UNIVERSITY OF TARTU

Faculty of Social Sciences and Education

Institute of Government and Politics

Bachelor's thesis

Siim Mändoja

A comparative analysis of the effects of the Fukushima catastrophe on the EU States nuclear policies. The example of France and Germany.

Supervisor: Andrei Belyi, PhD

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Introduction

The Fukushima catastrophe, which is considered to be one of the most notable nuclear catastrophes after the notorious Chernobyl incident in 1986, is yet again an example of the fact that however cheaper and more efficient compared to the other sources of energy nuclear energy can be, one cannot be oblivious to the threats it poses, especially when very often, these threats are brought on (and possibly amplified) by something as unforeseen and powerful as elements of nature. As Fukushima catastrophe was a direct consequence of the 2011 Tohoku earthquake and the tsunami created by it (Nöggerath, Geller, Gusiakov 2011), it can certainly be said that one of the main reasons for following disaster was of natural origin. However as I will explain the background to the catastrophe in more detail in the empirical section of my thesis, I will bring out several human factors which led to the catastrophe and the means how it could have been avoided.

In addition to the introduction of the background to the Fukushima catastrophe, I will focus my thesis on finding out if the Fukushima catastrophe, and the conclusions made from it, led to any changes in the EU states (more specifically French and German) nuclear policies. I am trying to defend the hypothesis that due to the differences in French and German long-term government objectives (for example an attempt to prevent energy dependence by French government), as well as the difference in electoral outcomes (for example the success of Green party in Germany), the Fukushima disaster had different effects on two country's nuclear energy policies. In order to achieve this, I'm going to compare the key aspects of French and German nuclear energy policies before and after the Fukushima catastrophe and in case of any alterations, I'm trying to determine if their origin could be due to the catastrophe.

From theoretical viewpoint, the thesis will attempt to define an applicability of the path dependence theory to the case of civil nuclear policies of the two countries in question: France and Germany. The path dependence theory defends a view, that policy makers may be reliant on current technologies and perceptions of risks. Here, I will try to argue that France and Germany chosen different policy options due to their discrepancies in path dependence.

The thesis consists of five chapters in total. The chapter at hand gives a general

introduction to the topic. Chapter two is focused on the theoretical background and consists of two parts: in part one I will try to give a general overview of path dependence theory in light of historical institutionalism and in part two I am trying to demonstrate the effects of the path dependence theory on civil nuclear policies of the two countries. Chapter three is concentrated on French and German nuclear energy policies before the Fukushima incident. In chapter four I will first present an introduction to the Fukushima catastrophe, as well as the causes and outcomes of said disaster. It is followed by an overview of French and German nuclear energy policies after the Fukushima incident. In chapter five I will offer a conclusion for my thesis.

1. Theoretical background

In order to understand the present situation, one must often look to the past to find reasons. In economics and social sciences, the theory which defends this sentiment is called Path Dependence. The path dependence theory can be defined in different ways, for example according to William Sewell, path dependence is „that what has happened at an earlier point in time will affect the possible outcomes of a sequence of events occurring at a later point in time" (Mahoney 2000, p. 510). In his article however, Mahoney argues that this kind of approach is not sufficient as it implies that arguments can be put forward as path dependent simply because later events are affected by earlier ones. He insists that one must also pay attention to the order of events and that „*when* things happen within a sequence affects *how* they happen" (Mahoney 2000, p. 511). Another important point, put forward by Scott E. Page, is that path dependent processes vary greatly in terms of their inertia (Page 2006). He provides an example of pest control strategies and laws, explaining that laws have a much stronger connection to past laws than pest control strategies have to past pest control strategies . Moreover, he claims that due to "historical forces", new laws tend to be similar to past laws, whereas new pest control strategies aim to kill those pests that the previous ones could not kill (Page 2006). Page further argues that there are four causes related to path dependence: increasing returns, self reinforcement, positive feedbacks and lock-in. The idea of increasing returns is that the more a particular course of action is taken, the greater the

benefits. Self reinforcement means that following a certain course sets in place certain forces and institutions that aim to keep this course. Positive feedback means that an action creates "positive externalities" (Page 2006, p. 88), meaning that the action is beneficial to others who have chosen that course in the past or will choose in the future. Finally, the concept of lock-in means that a choice or action becomes preferable to any other because everyone else has made the same choice or taken the same course of action. Page presents an example put forward by Paul David which considers the success of QWERTY typewriter. In this example, all four mentioned features are evident. Firstly the more QWERTY typewriters were sold, the more the costs of marketing fell, meaning increasing returns. Secondly QWERTY typewriter was self reinforcing because typewriting textbooks were all based on QWERTY layout. Thirdly the positive feedback of QWERTY typewriter was that one QWERTY typists could use any other persons QWERTY typewriter. Finally the lock-in happened when there was enough QWERTY typewriters in use. (Page 2006 pp 4-5)

The path dependence theory is often linked to historical institutionalism, which is best defined by explaining what makes it different from other social science approaches. Sven Steinmo brings out three of those differences: „its attention to real world empirical questions, its historical orientation and its attention to the ways in which institutions structure and shape political behaviour and outcomes" (Steinmo 2008, p. 118). In fact Steinmo distinguishes between three types of institutionalism used in the social sciences today: rational choice, sociological institutionalism and historical institutionalism. He argues that the common understanding between the advocates of different types of institutionalisms is that „they all see institutions as rules that structure behaviour" but the agreement differs „over their understanding of the nature of the beings whose actions or behaviour is being structured". (Steinmo 2008, p. 130)

According to Steinmo, institutionalists of the rational school argue that people are individualists with a rational type of thinking and they take into account the costs and benefits of the choices they have to make. Rational choice insitutionalists think that people tend to subject to the rules because by doing so, they can maximize their personal or individual gain. Simply put, „We co-operate because we get more with co-operation than without it and we follow rules because we individually do better when we do so". (Steinmo 2008, p. 130) Another set of characteristics, put forward by Hall

and Taylor, claims that rational choice institutionalists are identifiable first because of their rational way of thinking, already put forward by Steinmo. Secondly they indicate that rational choice institutionalists have a distinct understanding of politics, that is that they see politics as "a series of collective action dilemmas" (Hall, Taylor 1996 p. 945), caused by their inclination to maximize their own interests. In other words, due to this inclination, individuals are very likely to end up with an outcome what can be defined as "sub-optimal" (Hall, Taylor 1996 p.45), (meaning that at least one other outcome could be discovered that would result in at least one of the participants being better off and at the same time not making any other worse off). This kind of behavior is usually explained by the lack of institutional arrangements which could lead to complementary behavior by the others (Hall, Taylor 1996).

The third argument in this question is that the actors in the rational choice institutionalism paradigm are driven by a strategic calculus structured by information and strategic mechanisms provided by institutions (Hall, Taylor 1996). Finally it is claimed by rational choice institutionalists that the actors create the institutions, the reason once again lies in cooperation (Hall, Taylor 1996).

In contrast to rational choices institutionalists, the sociological institutionalists consider human beings to „fundamentally social". In their view, maximizing our self interest is outweighed by „logic of appropriateness". In other words, people are more interested in what is right and appropriate thing to do, rather than their personal gain. (Steinmo 2008, p. 131) Another perspective to sociological institutionalism is that individuals are using a much more profound basis in order to define their goals (Hall, Taylor 1996). That is to say that when rational choice institutionalists talk about individuals seeking to maximize their material well-being, sociological institutionalists argue that individuals and organizations want to represent their identity in socially acceptable ways (Hall, Taylor 1996). Furthermore, it is claimed that the most evidently bureaucratic processes have to be explained by using cultural terms (Hall, Taylor 1996).

In some sense, historical institutionalism stands halfway between these two approaches to institutionalism – labeled "calculus" and "cultural" by Hall and Taylor (1996 p. 940). They argue that there are three "seminal" questions in the new institutionalism school of thought and that the answers to these questions are quite different (Hall, Taylor 1996 p. 939). Firstly there is the question "how do actors behave?" to which the supporters of calculus approach answer that individual behaviour

is based on strategic calculation and the goals are set with an eye to maximum benefit (Hall, Taylor 1996). In contrast, the cultural approach states that individual behaviour is not limited with the strategic aspects but rather it depends on the individual's worldview and that decision-making depends more on the evaluation of the situation than on calculation (Hall, Taylor 1996). To "what do institutions do?", the calculus approach provides an answer that they provide "actors with greater or lesser degrees of certainty about the present and future behaviour of other actors" which in turn can affect individual action (Hall, Taylor 1996). From cultural perspective, institutions provide actors with moral and cognitive guidelines for interpretation and action (Hall, Taylor 1996). The final question "why do institutions persist over time?" is resolved by the calculus approach by claiming that the more the institutions take part in resolving collective action dilemmas, the more they will thrive (Hall, Taylor 1996). According the cultural approach, the institutions persist over time because they are collective constructions and can not be redesigned by any one individual. Furthermore, social institutions are so conventional that they "ultimately structure the very choices about the reform that the individual is likely to make" (Hall, Taylor 1996). In fact, the historical institutionalists believe that one's behaviour depends „on the individual, on the context and on the rule". According to Steinmo, the real objective of the historical institutionalism is to find out „why a certain choice was made and/or why a certain outcome occurred" and any noteworthy political outcome is most probably best understood as being the result of rule following *and* interest maximizing (Steinmo 2008, p. 131). Steinmo argues that for historical institutionalists, history is important because it matters. In his attempt to support this argument, he brings out three ways in which history does matter.

Firstly he explains that historical context has a direct effect on the decisions and events. This is done by using examples from Alexander Gershenkron who indicated in his work that the period in time *when* a country industrializes is an essential aspect of *how* it industrializes. Steinmo himself offers an another example outside of politics by arguing that the developmental experience of the firstborn children is very much different to the consequent children due to the change in parental experience and the fact that second or later children grow in a household with other children. (Steinmo 2008, p. 132)

Secondly he claims that history is important because it gives one an opportunity

to learn from experience. Therefore, understanding of the historical moment is a necessary factor in trying to provide correct explanations for particular events. (Steinmo 2008, p. 133)

Finally, relying on Paul Pierson's work, Steinmo argues that history matters because the past shapes one's expectations about the future. Here, he uses the example of the United States' campaign in Iraq to claim that rather than just an example of power politics, it was the result of United States' past victories over Germany and Japan during the Second World War and the success over communism, that led the policy makers in US to think that their intention of bringing capitalism and democracy to a former dictatorship would be successful. In addition to that, Steinmo argues that the consequences of the Iraq campaign will in turn shape the US foreign policy in the near future. (Steinmo 2008, pp. 132-133)

As already mentioned earlier, the idea of path dependency implies that earlier events in time create a kind of „path" for later ones, so in order to understand certain outcomes, we must rely on the past. One must also pay attention to the sequence of events, because the exact moment when an event takes place can also be of great importance. In order to claim that some kind of policy, development or decision is path dependent, one must first distinguish the reasons that make it so. In case of civil nuclear policies, it can be argued that there are many, so a closer look at the countries in question is necessary. In case of both countries I will first provide a background their history of civil nuclear policy, after which I am going to apply the set of characteristics put forward by W. Brian Arthur to link the civil nuclear policy to path dependency theory. In addition, I am also trying to apply the four causes of path dependence put forward by Scott Page.

1.1 Germany

In case of Germany, I am trying to demonstrate how the origins of its present day nuclear phase-out can be traced back to decisions and events that were made and took place several decades ago. It is worth to note that not only domestic factors play a role in this, but international ones as well, which, in fact, often prove to be more influential.

It has been put forward by Davies that the notable discussions over the positive and negative effects of the use of nuclear energy started in the late 1960's and early 1970's . Before that (and for certain parties also after that), the nuclear power was seen as an up-to-date measure to solve mankind's energy problems. However, since the 1970's, Germany has consistently followed to path of diminishing the role of nuclear energy in its energy mix. (Davies 2011)

The German nuclear phase out commenced with a series of protests in late 1976 and early 1977 which are called the Brokdorf protests. These protests can actually be seen as a follow-up to an earlier incident, concerning the proposed building of a nuclear reactor near the town of Wyhl, where the opposition of local residents eventually led to the cancellation of the project. The two incidents had a similar beginning, in both cases there was a strong opposition to the planned nuclear reactor, only in the Brokdorf case, the German federal government decided to involve the police to stop the protesters from occupying the construction site, which was what happened in Wyhl. This led to a series of violent clashes between the police and protesters and initially the opposition to the project led to a construction stop in autumn 1977. However a decision was later made to resume the construction in February 1981, which brought over 100 000 people to demonstrate against the project, who were in turn met with a police force of 10 000. (Davies 2011)

It is worth to note that the anti-nuclear protests at that time were not directed so much against nuclear energy, as against government's authoritan style and excessive use of force. (Davis 2011)

There were also other projects in the 1970's and 1980's which received vast media coverage and eventually increased the anti-nuclear sentiments in public opinion. One of those was the Kalkar fast-neutron reactor which led to thorough discussions over the safety issues of mentioned reactor, as well as an independent nuclear expertise in Germany (Davies 2011). However important the events in Wyhl, Bokdorf and Kalkar might have been, they were only the beginning of an „extended time period of considerable stability" which is what path dependency essentially means (Peters, Pierre & King 2005 p. 1276). Below I will explain in more detail the reasons that fixed Germany to its present day course regarding civil nuclear policy.

Up until the Fukushima catastrophe, there was one major catastrophe beforehand that can be held responsible for shifting the sentiments towards nuclear energy in

Germany from positive or neutral to negative – the Chernobyl catastrophe in 1986. The Chernobyl catastrophe is a noteworthy step on Germany's way to nuclear phase-out not only because of the obvious impact a failure in (relatively near-by) nuclear power plant can have on public opinion towards nuclear energy, but also because it convinced the German Social Democratic Party (SDP) to reject nuclear energy (Schreurs 2012). I will explain the importance of this development later on, but in order to do that, a closer look to German political scene is needed.

The most consistent opponent to the use of nuclear energy has been The German Green Party – *Die Grünen.* They appeared to the German political scene in early 1980's and although they were unsuccessful in their first attempt to reach *Bundestag* in 1980, already three years later, in 1983, they had sufficient support to cross the 5% margin and obtain a place in German parliament (Elections to the German Bundestag 2013).

This newly acquired position allowed them to pressure the major parties in parliament to take greater notice on environmental issues (Schreurs 2012). However, the Green party support was still not near enough to push through its own political agenda and although the government led by Christian Democrats and Helmut Kohl started to pay more attention towards environmental issues, it still supported the use of nuclear power as well (von Weizsäcker 2006). That is where the importance of SDP's decision to take a critical stand towards nuclear power following Chernobyl becomes evident. Now the Green Party had a powerful ally in its stand against nuclear power. In 1983 elections, the SDP had secured 193 places in parliament, whereas the Green party only managed to get 27 (Elections to the German Bundestag 2013).

Nevertheless, it took 12 more years after Chernobyl for SDP and The Green Party to form a coalition government and enforce their plans for systematic nuclear phase-out which I will cover in more depth in the latter part of my work (Glaser 2012). In the meantime the nuclear power was still considered as an option, mainly because of environmental reasons but due to the lack of interest towards building new plants as well as no sudden change in public opinion towards nuclear energy, there were no significant expansions in that matter (von Weizsäcker 2006).

In order to link the development of German civil nuclear policy to path dependency theory, I am using the four characteristics put forward by W. Brian Arthur (Pierson 2000 p. 252) which are following:

1. *Unpredictability*. Because early events have a large effect and are partly random, many outcomes may be possible. We cannot predict ahead of time which of these possible end-states will be reached.

2. *Inflexibility*. The farther into the process we are, the harder it becomes to shift from one path to another. In applications to technology, a given subsidy to a particular technique will be more likely to shift the ultimate outcome if it occurs early rather than late. Sufficient movement down a particular path may eventually lock in one solution.

3. *Nonergodicity*. Accidental events early in a sequence do not cancel out. They cannot be treated (which is to say, ignored) as "noise," because they feed back into future choices. Small events are remembered.

4. *Potential path inefficiency*. In the long-run, the out-come that becomes locked in may generate lower pay-offs than a forgone alternative would have.

The idea on unpredictability is quite obvious in Germany's case. As I have previously shown, the initial protests against nuclear energy were fairly spontaneous and the resentment derived more from the concern over local habitat than from the opposition to nuclear power per se.

The idea of flexibility is illustrated by the fact that in umpteen years, the political situation concerning civil nuclear policy changed so rapidly, from a point where there was virtually no opposition (in government level), to a point where at least one third of parliament members belonged to a party opposing nuclear power and that eventually these parties formed a coalition government clearly illustrates the idea put forward by Paul Pierson that „the probability of further steps along the same path increases with each move down that path" (Pierson 2000 p.252). Another important aspect of the idea of flexibility which can be noted in the case of Germany is the concept of lock-in, in other words „particular courses of action, once introduced, can be virtually impossible to reverse" (Pierson 2000 p. 251).

In terms of Nonergodicity one must pay attention to the fact how the initial protests in Wyhl, Bokdorf and Kalkar started a chain of events which eventually led to

the policy of nuclear phase-out. It is highly doubtful that without those events the Green Party would have gained sufficient amount of votes to be represented in parliament and campaign for renouncement of nuclear energy.

As far as the potential path inefficiency is concerned, the outcome of recent events in Germany is still uncertain and one can not, with full certainty, predict the efficiency or inefficiency of the present path in comparison to hypothetical alternative path that could have been taken. However, in the aftermath it very often turns out that something could have been done differently or an alternative decision could have or even should have been taken and there is no reason to think that in this case it is any different.

1.2 France

The history of civil nuclear energy in France is somewhat different to that in Germany. Due to various reasons, the „path" that France and French government in particular have chosen, has historically been a lot more supporting in terms of using nuclear energy than the German alternative. It has been put forward that since the 1960's until 2012, the French nuclear power industry has enjoyed an „overwhelming" and „unwavering" support from the government (Schneider 2013 p. 18). This has resulted in a situation where about half of the nuclear energy in European Union is generated in France and in France itself, about 75% of the energy in electricity mix comes from using nuclear power (Schneider 2013 pp. 27-28). So what makes France so different from Germany in terms of its position towards nuclear energy?

Amongst other, three reasons stand out. Firstly there has been a strong political desire to reduce the country's energy dependence (Finon, Starapoli 2010). Secondly there exists „a minuscule superelite of engineers" - *Corps des Mines* who are responsible for almost all important decisions considering the design, implementation and control of nuclear policy (Schneider 2013 p. 31). Thirdly, although there is also a Green political party in France, the shift that happened in Germany where Socialist

party came along with the idea of nuclear phase-out, never took place in France (Schreurs 2012). I will followingly address these three aspects in more detail.

It has been put forward that the initial support of the French government to the nuclear industry was largely influenced by the Suez crisis in 1956 and the oil crisis in 1973 (Finon, Starapoli 2010 p. 185). In the light of these events which resulted in the rapid rise of fossil fuel prices, one can understand why the government would feel the need for a (relatively) independent source of energy which would be less affected (in comparison to fossil fuels) by foreign markets. However, another question is that has this policy been successful? In terms of electricity, the answer is yes. However in terms of final energy supply, the answer is no. It has been pointed out that the government's goal to emancipate France from fossil fuel (most notably oil) imports , has been unattainable from the beginning, mainly due to the fact that since 1970's, the main sector responsible for oil consumption has been the transport sector which relies heavily on fossil fuels (Schneider 2008). For example in 2011, fossil fuels gave over 70% of final energy consumed in France, whereas nuclear energy accounted for about 17% (Schneider 2013, p. 21).

Schneider (2013) claims that the elected representatives have in reality very little influence on the decisions made concerning the energy and nuclear power. Most (some even say even all) important decisions in that area are made by *Corps des Mines* which consists mainly of the graduates from an elite school *École Polytechnique* and whose members occupy important posts in various ministries, as well as several agencies which are engaged in the design, implementation and control of nuclear energy. For instance the Nuclear Safety Authority (ASN), the National Radioactive Waste Management Agency and the French Environment and Energy Management Agency are all lead by the members of this group. (Schneider 2013) Officially the *Corps des Mines* is headed by the Minister of Industry, however the reality of it is that after a certain amount of time, ministers change but the corps members remain, which is exactly the reason that has made it possible for the Corps to get a hold of most key positions relevant to the decision-making over the nuclear energy issue. (Schneider 2008)

The third reason for France's heavy reliance on nuclear energy is, as I have pointed out earlier, the fact that in France, the Socialist party did not follow the example of its German counterpart and stayed faithful to the pro-nuclear approach. As already mentioned in the previous paragraph, the German SDP's shift from pro-nuclear to

antinuclear can be largely seen as a result of Chernobyl. Surprisingly, a great discrepancy exists between Germany and France when one looks at the impact of Chernobyl catastrophe on nuclear energy policies. In France, the Chernobyl catastrophe did not have any significant effect (at least on government level) on country's nuclear policy. This can mainly be accounted to the fact that in France, Chernobyl was not seen as a dangerous example that illustrates the threats of nuclear energy, but it was rather seen as an accident which was brought about by the inferior technological and institutional capacities of the Soviet system, and which therefore could not happen in France (Schneider 2012).

Followingly, I am trying to apply the previously used set of characteristics of path dependence to French example:

1. *Unpredictability* is already apparent when we look at the differences between German and French cases, where both had fairly similar starting points but the outcome was very different. One can also assume that some events, for example the 1973 oil crisis, had more influence in France than in Germany.

2. *Inflexibility* in French case is strongly linked to the influence of *Corps des Mines.* One can see that over time, their increasing influence has caused a „lock-in" in terms of nuclear energy policy and as the members of said group still occupy most major positions in this field, it is very difficult to change the direction of French energy policy. However, as I will explain in the latter part of my thesis, due to several factors, of which the Fukushima catastrophe is not the least important, nuclear phase-out may become a reality in France too.

3. *Nonergodicity* is a bit more vague in the French case. However one can still argue that events like the 1973 oil crisis have not been dismissed or forgotten as something in the past but are still serving as an explanation for the strong political desire of country's energy independence.

4. Notions of *Potential path inefficiency* can be seen in the fact that despite a very high percentage of electricity being produced by using nuclear power, its

share in the final energy mix is still relatively low and hence the goal of rendering the country independent from fossil fuel imports has not been fulfilled.

The four causes put forward by Scott Page are also present in both cases. In Germany's case the idea of increasing returns can be seen in the fact that the less nuclear energy is used, the less the chance of potential disaster. In France's case, the more nuclear energy is produced, the less the dependence on foreign energy sources. The idea of self-reinforcement reveals itself in growing political support for nuclear phase-out in Germany and in the impact of *Corps des Mines* in France. Notions of positive feedback can be seen in the fact that both France and Germany pose as excellent examples for countries that are facing the same challenges. The concept of lock-in is in fact tied in with the idea of self-reinforcement because due to institutional and political reasons, both countries in question are very strongly tied to its present course regarding civil nuclear policies.

2. French and German nuclear energy policies before Fukushima

2.1 Germany

It can be argued that prior to the Fukushima catastrophe, the civil nuclear policies in those two countries had taken very different paths. Although I have already tried to give some notion of the subject in the previous chapter, I will now approach the topic in more detail.

I have previously described the history how and why Germany chose the „path" of nuclear phase-out. In this paragraph I will try to elaborate more on the details of this planned phase-out, with main focus on the nuclear phase-out law, which came into effect in 2002 (Glaser 2012). Furthermore I will bring out some factors which allowed the government to overcome the opposition, mainly from other political parties and energy utilities, to this policy.

The (first) phase-out law which came into effect in 2002, stated that no new nuclear reactors will be built and that already existing reactors can be kept operating for a 32 year long lifetime cycle which was deemed equivalent to 2623 billion kilowatt

hours of production (Schreurs 2012, p. 35), hence it was the amount of nuclear electricity that was yet to be supplied. However the electric utilities were allowed to change the permits between reactors, so that the ones that were more costly to run (for example those that were older and needed more maintenance) could be closed earlier and the newer ones could continue to operate until the end of permitted cycle (von Weizsäcker 2006).

In Germany's case, the nuclear phase-out is in many ways tied in with the growing popularity of renewable energy sources. The idea of using renewables arose after the Chernobyl catastrophe with the establishment of a Ministry for the Environment, Nature, Conservation and Nuclear Safety (Schreurs 2012). The renewable electricity feed-in law of 1990 which put the grid operators under the obligation to purchase renewable electricity from third-party generators at 65 -90 percent of the retail price (Schreurs 2012), which served as a measure of encouraging the development of renewable energy sources. Due to the memory of Chernobyl and the fact that at that time, renewable energy was not seen as a danger to other energy sources, there was no strong opposition to the law by traditional energy utilities (Schreurs 2012). The law proved to be a success and by year 2000, the wind energy sector alone earned 1.7 billion euros as revenue and offered direct or indirect employment to 25 000 people (Schreurs 2012). In the same year, the feed-in law of 1990 was replaced by The Renewable Energy Law, which ensured the feed-in tariff scheme for renewable energy for 20 years (Jacobsson, Lauber 2006).

Despite the notable rise in the use of renewable energy, the idea that renewables might be the main contributors to the electricity sector or even the entire energy sector in Germany, was met with a fair amount of incredulity. As I have already noted, the Chernobyl catastrophe influenced German SDP to join forces with the Green party in terms of debating against nuclear energy. Yet there were other political parties like Christian Socialist Union (CSU), Free Democratic Party and parts of Christian Democratic Union (CDU), who did not share the feeling and who, similar to the prevailing sentiment in France, were of the opinion that the accident happened due to inadequacy in nuclear safety and technology standards (Schreurs 2012). Since the Soviet-style nuclear reactors that had existed in former East-Germany had been closed after the unification (von Weizsäcker 2006), it was convenient for the nuclear phase-out opponents to claim that due to superior safety standards, an accident comparable with

Chernobyl could never happen in Germany (Schreurs 2012).

Another argument put forward by the phase-out opponents was that Germany needed nuclear power to fulfill its commitment under the Kyoto Protocol to reduce its carbon dioxide emissions to 21 percent below 1990 levels by 2012 (Schreurs 2012). It was argued that nuclear power was an important „bridge technology" which could be used to produce electricity without greenhouse gas emissions as the renewable energy was being developed (Schreurs 2012).

The situation regarding the nuclear phase-out changed after the 2009 elections. The elections were won by the coalition of CDU/CSU and Free Democratic Party who had been supporting the nuclear energy and opposing the phase-out (Matthes 2012). The coalition now in power added an amendment to the atomic energy law of 2002 which resulted in a situation that is sometimes referred to as „the phase-out of the phase-out" (Schreurs 2012 p. 35). The amendment brought about following changes (Matthes 2012 pp. 46-47):

1. The lifetime of existing plants was extended for eight or 14 years, depending on the age of the reactors, without changing the 2002 implementation approach that allowed unused nuclear plant running times to be transferred to other plants.

2. The ban on licensing of new reactors was not changed.

3. To share the windfall profits from the lifetime extensions, the government and industry agreed to voluntary payments by nuclear operators to an energy and climate fund. As a result of the deal, the nuclear operators were able to gain extra profits from significantly larger production entitlements, and the government earned some extra income, which was earmarked for energy policy projects.

4. The decisions on nuclear energy were embedded in a set of short-, medium-, and long-term targets for greenhouse gas emission reductions (40 percent by 2020, 55 percent by 2030, and 80 to 95 percent by 2050, compared with 1990 levels), the expansion of renewable energy production (increasing to 50 percent of the energy portfolio in 2030 and 80 percent in 2050), and greater energy efficiency (a 50 percent reduction of primary energy consumption by 2050).

Although in the eyes of the nuclear energy opponents, this change was definitely a change for the worse, it has to be noted that in the long run, German energy policy objective stayed the same: the structured termination of the use of nuclear energy. It was still only regarded as a temporary solution, a „bridge technology" to be used until renewable energy has firmly secured itself in the energy market (Glaser 2012, p. 18). But just after one year, the whole nuclear situation was turned upside down by the Fukushima catastrophe to which I will come to in the next chapter.

2.2 France

As I have already put forward, nuclear power has until recent times enjoyed an overwhelming support in France. I have mentioned several reasons for that, like the desire for energy independence, *Corps des Mines* or the fact that the Socialist party in France did not go along with the idea of nuclear phase-out. Still these are only some of the reasons and in this chapter I will try to analyze in more depth the reasons which allowed the French nuclear program to prosper and avoid the controversies which the national nuclear programs brought about in other countries.

It has been put forward that in order to maintain projects with very long lead time (the period of time between the initial phase of a process and the emergence of results), there must exist a set of prerequisites. In case of France two necessary prerequisites can be brought out. Firstly the existence of a state regulated monopoly with the capacity and will to invest large amounts of capital into said projects (Finon, Strapoli 2001). In case of France, that has been the public electric company *Electricité de France* (EDF) which was nationalized after the Second World War to allow the French government „ to overcome the failure by private enterprises to develop major equipment in a co-ordinated way, and to pursue the objectives of industrial and social development" (Finon, Strapoli 2001, p. 183). The size and resources of EDF make the development and construction of large-scale projects (such as building nuclear power plants) possible and allows the engineering of complex equipment suitable for the task (Finon, Strapoli 2001). Secondly it is important to note the „long centralized tradition of public involvement and planning that has little exposure to politics and, as such,

allows planning of very large and long-term industrial programmes to be fulfilled" (Finon, Strapoli 2001, p. 184). In other words, although the executive power over decisions related to nuclear policy belongs to the government, in reality the French nuclear program has been allowed to develop fairly independently from political will.

According to Schneider (2009), another aspect related to the success of French nuclear industry is the fact that worldwide, French nuclear industry has a leading role in terms of nuclear manufacturing and servicing. There is one company in particular whose name can be brought out – AREVA SA. With over 65 000 employees, manufacturing facilities in over 40 countries and sales network in more than 100 countries, this in most part government owned company has the capacity to deal with all aspects of the nuclear supply and service system. In addition, AREVA has a share in large number of companies around the world. The company was created in 2001 with the objective of:

1. to create an industrial group with a world leadership position in its businesses and to streamline its organization, giving the group:
2. complete coverage of every aspect of the nuclear business and a unified strategy with respect to major customers
3. an expanded customer base for all of the group's nuclear products and services
4. The main fields of activity of AREVA are „ uranium mining, conversion, enrichment, fuel fabrication, nuclear island fabrication, maintenance, spent fuel shipment and storage, reprocessing, decommissioning and waste management" (Schneider 2009, p. 19).

In the field of uranium mining, AREVA has shares in uranium mines in Canada, Niger and Kazakhstan and in terms of uranium producing, in 2007, the AREVA corporation held the 3rd place in the world with 6046 tonnes (Schneider 2009, p. 23).
In Canada, AREVA corporation has a 30% share in the McArthur River mine, which is the largest high-grade uranium deposit in the world. In addition to that, AREVA also operates and is a 70% owner of McClean Lake mine. (Schneider 2009)

In Niger, AREVA is a major shareholder in two important mining companies:

Somaïr and Cominak which put together employ about 1800 people. However since there have lately been problems with Tuareg rebels in Northern Niger who demand that some of profits from uranium mining to be handed back to them and who also claim that uranium mining has a negative ecological and unhealthy effect on the area and its population, there is a certain insecurity when it comes to uranium mining in the area, especially since Tuaregs have shown that they are capable of inflicting serious damage if they do attack. After the attack against one of the mines in April 2007, the head of AREVA's uranium mining in Niger indicated that „the attack caused us to stop all our operations for almost a month" (Schneider 2009, p. 25).

In Kazakhstan, AREVA has a 51% share in the mining company Katco which in 2007 produced 871 tonnes of uranium (Schneider 2009). AREVA (AREVA 2013) has claimed that in 2009, the Kazakhstan authorities gave Katco permission to increase its production to 4000 metric tonnes per year since the beginning of 2013.

AREVA is also active in the field of uranium conversion and enrichment. In its reprocessing plant in La Hague, the corporation has been reprocessing a vast amount of spent fuel for decades. Since 2006, AREVA has been forced to send all its reprocessed uranium to be re-enriched in Russia, since the only plant with conversion capacity of reprocessed uranium had been shut. However, due to the problematic nature of the enrichment process of reprocessed fuel, and lack of commercial value, some claim that AREVA is using Russia as a waste disposal site. (Schneider 2009)

Apart from uranium mining and providing services of recycling used fuel, France has also been exporting and providing a total number of eleven nuclear reactors to four different countries: three to Belgium, four to China, two to South Africa and two to South Korea. (Schneider 2009:28)

Despite the apparent success of nuclear energy in France, it can be argued that in light of Fukushima catastrophe in 2011 and the presidential elections of 2012, things are about to change. I will give the details to this argument in the next chapter concerning nuclear policies after the Fukushima catastrophe.

3. French and German nuclear policies after Fukushima

3.1 The catastrophe

The objective of this paragraph is on the one hand to give general idea about the miscalculations in terms of tsunami awareness made by Tokyo Electric Power Company (TEPCO), while constructing and managing the power station on the eastern coast of Japan which has a notable history of tsunamis. On the other hand I will try to draw attention to the imprudence with which Japanese government took concern in the guidelines for tsunami hazards.

On march 11, 2011, a massive tsunami generated by an earthquake with estimated magnitude of 9.0 (Nöggerath, Geller & Gusiakov 2011) hit the Japanese Pacific coast in the Tohoku region. There were altogether five nuclear power stations in the region most affected by the tsunami and of those five, one in particular experienced severe problems due to the flooding caused by the tsunami (Nöggerath, Geller & Gusiakov 2011). The station in question is TEPCO's Fukushima Daiichi (no. 1 in Japanese).

As the tsunami hit the Japanese coast, it flooded the Fukushima power plant and consequently all electricity to the facility was cut. Due to the power cut, the cooling of the nuclear reactors was no longer possible and eventually it led to the meltdown of reactor cores in three reactors (Nakamura, Kikuchi 2011). On the second day of the catastrophe, a hydrogen explosion followed, which exposed the spent fuel pool (a storage pool for spent fuel from nuclear reactor) to the atmosphere, hence releasing the radioactive material to the environment (Funabashi, Kitzawa 2012). Another issue is that due to power loss in the plant, workers were forced to use seawater as a measure for cooling the reactors (Funabashi, Kitzawa 2012) which resulted in „a discharge of large quantity of nuclear substances into the Pacific Ocean over a period of several months" (Sukasam, Nies & Kaiser 2012).

When the building of Fukushima nuclear power station began in 1967, there was relatively little information available both about the dangers tsunamis could pose to such a construction, or what could be the approximate height of the tsunamis attacking that particular area where the construction of the power station was planned (Nöggerath,

Geller, Gusiakov 2011). Originally, the safety measures protecting the power station from tsunamis were designed in the manner that they would protect the power station from tsunamis up to 3.1 meters in height (Nöggerath, Geller & Gusiakov 2011). This decision was based on the observations made during the 1960 tsunami which hit Fukushima (Nöggerath, Geller & Gusiakov 2011). Later, in 2002, the design of the heights were reassessed by a subcommittee of the Japan Society of Civil Engineers and heightened up to 5.7 meters (Nöggerath, Geller & Gusiakov 2011). This was done after considering the Shioyazaki earthquake of 1938 (Nöggerath, Geller & Gusiakov 2011). It is worth to note that the height of the tsunami that hit Japanese coast and Fukushima Daiichi nuclear power station on march 11, 2011, was approximately 14 meters (Funabashi, Kitazawa 2012), so the security measures clearly could not cope with it.

However the constructional shortcomings were not the solely responsible for the catastrophe. According to some researchers: „many human errors were made at Fukushima“ and it was „elaborated on in great detail in the interim report of the Japanese government's Investigation Committee on the Accident at the Fukushima Nuclear Power Stations“ (Funabashi, Kitazawa 2012, p. 5). Probably the one with the most serious consequences was when in the early hours of the catastrophe, a TEPCO worker „misjudged the backup cooling situation at Unit 1“ (Funabashi, Kitazawa 2012, p. 4). Eventually his misjudgment and the fact that he removed an emergency cooling system from service for about 3 hours, led to an explosion in the reactor building which resulted in the exposure of the reactors spent fuel pool to the environment (Funabashi, Kitazawa 2012).

Although the worker's errors played a significant part in the catastrophe, some or even most of their shortcomings were actually due to TEPCO's inadequate and incompetent handling of the situation. Some researchers blame the „problems in TEPCO's management structure and culture“ (Funabashi, Kitazawa 2012, p. 5). One example of that is that neither the chairman, nor the manager of TEPCO, were present at the head office of TEPCO during the most crucial period for dealing with the accident – Friday, March 11 and 10 am on Saturday, March 12 (Funabashi, Kitazawa 2012). According to TEPCO's explanation, company chairman Tsunehisa Katsumata „was traveling in China on a business trip“ and company president Masataka Shimizu „was in Nara, a historical in the western part of Japan, sightseeing with his wife“ when the

disaster happened (Funabashi, Kitazawa 2012, p. 5). As the closure of major transport arteries leading back to Tokyo area prevented Shimizu from arriving back to company headquarters no earlier than „mid-morning on Saturday“ (Funabashi, Kitazawa 2012, p. 5), TEPCO was unable to make any major decisions related to solving the catastrophe. At one point, there also occurred „a heightening of tensions“ between TEPCO headquarters and on-site employees (Funabashi, Kitazawa 2012). This was caused by the fears of Nuclear Safety Commission's officials that „re-criticality“ might occur in the damaged fuel in the Unit 1 reactor if workers continue to inject seawater into Unit 1 in order to cool it. These fears were transmitted by TEPCO president Shimitzu to the Fukushima power plant's director Yoshida, who was consequently ordered to avoid further injections „until the government decided on a course of action“ (Funabashi, Kitazawa 2012, p. 10). Although director Yoshida openly agreed to do that, he secretly ordered the cooling to continue, which eventually proved to be right decision (Funabashi, Kitazawa 2012).

One can also find some shortcomings on the government's behalf in dealing with the unexpected catastrophe. An excellent example of that were the nuclear emergency response headquarters or off-cite centers, which were originally „planned to be the base to cope with nuclear disasters“ (Funabashi, Kitazawa 2012, p. 6). In reality these centers were not working during the catastrophe because the roads were blocked and there was no electricity. In addition to that, the centers were not even equipped with some basic protection equipment, for example air-purifying filters (Funabashi, Kitazawa 2012). It can also be mentioned that SPEEDI (System for Protection of Environmental Emergency Dose Information) system which was developed to help to „provide forecasts for the diffusion of radioactive materials during a nuclear event“ (Funabashi, Kitazawa 2012, p. 6). During the crisis, the SPEEDI data was deemed unreliable and it was not provided to the top leaders until March 23 (Funabashi, Kitazawa 2012).

According to some researchers, an important reason for the inadequate handling of the situation was the myth about the „absolute safety“ of the nuclear power which was widespread before the Fukushima catastrophe. It is said that the public opinion that nuclear energy is absolutely safety was needed to get over the strong negative sentiments towards nuclear energy created by the memory of atomic bombings of Hiroshima and Nagasaki (Funabashi, Kitazawa 2012). However, the myth of „absolute safety“ was not some kind of lie the nuclear advocates advertised knowingly, but rather

it was something everyone believed in. Still it can be said, that the kind of certainty hindered the decisive action during the crisis. For example, the TEPCO's abnormal operating procedures manual did not have a part about the prolonged, total power loss at a nuclear plant. Which is exactly what happened. As it was put by some researchers: „when on-site workers referred to the severe accident manual, the answers they were looking for simply were not there" (Funabashi, Kitazawa 2012, p. 5), in addition ,the workers lacked both training and instructions. One can also point finger at the government safety authorities - NISA (Nuclear and Industrial Safety Agency) and NSC (Nuclear Safety Commission), whose guidelines suggested that: „the potential for an extended station blackout need not be considered, as it is reasonable to expect that transmission lines will be restored or emergency power systems repaired quickly" (Funabashi, Kitazawa 2012, p. 4).

3.2 The effects of Fukushima on German nuclear energy politics

For Germany (and in fact for the whole world), the Fukushima catastrophe signified an end to an almost 25 year long period without catastrophic accidents in nuclear energy domain. Furthermore it was a wake-up call for those who had started to believe in „ the viability of a large-scale global nuclear expansion or renaissance" (Glaser 2011, p. 27).

In political context, the catastrophe happened at an awkward moment. Only about a year had passed since the moment when the new coalition government had decided to prolong the lifetime of existing reactors while yet maintaining the course of eventual phase-out. In some sense, the decision could be seen as a compromise that was meant to keep the utilities happy while preventing a large-scale public turmoil (Glaser 2012). In the aftermath of the catastrophe, that kind of compromise was no longer possible.

Already when the disaster was still unfolding, German Chancellor Angela Merkel issued a three-month moratorium on the nuclear power extension plan, as well as a safety check of all power plants of which the seven oldest were to be shut down for the duration of the moratorium (Schreurs 2012). The report on the safety standards of German nuclear facilities safety standards was delivered in may 2011 and it concluded

that there were indeed lackings in the safety standards of the seven oldest power plants, one of those was for example the inability to withstand a jetliner crash (Schreurs 2012). Another report, produced by the Ethics Commission for a Safe Energy Supply, put together by Chancellor Merkel with the purpose of producing „ a report on the ethical dimensions of energy use", stated that „there are many ethical dilemmas associated with nuclear energy, including those related to the release of radioactivity in major accidents and the problems of nuclear waste storage", the report also supported a change towards more renewable oriented energy mix and claimed that other, more safe, low-carbon forms of energy could be used (Schreurs 2012, p. 37). As a result of these reports, in july 2011 the *Bundestag* passed a law that required the shut-down of 8 nuclear reactors (one was already shut down prior to Fukushima) and a complete shut-down of remaining nuclear plants by 2022 (Schreurs 2012). It is worth to note that the phase-out course adopted in 2011 was not very different from the one adopted in 2002. The original phase-out schedule was only accelerated by two or three years (Matthes 2012). So in that sense, the new agenda did not come unexpected for utilities, who had a better part of the decade to prepare themselves for coming. This was probably one of the reasons why the consensus for phase-out, which was overwhelming in public and even reached across political spectrum, also gained ground among parts of the industry (Glaser 2012). In can be further concluded that the original phase-out plan was probably the reason which allowed the German government to have such a quick and decisive reaction to Fukushima. Here, one can not look past the significance of renewable energy in Germany's energy transition.

As I have already pointed out, one of the major challenges attached to its energy policy that Germany was and still is facing, is reducing its greenhouse gas emissions. For an important economic power like Germany, it is essential that the reduction would not come at the cost of economic growth and in that sense, the German energy policy has been a success. Between 1990 and 2011, Germany's carbon-dioxide emissions dropped from 1042 million tons per year to about 800 million tons per year (Metz 2012, p. 25). In the same time period, Germany's gross domestic product (GDP) increased from 1800 billion euros to 2440 billion euros, so in fact a reduction of about 23 percent in terms of carbon-dioxide production was matched with a rise of 36 percent in terms of GDP (Metz 2012, p. 25). In terms of total primary energy use, the share of nuclear power has made a small decline from 11.2 percent in 1990 to 8.8 percent in 2011, while

the use of renewables has made a big jump from 1.3 percent in 1990 to 11 percent in 2011 (Metz 2012, p. 26).

The fact that Germany was already clearly on a path to phase-out and the important question was not *if?* but rather *when?* linked with the vigorous development and rising popularity of renewable energy allowed Germany to be flexible if any sudden challenges should arise (Glaser 2012). Although the phase-out has its costs, both economic and social, Germany has decided to carry on with its „death warrant" on nuclear power (Davies 2011, p. 1951).

3.3 The effects of Fukushima on French nuclear energy politics

In comparison to German reaction to Fukushima, France took a more vague and indefinite stand towards the future of nuclear energy. Although in his electional campaign, president Hollande promised to reduce the share of nuclear power in the energy mix from about 75 percent to 50 percent by 2025 (Schneider 2013, p. 28), there is still no clear political consensus in the matter as it still stands undecided (Faro 2013).

When it comes to public opinion, it is increasingly evident that the majority supports a nuclear phase-out. Different opinion polls conducted after the Fukushima disaster indicate that up to 77 percent of population supports the idea (Schneider 2013, p. 30). According to a survey conducted by the French polling firm IFOP, the percentage of people who supported a gradual phase-out scheme over 25 to 30 years, increased from 51 percent to 62 percent between march and June 2011 (Schneider 2013, p. 30). In the same time span, the percentage of people who supported a rapid phase-out plan increased from 15 percent to 19 percent and the percentage of people who supported the continuation of the existing program declined from 30 percent to 22 percent (Schneider 2013, p. 30).

It is much more difficult to convince energy utilities of the benefits of leaving nuclear, mainly because they claim that considering the economics, a phase-out is too costly. A study was published by the French Union of Electric Companies (UFE), which concluded that if the nuclear power's share in the electricity mix is reduced to 20 percent by 2030, instead of keeping its share at 70 percent, it would cost France 112

billion euros in extra investments (Schneider 2013, p. 19). Another scenario, put forward by Areva, claimed that complete nuclear phase-out would have a price of 350 billion euros (again, compared to maintaining the present electricity mix) (Schneider 2013). It was also claimed by Henri Proglio, the chief executive officer of EDF, that French nuclear phase-out would come at the cost of 1 million lost jobs (Schneider 2013). These sinister predictions came together with outcries by other proponents of nuclear energy who advocated the low electricity prices and shunned the potential price increases and rise on greenhouse gas emissions linked to nuclear phase-out (Schneider 2013).

It is evident that in the case of phase-out, initially there would be some extra investments needed to cope with the new situation. However, it has been put forward that when leaving nuclear behind, France would (have to) commence aggressive energy efficiency programs linked with heavy investments in alternative energy sources as was the case in Germany (Schneider 2013). When it comes to low electricity prices, it is worth to note that the calculations provided by government and EDF are in fact quite different from those provided by the Court of Accounts. For example in the case of Flamanville reactor, the government initially projected its electricity generating costs to be at 28 euros per megawatt- hour (Schneider 2013). This calculation was also used to justify its building (Schneider 2013). In its own projections released in 2012, the Court of Accounts projected the reactors electricity generating costs to be at 70 to 90 euros per megawatt-hour, which is up to three time as much (Schneider 2013). In another estimation, the Court of Accounts found that instead of levelized cost of electricity generating for existing nuclear plants (meaning that the electricity price is at the level needed to break even with the investment cost over the lifetime of the project), which would be 33.4 euros per megawatt-hour, the actual cost was at 49.5 euros per megawatt-hour, which could rise up to 54.2 euros after going through with the improvements mandated after the Fukushima catastrophe (Schneider 2013).

The resentment of large utilities towards the idea of nuclear phase-out was countered by a group of independent experts called the négaWatt who put together its own scenario which describes how a switch from fossil fuels and nuclear energy to efficient use of energy and renewables is achievable in France (Schneider 2013). The scenario strives to find a balance between „energy, safety and industrial constraints" (Schneider 2013,p. 23) and its aim is to complete a gradual nuclear phase-out in France

by 2033 with the longer term objective of developing an energy system that by 2050 would use just above one-third of present day's primary energy and where the share of renewable energy would be as high as 90 percent (Schneider 2013). Nevertheless, the négaWatt's scenario has little to none chance of succeeding if the current political stand towards nuclear energy will not change.

The support for nuclear energy on political level is high. Both main governing parties – *Union pour un Mouvement Populaire*, the conservative opposition party and the governing Socialist Party led by president Hollande – are known to be firm supporters of nuclear energy (Faro 2013). Yet it has been pointed out that already the fact that there is a debate over the question indicates that the unopposed reign of nuclear energy in France could soon be over (Schneider 2013).

Conclusion

The thesis at hand uses the concept of path dependence linked to historical institutionalism to analyze the discrepancies in French and German civil nuclear policies both before and after the Fukushima catastrophe.

An analysis considering the pre-Fukushima developments of civil nuclear policies of the two countries in question is offered, in which a set of characteristics, put forward by W. Brian Artur, which are supported by the four causes of path dependency, put forward by Scott E. Page, are used to conceptualize the path dependent nature of French and German civil nuclear policies. It is followed by an overview of the Fukushima catastrophe with the main emphasis on the shortcomings in preparing for and handling of the catastrophe, whereas the final part of thesis deals with the changes in French and German civil nuclear policies after the catastrophe.

It was found that although the development of civil nuclear policies in both countries can indeed be defined as being path dependent, the nature of said policies turned out to be quite different. Amongst others, three major reasons can be brought to explain these differences:

1. Firstly the effect of the Chernobyl catastrophe was different in these two countries. In Germany, it caused one of the major parties - the German Socialist

Party - to change from pro-nuclear to pro nuclear phase-out. In France, Chernobyl catastrophe was considered to have happened due to inferior safety and engineering standards in Soviet Union and therefore it was not thought to be possible in France. Hence the political support for nuclear phase-out in France stayed very low.

2. Secondly there is a difference in decision making processes over nuclear policies. It has become evident that the *Corps des Mines*, technocratic elite controlling most major posts regarding nuclear policy, is at least in part responsible for the prevailing pro-nuclear attitudes in France. The lack of this kind of element in Germany has made the progress of the idea of phase-out much more easier.

3. Thirdly the existing state regulated monopoly – EDF – and long centralized tradition of public works, coupled with the objective of accomplishing energy independence, provided France with a set of perquisites and political will for developing costly long-term projects such as building nuclear power plants.

The analysis of French and German civil nuclear policies after the catastrophe leads to an assumption that the Fukushima catastrophe did have an effect on both countries. However that effect was considerably stronger in Germany where an overall consensus, covering the public, political spectrum and industry, was achieved, that further accelerated the already planned phase-out. In France, the effects of Fukushima are somewhat less clear. Although President Hollande has promised to reduce the share of nuclear energy, no certain steps have been yet taken and due to the reasons mentioned beforehand, it is doubtful that France would be leaving the nuclear power behind anytime soon.

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Kokkuvõte: Võrdlev analüüs Fukushima katastroofi mõjudest ELi liikmesriikide tuumaenergia poliitikale Prantsusmaa ja Saksamaa näitel

Antud bakalaureusetöö analüüsib Fukushima katastroofi mõjusid Prantsusmaa ja Saksamaa tuumaenergia poliitikale. Kasutades ajaloolise institutsionalismiga seotud rajasõltuvuse ideed, püüab antud töö tõestada hüpoteesi, et tulenevalt erinevustest poliitilistes eesmärkides (näiteks energisõltumatus Prantsusmaa puhul) ja valimistulemustes (näiteks Rohelise Partei edu Saksamaal), oli kahe riigi reageering Fukushima katastroofile väga erinev.

Töö teoreetilise poole üldosa annab ülevaate rajasõltuvuse ideest ning selle tagajärgedest. Lisaks kirjeldatakse ajaloolise institutsionalismi olemust ning tuuakse välja sarnasused ja erinevused institutsionalismi teooria teiste alaliikidega. Teoreetilise osa teine pool püüab siduda Prantsusmaa ja Saksamaa ajaloolisi arenguid tuumaenergia valdkonnas rajasõltuvuse ideega, kasutades selleks W. Brian Arthuri poolt välja toodud nelja iseloomustavat omadust ning Scott Page'i poolt välja toodud nelja rajasõltuvuse tagajärge.

Töö empiirilises pooles tuuakse esmalt välja Prantsusmaa ja Saksamaa tuumenergia pollitika areng enne perioodil enne Fukushima katastroofi, lisaks antakse ülevaade erinevatest teguritest, mis on antud arenguid mõjutanud. Empiirilise osa teises pooles antakse kõigepealt ülevaade Fukushima katastroofist, sealhulgas sellele põhjustest, millele järgneb analüüs katastroofi mõjudest Prantsusmaa ja Saksamaa tuumaenergia poliitikale. Analüüsi tulemusel selgub, et tulenevalt erinevatest eesmärkidest ning arengutest tuumaenergia valdkonnas, on Fukushima mõjud Prantsusmaale ja Saksamaale erinevad. Üldiselt selgus, et kui Saksamaa puhul tõi

Fukushima kaasa kava loobuda tuumaenergia kasutamisest hiljemalt aastaks 2022, siis Prantsusmaa puhul ei ole mõju hoopiski nii selge ja mingeid kindlaid otsuseid vastu võetud ei ole, samas võib ka Fukushima mõjul alanud diskussiooni tuumaenergia üle lugeda üsna oluliseks kuna varasemalt selline diskussioon puudus. Täpsemalt erinevusteks välja tuua kolm peamist põhjust:

- Tšernobõli katastroofi erinev mõju Prantsusmaal ja Saksamaal. Nimelt leiti Prantsusmaal, et katastroof tulenes pigem Nõukogude Liidus ehitatud tuumareaktorite nõrgemast turvalisuse astmest ning üldistest tehnoloogilistest puudujääkidest. Saksamaal seevastu tõi Tšernobõl kaasa Sotsialistide Partei muutumise tuumaenergia kasutamise vastaseks.

- Kahes riigis on tuumaenergiat puudutavad tähtsamad otsused tehtud erinevalt. Prantsusmaal eksisteerib elitaarne tehnokraatide grupp – *Corps des Mines*, mille liikmed asuvad paljudel tuumaenergiaga seotud tähtsamatel ametikohtadel ning omavad suurt mõjuvõimu. Saksamaal on huvigruppide mõju tunduvalt väiksem.

- Tuumaenergia kasutamist soodustav keskkond erineb riigiti. Prantsusmaal on keskkond soodsam kuna ühelt poolt on olemas üks riiklik monopol – EDF ning teisalt eksisteerib tsentraliseeritud ühiskondlike tööde tava koos poliitilise sooviga saavutada energiasõltumatus.