US, Finland, Expert F-4 explains, just haven't been practicing the construction enough, to do it well and efficiently. Expert F-4 continues explaining that other countries like South Korea, set examples of a country that is successful at it:

"The Koreans know how to build reliable nuclear power plants on budget and on track with the schedule. I think you can also see the same kind of effort in Russia or China as well. 'Doing it' is like a practice to develop the expertise. And if you only build a nuclear power plant once every 25 years, how are you going to have strengthen your capabilities?"

Expert F-4 asks. Today, the construction of nuclear power plants in Europe suffers from major supply chain issues and management problems. Combined with cost overruns, these shortcomings in the construction of nuclear power plants emerge as vital challenges for the nuclear industry. Moreover, the shifts in nuclear technologies and the move away from big central stations to small nuclear reactors remains under the domain of know-how yet to be developed.

The second point concerns the newcomer countries and therefore deeply interests the case of Turkey. As a matter of fact, “the lack of know how” is considered to account for 8,43 percent of the constraints for Turkey’s nuclear energy policy. In this context, the emphasis of the Turkish experts is more focused on the importance of experienced policy-makers and institutions in nuclear energy, rather than shortcomings in the technical capabilities.

Yılmaz Batıbay, who is a prominent nuclear expert with extensive experience in the United States, warns that the lack of indigenous know-how can be a hurdle for sustainable persistence and execution of Turkey’s nuclear energy policy in the long run (personal communication, 2018). Batıbay offers his insights from his experience in the United States, which he defines as a country with “*immense*” technical background and R&D capacity in the field of nuclear energy and with an established structure for research and development to enhance nuclear science. Furthermore, he makes a similar comparison with his counterpart in France, Expert F-4 with South Korea, as he states:

“First, it might seem impossible to reach that level of experience. Yet South Korea offers a great example, in that it is a nation which started from zero in terms of money, education, knowledge or experience and reached its current nuclear expertise. Then, I feel hopeful for Turkey too, why not to achieve the same progress?”
(personal communication, 2018).

An important feature of Turkey is that, Turkey does not totally “lack” the know how to execute a nuclear energy policy. Indeed, some experts such as Prof. Şule Ergün does not even define Turkey as a “newcomer” since the country has been engaged in nuclear research for many years (Ergün, personal communication, 2018). Therefore, Turkey stands as neither a newcomer nor an experienced nuclear power. Ergün considers this as one of the main deficiencies of Turkey’s current nuclear policy, as she suggests that it would be much easier and faster for Turkey if it was to start from zero and there were no experts at all:

“if we were a country starting from scratch it could be so much easier for us. There would be a to do list and we would be ticking the list one by one. However, now there a list such that in one item we are at minus hundreds in another we have thousand years of experience. Finding a balance in between is a real challenge”
(Ergün, personal communication, 2018).

Several experts agree that the lack of political experience to execute nuclear energy policy with regards to legal and institutional framework created some tension in the nuclear power plant construction projects of Turkey. So far, compared to the experience of France, Turkey has been slow to establish an institutional framework which also promotes a collective working culture encompassing all the actors in nuclear energy policy. To illustrate, according to Expert T-4, *“after all these years, our institutions are newly determining their roles in our nuclear power plant projects. Before it was a mixture, everyone was involved in every phase”*. Expert T-4 continues by telling that:

“We are too distracted. Nuclear engineering, the economics of nuclear, legal aspect of nuclear, the international market for nuclear...these are very different things. However, in Turkey the policy-makers had an impression that if someone somehow knows about nuclear energy, then he/she can deal with all of these. Personally, I’ve been doing my best to meet this expectation, yet there are also others who were heartbroken by not being consulted in the very beginning of nuclear policy-making and thus who said ‘they should have asked me before’ and stood aside” (Expert T-4).

As a conclusion, according the remarks of Turkish experts, the progress of Turkey’s nuclear energy program was hampered more by the lack of political expertise regarding the know-how about how to handle the institutionalization process and the assignment of existing national nuclear experts into the design and execution of nuclear policy, than the lack of technical expertise to build a national nuclear reactor.

6. 9. Alternative Resources

The discussion of alternative resources as a constraint for nuclear energy is only presented in Turkey, by 19 percent of the experts. Nevertheless, this statistic shall not be misleading. As earlier discussion on decarbonization and energy supply security covered, the interviews in all three countries had a considerable focus on renewables. Most of the time the statements of the experts concerned a comparison between renewables and nuclear energy, with regards to their comparative advantages and disadvantages. However, the expressed views were more in the form of a broader discussion on energy resources and diversification of the energy mix. The expressions in the sense that “the existence of potential for alternative resources” is a constraint for engaging in nuclear energy generation, was specifically referred for Turkey.

Let me further clarify this point. In Germany, nuclear energy policy-making evolved towards a phase-out. Although the basic view under *Energiewende* is reaching an energy portfolio made up of renewables, there was already a push in Germany for nuclear phase-out regardless of whether there are alternative available resources or not. The pressure coming from other constraining factors as discussed in this chapter has lasted for decades, when both nuclear energy and the alternatives, i.e. the renewables (since 1991)⁸³ were already in the country's energy mix. During the fieldtrip in Germany, a clear promotion of renewables as clean energy resources was present among official representatives, yet this was not stated in the context of constraining factors. Rather, the renewables and the investments for additional renewable capacities were considered as the solution to compensate for the loss of installed capacity to generate electricity due to the nuclear phase out, which would happen anyway. Germany did prefer alternatives over nuclear, but this was not the main motivation since the aim was to get rid of nuclear at any cost.

In France, the existence of alternative resources is not indicated as a constraining factor either, since renewables are evaluated in the framework of resource diversification, they are considered as complementary resources to nuclear energy, rather than rivals.

On the other hand, in Turkey, since current electricity production does not include nuclear energy, yet, some of the interviewed experts consider renewables and energy efficiency as “rivals” that render nuclear energy unnecessary, believing that the investments for nuclear should be allocated into the renewables and efficiency. Therefore, this preference of renewables over nuclear is voiced as a constraining factor. Expert T-1 expresses this point as the following:

“nuclear energy is expensive and dirty! Its alternatives are healthier and more accessible. As a primary concern we must work on energy efficiency, in order to save energy. Then, our economy can be more energy efficient and thus we won't need nuclear energy”.

⁸³In 1991, the first German feed-in law called the Act on Supplying Electricity from Renewables (Stromeinspeisegesetz, StrEG), came into force which made the payment of a fixed remuneration to electricity based on renewable energy sources. Bechberger and Reiche call this a “market breakthrough” in wind energy, in Germany (Bechberger & Reiche, 2004).

However, Expert T-15 underlines that Turkey has a huge potential for alternatives, but there is a lack of political will to work on them: *“they blame us saying that we criticize nuclear energy policy and yet we do not recommend any concrete alternative policies or any alternative solutions to meet Turkey’s energy needs. It is not true! We offer plenty of solutions, action plans but the decision-makers lack the will to execute them”* Expert T-15 says.

This research does not aim to promote an understanding where a resource is favored more than the other. On the contrary it suggests that the total energy mix should be the primary concern when designing the policy for a specific resource. While some of the interviewed experts hold the same view, as demonstrated in the discussion of energy supply security as a driving factor for nuclear, others strongly believe that Turkey has no other alternative but nuclear energy. To illustrate, Expert T-11 argues that: *“We must first discuss the alternatives. What are we going to do if we do not build nuclear power plants? Do we have any other option? NONE!”*. In the dominance of this perspective among the policy circles in official institutions, the view that the existence of alternatives creates a constraint on policy-makers to come up with a pro-nuclear policy loses its significance.

6. 10. Health

The effects of radiation exposure on human health are usually discussed under the risks of nuclear energy generation, in scope of the consequences of a potential nuclear accident. Nevertheless, some experts in Germany referred to “health issues” not under the risks of nuclear, but rather as a direct statement in our discussion for constraining factors. Therefore, such statements are coded under a category of their own, i.e. “Health”.

For Germany, the emphasis on health dimension of the issue dates back to Chernobyl Accident. By the 30th of April 1986, only a day after the accident, the whole of southern Germany was affected by the radioactive cloud. The radioactive substances released from Chernobyl, highly contaminated drinking water, air, soil and foods (especially products ready for harvest), eventually leading German population to radiation exposure (Ettenhuber et al, 1996).⁸⁴ These immediate impacts of the accident on the health and

⁸⁴ For more information on the health effects of Chernobyl please see *Health effects of the Chernobyl accident and special health care programs*, by World Health Organization (2006). Moreover, Svetlana

daily lives of German citizens operated among the major root causes for public opposition and politicization of the nuclear debate in Germany. Furthermore, according to Expert G-10, this experience increases the respect of policy-makers to the perception of “dangers” associated with nuclear. Therefore, this became an important constraint throughout the years for nuclear energy generation.

Same emphasis is made by a minority of experts from Turkey, in the context of Chernobyl’s similar impact on the Black Sea region of Turkey.⁸⁵ The issue is raised as a factor that should normally hold back the policy-makers against nuclear. Nevertheless, the same experts think that, on the contrary, this factor does not affect the policy-making in Turkey. In this context, the remarks of Expert T-16 can be illustrative, since he believes that these arguments emerge due to lack of information and that there is no proved connection between cancer incidents in the region and radioactive contamination.

6. 11. Human Factor

“Human Factor” is a challenge only raised during the interviews in Germany, by Kurt Dieter Grill who points to the “*problem between the machine and human being*” (Grill, personal communication, 2017). According to Grill each nuclear accident that occurred so far, had to a certain extent the human factor, demonstrating the potential of human’s failure in the design or operation of the nuclear power plants. Grill, as an experienced politician who has been right at the center of the nuclear debate in Germany, underlines that the solution rests designing a system which totally detaches nuclear safety and nuclear security from the human component. The human factor corresponds to only 0,52 percent of the overall constraining mechanisms and it can also be evaluated among the “risks” associated with nuclear energy generation. Still, this is a constraint valid for every country. Especially, for the newcomer countries which are developing their nuclear program, this is certainly a factor which needs to be underlined independent from other risks and which needs significant attention in the education indigenous human capital in nuclear.

Alexievich’s book titled as *Voices from Chernobyl: The Oral History of a Nuclear Disaster* also offers insights to the post-accident experiences.

⁸⁵ In her book, *Beni Akkuyu’larda Merdivensiz Biraktın*, Filiz Yavuz (2015, pp. 47-54) offers a snapshot of the discussion about the effects of Chernobyl on Turkey, with anecdotes from the actors of the era.

6. 12. Conclusion

What hinders a country's nuclear energy decision? This chapter demonstrated the combination of different factor which can operate as constraining mechanisms in the decision-making for nuclear energy, with an effort to answer this question. The insights of the experts from three different cases allowed a comparative analysis. As France continues its nuclear energy generation, the factors listed above emerge as *challenges* for France, which did not constraint its leadership position in domestic nuclear energy production but created hardship to French policy makers and French nuclear industry. For Germany, these factors were actually the drivers of the eventual nuclear phase-out decision. For the case of Turkey, the chapter illuminated which factors constrained Turkey's progress in its path for nuclear energy which has been subject to fluctuations with several cancelled attempts to construct a nuclear power plant, despite political willingness.

The analysis detected three major groups among the factors as technical issues, economic issues, and political issues. Among these, the problems concerning the management of nuclear waste, the high capital investment and safety costs of nuclear power plants and public opposition to nuclear energy are identified as the top three constraining factors in nuclear energy policy-making. However, the remaining factors also are not to be disregarded.

Furthermore, I suggest that an additional finding needs to be highlighted. Some constraining factors are highly interactive. In this way, the existence of one, can catalyze and augment the impact of the other. To illustrate the issue of nuclear waste is a technical constraint on its own due to the lack of a final solution. However, at the same time, the concerns over the legacy of radioactive waste for future generations and "not in my back yard" approach against the execution of the policies for interim storage intensify public opposition.

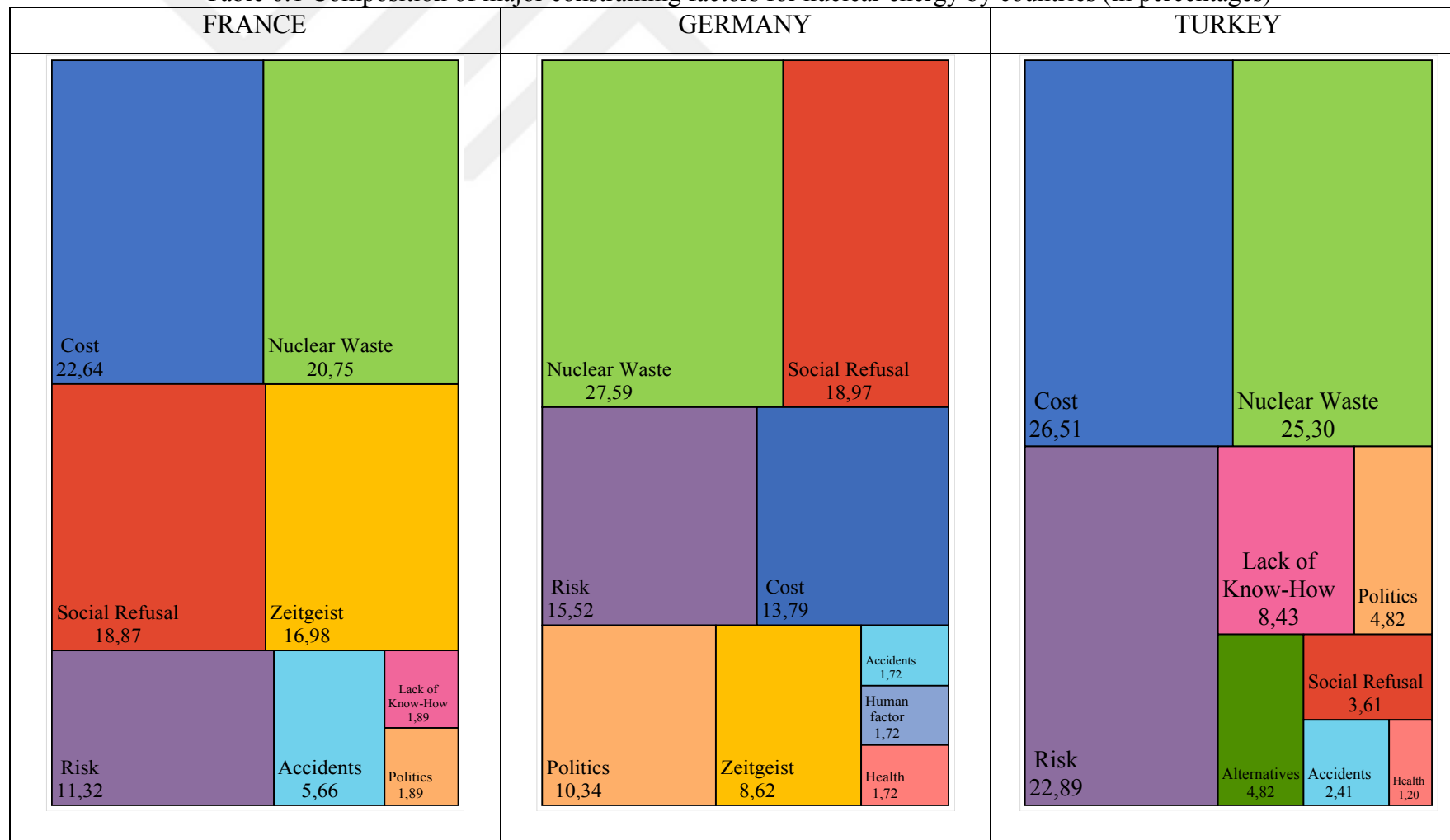
The analysis results show that each country's constraining factors change by their level of importance or some factors are not present at all in certain cases. Table 6.1 offers a

comparative illustration of constraining factors for the cases of France, Turkey and Germany.

When it comes to the decision on nuclear energy, motivating factors and constraining factors are pulling the decision makers into opposite directions. Hence, the policy outcome is a function of the “clash of factors”. The way the push coming from the drivers and constraints are perceived and the extent they penetrate into the decision-making is dependent on the country’s national circumstances. To this end, the following chapters focus on important components of the domestic context in which nuclear energy decision is made and which has the capacity to influence nuclear energy policy.



Table 6.1 Composition of major constraining factors for nuclear energy by countries (in percentages)



Chapter 7

THE DOMESTIC CONTEXT

The decision on nuclear energy is highly affected by the interplay between the embedded parameters (Weible & Jenkins-Smith, 2016) in the policy subsystem (such as the advantages and risks of nuclear energy as discussed in earlier chapters) and external subsystem dynamics (Sabatier & Weible, 2007) which do not directly address nuclear energy per se, but indirectly affect the policy on nuclear. Policy-making on nuclear energy is an output of several calculations which take place under the limitations or advantages of a country's national circumstances. Domestic elements, which in the context of this research can be labelled as external subsystem parameters, are the "given" of a country according to which driving and constraining factors of a policy preference are processed. Therefore, from a country's foreign policy options to its economic activities, from its development trends to its energy preferences, all policy spheres are compelled to be evaluated within the boundaries of the country's national context.

The model used in this research suggests that the nuclear energy policy-making takes place within the dynamic interaction between the global and domestic levels, and claims that to the extent that the components of these levels are conceived, understood, and interpreted by the stakeholders in the policy-making process, they become influential. This chapter reviews major domestic elements revealed by the analysis, which are relevant in nuclear energy policy-making. The chapter reflects the perspective of stakeholders and their relative emphasis on different dynamics.

Following sections offer main findings of this research which are categorized under national elements, in line with the categories that emerged from analytical examination of the interviews' content. Accordingly, the chapter is not guided by the literature, but from the data analysis following grounded theory approach. Therefore, additional national conditions may apply once the study is extended to different countries. Still, the fact that common themes appeared in all three cases of Germany, France and Turkey despite their significant national differences, proves that the following themes can offer

a common denominator applicable to all countries (though national components of the same categories will differ), as per major domestic elements that condition nuclear energy decision-making.

Figure 7.1⁸⁶ demonstrates domestic factors by the percentage of participants referring to that specific topic. These are the contextual elements which offer the venue for nuclear energy policy-making, the decision-makers are bounded by these factors or by the way these factors are perceived by themselves or by other stakeholders who have access to the decision-making. Accordingly, in the clash of driving and constraining factors, as the previous chapter has concluded, these domestic components can have an amplifier effect for either side, and affect the policy outcome.

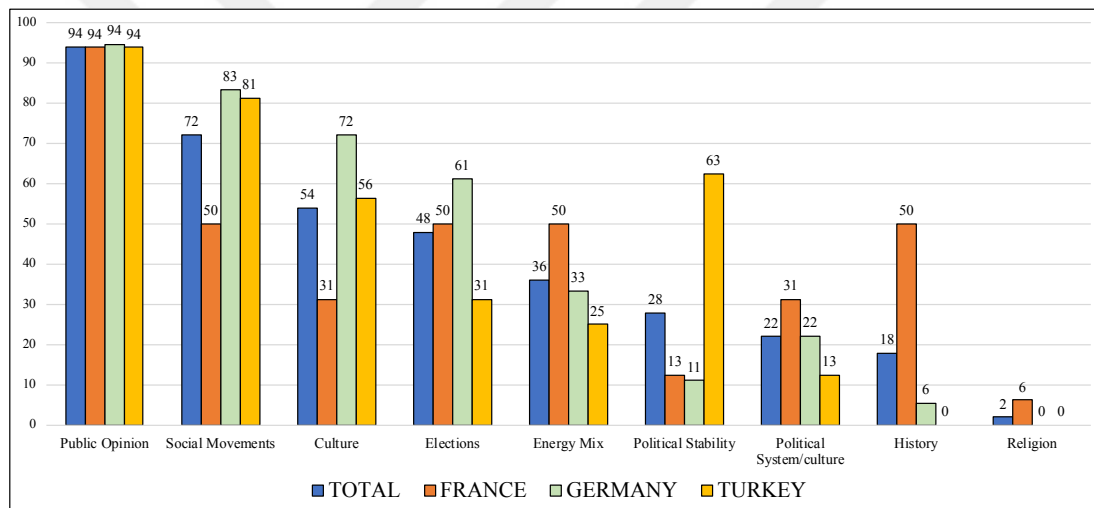


Figure 7.1. Major domestic elements in nuclear energy policy-making by interviews, in percentages (Prepared by the author).

Needless to say, it is not easy to draw conceptual boundaries between these factors nor it is possible to offer a hierarchical relationship with regards to their influence and chronological appearance. They all offer an intertwined sum, with different relative weight, as Figure 7. 2 illustrates.

⁸⁶ Detailed frequency tables for each country are available in Appendix VI.

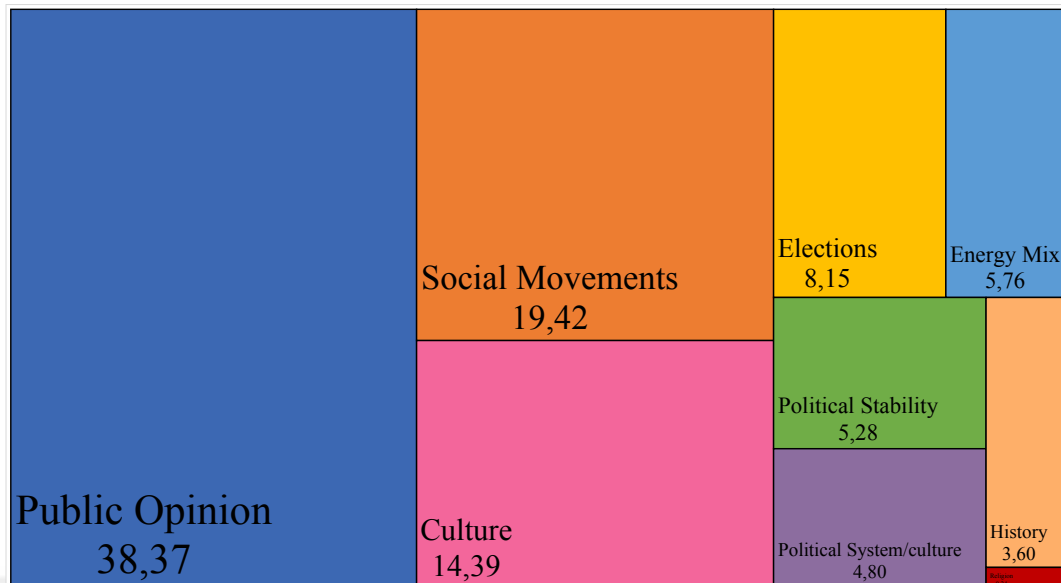


Figure 7.2. Domestic elements in nuclear energy policy-making, by coded segments, in percentages (Prepared by the author).⁸⁷

Overall, it is possible to talk about three broad categories of factors, plus the energy mix of the country. The first category concerns the national features with regards to the public opinion and anti-nuclear movement, which are highly interactive with each other. The second category relates to the socio-political structure of the country, interestingly depicting how history, socio-cultural elements and state culture are enmeshed with each other. The third category involves the interplay between the domestic and international levels and tackles intervening or triggering mechanisms which influenced the course of policy-making.

7. 1. The Energy Mix

When decisions on energy policy are at stake, the country's domestic energy production, the availability of indigenous natural resources, the economy's energy intensity, energy demand projections, energy import dependency of the economy are the central factors of the policy calculations. These "usual suspects" that immediately come into the picture as the "fundamentals" of energy policy-making are already overviewed for Germany, France and Turkey in Chapter 2, in the discussion of case selection and partially in Chapter 5 in the energy supply security among the drivers of nuclear energy. In addition to these discussions, some of the experts specifically underlined the need for a general

⁸⁷ The factor represented with the littlest share in the right bottom corner is "religion" with a share of 0,24 percent. It is discussed under the interplay of socio-cultural elements.

perspective on the “energy mix” of the country. Hence, the need for a relative evaluation of every possible resource was coded under national context, since it depended on domestic availability of alternatives.

Most of the experts who refer to this category, share the view that designing nuclear energy policy, the policy-makers need to analyze the overall energy picture, instead of focusing only on nuclear. To illustrate Alain Bucaille warns that it is a “*dangerous illusion to focus only on nuclear*” and adds: “*I was always convinced that all the other forms of energy were as important for understanding nuclear, than only nuclear*” (personal communication, 2018). This requires the design of energy policy considering three major challenges at the same time, as Makoto Kanda explains: “*the first challenge is energy security, stable supply of energy, the other is economic efficiency and the third is environmental protection. Sometimes these three are conflicting. For instance, from the environmental protection point of view renewables might be the good energy source, but from the energy security point of view stability is questionable.*⁸⁸ *Therefore (instead of a specific resource) the best mix of energy should be promoted*” (personal communication, 2018). Accordingly, the right conversation to have about the future energy plans of a country should be in terms of not only simply maximizing the share of a certain energy source (such as renewables or nuclear) but to find the right mix of resources based on capacity, storage or the best cost. In this regard, Expert F-4 also points to the need to evaluate the overall energy system in a logical fashion and warns that no policy-maker is looking the issue from that way. “*This is unfortunate*” he says, and underlines the risks of being too dependent on a single resource for energy supplies as he asks “*do we have to wait for a crisis for people to recognize the direction that things can take?*”.

The consideration of energy indicators and the evaluation of the available resources in the energy mix are *sine qua non* in energy policy-making. However, they are not the

⁸⁸ In this regard, Kanda also makes an important remark for Germany’s nuclear phase out decision. He notes that Germany was able to take such a decision because there is international connectivity in Europe. The grid is connecting Germany to French electricity system. Therefore, Kanda explains, Germany can buy electricity from France in order to fulfill the gap for when the renewables do not work. However, that electricity would be generated by a nuclear power plant.

unique drivers of energy decisions and they are enmeshed with other domestic conditions as following sections will further clarify.

7. 2. The Elephant in the Room: Public Opinion

The public opinion is one of the most important issues raised when discussing nuclear energy. Nevertheless, what is often referred by “public opinion” is the opposition dimension, which is a component of constraining factors in nuclear energy policy-making. In the previous chapter, I have already suggested that a country’s general public opinion dynamics and the existence of a public resistance for nuclear are not the same. Differentiating between public opposition and public opinion, I argue that the issue of public opinion is so much more complex than just the “public resistance” dimension in policy-making. The results also support my view since 94 percent of the experts referred to public opinion and 38,4 percent of the contextual factors concerned public opinion.

Why the public opinion requires special emphasis rests on a number of reasons. First of all, both understanding public opinion dynamics and getting through them in policy-making are very complicated and difficult. Social acceptance is not an issue unique to nuclear energy, since different concerns of the public with regards to safety, environment or health can complicate the policy-making of any energy resource. However, the extent that public opinion can be an effective factor on the actual policy is very much dependent on the national context of the country. The impact of public opinion is dependent on whether the decision-makers take public opinion into account and whether they are responsive to their citizens, or not. If not, even a strong public opposition might be irrelevant for nuclear energy policy-making.

With this background, this section investigates two major questions: “Does public opinion matter?” and “what does the public really think about nuclear?”. Furthermore, it addresses the role of national debates on energy policy-making in transferring the public opinion into decision-making mechanism.

7. 2. 1. Does Public Opinion Matter?

In all three cases the reference rate to public opinion is 94 percent. While almost all the experts made statements with regards to public opinion, one of the major questions was whether they really consider public opinion as an effective input in decision making.

According to the majority of German experts, public opinion significantly shapes the policy-making in energy. To illustrate, Rainer Baake explains that the primary decisive factor for nuclear energy, in a democracy, is public opinion: *“you cannot do anything against public opinion! After that of course, you have environmental reasons, security reasons, now there are also economic reasons”* (personal communication, 2016). Similarly, Expert G-9 also affirms that *“for policy-making the limit is always the acceptance of the population”*. From the German perspective this is not only valid for nuclear energy. The policy-makers are receptive to public opinion in every dimension of energy. Expert G-6 offers a very relevant example referring to the growing opposition among the peasants living in northern Germany, against the wind turbines: *“the region is full of wind turbines and now the governing Green Party in the northern region federal state slowed down the wind turbine constructions because of this opposition. There is always the fear of the green camp that somehow the support of the public might go down”*.

French experts also agree that decision-makers have to build public support in order to get a nuclear power plant project done (Expert F-4). Increasing importance of public opinion is acknowledged by the stakeholders due to the fact that digital tools distribute information rapidly and expose policy-makers more to the public. Expert F-14, who works for one of the Ministries in France, declares that they are trying to introduce new tools and ways to increase public participation into the decision-making processes due to increasing importance of public opinion. He states: *“it is more important because the way the world functions has changed with internet and fast networks distributing the information everywhere. Any information can become public in the same second, at the same time, for anyone”* (Expert F-14). Accordingly, Expert F-10 who is also working for the French government underlines that *“The key is to speak about nuclear, transparently with sufficient level of information, to explain what happens, why it happened, and how to deal with technical difficulties.”* In this regard, during the interviews, most of the

French experts have been particularly stressing local and national mechanisms for including the public into the policy processes, such as “*Commission Locale d’Information*” (Local Information Committee) which includes different stakeholders from the NGOs, the public or local governors to discuss the details of nuclear projects before the construction or modification. Dr. Laurent Turpin makes it clear that France strictly follows national and European conventions which requires public consultation and information as mandatory elements (personal communication, 2018).

In Turkey, the majority of the interviewed experts think that public opinion is not taken into account as an input for the decision-making process. However, they have very different arguments regarding why it is the case. Expert T-5 and Necdet Pamir strictly state that neither public’s nor the informed experts’ opinion are considered by the decision-makers. Furthermore, Pamir thinks that the procedures regarding the involvement of the local public and the environmental impact assessment processes for the ongoing nuclear power plant projects are simply “*superficial*” (personal communication, 2017). Expert T-7 and Expert T-13 on the other hand, suggest that the policy-makers does not take public opinion into account since they have to deal with other pressing challenges such as the cost of building the power plant or the burden of being an import dependent country for natural gas:

“The decision-makers have to deal with the ugly truths of the country. If nuclear energy is introduced into the energy mix we will not have to pay for imported natural gas. This is the basic calculation that they take into account. They will not give up deciding based on these concrete facts just because a couple of people protest nuclear on the street” (Expert T-7).

This apparent difference of approach to public opinion between France, Germany on one side and Turkey on the other, is also raised by two Turkish experts who think that this is due to fundamental differences in the understandings of democracy. According to Expert T-6 and Expert T-5 not only the decision-makers do not feel obliged to consider public opinion, as “*they think they know the best*” (Expert T-6), but also the public does not really consider itself as a stakeholder either:

“Despite democracy, Turkish society has the eastern culture of absolutism. Our people do not really demand or decide for anything. They always follow a leader who decides for them and they follow their ideas. The policy-makers know this very well and that’s why they never take public opinion into account. Unless the

public awakens about its own power in ruling this country, about the power of the votes and taxes and say 'it should be us who decide' nothing will change. Therefore, the decision to build a nuclear power plant in Turkey has nothing to do with public opinion. The public does not ask for anything from the policy-makers, they just accept what is given to them, especially when it comes with side-benefits!' (Expert T-5).

It is important to note that the Turkish experts are reflecting the way they *see* the domestic context of Turkey. Therefore, their remarks do not necessarily mean that they approve what they *see*. This means that their statements of certain facts are not endorsements. While the majority of the experts think that public opinion is not taken into account, experts such as Expert T-4 and T-8 personally believe that without public awareness and acceptance it is not possible to execute nuclear project in a successful manner, adding that if the public is against nuclear, the power plant projects should be abandoned. With a sharp contrast there are also those who think that the public opinion is not taken into account simply because it does not matter at all. The first reason according to Expert T-3 who is working in a government institution is because the public opinion is totally biased. The second reason, according to Expert T-10, is because the public is not competent enough to decide as *“they believe whatever the media offers them”*. Expert T-10 also believes that an informed public would not even be discussing whether Turkey should build nuclear energy or not, since nuclear energy is a must for Turkey to be a player in the international arena.

7. 2. 2. What Does Public Opinion Say?

The argument that public opinion is increasingly shifting against nuclear energy, has been at the very center of nuclear debates (Szalai, 2018). However, understanding and reading the dynamics of public opinion on nuclear is not a straightforward task. This section focuses on both how the experts perceive the status of public support in their countries and on the actual public opinion for nuclear.

Germany versus France

In Germany, Expert G-17 and Expert G-18 stress that the majority of the German people are strongly against nuclear technology. Craig Morris underlines that even when Merkel

had extended the phase out decision, almost two thirds of the population was anti-nuclear and that public opinion did not really change over time. Morris adds: “*asking if the Germans are anti-nuclear, is like asking if the Germans like beer or not!*” (personal communication, 2017). Now that the phase-out decision is being executed, Morris believes that the topic is not whatsoever relevant for Germans anymore. He says: “*the Germans don’t really take part in the international debate about nuclear any longer because the topic is dead here*” (personal communication, 2017). My fieldtrip experience confirms this claim since some of my interview requests with Bundestag representatives, including Green Party, were rejected with the argument that the issue is no longer salient for them.

An interesting remark stands out in the discussion of German public opinion. This comes from Kurt Dieter Grill who thinks that the lack of public support for nuclear is not actually unique to nuclear energy. To explain his point Grill points to the opinion polls stating that the majority of the population is not only against nuclear power, but also against oil and now increasingly against coal. He argues that the same people who made campaign against nuclear power are now running campaigns against coal. According to Grill, the root cause for this opposition in Germany is “*the dream to be free of problems, the dream of ‘no problems’*” (personal communication, 2017). This interpretation is important from a climate perspective as well: coal or nuclear, the Germans are against both no matter what their emissions are. Nuclear energy is not considered as a remedy for climate change at all by the German public.

For France, the discussion of public opinion is less straightforward compared to Germany. In France the majority of the interviewed experts consider French public opinion as being stable and as distributed evenly between supporter and opponents without any significant opposition. Representatives from official authorities such as Expert F-1 and F-10 believe that this politically permits the government to continue with its nuclear program. The experts link France’s relatively (compared to Germany) favorable public opinion to several factors.

First of all, Dr. Laurent Turpin tells that general public opinion was not against nuclear especially in the 1950s and at the initial times of French nuclear policy, because nuclear

energy was considered as a progress for France.⁸⁹ The second reason which is very much related to the view of progress, is the pride factor. Governmental representatives believe that French people are enormously proud of their country's nuclear capabilities and the independence of France provided by nuclear power. Expert F-2 explains this as the following:

“a huge part of the population is still thinking that we own our position on the international stage because of a few factors, one of which is the fact that we've got nuclear power. So that is the reason why the Greens or NGOs like Greenpeace find limited number of supporters. We have to admit that after Fukushima an opposition has been growing against nuclear industry but still the majority of the public is in favor of nuclear.”

Some critics also agree with this argument saying that *“despite all the failures of French nuclear industry, France's nuclear power and the French sense of prestige or the French sense of power and security, are hugely enmeshed”* (Dorfman, personal communication, 2018).

The third factor concerns pragmatic reasons such as continuous and affordable electricity supply. Some experts suggest that French people are pro nuclear and nuclear energy is not a salient issue in France since it offers cheaper electricity compared to the rest of Europe (Expert F-9). Expert F-3 reminds that especially during 1980s and 1990s, following the economic crises, it was communicated to the citizens that due to nuclear, they were having very cheap bills at the end of the month. In this realm, Expert F-2 and Expert F-15, who are working in two different ministries of the French government, both stress that in evaluating public opinion, asking people abstract questions such as *“are you for or against nuclear?”* would not offer their real perspectives. When the French citizens are asked the practical question of *“we are going to close all the nuclear power plants, are you ready to pay the price?”* or *“how much are you prepared to pay?”* they think that the French people are not ready to pay the price:

“In Germany people are ready to accept to pay large amounts for getting out of nuclear. If you ask the French to pay this tax to get out of nuclear, you'll get a revolution in the streets. Currently, in abstract terms the opinion almost evenly distributed in our

⁸⁹ Dr. Turpin states that with the 70s, the negative attitude had started to grow as opponents was linking it with the war and the US. He tells that it was only with the psychological shock created by The Threemile Island in 1979 that some opposition started to grow in France.

country. But as soon as you get on a concrete choice, a pragmatic choice, then the result is very different. Because in fact, the French are not really afraid of nuclear. You don't have these kinds of fears that you have in Germany" (Expert F-15).

It is important to underline that these three reasons were also among major drivers for nuclear energy in decision-making. Therefore, these drivers do not only motivate the decision-makers to choose nuclear power in their energy mix, but also they indirectly serve to curb the constraint coming from public opposition by offering incentives to the public to support or at least not to oppose the policy on nuclear. The recent opinion survey conducted by IRSN supports these arguments: Energy independence and the price of electricity are indicated as the two strongest arguments for nuclear power today, by 36 percent and 21 percent of the participants, respectively (IRSN, 2020).

There are also French experts who do not see the picture from this perspective. First of all, Mycle Schneider explains that the French people have never been fanatics about nuclear power, as many people write or think. On the contrary, he underlines that French citizens have always been critical: *"actually if you take into account the brain washing that has been ongoing for 40 years, it is remarkable to what extent people could remained critical"* (personal communication, 2018). Furthermore, Schneider contends that a distributed public opinion or people having mixed views on nuclear shall not be interpreted as a "favorable" public opinion in France. Underlining the opposition has been growing even before Fukushima, Mycle Schneider points to *"critical minority"*:

"If you look at the opinion studies, prior to Fukushima, it was around 44 in favor of maintaining nuclear and around 40 for a phase out. After Fukushima, the percentage in favor of a nuclear phase out increased. It is not that an overwhelming majority of the French people are against nuclear, but still there has always been a critical minority. And this is a strong minority. It is not a 5 percent minority but rather a 40 percent minority at the very least. However, no one in the decision-making process considered this" (personal communication, 2018).

Likewise, Expert F-7 rejects that the French trust nuclear energy. According to him, the French people are beginning to understand more and more the problems associated with nuclear, such as the waste and largely the cost. However, he adds *"The French know that there are these nuclear plants everywhere, they just have to live with it. And because you*

have to live with it, you sort of ignore it. That is largely what I think the French do". This perspective basically claims that the issue of nuclear is not salient for the French people because they have to live with it. Alain Bucaille from CEA disagrees on the grounds that it is rather a matter of delegation of responsibilities: *"the public thinks rationally and believes that it is the duty of the professionals to decide whether nuclear needs to be part of the French energy mix in the future and what should be its exact share"*, he states (Bucaille, personal communication, 2018).

These remarks are how these high-level experts read public opinion from their own perspectives. What is really the case? Keeping in mind the striking difference in nuclear energy policy positions of France compared to Germany, and considering the strict stance of Germany for phasing out its nuclear power plants, it is possible to expect that France might have a more flexible public opinion for nuclear energy while German public opinion can be expected to be significantly more anti-nuclear. Checking public opinion in France and Germany right before the Fukushima accident which is an important benchmark event followed by the German nuclear phase-out is a fruitful comparison.

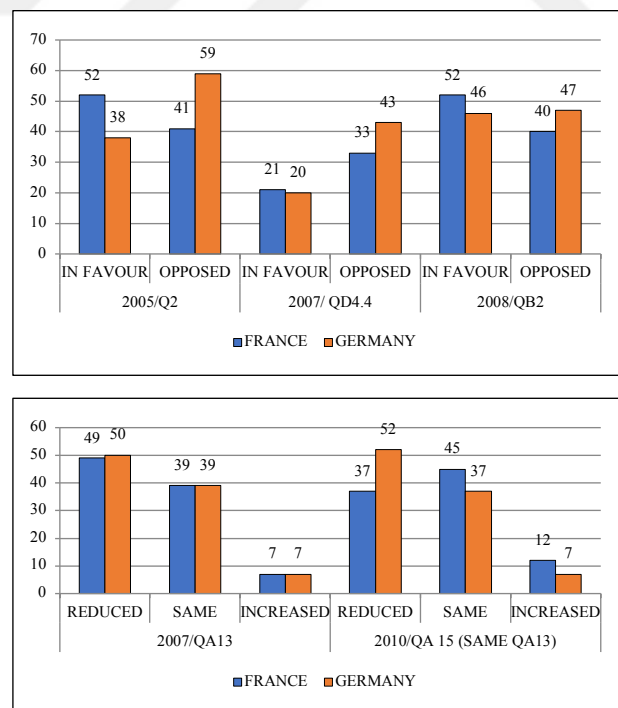


Figure 7.3. Support for nuclear energy and the share of nuclear energy, in percentages.⁹⁰

⁹⁰ Compiled by the author, data sources are as following: For the graph on the left, 2005/Q2 is from Special Eurobarometer 227. The question is "Are you in favor/balanced/against to energy produced

Figure 7.3 demonstrates the results of four different Eurobarometer surveys conducted until the Fukushima accident in 2011. For Germany, the percentage of the nuclear opponents and participants who want the share of nuclear to be decreased are higher than in France. Nevertheless, the variation is not as much as expected since the results for France and Germany are not significantly at odds. Especially concerning the opinion survey of 2008, the difference between the percentages of “in favor” and “opposed” respondents France and Germany are less than 10 percent. Country-specific results as well do not show an opposition or support concentrated on one side or the other. For instance, in 2008, German public opinion was split into two with really close percentages, 46 to 47. Regarding the share of nuclear, in 2007 the majority of France was for reduction just like in Germany. In 2010, 45 percent of the French wanted to keep the share of nuclear as it is, while 52 percent of the Germans were in favor of reduction. The updated version of the results reveals a slightly different trend on the part of France, while German position remains approximately the same. Although the minor increase in the French position in terms of increasing nuclear energy share is striking, 37 percent responding in favor of reduction implied that a totally pro-nuclear French public opinion is not present. Furthermore, the fact that the French opinion was almost evenly distributed between opponents and supporters of nuclear energy supports Mycle Schneider’s point concerning critical minority.

As another important statistic, Special Eurobarometer 324 on “Europeans and Nuclear Safety” conducted in 2010, only a year before Fukushima, finds that 65 percent of the French people consider nuclear power plants as a risk, as opposed to only 46 percent of the Germans (European Commission, 2010). As a consequence, the surveys indicate that the public opinion differences between France and Germany do not vary as much as their

by nuclear power stations? (European Commission, 2005b). 2007/Q.4.4 is from Special Eurobarometer 262. The question is “Are you in favor or opposed to the use of nuclear energy in your country?” Please note that 44 percent of the French participants were “balanced”. (European Commission, 2007b). 2008/QB2 is from Special Eurobarometer 297. The question is “Are you totally in favor, fairly in favor, fairly opposed or totally opposed to energy production by nuclear power stations?” (European Commission, 2008b). For the graph on the right, 2007/QA13 is from Special Eurobarometer 271. The question is “In your opinion, should the current level of nuclear energy as a proportion of all energy sources, be reduced, maintained the same or be increased?” (European Commission, 2007c). 2010/QA 15 is from Special Eurobarometer 324 and it is the same question (European Commission, 2010).

nuclear policy positions as response to Fukushima. Indeed, looking at the mixed messages coming from the statistics, one could even expect that after Fukushima disaster, France with 65 percent of the public seeing nuclear energy as a risk would be more inclined to have a radical decision regarding nuclear power generation. The statistics prove that it is not possible to draw a direct conclusion between public opinion and nuclear energy. Although public opinion is an important component, it is not a sufficient factor to explain nuclear choices.

The situation in the aftermath of Fukushima is still challenging for public opinion analysis. For Germany, an opinion poll realized in June 2011 found that 57 percent of German citizens believe the phase-out policy of the government is feasible (Foratom, 2012, p. 11). However, according to a recent Eurobarometer conducted in 2019 on “Europeans' attitudes on EU energy policy”, 52 percent of the French and 57 percent of the Germans *totally* agree (plus 34 and 23 percent *tend* to agree) that in order to ensure access to secure energy, it is necessary to ensure that nuclear energy is safe and secure in the EU (European Commission, 2019). The results offer mixed interpretations since it is not perfectly clear whether the respondents are only thinking about nuclear safety or if they also support nuclear energy for energy security.

The Case of Turkey

The study of public opinion on nuclear energy in Turkey is no less complicated than France or Germany, yet for completely different reasons. An anti-nuclear movement is not absent in Turkey as the following sections will be covering. This proves the existence of a certain number of individuals opposing nuclear energy. However, Turkey lacks a nation-wide opinion poll which offers yearly results on the public opinion on nuclear energy in Turkey. Some NGO-driven polls, such as one from Greenpeace, reveal that approximately 60 percent of Turkish citizens are against nuclear energy (Greenpeace, 2011; Ertör et al., 2012). Similarly, a more recent independent opinion survey shows that the rate of supporting nuclear, which was 43 percent in 2011, decreased from 37 percent in 2012 to 34 percent in 2018. (Konda, 2018, p. 33). Accordingly, 66 percent of the sample thinks that Turkey should not build nuclear power plants. The lack of a state-led opinion poll on the issue, renders the view of the stakeholders even more interesting,

since they develop their perspectives mainly based on their own observations and experiences.

Five of the experts interviewed in Turkey clearly state that they believe Turkish public opinion does not have a serious idea on nuclear energy due to the lack of education and interest. According to Expert T-6 Turkish people does not have any intention to learn about nuclear and develop an opinion on it. Expert T-5 agrees with this point as he says the general public does not follow the news on nuclear, does not have information nor the interest to meaningfully assess nuclear, because the public does not see itself as an actor in the decision-making.

With this background, Expert T-4 still sees three mainstream dimensions to Turkish public opinion on nuclear energy. Accordingly, first, some think that nuclear technology is a useful source for energy and supports it, but does not want it in Turkey believing that the power plants will not be operated properly and nuclear safety will be a problem. Second, others are completely against nuclear energy due to their deep fears rooted in nuclear accidents in the world. Third, there are also those who support nuclear power projects in Turkey because they want to support the government. Arif Künar, who was one of the forerunners of anti-nuclear movement in Turkey back in the 1990s, even thinks that the third group might be in majority, for supporting Turkey's nuclear energy policy: *"based on arguments over increasing power, investment, employment, energy diversification, or by simply thinking 'the US and France have nuclear power so why shouldn't we?', I think that unfortunately the majority of the public might be even supporting nuclear energy in Turkey"* (personal communication, 2018). Furthermore, both Arif Künar and Expert T-7 agree that today, the opposition to nuclear energy has moved from public into a specific group of elites, with less members and more ideology. Künar observes that the public participation into the nuclear debate is less than before because for at least the last ten years Turkey lacks any public debates on nuclear energy that can diffuse anti-nuclear perspective into a broader audience. Interestingly, Expert T-13 agrees that there is no public debate, but approaches the issue from the opposite side arguing that while anti-nuclear views always find their ways in the media, those supporting nuclear, such as the industry in Turkey, do not really go public to praise nuclear.

In line with the perspectives of these experts, although the atmosphere seems in favor of the Turkish government not facing a massive negative public opinion on nuclear policy, Expert T-4 highlights that if the policy-makers want to follow the right way, it is not the general public opinion but rather the local opinion that matters the most, and explains why: *“in nuclear there is always the issue of NIMBY (not in my backyard). I think the overall public opinion might support nuclear energy for political reasons, just because they also support the government. But the main question is whether the people of Mersin or Sinop really wants nuclear energy or not”*.

Interestingly the reference in this last point exposes an interesting common point across the three case countries. Despite their completely different settings for public opinion, the expert views in all three cases unites in underlining the interaction between the public and the nuclear power plant site, with the view that the opposition mainly comes from people living miles away from the plant site, not from the close neighborhood. Experts following this logic consider that the public opposition to nuclear is not local but rather originates from other locations in the country, from people who cannot exploit from the spillover benefits of a nuclear power plant.

According to the representatives from the French Ministry For An Ecological and Solidary Transition, local communities near nuclear sites are very positive for nuclear power plants, because development of the site comes with the development of the area, offering the local communities richer lives (personal communications, 2018). As an example, opinion polls also reveal that according to 56 percent of the participants, job creation is considered as an important benefit of nuclear energy. This percentage further increases to 67 percent for the young respondents aged between 18 to 24 years (WNN, 2019a). Expert F-16 explains that since nuclear power plants are spread all over France, most of the citizens are near or close to a power plant. Consequently, most of the people who are living in the surroundings of a nuclear power plant are in favor of nuclear and are very attached to nuclear power plants because it is part of their personal lives through jobs or other economic reasons, and according to him *“when you are not living near, you view the issue differently”*. Expert F-15 agrees as he tells:

“If you look at the price of houses, in France the price of housing

doesn't decrease when you go towards a power station, on the contrary it tends to increase, since local people pay lower taxes. Or it is very difficult to be against a nuclear power station, when you see your neighbor who goes to the plant every day to work and is happy with his/her job. The local communities are very much in favor of nuclear."

Expert F-15 suggests that this is even reflected in the election of the parliaments members, as most of the elected representatives from the constituencies where there is a nuclear power plant are pro-nuclear: *"you never get an anti-nuclear elected in a constituency where you have a power station. Moreover, when there is a protest, the protestors are not local they are coming from afar"*.

Turkish experts also make similar remarks with regards to the locations where Turkey is planning to construct its nuclear power plants. To illustrate, Arif Künar states that *"Today, in Akkuyu, the Russians gave local people jobs. They opened cafes, restaurants. There is a new income source, employment and rent there. We used to visit Akkuyu a lot, but now we can't, because everybody in Akkuyu has become pro-nuclear"* (personal communication, 2018). Nilay Çubukçu who has been an active professional of the energy sector and nuclear industry for years, offers a similar perspective from her own experiences:

"I have been both in Akkuyu and in Sinop to interact with the local public. These are places suffering from unemployment and emigration. The main concern of a father living there is whether his son will find a job in there or leave home. Nuclear power plants immensely increase economic activities in their neighborhood. It is not only about 2000 engineers or technicians working in the power plant. It is also about their families and needs. They will need grocery stores, hairdressers, cinemas...Did you know that there is not even a proper cinema in Sinop now? Why would you expect these local people to be against nuclear?" (personal communication, 2018).

Expert T-13 also confirms this with an example from Sinop declaring that apart from a few associations, there is not a striking local opposition: *"when we organize events in Sinop, anti-nuclear organizations bring people with buses from other cities, such as İstanbul. I'm pretty sure that the majority of the audience is not from Sinop"*.

Right at this point, for Turkey, it is important to open a parenthesis and to repeat that this is how the experts view the situation in line with their personal experiences. Oğuz Türkyılmaz for instance totally confronts these arguments saying: *“Just because they will employ 3 relatives of the local governor, does not mean that they can deceive the rest of the population. According to the opinion poll conducted in Mersin, 88 percent of the people does not want the power plant!”* (personal communication, 2018). Indeed, despite the interpretations of previous experts Türkyılmaz is right since a public opinion survey conducted by three NGOs in Mersin with 5050 individuals discovers that 86 percent of the local population does not want Akkuyu power plant and think that it will affect their lives negatively (Hürriyet, 2016).

The idea that the public is more favorable to nuclear if they are directly benefiting from the nuclear power plant is also present among some German experts despite clear anti-nuclear position of the society in Germany. Expert G-8 who is an experienced representative from the German energy industry tells that before Fukushima, he had the opportunity to speak to some of the mayors in several towns near nuclear power plants and that they were quite favorable as it was a very important source of income for the communities, through good jobs or better infrastructure. Therefore, a dominant view among the proponents of nuclear energy is that, the closer people are located to the nuclear power plant, the more comfortable they are about living next to a power plant since they see the advantages of it.

7. 2. 3. *The Role of National Debates*

Within the discussions under the category of “Public Opinion”, 37,5 percent of the French experts, 56,3 percent of Turkish experts and 44,4 percent of the German experts referred to the concept of national debate as a form of communication between the decision-makers and public opinion. This section reviews the importance of having a national debate as a national component in nuclear energy policy-making. By demonstrating examples and perspectives from three cases, the section explains the successes, failures and lessons from the countries’ efforts in using national debate as a tool in nuclear policy-making, to understand what the public wants or, most of the time, to mitigate public opposition to nuclear.

Talking and reading about public opinion and protest movements on nuclear energy, I have noticed an implemented emphasis on the disconnection between the technical facts of nuclear, technical aspect of the discussion and the public. For most of the times, the information presented to the public is often very biased or is believed to be biased, which further complicates the availability of an informed input from the public. According to William Magwood from OECD-NEA (Nuclear Energy Agency), this problem has always existed (personal communication, 2018). Even back in the initial years, when countries were building large numbers of nuclear power plants, there was a major disconnection between the technical community and the public. Expert F-4 from France thinks that the nuclear industry and governments are still not good at bridging the gap with the community:

“In the past, there was this attitude from the nuclear technology and science community that basically said ‘look this is too complicated for you to understand, so we are the experts, we will make the decisions, you just trust us and we will be okay’. Maybe you were able to get away with that back in the 1950s and 1960s, but by the 1970s you could not anymore and certainly not today!”

One big problem in this is the fact that nuclear matters are very complicated and technical, and thus it is necessary to transfer them into “plain language”. Expert F-4 from the nuclear industry talks about this struggle and says:

“We always have this idea that we need to take all these technical things that we are doing and put them out to the public in plain language so that people can understand it. We really try to do that but it is hard to achieve it. I think we have struggled with that as the nuclear community and we will continue to struggle with it”.

Institutions like NEA, definitely acknowledge this necessity to engage with the public especially in the decision-making process. However, the big challenge of how to involve the public and other stakeholders into decisions on all sort of nuclear issues, including nuclear waste disposal, building new power plants or extending lives of the existing plants, is on national governments. The task to design tools to engage the public into the policy-making process for nuclear energy is up to the governments. In this regard, the existence or non-existence of a national debate affects the legitimacy of the decisions in the eyes of the public.

France

For the case of France, the notion of a “national debate” has been frequently brought up into the discussion of whether the decision-makers consider public opinion as an input or not. In the initial phases of its nuclear energy program, France faced a long-lasting criticism that goes back to the Messmer Plan, arguing that the French nuclear energy policy-making is highly de-politicized. The Messmer Plan, announced on March 6, 1974 to establish the foundation of France’s nuclear policy has been subject to reactions for being a top-down policy approach which lacked any public consultation. The mass petition coming from the scientists who opposed to the nuclear program, The Appeal of the 400, was one of the strongest criticisms which created a real shock by shattering the scientific and institutional consensus on nuclear power (Topçu, 2013 p. 81).

In the following years, catalyzed by the lack of public consultation, the reactions to nuclear power projects continued. On April 5, 1979, the Socialist opposition party requested at the National Assembly, a moratorium of nuclear expansion which was declined by the then Minister of Industry André Giraud (Patterson, 1979). Only a few days after, for its issue of April 14, 1979, the French news weekly L’Express used a dramatic cover⁹¹ on “The Nuclear Risk” declaring that in France “there has never been, even in the National Assembly, the least debate on civil nuclear policy followed by a vote” (Patterson, 1979). L’Express affirmed that “the French have the right to insist, first, on a commission of inquiry into nuclear safety, independent of the executive, and thereafter, on a real parliamentary debate, based on the conclusions of the commission” (Patterson, 1979).

Corinne Lepage, agrees that these initial steps of the French nuclear policy were rather personal decision of the leaders of the day and that until Chernobyl, the discussions were more between specific persons against nuclear and the government (personal communication, 2018). It was not a question for the whole of the population:

⁹¹ The cover picture is available in the following link:
<http://antiquite.web.free.fr/l'express/S1055240.JPG> .

“There was no public discussion about the nuclear question. Personally, as a lawyer, with my husband Christian Huglot, we attacked for the jurisdiction a lot regarding local decisions on Flamanville, Belleville, Golfech, Cattenom, Chivaux, Cruas⁹², and La Hague. Each case was different and not different. It was different because in terms of legal questions, each case differs on the question of site, water, population and the reactor itself. But it was ever the same problem: France decided to develop nuclear reactors and most of the times the decisions were controversial” (personal communication, 2018).

There are also French experts who think that the public debate on nuclear is still problematic in France in the scope of nuclear energy policy-making. Mycle Schneider for example argues that the public debates and the national commission for public debates are completely irrelevant as the decision-making process is somewhere else: *“This is a very sophisticated PR activity. It is more complex than PR because it is actually to give people the impression they have influence on what is happening, which is not the case”* (personal communication, 2018). Corinne Lepage, former French Minister for Environment, also strongly believes that in reality there is no debate in France and she explains her case with some examples:

“First, is the Grenelle Debate in 2007. Jean-Louis Borloo (the French minister of State for Energy, Ecology and Sustainable Development between 2007-2010) organized a big debate on the all the environmental questions. Only one topic was not in the debate: The Nuclear! Second, in 2012, there was another debate on the energy, but it was not a real debate as the public was not really involved. And in particular, the debate came after the decision of the government. We also have a debate on the question on PPE (Program Pluriannuel de L’Energie/ Multiannual Energy Program). However, people debate on nothing! We don’t have a document to discuss as EDF refused to give documents to the National Commission for Public Debate” (personal communication, 2018).

As a matter of fact, the 2007 Grenelle Debate for Environment (Grenelle de l’Environnement) is one of the first major attempt of France to increase public participation and to actually include the debate outcomes into the environmental policy. The debate included employers, employees’ unions, environmental NGOs, local representatives’ associations and state authorities. Two acts, Grenelle I and Grenelle II

⁹² These are some of the nuclear power plants in France which are still in operation.

were adopted by the Parliament in 2009 and 2010 (Mauger, 2019). Nevertheless, as Corrine Lepage underlines, the issue of nuclear “was not allowed on the table” (Schneider, 2013; Lepage, personal communication, 2018), because it was considered to be too controversial. As Mauger emphasizes, this accentuated a barrier to public participation on “sensitive” issues (Mauger, 2019). According to some, the design of nuclear energy policy by a “minuscule super-elite of engineers” (Schneider 2013, Aykut & Evrard, 2017), which excluded public opinion, had become the traditional French way in energy policy-making. This is why, National Debate on the Energy Transition (DNTE-*Débat national sur la transition énergétique*) was an important benchmark since, energy policy-making was submitted to public participation for the first time in France’s modern history (Mauger, 2019).

The National Debate on Energy Transition of 2012 covered every aspect of energy policy and it was the first debate in which French nuclear policy was put into public discussion. The debate was right after the election of Francois Hollande who had proposed to reduce nuclear power's share of generation to about 50 percent by 2030 and close the country's oldest nuclear power plant as a concession for Green support. Hollande won by 51,6 percent and it was the first time since 1995 that a Socialist has held the position (WNN, 2012). Within this political context, according to the French Ministry for Ecology, Sustainable Development and Energy, 170.000 people took part in 1000 regional debates and 1200 submissions over the Internet (WNN, 2013). As an example, regarding the input for nuclear energy, The National Academy of Technologies of France (NATF) wrote in its first contribution to the ongoing debate that:

“the strategic position held by the nuclear industrial sector in France, combined with the high potential for an export market of French nuclear and associate civil engineering know-how and the awareness of policy makers that we are in an “after oil” situation in the long term, all of which should be seen as conducive to maintaining and developing French skills and commercial advantages in this field... France can avail of a noteworthy advantage in maintaining its nuclear power potential which not only allows the country to drastically limit the imports of fossil fuels to produce electricity, but also reduces to a considerable extent the emission of GHGs thereby complying fully with the commitments taken, in respect of the Kyoto protocol, etc.” (NAFT, 2013, p. 41, 53).

Philippe Martin, the then Minister of Ecology, Sustainable Development and Energy said “The involvement was fantastic...We must acknowledge the quality of the process that allowed all view to be expressed. Consensus exists, but there are still differences and this is normal” (WNN, 2013). The results of the debate were debated in the parliament and ended up with the adoption of the Energy Transition for Green Growth Act of 2015, which had decided for reducing the share of nuclear energy to 50 percent of electricity production by 2025 (Gouvernement, 2015).

Half of the interviewed French experts believe that, France had been going through a “real” democratic process concerning energy transition. Even some critiques of the French nuclear policy, such as Expert F-7, view that the process in France has been a significant participatory democratic process, where a lot of individuals engaged into energy discussions in the form of involvement, consultation, or participation, instead of a formal policy discussion of politicians. Expert F-7 even suggests that the decision to reduce its nuclear fleet to 50 percent by 2025 was an output of the participatory democratic process: “*Everybody knew that is not doable, and yet this was a step towards change*”, he notes. Although the officials from French ministries are cautious about confirming such a link and evaluate the decision to decrease the share of nuclear in the energy mix as a mathematical necessity to meet the renewable share requirements by the European Union (such as Expert F-10), still they acknowledge the importance of the national debate for the decision process by stating that “*we take into consideration the citizen’s views*” (Expert F-10). Expert F-13 from a state institution underlines that this is because the MPs know that they are under the eyes of the public through internet and all other available tools. Therefore, he stresses that one of the major issues in the assembly is to device new schemes on how to introduce “participation of the public” in the parliamentary process on energy choices. The public debates are important tools to this end. Expert F-14, who is a high level French representative from Assemblée Nationale-OPECST (Office Parlementaire d’évaluation des Choix Scientifiques et Technologiques/ Parliamentary Office for the Evaluation of Scientific and Technological Choices) briefly explains the process as the following:

“the office used to work on a subject for several months and publish a report which would be presented to the press and made public in the website of Assemblée Nationale or Senate. But more and more this way of working on subjects is replaced by public

hearings. The idea is to bring people from the industry, governmental bodies and NGOs, who are interested in the same subject but with different opinions, into same room. They have to give their opinion in turns for around ten minutes, and after, the second part of the public hearing is like a debate between them and with the MPs. This form of public hearing traditionally is open to the public and also is broadcasted on the internet.”

As a follow-up procedure to the public debate, Expert F-14 explains that OPECST draws conclusions to be presented to the MPs and senators, so that the remarks of the public hearing are examined by them and are incorporated into the writing process of the relevant laws. To illustrate, following the National Debate on Energy Transition, OPECST published a report in 2013, stating that “France risks being exposed to a power price shock if it pursues a speedy reduction of nuclear power and there is insufficient replacement through renewable energy and energy efficiency measures” (WNA, 2020).

To conclude, regardless of whether or not the public debate process is working with full efficiency, an overview throughout the French nuclear history reveals that even the existence of such a mechanism and its acknowledgement by the decision-makers has been a change for France, in favor of public contribution into nuclear energy policy-making.

Turkey

In Turkey, the majority of the interviewed experts believe that the country lacks efficient communication between the public and decision-makers in the form of a national, public debate. Expert T-1 explains that Turkey used to have a better environment for free public debates and the decision-makers use to take these debates seriously, especially back in the times of Chernobyl and its aftermath: “*We used to have open meetings with high participation from the public, where people could ask their questions to the experts and state representatives. These questions would include everything from the costs to the waste management. It was a healthier environment of decision-making*” (Expert T-1). Arif Künar also confirms this remark, as he tells that prior to 2000 decision, he used to travel all around Turkey to participate in panels as an invited delegate to discuss nuclear energy, and he adds:

“now we do not have these kinds of discussions anymore, there is no more venue to do that. The government has changed the very

notion of ‘debate’, as they framed opposing big investments or big projects equal to being a traitor to the nation. Once they accuse whoever opposes Turkey’s nuclear energy projects as a traitor, you automatically stop talking about it” (personal communication, 2018).

According to Expert T-1, today, *“there is a specific group of policy-makers who think they know the best, who does not have any tolerance for alternative views, and who act as if there is no need for alternative views from the public in the first place!”*. The major downside of this kind of approach is the loss of contact with the public opinion. Indeed, Turkey has some attempts to avoid this loss of contact and establish communication with the public. However, an important difference with France is that the efforts are after, not during, the decision-making process, therefore the efforts are perceived as a public relations activity or as public information sessions rather than debates.

The Public Information Center (PIC) of Akkuyu NPP opened in Mersin in 2012, is a concrete example for the steps already taken to inform the public on the progress and details of the Akkuyu project. The center has been performing active information studies, developed training programs, organized film screenings, tours, lectures, seminars, open days for local residents and the media (Akkuyu NPP Construction Project, 2020). However, according to my personal communications with the representatives from the information center, the local people in Mersin are hesitant for even entering the information center and they are highly “unfriendly” to the representatives, making the success of the efforts questionable. This unofficial feedback is very important as it is consistent with the earlier finding that 86 percent of the local population does not want the Akkuyu power plant (Hürriyet, 2016) and yet, it contrasts with some of the nuclear expert’s argument that the public opinion is more positive in the close neighborhood of the nuclear power plants. This is a proof for the lack of communication between the public and other stakeholders.

In this regard, a national debate on nuclear energy emerges as a necessity for Turkey. Expert T-4 who works closely with both national and international officials and with nuclear industry agrees with that: *“Turkish people are not ignorant, they can understand everything when explained properly. However, for nuclear power plants to be built in Turkey, there are many points which are left obscure. That is why the government has to*

enlighten the public, it is the government's responsibility". In this realm, the concerns of Expert T-4 are remarkable since this expert worries that in Turkey some actors could have "evil plans" with regards to the enlightenment of the public:

"I fear that some politicians can think they can bribe or buy public support, or at least to pretend as if there is public support for the nuclear project, as if the local people are happy having the power plant on their land, to pretend as if they are really incorporating the public as an actor into the processes. I do not want Turkey to engage in a technology of which its people are extremely terrified or opposed. The government should work sincerely, until all the fears and questions of the public are addressed, until all the dark spots on the Akkuyu project are illuminated".

Expert T-4 is not alone feeling worried. Expert T-7 and Expert T-8 also think that public participation is not working for Turkey. The fact that all these three experts have an extensive experience on nuclear energy and are all supporters of nuclear power, renders their criticism even more interesting. Reminding that organizing a public participation meeting on environmental impact assessment is a regulatory requirement before starting a nuclear power project, Expert T-8 tells about one of the public meetings he attended which was organized by government authorities: *"It was too controlled. Only supporters were invited. And that is not a good way to build up trust to the decision-making authorities."* Regarding a similar meeting on the environmental impact assessment of the nuclear power plant, Expert T-7 also states that *"it was totally political, led by whoever can dominate, with a 'first come, first served logic': if anti-nuclear groups are well organized and come first, they dominate the meeting or visa-versa. None of the participants really come with the intension to learn and debate."*

Overall, the interviews with the Turkish experts reveal that the relationship between the public and decision-makers remains problematic for Turkey's nuclear energy policy-making. Most of the experts believe the interaction between the two is weak and superficial, which misguides the public opinion. To illustrate, Expert T-11 working for a state institution does not think that the authorities are properly informing the public: *"this is why those who are interested have to learn about nuclear by their own means and most of the time they are misguided and they end up being prejudiced against nuclear, closing themselves to any correct information that can change their minds"*. Similarly, Expert T-14 also sees that the anti-nuclear stance among the public is due to insufficient

information, showing that relevant governmental institutions have not done their full duty: *“They act as if the public would not understand anything. At the end of the day, this is their neighborhood, their land. Why not informing them properly? Why not sharing the research results on TVs, on billboards?”* In this realm, Expert T-10 also believes that an important mistake of the Turkish government is to avoid the discussion of nuclear energy:

“We shall not avoid discussing nuclear energy. We need to debate why Turkey needs nuclear energy, on the TV, on impartial media channels. We need objective debate environment instead of publicities on media outlets or on billboards⁹³ in order to communicate to the public why nuclear is really a must for Turkey”.

The analysis represents a strong contrast between France and Turkey: While the French experts stress the importance of the transparent communication between the policy-makers and the public, Turkish experts emphasize the lack of it. This indicates an area open for progress in Turkey for a healthy nuclear energy policy-making.

Germany

With regards to the importance of national debates on nuclear energy policy-making, among three cases, Germany offers a lot of insights throughout its history of nuclear energy. Specifically, three major examples repeatedly emerge during the interviews. These examples are all crucial to understand how Germany ended-up with a nuclear phase-out.

The first reference points to the end of 1970s, as Michael Sailor from Öko-Institute explains, when Germany was trying to have big information and discussion panels in several cities, with a mixed group of participants including people from the industry, local people from the cities and people from environmental organizations. Sailor notes that

⁹³ Akkuyu Project company has prepared billboards to be used in several cities. The publicities faced strong criticism by The Chamber of Electrical Engineers (EMO) and Anti-Nuclear Platform who filed a criminal complaint for misleading advertising, arguing that “Death cannot be advertised” (EMO, 2015). In Çanakkale also, the advertisements were removed by the local municipality on the grounds that “the innocence of children and the purity of nature were used as materials to show the nuclear as sympathetic in the campaign images” (MersinSiyaset, 2015). Moreover, there were also promotional videos for Akkuyu giving the message that nuclear energy will offer Turkey independent and national energy, as well as increasing Turkey’s development. In order to watch these promotional videos for Akkuyu please visit <http://www.akkunpp.com/akkuyu-nukleerin-reklam-filmi-yayinda> and <https://www.youtube.com/watch?v=Gd0DLGkF7OQ>.

through time, these environmental organizations and discussions which initially involved specific issues such as natural protection, birds' protection, etc., evolved into a more general view of the environment so as to include an anti-nuclear stance (personal communication, 2017). 1970s also stand for a change in the German Federal Government, when Social Democratic Party and Free Democratic party coalition replaced Christian Democrat -Liberal coalition. According to Sailor, social democrats were very much in favor of democratic debates and they were also “*a little bit of cautious about*” nuclear energy (personal communication, 2017). Consequently, this political setting leads to the platform known as “*Bürgerdialog Kernenergie*” (Citizens’ Dialogue on Nuclear Energy), with a desire to have a carefully designed decision on nuclear energy. The dialogue was started by the then Federal Research Minister Hans Matthöfer and it included a series of events between 1975 and 1978, prepared to be “the first nationwide, public discussion process on all energy, research, economic and socio-political issues related to the use of nuclear power” (German Federal Office for the Safety of Nuclear Waste Management, 2019). This Citizens’ Dialogue on Nuclear Energy, was considered as a public relations activity on nuclear power as a response of the German government to the increasing resistance against nuclear energy.

The second major example is “Gorleben Hearings”, which is one of the most concrete milestones for the intricate relationship between public opinion, anti-nuclear protests and the government. In 1977 Gorleben, located in the West German state of Lower Saxony, was proposed as the site for a facility for final disposal of all the spent nuclear fuel and nuclear waste. The idea was promoted by the Federal Bonn Government, the energy companies and the nuclear industry (Patterson, 1979). As the licensing authority for the facility was the government of Lower Saxony, State Premier Ernst Albrecht was under heavy pressure from local and national opposition to Gorleben plans. Many farmers and harvesters from the region organized protest activities including “mobile forest guard” to protect the forests in the investigation areas. One of the major concerns of the opponents was the improper information policy on Gorleben. In the shadow of the Three Mile Island which happened on March 28, 1979, the opposition grew bigger and around 100,000 nuclear opponents gathered for a rally, which was one of the largest protests in the history of Germany, referred as “the heyday of the anti-nuclear movement” (Wille, 2019).

Around the same time, “International Gorleben Symposium” was taking place, as a response of State Premier Albrecht to the growing opposition. In our interview, Kurt-Dieter Grill who had Gorleben nuclear facilities in his constituency and who was the chairman of the Gorleben commission between 1978 to 1991, exactly when the events were taking place, explains the rest from the first hand:

“I think a very important thing have been lost in the history of nuclear power in Germany. My Prime Minister, Mr. Albrecht had made a consultation of one week! One whole week of consultation about the nuclear plans for Gorleben. In public! Two sides yes and no...It was a panel managed by one of most famous scientists in Germany: Carl Friedrich von Weizsäcker who was also a philosopher respected by all. There was a panel where the scientists could talk and discuss” (personal communication, 2017).

Albrecht had commissioned a panel of 20 international nuclear specialists and experts for the independent evaluation of the Gorleben proposal. After the submission of its 2200-page report, called the Gorleben International Review, the commission members attended six days of public hearing, between March 28 and April 3, 1979. The audience included around 200 politicians, civil servants, nuclear industry people, journalists, and in the official terminology “qualified public”. Gorleben Hearings concluded that “the Gorleben proposal as presented was not satisfactory” (Patterson, 1979).

As Kurt-Dieter Grill notes, Federal Chancellor Helmut Schmidt did not attend the hearings with Albrecht. Eventually, Albrecht announced the withdrawal of the plans for building a reprocessing plant in Gorleben, with the reason that “the political prerequisites are not in place at the moment” (Gorleben Archiv e.V., 2020). However, despite the results of the public debate, the plans for the final disposal continued and the exploration of the salt dome began in 1979 (Wille, 2019), fueling further heated anti-nuclear protests in Germany.⁹⁴ According to Grill, they did their best back at the time:

“I think today the people say everything had gone wrong at that time, but I haven’t heard a lot people who said how we could have discussed it better than we did! Mr. Albrecht wanted to have a discussion in public with all the proponents and opponents so that everybody could represent their view. He wanted to get

⁹⁴ For the complete story of Gorleben with archival documents including interesting photos and videos please see <https://www.gorleben-archiv.de/chronik/>.

acceptance of the public. He wanted to make clear what happens, why we should do it that way or another” (personal communication, 2017).

While Grill suggests that they did their best, some scholars think that Gorleben Hearing, through intense public opposition and political maneuvers, paralyzed the process of policy-making as they increased the polarization between the nuclear advocates and opponents (Hocke and Renn, 2009). Today, Gorleben still operates as an interim storage of spent fuel, storing 50 of 166 large casks of glass canisters in Germany (WNA, 2019a). The license to store highly radioactive nuclear waste in the Gorleben interim storage facility will expire in December 31, 2034 (Gorleben Archiv e.V., 2020). The struggle of the opponents continues as they say “Gorleben is not history yet” (Citizens’ Initiative for Environmental Protection Lüchow-Dannenberg eV., 2019). Would it be a different story, if the result of the public debate had been followed by the decision-makers remains a mystery.

The third example is the Energy Consensus Talks which took place in 1993, 1994 and 1995 with the intention to reach an agreement among all political parties on Germany’s long-term energy policy. Craig Morris tells that these discussions were led under Helmut Kohl who picked up the idea of a “*big tent approach*” and who said: “*All right, there is all these grassroot movements going on, everybody is talking about the future or energy, so why don’t we? I want all the political parties, including the opposition, all the relevant stakeholders to come together!*” (Morris, personal communication, 2017). According to Morris, this was a very important development for German energy policy-making. However, he adds: “*What they basically left room saying was okay, we have agreed on everything except this: the nuclear. Some wanted it off some wanted it on, they were very divided so there was no decision on nuclear*”. Although the parties had agreed on coal subsidies and the reduction of CO2 emissions, there was a major disagreement regarding the role of nuclear power. While nuclear was considered as one of the major sources of energy by the Government, the Green Party (Bündis 90/Die Grünen) was struggling for a nuclear phase-out. Furthermore, due to Chernobyl Accident, Social Democrats (SPD) also had already voted in favor of a phase-out in their own party platform back in 1986. Still, only four months after the start of the talks, the Greens, who did not want to compromise on nuclear policy, left the negotiations on the grounds of “insoluble

differences with others” (Hempfen, 1995). Consequently, the talks did not bring a policy change in Germany’s nuclear energy policy. It was only in 1998 that a significant change happened when the coalition of Alliance 90/The Greens and Social Democratic Party came to German Bundestag and “*clicked: finished*”, in Morris’ words (personal communication, 2017), for the debate by officially declaring their intention to phase-out nuclear.⁹⁵

Christian Wossner from DATF (Deutsches Atomforum e. V.) concludes that especially in recent years, both the authorities and the utilities or vendors have been putting significant effort in integrating the public into the decision-making processes, at least information wise. Accordingly, although the ultimate decision to incorporate the debate outcomes into the actual policy is up to the policy-makers, it was made sure that a vast stakeholder involvement is taking place. During the interviews, several German specialists confirmed that it was very common for Germany to have pro-con debates on nuclear energy, especially until the eventual phase-out decision. In this regard, Expert G-8 and Expert G-1 highlight that there has always been a dialogue with the society through several platforms, including informal talk shows on TV channels and formal discussions between the Government, opposition and coalition parties. At this point Expert G-1 notes that the discussions have been mostly dominated by the majority of a group who were sceptic about nuclear, such as the ecologists, representatives of the NGOs, the Social Democrats and the Greens, while the supporters of life extensions for nuclear power plants, which were also significant in number, were not often part of the public discussion, as the majority of the interviewed experts coming from German nuclear industry mentioned with disappointment.

The immediate relevance and success of public debates in directly effecting the German nuclear energy policy is another deep research question. Still, the examples indicate that German policy-makers had to put considerable effort to at least create the debate environment. This highly relates to a responsibility coming from a striking feature of Germany: both the official representatives and the people of Germany consider public

⁹⁵ Note that this phase-out decision was later “phased out” for a later date by the Christian Democrat (CDU) and Liberal Democrat (FDP) coalition government elected in 2009, with life-time extensions for German nuclear reactors.

engagement into nuclear energy policy-making as a citizens' right, rather than an exclusive offer from the decision-makers to the people. In this framework, Michael Sailor underlines that German people's fight against nuclear is not only against its dangers, but against the democratic principles that are "*ignored*" throughout the policy-making processes (personal communication, 2017). This is why some Germans consider top-down enforcement of nuclear policy as a violation of their basic citizen rights such as safe environment for current and future generations. This "*Green spirit*" and the German citizens' willingness to be a part of the decision-making is very important. Craig Morris also underlines the commitment of German citizen to contribute into policy-making:

"The authorities put online the draft bill which is being discussed in the parliament and request feedback from the citizens. Just from your home you can access it, and if you want you can comment on it. All the Germans go 'Oh my God! I have only two weeks to read and comment 300 pages!' So, they actually care, they see it is a duty, the public writes back. And it is not just a couple of concerned individuals, teachers or taxi drivers. What I mean is the organized public, a massive civil society" (personal communication, 2017).

This offers a striking contrast with Turkish experts who think that the public is not only not given a real opportunity to participate into the decision-making, but also does not have the interest in doing so. Expert T-15 suggests why this is the case in Turkey as he says: "*people are mainly struggling for their lives, for the financial burdens they are facing. They do not think about nuclear or climate*".

This section concludes that whether the public opinion matters in the eyes of the decision-makers and what the public opinion thinks about nuclear energy are two major national features that impact nuclear energy policy-making. As a matter of fact, the answer of these two questions combined with the existence or efficiency of an official national debate on nuclear energy are the major determinants of whether public opposition, addressed in the previous chapter, can operate as a constraining mechanism or not.

7. 3. Social Movements and Nuclear Energy Policy-Making

Building on the discussion on public opinion, this section focuses on social movements, more specifically the anti-nuclear movement. This issue area is addressed by 72 percent

of the experts and accounts for 19,42 percent of the coded segments, ranking the second after public opinion.

A major remark that needs to be underlined before the analysis is that even the experts who are very much “security” oriented in the sense that they value national security as the central concern in decision-making, acknowledge that environmental protests are becoming more and more important. What is more interesting is that, environmental movements or protests are associated with anti-nuclear protests, by most of the experts. This is striking compared to the literature which considers nuclear energy as part of environmental efforts for sustainable development. There are many actors such as Nuclear For Climate or Union of Concerned Scientists, which highlight that nuclear power is part of the solution required for limiting the effects of climate change, as reported in Chapter 3. On the other hand, this section represents collective perspective of the interviewed stakeholders and analyses how the anti-nuclear movement is perceived by them, in order to draw comparisons and lessons on the linkage between anti-nuclear movement and nuclear energy policy-making.

France

Official representatives interviewed in France, always underline that the decision-makers are incorporating citizens’ opinion and that the system of decision-making is taking into account all the social protests, all the ideas and requests coming from people. To illustrate, according to Expert F-16, this is clearly reflected in the recent French decision to decrease the share of nuclear, to close Fessenheim⁹⁶ and to improve the level of renewable production in the energy mix. However, with a critical perspective, Mycle Schneider disagrees and thinks that this has never been the case and that recent efforts to incorporate citizens’ perspective through national debates, are a public relations activity (personal communication, 2018). Indeed, in 2008 Schneider wrote about this by referring to Pierre Guillaumat, former Minister of the Armed Forces and former Minister responsible for Atomic Energy under De Gaulle, who in an interview in 1986⁹⁷ said “What are those

⁹⁶ The Fessenheim Nuclear Power Plant operating since 1977 was closed in June 30, 2020. Fessenheim Mayor Claude Brender said the decision was “absurd and incomprehensible” since the plant “was in good working order and has passed all the security tests” (France24, 2020).

⁹⁷ Interview with Georg Blume and the author, published in *Damocles*, n°67, Autum 1995 in Schneider, 2008.

parliamentary debates good for?”. According to Schneider this question itself was a proof that “the CEA’s General Administrator in the 1950s, later minister of industry and defense and godfather of the Corps des Mines⁹⁸, the state elite that engineered the civil and military nuclear programs”, as he had described Guillaumat, did not believe in consulting public opinion (Schneider, 2008). Schneider shares an anecdote in our interview as well, to further clarify his point:

“many years ago, for a research project on radioactive waste policy, Andrew Blower and I, we went to visit an Official, who was a Corps des Mine writing all the nuclear transport legislation. Blower asked him a question: ‘How did the anti-nuclear movement influenced regulation?’ The Official stared him and said: ‘what you mean by anti-nuclear movement? We have sent riot police. What you mean by influencing the regulation?’. He even saw it as a completely absurd question. Anti-nuclear movement influencing the regulation? Are you kidding? I don’t know any other country where an official would have dare to say something similar. It is very much the same today. Where is the interaction? And it tells a lot about the spirit behind the whole process of French nuclear policy” (personal communication, 2018).

This perspective of Mr. Guillaumat, however, does not mean there were no anti-nuclear protests in France. Especially in the 1970s, there were strong anti-nuclear protests (Expert F-7). As a matter of fact, several scholars consider the French anti-nuclear movement as the first of its kind in Europe. To illustrate Rucht writes that the protests in Bugey 1, which took place in July 1971 when 15000 people rallied against the planned nuclear power station, was “the first large demonstration against nuclear power in Europe” (Rucht, 1994, p.129). Schneider also notes that the anti-nuclear movement in the early 1970s, was popping over from France to Germany not the other way around (personal communication, 2018). To illustrate, the Wyhl movement, which was the first big anti-nuclear movement in Germany, was a cross border movement. However, according to some, “nearly all other anti-nuclear activities in France, turned out to be largely unsuccessful” (Rucht, 1994, p.129).

In today’s context, some of the French experts think that the general mass society in France would not go to protest nuclear in the streets anymore. *“It is finished. It was in the*

⁹⁸ The issue of Corps des Mines is addressed in detail in the upcoming sections.

1970s, now it is over” says Expert F-9 who works in the nuclear industry, and continues *“So today the opponents to nuclear are only NGOs, such as Greenpeace. They can make some demonstrations, but they cannot have one hundred thousand people against nuclear industry, it does not exist anymore in France”*. As a matter of fact, France includes several anti-nuclear associations representing scientists, environmentalist and activists. The examples include, but not limited to, Association NegaWatt, Global Chance (association of scientists for global sustainable development), Réseau Action Climat (The Climate Action Network, a federation of national and local associations fighting against the causes of climate change). These associations especially advocate an energy transition with 100 percent renewables arguing that nuclear energy has shown its limits, with the risk of accidents, with aging of reactors, with the issue of nuclear waste which remains unresolved and with astronomical costs. Furthermore, there are also other platforms which focus directly on nuclear energy and bring anti-nuclears together such as Réseau Sortir du Nucléaire (Network for Quitting Nuclear Power) with 60,000 current signatories. Although experts acknowledge the existence of such critical groups against nuclear energy, some, such as Expert F-16, think that they don’t have enough voice to take an actual action against nuclear. This is because the movement does not have enough support from the public since the majority of the French people are alleged to be positive towards nuclear energy, especially in the places where power plants are located. In this regard, Expert F-15, who has been working in the administration of French nuclear energy program for several years, says *“the people that you see demonstrating are coming mostly from Germany!”* and repeats that the nuclear power stations are not rejected locally, the acceptance gets higher as we get nearer to the nuclear power sites, and that local people are even volunteering to welcome a nuclear power plant in their town. The recent case of Fessenheim offers a relevant proof for this argument as the closure of the plant was criticized by many on the grounds that the decision threatened the livelihood of 2500 local people. In 2017, more than 1000 employees were working in the power plant. This number will be declined to only 294 until 2023 for the fuel removal, and afterwards to 60 employees for the final assembly. Regarding the decision, the French labor union tweeted: *“what pain, it is inhuman what is happening!”* (France24, 2020). As a conclusion, such examples and the interview results indicate that the influence of and the support for the anti-nuclear movement in France remains complicated.

Turkey

Although 81 percent of the Turkish experts touched upon social movements during the interviews, they have significantly mixed opinions on the relationship between the anti-nuclear movement in Turkey and nuclear energy policy-making. Some, such as Prof. İnci Gökmen, regret that the decision-makers do not take into account the public reaction towards the construction of nuclear power plants, while others such as Arif Künar point to the influence of the movement on Bülent Ecevit's, the then Prime Minister, decision to cancel the plans for Akkuyu in 2000. There are also experts who have significantly sharp opinions on the anti-nuclear movement, such as Expert T-16 who thinks the reason why the anti-nuclear movement in Turkey does not have any effect on the decision-making is because their arguments are “*nonsense*” or as Expert T-2, a government official who believes that environmental movements are extremely important, but who is only being cynical as he adds “*they are important but on the opposite direction. If there is a reaction then it means that we are on the right path!*”.

The year 2000 emerge as a critical date in the discussions, not only for Turkey's nuclear energy policy but also for the fate of the anti-nuclear movement in Turkey. Especially after Chernobyl the anti-nuclear movement accelerated in Turkey. Numerous panels and peaceful protests were organized. The anti-nuclear movement had many components not only as mass gatherings including festivals or concerts⁹⁹, but also individual protests by its members (Şahin, 2007). To illustrate in 1995, in order to highlight that nuclear will take Turkey's development backward not forward, Özgür Gürbüz started a backwards walk from Mersin for 170 kilometers for 18 days (Cumhuriyet, 1995). Similarly, to protest the construction of nuclear power plants in Turkey, Timur Daniş walked 3500 kilometers in 3,5 months (Cumhuriyet, 1994). These mass and individual efforts were also supported by publications and journals in the field of ecology, such as *Ağaçkakan* and *Git*,¹⁰⁰ which had a strong anti-nuclear position. Arif Künar, who is one of the prominent figures of the anti-nuclear movement in Turkey tells about their efforts in those

⁹⁹ To learn more about the anti-nuclear movement in Turkey before 2000 please see *Don Kişot'lar Akkuyu'ya Karşı: anti-nükleer hikayeler* (Don Quixote's Against Akkuyu: Anti-Nuclear Stories) by Arif Künar (2002).

¹⁰⁰ Please contact the author for her personal archive on relevant volumes of these journals.

years as the following:

“We have established the Anti-Nuclear Platform, but in reality we were simply being Don Quixote. In Turkey, struggling for the environment, for clean energy or against nuclear energy is the same as Don Quixote’ fights. For decades, I have been telling the same things over and over to the ministers, to the undersecretaries who used to change every few months¹⁰¹, causing me to state my arguments from the start, all over again. It was a fight against the windmills” (personal communication, 2018).

Although it was a difficult struggle as Künar puts it, still, the anti-nuclear movement has reached such a scope that some even considered the 2000 decision of Ecevit as the success of Turkish anti-nuclear movement (Şahin, 2007). Künar is one of those individuals as he writes in the foreword of his book: “the nuclear story has a happy ending” thanks to the success of anti-nuclear movement (Künar, 2002). When I remind him his words in our interview, he smiles and replies: “yes, I really thought it was over. I wouldn’t expect the decision to change and to see what is happening today” (personal communication, 2018).

With a contrasting perspective, other Turkish experts who have been working in the nuclear industry or in governmental institutions disagree with Künar, stating that the decision of 2000 had nothing to do with the protests or the activities of the anti-nuclear platforms (Expert T-7). While Erol Çubukçu states that the decision was a financial calculation and was taken due to Turkey’s economic problems (personal communication, 2018), Expert T-4 explains what happened as the following:

“Of course, Ecevit was a politician who respected the citizens a lot, it was what made him who he was. He was a man of the people. So of course, to a certain extent he might have listened to them. However, it was not their victory at all. Back then the circumstances were different. Natural gas had emerged as a new alternative against coal which was very very dirty. Furthermore, there were also rumors of bribery about the tender.¹⁰² The relations behind the tender were considered as very dirty. It was a messy situation. So, it was not the success of anti-nuclear movement. It was not a “success” or failure in the first place, as the nuclear energy decision is about the future of our country”.

¹⁰¹ This remark is especially important in relevance to the relationship between political stability and nuclear energy policy-making, which is further addressed in the section on Political Stability.

¹⁰² Arif Künar also touches upon the issue of corruption in his book *Neden Nükleer Santrallere Hayır?* (Why Saying No To Nuclear Power Plants) (2006, p. 50-51).

İrfan Koca thinks that the representatives of the anti-nuclear movement are partially right in that the protests affected the Prime Minister who was a Social Democrat and his advisors, since the movement had been growing considerably since NGOs, environmental organizations and chambers were joining their forces.

Whether it was for economic reasons, for overcoming the corruption rumors or for political motives, once Ecevit decided to cancel the nuclear power plant in 2000 and the anti-nuclears considered this as a victory, the movement was divided (Şahin, 2007) and has lost its momentum. In this regard the contrast between anti-nuclear movement before and after 2000¹⁰³ is remarkable. Künar explains that before 2000, there were several groups of people, mostly leftists, who used to focus a lot on the environment. Once the political impact of these groups has weakened, the scope of the movement has also decreased. Künar states:

“Back in the 1990s, we used to have impactful and enthusiastic gatherings made up of ten-twenty thousands of people in Mersin, in Sinop. It was a period when the environment was high on the agenda and the masses were more active, sensitive and not divided by political disputes. Today, I consider environmental movements in Turkey very weak, very local, and so much smaller than they should be” (personal communication, 2018).

Expert T-1 who had also taken active part in the anti-nuclear struggle agrees with Künar and points to an important matter:

“It is very interesting. We did not have social media back then. We used to get organized via telephone. However, the movement was stronger and better organized compared to today. On the government side, there used to be many public hearings where you could attend and ask your questions. However today it is not like that. Everything happens behind closed doors. Furthermore, once you put all the people who are willing to raise their voices and to protest into the jail, no one else wants to protest anymore.”

Other experts do not necessarily agree that the movement is not effective anymore. Expert T-14, for instance, believes that the anti-nuclear movement is still very active in Turkey as they react to every step taken for the construction of Akkuyu Nuclear Power Plant, by

¹⁰³ To examine the activities of Anti-Nuclear Platform (Nükleer Karşıtı Platform) after 2000s please visit: <http://portal.nukleerkarsitiplatform.org>

making objections and court appeals against the project company regarding site licensing or the environmental impact assessment processes. *“Although the final decision to construct the nuclear power plant does not change”,* he says, *“there are several court cases which continue. The anti-nuclear movement is definitely slowing the process”*. Prof. İnci Gökmen also believes that the anti-nuclear movement in Turkey should continue its efforts, as she says: *“We cannot give up because what we are defending is life itself. Would humans give up on life? We need it. We must not be imprisoned by fear and suppression and must not lose our hope for a better World”*.

The reasons why the momentum and thus the impact of the anti-nuclear movement in Turkey has been decreasing or was never effective at all (as some of the interviewed experts see it) on the nuclear energy policy-making, offer interesting insights. Three major points emerge from the experts’ opinion.

First, according to some Turkey experts, the anti-nuclear movement in Turkey is not effective in the decision-making process, because it is *“too local”* and *“detached”*. To illustrate, Oğuz Türkyılmaz mentions that there are many distinguished individuals, lawyers or local representatives from the municipalities in Mersin who dedicated themselves to the anti-nuclear struggle: *“they have not only devoted their time but also they have been ready to take whatever the risks are: they were taken into custody or they had to face police violence several times”* (personal communication, 2018). *“However,”*, Türkyılmaz adds, *“the anti-nuclear protests are very local in Mersin or in İçneada, and not that active at the national level. The movement lacks a national center to coordinate cooperation between local representatives of the movement in different cities and to create a common strategy”* (personal communication, 2018). Expert T-1 believes that this lack of common strategy is because the environment is under attack from many different fronts: *“the problems and attacks to nature multiplies and yet the number of people who are concerned and struggling is not increasing. On the contrary, they are increasingly discouraged and they are breaking off from the movement. There is a need to get together and to keep the anti-nuclear culture alive”*.

Second dominant view is that the public interest on anti-nuclear movement is low. Expert T-12 shares a memory of his to clarify this point: *“A couple years ago we organized a panel in Sinop to talk about the nuclear power plant to be build. The number of local*

people who participated to the panel from Sinop were less than us, who came from all the way to Sinop from different cities. It was a disappointment". Expert T-5 thinks that it is not only an issue of interest but also a matter of social readiness for being part of a grassroots movement. He says: *"you cannot impose the spirit of grassroots movements into a society which is not ready for it. Once the movement is imposed top-down, by a leader, the masses would only follow the leader and the spirit would disappear once the leader is gone"*.

Last but not least, the third point, which is frequently mentioned by the experts especially working in the nuclear industry or government institutions is that the anti-nuclear movement in Turkey is *"too ideological"*. Expert T-2 claims that today, in Turkey, the anti-nuclear movement is a non-mass movement, majorly undertaken by radical left groups and "a few Greens" who follow a political stance based on sharp and extreme arguments. In this regard, İrfan Koca, thinks that this is one of the major weaknesses of the anti-nuclear movement or ecological movements in general in Turkey. Koca explains that once the opponents of nuclear approach the issue solely with ideological elements and do not take alternative perspectives into account, they are losing their objectivity and cannot defend their arguments properly anymore (personal communication, 2018). According to Koca, this does not only cause their arguments to be refuted immediately but also decrease their credibility. Koca also shares his own experience:

"In the years when the anti-nuclear movements were growing I remember very heated debates as I used to participate in those meetings as a representative of TAEK. I was not there as a nuclear advocate; indeed, I was the representative of the institution which would audit the nuclear power plant for the sake of the environment and the public. Despite my neutral position in the meetings, I had to face harsh criticisms or even harassment. Some of these criticisms were due to lack of information, some were simply false or pure ideological and political reactions" (personal communication, 2018).

Others, including Expert T-7 and Yılmaz Batıbay consider that this ideological approach prevents the opponents of nuclear energy from being active stakeholders in policy-making. According to Batıbay, the anti-nuclear movement in Turkey does not really know its *raison d'être* and explains why this affects their inclusion into the policy-making processes:

“You can be in favor or against nuclear energy but still you need to be open to discussion. However, with opponents there is no possibility of such discussions. They act as if only their arguments are true and everything else stated by pro-nuclears are false. This mentality needs to change. Individuals should update their knowledge and be open to self-criticism. That is the only way to work together and reconcile. Be an anti-nuclear, that is completely okay, but why? To find the real answers we need to have proper pro-con discussions” (personal communication, 2018).

Expert T-7, based on years of interactions with both the opponents of nuclear and the nuclear authorities, thinks that the anti-nuclear groups do not really know about nuclear energy. *“Once you start talking with them, you notice that they (anti-nuclears) make false statements. They have no fundamental knowledge, and yet they still have a lot to say. They base their arguments on inaccuracies and omissions, and some even use inadequate information on purpose to manipulate the discussions”*. According to Expert T-7, the anti-nuclear arguments always point to Chernobyl and Fukushima, and yet the opponents lack sufficient information about what really caused these accidents or what went wrong. *“They don’t care and they don’t have any intention to learn”* says the same expert with regret.

The majority of the Turkish experts see the anti-nuclear movement in the post-2000 decision as too local, too ideological, lacking focus and attracting low public participation. In addition to these hurdles coming from the expert perspectives, a last point emerging in the analysis is the view that the anti-nuclear movement in Turkey cannot influence the policy-making in Turkey because it is not *real* in the first place. This means that, some experts question the sincerity of the anti-nuclear movement in Turkey, on the grounds that it is potentially manipulated by foreign actors. To illustrate Expert T-2 who is working in Turkish Court of Accounts asks: *“is it really for protecting the environment or are there other reasons to protest?”*. He thinks that these are not grassroot movements, suggesting that people often protest to create difficulty to the project company, so that the value of their land is increased. Furthermore, he warns that it can be even worse as political actors or international companies can manipulate the public and support the protests for their own interest. Expert T-2 says:

“it is difficult to distinguish between whether the protests happen really because Turkish people are against the construction of nuclear power plants or whether foreign organizations catalyze the protests with a hidden agenda. Do the protests increase or decrease when we are negotiating with Russia or France?”

In our discussion, the same expert underlines that most of the protests are organized by foreign institutions, such as Greenpeace, and ask suspiciously: *“Who is behind Greenpeace?”*. The idea of foreign powers trying to manipulate Turkish policy is not new (Akyol, 2018; Al-Monitor, 2015; Deutsche Welle, 2013; Erdoğan, 2017). It is however, interesting to come across the same view of “external forces” or interveners in the discussion of anti-nuclear movement and nuclear energy policy-making in Turkey. Expert T-9 reminds that even back in the golden years of the anti-nuclear movement, in the late 1990s, a very high-level representative from Turkish Atomic Energy Authority used to call anti-nuclears as radicals, as individuals who are deceived and “bought” by the United States, claiming that the anti-nuclear activists were paid by the United States and were part of an international conspiracy. Our interview with Expert T-2 proves that the conspiracy perspective of this argument lives up till present and it is possible to note that the idea is quite in parallel with pro-government policy stance that “nuclear energy will render Turkey more developed and powerful” and hence the “external forces might try to sabotage Turkish interests as they don’t want Turkey to get nuclear”.

Germany

The portion of experts referring to social movements in Germany (83 percent) significantly differed from France (50 percent). For the case of Germany, anti-nuclear movement is identified as extremely important in the decision-making. The government is defined as being very receptive to social movements and public opinion (Expert G-17 and Expert G-18). Throughout the history, the anti-nuclear demonstrations in the streets of Germany, have been *“large, constant and intense covering all ages in all places”* as described by Expert G-3 and today, as all the experts including Michael Sailor highlight, the decision-makers know that they have to respect the general anti-nuclear stance. What is the major reason that makes German anti-nuclear movement so strong? What renders the German context so special that the environmental movement, together with anti-nuclear movement, has been transferred into *Energiewende*? These are interesting,

relevant and yet complex questions. However, they are extremely useful in understanding the roots of Germany's nuclear energy policy.

Dr. Ludger Mohrbach who has been working in the nuclear industry for decades, explains that in the beginning, the green movement in Germany had two main intentions: One was against nuclear and the other one was for peace. Accordingly, he sees the peace movement and the anti-nuclear movement as intermingled, since they were the struggle and organization of the same people (Mohrbach, personal communication, 2017). However, as it was the time of Cold War, the atomic bombs had a great impact on how people understood the notion of "nuclear": The connotation of atomic bombs on nuclear, resulted in an intermixing of intentions in the minds of German people, with the word "nuclear". Indeed, according to Dr. Mohrbach, initially the early protest movements in Germany were against nuclear bombs and did not directly address the civil use of nuclear power (personal communication, 2017).

Other German experts view the story from a relevant, yet different perspective. One dominant view among these experts is that Germany has always been among the early industrially developed countries, therefore, the more Germany's industry developed, the earlier German people, who has been traditionally engaged with forests in a diverse ecological habitat, had to face the negative effects of industry on the ecology. As a consequence of rapid economic growth, back in 1970s, the Germans have seen negative consequences of treating the environment badly (Expert G-8). To illustrate Expert G-1 states that in Germany, they had intense air pollution, when it was not even a problem in China or in other countries. Consequently, as early as 30-40 years ago, Germany had started to develop a social defense mechanism against ecological damage.

In this framework, Viviane Raddatz, Senior Policy Advisor at WWF Deutschland, notes that the idea of an energy transition for using wind and solar dates back to the late 1960s, with the motivation to replace dirty and unhealthy energy production with a better way, in which the citizens can also play a role. According to her, this is when the German citizens decided to create a change *themselves*, rather than asking energy companies to

change their ways. (personal communication, 2017). Raddatz thinks that the intellectual products of the time, such as the *Silent Spring*¹⁰⁴ book were among the major catalysts:

“in the 1960s, first came the idea that spreading pesticides everywhere might do harm to the balance of nature, and not just to the weeds. This was leading to the awareness that we are actually messing with our environment to a level that we are changing it, and so we need to take a step back and do something different” (Raddatz, personal communication, 2017).

Therefore, in the late 1960s and onwards, a lot of mass social movements occurred for the protection of the environment, with a deeper idea that citizens can actually act against the state, against the way the state and the society is impacting the individual and the environment. *“This was very much rooted in Germany”* says Raddatz, and continues:

“it is a generation, the sixty-eighters, who first wanted to break from their parents because they were all somehow part of the old regime, the Nazi regime, either as active servants or as compliers with the systems. And people that grew up after the war, became adults in late 1960s. They started to ask questions and they basically had this feeling that they had to break with everything that their parents did, what the whole generation did basically: their ways of discipline, working for the state, going to the military and all” (personal communication, 2017).

This new approach against the manifestation of state was also bringing a change in how the Germans see what it means to be a “citizen”. Before, a citizen would be somebody who always pays the taxes on time and doesn’t ask for more, just obeys. With this new approach, the Germans started to see a citizen as someone who asks questions, who actually takes responsibility for changing the society, the surroundings and changing the impact of these on the environment and individuals.

With this background, Expert G-6 notes that in the initial phases of the anti-nuclear movement in the 1970s, the movement was dominated by an “anti” fight against the industry. Climate protection or decarbonization were not on the agenda yet, and came only slightly later. A similar remark comes from Expert G-9:

¹⁰⁴ *Silent Spring* of Rachel Carson is a bestseller book published in 1962, which calls the humanity to act responsibly for the future of the planet and all life on Earth. In her book, Carson underlines the need for change towards more democratic and liberal societies, so that the citizens can question how their governments are dealing with environment. For more information please see Carson (1962) or visit <http://www.rachelcarson.org/SilentSpring.aspx>.

“the anti-nuclear movement was only one aspect of the fight against the establishment, against war. The establishment included the big industry, old political parties, old elites in academia and so on. They were all questioned by that movement. Renewables, decarbonization or other minor issues were only framed under the environmental questions. And suddenly that environmental aspect also became a part of the identity of that movement against the establishment”.

The breaking point of this intellectual change and its convergence with the anti-nuclear movement in Germany was the anti-nuclear protests in Wyhl, Kaiserstuhl. Following the selection of Wyhl for a new nuclear power plant, on February of 1975 local people organized gatherings to occupy the selected site and were suppressed by brutal police intervention. The impact of the events meant more than the withdrawal of the construction license on March 21, 1975, because the television coverage of brutal police intervention rendered the issue a national problem (Meyer, 2014). As Rainer Baake explains, the anti-nuclear movement following the Wyhl protests were very important since it was hardly possible to transport nuclear waste material without having big demonstrations, anymore: *“this has raised a lot of attention on the issue, with a lot of newspaper reports and TV coverage. This public pressure made the difference in Germany’s nuclear history”* (Baake, personal communication, 2016).

The anti-nuclear protests in Wyhl had two crucial points to consider for the German nuclear energy policy-making. The first concerns the relationship between the state and citizens. Craig Morris underlines that what people were protesting back then was not radioactivity or they did not know about the climate change, yet (personal communication, 2017). The reason was the government arranging a deal with the local mayor for the construction of a nuclear power plant without consulting the local people. The people basically reacted saying *“we are a farming community, we are doing fine and we do not want neither the power plant nor the industry here to create pollution”* (Morris, personal communication, 2017). Therefore, it was about rural conservative communities telling their government not to be so authoritarian, asking for accountability, wanting to be told what the infrastructure plans were. It was an extension of the 1968 Student Revolution which has changed what was expected from the government in terms of responsiveness. Morris notes: *“before this, if the authorities wanted to build something*

they did not think that they have to ask the local people and the people did not think about protesting when they were not consulted” (personal communication, 2017).

The second point concerns the protesters. Michael Sailor remembers the protests clearly and tells he saw back then:

“The struggle included a lot of people who made a sitting for long days. I remember, the police came and threw them away. And then more people came and the police replied again and they tried again. In those days, people used to support the police against the leftists, because it was a common opinion to think of them as communists, as the enemy. However, in the Wyhl events the protestors were not communists or leftists, they were ordinary villagers and normal farmers. Then it became an issue of democracy and state force against its own people” (Sailor, personal communication, 2017).

The initiation of the Wyhl, was not by “*ecological hippies*” but by ordinary farmers and conservative voters who wanted to tell their own government “*Wait a minute! You cannot do this!*”, as explains Craig Morris and adds: “*This is what makes Wyhl so special, the way it starts...The spirit is still there today in Germany*” (personal communication, 2017).

7.3.1. The Institutionalization of Anti-Nuclear Movement

The most prominent feature of German anti-nuclear movement is that it started as a real grassroot movement and step by step, evolved into an institutionalized opposition that finds its way in the parliament, into the core of decision-making. The way anti-nuclear movement in Germany institutionalized needs to be underlined as I think it offers a major difference of Germany compared to France and Turkey. The analysis of the in-dept interviews reveals two main dimensions in this institutionalization process: the intellectual world and the political scene.

The intellectual dimension concerns the link between the student protest movements in the late 1960s and the environmental movement. The members of these left-wing movements were very influential in the German intellectual world, rendering their promotion of ecological questions very successful (Expert G-1). These individuals have undertaken important roles in the society as many of them later became teachers or media members, as Expert G-6 explains: “*Many of the people sitting on the top positions of some*

media channels had this background of 1968 student revolution". Expert G-6 goes on underlining that the perspective of the members of this movement regarding the industry has been influential in shaping the image of nuclear in Germany:

"The nuclear power companies are members of the heavy, rich and powerful industry. In the fantasy of these people, this kind of industry is like a picture of an enemy for them, the industry is 'bad', just like nuclear which they see as dangerous, or as the incarnation of the bad heavy industry which they consider as part of the past. Because, these left-wing people who created this bottom-up movement in Germany, have a romantic idea of economy with a decentralized rule, village-based way of working, as the ideal way. But they are not seeing the reality. So, I think for those people the anti-nuclear fight is like a symbolic fight."

In this struggle, as Expert G-1 explains, the ecologists in Germany has been strategically very successful in raising money for their purposes: *"from strategic point of view, the ecologists managed the process technically very well. They worked step by step for creating political instruments to raise money for ecological purposes. Therefore, the influence and institutional power of ecological ideas got stronger and stronger in Germany"*. With this strategy the members of the anti-nuclear movement wanted to take part in official institutions. As Expert G-6 notes this effort also includes the establishment of research institutions, such as the Öko Institute, which was a small high-class scientific institute which offered another level to the movement with the touch of classical research. *"I think it was a very clever step"* says Expert G-6, *"and now they are one the most prominent think tanks in Germany!"*.

For years, the mass demonstrations against nuclear power plants and against the nuclear waste transportation continued in Germany. Expert G-6 talks about trains carrying nuclear waste to Gorleben as examples: *"tens of thousands of demonstrators were trying to block the rails and ten thousand police were coming to carry them away from the rails. These civil war-like scenes were on TV every night, for years. They kept the topic alive"*. But this was outside the parliament.

There was a very strong movement on the streets, however, there was no opposition in the parliament yet, until the issue was further politicized and anti-nuclear demonstrations gave birth to the Green Party (Expert G-3). According to many experts such as Rainer

Baake, three major movements made Green Party possible in Germany: the women's movement, the peace movement and the environmental movement, which was very much focused on “*getting rid of nuclear*” (Baake, personal communication, 2016). The anti-nuclear movement on the streets was one of the sources for the establishment of the Green Party in Germany (Expert G-1), whose fundamental idea, *raison d'être*, was to fight against nuclear power (Expert G-6, Expert G-1). As Vivianne Raddatz underlines, the party became “*a catalyst for actually pushing nuclear over the edge*” (personal communication, 2017). In 1998, with the election of the Green Party, this main idea took a step into the government.

The 1998 election was the first time since Second World War, that it was possible for a new party to enter the German parliamentary system (Baake, personal communication, 2016). According to some, the success of the greens was due to the fact that they had campaigned for a nuclear phase-out (Expert G-8, Raddatz, personal communication, 2017) and due to their strong motivation to get the idea of exiting nuclear politically done (Expert G-6). Both Rainer Baake (personal communication, 2016) and Ludger Mohrbach (personal communication, 2017) state that the nuclear phase-out is one hundred percent the success of the Green party, as Baake adds: “*without green party there would not have been a nuclear phase-out. It was only after the greens got so much support and entered the parliament that other parties started to change their position*” (personal communication, 2016).

Since then Alliance'90 /the Greens (Bündnis'90 /Die Grünen) in Germany operates as the representative of the “*really loud voice on the street*”¹⁰⁵ as Expert G-11 who is a Green party member describes, and tries to put pressure from the opposition to the government. Expert G-11 explains how:

“we ask questions about nuclear in parliament. We write to the press, we try to discover things that may be the industry tries to hide. We grab them and put them into the light and try to give it to the media, so that there is some reporting or some journalists write about, to bring it into public attention. We try to push the governments”.

¹⁰⁵ The party program says coal and nuclear are obsolete (Bündis 90 Die Grünen, 2020).

Expert G-4, who is a distinguished member of the German nuclear industry agrees that the green party have so much power now in Germany:

“They are the ones that are being heard. They are the ones that always issue statements, they are the ones pointing out the faults in the plants. The nuclear power plant operators already report every incident to the nuclear safety authority, if there are any. Even the littlest ones. However, if the word gets out, the greens report it to the public or to the newspapers. Even if nothing happens, it still becomes bad news in the attitude of ‘Oh! Look! Something happened in the nuclear power plants’” (Expert G-4).

A similar political institutionalization of the anti-nuclear movement in Turkey is not present. Earlier section on the anti-nuclear movement in Turkey has underlined that the movement is too local and too distracted to make a strong impact especially in the post-2000 decision. Can it be also because the movement was not transferred into the political arena via a green party to embrace all local anti-nuclear movements under its roof, and make a political stance? This is an important possibility.

Oğuz Türkyılmaz underlines that there have been concrete anti-nuclear efforts in the forms of protests, debates or publications to increase the visibility of the nuclear issue, however, he notes that the efforts lacked a centralized political organization (personal communication, 2018). Türkyılmaz continues explaining that when the first anti-nuclear protests started in Turkey in the late 1970s, there were *“no greens at all”* in the political scene, and when The Greens emerged it was a political party considered as *“too complicated, leftist, or as part of a marginal movement”* (personal communication, 2018). The green parties in Turkey¹⁰⁶ have been either short-lived or marginally positioned in the political arena with very limited vote shares. According to Expert T-15, this was caused by the fact that these parties were not focused on the energy or anti-nuclear policy per se, but have been also touching upon the Kurdish issue, which has been a sensitive element of Turkish political arena. *“This is why”*, Expert T-15 says *“most of the anti-*

¹⁰⁶ Turkish Green Parties are: The Greens (between 1988-1994, with a come-back in 2008); Gönül Birliği Yeşiller Partisi (between 2000-2003) and Yeşiller ve Sol Gelecek Partisi (founded in 2012) (TBMM, 2020b). As a very recent development, in September 2020, a new green party, The Greens (Yeşiller) is founded. With regard to nuclear energy, The Greens indicate in their party program that they salute the anti-nuclear movement which have been fighting for a period of nearly half a century in Turkey and they declare that all nuclear power plant projects, including those whose construction has started, will be stopped (Yeşiller, 2020).

nuclears refrained from being in the same picture with the Turkish green parties”.

The anti-nuclear movement in France does not include a direct political transformation and the story of the greens in France is also complicated just like in Turkey. Although party program of the Europe Ecologie/Les Verts in France officially includes their anti-nuclear position (Ecologie Les Verts, 2013), the anti-nuclear movement’s direct association with the Greens is problematic, which are not considered as a grounded party (Chadwick, 2020).

Mazzucchi explains that when the green parties started to develop in France in the 1980s, they were mostly dominated by former socialists, former communists or by people from extreme left parties. In that period, France ended up with small parties such as Les Verts, or Generation Ecologie which spent their effort to compete with each other. In a context where nuclear energy was significantly framed under the themes of national independence and French “grandeur”, it was very difficult for the anti-nuclear movement to find its political way through a green party, independent from left-right cleavages or dominant political camps (Rucht, 1994, p.151). Even when these parties decided to merge, important inside party political struggles remained. *“Even when choosing the name, it was impossible for them to reach a consensus on a new name so they choose to call themselves as Europe Écologie les Verts”*, says Mazzucchi (personal communication, 2018). An enduring problem with the Green Party in France is that, inside the same party, there are very large number of specific policy orientations such as pro-life, anti-life, vegan-not vegan, pro-nuclear, pro-wind which are in competition with each other, instead of a strait focus on nuclear (Mazzucchi, personal communication, 2018). According to Expert F-10 today the green issues are already taken into account by other parties which have developed a green thesis. This is why, most of the experts think that the political credibility of the greens is very low (Expert F-2), their arguments are not convincing (Expert F-7) and their presence in the national political scene is not significant in France (Turpin, personal communication, 2018). Even Corinne Lepage, the founding member of Ecology Generation in the early 1990s and former Ministry of the Environment in a center-right government between 1995-1997 says: *“we don’t have a strong green party in France, today. Because we are bad. The Greens have bad politicians and for this*

reason the green party disappeared” (personal communication, 2018).

The transmission of the anti-nuclear movement into the political arena where actual decision-making takes place is instrumental. In this regard, the weight of the green party in Germany compared to France, can cause a higher reflection of the anti-nuclear public position into the political scene, and eventually can contribute to the variance between France and Germany in terms of their positions on nuclear energy. The figure below compares that vote shares of Alliance’90 /the Greens (Bündnis’90 /Die Grünen) in German Bundestag elections and Europe Ecology/ Les Verts in the French National Assembly elections. While both in France and Germany the Green Party vote shares fluctuate through subsequent elections, the Green Party in Germany gets almost twice of the vote shares in France. The difference can represent a higher presence of the green party premises in the decision-making processes and this can lead to a more concrete anti-nuclear position with regards to especially the commitment to nuclear energy for the future. Materialization of anti-nuclear positions through representation in the assembly by a party which has significantly internalized the pursuit of an anti-nuclear policy, can have a restrictive or even anti-nuclear effect on the policy decision, as the German case illustrates.

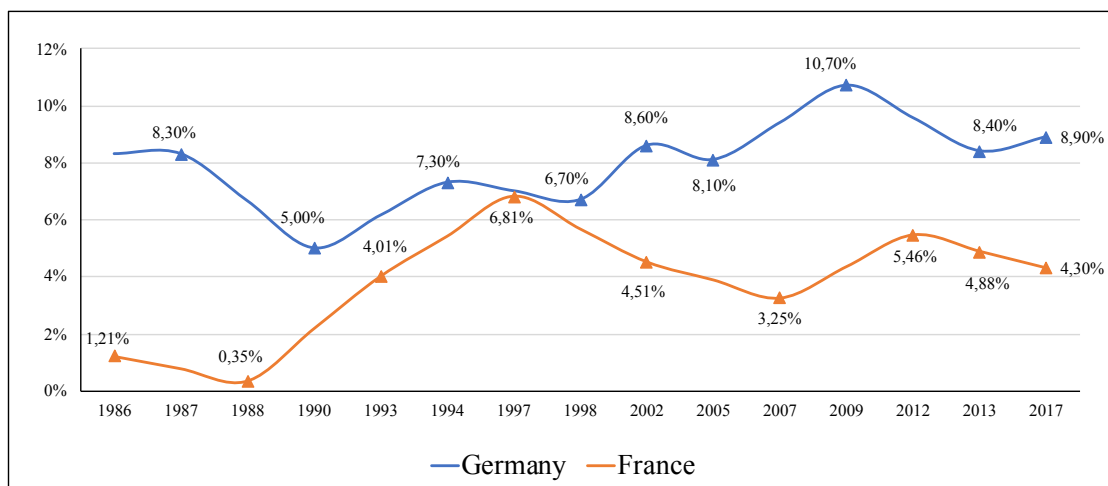


Figure 7.4. Vote shares of Green Parties in France and Germany¹⁰⁷

¹⁰⁷ Compiled by the author. Date sources: Source: Bündis 90 Die Grünen, 2020 & Inter-Parliamentary Union, 2020.

This section demonstrated some country-specific features of the anti-nuclear movement revealed from the analysis of the interviews. These characteristics play crucial role in determining the impact of the anti-nuclear movement on the decision-making. It is striking that in Germany, nuclear energy has been considered a technology essentially forced on people, resulting in a massive grassroots movement which has started years before Chernobyl. Furthermore, the political institutionalization of the anti-nuclear movement has also been instrumental in shaping nuclear energy policy in Germany. This feature significantly lacked for the case of Turkey and was highly complicated for the case France under the left-right cleavages in politics. An interesting common point between France and Turkey, is the perspective which associated anti-nuclear movement with an “external actor” pursuing a political agenda. This perspective is especially reflected by French experts who think that the protests are not local (often coming from Germany¹⁰⁸) and by Turkish experts who claim that the anti-nuclear movement in Turkey is catalyzed by those who do not want Turkey to become a global power. Given the importance assigned to the prestige factor and national independence by both countries, this is a finding that stands out, as opposed to Germany in which case the movement is considered to be completely owned by its people.

7. 4. Sociological Elements: The Interplay Between Culture, History and Technology

The socio-political structure of a country constitutes the second set of contextual dynamics which impact the interplay of driving and constraining mechanisms. These elements are also influential in shaping the essence of public opinion and anti-nuclear movement. To illustrate, in my fieldtrip in Germany I have noticed an outstanding emphasis on the “green culture” of Germany as a trigger for a strong environmental movement.

The analysis of the interview results uncovers that history, culture and political structure are enmeshed with each other so as to impact nuclear energy policy-making from different and complementary fronts.

¹⁰⁸ Dr. Turpin highlights that in the early years of anti-nuclear protests in France, there were many conspiracy theories claiming that the anti-nuclear movement in France was in the soviet interest (personal communication, 2018).

During the analysis of the interviews, one of the most surprising¹⁰⁹ results was to see “culture” emerge among the main domestic factors that influence nuclear energy policy-making. It is interesting to find out culture, as an influential factor in the decision-making of an energy resource.

Overall 54 percent of the experts referred to elements which are clustered under the theme of culture. The reference to cultural elements differs across case studies: in France 31 percent, in Germany 72 percent and Turkey 56 percent of the experts talked about them. In Germany and in Turkey, cultural elements have the third highest emphasis among the coded segments, after public opinion and social movements. The insights of the experts on certain traits of their countries’ distinct cultural elements offer vital insights about the national context for nuclear energy decision.

How does cultural elements relate to nuclear energy policy-making? The experts’ insights based on their national backgrounds or career experiences reveal that certain sociological, historical and cultural traits are instrumental in shaping the image of nuclear energy within the society, shaping the motivation of decision-makers for or against nuclear energy or influencing the successful execution of nuclear energy policy.

France

An element that is very important in the development of French nuclear policy is the influence of the state and the perception of the state in the French culture. Some of the participants suggest that in the Anglo-Saxon world, or in Germany, the state is seen as a threat against civil liberties, and free market. In such countries, the political history is based on how local communities can weaken the state and prevent the state from becoming too powerful. In France, it is rather the opposite. Expert F-15 for example explains that in France, the historical story is about one central state that is seen as the protector of the freedoms against the local nobility: “*The French centralization is the*

¹⁰⁹ The most surprising factor for me was the remark of a French expert on the impact of dominant religious belief on the French and German people’s perspective on nuclear energy. Expert F-15 suggested that the French people are not really afraid of nuclear, because the “fear” factor is not very much present in the French culture. He suggests that “this might be due to the influence of the Catholicism, and resignation to the will of God”.

story of people that preferred being governed from Paris rather than their own local nobility". Accordingly, Expert F-15 suggests that the trust to the state is a cultural element in the French society. One can suggest that in a country where the trust between citizens and the state is high and strong, it is more convenient to launch a nuclear power project and to proceed with a pro-nuclear policy. As Expert F-4 explains, in such countries, people can feel more comfortable to delegate the decisions on complicated technical matters, such as nuclear energy, to governments and regulators who are supposed to be "watching." It is crucial for citizens to have faith in relevant institutions for the protection of their rights and for the assurance that the right decision is being made. Expert F-4 continues as following:

"I think citizens do have a lot of confidence in the regulators in France. In some other countries they don't, and if you don't have that faith then things get very difficult. I have been watching the Japanese case since the accident. I have gone to Japan many times over the years since the accident and that's a case where the public really lost complete confidence in the ability of the regulatory people and the government to protect them in the aftermath of the accident. Because the problem was not just the accident. There was a lot of information that came after the accident that showed people that people that were supposed to be protecting the public were not doing their job. That is hard to crawl back from there" (Expert F-4).

The trust factor is considered by the French experts as part of their culture. Although whether "trust to the state" would be a cultural qualification or not is open to debate, what is for sure is that this argument is also supported by the statistics. The 2020 barometer of IRSN about the "Perceptions on Security Risks" reveals that in the field of industry and nuclear energy, French nuclear institutions are both considered as technically competent and as trusted sources of information by more than 70 percent of the citizens, significantly more than the government or the politicians, as the following table demonstrates (IRSN, 2020).¹¹⁰

¹¹⁰ The exact questions are as the following: "In the field of industry and nuclear energy, do you think that the following stakeholders and organizations are technically competent?" and "In the field of industry and nuclear energy, do you think the following stakeholders and organizations are trusted sources of information?" (IRSN, 2020).

Table 7.1. Public opinion on the competence and credibility of selected stakeholders

Stakeholder	Technical Competence			Trust		
	YES	NO	DK	YES	NO	DK
ASN (The Nuclear Safety Authority)	85,2	10,8	4,1	77,6	17,1	5,3
IRSN (Institute for Radiation Protection and Nuclear Safety)	82,4	12	5,6	78,5	15,1	6,4
CEA (The French Alternative Energies and Atomic Energy Commission)	79,2	13,9	7	73,7	18,3	8
ANDRA (National Agency for Radioactive Waste Management)	78,6	12,7	8,7	71,5	20,1	8,4
Government	44,4	49,8	5,8	37,7	56,8	5,5
Journalists	37,8	55,6	6,6	40,2	52,2	7,6
Politicians	33,1	61,1	5,8	30,7	62,4	6,9
Compiled by the Author. Data Source: IRSN, 2020.						

As a result, for the case of France, according to the interview results the cultural role assigned to the state, the trust in the state operates as an enabling factor in the nuclear energy decision-making.

Another striking finding concerns the way history is shaping national culture. An important remark from several French experts concerns how national values are incorporated into the French identity and how the French people embrace what *belongs* to their nation. This refers to a strong interaction between French national values, history and nuclear technology. To illustrate, Alain Bucaille suggests that the fear of depending upon the Middle East has rooted into the French culture and was the major point that played a role, perhaps less role today than in the world of yesterday, in French nuclear policy-making. According to him, this includes several dynamics, such the fear of Islam or the independence of Maghreb countries, Algeria, Morocco, Tunisia. Therefore, history always has its weight in the background of decision-making process, as Bucaille underlines by saying: “*you cannot tell that we forget the history*” (Bucaille, personal communication, 2018).

As a matter of fact, the legacy of history is touched upon by 50 percent of the French participants, significantly more than in Germany (6 percent) and in Turkey (none). In France the statements regarding history represents the third highest coverage among the coded segments after public opinion and social movements. These experts state that the

French motivation for nuclear energy is intrinsically linked to its history. There were “*three ingredients in the mix*” as Dr. Turpin categorizes in his interview. Reminiscing feelings from the world wars (especially the reconstruction after World War II), the considerations of the Cold War era and the Oil Crisis undertook critical role in French nuclear policy-making (Turpin, personal communication, 2018). In this regard, certain historical milestones are repeatedly mentioned by the participants as having crucial impact on the French perspective on nuclear, as the following paragraphs will review.

As the chronology goes, in the late 1940s, France started a very sharp policy of research for its nuclear program (Turpin, personal communication, 2018). Accordingly, the story begins at the end of World War II with the establishment of CEA, which started to work on the nuclear question and on the first nuclear reactor. According to Corinne Lepage, the fact that CEA was initially directed by Frédéric Joliot-Curie, son-in-law of Marie Curie who was the first person and the only woman to win the Nobel Prize twice and who is a remarkable national value for France, was a symbolic element in the nuclear history of France (Lepage, personal communication, 2018).

In the early 1950s, when the French nuclear military program was launched, as discussed earlier in the chapter on driving factors, nuclear was strongly linked to the defense industry. Expert F-2 notes:

“the tools we developed in the field of submarines and missile launchers, were developed for the use of a nuclear bomb. We had a Mirage IV which was a kind of fighter that could take a nuclear missile to target the Soviet Union and the Warsaw Pact forces in case of war in Central Europe”.

By 1958, when General De Gaulle came into the power, the civil nuclear program and the military nuclear program was very much interlinked. This also coincides with the creations of IAEA and of the European Community of Atomic Energy (The Euratom Treaty), with the goal of building civilian nuclear industry in Europe, as some experts suggest.

In 1960s, EDF started to think that the coal resources in France were being exhausted, they have seen the need for another kind of energy so they started with oil fired conventional plants. EDF started to produce electricity by burning oil in the 1960s. At

that time, Algeria with vast oil and gas reserves was still under French authority. In 1962, when Algeria became independent, this also meant that France had no more resources of gas and oil. Dr. Laurent Turpin, the Director of AFNI (France International Nuclear Agency) explains that this is when the idea for a civilian nuclear program started to grow and EDF started to train conventional engineers for working in nuclear energy generation as of 1965: “...so ten years before the big launch of the French program (he refers to the Messmer Plan of 1974), even before the big oil crisis they had already started to the preparations” (Turpin, personal communication, 2018). Following the oil crisis, “France decided to become the biggest nuclear state in the world” (Lepage, personal communication, 2018).

As this background reveals, the rise of France in the aftermath of wars and oil crises was in parallel with its nuclear power policy merging military and civilian usages. Both the interviews and my experience with the experts guide me to conclude that the role nuclear energy played in France’s development renders nuclear power a national value for France, an intrinsic part of French identity. Although current conditions disclose several constraining factors for the French policy on nuclear energy, as discussed in the previous chapter, still, nuclear energy is itself a cultural element for France. In certain spheres, this embracement brings a nationalism which creates a deep sympathy for big projects. A critic of nuclear energy highlights this point: “*This is how France works: big nuclear power plants, big national corporations, big trains, large technical things... God knows why but France has been locked into the passion of big technical solutions*” (Expert F-7).

In this context, in her book “La Vérité sur le nucléaire: le choix interdit” (The Truth About Nuclear: The Forbidden Choice) Corinne Lepage offers an insightful remark. She explains that for France, leaving nuclear power would be an abandonment, a form of mourning to accomplish in relation to what has always been presented to the French people as a national pride, like an area of excellence like the Concorde which “we have however abandoned to be proud of the Airbus”, she says. Lepage notes that France has to accomplish the same cultural revolution, by aiming a leadership position in the development of new green technologies and renewable resources. Lepage believes that the success in energy transition and finding new sources of national pride will save the French people from becoming the authors, directors and actors of a radioactive disaster

for which future generations will blame. Lepage concludes that: “We have all the reasons to change and more importantly, all the reasons to succeed” (Lepage, 2011, p.229-230).

Another major point that emerges from the interviews is the emphasis on rationalism and science in France. To illustrate, Expert F-15 suggests that the school culture in France is an important difference compared to other countries, arguing that the French have an exclusive focus on scientific culture. According to Expert F-15, the French people start seeing atomic physics even in secondary school and therefore they are able to understand more the explanations of the nuclear industry:

“In France, the Cartesian¹¹¹ heritage is very strong, science is an important topic in teaching and the scientists have a good standing. In some other countries, there is an enormous difference to what science is. In Germany the figure of the scientist is Dr. Faust and in France it is Pasteur. The scientists have a positive figure in France, it is a negative figure in the Anglo-Saxon world. The French system is more logical and more scientific. The idea of conspiracy theories work less well in France then would do in the Anglo-Saxon countries” (Expert F15).

The majority of the French experts from the nuclear industry raise a similar point. Alain Bucaille thinks that looking at Descartes, Molière or Victor Hugo can offer an understanding of the French identity: “*So if you tell something in France, which is true in terms of facts but, which is against what Descartes, Molière or Victor Hugo say, forget it, it will never be considered!*” (personal communication, 2018). Despite the sympathy for big technological solutions or the legacy of rationalism and science as claimed by these experts, others also point to the changing technical culture in France stating that some decision-makers lack technical literacy. One of the participants regrets that some decision-makers don’t even know the difference between the final consumption and electricity production: “*When you are in an environment where there is no technical culture, people don’t even know what you are talking about. Getting prepared before a tv debate on how energy systems and everything works, is an issue of culture, technical*

¹¹¹ Cartesian heritage is a scientific tradition derived from the writings of the French philosopher René Descartes (1596–1650).

culture” (Expert F8). Same expert makes a brief reference to German policymakers and suggests:

“If you talk to German Green party representatives, they may have limited information of technics, but they some kind of technical culture. And I might disagree with them on many things, but they have some kind of technical culture which is good enough for them to understand what I would explain as an expert”
(Expert F-8).

Although there are mixed views regarding technical knowledge capacity of French decision-makers, the combined analysis of the interviews and my fieldtrip for the case of France demonstrates the interactive relationship between history and national culture rendering nuclear energy an intrinsic part of national history, an icon almost as important as Descartes or Pasteur’s legacy for the French policy-makers. I suggest this offers an enabling venue for a pro-nuclear energy policy.

Germany

For the case of Germany as well, several experts’ interpretations offer linkages between the effect of the country’s history on its cultural perspective and ideas on nuclear energy. As a matter of fact, the “*German Angst* (fear)¹¹²” has been a common response for my question regarding the difference between France and Germany’s perceptions of nuclear energy. Expert G-6 explains *angst* which leads nuclear to be seen as “*a threat*”, as the following: in the aftermath of Second World War and its horrors, Germany ended up as not only separated as East and West, but also as one of the most militarized area of the world. On each side of the wall, both the Soviet Army and US Army were ready for war with their nuclear weapons. On top of the risk of a hot war that could totally destroy Germany, the families had also fallen apart between the East and the West with limited contact. Therefore, as Expert G-6 continues, “*the feeling, the fear to be under a nuclear threat was very strong. Associating nuclear energy with this threat factor, adding up on its dangers regarding accidents and radioactive waste, Germans didn’t want to have any risky things anymore in their territory*”.

¹¹² For an interesting article on German Angst please see “Germans and why they worry about "German Angst" at: <https://www.dw.com/en/germans-and-why-they-worry-about-german-angst/a-16425161>

Talking about this fear of risk, Michael Sailor underlines that “*Germans always think about absolute safety!*” (personal communication, 2017). Similarly, Expert G-2 also says “*Germans are not prone to taking risks. We like to control everything. We don’t like try and error. Instead of failing, we’d rather think two or three years before making a decision*”. Adding to this, Expert G-4 explains that in general, this perspective is also reflected into the life choices of German people as they are very settled down staying in the same cities, same jobs for years. “*Although younger generations are more open to change, we were raised like this. Once we settle our lives, we know exactly what it would be like until we die. Imagine something happening at a nuclear power plant*” explains Expert G-4 and continues, “*we would have to evacuate a large part of Germany. Where would those people go? That would totally destroy people’s safe and secure lives.*” Such cultural traits combined with the risks associated with nuclear energy as addressed in the constraining factors, partially contributes in understanding German public opposition to nuclear energy and the eventual phase out decision in the aftermath of Fukushima.

One important remark to underline with regards to Fukushima concerns the image of Japan in Germany and how Fukushima accident was processed differently than Chernobyl in Germany. Fukushima accident happening in Japan has created an exclusive shock for Germany due to the national stereotype assigned to Japan by Germans. Michael Sailor states: “*Germans always think they are the best of the nations in technical sense. We are the best technicians all over this world, with best engineers, best technological quality. Maybe the Japanese are on the same level as we are*” (personal communication, 2017). Vivianne Raddatz and Expert G-8 also confirm this perspective that both in German society and within the German industry, Japanese technology is acceptable and *trustable* due to both nations’ similar mentalities with regards to quality, reliability and safety. Prior to Fukushima, in Germany, there was a firm belief in the ability of Japanese nuclear engineers just like their German counterparts. Expert G-8, who is a representative from German energy industry says, referring to nuclear technology: “*We know we can do it. Everybody thought Japan can do it too in a safer way compared to other countries. However, the power of the pictures of the collapsing buildings in Japan made people to question the limits of our capabilities*”. It was a great shock for the Germans that the Japanese failed. Vivianne Raddatz further elaborates on the issue by stating that:

“in Chernobyl people could say ok it is in Soviet Republic where

they don't have the money to make sure that everything is fine. But for Fukushima...Its Japan! Seeing that things can still go wrong even in Japan really made it possible for the whole anti-nuclear movement which was very much prepared to use any moment like this to step in very quickly and say 'look you really have to see that there are things you cannot control, even in such a high-tech environment with tons of engineers. You can make sure that everything is safe but there are always factors that you cannot anticipate'. Then, the absolute phase out decision was very quickly taken" (personal communication, 2017).

In addition to *Angst* and the shocking effect of seeing a trusted technological counterpart fail on the German society, one more factor is highly uttered by German experts, which is the German passion for nature. Starting the field trip in Germany, one of my major curiosities concerned the power of green movement in Germany, which has been an influential factor in the anti-nuclear German policy. What makes green movement that strong in Germany not only for nuclear energy policy-making but also regarding the whole *Energiewende* policy that locates environment to the core of policy? My quest for answers led me to the view that, as summarized by Rainer Baake "*there is higher sensitivity when it comes to environmental issues*" (personal communication, 2016) and to the role forests in German culture.

In the case of France, the interviewed experts have highly referred to the role of scientists or the influence of Cartesian heritage, of early French thinkers and writers on French perspective to science and technology. It was very interesting to observe this, for the German case as well. Although the content is completely different, the interviewees established similar linkages with the past, suggesting that the specific picture of nature which stands from the romantic times in the first half of the 19th century (Sailor, personal communication, 2017) penetrated strongly into the German culture through literature, poets and classical music (Expert G-2, Expert G-3). Having one of the largest productive forest landscapes in Europe, Germans' sensitivity about forests is "*easy to explain*" in Craig Morris' words because "*the British cut theirs down to have a navy and the French cut theirs down to build cathedrals. So, they don't have forests like Germany does*" (personal communication, 2017). Expert G-11 also thinks in a similar way: "*Germany has been full of forests, and traditionally German people have been living in country side*

instead of big cities, growing their own vegetables. I think there is a German passion for nature, for being in nature, being connected with nature”.

The love for nature is maybe one of the rare points of agreement between pro and anti-nuclear German experts. It is a characteristic that I could even notice during the interviews. To illustrate during our discussion, Kurt Dieter Grill occasionally referred to different philosophers underlining that human beings should never be in the role of God, dominating over nature. As a result, the “green values”, the green ideas are strongly rooted in the German Society (Expert G-16). Expert G-4 explains that over decades, this ecological perspective, which she defines also as a “*more left-wing approach*”, is so engrained in the mindsets that today, Germany’s well-educated engineers are also voting green and that they follow the vision and fantasy to build a new, cleaner, safer world. The game changing difference between pro-nuclear and anti-nuclear views in Germany stands out right at this point as the opponents think “*nuclear power is so destructive, it can ruin all of these*” (Expert G-11).

Turkey

The discussion of socio-cultural elements for Turkey contains totally different aspects, as expected. The remarks in this category mainly represent concerns of the interviewed experts with regards to the “way of doing business” in Turkey which, according to them, can hamper the nuclear energy policy-making and its safe execution. The majority of the experts think that Turkey suffers from the absence of an informed debate on environment due to fundamental deficiencies in its education system. Expert T-11 expresses his resentment in the following words:

“The policymakers need to quit empty words. Your status in the world depends on where you are in science, in mathematics in technology. Check out the latest PISA test scores Turkey performs lower than the OECD average in every category. This is the ugly truth and it is heartbreaking. Because, we have a strong history, we have the legacy of a giant empire which ruled the World. Think about the technology used to conquer İstanbul as an example. And look at Turkey now, outpaced in technology and development by several small countries”.

The statements of the experts in the realm of socio-cultural structures hampering the policy-making process concern three major spheres: knowledge, critical thinking and

technology. A common point emphasized by Experts T-7, T-11, T-16 and T-10 is that in Turkey the public lacks necessary information and knowledge background on nuclear energy opening the way for a lot of information pollution. Similar to the perspectives asserted on public opinion, Expert T-16 says: *“there is a group of people in Turkey who totally lacks knowledge on nuclear energy, yet has an opinion on it and has a lot to say on it!”*. Accordingly, the lack of informed opinion brings a fanaticism in favor or against nuclear energy which further sabotage Turkey’s chance to engage in a fruitful debate on nuclear by obscuring the stakeholders’ ability of critical thinking with regards to benefits and costs of nuclear for Turkey. In line with his experience in numerous institutions Expert T-11 states that *“once Turkish people believe in something it is impossible to change their opinion. In every counter-argument they become defensive, they have a partisan attitude with regards to nuclear.”* Expert T-7 who has been working in Turkish nuclear industry reaches a similar conclusion as a result of years of experience: *“People either support or oppose nuclear energy unconditionally. They do not intend to ask questions or debate. They just shout. They don’t have the intention to learn and understand nuclear.”*

Concerning the issue of nuclear energy in Turkey my own observation from numerous events and conferences I have attended, confirms the obvious lack of communication between the pro-nuclear industry and/or decisionmakers and the anti-nuclear critics. In occasions where they come together both parties approach each other with extreme arguments or requests causing the other party to completely shut itself against any alternative views, not taking the other party for serious. The stakeholders miss the fact that it is okay to support a team and yet to criticize its goal keeper. Taking criticisms personal and the lack of friendly discussion environment based on facts emerges as a problem in many policy spheres.

The lack of technology culture is another reoccurring theme for Turkey. According to some experts this highly affects the diffusion of green or environmental movements into the society. Expert T-4 explains the linkage between the two as the following: *“technology culture is not internalized in our lives, which is caused by the fact that we do not produce the technology. If we were a technology producing society we would be more*

sensitive towards the environment since we would be able to compare the benefits and costs of that technology from the first hand’.

Another group of characteristics addressed by the experts concerns safety and proper execution of nuclear energy policy in Turkey. Some experts, such as Expert T-5, express their concerns that the lack of respect to the laws in Turkey, in their words, can be dangerous when it comes to nuclear regulations: *“In Turkey people try to use bypasses to override laws which not only weaken the staidness of the legal system but also wears down the institutions’ credibility”*. The same expert continues by telling that *“The Turkish society has a tendency to deal with everything through shortcuts! People want to achieve success overnight, quickly. That’s why we do not have long term action plans or ideals to reach as long-term goals. Turkey wants to be a world leader, but wants it quickly!”* These concerns become especially important in the context of the construction of Akkuyu nuclear power plant and its Environmental Impact Assessment.

Last but not least, there is an extensive reference to the risk perception in Turkish culture. Experts such as Prof. Gökmen and Necdet Pamir believe that in Turkey there is a tendency to underestimate the risks, with a perspective that *“nothing can happen to us”* (personal communications, 2018). This perspective is often supported by the declarations of Turkish policy-makers with regards to the risks of nuclear. This is a sharp contrast in comparison to the French and German experts’ emphasis on the importance of safety culture.

The elements reviewed under this section have been bonus prizes of conducting semi-structured interviews and grounded theory, because normally one might not expect the discussion on nuclear energy to end-up in those features. However, the fact that experts, independent from each other, mentioned these same historical, cultural and social traits, made them meaningful in understanding the analysis of nuclear energy decisions. These statements cannot be generalized to the whole French, German or Turkish citizens and the main purpose of this research has never been to stereotype the national traits. Nevertheless, noting that these experts are no ordinary stakeholders but professionals who have been at the heart of energy policy-making for years, their insights are worth

considering.

7. 5. Political System/Political Culture

Another interesting research output from the interviews is the impact of political culture on nuclear energy policy-making. The reason why this category was coded as “political system/culture” is because during the interviews in all countries, I significantly experienced that political system or the way political system is perceived by the decision-makers, has created a distinct political culture for the concerned country, with regards to the “way of doing business” or making decisions.

The view that nuclear power fits better in centralized systems is a reoccurring theme, especially as a significant difference between France and Germany. Michael Sailor and Expert G-11 emphasize that as opposed to France which is a centralized country, Germany has a federal structure, with “*free governments*”, in Sailor’s words, which are responsible for the decision-making process and supervision of nuclear power plants (personal communication, 2017). Craig Morris explains that the German political system is more open, and allows for popular will to express itself. Therefore, the political leaders can see what people want, and the movements in the street can actually transfer to the political level (personal communication, 2017). Indeed, in their book *Energy Democracy: Germany’s Energiewende to Renewables*, Morris and his co-author Arne Jungjohann extensively talk about the necessity of a healthy democracy, as a key to the Energiewende’s success (Morris & Jungjohann, 2016).

Some Turkish experts also claim an opposite relationship between democracy and nuclear energy, arguing that today, the countries where nuclear power is growing are mostly those which lack democracy, where people cannot question the decision-making a lot. To illustrate Expert T-1 suggests that “*Nuclear loves political systems which are deficient in democracy*”. The central decision-making and the President’s strong presence in the political system is a feature underlined for Turkey by some experts who imply that certain projects in Turkey are conducted with specific decision of the President, and are not open to debate or opposition. To illustrate, Expert T-1 states:

“It is all about the mentality of ‘I can do whatever I want, and nobody can do anything about it’. Many of the projects in Turkey’s current agenda are unbelievable! Let alone nuclear, why are we still talking about The İstanbul Canal, despite many scientists and environmentalists who warn about its immediate dangers?”

According to Expert T-5 this over emphasis on the policies or decisions of the ruling party and the President rests on the lack of democracy culture in which the citizens see themselves as a legitimate stakeholder in decision-making. Expert T-5 notes that the majority of the Turkish citizens do not consider themselves as stakeholders for policy decisions and underlines this feature as an important component of Turkish political culture.

France has been the case where the features related to political culture have been emphasized the most. 31 percent of the participants in France suggest that political system and political culture is influential in nuclear energy policy-making. According to these experts, the role of the presidential decision making and the central state has been very instrumental in French nuclear energy policy. They suggest that a strong government is needed for taking the decision for nuclear energy and making it sure that the decision will be applied. Paul Dorfman underlines France’s Napoleonic mode of power stating that the French presidential power is “*enormous*”, and it is distinct from English, German systems or from other forms of leadership and power (personal communication, 2018). Accordingly, he suggests that in the UK or in Germany there are checks and balances in terms of cabinets and parliamentary discourses. In France on the other hand, the power structures are less diffused, they are much more concentrated, giving the state and the president a central position. Similarly, Expert T-7 highlights the power and freedom of the president as the following: “*Mr. Le President, can do what he or she wants to do. And it is reflected in the way people look at the president with admiration, it is incredible! So, if they want to do something they do it. And that’s what happened with nuclear*”. Expert F-15 explains why the state has such an important role in France:

“France is not a federal country it is a unitary country, the people that administer the local areas are nominated by the minister of interior so it is a very centralized system and people have a great confidence in this system. There is a trust to the state that is very

different from what you see in other countries. So, when the state says that nuclear is a good thing, people tend to accept”.

According to Schneider, in France, “there is nothing else that symbolizes the state more and better than nuclear and nuclear means centralized decision making and power” (Schneider, personal communication, 2018). This top to the bottom decision-making in nuclear policy has been a facilitator in the initiation of French nuclear energy strategy. Expert F-15’s perspective as an official state representative on the French decision to engage in a comprehensive nuclear energy program is as the following:

“It was an executive decision which nobody ever contested. I mean, people accepted it. You may think that in a country as politically active as France people would have gone to the streets to protest, not at all! The French have a confidence in the administration, the central administration to do things correctly.”

I believe this insight needs a special emphasis in the light of earlier discussions of this chapter. When the French nuclear program was launched, there was no debate in the parliament, and this had resulted in a decades-long criticism about the design of French nuclear policy considered as “driven by the elites” or as “lacking public approval”. Therefore, the interpretation that the executive decision of France on nuclear energy was not contested at all is incomplete. Nonetheless, as the results of the IRSN survey revealed, it is true that the French citizens’ confidence in institutions “*to do things correctly*” is high. These two points confirm that nuclear energy decision has gift dynamics.

The claim that the French nuclear program was directed without public consultation or parliamentary debate from the start is an important one and it is highly related to the state culture in France. This culture of state policy, is often associated with one of the most common criticisms raised for the French nuclear energy policy claiming that the initial design of the policy was a technocratic decision, in a de-politized policy-making environment, dominated by elite technocrats in government and industry (Schneider, 2013, p. 28, 33). One leading view, as articulated by Mycle Schneider as well in our interview, points to the idea that all the French decision-making in energy is still directed exclusively by technocrats. Schneider wrote in 2008 that “the program has been designed, developed and implemented under the guidance of a powerful technocrat elite, beyond governmental changes and outside parliamentary decisions and control” (Schneider,

2008). Schneider thinks that even today, the core of the nuclear program is not the politicians, it is the elite technocrats. Paul Dorfman also underlines that in France, there are social and political elites who dominate the policy discourse and who have immense power on the decisions: “*these French elites*”, he adds, “*had a huge amount of play in the decision to go nuclear in France*” (Dorfman, personal communication, 2018).

If one conducts deeper research on the impact of the technocratic-elites on nuclear policy as part of the state culture, the notion of the “Corps des Mines¹¹³” emerges as a reoccurring theme. Even in this research’s interview sample, 34 percent of the French experts talked about the Corps des Mines. Is it a member only club? A lobby group? The critics of nuclear energy define them as a group of pro-nuclear elite engineers who do not question the need for nuclear energy in the energy profile, who occupy “top positions in the design, implementation and control of energy and nuclear policy¹¹⁴” and who impose their own energy strategies in the absence of strong political leadership (Boselli, 2012; Schneider, 2013, p. 31). Looking from outside the French system, understanding what Corps des Mines mean, what it actually is or who are Corps des Mines is not an easy task, but it is crucial to decipher policy-making in energy, especially for nuclear decision.

The concept of Corps des Mines comes from the system of “Grands Ecoles”, which does not exist in other countries (Expert F-1). Nicolas Mazzucchi explains the existence of Corps des Mines in France as “*having almost a feudal system in higher education*” (personal communication, 2018). This system of “Grands Ecoles” involves a selection of elite schools, which are reserved for the top rankers. “*This is the top of the pyramid in France*” Mazzucchi says, “*an elite within elite*” (personal communication, 2018). The two top members of this pyramid are *École Polytechnique* (Les Corps des Mines) and *École Nationale d'Administration* (ENA, National School of Administration, more specifically *Corps des Finances*). As a relevant example President Emmanuel Macron is from ENA.

¹¹³ Although a direct translation is not meaningful, the concept can be still interpreted as “mining engineers”.

¹¹⁴ Examples include: Anne Lauvergeon, ex-head of nuclear giant Areva, current head of France’s nuclear energy watchdog ASN, Pierre-Franck Chevet, Andre-Claude Lacoste and Jacques Repussard of the IRSN Nuclear Safety Institute (Boselli 2012).

The creation of *Corps des Mines* dates back to a decree of the King's council dated March 19, 1783. After its disappearance at the beginning of the French Revolution, the school was re-established in July 1, 1794 (Lepage, 2014, p. 115). Therefore, the impact of *Corps des Mines* on the policies of energy and industry, as well as domestic affairs of France is not new at all. As of 1930s, just like the government had started to get interested in the development of the industry, the Corps started to get involved in politics (Gadault, 2012).

Dr. Laurent Turpin clarifies the Corps des Mines as a hiring system for the administration, made up of technical civil servants, who go through very difficult scientific education tracks (personal communication, 2018). Expert F-16 also explains the Corps des Mines just like a standard career path:

“To be precise, the Corps des Mines are composed of the best engineers in France. These are technocrats coming from the most prestigious schools. As they are the best students, at the end, they take over and manage the most important factories, the most important firms and/or government positions”.

According to Corinne Lepage, the main objective of this hiring system has been to place men and women in key positions in order to control the policy decisions (Lepage, 2014, p. 123). Therefore, critics basically consider the Corps des Mines as a pressure group which influence political decisions in France. The influence of the Corps des Mines on the French energy policy is thus considered to originate in its privileged relationship with the leaders from state administration, ministerial offices or big companies (Greenpeace, 2013a). The entire Corps des Mines are not particularly working only in the nuclear industry, however, traditionally a large number of representatives or CEOs in companies such as EDF or AREVA come from Corps des Mines. The presence of Corps des Mines as advisors and representatives in the presidency, in the Ministry of Ecology, the Ministry of the Economy, DGECC (Directorate General for Energy and Climate), or their occupation of management positions in key energy policy institutions (ASN, IRSN, ANDRA) is often received with suspicion (Greenpeace, 2013a; Schneider, personal communication, 2018). To illustrate, Cyrille Cormier, Energy campaigner for Greenpeace says: “There is no place of power in France linked to energy policy that is not in their hands. The French nuclear program for more than 60 years, it is them. They are the guardians of the nuclear

temple. The Corps des Mines is not a lobby for political power, it is power itself” (Greenpeace, 2013a).

With regards to nuclear policy-making, Lepage explains that the impact of Corps des Mines on the French nuclear policy dates back to 1970s, to basically four key individuals known as the “*Barons de l’atome*” (Pierre Guillaumat, Andre Giraud, George Besse, Michel Pecqueur), who were all from the Corps des Mines and who strongly believed in the power of nuclear in the international scene (Lepage, 2014, p. 116). Lepage writes in her book in 2014 that occupying powerful governmental positions or being close enough to those who are making the decisions has been the key strategy of Corps des Mines in order to protect the choice of nuclear which constitutes the heart of their expertise, and thus their power (Lepage, 2014, p. 117). According to this perspective, the network for the energy decision-making processes was highly monopolized and closed by these technocratic political elites. This guaranteed the endurance of a pro-nuclear discourse attached to the core values of national independence and technological prestige, over years and most importantly over governments. Hence, the interests of these elites evolving around the Gaullian idea of “France cannot be France without greatness” shaped the energy industry and policy (Hecht, 2009; Aykut & Evrard, 2017).

Alain Bucaille from the CEA, (who is former Managing Director of famous French brand Hermes, former Special Advisor to the president of AREVA Anne Lauvergeon and who is from the Corps des Mines himself) thinks the argument that the French nuclear policy was designed by technocrats belongs to those who are skeptical towards nuclear energy or who simply want to criticize the authorities. Bucaille notes that the initial push behind French nuclear program comes from geopolitics and the desire to be independent from the Middle East (personal communication, 2018). He agrees that those who made the nuclear industry possible in France were people from the Corps des Mines, but underlines that these were mainly pro-nuclear leaders coming from the oil industry (personal communication, 2018). In this framework, Expert F-1 underlines that in the design and execution of nuclear energy policy, high level of knowledge of technology and science is crucial as he declares: “*in the initial years of our nuclear program, we were able to build ten nuclear power plants in just a few years, it is quite crazy now! Many countries ask*

France how it has been possible to do that in a very short time". Expert F-1 believes that the success of France in nuclear rests on the fact that the people who have built the French nuclear energy policy in the first place were individuals with a very high level of knowledge and experience.

As a consequence, the experts from the official institutions, who comment from within the system, hardly agree that the Corps have been influencing the policies for their own interests. To illustrate, Expert F-15 explains that the activities of the Corps should be distinguished from a lobby or pressure group in the sense that their interest in the nuclear energy is very different from the economic interests followed by companies. Expert F-15 clarifies his point as the following:

"Les Corps des Mines are engineers working for the state, their salary is already paid by the state. Therefore, they are not winning more because they support building nuclear power stations. They would have exactly the same salary if they had built wind farms. This means that they are not really lobbying in the economic sense. Their concerns are rather political as they care about the future of France and our national independence".

Other experts from French Ministries and official agencies also underline that there is no pressure or lobbying by the Corps des Mines in the sense of promoting some economic interest or individual interests. Critics would not agree as they argue that nuclear power is not only the obsession and pride of the Corps des Mines but above all the surest way for it to maintain a major influence on French energy policy (Cormier in Greenpeace, 2013a). As a response, Dr. Turpin from AFNI says *"people very often like conspiracy theories"* (personal communication, 2018). Similarly, according to Expert T-10 the Corps des Mines raised a lot of *fantasies* which were vehicled by some NGOs which are against nuclear through articles or TV shows. As a matter of fact, Greenpeace has a detailed research file on the issue where they call Corps des Mines as *"conseillers de l'ombre"*, shadow advisors, offering a dark and mysterious image. Even one of my interviewees, Antoine Caron who is the Head of External Affairs Office in the Ministry for an Ecological and Solidary Transition-General Directorate for Energy and Climate Change (DGE) Sub-Directorate for Nuclear Energy, was written by Greenpeace to the list of Corps des Mines (Greenpeace, 2013b).

According to Alain Bucaille, the Corps des Mines did play a role in the energy policy until around 2000s. Since then, he thinks that the role of the Corps des Mines has diminished in the state administration because, most of the brightest individuals among them are more in the private sector rather than the public sector, playing a bigger role in the industry. If the Corps des Mines are more focused on the industry now, can this be one of the indirect causes of the decision to decrease the share of nuclear through a change of mentality in the policy-making circles? That would only be an exaggerated guess, because the perspective of the official representatives still underlines that “*the industry, les Corps des Mines and the French people are very proud of nuclear*” (Expert F-16), proving a persistence for the pro-nuclear stance in the policy circles. Nevertheless, one could still wonder why until present, it would be the Corps des Mines, and not some other factors such as the anti-nuclear movement, which have been powerful in French nuclear energy policy. The answer might rest in the history of France again, as Mycle Schneider explains: historically, Les Mines, inherited the three ingredients for war: energy (coal), steel (iron), and power, which made the mining engineers absolutely indispensable in warfare. Schneider adds that till today, the way of “military thinking” has been streamlined in the mentality of these technocrats, who were very powerful in the French political circles (personal communication, 2018).

In the framework of this debate, when I asked one of the experts directly, whether these technocrats have been really affecting the decision-makers, he replied: “*Of course, because they are the best!*”. Keeping the criticisms about the lack of public approval in the decision-making aside, it is important to highlight that creating a political culture where the state policy comes from the system of Grands Ecoles, significantly allowed France to design, execute and sustain its nuclear energy policy. The existence of this political elites or technocrats kept the connection between France’s independence, nuclear technology and prestige alive and on top of the political agenda for years, irrespective of governments or political authority. This contributed in making nuclear energy a state policy, difficult to be contested by other actors, by the anti-nuclear movement or by the constraints which have hardly found their ways into the decision-making.

7. 6. Political Stability

Political stability is one of the most omitted factors in the discussion of nuclear energy both in the literature and in the contemporary debates on the issue. Indeed, what political stability stands for nuclear energy policy-making concerns not only the domestic dimension (national stability), but also involves a strong interaction between the domestic level and international level (regional or international stability).

According to the analysis of the interviews, while French experts stress more the impact of regional/international stability on the domestic context for decision-making, German and Turkish experts focus more on the political stability at the national level. Although the reference to political stability was minor in France (13 percent) and in Germany (11 percent), in Turkey, a significant majority (63 percent) of the interviewed experts talked about political stability. This is understandable given Turkey's long-lasting failed attempts to construct a nuclear power plant. The same Turkish experts also believe that the lack of political stability creates a major venue for the constraints against a pro-nuclear policy.

The importance of political stability comes into the equation for decision-making especially considering long construction periods and lifetime of nuclear power plants. Expert G-18, who is a technical expert from the nuclear industry, explains that with nuclear energy, the decision-makers end up in a situation where they can get the return of their investments over the 40 to 60 years of lifetime of the power plant. This means at least 6 to 8 cycles of governments depending on the country, following of course a long-lasting construction time which is further challenged due to post-Fukushima safety measures as well as construction costs. This remark is especially relevant for newcomer countries, such as Turkey.

Why did the achievement of a concrete nuclear power project take so long for Turkey? The answer to this question is surely not straightforward, as addressed by this research. Nevertheless, political stability emerges as one of the important “field conditions” so as to say, for Turkey's policy options in nuclear. Several Turkish experts declared that one of the major reasons for Turkey's policy fluctuation in nuclear energy with forward and

backward steps is the political instability which has dominated Turkey's political scene for years.

Yılmaz Batıbay indicates the importance of political stability for a consistent and successful nuclear energy policy in the following words:

“There is a saying: start like a Turk and finish like a German! Turkey started its nuclear energy plans in the 1960s very ambitiously. However, due to the political and economic turmoil in the following years with military coup and constant changes in the governments, the policy couldn't be executed in the best possible way. Check out South Korea which started way behind Turkey, let alone building nuclear power plants, they are now exporting their technology!” (personal communication, 2018).

Having a consistent government, determined for a certain direction in nuclear energy policy has a significant role in nuclear energy policy-making. As a relevant anecdote, Erol Çubukçu refers a memory of his, from 1990s:

“We were at a meeting with Canadians who were marketing their reactors. One of the representatives from CANDU said: ‘if there is to be a revolution in the nuclear energy business, it will happen only when someone manages to decrease the construction time of a nuclear power plant to less than the lifetime of a government’. Even the Canadians were aware that the government back then would not agree to buy their reactor because they would not be able to start operation in their ruling term” (personal communication, 2018).

Expert T-13 points to subsequent elections which took place every few years and dominated the politicians' agenda, as a hurdle for designing a nuclear energy policy for Turkey. Indeed, by the time Akkuyu intergovernmental agreement was signed in 2010, since the declaration of republic in 1923 Turkey had 60 governments in 87 years, 13 of which were coalition governments (TBMM, 2020a). Therefore, not only the governments did not last long enough to execute a nuclear policy with long-term commitment, but also the decision-making was taking place under conflict of opinions within the coalition governments. Arif Künar touches upon this point by saying that: *“In 2000, when the bid for Akkuyu was cancelled, there was an obvious crack within the government as the coalition parties were not on the same page: MHP was on one side pushing for the nuclear power plant and Ecevit on the other side wanted to cancel the bid. Now it is not the case, since whatever Erdoğan says, happens”* (personal communication, 2018).

Expert T-4 also agrees that a strong AKP government which has been in power since 2002 had an impact on making Akkuyu agreement possible and says:

“How long has been the average lifetime of a government? AKP has been in power for a long time. It was the determination of the government that resulted in the special partnership with Russia through a distinct investment model of BOO for the power plant. It was the merger of Crazy Turks and Crazy¹¹⁵ Russians!”.

The only problem caused by the lack of political stability is not failing to take an actual step in nuclear energy decision. The legacy of political instability costs more, since it also impacts the stability of energy-relevant institutions, merit-based appointments in such institutions and the design of a long term “state policy” as opposed to “government policy” in the field of energy, or more specifically nuclear energy. Koray Tuncer, the Founder of Turkish Nuclear Industry Association (NIATR), observes that many people consider nuclear as an AKP project. However, he also believes that nuclear energy policy should not be considered as a government policy but as a state policy: *“It should be considered as a way of life for that specific state. It is very problematic to see that an approved nuclear power project might be in jeopardy if the signatory government is replaced with another one”* (personal communication, 2018). Tuncer is not alone in thinking that political instability brings the risk for the lack of policy persistence (Expert T-13). Expert T-5 believes that the reason why it is very difficult to follow a permanent policy line in Turkey is because governments are not inclined to design permanent policies in the first place:

“They go for short-term, good-looking policy solutions that they can benefit from. The sole concern of the governments is to look cool/fancy in their ruling terms. Their development plans and strategies remain on paper as no one really checks if they are put into practice or not. The policy makers write fancy targets and plans, yet, they cannot design a permanent policy in terms of producing high added value technology. This is valid for every aspect of energy from coal to nuclear. Turkey has government policies and no state policy. While the former can only last for around four years, the latter is permanent.”

¹¹⁵ Here the expert uses the term “crazy” so as to mean “making the impossible possible”, thus the term is not used in a negative sense. Expert T-4 also adds: *“I don’t think that the Russians will ever construct another nuclear power plant in the world based on built-own-operate model! That was a crazy moment in nuclear history, a moment when the stars aligned and everybody thought that was a good idea!”*

Linking political stability to policy stability, many interviewed Turkish experts underline that Turkey lacks a long-term national/state policy in nuclear since energy decisions are “*made on a daily basis*” in Expert T-14’s words. This causes policy fluctuations in decisions and strategies, as opposed to a straightforward goal followed by each subsequent government. As short-living governments are accused for the lack of a nuclear energy policy, the fact that the AKP government has been in power for a long time seems to “pause” the instability for Turkey in nuclear decision-making and to make the decision to materialize nuclear power plant plans possible.

Erol Çubukçu and Nilay Çubukçu who are both prominent figures in Turkey’s nuclear industry highlight one of the major differences between Turkey and France: in France nuclear energy is a national policy, not a government policy (personal communication, 2018). Erol Çubukcu thinks that one of important reasons for France being successful in nuclear energy is their decision in the late 1950s to design a state policy so as to address the lack of national resources of energy supplies and to come up with a permanent solution (personal communication, 2018). As France’s nuclear energy strategy has become a state policy, it did not change over different governments.

Despite this reference to this characteristic of France, French experts did not specifically talk about political stability in relation to the difference between state policy and government policy. Based on the total context of the French interviews this is because they already see nuclear energy policy as an inherited part of their national strategy, especially for the initial years of their nuclear energy program. What is emphasized by the French experts concerns rather the political stability at the intersection between the domestic and international levels. To illustrate, Expert F-2 points to political instability in the Middle East, as a hurdle for the expansion of nuclear energy especially for the desalination activities for water-poor countries. He underlines that combined with security issues and problems of proliferation, political instability has led to the postponement or abandonment of nuclear energy projects.

This interaction between political stability at the domestic and regional/international level is further critical especially for nuclear programs which are not indigenous and which require a strong exchange with a foreign country, i.e. Turkey. French experts, such as

Expert F-15 from one of the French ministries, stress the need for stability, for it would be impossible to cooperate if the partners fall apart in political turbulences:

“You have to choose a partner with which you will not fall apart over a small political conflict. For a nuclear power project, you will need to cooperate for 40 to 50 years. Therefore, even when partners disagree on a matter, even when they belong to different camps, for this time period they have to work together” (Expert F-15).

This approach signals the need to decouple nuclear cooperation at the technical level from political interactions at the foreign policy level, so that political disputes do not affect the nuclear power project. Accordingly, Expert F-15 adds: *“so you have to be careful about the choice of partners. It should be either a partner far away with less points of current and historical conflicts, or a partner ready to solve conflicts”*.¹¹⁶

Not only the level of emphasis about political stability but also what the three case countries prioritize as part of political stability differs a lot too. For some, the political stability represented a guarantee covering the construction time and assuring the return of investments. For others, such as the case of Turkey, political stability has been highly associated with a stable nuclear energy policy. In both Germany and Turkey, the domestic dimension of political stability is more emphasized, while in France, experts point to the interaction of domestic and international level with regards to the relationship with nuclear partners and international security. This is understandable since France is not only a nuclear energy producing country but also a nuclear technology exporter. Therefore, the emphasis on stability in bilateral relations can be due to French experts' desire to position France as a reliable nuclear partner in the global market, as opposed to their market competitors such as Russia.

7. 7. Triggering and Intervening Mechanisms

Triggering and/or intervening mechanisms are not easy to detect. Furthermore, depending on the level of analysis or the phenomenon which is under focus, their impact can differ.

¹¹⁶ Same expert believes that Turkey's partnership with Russia can be problematic due to several regional situations where the two countries fall apart. Moreover, he thinks that superpowers, such as Russia, are difficult to manage in such partnerships.

We must also note that these mechanisms can multiply in number as we look deeper into cases, into selected time periods, or a unique decision point in history.

For the matter of this research project, in the study of nuclear energy policy-making in France, Germany and Turkey some same events crystallized in all three cases. During some interviews, the experts specifically referred them as critical junctures or important benchmarks, in others their role was disguised under the narratives of the experts in revealing their perspectives. Although all three cases disclosed same benchmarks to evaluate as critical junctures, the impact of these selected events still changed from case to case. This section discusses these benchmark events from the lenses of triggering and/or intervening mechanisms.

7. 7. 1. The Chernobyl Nuclear Accident

Even after Chernobyl accident in 1986, world nuclear energy production continued to its increasing trend (WNA, 2020b). Even though the accident did not specifically change the interest of countries in nuclear energy generation, the effect of Chernobyl has been especially instrumental in shaping the relationship between nuclear energy and public opinion, as well as between the public and the policy-makers.

For France, the major impact of Chernobyl has been the change in the public opinion, as Corinne Lepage underlines (personal communication, 2018). In the initial phases of the French nuclear program, there was no emphasis on government's "public relations projects" to address public opinion. Because until Chernobyl, despite early protests in the 1970s, the authorities assumed that the public had no problem with nuclear energy. Therefore, as Nicolas Mazzucchi explains, until Chernobyl, the main communication strategy of the French government and of EDF, was based on having cheap, affordable electricity and energy independence (personal communication, 2018). After Chernobyl, there has been a drop in public's confidence in French authorities, because back then, there was a lack of communication between the citizens and nuclear authorities about the causes, details and consequences of the accident. Dr. Laurent Turpin thinks that this was a mistake: *"Only politicians were provided detailed information about the accident. Publicly, they said, 'nothing happens, it is a Soviet Accident'"* (personal communication, 2018). Corinne Lepage agrees with Dr. Turpin in that the French government's main

strategy to handle Chernobyl accident was to frame it as a Soviet problem. The main message of the authorities to the French public was: *“it is impossible to have an accident in France”* (Lepage, personal communication, 2018). As a matter of fact, talking about the accident, Dr. Laurent Turpin also emphasizes that *“Chernobyl was not a French reactor”* (personal communication, 2018). However, he also remarks that this argument did not stop the increase of real fear and contestation in France in the aftermath of Chernobyl, since French people started to believe that big accidents and big radioactive leakages can occur everywhere. According to Nicolas Mazzucchi this has created a *“culture of Chernobyl”* in France which has been nurturing skepticism towards nuclear energy:

“There were some dishonesties about what happened in Chernobyl and about Chernobyl’s radioactive cloud. The French authority said that the Chernobyl radioactive cloud did not reach France, as if it could stop in the border. But unfortunately, we know actually that there were some radioactivity related problems in the Eastern part of France. So, the public still has this issue and potential consequences of nuclear accidents in memory. Therefore, a portion of the public wants to switch towards more renewable energy, towards an energy that is not dangerous because they are still seeing nuclear as some kind of dangerous resource” (Mazzucchi, personal communication, 2018).

For Germany, the example of Wyhl protests reveal that the anti-nuclear movement was a component of German political scene and nuclear energy policy-making as early as 1970s, way before Chernobyl. As Expert G-17 also underlines, in the late 1960s, the development of nuclear technology and its increasing use for electricity production was paralleled with social resistance. However, Expert G-16 who is a Green Party member from Rebecca Harms’ team, thinks that Chernobyl has certainly played a big role because it was a breaking point for Germany, where the anti-nuclear movement gained additional support.

Due to its geographical proximity to the accident, Germany was severely affected by the nuclear fall-out in the aftermath of Chernobyl. Rainer Baake shares his own experience from back in those days:

“After the Chernobyl accident in 26 of April 1986 (with a significant emphasis on the exact date) Germans experienced a fall out. I very vividly remember those days what we found out

after it had rained. The vegetables, the carrots in our gardens and everything else was decaying due to radioactivity. The parents were worried for the health of their children. And our government really failed at that time because for quite some days they said that the accident was so far that it can never have an effect on us. Then afterwards when we got university experts to do the tests, the results revealed all that radioactivity in the end!” (personal communication, 2016).

A similar anecdote is also shared by Expert G-11 who works with Sylvia Kotting-Uhl, a member of the Bundestag from Alliance 90/The Greens:

“For example, my boss, she used to live on the country side with her two little kids. They were growing their own vegetables and food. Then Chernobyl happened, and that was how she became politicized saying ‘it doesn’t work anymore, I cannot go and live on a little island isolated from the rest of the world. Nuclear cloud is coming and I cannot change it! I have to become political. I have to do something to change the laws or do something for those nuclear power plants that shall be shut down’ This was how she joined the Green Party. That’s was her motivation to join politics, to become member of the parliament. These memories are very strong among the population. I remember my self, not being allowed to go outside and play in the sand or go eat mushroom from the woods since everything was contaminated with radioactivity”.

The effects of Chernobyl on the lives of German citizens have significantly strengthened the anti-nuclear sentiments among the public. More than that, the effects of the accidents led many Germans to get politicized and intensify their anti-nuclear struggle through political means. Rainer Baake notes that the French people did not have such an experience in the immediate aftermath of the accident. Indeed, this was at least what was being promoted to the French public at the time, as he ironically says: *“Because the wind didn’t blow far enough and it didn’t rain”* (personal communication, 2016).

There were no new build power reactors after Chernobyl in Germany. This leads some to conclude that Germany’s way out of nuclear was already on stage even back in those days. To illustrate Expert G-16 thinks that: *“it was not as if the nuclear phase-out decision would have stopped many projects that otherwise would have happened, because it didn’t. Among the society it was already understood that there will not be any new nuclear power plants”*. This view is especially common among the opponents of nuclear in Germany, since the final official phase out decision is considered to rather deal with the

question of how long the reactors that Germany already has would work (because they would be shut down anyway).

Chernobyl was also a game changer in the Turkish context with regards to anti-nuclear movement. For example, Arif Künar explains that prior the accident he was rather neutral to nuclear technology and yet after Chernobyl he became an active representative of nuclear opponents (personal communication, 2018).

According to Nilay Çubukçu, a major problem in the aftermath of Chernobyl was that both nuclear engineers and nuclear authorities in Turkey were unsuccessful in explaining Chernobyl accident to the Turkish public (personal communication, 2018). She underlines that the Chernobyl accident was a man-made accident due to excessive pressure imposed during testing, and that the reactor was forced too much. Çubukçu concludes as following: *“We were unsuccessful to explain this. People were terrified believing that the reactor exploded. Due to this image and as Black Sea region was under the impact of radioactive leakage, it had effected Turkish public opinion a lot”* (personal communication, 2018).

In all three countries, the Chernobyl Accident had a significant impact on the image of nuclear perceived by the public. The accident definitely has increased negative public opinion on nuclear energy, especially strengthening the anti-nuclear movement in Turkey and Germany. However, in none of the cases, a concrete official policy change occurred in the immediate aftermath of the accident. Therefore, it would be misleading to conclude that Chernobyl Accident “triggered” a changed in the policy-making. Nevertheless, the accident was rather an intervening factor which has significantly increased anti-nuclear pressure, and increased the constraining capacity of the public opposition.

7. 7. 2. The Fukushima Accident

The impact of Fukushima Accident has been different from Chernobyl for a number of reasons. First, the accident was beyond design basis due to the unforeseen impact of the tsunami on the plant site. Second, the accident occurred at an era, when the idea of a “nuclear renaissance” was on stage. Increased nuclear safety thanks to the latest reactor designs, and low carbon emission of the nuclear power plants, promised an appealing

recipe for meeting increasing energy demand while also mitigating the impact of fossil fuels on climate change. Third, the accident occurred in Japan, a country known for its quality culture, high-tech skills and proven capabilities in nuclear energy technologies.

The Fukushima Accident was followed by an immediate shut-down of eight nuclear reactors and a phase out decision for all the nuclear power plants in Germany, triggering a striking change in the nuclear energy policy. According to Expert G-11 prior to the accident, some policy-makers ignored the risk factor supporting the argument that nuclear is a safe and secure technology. When the risk of accident was raised, Expert G-11 notes that the proponents used to say: *“Chernobyl was an old Russian reactor and such an accident cannot happen to our good, new, German quality reactors”* and used to consider the opponents as *“ecological hippies”*. However, Fukushima was not an old Russian reactor, but it was a new technology developed by a highly experience nuclear country, Japan.

The accident had a deep social impact on Germany. Fukushima was even labelled as a “Super-GAU”, using the German acronym for a nuclear accident: GAU standing for *Größter Anzunehmender Unfall*, translated as “largest conceivable accident” (Wittneben, 2012, p. 2). The interviews made it clear that Fukushima did not actually change the public opinion in Germany per se, since the majority of the population was already opposing nuclear energy. Nuclear power was already very antagonized among the population, since they had already experienced Chernobyl. Therefore, the accident rather augmented the reaction of the anti-nuclear movement in Germany which already had a very long history. As Expert G11 clarifies, the German public reacted to the accident saying that: *“We said it all the time, we said it before Chernobyl, we said it after Chernobyl and now look what happened!”*

The Fukushima accident rendered the policy-makers more responsive to the public pressure for phasing out nuclear energy. Following Fukushima, big demonstrations occurred. Expert G-17 states that German politicians were so much under pressure that they had to say: *“Okay, we cannot ignore this wave of resistance and therefore, we have to decide to phase out”*. The immediate reaction from Merkel according to Expert G-1 and Expert G-11, was thus a signal to the public that she *understood* them and that

Germany would not stay on track with its former nuclear policy which had postponed the phase-out. Dr. Ludger Mohrbach, who is an experienced member of nuclear industry in Germany, thinks that prior to Fukushima, the majority in the German Bundestag was in favor of the lifetime extension of nuclear power plants, because the conservative party of Angela Merkel, the CDU was pronuclear. Mohrbach notes: *“everything was quite ok until Fukushima happened. And everything went totally 180 degree in the other direction...”* (personal communication, 2017). Fukushima was a catalyst for decision-making, to transfer the long-time anti-nuclear resistance in Germany into policy. The public opposition was there, but it was with Fukushima that it was immediately transferred into decision-making.

According to the analysis of the experts' views, for France and Turkey this triggering effect of Fukushima did not work in the same way as in Germany. While official representatives in France such as Expert F-10 and Expert F-14 agree that Fukushima accident had an impact on public opinion so as to decrease French people's positive perception of nuclear energy, *“when the crisis cooled down, people returned back to their more positive opinion about it”* in Expert F-14's words. However, an important remark is that after Fukushima, the French authorities were more responsive towards the public concerns, as they felt the need to provide information, unlike the aftermath of Chernobyl when they kept the reality to themselves. Dr. Turpin confirms this point as he says: *“After Fukushima, the authorities worked as if the accident was in France. Their attitude was very different from ‘that’s a soviet accident’ approach”* (personal communication, 2018).

For Turkey, Fukushima accident mainly made the execution of the policy more difficult for Turkey, not because it created an increased public pressure but due to increased safety costs which hampered the progress of Akkuyu and Sinop nuclear power plant projects. Erol Çubukcu states that, as Turkey does not have a running power plant yet, Fukushima accident remained too abstract for the Turkish public and for policy makers to cause a policy change (personal communication, 2018). Arif Künar thinks that this was also caused partly because Fukushima was a distant image followed from the TVs, unlike Chernobyl accident which had severely affected Turkey's Black Sea region: *“As Fukushima did not have such a direct effect on Turkey, Turkish public was less sensitive about the accident. Moreover, interestingly, the accident did not cause many to say ‘look*

even an experienced country as Japan has failed in nuclear, so Turkey should avoid it” (personal communication, 2018).

7. 7. 3. Elections

The elections and their results can mirror major domestic dynamics in a country, and can operate as interruptive events for the business as usual. 48 percent of the total participants, has brought elections into the discussion. The statements under the “elections” category, correspond to the fourth major factor (8,2 percent) in terms of its weight within domestic elements in nuclear energy-policy making.

The sections above already discussed the experts’ emphasis on the necessity of political stability, for designing a long-term, permanent nuclear energy policy. Especially for the case of Turkey, frequent elections and high turn-over of governments are underlined as hurdles for the establishment of a nuclear energy policy assigned to the State, rather than to the governments. Therefore, elections emerge as intervening factors, which interrupt the policy-making process.

The experts have diverging views so as to whether the nuclear issue becomes an electoral issue or on whether nuclear energy policy is used by the parties (i.e. to phase it out or to keep it) as a strategy in reaching the voters and gaining support.

In France, there has already been cases where nuclear energy was used as an electoral bargain. To illustrate, Mycle Schneider reminds that cancelling a nuclear power plant in Brittany was an electoral promise of François Mitterand (personal communication, 2018). Mitterand had pursued a campaign which echoed several themes from the environmentalists, who were demanding an exit from the nuclear power program. After the elections, Mitterand cancelled the power plant in Brittany, but did not touch to the rest of the nuclear power program which was a disappointment for the Greens (Gustafson, 2020, p.97). The 2012 election is another example where Holland had used nuclear as a political maneuver. President-elect François Hollande’s election manifesto included a reduction of nuclear’s contribution to domestic energy production to 50 percent by 2030, which was considered as a concession to the Greens (WNN, 2012), as already discussed

in scope of the political context for the National Debate on the Energy Transition. Expert F-10 clarifies that “*later it turned out that the reason was only diversification*” rather than a categorical opposition to nuclear or a safety concern, since Holland had later declared that he has trust in independent nuclear safety authorities of France.

With the exception of these examples, other experts from France do not think that there is a specific effort to use nuclear as an electoral issue or to pursue a public diplomacy over nuclear to gain voters (Schneider, personal communication, 2018). This is because there is no need to do so, as representatives such as Expert F-14 believes, since all the political parties accepted¹¹⁷ the idea that nuclear energy will remain, yet with a decreasing share. Accordingly, they think that there is no more question on the issue, except the rhythm of the change and policy towards aging reactors (Expert F-15).

For Turkey, nuclear energy is not considered as a salient issue for the elections. Although Expert T-12 suggests that framing nuclear energy as a “domestic energy resource” and using it as a public relations asset is part of the ruling party’s propaganda, Expert T-6 underlines that none of the major opposition parties has an official stance that is categorically against nuclear energy, despite the fact that nuclear power is considered as the project of the ruling party. The reason is the nature of the Akkuyu agreement, which is much more than an economic deal but an intergovernmental agreement. Therefore, Expert T-5 and Expert T-6 state that in order to change that policy after an election, one has to be ready to face not only economic but also political consequences that might cause Turkey its relations with Russia and its international prestige. Furthermore, some experts also believe that even if the nuclear issue was used in the elections, it would not affect the voters’ behaviors since they believe that the acquisition of nuclear technology, or Turkey’s energy security is not a salient issue for the voters (Expert T-10). From the other

¹¹⁷ Prior to the Act of 2015, which validated France’s model for energy transition, there were concrete opinion differences between the policy-makers and Green Party representatives. To illustrate, in August 2012, Arnaud Montebourg, the Minister of Industrial Renewal affirmed that France has a sustainable need for nuclear energy (Le Monde, 2012). Similarly, the Minister of the Interior, Manuel Valls and the Minister of Ecology, Energy and Sustainable Development Delphin Batho as well-made declarations supporting nuclear energy (Le Monde, 2012). On the other hand, as a response, the Green ministers such as Noel Mamere and Denis Baupin condemned these declarations as “provocation” and “divorced from reality” (The Guardian 2012). Overall, while some stood solidly in favor of a nuclear future, the Green Party remained firmly opposed to nuclear energy (Schneider, 2013, p. 29).

side of the coin, Koray Tuncer finds it surprising that nuclear energy does not come on the agenda during the election times, as he says:

“as a citizen I would expect the candidates to talk about how they will further support Turkish firms in the field of industry and technology, to become players in the nuclear market as suppliers. I would expect them to discuss such projects that would rise up Turkish firms in the global nuclear market” (personal communication, 2018).

Although nuclear energy is not considered as a salient issue during the elections, neither so as to make a policy change nor to enhance Turkey’s progress in nuclear, the indirect effect of frequent elections in the country seems to be more crucial in Turkey’s nuclear energy policy-making. In this context, although the ruling party’s predominance has created a policy continuation since 2002, prior to that year, elections’ disruptive impact on Turkey’s political stability and hence on the creation of a continuous state policy on nuclear energy is worth highlighting as addressed in previous sections.

Germany is the case with the highest reference to the elections, by 81 percent of the experts. The intervening impact of the subsequent elections on nuclear energy policy is very understandable in Germany, since the fluctuations in Germany’s nuclear energy policy are quite in parallel with state and federal elections.

Although the idea of *Energiewende* and the support for solar and wind have started so much earlier than 1990s, the initial nuclear phase-out decision in scope of German energy transition was made only after the elections in 1998. Until 1998, it was a long, 16 year of ruling term for Chancellor Helmut Kohl from CDU (Christian Democratic Union), who was pro-nuclear. In 1998, when the Christian Democrats lost the national elections, a coalition of Gerhard Schröder from SPD (Social Democratic Party of Germany) and Joschka Fischer from the Greens came to power. The fact that Schröder was in a coalition together with the Green Party whose *raison d’être* was the fight against nuclear power, made the first phase-out decision possible. The decision has set a final amount of electricity for every nuclear unit (Expert G-6, Expert G17). Rainer Baake, explains the decision as following:

“In the year 2000, we, I’m saying because I was one the negotiators for the German government at that time during my

first time in government, we negotiated with the nuclear industry a phase out plan and then that was turned into a legislation. The legislation went into effect in 2002. This decision, was a majority decision in our parliament and there was a strong opposition from the opposition party. The conservatives” (personal communication, 2016).

In 2008, prior the elections of 2009, CDU and FDP (Free Democratic Party) ran an electoral campaign saying that they will be “phasing-out the phase-out”, also known as “*Ausstieg vom Ausstieg*”, “exit from the exit”, by extending the lifetime of nuclear power plants. According to the supporters, the idea of Merkel was a comprehensive energy and climate reform package, to accelerate the reduction of carbon emissions and nuclear was part of that plan as a bridge technology (Expert G-1). Although the CDU was opposing the very first decision of nuclear phase-out, the members knew that they could not win the consent of society for building new nuclear reactors. Still, they were promoting that the nuclear phase-out could be too expensive, and could endanger the economy (Expert G-6). Baake thinks that this policy was against the majority of the Germans and that calling nuclear extension as an “intermediate phase” was only an effort to hide nuclear under a big energy package (personal communication, 2016). Regarding this election, Expert G-16 portrays that:

“there was such a clear situation that the conservatives and the liberals wanted to prolong the lifetime of nuclear reactors, and there was the greens and social democrats who were saying ‘Hell No!’. This was a very polarized debate. So, if you cared for this issue, then you knew who to vote for!”

Expert G-8 also confirms that the role of nuclear power plants was very prominent in this election:

“Mrs. Merkel who had said they wanted to extend the lifetime of nuclear power plants won by a large majority, therefore this was seen, in a way, as kind of a referendum for pro-longer lifetime for nuclear reactors. But at that time, one could already sense that the societal consensus on the nuclear issue was rather fragile. At that time, the pro-nuclear view was slightly more prevailing than before. But you could see this was under very favorable conditions: because people were concerned about the energy prices. Everybody was aware of the need to have cheap energy.”

Accordingly, unlike Expert G-16 from the Green Party, some believe that other pressing

issues were on stake in this election rather than nuclear. Craig Morris affirms that people voted for pro-business parties because of their economic concerns such as the state of Euro or the amount of their minimum wage which had been at stake due to social democrats' former policy to reduce welfare and unemployment benefits in 2005, which was very painful for the people that had been affected. Expert G-6 also agrees that the nuclear power did not play a role in the election campaign: *"In the national election of 2009, it was very clear that CDU would be prolonging nuclear energy. It was open to the voters. Still, the pro-nuclear camp won the election, knowing that these parties would not phase out nuclear"*. This implies that for the majority of the population nuclear was not the primary issue at the time: *"It was a question for minority, because it is a complicated question. However, it was still a very loud minority which was very present in the media"* (Expert G-6).

Whether or not nuclear was on the minds of the voters for that election or economic concerns really overweighed the nuclear issue are questions for a different research field. However, what is for sure is the interruptive impact of the 2009 elections on Germany's nuclear energy policy as in 2010 Merkel was able to prolong the phasing out period.

Only six months after Merkel decided to extend life of nuclear power plants in September 2010 (Connolly, 2010), on 11 March 2011 Fukushima accident happened. According to some German experts, such as Kurt Dieter Grill and Christian Wossner, this was the time when the phase out decision for nuclear was really used as an electoral move by Merkel. Christian Wossner from DAtF (Deutsches Atomforum e. V.) defines the way the decision was taken as *"in a hurry, not fact oriented and political motivated"* before the details of the accident, and thus its technical relevance to German nuclear power plants were understood properly (personal communication, 2017). Wossner explains what happened as the following:

"It was a Friday when the Fukushima accident happened, or started. And it was a week before the big state elections in Baden-Württemberg¹¹⁸, where The Greens had a good chance to win.

¹¹⁸ The decision of Merkel was declared right before the Baden-Württemberg elections which took place on March 27, 2011. According to the results, CDU got 39 percent of the votes as opposed to 24,2 percent share of the Greens (Bündis 90 Die Grünen, 2020). The vote share of the Greens was enough to govern the state parliament through a coalition, when combined with the 23,1 percent vote

The decision was taken very fast at that week. Actually, on Sunday, after the accident happening on Friday, the decision was made and at that time nobody, at least outside Japan, really knew what had happened. So, already on Sunday the political decision was taken to immediately shut down the eight oldest plants which then led to a decision to complete shutdown of all plants until 2021” (personal communication, 2017).

Expert G-16 from Green Party also points that the immediate shut down of eight nuclear reactors was one of the most drastic decisions that has been taken after Fukushima Accident, and agrees that the decision included political motives. She evaluates that because a major nuclear accident happened in Japan right after the government had taken the decision to move away from the earlier consensus on nuclear phase-out by extending the lifetime of nuclear reactors against the will of the majority of the German People, this created a fear in CDU regarding a major negative impact on the results of the upcoming regional elections in Germany: “*Therefore*”, Expert G-16 says, “*there were some mixed factors. The decision of Merkel had nothing to do specifically with nuclear technology but rather addressed political circumstances at that time. All of this was due to the fact that the population is against nuclear*”. Kurt Dieter Grill, the former chairman of the federal committee for environment and energy of the CDU, thinks that this was a very clever political move by Merkel. According to Grill, by phasing out nuclear herself, Merkel took away from the Greens, the major element of their existence. He thinks that when Merkel phased-out nuclear, the Greens lost their identity, because, before the phase-out the Greens’ mere existence was strongly linked to anti-nuclear movement: “*so the Greens had to change*” says Grill, “*as their major enemy was not there anymore*” (personal communication, 2017).

The last decision on the nuclear phase-out was an “*all party decision*” in Rainer Baake’s words (personal communication, 2016), supported by all the parliament members. According to Expert G-17, this is an exclusive situation since in most of the countries there are two camps on nuclear: conservatives wanting to use nuclear energy and the greens opposing. “*In Germany*”, Expert G-17 says, “*we have this current situation that*

share of the Social Democratic Party. The election result was marked as “a historic win for the minority party” (The Guardian, 2011).

all political parties the conservative, most of the conservatives, the social democrats, the greens, the left, are aligned with the same position on nuclear”.

Today, nuclear is not a major political subject any more in Germany, since all of the interviewed experts think that there will not be any return from the final phase-out decision. As Expert G-1 notes, no political party or political group would promote going back to nuclear and there are only technical issues ahead Germany, such as management of the nuclear waste. Indeed, the issue is now so out of the agenda of some Bundestag representatives that even my interview requests were declined by some of them as they think that “*the topic is not politically important anymore*”¹¹⁹. Still, until its current form, the elections affected the policy-making on nuclear energy as intervening mechanisms.

7. 8. Conclusion

This chapter has reviewed the findings from the interview analysis, which correspond to nation-specific contextual factors. In line with the decision-making model suggested in Chapter 4, this study suggest that the driving and constraining factors are filtered through these domestic elements. Although the chapter addressed these as the domestic context, it also demonstrated that some international events such as Fukushima can trigger policy change in the domestic level. Moreover, some characteristics attributed to the impact of international level, such as world history, geopolitical calculations or international stability, can further impact the evolution of these domestic features. To illustrate, the linkage of French nuclear power policy with history highlights clearly the importance of geopolitics and international relations. In that respect, the interaction between different levels of analyses are apparent in the development of contextual dynamics.

Some specific features which crystallized in each country are worth examining as part of further research. These include but not limited to the positive image of scientist, the nationalism and trust to the state for France; angst, passion for nature, the search for guarantee/safety/assurance for Germany and the need for critical thinking, increased risk aversion or lack for technology culture for Turkey.

¹¹⁹ The quote is from our mail correspondence. The rest of the email as well as the details about the Bundestag member is left anonymous for confidentiality purposes.

In general terms, the revealed distinction between state policy versus government policy is an important finding. This is especially valid for the case of Turkey where the lack of a national, long term energy plan, strategy or policy has been a common complaint among the participants. Political stability's impact on policy stability is one of the potential causes of this problem. On the other hand, a centralized decision-making and the presence of strong political leadership offers convenient ground for a pro-nuclear policy, which can even override the public participation in the decision-making. The initiation of French nuclear policy and Turkey's move with Akkuyu can be examples for this point.

In line with the literature, from the fieldtrip as well, the public opinion emerged as a major issue. In this framework, how public opinion is managed by the political authorities and whether the policy-makers consider the public opinion as an input for policy is a crucial factor especially determining the impact of public resistance to nuclear. Examining the cases of France and Germany, it is possible to conclude that in the aftermath of Fukushima there has been an increase in the responsiveness of official authorities towards public concerns and questions, compared to the Chernobyl era. As the experts from France significantly highlighted, the public opinion is considered as an input for policy-making, through national debates organized by well-structured agencies such as ASN, through consistent public opinion polls by IRSN, and through transparent communication of these with online databases accessible to everyone. National debates and transparent information tools are instrumental in establishing the trust relationship between the public and the policy-makers. These elements significantly lack in the case of Turkey, despite the fact that some experts connect anti-nuclear sentiments among the public with lack of information about nuclear. The concerns over nuclear safety and the citizens not considering themselves as part of the policy-making are among other significant remarks by the Turkish experts which have been discussed in relation to socio-political dynamics.

The most striking findings concerned the intertwined relationship between history, culture and the development of nuclear policy. The long history of the green movement in Germany which came from the 19th century's focus on nature has a strong role in the anti-nuclear movement and its institutionalization in the political scene. Some experts even associate the difference in the strength of the green parties in France and in Germany

with cultural reasons that follows the historical role of nature. Expert F-15 notes that in the German culture, the idea that nature is the source of all good and man is the evil is very strong, as opposed to the Cartesian tradition in French thinking in which man is the measure of everything. *“The green feeling and the green sentiment in France are very weak. It is very much in the speeches but in practice it is weak”* Expert F-15 explains, and adds that this is the reason why the French green parties are weak and opportunistic, since they not only get few votes but also want power at all costs being ready to give up their green convictions.

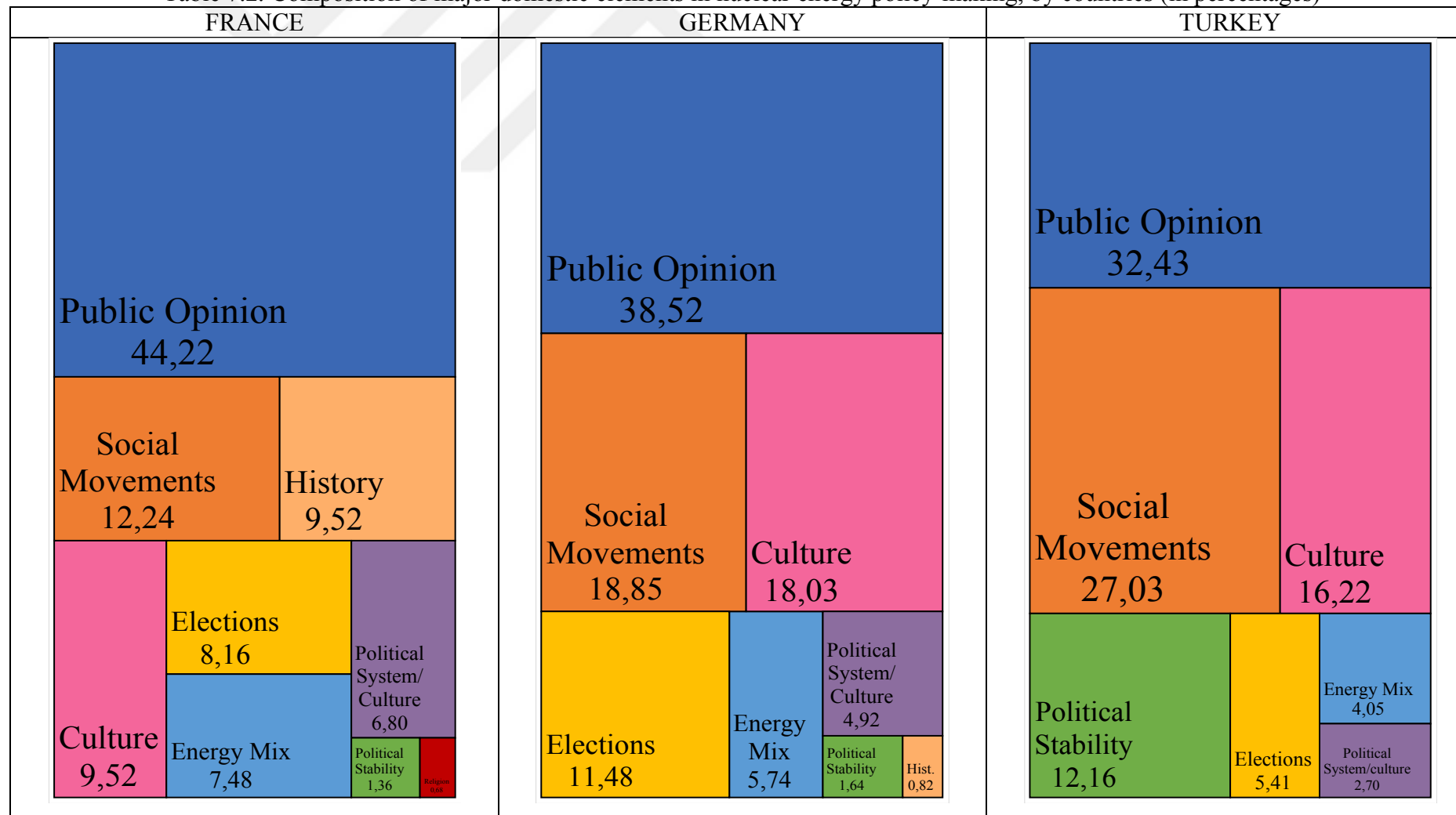
The insights of the experts combined with extensive research represented in this dissertation, leads me to conclude that France has a technocratic approach to nuclear policy-making. The motto of “in France, we don’t have oil but we have ideas” marked the 1970s and located nuclear energy right at the hearth of French nationalism and pride. The long-debated Corps des Mines, i.e. the technocratic elites, helped France in transforming its nuclear policy into a state strategy which lasted over governments. This furthermore has been instrumental not only in diminishing the impact of social opposition on the launch of French nuclear policy but also in offering an ideological and nationalist support to nuclear despite its perceived risks, as Sovacool and Scott also stressed in their study (Sovacool & Scott, 2012).

With a striking contrast to France, the nuclear debate in Germany was an emotional debate, rather than a technical one as Expert G-2 also summarizes. This has been especially apparent in the aftermath of Fukushima when the ethical committee (the “Ethik Kommission”) was gathered to reflect on phase-out decision. It was uncommon to see a commission for a decision on an energy resource to be called as “ethics” committee. What was more interesting is that the commission included bishops from churches along with other experts from the economy, politics and academia (Expert G-1, Expert G-12), in which the nuclear industry was underrepresented according to Dr. Ludger Mohrbach (personal communication, 2017). Neither the technocratic approach nor the so called “emotional” anti-nuclear approach have shown any traces in the context of Turkey.

Just like the driving and constraining factors, the content and significance of these major elements differ from country to country. The table below concludes this chapter by demonstrating different national combinations of the frequency of contextual factors.



Table 7.2. Composition of major domestic elements in nuclear energy policy-making, by countries (in percentages)



Chapter 8

CONCLUSION

This research investigated the pushing and constraining mechanisms in nuclear energy policy-making, by comparing three different national settings. The comparative study of three different nuclear energy profiles presented in this study offered insights about general patterns. The study indicated what kind of constraints a country with an extensive nuclear energy policy might face, which challenges cause a nuclear phase out, as well as major motivations and hurdles of a nuclear newcomer. Moreover, the research suggested that the calculation of these factors in the policy-making process is an output of the theoretical framework presented in this study.

8.1. Revisiting the Propositions and Main Findings

The initial assumption of this study was that the advantages and disadvantages as well as global/domestic dynamics are filtered through different stakeholders which possess different lenses for review. When the factors coming from the outside layers of the model penetrate into the core decision, they become the interpretations/perspectives of the interest groups to be calculated by the state authorities. The diverse national combination charts presented at the end of driving, constraining and contextual factors chapters based on quantitative analysis of the interview transcripts and the in-depth comparison of each factor across three cases, supported this proposition. The first hypothesis suggested that:

H1: The impact of the components of nuclear debate (as advantages or risks) on the policy-making is a function of their perceptions and interpretations by the policy stakeholders.

H1 is supported by the findings. This allows us to conclude that nuclear energy policy of a certain country is a function of how the driving and constraining factors are interpreted by the policy stakeholders and of the extent of their diffusion into the decision-making authority.

The study also proved that nuclear energy preferences are not driven only by economics, by technology or by simply supply security concerns. The suggestion of an interactive framework which has foreseen an intertwined role between factors and the domestic-international nexus is also supported by the research findings. The approach of grounded theory was instrumental in reaching these results. The figure below illustrates the frequency of all the codes, across cases without any classification. Building on the discussions in earlier chapters, it is possible to conclude that the figure offers an accurate depiction with regards to nation-specific elements which came to the fore during the analysis.

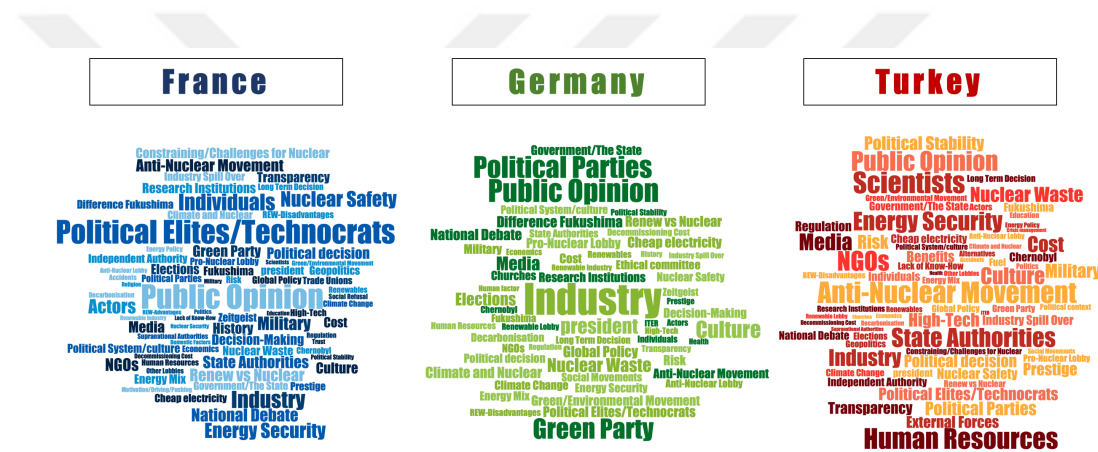


Figure 8.1. The most cited codes, by country (Prepared by the author)

From a theoretical perspective, for especially the agenda setting process of nuclear energy policy-making, the findings show that there is no consensus among the stake-holders with regards to which arguments and facts over nuclear are most relevant. This conclusion confirms Mitchell et al. (2007), Finlayson (2004), and Zelikow (1994), as they indicate that the arguments (over drivers and constraints) are not immune to the experts' personal, deeper socio-political belief and psychological motivations, processed under the influence of the national context. In this framework H2 had suggested that:

H2: Socio-political features of a country are influential in framing coherent narratives about nuclear energy.

Chapter 7 proved that the interaction among the contextual factors create an indirect domino effect on nuclear energy policy-making from a number of channels. The socio-political features of a country can thus adjust the diffusion of driving or constraining factors into the nuclear energy policy by determining the perception of the citizens or policy-makers about nuclear energy, by opening or blocking the way of anti-nuclear movements into the decision-making, by paving the way for specific actors, or by reflecting the interplay of history, technology and culture into the policy-making process. The case studies showed that the dominant narrative about nuclear energy benefits a lot from the cultural traits, from history, and from the relationship between the state and its citizens. Furthermore, the detailed analysis of the cases indicated that the policy framework evolves distinctively for each case, in line with different prioritization of factors in each national context.

The findings on drivers (Chapter 5) and constraints (Chapter 6) evolving around technical, economic, and political issues, significantly reflected how major elements of nuclear energy work distinctively for each case. To illustrate, the section on the risks of nuclear energy revealed that despite some general elements valid for nuclear industry operating everywhere in the world, the countries' perspectives over them are significantly different. For instance, for France the risks of nuclear are considered as manageable, while in Germany the risks are associated with absolute danger. More importantly, what countries understand from the very notion of *risk*, and what issues they consider as their own risks are also different. To illustrate, being too dependent on nuclear energy emerges as a risk for France. Just like the elements which are constituted as risks or not can change upon perceptions, whether the same factor can be qualified as a motivation or a constraint is proved to differ as well. Another example for this is the view that nuclear energy is a political decision. Previous chapters presented that the motivation to accomplish a political agenda, such as consolidation of a power politics strategy, can overweight technical facts. The very same political agenda argument was indicated as a constraint due to the fear of losing public support and thus political leadership, in the chapter on constraining factors.

The priorities and problems of countries with regards to their perception of the “nuclear choice” in terms of energy supply, is affected by the domestic conditions they are in. This

is also valid for the international drivers such as climate change, or geopolitical dynamics, to the extent they make sense in line with the national circumstances in the country of concern.

Consequently, domestic factors assemble elements that can make the country more prone to prefer nuclear or not, by augmenting the impact of constraining and/or motivating factors, with a magnifier effect. To give examples, France's history linking nuclear to the defense industry and to nationalism is an important factor feeding into the motivation to keep nuclear energy running. It is not a motivation on its own, but it prepares the ground by supporting the prestige factor. On the other hand, for Germany these domestic elements support constraining factors: the role of *angst* in risk perception and having a green culture which gives way to a strong green and anti-nuclear movement in the country were instrumental in turning nuclear into a highly refused resource by the society, making it impossible for policy-makers to ignore. On the other hand, as a striking contextual element, in Turkey, the lack of political stability has been affecting the motivation and ability of the decision-makers to engage in a nuclear energy program. This has also caused Turkey a significant deficiency in planning. The lack (and necessity) of a long-term energy strategy, the non-existence of an energy/nuclear energy policy has been often revisited by the experts as a major deficiency. Furthermore, general cultural attitudes over risk aversion and safety measures have also been amplifying the risks of nuclear energy (perceived as a constraint) in the context of Turkey. These were in complete contrast with France where nuclear energy has been a systematic state policy, and nuclear safety was at the heart of every nuclear debate.

Other hypotheses concerned potential drivers and constraints. H3 suggested that:

H3: Greater concern for energy security is a necessary, but not sufficient, condition to explain the motivation of a country to pursue nuclear energy.

The answers for this proposition was covered in Chapter 5 where I have shared the findings with regards to the drivers of nuclear energy policy. Ensuring supply security and achieving affordable electricity prices are among motivating factors for the countries

which prefer nuclear energy. In this regard, energy security is a necessary condition. However, the interview findings also confirm H3 in that, the pursuit of energy security is not a sufficient condition on its own to explain the choice for nuclear. Concerns for energy security can drive nuclear energy policy towards pro-nuclear stance only together with the presence of other combined factors. The similarities between France and Turkey indicate that in national settings where nuclear energy is valued as an asset in international power distribution at the intersection of national agenda and geopolitical calculations, the decision-makers are highly motivated to link nuclear technology with national security. Therefore, it is likely that nuclear energy policy is also driven by the desire to possess a high-level technology for international prestige. However, this point also inherits a paradox for Turkey since the nature of Akkuyu agreement with Russia implies a clash of interest with regards to the motives of diversification and national independence in energy. In this regard, the strategic interdependence between Turkey and Russia, leaves Turkey with an increasing reliance on Russia in their bilateral relations.

Regarding the role of climate change and decarbonization, in H4 this study has suggested that:

H4: Higher policy-making concerns for climate change increase the likelihood that the goal of decarbonization will motivate a country's pursuit of nuclear energy.

The insights from the experts in all three countries were very much in parallel with earlier discussion on nuclear energy and climate change covered in Chapter 3. The climate change was acknowledged as a crucial global challenge for energy policy-making. However, decarbonization was not identified as a major driver for nuclear energy as much as I had expected to see. The preference for nuclear energy is not first and most driven by the need for decarbonization and therefore, decarbonization is neither necessary nor sufficient in explaining a country's nuclear energy policy. As a low carbon resource, nuclear energy's contribution to carbon reduction is rather considered as a side-benefit for generating nuclear energy. Unless a country is already producing nuclear energy, for newcomers like Turkey, in the presence of alternative competitive resources, decarbonization is not the main driver for nuclear energy decision, even when its role in

carbon mitigation is acknowledged. Moreover, for Germany this hypothesis was certainly refuted: for a sustainable energy transition, nuclear energy receives the same treatment with the fossil fuels, as resources to get rid of, as opposed to renewables.

The last hypothesis, addressed a potential constraining mechanism: the public opinion. Before the analysis, in line with the literature's great emphasis on public opinion, H5 had suggested the following proposition:

H5: Stronger institutionalized representation of negative public opinion and anti-nuclear movements increases the likelihood of constraining a country's pursuit of nuclear energy.

The evaluation of H5 rests in the combination of the findings in constraining mechanisms (as public opposition) and in contextual factors (as the overall national dynamics with regards to public opinion). The findings confirmed the mainstream literature, since the public opinion has been identified as a potential factor which can affect policy-making and constraint a pro-nuclear policy decision. However, although public opposition was identified as important for both France and Germany, it did not affect the policy on equal terms since, despite similar public opinion scores, their nuclear policies differed a lot. This was because, in the lack of relevant stakeholders with direct access to the decision-making, anti-nuclear movement and public opposition remained insufficient to influence the nuclear policy in France (and also in Turkey). Although the French system has been updated so as to include the public opinion into the decision-making through national debates, it was not the case in the launch of initial French nuclear energy policy. Over the years, having a political and cultural structure for national debates offered France a better communication with the public in mitigating public opposition, if not increasing support. On the other hand, in Germany, the institutionalization and politicization of negative public opinion through the Green Party and research institutions, increased the diffusion of social opposition into nuclear energy policy. Therefore, the findings indicated that the public opposition on its own is not a sufficient condition to change nuclear energy policy and the institutionalization of the movement is necessary, as proposed by H5. Furthermore, the perception of most of the French experts on the public opposition was a

matter of responsibility and accountability, rather than a policy constraint. This was a significant difference between France and Turkey: while the French experts stressed the importance of transparent communication between the policy-makers and the public, Turkish experts emphasized the lack of it. The consolidation of nuclear energy policy necessitates a transparent and responsive relationship with the public, including the need to make information available and easily accessible. This indicates an area open for progress in Turkey for a healthy nuclear energy policy-making. In Turkey, although an anti-nuclear movement is existent, the lack of an institutionalized movement in the political arena so far hindered it to become a constraining factor in the decision-making.

The analysis of other contextual dynamics also proved that the politicization or institutionalization dimension is not only valid for public opinion and anti-nuclear movement. Overall, the findings confirmed that nuclear energy policy is the translation of beliefs of the winning coalition and the winners are the politically proactive players which navigate directly into the decision-making through especially bureaucratic positions, as Dunlop (2013) argued. The discussion of Corps des Mines in France provided an exact illustration for this. Apart from some individuals and NGOs, in the absence of a strong political group in France which is fighting against nuclear energy, technocratic elites' active role in politics and industry has been key to consolidate the image of nuclear as a national asset and allowed a strong pro-nuclear state policy lasting for decades. In this regard, based on both the cases of Green Party in Germany and Corps des Mines in France, it is possible to conclude that the power balance among the actors (and therefore the transfer of their arguments into the decision-making) is very much affected by their relative political pressure.

In addition to stable and dynamic parameters, this study also determined external shocks for the decision-making mechanism for nuclear energy policy. The discussion of the theoretical framework in Chapter 4 underlined that critical junctures can play constitutive roles in the formulation and change of a policy. My analysis included the study of Chernobyl and Fukushima accidents as such critical junctures. Chernobyl accident represented an example for Gerston's (1997) argument that a critical event (Chernobyl accident) can convert a routine problem (for Germany, the adoption of a "risky"

technology without public consultation) into a widely shared negative public response, and cause a pressing demand for change. This was especially apparent in the institutionalization of anti-nuclear movement, and politicization of public opponents to nuclear. Although anti-nuclear movement in Germany was present before Chernobyl, the accident significantly reinforced the position of the greens in the decision-making system since the accident demonstrated that their belief system which identifies nuclear as risky and dangerous, is more equipped to interpret the policy problem. A similar effect, though not as strong and political as in Germany, was also present in Turkey since Chernobyl had played a role in the emergence of anti-nuclear movement.

The national elections have also worked as external shocks for nuclear policy-making, with their ability of redistribute the assets between rival power groups. To illustrate, in Germany the elections led the Greens to advance within the decision process. While in France the nuclear issue only intended the support of more voters and not a real policy-change per se, in Turkey the elections worked in a completely different way, damaging political stability and thus the design of a permanent nuclear policy.

The Fukushima accident was more in line with Cairney's suggestion that triggering mechanisms can also force the actors to question fundamentals of their beliefs in the light of new evidence (2012, p. 201). Critical events with large impact, require competing groups to use their policy skills to exploit crisis, or at least to survive. The Fukushima accident has given the competing groups a window of opportunity by adapting their arguments to emerging conditions. To illustrate, this was especially apparent in Germany, with Merkel's move for an immediate phase-out decision, which was a proof of a quick adaptation to the new conditions. The perception of Fukushima in the renewable industry and nuclear industry has been very different, and the phase out decision of Germany created a big window of opportunities for the renewables sector. As a matter of fact, the background of the discussions at the energy-climate nexus in Germany, included a strong rivalry between the renewables and nuclear energy, with the opponents of nuclear basically framing nuclear energy as inflexible and therefore incompatible with renewables. Same cleavage is present in Turkey as well among the stakeholders, yet it is not transferred into the state policy. However, for France, rather than a rivalry, the

findings revealed an interaction in the form of a general focus on the energy mix and diversification, because developing renewables industry in France is already dominated by the actors from the nuclear industry.

Combined with cultural circumstances which associated nuclear energy with national interest, previous chapters also revealed how nuclear energy has become an intrinsic part of French identity and sense of prestige in the international arena. I suggest that today, under the global zeitgeist dominated by energy transition and the ultimate goal of carbon-free systems, the Energiewende symbolizes the same feeling of prestige and pride for Germany. According to many German stakeholders, the strong vision and desire to build a cleaner, safer, new world should be dominated by renewables. Together with nuclear phase-out, Energiewende operates as part of nation branding for Germany in the global vision for the post-carbon world. This was also apparent during the interviews with the nuclear industry members who had a resentful attitude regarding the end of an era for nuclear in Germany.

With Fukushima, the change at the national level in response to an event at the international level has been one of the clearest examples for the interaction between the levels of analysis. However, it is not the only example as this study often underlined. In the study of nuclear energy policy-making, we must note that the boundaries between levels of analysis are very porous. I have already stated that the international relations literature still risks to remain too focused on the systemic level, missing the opportunity to enjoy the synthesis of different levels. An approach too much focused on a single level of analysis would not offer accurate findings regarding nuclear energy decisions.

It is important to note that, by its nature, energy policies have a dual face: nourishing the national economy and keeping the balance between exporters and importers at the international level. While the former is valid for every single country, the latter is more of an issue for countries dependent on imported resource supplies. Consequently, especially in the initial phases of a nuclear energy policy, like in the case of France, or for newcomers (like in the case of Turkey) the decision for nuclear energy at the national level, is highly motivated to address the balance of power in the international level. This finding leads to the conclusion that it is highly likely for developing countries to consider

nuclear energy as a tactical asset. Therefore, some developing countries can be highly interested in developing their national nuclear energy program to address the distribution of power at the systemic level since they might consider having nuclear energy technology in their territories as a sign of prestige, a proof of their high-tech skills and energy independence. This finding promises ample room for further linkages with the perspective of states' status-seeking behavior in the international arena. The literature on status seeking suggests that a state's concern for its relative status in the international system can drive its foreign policy (Freedman 2016; Larson, Paul, and Wohlforth 2014), and that states can seek to enhance their status in the international arena in order to increase their credibility, power or influence in the international sphere (Gilpin, 1981). My study's emphasis on the international prestige factor indicates that status-seeking state behavior can also be valid for energy policy-making. Nuclear energy issue framed as an issue of national prestige and national independence, might be used as an instrument of status-seeking in international relations. When this is the case, economic rationale of constructing nuclear power plants or and cost-benefit calculations over nuclear energy can be sidelined, despite increasing financial costs of nuclear. However, this shall not imply a superiority of nuclear over other developing technologies, since this image is very much dependent on the vision of the decision-makers and leaders, bringing individual level into the picture.

With the impact of climate change and disruptive crises like Covid-19, this study started by emphasizing that the world and thus international relations are in a transformation which requires both the policy-makers and researchers to revisit conventional understanding of security. Due to new dimensions of challenges and threats, the definition of security is also evolving from traditional understanding of state's survival or territorial integrity towards an expanded notion of human security. The analysis presented in this research leads me to conclude that, when the decision-makers see the world through the lenses of classical understanding of security and nationalism, they tend to see that the national interest is still associated with military features, or with definitions of "prestige" and "high tech" inherited from the Cold-War era. For example, security and nationalism-oriented approach in the perception of nuclear energy was detected as a significant similarity between France and Turkey, which can partially explain why they both pursue a pro-nuclear policy. A dominant narrative in both countries concerns the role of nuclear

energy technology in the country's position in the international arena. Given nuclear energy's intrinsic relationship with military capabilities, some decision-makers might be likely to use the preference of nuclear energy as an undertone message of their national potential for technology, even when they do not have any intention ever for proliferation. De-coupling the image of nuclear from the military, is still a point that the nuclear industry needs to work on.

On the other hand, when the decision-makers have a perspective of reading the world through the lenses of an enlarged vision of security, they will still value the national interest at the highest level, however, they might be more likely to associate national interest with additional elements. In this regard, the leaders can still search for the elements of national prestige or being a member of high-tech club in the international arena, but this time, the roots of these motivations may not rest only in nuclear, but also include other technological breakthroughs. Today, leading a groundbreaking innovation in energy efficiency or renewables can be as prestigious as the development of nuclear energy in the post-war era. Therefore, at the intersection of their drivers, constraints and contextual features, this emerges as an important message for nuclear newcomers to better identify their national priorities, especially when nuclear energy policy stands at the expense of their economies or public support.

Nuclear energy is what states make of it. What nuclear energy represents in political terms is the construct of the nation-states. Although this expression may sound constructivist, this study revealed that the drivers for nuclear energy are indeed highly motivated by realist calculations over power and security. The pursuit of nuclear energy is a package of different components, where each country adds what matters most for its national interest. Consequently, nuclear energy policy-making is not a simple energy decision but a national strategy and a holistic program, very much politically driven.

8. 2. Contributions to the Literature

This study intended to offer a perspective with an organized representation of the nuclear debate in the field of social sciences, and to highlight the topics which have been previously disregarded by the literature on nuclear energy. The limitations of the literature

on nuclear energy in social sciences have been already stated in Chapter 4. As a response for these shortcomings, with the comparative study of France, Germany and Turkey, the research aimed contribute to the field of comparative politics and the literature on public policy-making in the realm of nuclear energy policy.

The structural factors can sometimes remain insufficient to explain certain policy choices, such as the nuclear energy preference. My effort has been to offer an analytical mapping of the factors which would guide us to see the big picture on nuclear energy policy-making. I suggest this is a fruitful effort for the state-of-art in order to understand nuclear energy preference as a phenomenon and to make further observations for newcomers. Since the literature tends to address the risks or advantages of nuclear individually, the framework suggested in this research is instrumental to locate the issues in relation to each other, to identify their interlinkages and to detect the transitions among different levels of analysis within policy-making structure. This perspective is key in making sense of energy politics and yet, especially for nuclear energy it is significantly under-scrutinized as also highlighted World Nuclear Industry Status Report (2018, p. 185).

I believe this study can offer a constructive contribution to the literature in understanding policy-making in the field of nuclear energy. The factors presented as drivers and constraining mechanisms can be used as a check list to offer predictions for the direction of nuclear expansion. Furthermore, the way the factors have been perceived by the stakeholders and addressed by the state (i.e. including public opinion into the decisions through national debates or institutionalization of the anti-nuclear movement) in France, Germany and Turkey, can offer an opportunity detect the risks and strengths of newcomers. The parameters discussed in the framework can especially work for evaluating the future of nuclear energy policy in newcomer countries by filling the template with national features with regards to the factors reviewed in the driving, constraining and contextual factors. I believe this extensive discussion of the contextual factors, especially with regards to the public opinion, offers crucial insights for managing nuclear energy policy-making processes.

The study also offers policy input for the decision-makers so as to the factors they need

to take into consideration. This is especially valid for newcomers and for the international nuclear regime, as it reveals the factors that the stakeholders care about the most and therefore will reflect into their policies. Consequently, regardless of whether they are proponents or opponents of nuclear, using this model, stakeholders can have a glance for better understanding their national context to be able to come up with more efficient policy strategies. The study offers the policy-makers a template to be used in policy-making, which can be useful in developing a roadmap or strategy for nuclear energy.

From the perspective of methodology, I suggest that the preparation and conduct of the fieldtrip experience can offer crucial insights with regards to conducting interviews with high-level experts on topics which include a lot of sensitive information. Furthermore, since research based on first-person accounts on nuclear is not common in the literature, insider views from different countries, institutions and opposing perspectives which have been presented in previous chapters can also be considered as contributions, to build on by other scholars.

This study did not conclude with any normative statement regarding whether a country should or should not engage in nuclear energy. The arguments have been presented with an objective comparison across the cases and only policy-lessons emerging from this comparison were highlighted. Accordingly, the research also contributed to the literature for understanding nuclear, not for supporting or opposing it.

Last but not least, today nuclear is still a topic which is highly considered as “mysterious”. Duffy states that the concern for “maintaining the secret of the atom set the tone for the atomic program far into the future. From the beginning, access to information involving atomic energy would be severely restricted” (Duffy, 1997, p. 22). This has been highly caused by the military legacy of nuclear and the connotation of some current nuclear programs in Iran or North Korea which kept the international security agenda alarmed. However, if nuclear energy is to be a part of the energy mix (or not) it needs an open examination from the perspective of policy-making. One of the motivations of this research was to treat nuclear as a phenomenon open for discussion, rather than an eccentric technology that the policy-makers refrain from talking about. The interviews in

all three cases still included a lot of “off the record” insights. Especially for Turkey, questioning nuclear energy has been treated almost as investigating a state secret, despite the fact that some of the information were already available to citizens. However, the extensive effort for an X-ray of nuclear energy decision contributed to the developing literature which has been opening nuclear energy up for academic discussion.

8. 3. Avenues for Future Research

As earlier discussion on the zeitgeist examined, some suggest that the time for nuclear has passed and that nuclear energy is over, therefore there is no need to further study nuclear. I do not agree. The examination of a policy issue as tricky as nuclear energy, which is at the intersection of security, society, international relations and sustainability, can tell the political scientists a lot about the visions and motives of nation states. Especially with growing interest on nuclear energy from the Middle East and Asia, the potential for future research on nuclear energy can further develop with regards to specific countries and issues. The policy framework presented in this study can be examined in the context of other countries, such as South Korea or the Gulf countries, especially where the interest in nuclear energy is on the rise.

This research focused on the policy-making dimension of nuclear energy. However, the study can further evolve so as to investigate broader political implications of the choice for nuclear energy, with regards to how different economies’ distinctive configurations between the state, markets and societies operate in reference to nuclear energy preferences. In this perspective, the study promises broader insights from the comparison of additional cases which represent different economic structures, state cultures as well as distinctive features with regards to their nuclear energy policy. This opens a new avenue for research with the integration of additional empirical data and cases. Further comparative investigation of cases would be a fruitful effort to illuminate additional signature characteristics impacting, or resulting from the nuclear choices. Example of such cases include, but not limited to, the United States which increasingly faces the challenge of high-level nuclear waste management, China which represents the highest number of planned and proposed nuclear power reactors, Japan which struggles to rebuilt trust in its nuclear sector, or South Korea which has been often stated by Turkish policy-

makers as a remarkable example of a country which started from zero in nuclear technology and yet has become a nuclear technology exporter today. Such further comparison would significantly benefit from adopting the lenses of varieties of capitalism approach (Hall & Soskice, 2001), so as to uncover how the interaction between the factors presented in this study and stakeholders operates in different types of market economies.

Furthermore, the findings revealed that the policy-making on nuclear energy is significantly affected by the relationship between the state and its citizens. The French case emphasized the principles of responsiveness, transparency and accountability with respect to the public. The German experts often framed the issue as a democratic concern, depicting nuclear energy as a technology “enforced” on citizens and thus rejected by the public which considers itself as a legitimate stakeholder in the decision-making. With a striking difference, a majority of Turkish experts underlined that the public is not considered as an actor in nuclear energy policy-making and on top of this, they raised further concerns with regards to transparency in nuclear policy and the lack of a long-term, comprehensive state strategy on nuclear energy. The state structure can play a significant role to impact nuclear energy decision-making. Issue areas such as institutional structure, the role of civil society, public opinion, the transparency and democratic accountability of decision-making process, have already been highlighted by the findings as having critical roles in nuclear energy policy-making. Therefore, there is potential room for further research to build on the framework and findings presented in this existing work, with regards to broader comparative insight regarding welfare implications of the nuclear option, across different regimes with different social, political and institutional context, as classified by Esping-Andersen’s (1990).

From the perspective of nuclear energy as a technology choice, the research can also be further extended so as to decipher “Allowing Factors”, which would take the decision-making a step further, towards the policy execution. What makes a nuclear energy policy accountable, successful or well-functioning? Being outside the scope of this research’s main research question, this dissertation did not include the study of the codes which corresponded to the successful execution of a nuclear energy policy, as revealed by the actors. In this regard, issue areas such as transparency, effective nuclear safety regime,

existence of an independent authority, nuclear literacy or human resources will be part of a follow-up volume to this dissertation.

Although this study targeted to present the big picture in nuclear energy policy-making, each of the codes investigated under driving or constraining factors can be further examined as a research topic on their own, based on a comparison of different countries, comparison of different time periods within a selected case or based on a specific decision point in time.

Moreover, the policy-making on energy is very much dependent on new technological developments and therefore their impact on policy-making can open new spheres for research especially with regards to policy transfer or policy entrepreneurship. Among these topics, the issue of nuclear waste can be a specific example since the management of nuclear waste is a global concern regardless of a global nuclear expansion or stagnation. The issue of high-level nuclear waste remains as one of the biggest challenges both for nuclear energy producers, such as the United States, or for countries closing down their existing nuclear power plants. To illustrate, despite the phase-out decision, nuclear waste is still a problem for Germany waiting for a final solution. The management of nuclear waste is highly correlated with nuclear safety and factors such as the lack of safety culture or the perspective of decision-makers downgrading the risks of nuclear are very critical for safe execution of nuclear energy policies. In this regard, the interplay between policy and technology is still subject to uncertainties, which necessitates further investigation. The same technological and economic uncertainties are also valid for the development of SMRs.

The analysis in this research has put significant emphasis on the levels of analysis and on the interaction between them. Among them, the individual level needs further analysis to examine the role of leadership in nuclear energy policy-making. The emphasis on De Gaulle's nuclear vision for France, the discussion of Merkel's sharp decision in the aftermath of Fukushima or Erdoğan's determination for nuclear energy have been partially addressed throughout the analysis. However, the impact of strong leadership on nuclear energy policy, commonalities and differences between such leaders in terms of

their energy visions is worth examining to offer projections over the course of nuclear policy in case of a change in leadership.

Another research area concerns the actors in nuclear energy policy-making. Especially in Germany, the long struggle between two major nuclear camps as opponents and supporters for nuclear signaled a major clash between the actors. This study primarily focused on the major factors in the policy-making process and the selection of the experts for data collection already originated from the actors as identified by the policy-making literature. However, the approach can also be reversed so as to offer a map of actors, again using the grounded theory approach in the examination of the interview content. This would not only uncover additional actors but also would offer a venue to examine the role of specific actors in nuclear energy policy-making, such as the media, which are not covered by this study. This effort would complement this current study by offering an opportunity to discover the relative weight of the actors with respect to the model presented for nuclear energy policy-making. This further enquiry signals important insights for the role and influence of different actors in nuclear energy policy-making across diverse national settings.

Interview findings indicated that the driving motives for nuclear energy partially emanate from geopolitical calculations and the motivation to increase national capabilities in the global balance of power dynamics. This proved that the considerations over nuclear energy cannot totally be detached from the traditional notion of security. Future projections on nuclear energy indicate a shift for major nuclear producers from Western economies towards Asia and Middle East. Therefore, investigating the impact of nuclear energy policy in Asia and Middle East on global security emerges as another crucial future research topic.

The last major issue area for future research concerns other energy resources than nuclear energy. The policy-making framework suggested in this study can be applied to developing energy technologies, such as hydrogen, or to renewables which has received relatively less interest than wind and solar, such as geothermal. This practice can have a potential contribution, in that it can allow us to compare and contrast the drivers and barriers across different resources. Energy policy should be designed by considering the

overall energy mix, therefore especially the detection of common barriers for major energy resources for decarbonizing the energy mix can offer both the technology developers and policy-makers insights for future development.

8. 4. Concluding Remarks

Policy making is a very complex process and a result of complex interplay of several factors, in multiple levels. My model presented a “menu”. The decisions are an interplay of these factors which can come out with different combinations for different countries. It is not realistic to present common factors which are absolutely valid, in the same way, in every national context. However, this menu is helpful in at least outlining the general template to be modified for different countries, and to determine which elements stands out in which country.

On the other hand, some challenges remain valid for this theoretical framework. First of all, public policy-making is an interactive and dynamic process. It is more complex than schematic assumptions of “how an idea becomes a policy” (Barberio, 2014, p. 90). Conventional factors, events, institutions and actors such as elections, bureaucrats or interest groups can be in combination and in conflict in unpredictable ways with forces and dynamics such as triggering events, impaired capabilities of actors or social pressure, which can distort the course of government behavior (Lindblom & Woodhouse, 1993, p. 11-12; Gerston, 1997, p. 20). Accordingly, the interaction of social, political, economic, and technological factors can be difficult to detect and this interaction can be further evolving into new types of social, political, economic, or technological elements (Barberio, 2014, p. 90-91). This is especially valid when the subject matter is technology, i.e. nuclear power. The policy on nuclear power is highly vulnerable for unexpected crises (such as the Fukushima) and it is highly exposed to new technological developments which can affect the advantages or disadvantages of nuclear energy, and therefore its social, economic, political dynamics. Barberio asserts that “while such change is potentially daunting to those of us who study policy-making, there are a number of long-lasting aspects to this environment that may give us some needed perspective on the changes taking place” (Barberio, 2014, p. 90-91). This is why, I have designed the

framework more like a template which can always be modified throughout the years with new variables falling into these pre-defined categories (i.e. global, domestic, etc.) making up the whole model.

The second challenge concerns cognitive limits and deficiencies. I agree with Lindblom and Woodhouse that “there is a deep and persistent unwillingness in Western culture to acknowledge the difficulties arising from the world’s complexity and humans’ modest cognitive abilities” (1993, p. 5). Especially in the field of social sciences, coming up with a model which explains everything is not a realistic aim. As Gerston summarizes:

“The methods of public policy analysis differ from those used in the hard sciences. Social science revolves around needs, emotions, unanticipated events and a good deal of irrationality. These characteristics are extremely difficult to quantify or duplicate, and they rarely produce consensus regarding any order of importance or rank. The hypothetical problem of 2+2 will always yield 4 regardless of inflation, war, unemployment, disease, or any number of factors that may affect society. Such accuracy does not occur in the study of public policy” (Gerston, 1997, p. 7-8)

I think this means that there can be no sharp conclusions that provide all the answers. Any sense of certainty in the realm of policy-making behavior would necessitate infinite data regarding leaders’ values, interest group pressures, citizens’ attitudes, institutional checks as well as other dynamics which affect the preferences (Gerston, 1997, p. 92). Very complicated phenomena may rest on a very simple, emotion-driven decision of a leader, or a simple judgement of a decision-maker might be an output of highly complicated calculations of interest.

An important advice by one of my interviewees during my fieldtrip was: *“don’t look for the silver bullet to explain things, it won’t work. It is the interaction of many different things which really matters. Don’t pick out anything to explain it all, that is a trap, it won’t work. You have to put the puzzle together. One piece at a time...”*.

In the study of policy-making, as social scientists, we are only reaching to conclusions based on the information that we can access. On the other hand, as enthusiastic researchers, it is our quest to work for illuminating as many pieces as we can. This

suggested framework on nuclear energy policy, together with this dissertation, has been an effort to accomplish that, by trying to split the decision on nuclear.



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Appendix I

Case Comparison

INDICATORS		FRANCE	GERMANY	TURKEY
ECONOMY INDICATORS	INCOME GROUP BY WORLD BANK	High Income Level	High Income Level	Upper Middle Income
	GDP GROWTH (2000-2018 Average)	1,4%	1,4%	4,9%
	GDP PER CAPITA (2000-2018 Average, current US\$)	36.659	38.805	8.782
ENERGY INDICATORS	CONCERN FOR ENERGY SECURITY	YES	YES	YES
	TOTAL PRIMARY ENERGY SUPPLY (Mtoe) 2018	245	298	146
	PRIMARY ENERGY CONSUMPTION (2000-2018 Average, Mtoe)	249	311	100
	ENERGY IMPORT DEPENDENCY (2000-2018 Average)	49,3%	61,3%	72%
	EU ENERGY DEPENDENCE AVERAGE (52%)	Mid-level	Mid-level	High-level
CLIMATE INDICATORS	GHG EMISSIONS (CO ₂ equivalent, base year 1990=100, 2017)	86,6	74,1	244,5
	GHG EMISSIONS PER CAPITA (2000-2017 Average, tonnes)	8,3	12	5,5
	EMISSION REDUCTION TARGET?	40% by 2030	55% by 2030	21% by 2030
OTHER	EU FRAMEWORK?	Founding Member	Founding Member	Candidate
	SUBJECT TO EU DIVERSIFICATION POLICIES?	YES	YES	NO
	LEGAL FRAMEWORK FOR NUCLEAR?	Strong (+Euratom Treaty)	Strong (+Euratom Treaty)	Under Construction
NUCLEAR ENERGY PREFERENCE		YES	NO	YES

Data Sources: Eurostat, World Development Indicators, IEA, 2020

(Compiled by the Author)

Appendix II

List of Participants by Country (in Alphabetical Order)

FRANCE		
Name	Institution and Position	Interview Date
Alain Bucaille	Expert/ CEA; Former Director of Research and Innovation /AREVA (2006); Special Advisor to Anne Lauvergeon- CEO of Areva 2001-2011; Engineer of Corps Des Mines	9.02.2018
Antoine Caron	Head of External Affairs Office/ Ministry for an Ecological and Solidary Transition- General Directorate for Energy and Climate Change (DGEC) Sub-Directorate for Nuclear Energy	7.02.2018
Christophe-Alexandre Paillard	Head of Department / General Secretariat Security, Defense and Business Intelligence Directorate- Ministry of Environment, Energy and the Sea / Ministry of Housing and Sustainable Homes	7.02.2018
Corinne Lepage	Former Minister of Environment (1995-1997/ President: Jacques Chirac); President of CAP21/Le Rassemblement Citoyen; Lawyer following energy, environmental health, pollution and industrial disasters cases	8.02.2018
Dr. Fatih Birol	Executive Director/ International Energy Agency	6.02.2018
Dr. Laurent Turpin	Director/ AFNI (France International Nuclear Agency)	1.02.2018
High Level Expert	CEA	12.05.2017
High Level Expert	<i>Assemblée Nationale-OPECST (Office parlementaire d'évaluation des choix scientifiques et technologiques)</i> / National Assembly- Parliamentary Office for the Evaluation of Scientific and Technological Options	9.02.2018

High Level Expert on Nuclear Energy	AFNI (France International Nuclear Agency)	9.03.2016
Mario Pain	Former Deputy Director for Energy/ French Ministry of Ecology, Sustainable Development and Energy	8.03.2016
Michael Krauth	<i>Ingénieur, Chargé de Mission/ Assemblée Nationale-OPECST (Office parlementaire d'évaluation des choix scientifiques et technologiques)</i> / Representative in charge of Energy /National Assembly- Parliamentary Office for the Evaluation of Scientific and Technological Options	9.02.2018
Mykle Schneider	International Consultant; Initiator & Convening Lead Author / World Nuclear Industry Status Reports; Founding Board Member and Spokesperson / International Energy Advisory Council	2.02.2018
Nicolas Mazzucchi	Research Fellow / FRS (Fondation pour la Recherche Stratégique)	31.01.2018
Paul Dorfman	Founder/ Nuclear Consulting Group; Board Member / International Nuclear Risk Assessment Group; Honorary Senior Research Fellow / the Energy Institute, University College London (UCL)	2.02.2018
Remy Mensire	Deputy Head of Public Policy and Supervision Unit/ Ministry for an Ecological and Solidary Transition- General Directorate for Energy and Climate Change (DGEC) Sub-Directorate for Nuclear Energy	7.02.2018
William Magwood	Director-General / Nuclear Energy Agency (OECD - NEA)	5.02.2018

GERMANY		
Name	Institution and Position	Interview Date
Christian Wossner	General Manager/ DAfF (Deutsches Atomforum - German Atomic Forum)	13.12.2017
Christiane Nowotzki	Senior Manager/ World Energy Council- Weltenergierat Deutschland	12.12.2017
Craig Morris	Journalist & Lead Author of German Energy Transition (www.energytransition.org); Co-author of Energy Democracy	12.12.2017
Dagmar Weinberg	Counsellor /Nuclear Policy Division in Federal Ministry for Economic Affairs and Energy (Bmwi)	15.12.2017
Dr. Bilun Müller	Federal Ministry for Economic Affairs and Energy	15.12.2017
Dr. Eberhard von Rottenburg	Senior Manager on Energy and Climate Policy/ Federation of German Industries (BDI)	12.12.2017
Dr. Ludger Mohrbach	Head of Nuclear Power Plants; Head of R&D Co-ordination and Research Foundation/ VGB Powertech	9.03.2017
Dr. Stephan Krieger	Director /International Relations Strategy and Politics Division at BDEW (German Association of Energy and Water Industries)	13.12.2017
Dr. Tobias Pohl	Leading expert for energy economics/policy of the group of the CDU/CSU	13.02.2018
Gareth Wynn	Expert on Strategic Communications	12.10.2016

High Level German Expert	Representative from the office of Rebecca Harms, member of the Alliance '90/The Greens (BÜNDNIS 90/ DIE GRÜNEN) and European Parliament	1.06.2017
High Level German Expert	Manager / Projects and International Affairs Division in an anonymous German institution on nuclear safety (and security), radiation protection and the nuclear fuel cycle	9.03.2016
High Level German Expert	Representative for Sylvia Kotting-Uhl, Member of the Bundestag and BÜNDNIS 90/ DIE GRÜNEN	14.12.2017
Kurt Dieter Grill	Chairman/German ITER Industrial Forum; Former CDU Politician; Former Chairman of the Federal Committee Environment and Energy of the CDU (1987 -2002); Former Member of the German Bundestag (1994- 2005)	14.12.2017
Michael Sailor	Ceo/ Öko Institut e.V.; Chairman of the Nuclear Waste Management Commission (German: Entsorgungskommission, ESK)	12.12.2017
Nicole Kaim-Albers	Head of Office/World Energy Council-Weltenergierat Deutschland	12.12.2017
Rainer Baake	Former State Secretary at the Federal Ministry for Economic Affairs and Energy; Politician from the Greens	12.10.2016
Viviane Raddatz	Policy Advisor Climate and Energy/ WWF Deutschland	11.12.2017

TURKEY		
Name	Institution and Position	Interview Date
Dr. Abdullah Zararsız	Chairman of the Board/ Union of Chambers of Turkish Engineers and Architects (TMMOB) Chamber of Physics Engineers	24.05.2018
Arif Künar	Project Advisor/ Nükleersiz.org; Member/ The SHURA Advisory Council; Expert on Energy Efficiency	22.05.2018
Dr. Erol Çubukçu	President/ Nuclear Engineers Society; Professor/ Hacettepe University Nuclear Engineering Department	23.05.2018
Government Official 1	Turkish Court of Accounts	21.05.2018
Government Official 2	Turkish Court of Accounts	21.05.2018
Dr. İrfan Koca	Former President/ Department of Nuclear Safety, Turkish Atomic Energy Authority (TAEK); Former Representative of Turkey at IAEA	23.05.2018
Koray Tuncer	Founder/ Turkish Nuclear Industry Association (NIATR)	24.05.2018
Makoto Kanda	President/ Mitsubishi Heavy Industries France; Former President/ Sinop Nükleer Enerji Ltd.	22.05.2018
Necdet Pamir	Energy Expert; Head of Energy Commission of Republican People's Party (CHP)	12.05.2017

Nilay Çubukçu	General Manager/ Mitsubishi Heavy Industries Ankara Liaison Office; Former Project Manager/ Sinop Nükleer Enerji Ltd.	22.05.2018
Oğuz Türkyılmaz	Head of Energy Working Group/ Union of Chambers of Turkish Engineers and Architects (TMMOB) Chamber of Mechanical Engineers	24.05.2018
Prof. Dr. Haluk Yücel	Nuclear Engineer/ Ankara University Institute of Nuclear Science	11.05.2017
Prof. Dr. Niyazi Meriç	Director/ Ankara University Institute of Nuclear Science	11.05.2017
Prof. İnci Gökmen	Project Advisor/ Nükleersiz.org; Expert on Chernobyl radioactivity on the Black Sea coast of Turkey; Professor/ Middle East Technical University Department of Chemistry	25.05.2018
Dr. Şule Ergün	Board Member/ Nuclear Engineers Society; Professor/ Hacettepe University Nuclear Engineering Department	23.05.2018
Yılmaz Batıbay	High-Level Nuclear Expert/ Turkish Atomic Energy Authority (TAEK)	24.05.2018

Appendix III

List of Interview Questions

This list includes the main questions which have been asked in every interview. I would like to emphasize that the list does not include the follow up questions, which changed in line with the spirit and content of every conversation and the participant's expertise.

Questions For Germany

1. According to you, what are major advantages and disadvantages of nuclear energy for electricity generation?
2. How would you characterize Germany's nuclear phase out decision? What really drives the phase out decision?
3. What are the constraining factors for Germany's nuclear energy program?
4. What is the difference between France and Germany with respect to electricity generation from nuclear power? Why was Fukushima perceived differently?
5. What motivates Germany's energy transition/phase out policy? What are the challenges for Energiewende?
6. How do you evaluate Germany's INDC target in the context of nuclear phase out?
7. Which actors are involved in the decision-making process related to nuclear energy decisions? To what extent they are effective?
8. What is public's position towards the use of nuclear energy for electricity generation? To what extent public opinion impacts nuclear energy policy?
9. To what extent policymakers incorporate anti-nuclear movement into their decision about nuclear energy? Do you think it affected the phase out decision? If so how it was reflected into the decision-making process?
10. What is the role of political parties in Germany's nuclear energy policy?

Questions For France

1. According to you, what are major advantages and disadvantages of nuclear energy for electricity generation?
2. What is French motivation for high level of nuclear energy generation? What is the difference for France and its outstanding nuclear performance?

3. What is the biggest challenge for France in nuclear, if any, to sustain or even further expand its nuclear program for electricity generation?
4. What are the constraining factors for current nuclear energy decisions?
5. What is the difference between France and Germany with respect to electricity generation from nuclear power? Why was Fukushima perceived differently?
6. Which actors are involved in the decision-making process related with nuclear energy decisions? To what extent they are effective?
7. What is the public's position towards nuclear energy? To what extent public opinion impact nuclear energy policy in France?
8. To what extent policymakers incorporate social movements into their decision regarding nuclear energy for electricity generation?

Questions For Turkey

1. According to you, what are major advantages and disadvantages of nuclear energy for electricity generation?
2. How would you characterize Turkey's nuclear energy policy? Why Turkey is so ambitious for producing electricity from nuclear energy? What are the risks and opportunities associated with this strategy? What is the biggest challenge?
3. How would you characterize the effect of nuclear accidents such as Chernobyl and Fukushima, on Turkey's nuclear energy policy?
4. What are the driving factors and constraining factors for nuclear energy decisions?
5. Which actors are involved in the decision-making process related with nuclear energy decisions? To what extent they are effective?
6. What is public's position towards embracing nuclear energy in Turkey? To what extent public opinion is considered in the nuclear energy policy decisions?
7. To what extent policymakers incorporate social movements into their decision about nuclear energy?
8. Do you think that Turkey's nuclear energy decisions are in congruence with its energy security policy?
9. What took Turkey so long to realize its nuclear energy production plans?
10. To what extent environmental movement in Turkey affects its nuclear energy preference?

Appendix IV

Driving Factors

Major Driving Factors, by Interviews (TOTAL)			Major Driving Factors For France (by Interviews)		
	Documents	Percentage		Documents	Percentage
Energy Security	33	66	Energy Security	13	81
Military	19	38	Political decision	7	44
Cheap Electricity	18	36	Cheap electricity	7	44
High-Tech	16	32	Industry Spill Over	6	38
Prestige	15	30	Prestige	5	31
Political Decision	15	30	High-Tech	5	31
Industry Spill Over	14	28	Military	4	25
Decarbonization	11	22	Decarbonisation	3	19
Geopolitics	8	16	Geopolitics	3	19
Decommissioning Cost	6	12	Decommissioning Cost	1	6
Benefits	4	8	Benefits	0	0
ITER	2	4	ITER	0	0
DOCUMENTS with code(s)	45	90	DOCUMENTS with code(s)	15	94
DOCUMENTS without code(s)	5	10	DOCUMENTS without code(s)	1	6
ANALYZED DOCUMENTS	50	100	ANALYZED DOCUMENTS	16	100

Major Driving Factors For Turkey (by Interviews)			Major Driving Factors For Germany (by Interviews)		
	Documents	Percentage		Documents	Percentage
Energy Security	14	88	Cheap electricity	6	33
Military	10	63	Energy Security	6	33
High-Tech	10	63	Military	5	28
Prestige	8	50	Decarbonisation	5	28
Political Decision	8	50	Decommissioning Cost	3	17
Industry Spill Over	7	44	Prestige	2	11
Cheap Electricity	5	31	Industry Spill Over	1	6
Geopolitics	5	31	High-Tech	1	6
Benefits	4	25	ITER	1	6
Decarbonization	3	19	Benefits	0	0
Decommissioning Cost	2	13	Geopolitics	0	0
ITER	1	6	Political decision	0	0
DOCUMENTS with code(s)	15	94	DOCUMENTS with code(s)	15	83
DOCUMENTS without code(s)	1	6	DOCUMENTS without code(s)	3	17
ANALYZED DOCUMENTS	16	100	ANALYZED DOCUMENTS	18	100

Source: Prepared by the author.

Appendix V

Constraining Factors

Major Constraining Factors, by Interviews (Total)			Major Constraining Factors For France (by Interviews)		
	Documents	Percentage		Documents	Percentage
Nuclear Waste	28	56,00	Social Refusal	9	56,25
Cost	24	48,00	Cost	7	43,75
Social Refusal	21	42,00	Nuclear Waste	7	43,75
Risk	19	38,00	Zeitgeist	3	18,75
Politics	9	18,00	Accidents	3	18,75
Zeitgeist	8	16,00	Risk	3	18,75
Accidents	6	12,00	Lack of Know-How	1	6,25
Lack of Know-How	3	6,00	Politics	1	6,25
Alternatives	3	6,00	Alternatives	0	0,00
Health	2	4,00	Human factor	0	0,00
Human factor	1	2,00	Health	0	0,00
DOCUMENTS with code(s)	44	88,00	DOCUMENTS with code(s)	14	87,50
DOCUMENTS without code(s)	6	12,00	DOCUMENTS without code(s)	2	12,50
ANALYZED DOCUMENTS	50	100,00	ANALYZED DOCUMENTS	16	100,00

Major Constraining Factors for Turkey (by Interviews)			Major Constraining Factors for Germany (by Interviews)		
	Documents	Percentage		Documents	Percentage
Cost	11	68,75	Nuclear Waste	10	55,56
Nuclear Waste	11	68,75	Social Refusal	9	50,00
Risk	8	50,00	Risk	8	44,44
Social Refusal	3	18,75	Cost	6	33,33
Politics	3	18,75	Politics	5	27,78
Alternatives	3	18,75	Zeitgeist	5	27,78
Accidents	2	12,50	Accidents	1	5,56
Lack of Know-How	2	12,50	Human factor	1	5,56
Health	1	6,25	Health	1	5,56
Human factor	0	0,00	Alternatives	0	0,00
Zeitgeist	0	0,00	Lack of Know-How	0	0,00
DOCUMENTS with code(s)	14	87,50	DOCUMENTS with code(s)	16	88,89
DOCUMENTS without code(s)	2	12,50	DOCUMENTS without code(s)	2	11,11
ANALYZED DOCUMENTS	16	100,00	ANALYZED DOCUMENTS	18	100,00

Source: Prepared by the author.

Appendix VI

Major Contextual Elements

Major Domestic Elements, by Interviews (Total)			Major Domestic Elements For France (by Interviews)		
	Documents	Percentage		Documents	Percentage
Public Opinion	47	94,00	Public Opinion	15	93,75
Social Movements	36	72,00	Social Movements	8	50,00
Culture	27	54,00	Energy Mix	8	50,00
Elections	24	48,00	Elections	8	50,00
Energy Mix	18	36,00	History	8	50,00
Political Stability	14	28,00	Political System/culture	5	31,25
Political System/culture	11	22,00	Culture	5	31,25
History	9	18,00	Political Stability	2	12,50
Religion	1	2,00	Religion	1	6,25
DOCUMENTS with code(s)	47	94,00	DOCUMENTS with code(s)	15	93,75
DOCUMENTS without code(s)	3	6,00	DOCUMENTS without code(s)	1	6,25
ANALYZED DOCUMENTS	50	100,00	ANALYZED DOCUMENTS	16	100,00

Major Domestic Elements For Germany (by Interviews)			Major Domestic Elements For Turkey (by Interviews)		
	Documents	Percentage		Documents	Percentage
Public Opinion	17	94,44	Public Opinion	15	93,75
Social Movements	15	83,33	Social Movements	13	81,25
Culture	13	72,22	Political Stability	10	62,50
Elections	11	61,11	Culture	9	56,25
Energy Mix	6	33,33	Elections	5	31,25
Political System/culture	4	22,22	Energy Mix	4	25,00
Political Stability	2	11,11	Political System/culture	2	12,50
History	1	5,56	Religion	0	0,00
Religion	0	0,00	History	0	0,00
DOCUMENTS with code(s)	17	94,44	DOCUMENTS with code(s)	15	93,75
DOCUMENTS without code(s)	1	5,56	DOCUMENTS without code(s)	1	6,25
ANALYZED DOCUMENTS	18	100,00	ANALYZED DOCUMENTS	16	100,00

Source: Prepared by the author.