

American University of Central Asia

European Studies

Implications of nuclear power orientation of France and Germany on EU energy policy

By

Sanora Abidkhozhayeva

Supervisor: Jean-Baptiste Jault

*A thesis submitted to the European Studies of American University of Central Asia in partial*

*fulfillment of the requirements for the degree of Bachelor of Arts*

April, 2014

Bishkek, Kyrgyzstan

## **Acknowledgement**

I would like to thank my family and friends for supporting me during the past four years it has taken me to graduate. I would also like to thank Mr. Jean-Baptiste Jault and Mr. Alexander Wolters for their help and for their direction with this senior thesis. Last but not least, I would like to thank the professors and staff of the European Studies Department for their advice and support throughout the whole process of working on this paper.

## **Abstract**

This senior thesis deals the difference of energy policies in France and Germany, in particular regarding the nuclear energy orientation and its influence on the European energy policy. The problematic of this thesis is that France and Germany being the biggest and the most influential countries in the European Union, have different energy policies. France being hardly dependent on nuclear energy continues to develop it, while Germany after the Fukushima catastrophe in 2011 accelerated the phase-out of nuclear power plants. This difference could affect the EU, which since recent got more power in European energy sector and energy orientation difference of France and Germany could create a problem for the further EU energy policy integration. This paper is aimed to study how different nuclear energy policies of France and Germany could affect the European energy policy. To find out that the paper researches the historical background of the energy policy of France and Germany since the 1950s that formed the current nuclear energy situation in these countries. Also the paper covers the development of European energy policy integration to understand the importance of this sector for the EU. Further, to understand the current energy situation in France and Germany the paper covers and does a comparative analysis of five main factors that influence the current energy policies of France and Germany, those are national government position, public opinion, energy companies' influence, budget issue and EU actions and plans. The part on national government position tries to analyze what are the current perspectives of French and German administration for the further energy development; the part on the public opinion is aimed to find out what is the position if society, because it also defines the government's choice when deciding the nuclear energy orientation; the part on nuclear energy companies influence is oriented to cover what role do such companies as EDF in France and E.On in Germany play in the state's energy policy choice; the budget part tries to analyze to which extend do the monetary issues such as cost of energy policy changes contribute to the current energy policy of both states; and finally the part on the EU analyzes what role play EU plans and actions in French and German energy choice. The analysis gives a picture of whom and what form state's energy policy what explains the further actions of French and German governments in the sphere of their national energy policy and therefore its

implication on European energy policy. The final part of research concludes that the current situation of all of the five factors that influence French and German nuclear energy policy, France and Germany will collaborate in the sphere of renewable energy sources (RES) and will promote it through the EU institutions to other member states (MSs) and the European energy policy in particular.

## **Le résumé**

Cette thèse supérieure traite la différence des politiques énergétiques en France et en Allemagne, en particulier en ce qui concerne l'orientation de l'énergie nucléaire et son influence sur la politique énergétique européenne. La problématique de cette thèse pointe la divergence des politiques énergétiques de la France et de l'Allemagne alors même qu'ils sont les pays les plus influents et les plus grands de l'Union européenne. La France est peu dépendante de l'énergie nucléaire mais tend à développer ce secteur, tandis que l'Allemagne depuis la catastrophe de Fukushima en 2011 a accéléré la réduction des centrales nucléaires. Ces deux voies divergentes pourraient affecter l'Union européenne, qui, a récemment obtenu d'avantage de puissance dans le secteur européen de l'énergie. Ainsi la différence d'orientation énergétique de la France et de l'Allemagne pourrait poser problème pour la poursuite de l'intégration de la politique énergétique de l'UE. Ce travail vise à étudier comment les différentes politiques énergétiques nucléaires de la France et de l'Allemagne pourraient affecter la politique énergétique européenne. Une mise en contexte historique de la politique énergétique de la France et de l'Allemagne depuis les années 1950 est donc nécessaire afin de mieux comprendre la situation de l'énergie nucléaire actuelle dans ces pays. Aussi cette étude porte sur le développement de l'intégration de la politique européenne de l'énergie et vise à comprendre l'importance de ce secteur pour l'UE. En outre, pour comprendre la situation actuelle de l'énergie en France et en Allemagne, cette étude fait une analyse comparative des cinq principaux facteurs qui influent sur les politiques énergétiques actuelles de la France et de l'Allemagne, à savoir la position nationale, l'opinion publique, l'influence des compagnies énergétiques, le budget en question et enfin les actions et les projets de l'UE. Une partie développe la position des gouvernements nationaux en tentant d'analyser quelles sont les perspectives actuelles des administrations françaises et allemandes

pour le développement de l'énergie. Ensuite, une partie est consacrée à l'opinion publique de façon à comprendre la position de la société. En effet, cette dernière influe également sur le choix du gouvernement au moment de la prise de décision concernant l'orientation de l'énergie nucléaire. La partie sur les sociétés d'énergie nucléaires est orientée sur l'influence et le rôle que jouent des entreprises telles que EDF en France et E.ON en Allemagne sur l'orientation de la politique énergétique de l'Etat. La partie sur le budget permet d'analyser les questions d'ordre monétaires tels que le coût des changements de politique de l'énergie et de rendre compte de la contribution financière à la politique énergétique actuelle des deux Etats. Enfin la partie sur l'UE analyse le rôle de l'UE et ses champs d'actions sur le choix de l'énergie français et allemand. Cette analyse permet de rendre compte des acteurs de la politique énergétique, en expliquant les différentes mesures des gouvernements français et allemand dans le cadre de leur politique nationale de l'énergie et leurs implications sur la politique énergétique européenne. Une dernière partie permet de conclure sur la situation actuelle en mettant en perspective l'ensemble des cinq facteurs qui influencent la politique de l'énergie nucléaire française et allemande. La France et l'Allemagne vont collaborer dans le domaine des sources d'énergie renouvelables (SER) et promouvoir ce secteur à travers les institutions de l'UE à d'autres Etats membres (EM) et la politique européenne de l'énergie en particulier.

## Table of contents:

Introduction.....	1
Chapter I	
1) Literature review.....	4
2) Historical background.....	7
3) Theoretical framework.....	11
4) Methodology.....	12
Chapter II	
1) Government position.....	14
2) Public opinion.....	17
3) Energy companies' interest.....	21
4) Budget issue.....	23
5) EU influence.....	26
Conclusion.....	28
Bibliography.....	30

## **List of abbreviations**

1. CAS - Center of Strategic Analysis
2. EU – European Union
3. Euratom – European Atomic Energy Community
4. ECSC – European Coal and Steel Community
5. GHG - Greenhouse gas emissions
6. IAEA – International Atomic Energy Agency
7. MS – Member state
8. NPP – Nuclear power plants
9. PPI - Pluri-annual Investment Plan
10. RES - Renewable energy sources

## Introduction

Nowadays France is one of the most nuclear dependent countries of the EU; according to International Atomic Energy Agency (IAEA) in 2012 the nuclear share of electricity generation in France was 74, 8 %<sup>1</sup>. France actively develops its nuclear power production from the 1970s, and it has increased its make of electricity from nuclear energy between 1990 and 2012 on 37 %<sup>2</sup> and is not going to give up on this type of energy in the near future. The neighbor country of France, Germany that was also developing nuclear energy in 1970s, in contrast did not become as dependent on this type of energy as France does. In 2011 after the Fukushima catastrophe the German government has announced that within ten years it is planning to totally abandon nuclear power usage and to close all the NPPs on its territory. To recover the 23% of the energy demand in 2011<sup>3</sup> that was overlaid by nuclear Germany plans to do a transition to Renewable Energy Sources (RES) within 11 years. Soon after its announcement of changing of its energy policy to renewables in 2011 German government has closed 8 of its 17 NPPs, while 9 others will be completely put out of action by 2022<sup>4</sup>.

At the same time with branching of nuclear energy orientations of France and Germany, in the last decade the EU has actively reinforced its actions in the environmental sphere, especially in the issue of greenhouse gas emission that highly affect the world's climate change. In 2009 the European Council adopted a European Energy 2020 Strategy that includes climate and energy change package objectives that are laying in decrease of greenhouse gas emissions (GHG), increase in usage of RES and improvement in energy efficiency by 2020. For realization of this ambiguous project EU needs maximally decrease its energy use and partially switch to the alternative sources of energy rather than gas, oil and coal that are in high use in EU Member States (MS) today. Implementation of Energy project demands a high budget input that not all countries can afford. The most efficient outcome in

---

<sup>1</sup> "Nuclear share of electricity generation in 2013," PRIS, 26 Apr. 2014. 13 Nov, 2013. <<http://www.iaea.org/pris/WorldStatistics/NuclearShareofElectricityGeneration.aspx>>.

<sup>2</sup> Paul Bolton, "Nuclear Energy Statistics," (2013): 7, UK Parliament, 9 Sept. 22 Oct. 2013. <[www.parliament.uk%2F...%2Fsn03631.pdf%E2%80%8E](http://www.parliament.uk%2F...%2Fsn03631.pdf%E2%80%8E)>.

<sup>3</sup> Miranda A. Schreurs, "The politics of phase-out," *Bulletin of the Atomic Scientists* (2012): 32, EBSCOhost,, AUCA Lib., Kyrgyzstan, 22 Oct. 2013. < <http://ldb.auca.kg:2688/ehost/pdfviewer/pdfviewer?sid=ab25cf11-db09-467a-b3a4-73bff6ad9128%40sessionmgr4004&vid=1&hid=4204>>.

<sup>4</sup> "Energy Policies of IEA countries: Germany," (France: IEA Publications, 2013) 171.



this situation is coordination of MS energy policies in a common EU policy, so that way the EU could have progress in the integration of MS' energy policies that was going hardly before. And after almost 60 years since the first European unification in 1951 the Lisbon Treaty of 2009 fixed and regulated the right of EU on the legislative level to have energy sphere being in “shared competence between the Union and the Member States.”<sup>5</sup>. The article 176 A of the Lisbon Treaty article regulates energy issues in the EU and it covers such aspects as to ensure the functioning of the energy market; ensure security of energy supply in the Union; to promote energy efficiency and energy saving and the development of new and renewable forms of energy; and to promote the interconnection of energy networks<sup>6</sup>. This legislation gives more “instruments” to EU for forcing MSs to coordinate their energy policies into a one common system. However, here the problem in opposition of energy policies of two France and Germany appears. On one side is Germany that plans in less than ten years totally give up with the usage of nuclear power and transfer towards renewables, while on the other hand is France that emphasizes economic and energetic importance of nuclear power. With this new legislation, when the EU can force MSs to fulfil its objectives and requirements, for France and Germany it would be favorably to promote their national energy program to the other states, what is for France to promote nuclear energy development and for Germany the RES. This way it would be better for France and Germany to flow into European common energy because it would be easier to develop its main components – energy market, energy networks and security of supply of energy. So, opposition of French and German energy policies could create some troubles for the future of European integration, particularly in the sphere of EU energy policy that is sic not highly supported.

This paper is aimed to explore how the difference in energy policies of France and Germany could affect the EU energy policy. I will try to analyze whether “individuality” in energy issue of France and Germany as leading MSs of union gives positive or negative effect for further European energetic integration. To answer this question I will firstly revise the historical background of development of nuclear energy in France and Germany because it shows the trends in the nuclear

---

<sup>5</sup> “Official Journal of the European Union,” European Central Bank, (2007): Article 2 C, 21 Oct. 2013. <[https://www.ecb.europa.eu/ecb/legal/pdf/en\\_lisbon\\_treaty.pdf](https://www.ecb.europa.eu/ecb/legal/pdf/en_lisbon_treaty.pdf)>.

<sup>6</sup> Ibid. Article 176 A.

energy development in both states. The second part of the research is aimed to analyze the main factors that influence French and German energy policies that in results could affect the EU energy policy. In the conclusion I will try to answer the research question and foresee the further development of EU energy policy.

## Chapter I

### Literature Review

This literature review is an analytical summary that is aimed to discuss European energy policy strategy and to provide different approaches of scholars on current changes and developments in energy policies of France and Germany. Throughout studying these materials I will try to define the frameworks of this paper in order to learn what has been done regarding the influence of France and Germany on EU energy policy.

The origins of current EU go back to 1950s when energy sources, firstly in the form of steel and coal and later due to economic reasons it was replaced by nuclear power, were seen as a field of European integration. Today energy plays not a less important role in the EU, however it is not limited only by nuclear energy but includes all the specter of energy mixes and even some efforts to coordinate the different energy systems of MSs. The most successful attempts regarding EU energy policy were done after the Lisbon Treaty. Three key points regulate European energy policy nowadays: competitiveness, security of supply and sustainability<sup>7</sup>. EU Commissioner for Energy Günther Oettinger called at ACER conference in Ljubljana for “creation of an EU-wide energy market” through compromises or even “giving up some established national practices in favor of European-wide solutions” but that would bring “the uncontested benefits of the harmonization project”. However, Dr. Andreas Grimmel in his article on difficulties of negotiations on a joint European energy the regulation law established by the Lisbon Treaty argues about non-realistic blueprints of EU on unilateral solution of European energy plan. As arguments Grimmel brings “divergence of political realm” including societal perception of energy policies of MSs as well as the difference in energy policies that has all 28 of them. Moreover, Grimmel impugns ability of EU to invest into the energy transition project. For the next decade European Commission estimates this project in approximately around 500 billion Euros, 200 million of which is for transmission networks

---

<sup>7</sup> Official Journal of the European Union,” Council of the European Union, (2012): Article 194, 21 Oct. 2013. < <http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%206655%202008%20REV%207> >.

alone<sup>8</sup> and during the economic unstable times it seems to be hardly possible; also Grimmel puts under doubt whether the developed energy plan could be implemented properly as well as EU energy plans could contradict with individual state's RES implementation blueprints.

Rahul Sastry and Bennett Siegel in their work "The French connection: comparing French and American civilian nuclear energy programs" discuss the French nuclear program. Comparing French and American nuclear programs authors come to a conclusion that France presents an example of a successful, safe and competitive national energy program. As a main feature of French success Sastry and Siegel point out the "streamlined organization" that brought relatively low money expenses and fast speed NPPs constructions.

Nevertheless, Mycle Schneider, French nuclear energy consultant argues that EDF (a state-owned industrial and commercial entity) as well as Areva (French industrial group that specializes in nuclear energy) are manipulating the facts and give unreasonable predictions on consequences of decrease of nuclear energy share in France, hide the real expenses on generation and service of nuclear energy. Mycle Schneider (2013) describes French nuclear program as a totally inefficient and expensive. Yves Marignac, a French consultant on energy questions shares opinion of Mycle Schneider about little even not any profitability of nuclear energy in France. Yves Marignac criticizes the decision on establishment of French nuclear energy program for being biased, while the affirmation of government that grace to nuclear energy France got energy independence as a wrongful and based on controversial choice to calculate the energy independence. According to Yves Marignac, France loses two thirds of its primary energy generated by NPPs in the atmosphere, what means it is just burns in the atmosphere and not used by people that is produced in vain. Both Yves Marignac and Mycle Schneider confident that only tracking example of Germany and transiting to RES would bring French energy policy efficiency, stabilize French electricity consumption and give energetic safety.

German government after the catastrophe on Japan's NPP Fukushima in 2011 adopted the law on the closure of all nuclear energy plants by 2022, while the gap from almost 25 % of electricity that

---

<sup>8</sup> Julia Black, European Union energy regulation, in OECD, International Regulatory Co-operation: Case Studies, (OECD Publishing, 2013) 40.

was generated by nuclear energy would be displaced by RES. This decision was ambiguously accepted by the world, however most of German population accepted this announce positively. Kersten et al. in their work "Europe after Fukushima. German perspectives on the future of nuclear power" argues that decision on nuclear phase-out was a logical final step of non-favorable source of energy in Germany, while Fukushima catastrophe just became a "nail in the coffin" that accelerated the process of phasing-out. As arguments in opposition to nuclear, authors bring the facts that nuclear energy was unpopular, economic disastrous and unsafe source of energy, while RES is a worthy replacement of nuclear energy. Nevertheless, not all scientists are so optimistic and support such a sharp switch of Germany towards the renewables and refuse from the nuclear power. Joachim Bitterlich (2013) in his article in Schuman Report criticizes the renewable politics of Germany. As an example he gives the limitations of grid infrastructure that is needed in order to transport renewable energy from one region to another. Chopin and Foucher support this idea and affirm that Germany faces a problem in this sphere as for utilizing of renewable energies it has to build 2800 km of new energy lines and 2900 km have to be reinforced, while for now only 1/10 part of the job is done. Moreover, Joachim Bitterlich argues on German energy overproduction, especially wind power (that is concentrated in the north of the country and for now cannot be transported to the south of Germany), thus Germany exports it to the neighbors as Belgium and the Netherlands. The problem is that German government gives big subsidies for renewables energy development, thus Belgium and the Netherlands do not have other choice as to import cheap energy from Germany, while their national producers are put into stagnation. Bitterlich is not the only one who put German "Energiewende" (Energy transition) under the doubts. Angelika Matveeva (2008) analyzing the newly-discussed policy mentions that many scientists specializing in energy attack renewables for being as unreliable, unchecked and expensive source of energy. Moreover, renewables could not be permanently available as they depend on sun, wind etc., therefore some energy conservation has to be kept. However, all the authors as positive sights of renewables point out the energy efficiency, stimulating of economy by job-places creation, support of EU as well as societal support. And while

all the authors emphasize influence of Fukushima Daiichi accident of 2011 as a turning point in energy policy of Germany, the transition to renewables was planned much earlier.

Literature review presented above is a summary of “inhomogeneous” relationship of scholars towards EU energy policy, which from 2007 became more powerful over the energy policies of EU MSs, but that according to article 194 (2) of Consolidated version of the treaty on the functioning of the EU “shall not affect a Member State’s right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply.”

Taking into consideration all of the above, my hypothesis is that as MSs are sovereign, France and Germany cannot “force” other countries to support their own national energy positions. Then it means that they will do it indirectly through the EU institutions, because as since the Lisbon treaty the EU has a shared competence with states in energy issues it; therefore the EU can influence MSs to do some changes in their energy policies by giving them energy objectives (e.g. 20-20-20) that countries are obliged to fulfil. And as France and Germany have the biggest population in the EU and therefore have more power in the European Parliament and in the Council, each of them will try to promote its own energy position, what is for France the development of nuclear energy while for Germany opposition to nuclear and rather promotion of renewable energy. And as their nuclear orientations are different, then these circumstances will oppose to the further integration process of European energy policy.

### **Historical Background**

This chapter gives an overview of development of nuclear energy in France and Germany, and the recent decisions in French and German governments regarding this type of energy.

After the WWII France had aggravated political and economic position on the international arena and the French government had chosen the nuclear path as a key to French success. The main reason for that was the fact that in the formatted bi-polar world having of nuclear power meant economic and technological superiority, as well as a “gesture” of power possession. The civil nuclear

program of France has started in the 1970s with the first oil shock and later the beginning of big economic crisis. The oil embargo by Organization of Arab Petroleum Exporting Countries quadrupled oil prices what reminded many European countries about their dependency on energy imports. In response to that French government started massively input nuclear energy considering it as an alternative solution to get rid of its energetic dependence. Nuclear energy was positively accepted and French government did not find any firm opposition from the public regarding this issue. This is was due to some facts; firstly because of the oil crisis and further economic difficulties, while the introduction of new technologies could bring staid changes and French government was strongly promoting the nuclear energy through the mass media showing nuclear as the only option for France to improve live standards<sup>9</sup>. Secondly, the change of energy policy was an administrative decision of the executive branch and “relevant publicly owned entities, EDF and CEA”<sup>10</sup> and was not discussed by parliament. Thus, French government took the whole process of nuclear energy production into their hands, not discussing their decisions with public or in parliament. The new energy policy had to contribute not only to ensure French energy independence, but also to create more job places and to fight the economic recession. Moreover, in the middle of 1980s France faced with air-pollution problem as a result of coal-fired power plants utilization, what gave one more arguments for nuclear energy as it is regarded to be a “clean” source of energy<sup>11</sup>.

In 20 years 58 NPPs with total capacity of over 63 GWe were constructed in France. The nuclear energy policy was not changing as the Vth Republic presidents were “preserving” this policy as the “core” of French energetic independence and cheap energy source. However, the current president of France Francois Hollande in his election program mentioned that plans to decrease French dependency on nuclear energy starting with closure of the French oldest NPP Fessenheim. Further, Francois Hollande puts as a target to decrease the share of nuclear energy in the mix from 75 to 50 % by 2025. As Mr Hollande said on the pre-election debates with Nicolas Sarkozy, his proposal on changes in energy policy lays in keeping the nuclear power as the principal source of electricity,

---

<sup>9</sup> Rahul Sastry and Siegel Bennett, “The French Connection: Comparing French and American Civilian Nuclear Energy Programs,” (Stanford Journal of International Relations, 2010) 18.

<sup>10</sup> Ibid.

<sup>11</sup> Yuka Fukushima, “Implication of the determinant of energy policy: The case study of Nuclear power in Germany and France,” (2011) 13.

however to decrease its share in order to stimulate the development of renewable sources of energy. Therefore, major changes in long-lasting and seemed to be immutable energy policy of France are foreshadowing in the near future. However, the nuclear energy still stays as the major “energy giver” of France with almost  $\frac{3}{4}$  of the electricity market share of France and therefore, France cannot in a short period of time give up on it.

West Germany the same as many other Western states started its nuclear technology yet in the 1950s. After two defeats in two world wars provoked by Germany less than in 40 years, Germany was still under suspicion and was seeking for a rehabilitation of its status on the international arena. The development of nuclear power was a great opportunity for Germany to “re-conquer” the world stage by the peaceful atom and show their peaceful scientific intentions. Germany as all the other Western countries “blackmailed by the all-powerful cartel of oil producers”<sup>12</sup> with the oil embargo crisis in 1973 decided to enhance energy independence orienting on gas and nuclear usage that “proved” that German governments and businessmen are on the right track<sup>13</sup>. However later, Germany faced a strong opposition to NPPs building. The electric power generating companies did not like the idea to be obliged to build and operate NPPs that were expensive in service as well as in construction, being an innovation at that time they were technologically complicated and there was not confidence in economic profit from it. Also other electricity providing companies were not supporting the idea of alternative way to generate electricity and put a strong lobby against nuclear energy generation. Moreover, the locals where the NPPs were built negatively accepted the constructions being afraid that it would badly influence the local climate and change their lifestyle in whole<sup>14</sup>. Therefore, while France has fast accepted the new technologies, in Germany the anti-nuclear movements appeared in the 1970s, right after German government decided to switch to new energy source. In the 1980s and 1990s with formation of Green Party the anti-nuclear movement has found political support of their position and its representation in parliament. The accident at Three Mile Island Nuclear generating and Chernobyl nuclear catastrophe put the question on security and reliability of nuclear energy even

---

<sup>12</sup> Rolf Linkohr. “German Energy Policy,” (London, 1999) 1.

<sup>13</sup> Jens Kersten, et al. “Europe After Fukushima. German Perspectives on the Future of Nuclear Power,” (Rachel Carson Center, 2012) 12.

<sup>14</sup> Ibid. 14-15.



more<sup>15</sup>. About the same time the energy demand analysis showed that Germany does not need any more NPPs as it already had sufficient amount of electricity generation, thus the NPPs construction has slowed down and in 1989 the last NPP was constructed on the territory of Germany. In 1998 the anti-nuclear coalition of Social Democrats and Green Party came to power. As one of their priority they had a phase-out of nuclear power. In 2002 after some years of discussions with electrical companies and nuclear lobbies, coalition gained to pass a law on diminution of nuclear energy through amendments in Atomic Energy Act. The new amendments established time frameworks for nuclear phase-out, and less in thirty years Germany had to be fully free from nuclear energy. The 2011 Fukushima accident accelerated the process of nuclear phase-out in Germany and in June of 2011 lower house of German parliament - Bundestag voted for the 13<sup>th</sup> amendment to the Atomic Energy Act that stands for phasing-out of all NPPs from Germany within the end of 2022<sup>16</sup>. In result the eight oldest out of total 17 German NPPs were closed down, despite that the safety standards of German nuclear facilities are very high. The total electricity generation share from nuclear energy felt down from 22 % in 2010 to 18 % in 2013<sup>17</sup>.

Some of analysts and scientists think that German targets with RES are unrealistic and unachievable due to lack of infrastructure, high prices, huge budget that has to be invested into renewable energies and long return-profit period, while others regard this RES path as a good solution to ecological and economic problems of Germany. Successfully or not, Germany would be the pioneer in the energy transition towards renewables. Comparing to France, Germany can more easily refuse nuclear energy as it has never been its principal source for electricity; the highest level of nuclear energy share in electricity did not exceed 30 %<sup>18</sup>.

---

<sup>15</sup> Tobias Henze, "Nuclear power in Germany – History and future prospects," (GRIN Publishing, 2012) 5.

<sup>16</sup> "Energy Policies of IEA countries: Germany," (France: IEA Publications, 2013) 176.

<sup>17</sup> David Blackbourn, "The Culture and Politics of Energy in Germany. A Historical Perspective," (Rachel Carson Center, 2013) 12.

<sup>18</sup> David Blackbourn, "The Culture and Politics of Energy in Germany. A Historical Perspective," (Rachel Carson Center, 2013) 12.

## **Theoretical framework**

For this senior thesis the concepts of supranationalism and intergovernmentalism are applied. As since the Lisbon treaty the energy sector of the EU is the shared competence of the EU and MSs, both of them have a power in this sector. The article 176 A of the Lisbon Treaty that deals with the energy says that the decision-making in that sector should be taken by the European Parliament and the Council in accordance with the ordinary legislative procedure. Under the ordinary legislative procedure here is meant that the European Parliament and the Council adopt legislation with qualified majority voting being applied. It means that in the Council during the voting at least 260 of the possible 352 votes representing minimum 62% of EU population have to be “for” this legislation. That is to say, the individual state’s unwillingness to adopt legislation cannot stop the whole procedure, what means that the supranationalism here prevails. This means that for France and Germany with this system it is easier to lobby their personal interest by agreeing it with several states with a bigger population. Moreover, only the EU Commission has the right of proposal; that all is explained by the concept of supranationalism, which interprets decision-making process in the EU as a transfer of power from MSs to a higher authority in face of EU. However, since the Nice Treaty of 2001 small MSs states got more power in the decision-making process of the EU. Since it, the higher populated MSs cannot dominate so much over lower populated ones, what developed more intergovernmentalism in the EU. Therefore, the intergovernmentalism is also an important part in EU decision-making, and especially for such a vital sector as energy. Moreover, there are some limitations for the ordinary procedure in energy sector, that are measures of fiscal nature, as well as measures that significantly affect choice of energy sources of a MS, especially for small states. In that situation during the decision-making the special legislative procedure is applied. In the special legislative procedure the decision is taken only by the Council by the unanimity voting, what means that if one of the MSs does not agree to adopt legislation, then it would not be adopted. So, here the interest of every state is taken into account and without agreement of all the MSs, the EU cannot go further on that issue. This state of affairs is explained by the concept of intergovernmentalism, which

says that MS in the EU decide the speed and level of integration process, what means that without the agreement of all the countries the integration process in the EU will stop.

## **Methodology**

To explain whether energy policies of France and Germany regarding nuclear energy help EU to go deeper into integration of European Energy Policies the qualitative and quantitative research methods are applied in this paper. In order to find the answer to the research question the primary and secondary data was collected and used. Primary sources include the Lisbon Treaty, public opinion statistics, recent documents published by the French and German governments, reports of EDF and E.On, as well as EU budget plan for 2014-2020, EU Energy strategy 2020 etc. The secondary data is composed of various French and German scholarly analyses on future and the past of energy policies orientations of both states and analyses of feasibility of energy policies changes planned by German and French governments. Hence, the main instruments that would be applied in data gathering for this paper is analysis of primary documents and materials as well as use of secondary sources as articles and books with scholarly analyses.

This paper is divided into two chapters. The first chapter gives the explanation on current importance of nuclear energy in France and Germany, what explains why France and Germany advances this or that particular energy position on EU level. To analyze that research goes back to the 1970s to look what and how influenced each state that it has its certain position towards nuclear energy nowadays. Following the timeline of nuclear energy development in France and Germany, the paper comes to the point when once parallel nuclear energy “paths” diverge and Germany comes up with idea on decreasing of nuclear energy usage, while France continues its nuclear energy direction. The first chapter ends up with current situation of diversified energy policies and different approaches on nuclear in France and Germany. The second chapter of this paper is devoted to analysis of the previous findings what is done through the comparative analysis of current energy policies of France and Germany. Analytical framework includes five main factors that influence policies of both states, those are firstly, government’s position (its energy policy and plans) who *de facto* decide the direction

and orientation of state's policies and later on advances its position on EU level through the EU institutions (e.g. Council of Ministers); secondly, public opinion (use of statistics) as it plays a huge role on government's decision in democratic societies as French and German ones and directly influence governments decision-making process that later influenced EU institutions; thirdly, energy companies' interest especially those of EDF in France and E.On in Germany that have strong interest in continuation of usage of nuclear energy and who promote their ideas through lobby groups, and as most of them are influential on state and sometimes even on international level the government also has to deal with them and protect their interest; fourthly, the budget issue that is not less important because all the current changes planned by Germany, France or EU even being good-developed are dependent on state-funding and during current economic crisis, not all of their ideas are realizable, and fifthly EU institutions actions and plans as the main "engine" of EU energy policy, and as from 2007 it has shared competence in member-states energy policies what means EU has direct influence on their government decisions by putting some energy and environmental objectives. Accordingly, the analysis is aimed to cover all the "powers" through which form the positions of France and Germany and the way they may implicate other states energy policies through the EU. The paper ends with summary of all the findings and an assumption on the future of EU energy policy and implication of nuclear power orientation of France and Germany on it.

## Chapter II

### Government position

This part of thesis is aimed to review the current government positions towards energy policies in France and Germany. Also, regarding the new initiatives occurring in Franco-German relations in the domain of RES this part covers these proposals and its further development.

The target of Francois Hollande on reduction of share of nuclear in French energy mix to 50 % announced by the current president during the presidential election campaign in 2012 gets its development. Recently, Francois Hollande proposed an initiative for cooperation in energy transition process with Germany. As French president said, France and Germany have to be an example in development of RES for the whole Europe and suggested to create a Franco-German enterprise for energy transition<sup>19</sup>. Despite that such an initiative to coordinate energy transition is not the new one and France and Germany already have an Office for Renewable energies to support co-development of renewables, an announcement on creation of a joint energy enterprise similar to the one of European aviation group Airbus was accepted by the public as a surprise<sup>20</sup>. This proposal got some critics because of market difference as well as energy mix that are not compatible and more likely Germany would not support this initiative and it would not be realized<sup>21</sup>. Also president's proposal is in some contradiction with the report done by the French Center of Strategic Analysis (Centre d'analyse stratégique, CAS), an institution of expertise and decision-making under the Prime-Minister of France. This report casts doubt on sustainability of German energy transition due to risk of lack of energy<sup>22</sup>. However regardless the report, Francois Hollande shows his firm intentions to reduce the

---

<sup>19</sup> « Ouverture de la conférence de presse du président de la République au palais d'Élysée le 14 février 2014, » Élysée. Présidence de la République, 14 January 2014. 10 Feb. 2014. <<http://www.elysee.fr/declarations/article/ouverture-de-la-conference-de-presse-du-president-de-la-republique-au-palais-de-l-elysee-le-14-janvier-2014/>>.

<sup>20</sup> Geert De Clercq, "Franco-German energy firm seen focused on renewables sources," Reuters, 14 January 2014. 10 Feb. 2014. <<http://www.reuters.com/article/2014/01/14/us-france-hollande-energy-idUSBREA0D1EX20140114>>.

<sup>21</sup> Nicole Goebel, "Hollande's Franco-German energy proposal criticized," Deutsche Welle, 16 January, 2014. 10 Feb. 2014. <<http://www.dw.de/hollandes-franco-german-energy-proposal-criticized/a-17363675>>.

<sup>22</sup> Vincent Chriqui ed., "Is the German energy transition sustainable?" Centre for Strategic Analysis, Sep. 2012. 10 Feb. 2014. <<[www.strategie.gouv.fr/system/files/2012-09-11\\_-\\_transition\\_eunergeutique\\_allemande-na281-7\\_Is the German energy transition sustainable?](http://www.strategie.gouv.fr/system/files/2012-09-11_-_transition_eunergeutique_allemande-na281-7_Is%20the%20German%20energy%20transition%20sustainable%3F)>>.

nuclear source in energy, and at the same time the political direction of Hollande towards Germany could be tracked.

Following the French proposal, Angela Merkel and Francois Hollande hold a meeting, in the results of which, sides agreed for common development and research on climate and energy issues<sup>23</sup>. This newly developed position of France and Germany directed on convergence in energy position on European level could speed up the integration of European energy policy that positively develops since 2007. However, in spite of this “inspiring” Franco-German cooperation, even having nowadays the same trajectory, energy policies as well as economic situation differ a lot what could create some obstacles for the collaboration.

Being highly dependent on nuclear energy France still has a particular emphasis on it. According to the report Pluri-annual Investment Plan (PPI) of electrical production of Ministry of ecology, sustainable development and energy for the 2009-2020 period to the Parliament, French government has plans on prolongation of exploitation period of NPPs to 40 years<sup>24</sup>. Such measures are planned to be done to support the smooth the investments into the current nuclear industry and keep and justify them for the next generation power plant<sup>25</sup>. That shows that still the nuclear energy has a dominant position in France. According to that PPI, the nuclear energy’s relative contribution to French energy production will decrease in 2020 to about 70 %. It is explained by increase support of government to development of renewable energy contribution of which is expected to double by 2020<sup>26</sup>. The issue here is that the nuclear is an integral part of French energy mix and while nuclear industry was developing since 1970s what is more than 40 years for now, billions of euro were invested into this energy sector what makes it impossible for French government in a moment to reject to use it. Hence, a blurry double-oriented position with the wish for the development of RES and inseparable dependence from nuclear energy of French energy sector appears.

---

<sup>23</sup> “Principales décisions du 16eme conseil des ministres Franco-Allemand,” Le service de presse presidence de la republique, 19 Feb. 2014. 3 Mar. 2014. < [http://www.france-allemande.fr/IMG/pdf/Conseil\\_des\\_ministres\\_franco-allemand\\_-\\_Principales\\_decisions\\_-\\_190214.pdf](http://www.france-allemande.fr/IMG/pdf/Conseil_des_ministres_franco-allemand_-_Principales_decisions_-_190214.pdf)>.

<sup>24</sup> « Rapport au Parlement Programmation pluriannuelle des investissements de production d’électricité. Période 2009 – 2020, » (Ministre de l’Ecologie, du Développement durable et de l’Energie, 2009) 13.

<sup>25</sup> Ibid.

<sup>26</sup> “Energy Policies of IEA countries: France,” (France: IEA Publications, 2009) 123.

In German energy policy the objectives and plans are clearer than those of France, however still some contradiction could be seen. The 2011 Atomic energy act on phase-out of nuclear energy till 2022 and closure of seven oldest power plants put the final point on the further energy policy of Germany. Since 2000s German government had intentions to get rid of nuclear energy and stay up on the green energy path, however in 2010 there were some initiative from Angela Merkel for prolongation of life of NPPs and lower the speed of their phase-out. But sixth months after the Fukushima catastrophe totally changed German chancellors' relation towards nuclear and she abolished her previous decision, and German parliament voted for nuclear energy phase-out<sup>27</sup>.

Germany is not nuclear dependent as much as France does, therefore it is more possible to get rid of nuclear energy and substitute it with RES in a short term. Concerning reasons for the German energy transition government emphasize creation of energy-efficient and green economy with competitive energy prices, climate protection and security of sustainable development<sup>28</sup>. The Energy Concept gives to Germany a long-term strategy with firm objectives on reduction of GHG (40 % by 2020, 55 % by 2030 and 80-95 % by 2050), increase in share of RES in its energy mix (18 % by 2020, 30 % by 2030 and 60 % by 2050) and decrease in electricity consumption (10 % by 2020 and 25 % by 2050)<sup>29</sup>. Nuclear energy then plays a role of a “bridge” for a limited amount of time till RES could fully contribute to German final energy consumption<sup>30</sup>. For that purpose German government extended the exploitation of NPPs to 32 years, what also has to contribute to financing of renewables through the taxation of nuclear fuel<sup>31</sup>. Therefore, as it could be seen, Germany has a clear roadmap of the energy policy with renewable energy development and application of nuclear energy for the time of energy transition.

---

<sup>27</sup> Andrew McKillop, “Germany will dilute – not abandon – its Energiewende plan,” EU energy policy blog, 22 September 2013. 16 Mar. 2014. < <http://www.energypolicyblog.com/2013/09/22/germany-will-dilute-not-abandon-its-energiewende-plan/>>.

<sup>28</sup> Ibid. 3.

<sup>29</sup> Andrew McKillop, “Germany will dilute – not abandon – its Energiewende plan,” EU energy policy blog, 22 September 2013. 16 Mar. 2014. < <http://www.energypolicyblog.com/2013/09/22/germany-will-dilute-not-abandon-its-energiewende-plan/>>.

<sup>30</sup> “Energy Policies of IEA countries: Germany,” (France: IEA Publications, 2013) 171.

<sup>31</sup> “Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply,” Federal Ministry of Economics and Technology, (2010): 15. 3 Feb. 2014. <[http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/energiekonzept\\_bundesregierung\\_en.pdf](http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/energiekonzept_bundesregierung_en.pdf)>.

As it could be seen out of the above, the nuclear energy in France and in Germany performs different roles: for France it is one of the main sources of energy, while for Germany it is only a time-framed bridge until the RES would be implemented. Therefore, the collaboration in this sphere of energy for France and Germany is impossible due to different orientations. And while Francois Hollande exercises some flexibility between nuclear and RES in French energy mix, what means that he tries “to be for both of them”, German government shows its firm intention that nuclear energy has no way to rest in German energy mix after 2022. Hence, French and German governments energy policy will not find a common position through the nuclear energy, but the most likely for them is to get the convergence for a common position in the channel of RES. And the latest French president’s announcements show that French energy policy is open for renewables to be accepted and developed. In spite of that, the difference of energy policies mix and plans for its further development could create problems for Franco-German energy strategy integration, especially with the clear orientation of Germany towards renewables and vague French position that still does not have a strict direction and “chases two rabbits”.

### **Public opinion**

As it was learned during this research, the general public opinion towards nuclear energy in France and in Germany had formed during the end of the previous century. France was seen as mostly pro-nuclear, while in Germany 1980s movements formed negative attitude towards nuclear energy. However, since the 2011 Fukushima accident the changes in public approach to nuclear energy have appeared. This part of the analysis is dedicated to the public opinion towards nuclear energy in France and Germany in the recent years, as it is one of the factors that influence the government’s energy policy.

For that part of analysis statistics regarding society’s perception of nuclear energy in France and Germany is used. As from the covered statistics and articles, it is clear that the nuclear energy is not among the major concerns of people and it becomes important only when something as Fukushima catastrophe happens. Hence, public opinion is a lot led by news “headlines” and it would be more useful to look at public’s opinion before and after them, and in this research the



Fukushima catastrophe would be used as a point. And as there are many surveys regarding nuclear energy were held by different organizations or government, with their question being formulated in a different manner and inequable answer options are given, it does not make sense to compare them between each other. Therefore, in this part of the analysis only several opinion polls are taken, among them ones of Eurobarometer, BVA/Win-Gallup International and Globescan.

The official opinion poll of European Commission Eurobarometer on “Europeans and Nuclear Safety” of 2009 gives some statistic of relation of Europeans including French and German towards nuclear energy. The first question that asks to what extent do people agree or disagree with the statement that nuclear energy helps to limit climate change gives an unexpected result. While in Germany, a country with mostly anti-nuclear society, 48 % of respondents tend to agree and 45 % tend to disagree that nuclear energy limits climate change. At the same time only 43 % of the French respondents, the ones who have about 75 % of their electricity coming from nuclear, believe nuclear energy helps to limit climate change and 40 % do not agree with that statement<sup>32</sup>. These results show that despite the difference in nuclear energy policies of France and Germany, the society’s vision of nuclear energy as a component contributing to limitation of climate change process is almost the same. The similar results gave the next question when people were asked whether they agree or not that nuclear energy helps to make countries less dependent on fuel imports. 72 % of German respondents and 70 % of French ones agree with that statement, and 25 % and 20 % correspondingly do not agree with it.<sup>33</sup> However, despite that about half of German respondents agreed on contribution of nuclear energy to climate change and more than 2/3 admitted that nuclear power provides energy independence, 52 % of interviewed Germans would like to decrease the share of nuclear in energy mix and only 37 % would like to maintain it at the same level. For the French side of respondents, more than 1/3 of people prefer to reduce nuclear share, 45 % maintain at the same level and only 12 % think about the increase of nuclear energy share<sup>34</sup>. So, German respondents have more negative attitude towards the idea of keeping nuclear energy than French ones. However, the statistics show

---

<sup>32</sup> “Europeans and Nuclear Safety Report,” European Commission, (2010): 14. 15 Mar. 2014. <[http://ec.europa.eu/energy/nuclear/safety/doc/2010\\_eurobarometer\\_safety.pdf](http://ec.europa.eu/energy/nuclear/safety/doc/2010_eurobarometer_safety.pdf)>.

<sup>33</sup> Ibid. 17.

<sup>34</sup> Ibid. 26.

that even in France, that is regarded as a pro-nuclear state, the attitudes towards nuclear among population are not so homogenous; only 12 % favor the idea of increasing nuclear share, while most of people want either to decrease dependency on nuclear power or maintain its level. Also, French respondents tend more to trust to companies operating NPPs (in the sense of safety), 56 % in France contra 39 % in Germany trust to nuclear operating companies, and 39 % and 60 % correspondingly do not trust them<sup>35</sup>. This indicates that majority of French people, seeing that nuclear reactors in France have always been operated safely, incline to trust and therefore somehow support nuclear companies. That does not have a case in Germany who despite the fact that no accidents have ever happened during nuclear plants operation, still majority of people do not trust nuclear operators.

A survey published by association in market research WIN-Gallup International “Impact of Japan Earthquake on views about nuclear energy” in April of 2011 compares the results of 2005 and 2011 survey conducted and it confirms the fact that nuclear energy is more accepted in France rather than in Germany. According to this survey, in 2005 66 % of French were favoring and 33 % were unfavoring the nuclear energy, while after the Fukushima catastrophe the numbers shifted to 58 % of those who support and 41 % of those who oppose nuclear energy usage. In Germany respondents’ opinion towards nuclear way of electricity production is more negative but still there are some of respondents who support nuclear power: in 2005 34 % of interviewees were supporting nuclear energy and it decreased to 26 % after Fukushima accident. However, still in both years the majority of respondents, what is 64 % in 2005 and 72 % in 2011, do not encourage the idea use nuclear energy<sup>36</sup>. Here we can see that while one of the polls was conducted right after the catastrophe, the public opinion in average on 8 % favors less nuclear energy in 2011 than in 2005. So, the society was affected by the pointed attention on the safeness of NPPs that was widely discussed in the mass media. The Fukushima catastrophe played an important role for French and German public opinion and therefore government’s energy orientation to shift, because until the earthquake in Japan, in general, throughout the world public tended to accept nuclear power more and more, and even in Germany the government had plans to extend the long-life of NPPs. Hence, the accident caused not

---

<sup>35</sup> Ibid. 62.

<sup>36</sup> “Impact of Japan Earthquake on views about nuclear energy,” NRC (2011): 9. 15 Mar. 2014. <[http://www.nrc.co.jp/report/pdf/110420\\_2.pdf](http://www.nrc.co.jp/report/pdf/110420_2.pdf)>.

only changes in Japan's fuel prices, but also in the renewable energy market and the "world's energy landscape"<sup>37</sup>. In result, the French new 2012 government finally decided to go for diversification of its energy mix, while for the German one the accident put the final point in the future of German nuclear energy.

A similar task does another survey, conducted by a public opinion research organization GlobeScan for the BBC "Opposition to Nuclear Energy Grows: Global Poll". The poll published in November of 2011 compares the results of 2005 and 2011 surveys about public opinion regarding nuclear energy before and after the Fukushima accident. One of the questions of this public poll asks for the views on the use of nuclear energy for electricity generation; and according to the results of this survey, in 2005 in France 50 % of respondents agreed that France should use existing NPPs but not build new ones. In 2011 this idea was supported already by 58 % of respondents, what is surprising, as according to the world tendencies the Fukushima catastrophe had negatively impacted on nuclear energy acceptance by public, and here we see the opposite track. At the same time the number of those who would like to close down all the NPPs as soon as possible rose from 16 % to 25 %, and the ones who prefer to increase the share of NPPs in electricity generation decreased from 25 % to 15 %. In Germany the responses are more in the "mainstream" and the number of people supporting the idea to use the existing nuclear energy plants decreased from 47 % to 38 %, while the number of those who agree that Germany has to close all the NPPs as soon as possible doubled from 26 % in 2005 to 52 % in 2011. Only 7 % of German respondents in 2011 agreed that it has to increase nuclear energy share in the electricity, while in 2005 there were 22 % of them<sup>38</sup>. For the German part of this poll the results are logic, as the Fukushima event negatively impacted on nuclear energy perception and therefore less Germans favor it. Nevertheless, the responses of French public put a question mark whether the Fukushima catastrophe did not affect societal perception of nuclear energy; a partial explanation could be found in the fact that this survey gives limited answer options that do not fully reflect respondents' positions.

---

<sup>37</sup> "Opposition to Nuclear Energy Grows: Global Poll," GlobeScan (2011): 3. 15 Mar. 2014. <<http://www.globescan.com/commentary-and-analysis/press-releases/press-releases-2011/127-opposition-to-nuclear-energy-grows-global-poll.html>>.

<sup>38</sup> Ibid. 9-10.

The public opinion in France and in Germany has some contact point, but in general opinions are different what is logical, because France and Germany do not have alike energy development history and current energy situations, what consequently reflects in societal perception of nuclear energy. And similarly to governments' policies, here Germans have a more clear non-nuclear public approach, while the responses of French interviewees are more diversified and do not have a clear nuclear or an anti-nuclear approach. So, German government tries to stick to the majority's opinion that lays in replacement of nuclear energy by renewables, what German government actually does. At the same time the French public's opinion is not so specific and there are some people who support nuclear and some who do not, government has to try to meet interests of the both sides. And as the world tendency show that most of public positively accepts renewables and many countries try to increase its share in their energy mix, French government currently does the same, it tries to have both types of energy - renewable and nuclear. And this is the only solution to satisfy the divided public opinion and also to keep up with the world energy trends.

### **Energy companies' interest**

The energy sector both in France and in Germany plays a major role in the state's economy. The government while doing any changes in its "energy path" has to take into consideration the importance of energy companies in its economy. This part is aimed to discuss the importance of interest of nuclear energy companies' as EDF in France and E.On in Germany for the government's energy policy.

EDF is a French electric company and the biggest electricity producer in the world; mostly it is gotten from nuclear energy. It was founded after the WWII through nationalization of smaller energy producers. Till today the EDF is largely owned by the French state, in 2012 the state's share of EDF's capital was 84, 44 %<sup>39</sup>. As the nuclear energy is one of the major sectors in French energy, EDF as a strategically important part of it gets a high protection from the state, avoiding the competition with foreigner energy producers. For that, the company gets some critics, as it opposes to

---

<sup>39</sup> "EDF Group. Reference document. 2012 annual financial report," EDF, ( 2013) : 121, 27 Apr. 2014. <[http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2013/ddr2012/EDF\\_DDR2012\\_interactif\\_va.pdf](http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2013/ddr2012/EDF_DDR2012_interactif_va.pdf)>.

the EU competition in electricity markets. The market share of EDF in 2011 was 86, 5 %<sup>40</sup>, that is to be said almost the whole French energy is hold up by EDF. In 2011 the total sales of EDF in France have reached 37, 2 million Euros<sup>41</sup>. EDF company presents a huge part of the job places of France, in 2012 the number of EDF employees solely in France was about 130 000<sup>42</sup>. Moreover, the EDF was and still stays one of the major contributors to the construction and research and development of nuclear energy. So, EDF has a strategic importance for France, as its energy sector and economy are highly dependent on this company. And as nuclear energy issues operated not only by EDF, but also by Areva, CEA etc., then it means that France puts a high priority to the nuclear energy companies' interests in energy sector. Therefore, the energy companies as EDF, Areva etc. have an influence over the French decision-making regarding the changes in energy.

In Germany one of the biggest nuclear energy generating company is E.On. It is a public power and gas company based in Dusseldorf. As the nuclear energy production in Germany has never reached the volume it has in France, the production capacity of E.On is much lower than that has the EDF. In 2013 nuclear production capacity of E.On in Germany was 44, 4 TWh<sup>43</sup>, while the one of the EDF in 2012 was 425 TWh<sup>44</sup>. E.On's share of power generation capacity in Germany in 2010 was about 14 %<sup>45</sup>. Also, the number of employees working in nuclear sector of E.On is much lower than the one in the EDF. In 2012 the total number of employees working on NPPs both in Germany and in Sweden composed about 3 500 people<sup>46</sup>. Hence, E.On even though being a big company serving six

---

<sup>40</sup> "Employees - Human Resources," EDF, (2012): 245, 27 Apr. 2014. < [http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2013/ddr2012/EDF\\_DDR2012\\_017\\_va.pdf](http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2013/ddr2012/EDF_DDR2012_017_va.pdf)>.

<sup>41</sup> "2011 full-year results: Solid results and commitments upheld amid a troubled environment Excellent industrial performance," EDF, (2012): 18, 28 Apr. 2014. < [http://www.edfenergy.com/media-centre/press-news/EDF\\_Group\\_2011\\_results.pdf](http://www.edfenergy.com/media-centre/press-news/EDF_Group_2011_results.pdf)>.

<sup>42</sup> "Major Shareholders," EDF, (2012): 276, 27 Apr. 2014. < [http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2012/ddr2011/EDF\\_DDR2011\\_017\\_va.pdf](http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2012/ddr2011/EDF_DDR2011_017_va.pdf)>.

<sup>43</sup> "E.ON Facts & Figures," Eon, (2014): 14, 28 Apr. 2014. <[https://www.eon.com/content/dam/eon-com/ueberuns/publications/Facts\\_and\\_Figures\\_2014.pdf](https://www.eon.com/content/dam/eon-com/ueberuns/publications/Facts_and_Figures_2014.pdf)>.

<sup>44</sup> "Nuclear Power in France," World Nuclear Association, Feb. 2014. 28 Apr. 2014. < <http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/France/>>.

<sup>45</sup> "Study shows E.ON is not in a dominant market position," Eon, 21 Oct. 2010. 28 Apr. 2014. < <http://www.eon.com/en/media/news/press-releases/2010/10/21/study-shows-e-dot-on-is-not-in-a-dominant-market-position.html>>.

<sup>46</sup> Andreas Ehlert, "Best Practice in E.ON. Decommissioning Projects," PRIS (2012): 4. 28 Apr. 2014. < [www.iaea.org/OurWork/ST/NE/NEFW/WTS-](http://www.iaea.org/OurWork/ST/NE/NEFW/WTS-)

out of nine German NPPs does not have a strong position in Germany. The government's decision on nuclear phase-out, as well as the nuclear-fuel tax imposed on companies operating NPPs; that for E.On was about 2, 5 billion Euros<sup>47</sup>. So, the state does not try to protect the market of nuclear energy companies, even the big one as E.On, but vice versa it could be said that E.On has quite "bad relationships" with the government. The confirmation to that could be found in E.On's 2013 Annual Report, where it claims that "the nuclear phase out, under the current legislation, to be irreconcilable with our constitutionally protected right to property and right to operate a business."<sup>48</sup> Therefore, on the example of E.On, it could be seen that German state does not take much into consideration the position of nuclear companies, and even though the nuclear energy is taken as a "bridge" for the energy transition, nuclear operating companies cannot influence much state's energy policy orientation.

Though, while in France the nuclear energy companies gets state's support and have an important strategic position in economy, in Germany energy companies experience totally different "attitude" towards themselves and are not much involved into the state's energy policy decision-making process.

### **Budget issue**

In this part of the analysis it is discussed cost of French pro-nuclear energy policy and German energy transition. Both of them cost a lot of money, and not all the states can afford such high expenses, so this part of paper is aimed to analyze which of these energy policies is more acceptable to the other states in financial term.

In 2012 French Court of Audit (Cour des Comptes) at the request of the Prime Minister published a report on costs of the nuclear power sector in France. According to this report between 1969 and 2004 on construction of 58 NPPs, engineering and labor costs and pre-operating charges in

---

Networks/IDN/idnfiles/WkpPlanLicencingDecomProjetc\_Germany2012/WkpPlanLicencingDecomProjetc\_Germany2012-Best\_practice\_EON\_decom-Ehlert.pdf>.

<sup>47</sup> "E.On 2011 Annual Report," Eon (2011): 28, 28 Apr. 2014. <[http://www.eon.com/content/dam/eon-com/en/downloads/e/E.ON\\_2011\\_Annual\\_Report.pdf](http://www.eon.com/content/dam/eon-com/en/downloads/e/E.ON_2011_Annual_Report.pdf)>.

<sup>48</sup> Ibid. 64.

France it was spent more than 83 billion Euros<sup>49</sup>. The total research expenditure on nuclear power from 1957 to 2010 is estimated at the sum of 55 billion Euros, including 38 billion Euros financed by public funds. In overall, the total past costs with all the physical investments, research and development, as well construction and operation costs are estimated at 188 billion Euros by 2010<sup>50</sup>. This amount does not include cost of deep geological storage for nuclear waste, what means that the total sum for nuclear energy is even higher. Such high spending infused into nuclear power that were sponsored by nuclear energy companies as EDF and Areva and the French state, in fact is one of the main reasons why France today cannot stop usage of nuclear energy and has “to care” so much about energy companies protection. The current costs for maintenance of nuclear power plants are also high and they permanently increase; according to Cour des Comptes’ report, between 2003 and 2010 the maintenance investments increased in three times, and between 2007 and 2010 the augment was 61 %<sup>51</sup>. One of the reasons for increase in maintenance cost is prolongation of exploitation period of NPP. This means that if the usage of NPPs would be increased (what is done every 10 years after the check of its safety), then France will not avoid increase in electricity price. Moreover, as it could be noticed today, the price for development of new NPP is also high; the cost of III<sup>rd</sup> generation Flamanville nuclear power reactor increased in 2, 5 times of its initial price and makes up already 8 billion Euro.

As Germany was never so nuclear dependent, it clearly did not spend so much money as France did. According to some counting the total German investments into nuclear technologies, including research and development subsidies, tax exemptions for nuclear waste disposal, restoration and rehabilitation of sites, closing of power plants from the 1950s till nowadays amounts for about 63 billion euros<sup>52</sup>. This amount is also high; however the anti-nuclear movement in Germany is very strong and the government also has firm intentions, what means that regardless of the money spent,

---

<sup>49</sup> “The costs of the nuclear power sector,” Cour des Comptes (2012): 24, 3 Apr. 2014. < [http://www.ccomptes.fr/content/download/43709/697228/version/2/file/thematic\\_public\\_report\\_costs\\_nuclear\\_power\\_sector\\_012012.pdf](http://www.ccomptes.fr/content/download/43709/697228/version/2/file/thematic_public_report_costs_nuclear_power_sector_012012.pdf) >.

<sup>50</sup> Ibid. 48.

<sup>51</sup> “The costs of the nuclear power sector,” Cour des Comptes (2012): 27, 3 Apr. 2014. < [http://www.ccomptes.fr/content/download/43709/697228/version/2/file/thematic\\_public\\_report\\_costs\\_nuclear\\_power\\_sector\\_012012.pdf](http://www.ccomptes.fr/content/download/43709/697228/version/2/file/thematic_public_report_costs_nuclear_power_sector_012012.pdf) >.

<sup>52</sup> David Blackburn. The Culture and Politics of Energy in Germany. A Historical Perspective, (Rachel Carson Center, 2013) 12.

Germany will do its phase-out. The plan of German government is to replace the nuclear power by renewable sources of energy and while the 13<sup>th</sup> amendment had badly affected the profitability of electricity generating companies, it would be also expensive for German government; according to recent estimate the costs of replacement would be around 45.8 billion<sup>53</sup> and 48 billion Euros<sup>54</sup>. Estimated amount includes the additional costs of building and operating dispatchable capacity with higher variable costs to substitute for nuclear plants with already amortized capital costs and the losses to consumers due to higher electricity prices. As the renewable energy is a relatively new type of energy, German government tries to promote it for production through subsidizing. The subsidies for the RES are laid down on energy users, and the amount constantly increases, especially in 2010 and 2011. In 2012 the total cost levy that subsidies for RES for reached a level in more than 13 billion Euros<sup>55</sup>. At the same time one of the most-known renewables solar energy while getting a high output of subsidies for now gives a low output contribution but has a perspective to become an important energy source in the future. The renewable energies being a relatively new energy are not so efficient today, however there are expectations that by 2025 in Germany will reduce in cost and at the same time the output will much increase<sup>56</sup>.

Hence, both the non-nuclear and nuclear energy orientations require high financial contributions. So, the budget issue creates a problem for French promotion of nuclear energy as well as for German promotion of renewable energies as not all the countries can afford it. So, for states as Czech Republic or the UK now it is more useful to develop the nuclear energy as they already possess these technologies, and for a country as Sweden who has a high share of renewables it does not make sense to switch to renewables. However, for other countries that do not have a priority in nuclear or in renewables, today it makes more sense to develop the renewables, because while the cost for both types of energy is very high, the renewables today are seen as energy of the future and moreover, the EU 2020 strategy obliges member-states to develop them. Therefore, most likely, the states that do not

---

<sup>53</sup> Ibid.

<sup>54</sup> Cynthia Gannon-Picot, Serge Gas, "The economic costs of the nuclear phase-out in Germany," (OECD Nuclear Energy Agency, 2012) 9.

<sup>55</sup> Jan Keil, "The German Energy Transition – Issues and Perspectives," *AICGS* (2012): 4-5, 3 Apr. 2014. <<http://www.aicgs.org/site/wp-content/uploads/2013/02/The-German-Energy-Transition-Keil-FINAL3.pdf>>.

<sup>56</sup> Ibid. 7.



have for now a priority neither in nuclear energy, nor in renewables, the latter would be more preferable.

### **EU influence**

As it was discussed before, the EU nowadays has more power to influence its MSs' energy policies. This means that EU plans and objectives are affecting MSs' policies and have to be taken into consideration when composing state's energy policy. This part of the analysis discusses the position of the EU, its objectives regarding the future of European energy policy.

In 2007 as soon as the EU got power over the energy sector, Commission has started to develop its strategy for the future development of the EU energy policy. And as the climate changing issues became more and more topical in the world, Commission turned its efforts into that direction. One of the major aims of the EU then is decarbonization of its MSs what as the EU plans; and as 80 % of total EU GHG emissions are produced by energy sector<sup>57</sup>, changes have to be done through modifications in energy sector, what is increase in the renewable energy usage. Another escape is the use of nuclear energy that also does not produce almost any CO2 emissions and considered to be "a clean" type of energy; however it does not enjoy the support of EU as it leaves some unrecyclable nuclear waste that is very radioactive but still the EU takes it as one of the "decarbonizers" and it cannot prohibit MSs to use this type of energy.

The 2020 strategy that was adopted by European Council in 2007, what means that all the MSs have to fulfil it, is aimed by 2020 to decrease GHG by 20%, to increase the share of renewable energy to 20%, and to make a 20% improvement in energy efficiency all comparing to the levels of 1990. Here it is clear, that as these objectives are influential for all MSs, strategy was adopted by European Council, what shows the intergovernmentalism priority in such policies adoption. However, at the same time, the proposals are done only by European Commission, what is manifest of supranationalism in the EU functioning.

Except the 2020 strategy, EU Commission developed 2050 Energy Roadmap published by European Commission in 2010; it puts as objectives by 2050 to reach 80-95 % reduction of GHG,

---

<sup>57</sup> "Energy 2020 – A strategy for competitive, sustainable and secure energy," European Commission (2011): 4, 15 Oct. 2013. <[http://ec.europa.eu/energy/publications/doc/2011\\_energy2020\\_en.pdf](http://ec.europa.eu/energy/publications/doc/2011_energy2020_en.pdf)>.

increase in share of RES in gross final energy consumption to 75 % and decrease in energy demand by 41% compared to the 2005-2006 peaks. Also in 2013 European Commission developed 2030 White Paper, that has to be a transition between 2020 Strategy and 2050 Roadmap, with objectives to reduce GHG by 40% below the 1990 level and increase the share of RES to 27% of the EU's energy consumption. The framework of White Paper has to be decided by the European Council by October of 2014<sup>58</sup>. Despite that there are many doubts about realization of these ambitious targets, the European Commission continues to develop plans for realization of a low-carbon economy, using the RSE as a primary source for its implementation. The EU Commission is aimed to start to do changes in investments as well, and there is an idea to start to change the old networks to new grids starting from the current investment cycle, so that the transformation goes faster. As the scenarios of Roadmap 2050 suggest “if investments are postponed, they will cost more from 2011 to 2050 and create greater disruption in the longer term<sup>59</sup>”. Also the EU Parliament approved EU budget for 2014-2020. EU allocated the budget, giving about 20 % on climate-related projects and policies, what is about 180 billion Euros out of 960 billion Euros of the total budget<sup>60</sup>.

Therefore, the EU has a strong idea to develop a green sustainable economy that has renewable energies as one of its primary sources in the consumption. And since the EU has a power to adopt the measures either through the intergovernmental or supranational decision-making, then it means that all the states are pushed to increase the share of RES in their energy sector and reduce the GHG. And despite that the EU objectives are ambiguous and there are many challenges for their realization, still the EU shows its firm intentions to increase the share of RES and decrease the GHG, and the 2020 strategy is an “affirmation” of that.

---

<sup>58</sup> “2030 framework for climate and energy policies,” European Commission (2014), 19 Apr. 2014. <[http://ec.europa.eu/clima/policies/2030/index\\_en.htm](http://ec.europa.eu/clima/policies/2030/index_en.htm)>.

<sup>59</sup> “Energy roadmap 2050,” European Commission (2012): 4. 19 Apr. 2014. <[http://ec.europa.eu/energy/publications/doc/2012\\_energy\\_roadmap\\_2050\\_en.pdf](http://ec.europa.eu/energy/publications/doc/2012_energy_roadmap_2050_en.pdf)>.

<sup>60</sup> “One-fifth of total EU budget to be spent on climate action,” European Commission, 19 Nov. 2013, 19 Apr. 2014. <[http://ec.europa.eu/clima/news/articles/news\\_2013111901\\_en.htm](http://ec.europa.eu/clima/news/articles/news_2013111901_en.htm)>.

## Conclusion

The analysis of research shows that nowadays, taking into account the condition of all the five factors influencing French and German nuclear energy policy, French and German nuclear power orientation will not be an obstacle for the European energy policy integration, but rather France and Germany will collaborate in the sphere of renewable energy and they will promote it to the other European states for it to become an important part of the European energy policy. So, the hypothesis of this paper was not proven. German government has a strong orientation towards the development of renewable energy and has a serious approach to this idea what is expressed by a clear plan how of RES development and installation and at the same time a strict schedule for nuclear energy phase-out in country. Therefore Germany has chosen its energy path for the future and will stick to it. In France with the current socialist president the situation is rather different. The government supports renewables and there are some efforts to promote them and re-orient French energy policy on them, but due to a historical dependence of France on nuclear energy, government cannot just refuse to use the nuclear energy. Hence, French government has to work for the both types of energies – nuclear and renewable. And while Germany has an experience in exploiting and development of RES, for France it is advantageous to cooperate with it in the sector of renewables, what actually the French administration currently does. Therefore, France and Germany found a common position and develop a common strategy in the sphere of renewable energies. As for the public opinion, In Germany even though there are some part of population that does support nuclear, not many people resist the development of RES and with its strong support by the government, the general public opinion is rather for RES, what corresponds to the government's orientation. In France, society does not have such a single opinion on nuclear energy, that is to say the public opinion is separated between those who are pro-nuclear and those who are not, what means that most-likely they support RES as nowadays there are worldwide tendencies for their usage. Regarding nuclear companies influence, on the example of EDF, it is clear that French government due to nuclear energy's strategic economic importance has to take its position as a core for the energy sector's further development, so nuclear will stay in its energy mix. In Germany the things are different and nuclear companies do not enjoy a

strategic importance role, and as even a big company as E.ON does not contribute so much to the budget and economy, they are not influential for energy orientation, so they cannot push Germany to stop or at least slow down phase out process. As for the budget, in France the development of nuclear energy was accompanied by huge money investments both from the side of state and from the EDF, so France has to keep and stick to its nuclear energy. In Germany the investments into nuclear development were not as big, as those in France; however, to do the energy transition, still Germany will have to spend not less than for nuclear. Hence, both nuclear energy development and energy transition cost a lot, and not many countries can allow it to themselves. But, as it is clear from EU position, it promotes and obliges MS to increase share of RES in EU energy mix. So, for countries that do not have nuclear it does not make much sense to invest into it today, because they will have to invest into the RES in any case as it is a “requirement” of EU. Therefore, for France it would be too difficult and almost impossible to promote its nuclear orientation to the other MS. So, taking into account all of the five factors, it could be concluded that France has to leave the nuclear energy as the major contributor to its energy mix, while Germany will continue to develop its RES, but this energy orientation difference will not be an obstacle for the further EU energy development.

The limitations of my work are the external factors that are happening today in Europe, as the Ukrainian crisis and the US proposal to supply shale gas to Europe, also the “updates” in the current political situation in Europe, as the changes in the French government after the municipal elections, also new elements in German phase-out added by the government recently that give more details on German phase-out and its future plans, and also the discussion in the EU of the new 2030 strategy proposed by the European Commission. These elements were not included into my senior thesis due to time constraints and in my opinion, these parts of the energy issue in Europe could shed more light on my research question, and I would propose to have a further research taking into consideration these aspects of energy issue.

**Bibliography:**

1. Black, Julia (2013). "European Union energy regulation in OECD, International Regulatory Co-operation: Case Studies." Vol. 2: Canada-US Co-operation, EU Energy Regulation, Risk Assessment and Banking Supervision, OECD Publishing.
2. Blackbourn, David. "The Culture and Politics of Energy in Germany. A Historical Perspective." Munchen: Germany Rachel Carson Center Perspectives, 2013 (4).
3. Bolton, Paul. "Nuclear Energy Statistics," (2013). UK Parliament. 9 Sept. 22 Oct. 2013. <[www.parliament.uk%2F...%2Fsn03631.pdf%E2%80%8E](http://www.parliament.uk%2F...%2Fsn03631.pdf%E2%80%8E)>.
4. Chriqui, Vincent ed. "Is the German energy transition sustainable?" Centre for Strategic Analysis. Sep. 2012. 10 Feb. 2014. <[www.strategie.gouv.fr/system/files/2012-09-11\\_-\\_transition\\_eunergeutique\\_allemande-na281-7\\_Is the German energy transition sustainable?>](http://www.strategie.gouv.fr/system/files/2012-09-11_-_transition_eunergeutique_allemande-na281-7_Is%20the%20German%20energy%20transition%20sustainable%3F)>.
5. Cynthia Gannon-Picot and Gas Serge. "The economic costs of the nuclear phase-out in Germany." (OECD Nuclear Energy Agency, 2012) 9.
6. Geert De Clercq. "Franco-German energy firm seen focused on renewables sources." Reuters. 14 January 2014. 10 Feb. 2014. < <http://www.reuters.com/article/2014/01/14/us-france-hollande-energy-idUSBREA0D1EX20140114>>.
7. "EDF Group. Reference document. 2012 annual financial report." EDF. (2013). 27 Apr. 2014. <[http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2013/ddr2012/EDF\\_DDR2012\\_interactif\\_va.pdf](http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2013/ddr2012/EDF_DDR2012_interactif_va.pdf)>.
8. Ehlert, Andreas. "Best Practice in E.ON. Decommissioning Projects." PRIS (2012). 28 Apr. 2014. < [www.iaea.org/OurWork/ST/NE/NEFW/WTS-Networks/IDN/idnfiles/WkpPlanLicencingDecomProjetc\\_Germany2012/WkpPlanLicencingDecomProjetc\\_Germany2012-Best\\_practice\\_EON\\_decom-Ehlert.pdf](http://www.iaea.org/OurWork/ST/NE/NEFW/WTS-Networks/IDN/idnfiles/WkpPlanLicencingDecomProjetc_Germany2012/WkpPlanLicencingDecomProjetc_Germany2012-Best_practice_EON_decom-Ehlert.pdf)>.
9. "Employees - Human Resources." EDF. (2012). 27 Apr. 2014. < [http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2013/ddr2012/EDF\\_DDR2012\\_017\\_va.pdf](http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2013/ddr2012/EDF_DDR2012_017_va.pdf)>.

10. “Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply.” Federal Ministry of Economics and Technology. (2010). 3 Feb. 2014. <[http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/energiekonzept\\_bundesregierung\\_en.pdf](http://www.bmub.bund.de/fileadmin/bmu-import/files/english/pdf/application/pdf/energiekonzept_bundesregierung_en.pdf)>.
11. “Energy Policies of IEA countries: Germany.” France: IEA Publications, 2013.
12. “Energy Policies of IEA countries: France.” France: IEA Publications, 2009.
13. Energy roadmap 2050.” European Commission. (2012). 19 Apr. 2014. <[http://ec.europa.eu/energy/publications/doc/2012\\_energy\\_roadmap\\_2050\\_en.pdf](http://ec.europa.eu/energy/publications/doc/2012_energy_roadmap_2050_en.pdf)>.
14. “Energy 2020 – A strategy for competitive, sustainable and secure energy.” European Commission (2011). 15 Oct. 2013. <[http://ec.europa.eu/energy/publications/doc/2011\\_energy2020\\_en.pdf](http://ec.europa.eu/energy/publications/doc/2011_energy2020_en.pdf)>.
15. “E.ON Facts & Figures.” Eon. (2014). 28 Apr. 2014. <[https://www.eon.com/content/dam/eon-com/ueber-uns/publications/Facts\\_and\\_Figures\\_2014.pdf](https://www.eon.com/content/dam/eon-com/ueber-uns/publications/Facts_and_Figures_2014.pdf)>.
16. “E.On 2011 Annual Report.” Eon (2011). 28 Apr. 2014. <[http://www.eon.com/content/dam/eon-com/en/downloads/e/E.ON\\_2011\\_Annual\\_Report.pdf](http://www.eon.com/content/dam/eon-com/en/downloads/e/E.ON_2011_Annual_Report.pdf)>.
17. “Europeans and Nuclear Safety Report.” European Commission. (2010). 15 Mar. 2014. <[http://ec.europa.eu/energy/nuclear/safety/doc/2010\\_eurobarometer\\_safety.pdf](http://ec.europa.eu/energy/nuclear/safety/doc/2010_eurobarometer_safety.pdf)>.
18. Fukushima, Yuka. “Implication of the determinant of energy policy: The case study of Nuclear power in Germany and France.” 2011.
19. Grimmel, Andreas. The difficulties in negotiating a joint European energy policy might ultimately help drive the transition to renewable energy sources. Andreas Grimmel, August 2013. Web. 18 Dec. 2013. <<http://www.andreas-grimmel.de/difficulties-in-negotiating-a-joint-european-energy-policy-might-ultimately-help-drive-the-transition-to-renewables/>>.
20. Goebel, Nicole. “Hollande's Franco-German energy proposal criticized.” Deutsche Welle. 16 January 2014. 10 Feb. 2014. <<http://www.dw.de/hollandes-franco-german-energy-proposal-criticized/a-17363675>>.

21. Henze, Tobias. "Nuclear power in Germany – History and future prospects." GRIN Publishing, Munich, 2012.
22. "Impact of Japan Earthquake on views about nuclear energy." NRC (2011). 15 Mar. 2014. < [http://www.nrc.co.jp/report/pdf/110420\\_2.pdf](http://www.nrc.co.jp/report/pdf/110420_2.pdf) >.
23. Keil, Jan. "The German Energy Transition – Issues and Perspectives." AICGS (2012). 3 Apr. 2014. < <http://www.aicgs.org/site/wp-content/uploads/2013/02/The-German-Energy-Transition-Keil-FINAL3.pdf> >.
24. Kersten, Jens et al. "Europe After Fukushima German Perspectives on the Future of Nuclear Power." Rachel Carson Center, 2012 (1).
25. Linkohr, Rolf. "German Energy Policy. London, the Uranium Institute 24th Annual Symposium." 1999.
26. "Official Journal of the European Union." European Central Bank (2007). 21 Oct. 2013. < [https://www.ecb.europa.eu/ecb/legal/pdf/en\\_lisbon\\_treaty.pdf](https://www.ecb.europa.eu/ecb/legal/pdf/en_lisbon_treaty.pdf) >.
27. "Official Journal of the European Union." Council of the European Union, (2012). 21 Oct. 2013. < <http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%206655%202008%20REV%207> >.
28. Marignac, Yves. Nuclear power, the great illusion. Promises, setbacks and threats. Global Change, 2008.
29. Matveeva, Angelika. Nuclear industry of Germany: Forward to the past? Russia: Security Index. Vol. 14 № 2 (85).
30. "Major Shareholders." EDF, (2012): 276. 27 Apr. 2014. < [http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2012/ddr2011/EDF\\_DDR2011\\_017\\_va.pdf](http://shareholders-and-investors.edf.com/fichiers/fckeditor/Commun/Finance/Publications/Annee/2012/ddr2011/EDF_DDR2011_017_va.pdf) >.
31. McKillop, Andrew. "Germany will dilute – not abandon – its Energiewende plan." EU energy policy blog. 22 September 2013. 16 Mar. 2014. < <http://www.energypolicyblog.com/2013/09/22/germany-will-dilute-not-abandon-its-energiewende-plan/> >.

32. “Nuclear Power in France.” World Nuclear Association. Feb. 2014. 28 Apr. 2014. <<http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/France/>>.
33. “Nuclear share of electricity generation in 2013.” PRIS. 26 Apr. 2014. Web. 13 Nov. 2013. <<http://www.iaea.org/pris/WorldStatistics/NuclearShareofElectricityGeneration.aspx>>.
34. “One-fifth of total EU budget to be spent on climate action.” European Commission. 19 Nov. 2013. 19 Apr. 2014. <[http://ec.europa.eu/clima/news/articles/news\\_2013111901\\_en.htm](http://ec.europa.eu/clima/news/articles/news_2013111901_en.htm)>.
35. “Opposition to Nuclear Energy Grows: Global Poll.” GlobeScan (2011). 15 Mar. 2014. <<http://www.globescan.com/commentary-and-analysis/press-releases/press-releases-2011/127-opposition-to-nuclear-energy-grows-global-poll.html>>.
36. « Ouverture de la conférence de presse du président de la République au palais d l’Élysée le 14 février 2014. » Élysée. Présidence de la République. 14 January 2014. 10 Feb. 2014. <<http://www.elysee.fr/declarations/article/ouverture-de-la-conference-de-presse-du-president-de-la-republique-au-palais-de-l-elysee-le-14-janvier-201/>>.
37. “Principales decisions du 16eme conseil des ministres Franco-Allemand.” Le service de presse presidence de la republique. 19 Feb. 2014. 3 Mar. 2014. < [http://www.france-allemande.fr/IMG/pdf/Conseil\\_des\\_ministres\\_franco-allemand\\_-\\_Principales\\_decisions\\_-\\_190214.pdf](http://www.france-allemande.fr/IMG/pdf/Conseil_des_ministres_franco-allemand_-_Principales_decisions_-_190214.pdf)>.
38. Rahul Sastry and Bennett Siegel. The French Connection: Comparing French and American Civilian Nuclear Energy Programs. *Stanford Journal of International Relations*, Vol. XI | No. 2, 2010 (Spring).
39. « Rapport au Parlement Programmation pluriannuelle des investissements de production d’électricité. Période 2009 – 2020. » (Ministre de l’Ecologie, du Développement durable et de l’Energie, 2009).
40. Schneider, Mycle. Nuclear power and the French energy transition: It’s the economics, stupid! *Bulletin of the Atomic Scientists*, 2013.
41. Schreurs, A Miranda. “The politics of phase-out.” Bulletin of the Atomic Scientists (2012):
32. EBSCOhost, AUCA Lib., Kyrgyzstan. 22 Oct. 2013.



<<http://ldb.auca.kg:2688/ehost/pdfviewer/pdfviewer?sid=ab25cf11-db09-467a-b3a4-73bff6ad9128%40sessionmgr4004&vid=1&hid=4204>>.

42. “Study shows E.ON is not in a dominant market position.” Eon. 21 Oct. 2010. 28 Apr. 2014. < <http://www.eon.com/en/media/news/press-releases/2010/10/21/study-shows-e-dot-on-is-not-in-a-dominant-market-position.html>>.

43. “The costs of the nuclear power sector.” Cour des Comptes (2012). 3 Apr. 2014. < [http://www.ccomptes.fr/content/download/43709/697228/version/2/file/thematic\\_public\\_report\\_costs\\_nuclear\\_power\\_sector\\_012012.pdf](http://www.ccomptes.fr/content/download/43709/697228/version/2/file/thematic_public_report_costs_nuclear_power_sector_012012.pdf) >.

44. Thierry Chopin and Foucher Michel. Schuman Report on Europe, State of the Union 2013. Verlag Springer, 2013.

45. “2011 full-year results: Solid results and commitments upheld amid a troubled environment

46. Excellent industrial performance.” EDF. (2012). 28 Apr. 2014. < [http://www.edfenergy.com/media-centre/press-news/EDF\\_Group\\_2011\\_results.pdf](http://www.edfenergy.com/media-centre/press-news/EDF_Group_2011_results.pdf)>.

47. “2030 framework for climate and energy policies.” European Commission. (2014). 19 Apr. 2014. <[http://ec.europa.eu/clima/policies/2030/index\\_en.htm](http://ec.europa.eu/clima/policies/2030/index_en.htm)>.