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國際學碩士學位論文

**Nuclear Energy vs. Safety:
Germany's Decision to Phase-out its Nuclear Energy after the
Fukushima Incident**

후쿠시마 사태 이후 독일의 핵 에너지 포기
결정에 관한 연구

2014年08月

서울대학교國際大學院

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**Nuclear Energy vs. Safety:
Germany's Decision to Phase-out its Nuclear Energy after
the Fukushima Incident**

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Graduate Program in International Cooperation
For the degree of Masters of International Studies

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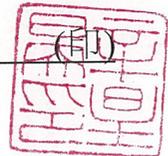
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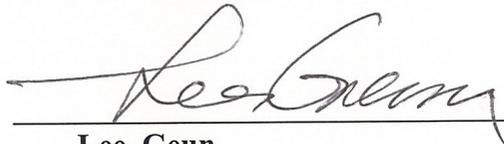
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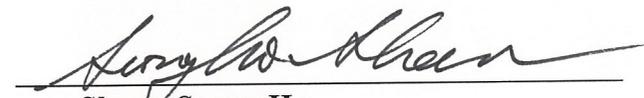
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ABSTRACT

Nuclear Energy vs. Safety:

Germany's Decision to Phase-out its Nuclear Energy after the Fukushima Incident

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This thesis investigates the causes behind Germany's most recent nuclear phase-out decision in that causal relationship on this decision is not clearly identified. In this sense, it uses three independent variables—public opinion, political dynamics, and the existence of alternatives—to explain policy outcome and the Fukushima accident is considered as the externally driven factor which provides an opportunity for nuclear energy policy change. Thereby, this study offers key implications for understanding Germany's nuclear phase-out decision. First, the most compelling factor for nuclear phase-out was the state election results in 2011. It fertilized the nuclear phase-out decision of Christian Democratic Union (CDU) because the party lost a key state that it had never lost in 58 years. Second, anti-nuclear movement expanded their influence to German society and its argument gradually soaked into the public. This trend met the Fukushima accident and the public strongly required nuclear phase-out. Third, the Green Party entered into the political system with providing a political channel for anti-nuclear advocates and the Social Democratic Party (SPD) changed their position to nuclear phase-out. Lastly, growth of renewable energy sources made nuclear phase-out possible because it could substitute electricity production of nuclear energy. Thus, the Fukushima accident provided an opportunity for Germany to implement nuclear phase-out policy, and its political situation and historical experience fertilized phase-out decision.

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Keywords: Public Opinion, Political Dynamics, Existence of Alternatives, State Election Results,
Nuclear Phase-out

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I. Introduction

In 1973, countries in Europe were led to reconsider their energy policy when the First Oil Crisis posed a threat to their energy security. In 1979, the Second Oil Crisis, which was accompanied by an international economic depression, again aroused interest in alternative energy sources to substitute oil sources. These two oil emergencies led to increased attention in nuclear energy, which was considered a way to decrease oil dependency. Although constructing new nuclear power plants required high fixed costs, these power plants could produce electricity at relatively cheaper prices once construction was complete. European countries' interest in increasing energy supplies from nuclear sources continued to grow, and many states decided to expand the construction of new nuclear power plants to ensure energy security.

However, the aftermath of the Chernobyl accident influenced opinions on nuclear energy. People became more aware of the possibility of nuclear accidents and the consequent radioactive contamination and side effects, and negative perceptions about nuclear energy continued to grow. People were afraid of nuclear energy, and decision-makers were forced to consider the negative aspects of operating nuclear power plants.

During the two energy crises, Germany followed the international trend of operating nuclear power plants to match domestic energy consumption. However, the Chernobyl accident shifted Germany's perspective on nuclear energy usage. The nation was swept up into controversy about the merits of using nuclear energy, and the German public was highly influenced by the Chernobyl accident, which brought radioactive dust into German territories.

Between 2000 and 2010, many countries saw nuclear energy as a reliable future energy source that could lead to energy independence. This decade was called the Nuclear Renaissance, which saw many countries maintaining their positive position on nuclear energy. However, Germany alone reconstructed its energy policy to implement a phase-out policy and search for new alternative energy sources. Although Germany realigned its policy to the pro-nuclear camp in 2010, the Fukushima accident again reversed its political decisions. Even among countries that declared a

moratorium on nuclear power plant operation, Germany had fast and unique plans. It declared an era without nuclear power, rather than follow the trend of maintaining nuclear power plants with strengthened safety measures. Germany was an outlier in nuclear energy policy.

It was not clear to the German government how necessary nuclear energy truly was. The political decisions surrounding nuclear energy were influenced by dissensions among various agents involved. Before the Fukushima accident, 20% of Germany's electricity was produced by nuclear power plants, and the German economy was highly dependent on the energy-intensive manufacturing industry. Proponents of nuclear energy worried about blackouts and expressed apprehension about the possibility of rising electricity prices after the implementation of the nuclear phase-out policy. They argued that nuclear energy sources should be used to prevent anticipated energy problems. In contrast, opponents of nuclear energy raised issues of safety, claiming that technology used at nuclear power plants was far from perfect, and that the highly radioactive waste was too great of a risk. Amid this controversy, only one thing was clear: Germany had bid farewell to the nuclear era. What factors influenced this decision?

For most countries, energy security was contingent on being able to harvest energy from a variety of sources. However, political elites tasked with making energy decisions were influenced by various stakeholders, as well as each country's specific circumstances and national-level factors. Although some criticized Germany's phase-out policy as being too radical and risking energy security, the decision was the result of carefully considered options, both rational and emotional.

The causes of policy change cannot be illustrated in a simple way, because it does not take place in a file. It is impossible to make policy decisions on a rational-choice basis because there is no way to foresee all possible outcomes. The decisions are made by weighing diverse factors such as the political system, severe accidents, interest group pressures, the background of political elites, and political culture. Policy change on nuclear energy is particularly complex because industrial, civil, and political interests are all different from one another. Industrial powers want to maintain power plant usage because they hope to gain as much profit as possible from their large initial investments in building the power plants. Citizens, particularly those living near power plants, fear for their safety.

Politicians, who make the ultimate decisions, receive pressure from society because they must maintain enough public support to succeed in the next elections. There is no clear-cut way to determine which factors were instrumental in leading to a decision.

Over the years, scholars have offered insight on the process of determining Germany's nuclear energy policy, and its implications. Before 1998, Joppke's article discussed the wide social movement against nuclear energy after the Chernobyl accident in terms of public, government, and protest movements.¹ The article mainly focused on anti-nuclear movements, diminishing the role of utility providers in nuclear energy policy. Hatch's article proposed an institutional role in nuclear energy policy by arguing that Germany's institutional characteristics were closer to pluralism than corporatism.² Hatch argued that the institutional framework influenced Germany's nuclear energy policy-making process, and that Germany's characteristics of pluralism allowed a painless process of nuclear policy change. Jahn's comparative study on the nuclear energy policies of Sweden and Germany took into consideration both anti-nuclear movements and energy mix conditions.³ The article argued that the political system in Germany was more open than that of Sweden, and that the anti-nuclear option had a louder voice. Blowers and Lowry's article argued that the anti-nuclear movement contributed to reprocessing prohibition of nuclear power plants, focusing on the Gorleben case because it was selected for high radioactive waste disposal storage.⁴ These articles were insightful in terms of understanding the influence of the anti-nuclear movement in a German context. However, these articles are limited in their explanatory power because they mainly focus on the anti-nuclear movement rather than on political dynamics.

After 2000, when the first nuclear phase-out policy emerged in Germany, Rüdig explained the political negotiation of the nuclear phase-out policy among different parties.⁵ The article

¹Christian Joppke, "Nuclear power struggle after Chernobyl: The case of West Germany," *West European Politics* 13, no. 2 (1990): 178-191.

²Michael T. Hatch, "Corporatism, pluralism and post-industrial politics: Nuclear energy policy in West Germany," *West European Politics* 14, no. 1 (1991): 73-97.

³Detlef Jahn, "Nuclear power, energy policy and new politics in Sweden and Germany," *Environmental Politics* 1, no. 3 (1992): 383-417.

⁴Andrew Blowers and David Lowry, "Nuclear conflict in Germany: The wider context," *Environment Politics* 6, no. 3 (1997): 148-155.

⁵Wolfgang Rüdig, "Phasing out nuclear energy in Germany," *German Politics* 9, no. 3 (2000): 43-80.

contributed to clarifying the specific political interests of the Green Party and how its contentions were soaked into the nuclear phase-out policy. His other article “Germany” also focused on the Green Party’s evolution and explained why their hard-liners’ nuclear energy policy was not chosen.⁶ It clearly identified how moderate opinion was chosen in determining Germany’s nuclear energy policy. Hunold explained the key factors in determining the nuclear phase-out policy by analyzing the relationship between the state and the society.⁷ His article also spotlighted radical and moderate arguments within the Green Party. Mez and Piening analyzed the phase-out policy in the Red-Green coalition government and argued that the phase-out decision leaned towards the nuclear industry’s interests.⁸ This article suggested that the operation of nuclear power plants was still guaranteed in the Atomic Energy Act. Most of these articles focused on analyzing the Green Party, and they overlooked the impact of the growing renewable energy sector, which could serve as a substitute for nuclear energy sources.

Jahn and Korolczuk’s recent study about Germany’s nuclear energy policy changes after the Fukushima accident provided a chronological overview of the nuclear phase-out policy.⁹ They argued that the waste problem, the Chernobyl accident, and the Green Party were the main causes for choosing phase-out policies. This article, however, was weak in that it did not connect the Chernobyl experience to the recent phase-out decisions. Rather, it only examined the relationship between the decision of the Red-Green coalition government and the nuclear phase-out policy. Jin and Park explained Germany’s nuclear energy policy by adopting the agenda-setting framework and comparing the nuclear energy policies in Germany and Korea.¹⁰ This article argued that the core cause for the nuclear phase-out policy in Germany after the Fukushima accident was Chancellor Merkel’s personal background in physics. Her knowledge about the safety measures of the nuclear power plant crumbled

⁶Wolfgang Rüdig, “Germany,” *Environment Politics* 11, no. 1 (2002): 78-111.

⁷C. Hunold, “Profile-Nuclear Waste in Germany: Environmentalist Between State and Society,” *Environmental Politics* 10, no. 3 (2001): 127-133.

⁸Lutz Mez and Annette Piening, “Phasing-out Nuclear Power Generation in Germany: Policies, Actors, Issues and Non-issues,” *Energy & Environment* 13, no. 2 (2002): 161-181.

⁹Detlef Jahn and Sebastian Korolczuk, “German exceptionalism: the end of nuclear energy in Germany!” *Environmental Politics* 21, no.1 (2012): 159-164.

¹⁰진상현 · 박진희. “한국과 독일의 원자력 정책에 대한 비교연구: 정책 흐름 모형을 중심으로.” 『한국정책학회보』 . 제 21권, 3호, 2012년, 265-289.

her conviction on nuclear safety after the Fukushima incident, because Japan had failed to prevent the meltdown of its nuclear reactor even with high technical standards similar to those of Germany. However, this article put too much emphasis on Merkel's personal background, and did not consider the decision that reversed Germany's nuclear phase-out policy in 2010.

Existing literature on Germany's nuclear energy policy suggests insightful implications to some extent, but most scholars' research remains confined to specific issues. For example, some literature focused on the growth of anti-nuclear movements while overlooking political dynamics. Furthermore, the research focused on a limited time span, precluding cross-time causation analyses in their outcomes. The recent nuclear phase-out decision in Germany should be analyzed through a cross-time framework with comprehensive analysis on the political situation in the country in order to produce a causal relationship.

Some scholars chose to focus on the decision-making process for their theoretical approach in analyzing policy change at the national level. By establishing a theory, they created a logical way to connect causes with outcomes. In the field of political science, three theories are commonly chosen for analyzing national policy decisions. First, Baumgartner and Jones proposed the "punctuated equilibrium theory,"¹¹ which argues that policy change happens when the right conditions are in place with accumulated experiences from the past. Large-scale policy change is the optimal goal, and the role of the media is heavily emphasized. Second, Sabatier and Jenkins-Smith suggested the advocacy coalition theory,¹² which argues that policy change occurs when individual advocates actively coordinate for the same core belief. This theory is more suitable for analyzing interest groups when a political system has clear channels for the groups to gain access to government. Lastly, Cohen, March, and Olsen suggested the garbage can model to analyze policy change.¹³ This model noted anarchic aspects when policy-makers draw up policy. Kingdon further developed Cohen's model and proposed

¹¹Frank R. Baumgartner and Bryan D. Jones, "Punctuated Equilibria in Politics," in *Agendas and Instability in American Politics*, ed. Frank R. Baumgartner and Bryan D. Jones, (Chicago: University of Chicago Press, 1993), 3-24.

¹²Paul A. Sabatier, and Hank C. Jenkins-Smith, "The Advocacy Coalition Framework: An Assessment," in *Theories of the policy process*, ed. Paul A Sabatier. (Boulder, Colo.: Westview Press, 1999), 117-166.

¹³Michael D. Cohen, James G. March, and Johan P. Olsen, "A Garbage Can Model of Organizational Choice," *Administrative Science Quarterly* 17, no. 1 (1972): 1-25.

the policy window theory, or agenda-setting theory.¹⁴ According to this theory, policy change is likely to happen when problem, policy, and political streams meet in the policy window opportunity. Also, the internal capacity to implement practical action is a significant factor when there are policy change opportunities. Each theory has its advantages and limitations, as no one theory can contain each aspect of complex policy change. Nonetheless, these theories can help investigators to organize their arguments in a logical way.

This thesis investigates the causes behind Germany's most recent decision on nuclear energy usage and adopts the policy window theory to apply the three streams of problem, politics, and policy. By using this theory, it uses three independent variables to explain policy outcome and is roughly divided into three areas – public opinion, political dynamics, and the existence of alternatives. The thesis is organized as follows.

Chapter II explains the theoretical and analytical framework being used. Chapter III describes the settlement before the Chernobyl accident in order to identify antecedent conditions. It also observes the outcome of the amendment of the Atomic Energy Act and analyzes the factors that made it possible for the nuclear phase-out policy to be implemented in the Red-Green coalition government. Chapter IV defines the reasons for the rapid decision on the nuclear phase-out policy. The nuclear lifetime extension policy in 2010 is discussed in depth, and previous acts are analyzed to explain the rapid phase-out. Chapter V provides a conclusion, and explains the key implications of the study.

II. Methodology

1. Process Tracing

¹⁴John W. Kingdon, "Agendas, Alternatives, and Public Policies," (New York: Harper Collins College, 1995).

Various methodologies exist when writing a political science thesis. This thesis does not implement the large-n analysis due to the variety of policy changes in Germany. That is, large-n studies are more relevant for exploring the correlation between independent and dependent variables. In contrast, a case-study observing the specific causal relation between the variables could provide a better understanding of the specific values of each variable. Thus, this thesis focuses on a case-study analysis to observe the causes that influence nuclear energy policy change in Germany by exploring the causal relationship between the variables.

This thesis also attempts to infer antecedent conditions by using the process tracing procedure. Germany is an outlier case in the realm of states that use nuclear power as an energy source for electricity production. Moreover, the dynamics of nuclear energy policy fits into a large variance of values among the variables within the case.

Process tracing is useful for investigators to observe and explore decision-making processes because outcome is a translation of different processes which are affected by initial conditions.¹⁵ It is a useful tool to identify causal relationships in that it can ascertain divided smaller processes which affect outcome. Process tracing, within the boundary of the cases' structure, is an adequate method to apply in single case studies because it can trace elements of actors' decision in a sequential and orderly form.¹⁶ Hence, this thesis will follow this process in order to answer why Germany decided to make radical policy changes and also to identify what the conditions were in helping or leading to its nuclear phase-out policy.

2. Theoretical Framework

Policy change is a complex and complicated process in which various factors play a role, and this is more so the case for nuclear energy policy. This is because the opinions of many stakeholders such as

¹⁵ Stephen van Evera, "What are the Case Studies? How Should They Be Performed?" in *Guide to Methods for Students of Political Science*, ed. Stephen van Evera, (Ithaca: Cornell University Press, 1997), 64.

¹⁶Ibid., 65.

governments, parties, interest groups, and the public affect the policy. Due to the complexity of the nuclear energy policy, it is important that the issue be analyzed in a framework of theory which provides clear and simple findings for the political decision.

The theoretical approaches applicable to analyzing policy change in political science are largely classified into two pillars: the 'coalition' theory, which advocates the coalition approach, and the 'policy window' theory, or agenda setting. The two political science theories that examine policy change each have advantages and limitations. This thesis focuses on the latter approach to investigate Germany's recent nuclear energy policy change.

To justify adopting the 'policy window' theory, it is important to first cognize the limitations of the advocacy coalition theory. The advocacy coalition framework, created by Paul Sabatier, derives its view in policy outcome from coalition competition, which advocates the policy problem and solution.¹⁷ As society rapidly becomes more complex with modernization, political decision-makers tend to form and lean towards a political subsystem that they can associate with. The advocacy coalition framework focuses on policy change within the boundaries of a political subsystem which includes individuals, collections of state actors, big industry associations, interest groups, NGOs, researchers, politicians, and journalists.¹⁸

To analyze policy change in a broader sense, the advocacy coalition framework has several limitations. First, while it focuses on the subsystem, it undermines the main policy system. As Sabatier himself later pointed out, the theory has a generalization problem in that although the theory is applicable to most OECD countries, it is inappropriate for countries with a parliamentary political system because the framework was first developed in the context of American politics.¹⁹ The framework also cannot be utilized by multi-party political systems.²⁰ Second, it underestimates not only the collective action problem but also the political opportunity structure. Moreover, not only does

¹⁷Paul A. Sabatier, "An advocacy coalition framework of policy change and the role of policy-oriented learning therein," *Policy Science* 21 (1988): 129-168.

¹⁸Paul A. Sabatier, and Hank C. Jenkins-Smith, "The Advocacy Coalition Framework: An Assessment," in *Theories of the policy process*, ed. Paul A Sabatier. (Boulder, Colo.: Westview Press, 1999), 117-166.

¹⁹Paul A. Sabatier, "The advocacy coalition framework: revisions and relevance for Europe," *Journal of European Public Policy* 5, no. 1 (1998): 98-130.

²⁰Daniel Kübler, "Understanding policy change with the advocacy coalition framework: an application to Swiss drug policy," *Journal of European Public Policy*, 8, no. 4 (2001): 627.

this framework fail to clarify how the social movement had occurred, but also, as Kübler suggests, the “advocacy coalition framework gives little sense of what ‘stable system parameters’ actually shape these venues, and of how they do it.”²¹

The analysis of Germany’s energy policy change in terms of the advocacy coalition framework suggests some important implications and limitations. First, Germany’s political system is a parliamentary system and this multi-party system causes frequent party coalition, and thus advocacy coalition theory is not a good framework for Germany’s political system. Second, policy change requires the occurrence of external system events as a prerequisite. In Sabatier’s theory, external system signifies the state’s main political system such as political parties and the government.. Third, even with the external system, the advocacy coalition framework is insufficient to conduct a deep enough analysis on Germany’s nuclear energy policy change, at least in terms of how it was processed in the governmental level. Thus, the advocacy coalition framework only deliberates certain limited aspects and Germany’s case-study will require the implementation of another theory.

Kingdon suggests another approach, policy window theory, to examine policy changes, _____. This model was inspired by the ‘garbage can model’ which was argued by Cohen, March, and Olsen.²² The ‘garbage can model’ tries to expand the decision-making spectrum from the orderly decision theory to an organization anarchy which is characterized by problematic preferences. The key implication of the ‘garbage can model’ is that it separates important streams which consist of the problem, solution, and decision-maker. Each stream has an independent flow, and in certain events, it gathers in a ‘garbage can’ in which an outcome results.

To understand Kingdon’s agenda setting theory, one must distinguish between the government agenda, decision agenda, and alternatives. The government agenda has a larger spectrum than that of the decision agenda. Whereas the government agenda is a list of agendas that demands attention, the decision agenda, among the list of agendas, results in an active action which leads to a

²¹Ibid., 629.

²² Michael D. Cohen, James G. March, and Johan P. Olsen, "A Garbage Can Model of Organizational Choice," *Administrative Science Quarterly* 17, no. 1 (1972): 1-3

solution.²³ Alternatives are also important for decision-makers. Without alternatives, decision-makers keep themselves aloof from making governmental actions when problems occur.²⁴

‘Policy windows’ is a key definition to understand policy change mechanism. Just as the garbage can model asserts that separated independent streams gather to make a policy change, Kingdon’s theory also argues that three independent streams, the problems, policies, and political streams gather together and influence policy change.²⁵ As Kingdon mentions, “policy window is an opportunity for advocates of proposals to push their pet solutions, or to push attention to their special problems.”²⁶ The difference between the ‘garbage can’ model and ‘policy window’ theory lies in dealing with anarchic organization. While the former places emphasis on anarchy, the latter focuses on organization.²⁷

Then, how do ‘policy windows’ open? What is the definition and component of each stream? To explain ‘policy window,’ Kingdon argues three independent streams: the problem, policy, and political streams. First, the problem stream is formed when the decision-maker defines and recognizes a problem by an indicator change and occurrence of focusing events such as crisis or feedback from people.²⁸ In this stream, not only are indicators themselves important but the interpretation of politicians or governmental officials are also significant. Focusing events can be seen throughout historic events such as oil crises and economic depressions among others. Feedback includes official and unofficial feedback that government officials receive. Budget also has a leverage effect on certain issues or agendas.

Second, the policy stream refers to ideas, perspectives, and suggestions that attempt to address problems. Many ideas by various specialists such as public administrators, researchers,

²³ John W. Kingdon, “How Does an Idea’s Time Come?” in *Agendas, Alternatives, and Public Policies (Second Edition)*, ed. John W. Kingdon. (New York: Harper Collins College, 1995), 2-4.

²⁴ *Ibid.*, 4.

²⁵ *Ibid.*, 16-18.

²⁶ John W. Kingdon, “The Policy Window, and Joining the Streams” in *Agendas, Alternatives, and Public Policies (Second Edition)*, ed. John W. Kingdon. (New York: Harper Collins College, 1995), 165.

²⁷ Reimut Zohnhöfer and Nicole Herweg, “Explaining paradigmatic change in German labor market policy. A multiple streams” (Paper prepared for the Workshop “The Politics of Labour Market Policy in Times of Austerity” at the ECPR Joint Sessions of Workshops 2012. Antwerp, April 11-13, 2012).

²⁸ John W. Kingdon, “Problems” in *Agendas, Alternatives, and Public Policies (Second Edition)*, ed. John W. Kingdon. (New York: Harper Collins College, 1995), 90-115.; Sarah Stachowiak, “Pathways for Change: 6 Theories about How Policy Change Happens,” *Organizational Research Service*, (2009): 8.

academics, and analysts of interest groups flow around a government. After they interact with each other, all the different ideas recombine.²⁹ An important process of the policy stream is the generation of alternatives which compete with each other and result in the narrowing of alternatives.

Lastly, the political stream is where governmental agendas are formulated. It includes factors such as national mood, party coalition, changes in administration officials, and election result.³⁰ The political stream has a powerful influence on the agenda because it is related to enactment. Policymakers who react sensibly to national mood are more likely to be elected. A policy change is not only affected by changes of government officials, especially the president or ministers, but also by the way in which the priority of their ideas changes.³¹ Along with its dynamics, consensus building in the political stream is realized by the bargaining process.³² A bargaining process is part of the foundation of the give and take mechanism in the political stream discussion processes.

‘Policy windows’ can be opened either by the problem stream or the political stream and may occur predictably or unpredictably.³³ A ‘policy window’ opens when a problem is pressing and the policy-maker recognizes this either by the occurrence of a new problem or by a situation shift changes existing definitions of the problem. Moreover, it can arise by a shift in national mood, member change of Congress, and other modifications in circumstances in the political stream. On the one hand, predictable windows are renewed on a regular basis such as in budget cycles or reform cycles. On the other hand, unpredictable windows occur as a result of, for example, grave accidents that affect consciousness of the public and decision-makers.³⁴

From Kingdon’s perspective, a policy change occurs when the three independent streams converge and opens a ‘policy window.’³⁵ For a policy change to arise, at least two streams should

²⁹John W. Kingdon, “The Policy Primeval Soup” in *Agendas, Alternatives, and Public Policies (Second Edition)*, ed. John W. Kingdon. (New York: Harper Collins College, 1995), 116-144.

³⁰John W. Kingdon, “The Political Stream” in *Agendas, Alternatives, and Public Policies (Second Edition)*, ed. John W. Kingdon. (New York: Harper Collins College, 1995), 145-164.

³¹ *Ibid.*, 153-154

³² *Ibid.*, 159-161

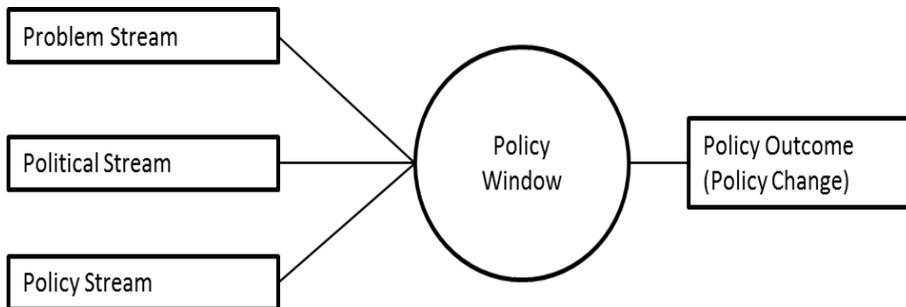
³³John W. Kingdon, “The Policy Window, and Joining the Streams” in *Agendas, Alternatives, and Public Policies (Second Edition)*, ed. John W. Kingdon. (New York: Harper Collins College, 1995), 173-175.

³⁴ *Ibid.*, 186-189

³⁵ Joanne D. Eustis, “Agenda-Setting the Universal Service Case” (PhD diss., University of Virginia, 2000), 21-23.

converge at the ‘policy window’ and the policy change is most successful when three streams come together.³⁶ In sum, the problem or political streams open the ‘policy window’ and policy change is more likely to happen when the policy stream couples with the two other streams.

<Figure 1>-Mechanism of the Three Streams and Policy Window



Source: By author. (Based on the John W. Kingdon’s “Agendas, Alternative, and Public Policies.”)

3. Analytical Framework

To investigate the reason for Germany’s sudden change of nuclear energy policy, one must draw an exquisitely organized analytical framework. A common agreed feature of the two theories is that policy change can be realized when a political field decides to adopt the changed policy. Advocacy coalition framework, for example, requires the prerequisite of an external system that includes socio-economic change, public opinion and government coalition. Agenda-setting also argues that policy change requires a political stream that contains elections, administration change, and party coalition.

Before structuring the analytical framework, this paper assumes that Germany’s political system has sufficient conditions to form its political opportunity. A political opportunity tends to be more open when a state is decentralized in terms of territory, has a higher degree of separation of power in terms of political system functions, has a multi-party system, and has democratic

³⁶ Sarah Stachowiak, “Pathways for Change: 6 Theories about How Policy Change Happens,” *Organizational Research Service*, (2009): 8.

procedures.³⁷ Germany's political system features are federalism, a parliamentary system, and a multi-party system.³⁸ Thus, it is reasonable to assume that Germany has sufficient conditions to form its political opportunity.

Then, what features should be taken into account in Germany's nuclear energy policy? In other words, in adapting features to the theoretical framework, which independent variable has high values to examine the nuclear energy policy change? First of all, antecedent conditions before the Chernobyl accident will be explained to clarify settlements that Germany had. Then, public opinion will be taken as the first independent variable to the nuclear energy policy change. Anti-nuclear demonstrations and movements will affect the political sphere and contribute to nuclear energy policy to some extent. The second independent variable is the political dynamics which can render nuclear energy policy change. Germany is a multi-party and parliamentary system in which many policies are highly dependent on regular election results, the governing party coalition, and past enacted laws. The last independent variable is the existence of alternatives. If no alternative exists that can substitute current nuclear energy production, the policy-maker would be skeptical to assert a nuclear phase-out.

This thesis, furthermore, divides the nuclear energy policy into two phases. The first phase starts from the Chernobyl accident and ends with the Social Democrat Party and Green Party coalition government (Red-Green coalition) which amended the Atomic Energy Act. The second phase starts from the end of first phase to the nuclear energy phase-out declaration after the Fukushima accident. Following these phases, the first phase policy outcome is not only a dependent variable but also an independent variable in the second phase.

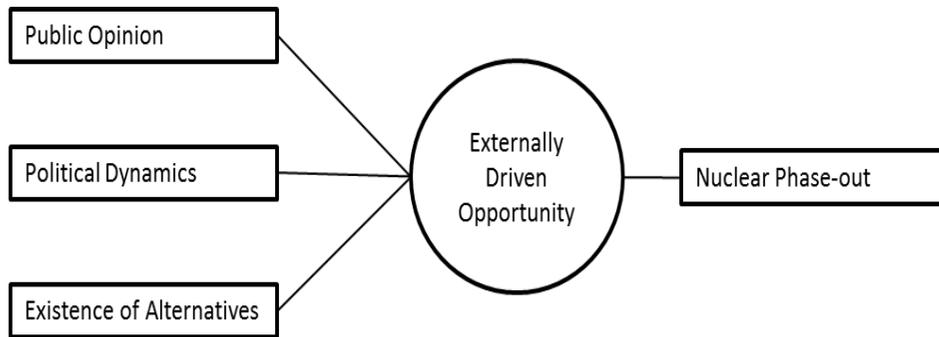
All in all, this thesis mostly uses the theoretical framework of 'policy window.' Moreover, to examine the reasons for the recent nuclear energy policy change, it firstly searches for antecedent conditions. It also sets three different independent variables: public opinion, political dynamics, and existence of alternatives. Furthermore, Germany's recent nuclear energy policy will be analyzed

³⁷Hanspeter Kriesi et al., "Institutional Structures and Prevailing Strategies," in *New Social Movements in Western Europe: A Comparative Analysis*, ed. Hanspeter Kriesi et al. (Minneapolis: University of Minnesota Press, 1995), 26-52.

³⁸Russel J. Dalton, "Politics in Germany" in *Comparative politics today: a world view (Seventh edition)*, ed. Gabriel A. Almond. (New York: Longman, 2002), 257-307.

within two divided phases.

<Figure 2>-Analytical Framework



Source: By author.

III. Analysis on Germany’s Nuclear Energy Policy: Chernobyl to Red-Green Coalition

1. Before the Chernobyl: What was settled?

First Oil Crisis and Nuclear Acceptance

The 1970s were a painful time for international society in terms of energy. The 1973 first oil embargo was implemented by the Organization of Petroleum Exporting Countries (OPEC), resulting in a world economy crisis. Before the crisis, many developed countries were enjoying cheap oil prices which led to an oil-based economy. However, OPEC decided to raise the price of crude oil from \$1 per barrel to \$5.11 per barrel in 1973.³⁹

Before the first oil crisis, Germany’s energy policy was tied with coal because it could be extracted indigenously. For example, in 1950, domestically, the coal sector was responsible for

³⁹ Daniel Yergin, “The Oil Weapon,” in *The Prize: The Epic Quest for Oil, Money & Power*, ed. Daniel Yergin (New York: Simon & Schuster, 2009), 587.

500,000 jobs for employment.⁴⁰ The world paradigm shifted from coal to oil due to cheap oil prices which resulted in a gradual loss of competitiveness of Germany's coal source. As a result, the coal energy sector became smaller through the 1960s and many existing mines were shut down.

Cheap oil prices brought about another characteristic to Germany. Its energy mix changed and it became more dependent on oil exporting countries. Once, in 1957, oil only consisted of 6 per cent of domestic energy consumption. It rose up to 55 per cent in 1972.⁴¹ This was due to cheap oil prices which had high efficiency compared to other energy resources that existed at the time. Oil was accepted not only as cheap and efficient, but also as an abundant fuel that encouraged economic development.

All situation changed when OPEC realized the oil embargo. It could not be considered as the stable energy resource that was once taken as granted. It was also an important time for Germany's energy policy because it was the first time that Germany perceived vulnerability in oil as a resource. It had a huge impact on Germany's economy and securing an energy supply became the most significant task for German politics. Thus, the concept of energy dependency started to emerge and nuclear power energy came up to the surface in Germany.

Germany's focus on nuclear energy was from an industrial perspective due to the West Germany political situation.⁴² The Atomic Energy Act, which mentions peaceful use of nuclear power, provided the standard scope of using nuclear power and the Act became effective in the 1960s.⁴³ In addition, West Germany's past experience of World War II and its status as a divided country promoted peaceful nuclear energy use. As a result, Germany handled nuclear power so as to promote electricity production in the energy sector, and peaceful nuclear energy usage was developed by various researches with strengthened safety measurements.

Interests in expanding nuclear energy usage in Germany brought about anti-nuclear protest movements which fought against nuclear energy expansion. However, there was no political part

⁴⁰ Michael T. Hatch, "Corporatism, pluralism and post-industrial politics: Nuclear energy policy in West Germany," *West European Politics* 14, no. 1 (1991): 76.

⁴¹ Ibid.

⁴² Ibid., 76-77.

⁴³ DetlefJahn and Sebastian Korolczuk, "German exceptionalism: the end of nuclear energy in Germany!" *Environmental Politics* 21, no. 1 (2012): 159.

representing or supporting the anti-nuclear side. The Social Democratic Party (SPD) was pro-nuclear since the nuclear power plant was first implemented in German territory. Moreover, the Christian Democratic Union (CDU) and Free Democratic Party (FDP) were traditionally consistent in their pro-nuclear position. It was a significant factor that no party was against using nuclear energy in German society.⁴⁴ There was no reliable channel for anti-nuclear supporters to access the political sphere because of Germany's political decision-making system, which, due to corporatist characteristics, was based on consensual principle.⁴⁵

With these internal and external forces, the political movement realized a revision to the original 1973 program. The revised version came out in 1974 and contained ambitious goals. The most significant change was reducing its dependency on oil import. It aimed to reduce its oil energy consumption from 55 per cent to 44 per cent by 1985.⁴⁶ Also, it decided to increase its consumption via expanding nuclear energy from 1 per cent to 15 per cent by 1985.⁴⁷ It seemed to be possible because, at the time, nuclear energy only occupied 4 per cent in electricity production, which did not represent a high ratio and appeared to have more room to expand.⁴⁸

⁴⁴ Christian Joppke, "Nuclear power struggles after Chernobyl: The case of West Germany," *West European Politics* 13, no. 2 (1990): 179.

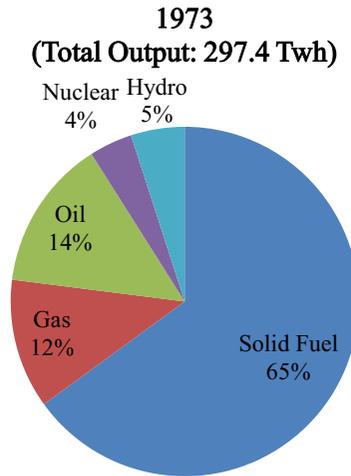
⁴⁵ Wolfgang Streeck and Lane Kenworthy (2005). "Theories and Practices of Neocorporatism," in *The Handbook of Political Sociology*, ed. T. Janoski, R. R. Alford, A. M. Hicks, & M. A. Schwartz, (Cambridge: Cambridge University Press, 2005), 441-443.

⁴⁶ Michael T. Hatch, "Corporatism, pluralism and post-industrial politics: Nuclear energy policy in West Germany," *West European Politics* 14, no. 1 (1991): 77.

⁴⁷ Ibid.

⁴⁸ Detlef Jahn, "Nuclear power, energy policy and new politics in Sweden and Germany," *Environmental Politics* 1, no. 3 (1992): 391.

<Figure 3>-Electricity Production by Fuel in 1973 (Percent in Terra Watt-Hours)



Source: DetlefJahn, “Nuclear power, energy policy and new politics in Sweden and Germany,” *Environmental Politics*, 1, no. 3 (1992): 391.

Second Oil Crisis and Nuclear Acceptance

The second oil crisis provided an aid to pro-nuclear advocates. Once again, oil prices began to increase due to the trigger of the Iranian Revolution and this increase reopened energy security problems. The crude oil price was up to more than \$40 per barrel,⁴⁹ which opened the possibility for nuclear energy to again take its advantageous position. This situation was not alleviated because the Iran-Iraq War was fueling the harsh depression of the world economy. The SPD/FDP government was also having a difficult time managing the economic situation. They tried to strengthen the nuclear energy policy which had been deadlocked through the 1970s because of the unresolved waste disposal problem in Gorleben.⁵⁰

Another important factor was derived from the SPD. The pro-nuclear and anti-nuclear

⁴⁹ MEI Staff, “The 1979 “Oil Shock:” Legacy, Lesson, and Lasting Reverberation,” *The Middle East Institute*, (2009): 10.

⁵⁰ Christian Joppke, “Nuclear power struggles after Chernobyl: The case of West Germany,” *West European Politics* 13, no. 2 (1990): 180.; DetlefJahn and Sebastian Korolczuk, “German exceptionalism: the end of nuclear energy in Germany!” *Environmental Politics* 21, no. 1 (2012): 159.

opinions on nuclear energy usage was clearly divided within the SPD.⁵¹ Chancellor Schmidt himself was pro-nuclear and pushed to construct a nuclear power plant, even though not everyone within the SPD agreed with the Chancellor's idea. The pro-nuclear advocates could claim their opinions because the Chancellor was able to ignore some of the opposition party policy with his decision power. But it did not mean that the anti-nuclear faction within SPD disappeared.⁵² As noted, if Chancellor Schmidt stepped back from the office and failed to manage the opposition, the anti-nuclear faction within the SPD always had the opportunity to assert its position.

The ruling party and the opposition party both were highly sensitive to the nuclear energy issue because the regular Federal election was to be held in 1980. The SPD/FDP government perceived nuclear energy as an alternative source to guarantee energy security in the time of a second oil crisis. Chancellor Schmidt also argued that nuclear energy was essential to ensure German energy security.⁵³ As a result, in 1981, the ruling government pushed the Third Revision of Energy Program which included more familiar standards to use nuclear energy. The revision took the strategy of 'give and take' because it was intended to focus on licensing procedures so as to mitigate waste disposal conflict. With these dynamics in the 1970s, finally the construction of three new power plants was permitted in 1982.⁵⁴ According to Joppke, this was possible because NATO's decision to display nuclear weapons on West Germany took away some concerns from nuclear energy and this curtailed the existing voice power of the Green Party in the political sphere.⁵⁵

However, the government's ambitious movement to build more nuclear power plants was not as fully realized as it was anticipated in its plan. This was because Germany's electricity power consumption growth was far from the government's anticipation. In light of the past incrementing trend, the government supposed that electricity power consumption would rapidly increase; thus, an increase in electricity production was considered to be natural. However, after the second oil shock,

⁵¹ Paul Hockenos, "Angst or Arithmetic: Why Germans are so Skeptical about Nuclear Energy," *Heinrich Boll Stiftung the Green Political Foundation*, (2012): 6.

⁵² Michael T. Hatch, "Corporatism, pluralism and post-industrial politics: Nuclear energy policy in West Germany," *West European Politics* 14, no. 1 (1991): 85.

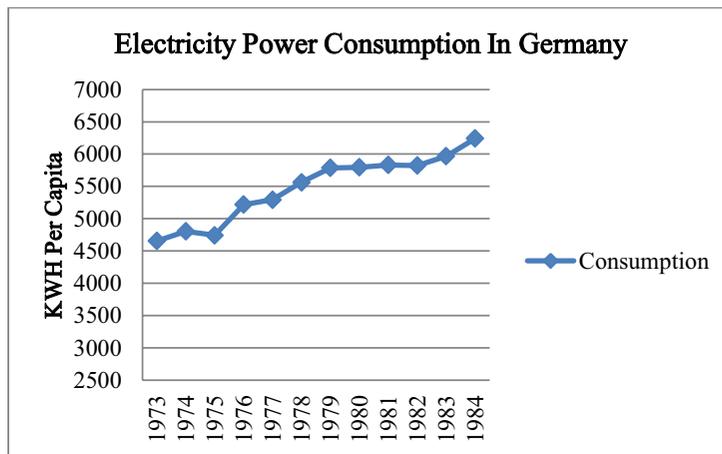
⁵³ *Ibid.*, 84.

⁵⁴ *Ibid.*

⁵⁵ Christian Joppke, "Nuclear power struggles after Chernobyl: The case of West Germany," *West European Politics* 13, no. 2 (1990): 181.

the electricity power consumption in Germany did not increase as much as the government expected. Rather, it appeared to stabilize or increase in a small margin. (Refer to Figure-4) As a result, the scale of the nuclear power plant did not fulfill the government’s initial plan and the Chernobyl disaster in 1986 further fueled the pessimistic viewpoint on nuclear energy usage to the public and the decision-makers.

<Figure 4>-Electricity Power Consumption in Germany (KWH Per Capita)



Source: Trading Economics, “Electric Power Consumption (KWH Per Capita) in Germany,” *Trading Economics*, accessed October 21, 2013, <http://www.tradingeconomics.com/germany/electric-power-consumption-kwh-per-capita-wb-data.html>.

Anti-nuclear Movement and Greens

The anti-nuclear movement fundamentally came out from the early 1970s. The government movement to build nuclear power plants revitalized the anti-nuclear movement in Germany. The first massive protests arose in Wyhl and Brokdorf when there were plans to build nuclear power plants.⁵⁶ Approximately 30,000 people gathered to oppose the construction of nuclear power plants in two locations.⁵⁷ Important anti-nuclear movements were introduced by citizens’ initiatives which opposed

⁵⁶Dietmar Henning, “The German Greens and the nuclear industry,” *World Socialist Web Site*, June 26, 2001, accessed October 24, 2013, <http://www.wsws.org/en/articles/2001/06/grns-j26.html>.

⁵⁷ “Nuclear power in Germany: a chronology,” *Deutsche Welle(DW)*, accessed October 20, 2013,

the construction of nuclear power plants.⁵⁸ Hence, the anti-nuclear movement was started to stop the government's plan of building nuclear power plants.

The other important issue on nuclear energy was the radioactive waste disposal problem. It hindered pro-nuclear advocates within the government. Nuclear energy produced radioactive waste and permanent places to bury this waste were required. Upon selection, the location for final disposal is usually confronted with strong resistance due to the NIMBY tendency of the public. The public recognizes nuclear energy as a problem when it is physically nearby and this tendency is enforced as they become aware of the dangers of radioactive waste.

In Germany, radioactive waste disposal was always an issue in the public sphere. A key location for this problem was Gorleben in Lower Saxony. Gorleben was selected as a nuclear waste disposal site with political concerns because this rural location was suffering from high unemployment with no strong political power.⁵⁹ In 1977, the prime minister of Lower Saxony announced that "the salt mines in Gorleben would be utilized to store radioactive waste." This was followed by a strong demonstration consisting of approximately 20,000 people gathering and protesting against the decision.⁶⁰ Most of the people were farmers and they strongly expressed their opposition status.⁶¹ Later on, when experts gathered to discuss the propriety of selecting the radioactive disposal site at Gorleben in 1979, about 100,000 people gathered against the decision, and this was yet the largest demonstration up to that phase.⁶² Ever since the government recognized the necessity of constructing a final disposal center, Gorleben has been a symbolic haven to anti-nuclear advocates. Thus, whether the government is pro-nuclear or anti-nuclear, Gorleben maintains its anti-nuclear position in German politics by reminding that nuclear waste is a main problem to using nuclear energy.

<http://www.dw.de/nuclear-power-in-germany-a-chronology/a-2306337-1>

⁵⁸ Michael T. Hatch, "Corporatism, pluralism and post-industrial politics: Nuclear energy policy in West Germany," *West European Politics* 14, no. 1 (1991): 79.

⁵⁹ Andrew Blowers and David Lowry, "Nuclear conflict in Germany: The Wider context," *Environmental Politics* 6 no. 3 (1997): 150.

⁶⁰ Dietmar Henning, "The German Greens and the nuclear industry," *World Socialist Web Site*, June 26, 2001, accessed October 24, 2013, <http://www.wsws.org/en/articles/2001/06/grns-j26.html>.

⁶¹ Wolfgang Rüdiger, "Phasing out nuclear energy in Germany," *German Politics* 9, no. 3 (2000): 50.

⁶² Detlef Jahn, "Nuclear power, energy policy and new politics in Sweden and Germany," *Environmental Politics*, 1, no. 3 (1992): 402.

The anti-nuclear movement gradually settled. Germany's anti-nuclear movement was far from the hysteric emotional outcomes of World War II. It was more of a fundamentally rational bottom-up or grass-root movement that was based on objective evidence and factors.⁶³ For example, the anti-nuclear movement that broke out in Wyhl was from the perspective of local farmers. They were concerned of nuclear power plant gas emission harming their harvest rate. This concern progressed to safety matters involving radioactive waste as the public began to become aware of the negative influences of radioactive waste on their health. According to Jahn's thesis, "Nuclear power, energy policy and new politics in Sweden and Germany," Germany's public opinion about anti-nuclear energy increased gradually from 20 per cent in 1974 to 45 per cent before the Chernobyl accident.⁶⁴ Thus, the anti-nuclear movement in German history had a rational perspective and the radioactive problem was consistent not only in the public but also in politics.

Another poll signifies different perspective of Germany's public opinion before the Chernobyl accident due to the Second Oil Crisis. (Refer to Tables 1 and 2) People thought nuclear power plants were necessary for their future. Excluding those with undecided opinion on nuclear energy, the German public was slightly more in favor of developing nuclear energy in that 37 per cent agreed to develop nuclear energy while 27 per cent deemed nuclear energy as an unacceptable risk. Moreover, comparing the attitudes toward further development of nuclear power in 1978 and 1982, anti-perception on further development of nuclear power declined 15 per cent, whereas advocates of nuclear power development increased by 2 per cent. It is clear that the Second Oil Crisis influenced public opinion on nuclear energy to some extent. However, it is also true that about one third of fixed opposition opinions on using nuclear energy consistently occupied the German public. Hence, although the Second Oil Crisis temporarily changed acceptance on using nuclear energy, still, certain amounts of the anti-nuclear public was consolidated in the German context.

⁶³ Paul Hockenos, "Angst or Arithmetic: Why Germans are so Skeptical about Nuclear Energy," *Heinrich Boll Stiftung the Green Political Foundation*, (2012): 1.

⁶⁴ Detlef Jahn, "Nuclear power, energy policy and new politics in Sweden and Germany," *Environmental Politics* 1, no. 3 (1992): 396.

<Table 1>-Opinions about Large-scale Nuclear Development in Four Major Countries (1978)

Country with Large-scale Nuclear Development	Worth While (%)	No Particular Interest (%)	Unacceptable Risks (%)	Don't Know (%)
Belgium	27	9	37	27
Federal Republic of Germany	37	14	27	22
France	51	4	30	15
United Kingdom	39	17	37	7

Source: Joop van der Pligt, "Public opinion and nuclear energy," in *Nuclear Energy and The Public*, ed. Joop van der Pligt (Oxford, UK: Blackwell, 1992), 6. *Large-scale nuclear development was partly taken among large-scale nuclear development, moderate nuclear development, and no nuclear power.

<Table 2>-Attitudes towards Further Development of Nuclear Power 1978-1982

Country	Development is Worthwhile			Development Leads to Unacceptable Risks		
	1978 (%)	1982 (%)	Difference	1978 (%)	1982 (%)	Difference
France	40	51	+11	42	31	-11
Federal Republic of Germany	35	37	+2	45	30	-15
Netherlands	28	34	+6	54	48	-6
Belgium	29	27	-2	39	37	-2
Luxembourg	35	32	-3	31	49	+18
Denmark	37	25	-12	34	49	+15
United Kingdom	57	39	-18	25	37	+12
Italy	53	34	-19	29	43	+14
Ireland	43	13	-30	35	47	+12
Greece	N/A	15	N/A	N/A	50	N/A
Overall Mean	38			37		

Source: Joop van der Pligt, "Public opinion and nuclear energy," in *Nuclear Energy and The Public*, ed. Joop van der Pligt (Oxford, UK: Blackwell, 1992), 5.

The most significant settlement before the Chernobyl accident was the establishment of the Green Party. Widespread anti-nuclear movement through the 1970s furnished the creation of the Green Party. The Green Party, evolving from the Green List established in 1977, was armed with ecological arguments but did not stand for violent anti-nuclear movements.⁶⁵ As can be witnessed by the 1998 coalition government, the Green Party was able to gain support by preoccupying a moderate view on using nuclear energy. The other two factors were also helping the Greens. On the one hand,

⁶⁵ Christian Joppke, "Nuclear power struggles after Chernobyl: The case of West Germany," *West European Politics* 13, no. 2 (1990): 179-180.

the Greens opposed the militarists who supported nuclear weapons. On the other hand, certain historical legacy from World War II such as the dropping of the atomic bomb in Hiroshima awakened the Greens to the risks of using nuclear energy. Further, Germany's status as a divided country, in terms of ideology, influenced its nuclear energy policy.⁶⁶ In addition, the sites of anti-nuclear origins such as Gorleben, Wackersdorf, Brokdorf and Kalkar contributed to establishing the Green Party to some extent. Responding to the anti-nuclear movement in the public, the Green Party gained significant seats in the Lower Saxony government and the Greens finally succeeded in penetrating the political sphere. In 1983, the Green Party entered into Bundestag with refreshed social agendas and gained several considerable state election results. Thus, the Green Party became able to carry important anti-nuclear considerations into the national parliament even though its power domain was still tenuous compared to other significant parties.

What was settled?

Before the Chernobyl accident, the anti-nuclear movement had essentially been settled. The anti-nuclear movement appeared in the 1970s. From a short-term perspective, it did not have enough power to change the whole paradigm of the German nuclear policy due to inadequate antecedent conditions. In the long-term perspective, however, this period settled some conditions that ultimately facilitated the nuclear energy phase-out policy in the future.

First, the anti-nuclear movement was settled through the 1970s. It was mostly in the realm of the NIMBY phenomena but organized demonstrations sometimes appeared when the public cognized nuclear power or radioactive waste as a major problem. However, the main agenda of the anti-nuclear movements was not the phasing-out of the nuclear power plant. Movements were focused on a regional basis rather than on the entire German territory. Anti-nuclear movements successfully took the position in German society, but a phase-out was not in the center of their agendas.

⁶⁶ Andrew Holland, "Why Germany is Saying Good-Bye to Nuclear Power," *Energy Trends Insider*, March 23, 2012, accessed September 12, 2013, <http://www.energytrendsinsider.com/2012/03/23/why-germany-is-saying-good-bye-to-nuclear-power/>; Sebastian Schwark, "The Roots of German Nuclear Energy Skepticism," *The Energy Collective*, April 16, 2013, accessed August 28, 2013, <http://theenergycollective.com/sebastian-schwark/210931/roots-german-nuclear-skepticism>.

Second, the Green Party initiated its participation in the political process and other anti-nuclear interest groups were organized. The establishment of the Green Party was a key factor before the Chernobyl accident. The existence of the Green Party in the political field meant that anti-nuclear advocates had obtained a channel to the political sphere and they could now insist on their nuclear energy agenda. Moreover, the Green Party's main idea on nuclear energy was phase-out in the way that one of the main contributors for establishing the Green Party was anti-nuclear hardliners. Indeed, whether the Green Party maintained a phase-out policy or not, its acquisition of an official channel was important in itself because, previously, the political sphere had continuously leaned more towards a pro-nuclear opinion.

Third, the Social Democratic Party (SPD) was in line with the pro-nuclear policies during the ruling party while the anti-nuclear faction continued to address their arguments within the party. The argument of phasing-out nuclear power existed within the SPD, unlike in the CDU/CSU, even though this argument could not be taken as the main agenda among the other different perspectives on nuclear energy. Later, a persistence of the phase-out opinion influenced the nuclear agenda of the SPD.

Lastly, in terms of energy security, even if the government would draw back from its nuclear energy policy, there remained the problem of finding alternative substitute energy sources. The government recognized the dangers of depending on energy sources from abroad from the past two oil crises. Renewable energy was also still not a realistic alternative option. Thus, an immediate phase-out policy was not realistic in that no alternative energy sources existed and energy security could not be ensured without nuclear energy.

To summarize, public opinion was not extensively opposed to using nuclear energy because most of the anti-nuclear movement was in the form of NIMBY. The Green Party did not obtain enough power to push its phase-out agenda in the political sphere even though it had finally achieved the channel to procure its nuclear policy. Other parties were in line with the pro-nuclear faction and the argument of one small party, the Green Party, could not influence the big picture of politics. Favorable to the pro-nuclear argument, no policy alternative that could substitute nuclear energy was proposed. Moreover, in the broader context, the nuclear energy issue was not the main agenda for the

election because of the two world economic depressions. The period before the Chernobyl accident was not enough to actualize a nuclear phase-out policy because of insufficient political consensus and the lack of alternative energy sources. Although this period had limitations in implementing a nuclear phase-out, some other progressive advancements were settled, including the anti-nuclear advocates becoming rooted in German society and the establishment of the Green Party in German politics.

2. How has the Public Opinion been changed?

Right after Chernobyl

The national mood of Germany changed throughout the 1980s after the Chernobyl accident that occurred in Ukraine. It was one of the most tragic nuclear accidents that ever happened in world history. Before the Chernobyl accident, Germany's national mood on nuclear energy was somewhat of a mix between anti-nuclear and pro-nuclear opinions. As can be witnessed through the 1970s to the early 1980s, nuclear energy was accepted with a complex view. The people in locations selected for the construction of waste disposal centers or nuclear power plants voiced their opinion in strong demonstrations, but the people of other regions did not relate seriously to these issues.

Chernobyl, however, changed important aspects of national mood and public opinion. Public opinion on using nuclear energy changed negatively. Even Germany which was located some distance from the site of the accident was affected, albeit remotely compared to the Scandinavian countries, by the radioactive dust cloud.⁶⁷ The German population was thus able to experience radioactive dust that penetrated its territory first hand and it was not long before rumors about harmful radioactive impact circulated through the public. None of the reports about the effects of radioactive repercussions addressed by officials of the German government or nuclear experts and professionals could convince

⁶⁷ "Looking Back at Chernobyl: In Germany, Fears of Food Contamination," *Spiegel Online International*, April 19, 2006, accessed September 22, 2013, <http://www.spiegel.de/international/spiegel/looking-back-at-chernobyl-in-germany-fears-of-food-contamination-a-411272.html>.

or calm the public.⁶⁸ In other words, no one could successfully clarify the plethora of information travelling through the public sphere.

The government's responses to the accident also affected public opinion. The government faced a difficult task due to the uncertainty of information. The Cold War made the situation worse because the Soviet Union did not alert the nuclear reactor meltdown to the public right after the accident. As a result, European countries were not even aware of the accident for a while.⁶⁹ Emergency responses to the Chernobyl accident failed and climate changes made it worse. Without any certainty in safeguards presented by the government, the people had no way to know how to respond to the disaster.

In the aftermath of the Chernobyl accident, the German society faced deep-seated nuclear fear. Tragic memories of Hiroshima resurfaced and, this time, the public was roughly aware of the long-term repercussions of radioactive exposure. People began to become suspicious of nuclear safety and technology. They clearly recognized the risk of human error associated with the management of nuclear power. Not only Germany but many other European countries also started doubting nuclear energy and the scope of its indirect impact in the case of an accident. Indeed, the most devastating factor was that Chernobyl was caused by a human error and that the accident could possibly have been prevented.⁷⁰ The German people began to worry about human errors and safety matters in their homeland, where nuclear power plants were in operation. Public idea and awareness on nuclear energy moved on to a negative perspective and the number of opponents of nuclear energy increased dramatically right after the accident.⁷¹ Nuclear opponents in West Germany increased to 30 per cent right after the Chernobyl accident and approximately 16 per cent of them maintained their position (See Figure 5).

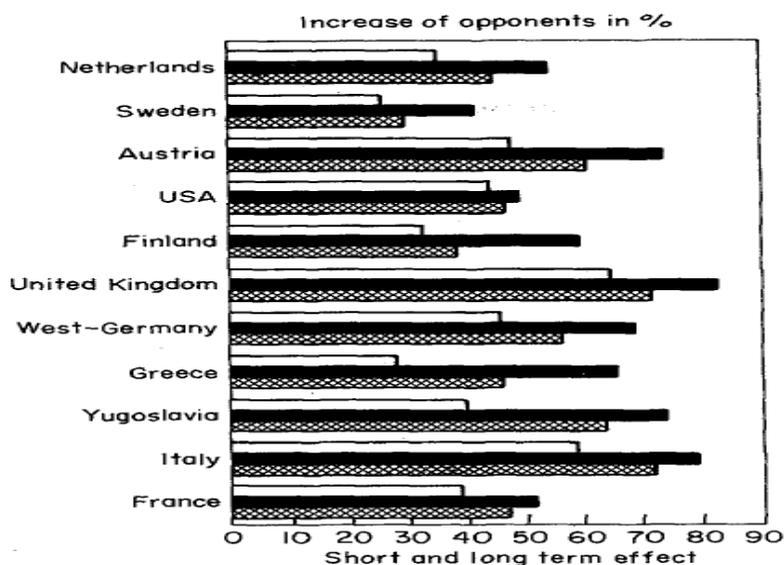
⁶⁸ Ibid.

⁶⁹ William C. Potter, "Soviet Decision-Making for Chernobyl: An Analysis of System Performance and Policy Change," *National Council for Soviet and East European Research*, (1990): 3.

⁷⁰ "Chernobyl Accident 1986," World Nuclear Association, accessed September 17, 2013, <http://www.world-nuclear.org/info/Safety-and-Security/Safety-of-Plants/Chernobyl-Accident/#.UnHxNHBSiSo>

⁷¹ Ortwin Renn, "Public Responses to the Chernobyl Accident," *Journal of Environmental Psychology* 10, no. 2, (1990): 154-156.

<Figure 5>-Nuclear Energy Opponents Before and After Chernobyl



Source: Ortwin Renn, “Public Responses to the Chernobyl Accident,” *Journal of Environmental Psychology* 10, no. 2, (1990): 156. *□ Before Chernobyl, ■ After Chernobyl, ⊠ 1 Year After Chernobyl

The nuclear phase-out policy began to encroach German society. Even though some radical anti-nuclear advocates had argued for a nuclear phase-out policy in the past, it was never the main agenda within the anti-nuclear movement. In fact, the opposition’s key argument was about the negative radioactive repercussions on human beings but this did not progress onto a nuclear phase-out argument. Instead, it was skepticism that eventually converged into a nuclear phase-out argument. The main debate on nuclear energy shifted from the construction of more nuclear power plants to nuclear phase-out, which was deciding lifetime of nuclear power plants.⁷² Indeed, the agenda of constructing additional nuclear power plants was gradually vanishing.

The Chernobyl accident contributed to the German public in assisting the anti-nuclear movement seize power to assert its nuclear phase-out opinion. Nuclear phase-out was not only the opinion of radical anti-nuclear advocates, but rather, a general opinion of the public. Opponents dramatically increased in their numbers, extended demonstrations, and gained more strength. After the

⁷² Alexander Glaser, “From Brokdorf to Fukushima: The long journey to nuclear phase-out,” *Bulletin of the Atomic Scientists* 68, no.6 (2012): 16.

Chernobyl accident, conflict between the police and the demonstrators became physically more severe. The demonstrators were throwing firebombs and the police was using tear gas and water cannons, violent acts not witnessed in past demonstrations.⁷³ Soon, however, this harsh conflict died down and the anti-nuclear advocates began organizing more strategic movements. After Chernobyl, the people of Germany became more supportive of the phase-out agenda.

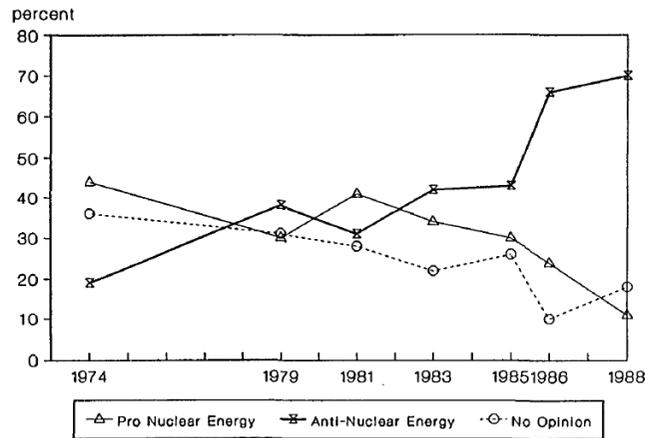
Continuance or Demise? Anti-nuclear Spirit within German Society

A significant factor of Germany's public opinion on nuclear energy was the steady increase of anti-nuclear opinion after the Chernobyl accident. Opponents of nuclear energy increased and proponents decreased in number, and all the while, there were no opinions on nuclear energy increase between 1986 and 1988. However, although percentage of anti-nuclear opinion increased, this must not be interpreted in strengthening of demonstration and assembly in that people do not always put their opinion into action..⁷⁴ In fact, anti-nuclear opinion increased even more after the Chernobyl accident compared to the Three Mile nuclear accident that happened in 1979. Germany's anti-nuclear movement was not merely a passing phase.

⁷³ 박진희, “독일탈핵정책의역사적전개와시사점,” 『역사비평』, 통권 98호, 2012년, 228.

⁷⁴ Nuclear Heritage, “Anti-nuclear Movement in Germany,” Nuclear Heritage, accessed August 27, 2013, http://www.nuclear-heritage.net/index.php/Anti-nuclear_Movement_in_Germany

<Figure 6>-Public Opinion towards Nuclear Energy in Germany 1974-1988



Source: Detlef Jahn, "Nuclear power, energy policy and new politics in Sweden and Germany," *Environmental Politics* 1, no. 3 (1992): 396.

Anti-nuclear advocates focused on two important factors, fighting against radioactive waste and using legal means to realize nuclear phase-out.⁷⁵ The anti-nuclear advocates' shrines, Gorleben, Wackersdorf, Whyll, Kalkar, and Borkdorf, continuously protested against the selection of waste disposal centers. Gorleben was the location of most confrontation because it was selected for the construction of reprocessing facilities and disposal of nuclear waste. Borkdorf had one of strongest physical conflict against police.

Then, anti-nuclear movements started to change their strategy to using legal methods. When the Chernobyl accident occurred, most anti-nuclear movements were very strong due to the shock effect. After strong short-term street demonstrations, anti-nuclear advocates searched for more effective ways to realize their view. As witnessed in Brokdorf, anti-nuclear advocates began to sue the government to make substantial nuclear energy policy changes.⁷⁶ Most anti-nuclear movements turned their strategy to raising formal objections to the government. For example, 470,000 formal objections were made against reprocessing centers.⁷⁷

'Castor', an auxiliary troop and a means of transporting irradiated nuclear material, kept the

⁷⁵ Wolfgang Rüdiger, "Phasing out nuclear energy in Germany," *German Politics* 9, no. 3 (2000): 51.

⁷⁶ 박진희, "독일 탈핵 정책의 역사적 전개와 시사점," 『역사비평』, 통권 98호, 2012년, 228.

⁷⁷ Ibid.

nuclear phase-out issue from perishing. It progressed to become a key issue during the '90s because Gorleben and Ahaus were selected as interim places for transport storage.⁷⁸ This transportation issue helped the public not to forget about the nuclear issue. Rüdig describes that “the Castor issue mobilized demonstrators and the direct action tactics first used in the 1980s came to a new prominence in the 1990s.”⁷⁹ Indeed, this issue not only played a role in keeping the phase-out agenda in the public mindset but also in signifying that the anti-nuclear movement had transformed and strengthened its agenda on the nuclear waste problem.

The general national mood toward nuclear energy gradually calmed during the '90s. On the one hand, the tragic accident had slowly disappeared from the public's memory.⁸⁰ On the other hand, the traditional forces against nuclear energy still continued their resistance in order to keep the nuclear phase-out agenda alive. However, as one can clearly see, public idea on nuclear energy stayed more critical in the post-Chernobyl period than in comparison to the pre-Chernobyl period. Additionally, the Castor-transport debate on radioactive waste had still not been resolved and this issue was the bridge between the Chernobyl and post-Chernobyl period.⁸¹

Lastly, when the SPD and the Green Party (Red-Green Coalition) took the government, the public attitude was more supportive towards operating nuclear power plants than towards the phase-out agenda. According to the Organization for Economic Co-operation and Development (OECD) report in 1999, the German public did not receive enough information from the government about the high contribution of nuclear energy in energy supply.⁸² Moreover, 62% of the public believed that phasing-out nuclear power was not realistic in the short-term. Only 20% supposed that nuclear energy would not be needed in the near future.⁸³ However, these results were based on public anticipation of the possibility of implementing the nuclear phase-out policy in Germany rather than the general

⁷⁸ Wolfgang Rüdig, “Phasing out nuclear energy in Germany,” *German Politics* 9, no. 3 (2000): 52.

⁷⁹ Ibid.

⁸⁰ Osha Davidson, “Germany Abandons Nuclear Power and Lives to Talk about It,” *Bloomberg*, November 17, 2012, accessed October 31, 2013, <http://www.bloomberg.com/news/2012-11-16/germany-abandons-nuclear-power-and-lives-to-talk-about-it.html>.

⁸¹ Alexander Glaser, “From Brokdorf to Fukushima: The long journey to nuclear phase-out,” *Bulletin of the Atomic Scientists* 68, no.6 (2012): 16.

⁸² OECD Nuclear Energy Agency, “Society and Nuclear Energy: Toward a Better Understanding,” *OECD Publications*, (2003): 114.

⁸³ Ibid., 116.

public opinion on nuclear power plants. Nonetheless, these results signify that the public opinion in the late 1990s had a different perspective from the coalition government's nuclear phase-out policy and that the public was skeptical on Germany's energy source without nuclear power plants.

3. Political Dynamics: To the New Coalition Government

CDU/CSU Long-term Position of Government and Parties

Before Chernobyl, German parties, except the Green Party, were eager to construct nuclear power plants. Germany has a multi-party system and many parties try to enter into the Bundestag (the German parliament). The two major parties in Germany's political field are the Social Democratic Party (SPD) and the CDU/CSU, which are the Christian Democratic Union (CDU) and its cooperator, Christian Social Union (CSU).⁸⁴ Both parties manifest characteristics of a catchall party. Through Germany's political history, both the CDU/CSU and SPD usually dominated the political sphere. Otherwise, the Free Democratic Party (FDP) stood for liberal traditions and usually played a pivotal role in the parliamentary system even though it generally gained a small amount of seats.⁸⁵ The FDP is considered a coalition party for two major parties. The Green Party, which entered the parliament in 1983, supported previously overlooked agenda.⁸⁶ The Green Party was an advocate of the nuclear phase-out policy from the beginning.

The SPD significantly changed its opinion on nuclear energy after the Chernobyl accident. While there were divided opinions within the party before the accident, the accident triggered the SPD to transform its nuclear agenda. After the Chernobyl accident, the party gradually came on board with the nuclear phase-out policy. The SPD's change in view on nuclear energy largely came from two factors. First, anti-nuclear advocates in the regions selected to be nuclear waste repositories

⁸⁴ In the German's multiparty system, CDU and CSU regarded as allies and same polity, such as they do the election campaign together. Bavaria state is the base of CSU established and its political philosophy is more conservative than CDU. In the Bundestag they form as same and single group.

⁸⁵ Russel J. Dalton, "Politics in Germany" in *Comparative politics today: a world view (Seventh edition)*, ed. Gabriel A. Almond. (New York: Longman, 2002), 288.

⁸⁶ *Ibid.*, 289.

continuously fought against the government's decision and nuclear opponents within the SPD supported this demonstration.⁸⁷ As one can observe, before the Chernobyl accident, anti-nuclear advocates within the SPD had little power. However, as regional riots, assemblies, and demonstrations became stronger, the anti-nuclear advocates were able to gain more support from the public. The second factor is the Chernobyl accident itself. The most devastating nuclear accident in history aptly provided power to anti-nuclear supporters within the SPD. Consequently, majority members of the SPD began to seriously consider the practicality of the nuclear phase-out policy.⁸⁸ Ultimately, it shifted its nuclear energy policy from operating nuclear power plants for as long as possible to phasing-out nuclear energy usage within ten years.⁸⁹ From this moment, the party's nuclear energy policy has consistently consolidated toward a nuclear phase-out and it has not changed since. Hence, the SPD's shifted position on nuclear energy was one of the crucial forces when the Red-Green coalition government emerged in 1998.

The CDU/CSU was also responsive to the Chernobyl accident. It was the governing party when the accident occurred and thus the leader of the party had no choice but to announce its stance on the nuclear issue. As a result, Chancellor Kohl established a new governmental organization body called the Federal Minister of the Environment.⁹⁰ Moreover, the CDU/CSU was not able to construct additional nuclear power plants due to the Chernobyl accident.⁹¹ However, it did not signify that the CDU/CSU government shifted its basic nuclear energy policy because the government neither announced any policy related to nuclear phasing-out nor abandoned using nuclear energy.

The nuclear energy policy issue was gradually pushed back on the priority agenda as the

⁸⁷ Peter Hocke and Ortwin Renn, "Concerned public and the paralysis of decision-making: nuclear waste management policy in Germany," *Journal of Risk Research* 12, no. 7-8, (2009): 926.

⁸⁸ Ibid.

⁸⁹ Rolf Linkohr, "German Energy Policy" (addressed at 24th the Annual Symposium of the Uranium Institute, London, September 8-10, 1999); Michael T. Hatch, "Corporatism, pluralism and post-industrial politics: Nuclear energy policy in West Germany," *West European Politics* 14, no. 1 (1991): 88.; Andrew Blowers and David Lowry, "Nuclear conflict in Germany: The Wider context," *Environmental Politics* 6 no. 3 (1997): 152.; Wolfgang Rüdiger, "Phasing out nuclear energy in Germany," *German Politics* 9, no. 3 (2000): 53.; Alexander Glaser, "From Brokdorf to Fukushima: The long journey to nuclear phase-out," *Bulletin of the Atomic Scientists* 68, no.6 (2012): 16.

⁹⁰ Ernst Ulrich von Weizsäcker, "German Nuclear Policy," in *Taming the next set of strategic weapons threats*, ed. Henry D. Sokolski (Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2006), 155.

⁹¹ 박진희, "독일 탈핵 정책의 역사적 전개와 시사점," 『역사비평』, 통권 98호, 2012년, 229.

German reunification issue penetrated into the public. Compared to the SPD or the Green Party, the CDU/CSU notably managed the reunification issue well. From a nuclear energy perspective, reunification provided space for the CDU/CSU, since East German reactors were to be shut down as it did not meet safety standards.⁹² This gradually moderated anti-nuclear sentiments and Kohl was able to avoid the opposition's criticism.

Another issue that provided room for nuclear energy was climate change. In 1992, the Rio de Janeiro Earth Summit of the Framework Convention on Climate Change helped nuclear power plants continue their operating scheme. Nuclear energy was considered to be a source that could contribute to and mitigate climate change.⁹³ This issue continued until the Kyoto Protocol agreement and nuclear energy was able to keep its important position in connection with it. It was fairly sure that the government used the climate change issue to promote or maintain nuclear energy usage whether or not it honestly dealt with the climate change issue.

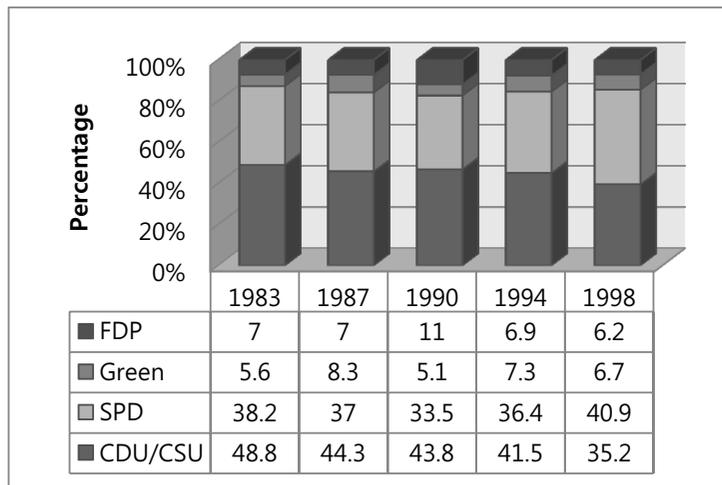
The Green Party Keeping Pace with the Bundestag

When the Green Party entered into Bundestag in 1983, its attention was on survival, that is, maintaining its position in the political sphere. Independent of its success in politics, the Green Party was successfully able to maintain a continuous position in Bundestag. Until forming a coalition government with the SPD, the Green Party never fell below 5 % in the party vote and the Green Party always had a chance to deliver its opinion.

⁹²Ernst Ulrich von Weizsäcker, "German Nuclear Policy," in *Taming the next set of strategic weapons threats*, ed. Henry D. Sokolski (Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2006), 155-156.

⁹³ Ibid.

<Figure 7>-Election Result, 1983-1998



Source: Russel J. Dalton, "Politics in Germany," in *Comparative Politics Today: A World View (Seventh edition)*, ed. Gabriel A. Almond (New York: Longman, 2002), 288.

The participation of the Green Party in parliament had a vital meaning to Germany's nuclear energy policy. Green's initial perspective on nuclear energy was the phase-out policy⁹⁴ and the SPD also turned over its nuclear policy to phase-out within ten years. The Green Party showed remarkable durability in its nuclear phase-out policy. When the SPD and Green Party were negotiating the coalition government, phasing-out of the nuclear power plant was a core issue that they had to compromise.

However, constituents of the Green Party changed. The Green Party was established within the framework of a fundamentalist viewpoint which argued for the radical phase-out of nuclear power plants. This radical argument had been moderated throughout history, and ever since the Green Party started to participate in local government and accumulated coalition experiences with the SPD at the local level. For example, at the local level, Christian Democrats were ready to work with the Green Party, and some of the Greens also had a more open position to cooperating with other parties.⁹⁵ As a result, the Greens gradually moved on to a more practical and realistic viewpoint and the radical

⁹⁴ Andrei S. Markovits and Joseph Klaver, "Thirty Years of Bundestag Presence: A Tally of the Greens' Impact on the Federal Republic of Germany's Political Life and Public Culture," *American Institute for Contemporary German Studies of the Johns Hopkins University*, (2012): 18.

⁹⁵ Wolfgang Rüdiger, "Germany," *Environmental Politics* 11, no. 1 (2002): 80.

fundamentalists that once contributed to initiating the Green Party gradually lost their power.⁹⁶

The Green party had successfully settled down in Germany's political system. The establishment of the Green Party first derived from the radical anti-nuclear movement. Later, it gradually evolved by keeping distance from radical movements because the party could not attract the public. If it maintained support for radical movements, the party might have demised in the political system. Indeed, the Green Party needed parliamentary presence with the help of public support and its survival in politics was the most significant factor when the Red-Green coalition government formed.

1998 Election: Shift from Conservative Government

In the 1998 election, Chancellor Kohl's reign throughout the '90s finally ended. Previous East Germany regions were suffering from high unemployment rates and his election pledge had not been fulfilled.⁹⁷ Moreover, a total of sixteen years of the CDU/CSU and FDP coalition government was having a difficult time making economic performance. Hence, the public sought for an alternative government.

The SPD gained the highest number of votes in the 1998 election. A most remarkable change was that the FDP lost its role as the swing party. In the past, the FDP had bargaining power to construct a coalition government with the two major parties because it had always gained a certain amount of votes in the elections. However, after the Green Party continuously took its position in the political system, the FDP's role considerably weakened.⁹⁸ Moreover, even if the SPD regarded the FDP as a potential coalition partner, the FDP was more attached to CDU/CSU during the 1980s to 1990s and the SPD's substantial policy and ideology were more similar to those of the Green Party.

In 1998, SPD was considering the Green Party as a coalition partner. One of the core issues was the compromise of phasing-out of the nuclear power plants. The SPD and Green Party coalition, or Red-Green coalition, broadly had the same vision on nuclear phase-out even though specific

⁹⁶Ibid., 79.

⁹⁷ "German Elections: Profile of the Two Main Parties," *Washington Post*, 1998, accessed October 15, 2013, <http://www.washingtonpost.com/wp-srv/inatl/longterm/germany/election.htm>

⁹⁸ Wolfgang Rüdig, "Germany," *Environmental Politics* 11, no. 1 (2002): 81.

measures such as how to reach the phase-out and when to implement the policy were different. However, in the end, the key background factor that made the Red-Green coalition possible was the SPD's changed position on nuclear energy usage after the Chernobyl accident.⁹⁹

4. Existence of Alternatives: Not Sufficient but Significant

The need for alternative energy sources that can substitute nuclear energy resurfaced after the Chernobyl accident. Because of the Chernobyl accident, the public and professionals were able to relate to the devastating radioactive side effects of nuclear energy if it was not properly controlled. At the government level, the Federal Ministry of the Environment was created not only to manage environmental issues but also to handle nuclear regulation and safety.¹⁰⁰ This establishment of a new department in the government was a significant step that allowed alternative professional groups to deliver their opinion on the nuclear energy policy.¹⁰¹ Indeed, the Nuclear Safety Section is a legacy of the anti-nuclear movement effort after the Chernobyl accident.

Another source of alternative energy was the government's interest in renewable energy. Why did the government begin to invest in renewable energy? First of all, the climate change issue had emerged in politics, to which the government had to respond seriously. The government used subsidiaries to foster renewable energy sources and one of its important policies was introducing 'The Electricity Feed-in Act' in 1991.¹⁰² It "obligat[ed] grid operators to give priority to green electricity and remunerate it with higher tariffs."¹⁰³ Moreover, from the past anti-nuclear experiences after the Chernobyl accident, the government could not but decide to push to develop renewable energy sources even though some argued it was ostensible.

⁹⁹진상현 · 박진희, "한국과독일의원자력정책에대한비교연구: 정책흐름모형을중심으로," 『한국정치학회보』, 제 21권, 3호, 2012년, 275.

¹⁰⁰ Wolfgang Rüdiger, "Phasing out nuclear energy in Germany," *German Politics* 9, no. 3 (2000): 59.

¹⁰¹임성진, "원전개발에서폐쇄에이르기까지독일원자력정책의변천과정: 행위자간관계를중심으로," 『대한정치학회보』, 9집 2호, 2001년(겨울), 32-33.

¹⁰² Anne Held, Mario Ragwitz, Claus Huber, Gustav Resch, Thomas Faber, and Katarina Vertin, "Feed-In Systems in Germany, Spain and Slovenia: A comparison," *Institute Systems and Innovation Research*, (2007): 3.

¹⁰³ "The new energy system is gathering pace," *Young Germany*, March 22, 2013, accessed October 11, 2013, <http://www.young-germany.de/topic/work/research-science/the-new-energy-system-is-gathering-pace>.

At the civil level, the Chernobyl accident not only fostered the formation of civil institutions but also accelerated research for alternative energy sources so that they could substitute nuclear energy in the future. The public's anti-nuclear advocates focused on improving energy efficiency and developing renewable energy sources because they generally recognized renewables as an essential requirement to reduce the government's nuclear energy dependency.¹⁰⁴ The most prominent civil institution was 'Oeko-Institut' which aimed to apply ecological aspects. Its role was to consult with decision-makers, key figures in industry, and civil society. The civil institutions' basic principle was to develop alternative energy policy by the civil society itself, to implement energy saving measurements, and to expand alternative energy sources so that they could become the core resources in Germany's energy mix.¹⁰⁵ For example, many interest groups such as BundesverbandErneuerbandEnergie (BEE) and InstitutfürEnergie- und Umweltforschung Heidelberg sought to develop renewable energy sources.

In Germany's context, renewables were regarded as the most important alternative energy source to replace nuclear energy. In fact, the renewables were depended on as reliable future energy sources by the government, the institutions, and the public. Increased interest in fighting against climate change, which was connected with reducing greenhouse gas emission, was one of the reasons for this belief. Moreover, the Chernobyl accident adjusted the direction of nuclear energy because it awakened the German people to the latent risk of radioactive repercussions. The disaster prevented hard pro-nuclear liners from making their argument on nuclear energy usage and many more professionals seemed to be more interested in renewable energies in that they had the possibility of replacing the nuclear energy portion in energy production. Thus, the renewable sources were regarded as future alternative energy even if that were not perfectly settled.

5. Red-Green Coalition Seizes the Government and Nuclear Phase-out

¹⁰⁴박진희, “독일탈핵정책의역사적전개와시사점,” 『역사비평』, 통권 98호, 2012년, 233.

¹⁰⁵진상현·박진희, “한국과독일의원자력정책에대한비교연구: 정책흐름모형을중심으로,” 『한국정책학회보』, 제 21권, 3호, 2012년, 274.

For the Coalition

In German politics, generally, when one party wins the election, it searches for a coalition partner to organize the government. After the 1998 election, the SPD was considering the Green Party as a coalition partner. Before forming the government, the SPD and the Green Party entered into negotiations to mediate different opinions on various issues. One of the core agenda which had to be mediated was the nuclear phase-out policy.

Both parties largely agreed on the nuclear phase-out policy. However, at the same time, each party bespoke a different opinion on how to implement the phase-out policy. The SPD's position on the nuclear phase-out was abandoning construction of new nuclear power plants and then gradually phasing-out existing nuclear power plants more or less within 10 years. On the other hand, the Green Party asserted that all nuclear power plants should be immediately phased-out. Especially, during the election campaign period, the Green Party consistently argued that all nuclear power plants must be phased-out as soon as possible. Thus, a mutual agreement on the phase-out policy was crucial to organize the coalition government.¹⁰⁶

The coalition had a difficult time reaching an agreement on the nuclear power phase-out policy. In its campaign, the Green Party had maintained a basic position that the government would end nuclear power without compensating the nuclear industry for its loss. However, every operating nuclear power plant had endless licenses backed up by legal warranties.¹⁰⁷ This meant that the Green Party would face serious resistance from the nuclear industry, which might eventually lead to legal liability for compensation. Moreover, the Green Party was eager to participate in the federal government. Fundamentalists and realists were divided within the Green Party on the nuclear energy issue. Joschka Fischer, who had a realist's perspective and tacitly considered to be the Party leader, thought that a coalition government was essential.¹⁰⁸ As a result, the Green Party formed a coalition

¹⁰⁶ Joachim Jachnow, "What's Become of the German Greens," *New Left Review* 81, May-June (2013): 97.

¹⁰⁷ DetlefJahn and Sebastian Korolczuk, "German exceptionalism: the end of nuclear energy in Germany!" *Environmental Politics* 21, no. 1 (2012): 160.

¹⁰⁸ BBC Special Report, "Greens negotiate a path to power," *British Broadcasting Corporation*, September 29, 1998, accessed November 2, 2013,

government with the SPD and took four positions: Joschka Fischer as Foreign Minister, Andrea Fischer as Health Minister, Renate Künast as Agriculture and Consumer Protection Minister, and Jürgen Trittin as Environment Minister.

Prolonged Negotiation for Nuclear Phase-out

The coalition government was based on consensus and the nuclear phase-out negotiation was not an exception. A nuclear consensus was made by both parties and it conformed to the following steps. The first step was the ‘first 100 days principle.’ Revising the Atomic Energy Act, it stipulated stronger safety standards on nuclear installations and banned nuclear reprocessing within 100 days.¹⁰⁹ Its core elements included prohibiting construction of nuclear power plants, reporting safety review within one year, and limiting waste disposal.¹¹⁰ In the second step, the government invited nuclear energy producers to come up with an agreement on the new energy policy within one year, and if the deadline passed, the government would not have to pay compensation.¹¹¹

However, implementing these steps failed to be implemented because of two important structural reasons. First, the Minister of Environment, Jürgen Trittin, and the Minister of Economics and Technology, Werner Müller, came from different backgrounds and had contrasting viewpoints. In the coalition government, Jürgen Trittin was supported by the Green Party and Werner Müller was backed by the SPD. On the one hand, for the Green Party, the nuclear phase-out was an important issue in terms of party survival in the next election because the party had initially stemmed from anti-nuclear protests during the ‘70s and ‘80s. On the other hand, Werner Müller was the manager of VEBA (Vereinigte Elektrizitäts und Bergwerks Aktiengesellschaft), which was one of the four major

http://news.bbc.co.uk/2/hi/special_report/1998/09/98/german_elections/181659.stm; C. Hunold, “Profile – Nuclear Waste in Germany: Environmentalists Between State and Society,” *Environmental Politics* 10, no. 3 (2001): 129.

¹⁰⁹ Wolfgang Rüdiger, “Germany,” *Environmental Politics* 11, no. 1 (2002): 97.

¹¹⁰ Rolf Linkohr, “German Energy Policy” (addressed at 24th the Annual Symposium of the Uranium Institute, London, September 8-10, 1999).

¹¹¹ Ibid.

nuclear energy companies in Germany.¹¹² Moreover, Chancellor Gerhard Schröder was interested in reducing unemployment rate which was also coincident with the union's interests.¹¹³ Second, decentralized principles in the consensus process, which included various stakeholders, in German politics¹¹⁴ was also another obstacle to enforce the nuclear phase-out policy. Although the trade union was not included in the consensus talk, four other major representatives¹¹⁵ who owned nuclear power plants participated in the talks and strongly urged their pro-nuclear position.¹¹⁶ The nuclear power industry, by connecting the unemployment problem with the nuclear phase-out policy, pursued the argument that the current level of employment would not be guaranteed if the phase-out policy was realized and that it would also mobilize pro-nuclear advocates to protest against the phase-out decision.¹¹⁷

The consensus talks went through many important disputes before the parties reached an agreement. The main topic was deciding the operation lifetime of existing nuclear power plants because it would determine the final year of nuclear energy usage in Germany. The SPD, the Green Party, and the nuclear industry all had different perspectives on the lifetime of nuclear power plants. The nuclear industry and the SPD tried to prolong the operation for as long as 40 years or at least 35 years.¹¹⁸ In contrast, the Green Party pushed for 25 years.¹¹⁹ The Green Party, in its perspective, needed to phase-out at least one nuclear power plant before 2002 so that it could gain support from its supporters in the next election to be held in 2002.¹²⁰ The consensus talk concluded with an agreement

¹¹² Lutz Mez and Annette Piening, "Phasing-out Nuclear Power Generation in Germany: Policies, Actors, Issues and Non-issues," *Energy & Environment* 13, no. 2 (2002): 169.

¹¹³ BBC Special Report, "Schroder on 'historic' election," *British Broadcasting Corporation*, September 28, 1998, accessed November 2, 2013, http://news.bbc.co.uk/2/hi/special_report/1998/09/98/german_elections/181738.stm

¹¹⁴ G. Fuchs and A.M. Koch, "Corporatism and 'political context' in the Federal Republic of Germany," *Environment and Planning C: Government and Policy* 9, no. 1 (1991): 7.

¹¹⁵ The four major companies representatives to compromise nuclear phase-out agreement were REW, EnBW, VEBA, and VIGA

¹¹⁶ Lutz Mez and Annette Piening, "Phasing-out Nuclear Power Generation in Germany: Policies, Actors, Issues and Non-issues," *Energy & Environment* 13, no. 2 (2002): 165.

¹¹⁷ Ibid.

¹¹⁸ Robert Jan van den Berg and Herman Damveld, "A Survey on Public Participation, Decision-Making and Discussions in Eight Countries: Belgium, Canada, France, Germany, Spain, Sweden, Switzerland, United Kingdom," *The Central Organisation for Radioactive Waste*, (2000): 60.

¹¹⁹ Campact, *ABSCHALTEN!*, trans. 김하락 (Frankfurt am Main: Fischer Verlag GmbH, 2011), 32.

¹²⁰ Wolfgang Rüdiger, "Phasing out nuclear energy in Germany," *German Politics* 9, no. 3 (2000): 64.

of 32 years for the lifetime of existing nuclear power plants.¹²¹ Within the 32 year rule, the key issue was how to calculate the lifetime of nuclear power plants. The Green Party could not maintain its initial position on the lifetime calculation method because, then, the industry could ask for high compensation and a legal suit could follow if the Green Party did not agree. As a result, in the 32 year rule, the lifespan of nuclear power plants was calculated by the amount of electricity production capacity rather than by calendar year.¹²² Moreover, it was possible for nuclear power plants to transfer their remaining production capacities to other nuclear power plants. This was not a welcome outcome for the Green Party because no nuclear power plant would be shut down before the 2002 elections.

<Table 3>- Final Timetable for Nuclear Power Plant Phase-out

Number	Reactor	Nominal ‘Shut Down’ 32 years since beginning of commercial operation	Residual amount to be produced from 1 January 2000 (in TWh)
1	Obrigheim	31.12.2002	8.70
2	Stade	2004	23.18
3	Biblis A	2006	62.00
4	Biblis B	2008	81.46
5	Neckarwestheim	2008	57.35
6	Brunsbüttel	2008	47.67
7	Isar 1	2009	78.35
8	Unterweser	2010	117.98
9	Philippsburg 1	2011	87.14
10	Grafenrheindeld	2013	150.03
11	Krümmel	2015	158.22
12	Gundremmingen B	2016	160.92
13	Grohnde	2016	200.90
14	Gundremmingen C	2016	168.35
15	Philippsburg 2	2016	198.16
16	Brokdorf	2018	217.88
17	Isar 2	2020	231.21
18	Emsland	2020	230.07
19	Neckarwestheim 2	2021	236.04
20	Mülheim-Kärlich	**	107.25

** Never Started Commercial Operation

Source: Wolfgang Rüdig, “Phasing out nuclear energy in Germany,” *German Politics* 9, no. 3 (2000): 64.

The nuclear consensus talks also dealt with other specific issues such as final storage for

¹²¹ Ibid.

¹²² 연합뉴스, “독일의 핵폐기 결정, 그배경과영향,” 『황해문화』, 72호, 2011년(가을), 93.

highly radioactive waste disposal, radioactive waste transportation, and reprocessing. The government still needed to decide on the site for final radioactive waste disposal. Positive talks exchanged between the political parties and the industry and they agreed on constructing intermediate waste disposal facilities beside the nuclear power plants.¹²³ Additionally, the government was able to reach an agreement on other issues such as transportation of nuclear reprocessing fuel by proposing a five year transition period.¹²⁴

Outcome: First Step to Phase-out

During the Red-Green coalition government, after a long debate on nuclear energy, Germany finally took the first step to phase-out. Phasing-out from nuclear energy was actualized by amending the Atomic Energy Act. According to Axel Vorwerk, the amended Atomic Energy Act signifies five important changes, which are 1) changing the concept of nuclear energy from utility to regulation, 2) strengthening safety measures and limiting operation time, 3) adding a new clause for radioactive waste disposals, 4) increasing financial deposit in the case of emergency of nuclear power plants, and 5) abolishing the amended Atomic Energy Act of 1998.¹²⁵ Although these changes did not reflect the immediate nuclear phase-out that the hardliners of the Green Party had expected, it was the first step of a huge shift in Germany's nuclear energy policy.

The Red-Green coalition government mandated the nuclear phase-out policy seriously. There were several factors that led to this outcome. In terms of public opinion, the Chernobyl accident boosted anti-nuclear movements which gradually settled down through the 1970s. In addition to the Chernobyl accident, the high-level radioactive waste disposal problem continuously stimulated the public and this induced the anti-nuclear advocates to maintain and reinforce their position. In terms of political dynamics, the Green Party successfully settled down in the political system. It maintained its

¹²³Wolfgang Renneberg, "Nuclear Safety, Radiation Protection, And Nuclear Fuel Cycle at the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety," (speech by General Director at the Madrid, May 24, 2001).

¹²⁴Ibid.; Nicola C. Ostertag, "End to Nuclear Power in Germany?" *Environment Practice* 3, no.1 (2001).

¹²⁵Axel Vorwerk, "The 2002 Amendment to the German Atomic Energy Act Concerning the Phase-out of Nuclear Power," *Nuclear Law Bulletin* 69, no. 1 (2002): 7-15.

nuclear phase-out argument and was finally able to assert its voice in politics. After the Chernobyl accident, the SPD changed its position on nuclear energy from being a proponent of nuclear energy usage to a supporter of the phase-out policy even though it aimed for a more mediated approach with a 10 year nuclear phase-out plan. Moreover, the previous 16 years of the CDU/CSU and FDP coalition government had built up public desire for a new government because of the government's failure to cope with the then stagnant economic situation. From the perspective of existing alternative energy sources, many institutions and professionals were developing alternative energy sources and most of these were in the category of renewable energy. However, even though the renewable energy sector was significantly growing, it was not entirely sufficient as a full replacement for nuclear energy. All in all, these three variables, public opinion, political dynamics, and the existence of alternative energy sources, had significant value when the new coalition government took office. The outcome of the Red-Green coalition government was the amendment to the Atomic Energy Act which took effect in 2002. Indeed, this was possible because internal forces were fostered by an unexpected external accident – the Chernobyl.

However, this was just a first step for Germany's road to nuclear phase-out because the existing alternative energy sources were not seen as feasible yet. Moreover, the CDU/CSU coalition was still against the nuclear phase-out policy and this meant that a government change would lead to a reverse in the nuclear phase-out decision. Hence, even though important conditions regarding nuclear energy phase-out were established, there were still persisting questions.

IV. Fukushima Incident and Decision to Phase-out

1. Continued Debate and Fukushima

Anti-nuclear Movement: Had it Ended?

After the amendment to the Atomic Energy Act, Germany's plan for the phase-out of nuclear energy seemed to be running smoothly. However, the nuclear waste disposal problem had yet to be clearly solved. Although there was an agreement for final nuclear waste disposal through the construction of an interim waste facility beside the nuclear power plant, this was not a satisfying solution for the people of Gorleben because high radioactive wastes had to be transported from La Hague in France.¹²⁶ This overland transport, also known as 'Castor,' kept Gorleben citizens in constant fear and the problem of final disposal site selection resurfaced. More worries broke out when the Asse II scandal occurred and Gorleben continuously articulated its anti-nuclear sentiment more than ever.¹²⁷

The Asse II scandal involved a nuclear waste leakage in a disposal site. Even worse, the operator did not notify the public about the leakage for 20 years. The Asse II had been used as a nuclear waste deposit place since 1967 and usually handled low and medium nuclear wastes. It was selected as a deposit place because "rock salt pits are the best geological structure to store radioactive waste."¹²⁸ However, this storage in Lower Saxony, where Gorleben is located, had leaked its nuclear waste since 1988 and the public finally became aware of this leakage after 20 years had passed.¹²⁹

The public experienced not only fear and anger but also the loss of trust in the actors involved.¹³⁰ Nuclear waste leakage had infiltrated drinking water and the public was afraid of radioactive contamination.¹³¹ Having wised up after the Asse II scandal, the public arose in strong protest in Gorleben in comparison to 2006 and the protest's barrier resulted in the longest

¹²⁶Wolfgang Rüdiger, "Phasing out nuclear energy in Germany," *German Politics* 9, no. 3 (2000): 66.

¹²⁷Nagako Sato, "Antinuclear Energy Movements in Germany and Japan" A Comparative Analysis of Protest against Disposal of Nuclear Waste," *国際公共政策研究* 14, no. 1 (2009): 179.

¹²⁸Bellona, "20-year-long German nuclear leak scandal engulfs country and disturbs Europe," last modified September 08, 2008, http://www.bellona.org/articles/articles_2008/german_leak.

¹²⁹Ibid.

¹³⁰Stepan Nicola, "Sitting on a nuclear bombshell," *European Energy Review*, November/December (2008): 37.

¹³¹Michael Fröhlingdorf, Udo Ludwig and Alfred Weinzierl, "Abyss of Uncertainty: Germany's Homemade Nuclear Waste Disaster," *Spiegel Online International*, February 21, 2013, accessed November 4, 2013, <http://www.spiegel.de/international/germany/germany-weighs-options-for-handling-nuclear-waste-in-asse-mine-a-884523.html>

transportation carrying time by the Castor.¹³² As Sato argues, the Asse II was “an important precondition that this issue would be on the agenda of politicians not to discontinue the phasing out of nuclear energy.”¹³³

Chancellor Merkel’s decision to extend the lifetime of nuclear power plants boosted anti-nuclear movements.¹³⁴ Anti-nuclear demonstrators gathered on the streets to criticize the government decision. While the organization argued that 100,000 people had gathered for protest, the police estimated 40,000 people.¹³⁵ Civil societies like Greenpeace and other anti-nuclear advocates made the slogan, ‘atom power kills,’ to criticize the government and this mess.¹³⁶ The reason for anti-nuclear advocates’ anger was not only the extension of the lifetime of nuclear power plants but also the procedure behind Merkel’s decision. Merkel declared that the Bundesrat’s approval was not needed for the Atomic Energy Act amendment and this stimulated the resistance of anti-nuclear advocates.¹³⁷ All in all, historically consolidated anti-nuclear advocates’ power strengthened on the nuclear energy issue and this contributed to the survival of the nuclear phase-out policy.

Finally, the Fukushima accident stimulated nuclear opponents to fight against the nuclear lifetime extension decision. Right after the Fukushima accident, the first assembly started in Southern Germany and at least 60,000 people gathered in this area. Soon after, mobilization gradually increased and the scale became nationwide. By estimation, 260,000 people actively participated in the nationwide anti-nuclear demonstration in March 26, 2011 and it was the largest assembly throughout German history.¹³⁸ The Fukushima accident had a different meaning for German people because it

¹³²Nagako Sato, “Antinuclear Energy Movements in Germany and Japan” A Comparative Analysis of Protest against Disposal of Nuclear Waste,”*国際公共政策研究* 14, no. 1 (2009): 180.

¹³³Ibid.

¹³⁴Ralph Atkins, “Merkel agrees nuclear power deal,”*Financial Times*, September 5, 2010, accessed November 4, 2013, <http://www.ft.com/intl/cms/s/0/d99ebe6c-b90d-11df-99be-00144feabdc0.html#axzz2jmsSO2ru>.

¹³⁵Dave Graham, “Thousands surround Merkel office in nuclear protest,” Reuters, September 18, 2010, accessed November 6, 2013, <http://www.reuters.com/article/2010/09/18/us-germany-nuclear-idUSTRE68H1KT20100918>.

¹³⁶David Raising, “Anti-nuclear protests in Berlin target Merkel,”*Deseret News*, October 28, 2010, accessed November 6, 2013, <http://www.deseretnews.com/article/700076950/Anti-nuclear-protests-in-Berlin-target-Merkel.html?pg=all>.

¹³⁷Brian Parkin and Nicholas Comfort, “Merkel Proposes 12-Year Nuclear Reactor Extension,”*Bloomberg*, September 6, 2010, accessed November 5, 2013, <http://www.bloomberg.com/news/2010-09-05/merkel-coalition-proposes-12-year-nuclear-reactor-extension-for-germany.html>.

¹³⁸ThadeusPato, “Anti Nuclear Movement: Stronger than ever – weaker than before,”*International Viewpoint*, June 6, 2011, accessed November 8, 2013, <http://internationalviewpoint.org/spip.php?article2171>

meant that with high nuclear technology the government could not guarantee their safety. Even Japan, which had more advanced technologies in comparison to the old reactor of the Soviet Union which was responsible for the Chernobyl accident, had also failed to prevent nuclear disaster.¹³⁹ As a result, the public began to accept the anti-nuclear advocates' nuclear phase-out argument in contrast to Merkel's nuclear plant lifetime extension decision.

Public Opinion on Nuclear Energy and the Fukushima Accident

There was some debate on whether to reverse the phase-out policy or not. For sure, on the one hand, strong opponents against using nuclear power plants were in the streets demonstrating and voicing their opinion. On the other hand, the government decided to extend the operating time of nuclear power plants. However, the remaining question is what the general public opinion was during the 2000s before the Fukushima accident.

First of all, the general national mood on nuclear energy usage was neutral, although the opponents' opinion was relatively more prominent. According to the European Commission's special report on the public perspective of nuclear energy in Europe, the German public sided a bit more against nuclear energy usage.¹⁴⁰ In 2005, anti-nuclear opinion was high and accounted for 59% of the population in comparison to around 50% in 2007 and 2009. However, this downturn of anti-nuclear opinion should not be regarded as downturn of anti-nuclear opinion because the asked question was different. Thus, it is more proper to argue that the public perspective on using nuclear energy was divided half and half before the Fukushima accident.

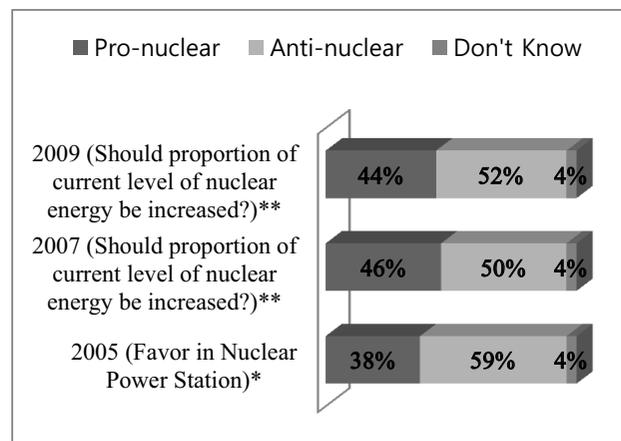
Perception on nuclear energy usage changed after the Fukushima accident, which was one of the most serious accidents throughout the history of nuclear accidents. The German society recalled the Chernobyl memories such as the radioactive fallout and social chaos. As a consequence, the public

¹³⁹진상현 · 박진희, “한국과 독일의 원자력정책에 대한 비교연구: 정책흐름모형을 중심으로,” 『한국정책학회보』, 제 21권, 3호, 2012년, 272.

¹⁴⁰European Commission, “Radioactive waste,” *Special Eurobarometer 227*, (2005), 27.; European Commission, “Europeans and Nuclear Safety,” *Special Eurobarometer 271*, (2007), 14.; European Commission, “Europeans and Nuclear Safety,” *Special Eurobarometer 324*, (2010), 26.

opinion of Germany again moved against nuclear energy usage. After the Fukushima accident, although Germany was far away from Japan, the public of Germany still showed high anti-nuclear sentiments, as proved by the BBC poll. According to the poll, among the surveyed countries, Germany had the highest demand toward immediate nuclear phase-out, which changed from 26% in 2005 to 52% in 2011.¹⁴¹ Media also contributed to this change in perception. The change was driven not only from the accident itself but also from the media which broadcasted most of its grounds on phasing-out nuclear power plants. In fact, as much as 80% of the press was about nuclear phase-out after the Fukushima accident.¹⁴² Except strong proponents of nuclear energy usage, those who were part of the public opinion pendulum heeled over to the anti-nuclear opinion after the Fukushima accident. Indeed, in terms of the public opinion on nuclear energy usage, the Fukushima accident clearly promoted the public’s nuclear phase-out opinion.

<Figure 8>-General Perspective on Nuclear Energy (2005, 2007, 2009)

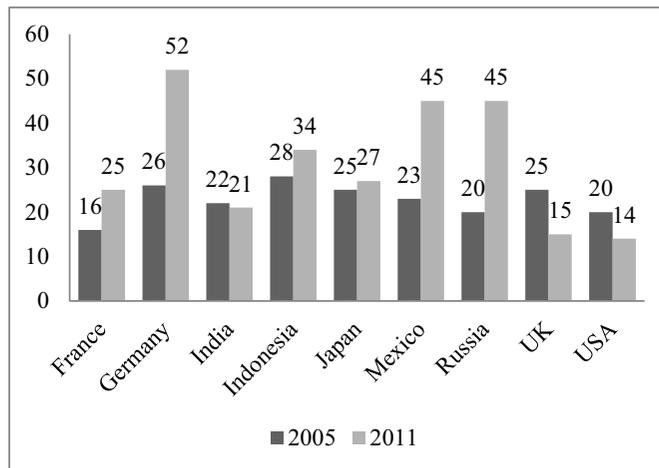


Source: European Commission, “Radioactive waste,”*Special Eurobarometer 227*, (2005), 27.; European Commission, “Europeans and Nuclear Safety,”*Special Eurobarometer 271*, (2007), 14.; European Commission, “Europeans and Nuclear Safety,”*Special Eurobarometer 324*, (2010), 26.* The question asked was “Are you totally in favor, fairly in favor, fairly opposed or totally opposed to energy produced by nuclear power stations?”** Asked question was “In your opinion, should the current level of nuclear energy as a proportion of all energy sources be reduced, maintained the same or be increased?”

¹⁴¹BBC World Service Poll, “Opposition to Nuclear Energy Grows: Global Poll,”*Global Scan Incorporated and BBC World Service*, (2011), 9.

¹⁴²Eberhard Umbach and Joachim Knebel, “Nuclear Energy after Fukushima-A German View,”*Nuclear Physics News 22*, no. 3 (2012): 5.

<Figure 9>-Opinion on Nuclear Phase-out: As Soon As Possible



Source: BBC World Service Poll, “Opposition to Nuclear Energy Grows: Global Poll,” *Global Scan Incorporated and BBC World Service*, (2011), 9.

2. Renewable Energy: Feasible Alternative Source

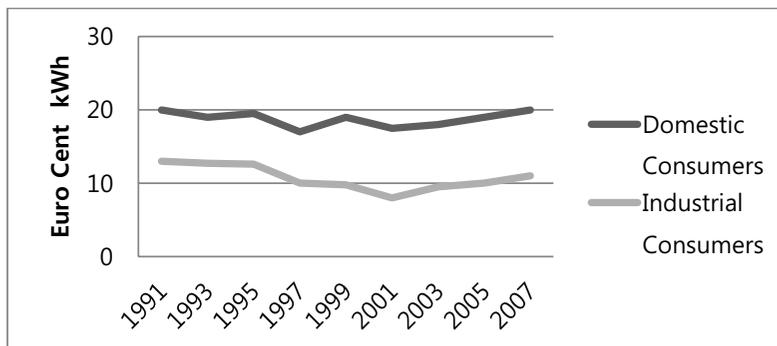
During the Red-Green coalition government, which included the amendment of the Atomic Energy Act, another important act passed by legislation was the Renewable Energy Source Act in 2000. As the German government planned to give up nuclear energy, it needed to foster alternative energy sources which could stably substitute nuclear sources. As explained in Chapter IV, the result of the Renewable Energy Act was derived from accumulated interests in the civil level, which considered renewable energy as an alternative to nuclear energy. By adopting the Renewable Energy Act, electricity produced by renewable energy sources such as wind, solar, geothermal, and biomass, could ensure its purchasing price for 20 years.¹⁴³

The large nuclear facilities, for certain, were opposed to the Renewable Energy Source Act. These facilities usually tackled renewable energy with electricity price. Their argument was that renewable energy required a higher production cost than nuclear energy and this would lead to high

¹⁴³The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, “Act on Granting Priority to Renewable Energy Source (Renewable Energy Sources Act),” *The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety*, (2000): 6.; *Ibid.*, 27.

electricity price. Ultimately, this price burden to the final consumers would harm Germany's economic situation.¹⁴⁴ However, the result was different. After adopting the Renewable Energy Act, although electricity price increased slightly, in 1993, it returned to the price level of when nuclear energy was used for electricity production. In fact, in contrast to the nuclear facilities' expectations, the renewable energy sector was accepted as a feasible alternative energy source. Moreover, two amendments to the Renewable Energy Source Act in 2004 and 2009 even followed up to enforce and ensure renewable energy. For example, the second amendment proposed to repower the renewable energy sector through enhancing its conditions so that it could fit into the electricity system more effectively.¹⁴⁵ Then, what other factors helped and combined to enforce renewable energy?

<Figure 10>-Consumer Electricity Prices in Germany, 1991-2007



Source: ThureTraber, Claudia Kemfert and JochenDiekmann, "German Electricity Prices: Only Modest Increase Due to Renewable Energy expected," DIW Berlin 6, no. 7 (2011): 38.

First of all, renewable energy was cognized as a firm alternative energy source in civil society and this was deeply rooted through history. Renewable energy NGOs started as small citizen group, which debated alternative energy sources, some of them further evolved and operated their own business to actualize renewable energy ideas. These small groups grew and developed into

¹⁴⁴박진희, "독일 탈핵 정책의 역사적 전개와 시사점," 『역사비평』, 통권 98호, 2012년, 237-238.

¹⁴⁵The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), "Renewable Energy Sources Act (EEG) 2009," *The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety*, modified December 22, 2010, accessed November 2, 2013, <http://www.erneuerbare-energien.de/en/topics/acts-and-ordinances/renewable-energy-sources-act/eeg-2009/>.

formal associations¹⁴⁶ such as the Eurasolar, DeutschesWindenergieninstitut (DEWI) and BundesverbandErneuebareEnergie (BEE), which could influence the government's energy policy.¹⁴⁷ For example, EWS (ElektrizitätswerkeSchö nau: Electricity Company) started as a small citizen group which searched for alternative energy sources. Then, it established a small eco-friendly and renewable electricity company which grew to be the biggest green electricity company in 2002.¹⁴⁸

In contrast to the clearly divided opinions on whether to phase-out nuclear power plants or not, there was wide agreement to foster renewable energy sector among the parties. While the SPD and CDU/CSU were supportive of fostering renewable energy, only the FDP, which was fundamentally oriented towards business supporters and had center-right ideologies, opposed the Renewable Energy Sources Act.¹⁴⁹ It was due to the successful outcome that renewable energy industry produced. After the Renewable Energy Act passed, the renewable energy sector gradually increased its proportion in electricity production from 3.1% in 1990 to 22.9% in 2012.¹⁵⁰ As it took up higher proportions in Germany's energy mix, it also contributed to creating jobs and enhancing employment rate. The number of employees who worked in renewable energy sectors increased from 160,500 in 2004 to 367,400 in 2010.¹⁵¹ It provided a reason for the parties to support the renewable energy sector because diminishing jobs in the nuclear energy sector could be replenished by employment creations in the renewable energy sector. Renewable energy performance was a valuable counterargument to the contention of nuclear facilities.

Climate change was another debatable issue for both nuclear energy advocates and

¹⁴⁶There are many interest groups that represent for renewable energy. Eurasolar and BundesverbandErneuerbareEnergie (Renewable Energy Association) have strong influence power in terms of renewable energy. Other interest groups also exists for wind, solar, biomass, and so on.

¹⁴⁷박진희, “독일 탈핵 정책의 역사적 전개와 시사점,” 『역사비평』, 통권 98호, 2012년, 238.

¹⁴⁸ElektrizitätswerkeSchö nau (EWS), “Introducing:ElektrizitätswerkeSchö nau (EWS),” EWS, accessed November 8, 2013, http://www.ews-schoenau.de/fileadmin/content/documents/Footer_Header/2012-03_presentation_EWS_english_.pdf.

¹⁴⁹Solar Server, “German election eliminates anti-renewable FDP, but future uncertain for feed-in tariff system,” Global Solar Industry Website, September 23, 2013, accessed November 10, 2013, <http://www.solarserver.com/solar-magazine/solar-news/current/2013/kw39/german-elections-eliminate-anti-renewable-fdp-but-future-still-uncertain-for-feed-in-tariff-system.html>.

¹⁵⁰The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and ArbeitsgruppeErneuerbareEnergien-Statistik (AGEE), “Development of renewable energy sources in Germany 2012,” *BMU*, (2013), 3.

¹⁵¹The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), “Transforming our energy systems: The foundations of a new energy age,” *BMU*, (2012), 18.

renewable energy advocates. Usually, nuclear facilities argued that nuclear energy was one of the cleaner energy sources among different energy sources. This argument was based on the nuclear power plants' low carbon dioxide emission which could contribute to reducing Germany's greenhouse gas emission. RWE, for example, one of the largest nuclear utility companies, started a sales campaign, the "pro-climate power" campaign, which asserted that climate change could be mitigated through CO₂-free energy sources.¹⁵²

However, the opposition's argument gained more support because of Germany's two track approach of enhancing energy efficiency and using renewable energy to reduce greenhouse gases. In 2007, Germany achieved 22.4% greenhouse gas reduction. This meant that it had already reached the goal of 21% which had been set for 2012.¹⁵³ Moreover, developed countries, including Germany, had agreed on the Kyoto Protocol and the coalition government was composed of the CDU/CSU and SPD, or the 'Grand Coalition.' As the SPD was attached to the nuclear phase-out policy, CDU/CSU could not but maintain this policy because the power between the SPD and CDU was distributed symmetrically. As a consequence, the nuclear facilities' argument lost legitimacy and renewable energy sources became a feasible alternative that could substitute nuclear energy.

In short, renewable energy was considered to be a feasible alternative to nuclear energy. Its position had been consolidated by strong support from citizen groups, associations, institutions, and parties. Moreover, renewable energy expanded its proportion in Germany's energy mix after the Renewable Energy Sources Act because it provided good economic performance. Finally, renewable energy exhibited its competitiveness to fight against climate change and convinced the German people of the possibility that climate change could be managed without nuclear energy.

3. Government Change and Attempts to Turnover Nuclear Energy Policy

In the 2005 election, the Red-Green coalition government was pushed aside by the CDU/CSU and

¹⁵²Len Ackland, "Can Germany survive without nuclear power?" *Bulletin of the Atomic Scientist* 65, no. 4 (2009): 49.

¹⁵³*Ibid.*, 43.

SPD. It was due to the majority principle of Germany's political system. Of the total 614 seats, the CDU/CSU won 226 seats, SPD 222, FDP 61, Party of Democratic Socialism (PDS) 54, and the Greens 51.¹⁵⁴ According to the majority rule, neither the CDU/CSU nor the SPD was eligible to obtain majority seats by making a coalition with the Green Party or the FDP. As a consequence, after weeks of negotiation between the CDU/CSU and the SPD, the two parties agreed to form the coalition government, the 'Grand Coalition,' for the second time in German political history.¹⁵⁵

In terms of the nuclear phase-out policy, the 'Grand Coalition', although not the best, was a preferable government. This coalition government allocated analogous power between the two coalition parties. This implied that the parties shared government control. Hence, the ministry positions were equally divided between the parties. For example, the appointee of the Federal Ministry for the Environment and Nature Conservation and Nuclear Safety was Sigmar Gabriel from the SPD, whereas Michael Glos from the CSU was the Minister of the Federal Ministry of Economics and Technology. It meant that neither party could change the nuclear phase-out policy during the duration of the 'Grand Coalition.' The CDU/CSU preferred to use nuclear energy. It had never declared a nuclear phase-out opinion in Germany's political history. From the perspective of CDU/CSU, nuclear energy was viewed as a type of transitional energy source which could be used until renewable energy became the stable source. In contrast to the CDU/CSU, the SPD supported the nuclear phase-out policy and had never switched its position on nuclear energy usage since the Chernobyl accident. Thus, the CDU/CSU could not change the nuclear phase-out policy in the 'Grand Coalition' and this policy could not help but continue.

The situation reversed when the CDU/CSU and FDP made a coalition government in 2009 after the elections. As a pro-business party, the FDP was traditionally proponents of nuclear utilities. Also, in the government of 'Grand Coalition,' the Minister of the Federal Ministry of Economics and Technology, Michael Glos, had doubted the nuclear phase-out policy because he thought that the

¹⁵⁴Administration of the German Bundestag, "The parliamentary groups in the 16th German Bundestag since October 2005," *Administration of the German Bundestag*, (2006).

¹⁵⁵Russel J. Dalton, "Politics in Germany," in *Comparative Politics Today: A World View (Seventh edition)*, ed. Gabriel A. Almond (New York: Longman, 2002), 287.

Russian natural gas supply was not stable.¹⁵⁶ Moreover, Merkel herself was not confident with the nuclear phase-out policy and perceived nuclear energy as necessary to fight against climate change.¹⁵⁷ Merkel had also rejected the proposal from the SPD which suggested prohibiting the new construction of nuclear power plants to continue the phase-out policy. Thus, in 2009, the new coalition government had sufficient intentions to reverse the nuclear phase-out policy.

Merkel's pledge on extending the lifetime of nuclear power plants by up to 15 years and the FDP's further assertion to build nuclear power plants brought serious resistance from anti-nuclear advocates.¹⁵⁸ The future of nuclear energy usage again emerged as the most important issue in Germany. Not only environment groups and civil societies but also the SPD and the Green Party strongly criticized the government intention to reverse the nuclear phase-out policy. They argued that extending the lifetime of nuclear power plants would set back renewable energy investments and lead to the reduction of job opportunities in the renewable sector. Moreover, if nuclear power plants started to generate electricity again, it would also damage renewable energy technology development and renewable energy production ratio in electricity generation would decline.¹⁵⁹

In contrast to the anti-nuclear arguments, the four major nuclear companies were in support of Merkel's idea on lifetime extension because they were expected to earn, excluding taxes, an additional profit of €25 billion.¹⁶⁰ Compared to other energy sources, the cost of producing electricity by nuclear energy was cheap once the plant was constructed and this characteristic could provide huge profit to nuclear power plant companies. Moreover, Merkel's benefits mirrored that of the nuclear facilities because the lifetime extension would provide an extra €2.3 billion to the government budget.¹⁶¹ She was also willing to maintain nuclear power because she wanted Germany to be seen as

¹⁵⁶염광희, “잘가라, 원자력: 독일탈핵이야기,” 『도서출판한울』, 2012년, 75.

¹⁵⁷William Tucker, “Let's Have Some Love for Nuclear Power,” *The Wall Street Journal*, July 21, 2008, accessed November 10, 2013, <http://online.wsj.com/news/articles/SB121659839296769061>

¹⁵⁸The Economist, “Nuclear power? Yes, maybe,” *The Economist*, September 10, 2009, accessed November 3, 2013, <http://www.economist.com/node/14419420>.

¹⁵⁹진상현 · 박진희, “한국과독일의원자력정책에 대한비교연구: 정책흐름모형을중심으로,” 『한국정책학회보』, 제 21권, 3호, 2012년, 276.

¹⁶⁰The Economist, “Nuclear power? Yes, maybe,” *The Economist*, September 10, 2009, accessed November 3, 2013, <http://www.economist.com/node/14419420>.

¹⁶¹The Economist, “Nuclear power? Um, maybe,” *The Economist*, September 2, 2010, accessed November 3, 2013, <http://www.economist.com/node/16947258>.

a leading role model in fighting against climate change while keeping its nuclear energy industrial powerhouse in order to ensure energy security.¹⁶² She also asserted that the goal relating to climate change, reducing greenhouse gas emissions, could not be compromised, if nuclear phase-out policy continuously conducted. Thus, with these intentions, the government and the nuclear facilities contended that the lifetime of nuclear power plants should be extended.

The coalition government finally announced “Energy Concept 2010” which stipulated an extension to the use of nuclear energy and implemented the 11th Atomic Energy Act which assured plant lifetime extension by law. In “Energy Concept 2010,” the coalition government aimed at stabilizing energy supply to prepare for the climate change era. To undertake this change, the government argued for the necessity of nuclear energy as transition sources.¹⁶³ On the one hand, the new concept still put emphasis on fostering renewable energy for the climate change era, and on the other hand, it clearly stated on using nuclear energy means of the time-limited bridge energy source to successfully reach that era. The government recognized that there was enough resistance to this decision, and justified its decision by imposing taxes on operating nuclear power plants to fund the renewable energy sector so that it could enhance energy efficiency.¹⁶⁴

The opposition claimed that the government would face a dilemma due to a deficit in “Energy Concept 2010.” Energy Concept 2010 had ways to transfer the profits of nuclear power plants to the green electricity fund, which it based on “a tax of EUR 145 per gram of fissile uranium or plutonium fuel for six years, yielding EUR 2.3 billion per year (about 1.6 c/kWh), payment of EUR 300 million per year in 2011 and 2012, and EUR 200 million 2013-16, to subsidize renewables, and a tax of 0.9 c/kWh for the same purpose after 2016.”¹⁶⁵ It also assured “utilities may reduce their contribution to renewables if safety upgrades to particular individual nuclear plants cost more than

¹⁶²DetlefJahn and Sebastian Korolczuk, “German exceptionalism: the end of nuclear energy in Germany!” *Environmental Politics* 21, no. 1 (2012): 160.

¹⁶³The Federal Ministry of Economics and Technology and Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, “The Federal Government’s energy concept of 2010 and the transformation of the energy system of 2011,” *The Federal Ministry of Economics and Technology and Federal Ministry for the Environment, Nature Conservation and Nuclear Safety*, (2010), 3.

¹⁶⁴*Ibid.*, 15.

¹⁶⁵World Nuclear Association, “Nuclear Power in Germany,” World Nuclear Association, modified October 2013, accessed November 2, 2013, <http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/Germany/>.

EUR 500 million.”¹⁶⁶ Combining these two rules could cause the government’s dilemma. The government might have to renounce fund revenue for the renewable energy sector if it asks for additional stricter safety standards, which could cost more than EUR 500 million, to the nuclear facilities. Moreover, the additional tax, which could be collected until 2016, imposed on nuclear companies was preferable to nuclear companies. To be specific, this was in inverse proportion to the amount of the additional tax increased or to the period of the additional tax extended.¹⁶⁷ In this logic, anti-nuclear advocates criticized that the government was providing a free pass to nuclear companies to earn extra profit. For example, ‘Oeko-Institut’ estimated that the four major nuclear companies could gain at least EUR 37 billion euro. Thus, civil society and opponent professionals claimed that the new concept only fulfilled interests of nuclear companies.

The other critical issue was the government’s decision to select the final high radioactive disposal site in Gorleben. Extending the lifetime of nuclear power plants resulted in the necessity of final disposal storage in a rush. The government asserted that final disposal storage was needed because of the future generation of nuclear waste and that the most suitable place was Gorleben, which was planned to take exploration with an open-end decision.¹⁶⁸ This decision was highly criticized due to the experiences of the Asse II leakage.

The lifetime extension decision also brought political controversy. Merkel asserted that the Bundestag’s approval was sufficient to amend the Atomic Energy Act¹⁶⁹ because the governing parties did not hold majority in the Bundesrat. This was because the CDU/CSU and the FDP coalition lost the state election in NordrheinWestfalen.¹⁷⁰ The opposition parties thought that Bundesrat’s approval was necessary and they strongly condemned the government’s amendment procedure. Some

¹⁶⁶Ibid.

¹⁶⁷Campact, *ABSCHALTEN!*, trans. 김하락 (Frankfurt am Main: Fischer Verlag GmbH, 2011), 27.

¹⁶⁸The Federal Ministry of Economics and Technology and Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, “The Federal Government’s energy concept of 2010 and the transformation of the energy system of 2011,” *The Federal Ministry of Economics and Technology and Federal Ministry for the Environment, Nature Conservation and Nuclear Safety*, (2010), 16.

¹⁶⁹Spiegel Online International, “Slowing the Phase-Out: Merkel Wants to Extend Nuclear Power Plant Lifespans,” *Spiegel Online International*, August 30, 2010, accessed November 2, 2013, <http://www.spiegel.de/international/germany/slowing-the-phase-out-merkel-wants-to-extend-nuclear-power-plant-lifespans-a-714580.html>.

¹⁷⁰Campact, *ABSCHALTEN!*, trans. 김하락 (Frankfurt am Main: Fischer Verlag GmbH, 2011), 38.

state governors and members of the SPD and the Green Party sued Merkel and the government in Federal Constitutional Court for disobeying the law by bypassing the approval of the Bundestrat.¹⁷¹ Also, not only the states of NordrheinWestfalen, Rheinland Pfalz, Berlin, Brandenburg, and Bremen, but also Greenpeace and other powerful citizen groups asked the Federal Constitutional Court to hold the amended act unconstitutional.¹⁷² While states sued the government by reason of procedural defect, Greenpeace appealed to argue that the nuclear lifetime extension violated citizens' life security and aggrandized the radioactive waste problem.

The government proceeded with the 'Energy Concept 2010' in conjunction with the Atomic Energy Act amendment to actualize the nuclear lifetime extension. At first, the government seemed to bring changes to the nuclear energy policy. Soon, however, this policy change encountered extensive resistance from opponents. An important factor was that the nuclear phase-out policy carved out by the Red-Green coalition had changed the nuclear energy agenda from safe usage to suspension of usage. As a result, proponents of nuclear energy had no choice but to argue for the extension of the plants' lifetime rather than for the construction of more nuclear power plants.

It is interesting to note that Merkel faced strong resistance even though her foray into lifetime extension did not totally overset the nuclear phase-out policy. She declared nuclear energy as a transitional source to fight against climate change until the arrival of the renewable era. Also, she argued that it was necessary to control high electricity prices in Germany. However, her political life was threatened by this endeavor to change nuclear policy. Indeed, wide use of nuclear energy was not an acceptable agenda for the opposition politicians and the public.

4. Fukushima Incident and State Election

The Fukushima accident was an external driven factor that profoundly affected Germany's nuclear

¹⁷¹Spiegel Online International, "14 Years Longer Online: Merkel's Government Extends Nuclear Plant Lifespans," *Spiegel Online International*, September 6, 2010, accessed November 2, 2013, <http://www.spiegel.de/international/germany/14-years-longer-online-merkel-s-government-extends-nuclear-plant-lifespans-a-715833.html>.

¹⁷²Campact, *ABSCHALTEN!*, trans. 김하락 (Frankfurt am Main: Fischer Verlag GmbH, 2011), 40.

energy policy. In March 11, 2011, a tsunami devastated the Japanese main island of Honshu, where two nuclear power plants including the Daiichi (first nuclear power plant) were constructed. Despite the fact that the plants were considered to be guaranteed with perfect safety measurements, Japan failed to defend from the natural disaster. Although Germany was far away from Japan, the nuclear disaster jogged the memories of the Chernobyl accident to German citizens.¹⁷³ Shortly, Germany returned to its original nuclear phase-out policy.

Germany's internal situation was ripe for following through with the nuclear phase-out policy. The Fukushima accident provided an opportunity for policy change together with past anti-nuclear sentiments. Thereby, the public did not consider nuclear energy as necessary for their future and consequently asked the government to immediately phase-out nuclear power plants. Moreover, alternative energy sources were definitely existent as they were fostered through the 2000s. The Renewable Energy Sources Act and civil institutions made efforts to increase the efficiency of renewable energy in order to secure its position in Germany's energy mix. Renewable energy also exhibited reliable performance such that people had confidence in its future. Furthermore, repeated debate on the nuclear lifetime extension and the antecedent nuclear phase-out determination by the Red-Green coalition contrived to keep awake the nuclear agenda in the political sphere. Indeed, the Fukushima accident and Germany's internal conditions met at the right time to consolidating a permanent nuclear phase-out policy.

Right after the Fukushima accident, in March 15, 2011, Merkel directly ordered the moratorium of seven old nuclear power plants with up to three months to respond. However, even with this immediate action, she was not free of her previous lifetime extension decision. It was because the state election was prearranged in March 27, 2011. The people suspected her intention of making the moratorium decision to be to win the election by appeasing the opponents. This suspicion was an opportunity for the opposition parties to win the election, and besides, the public was already disappointed with the government's previous lifetime extension decision.

¹⁷³ '脫원전' 독일을 가다, <주간조선>, 2013/11/10, <http://weekly.chosun.com/client/news/viw.asp?ctcd=C01&nNewsNumb=002164100001>.

The state election results, which were largely affected by the Fukushima accident, were a second shock for Merkel. In Baden-Württemberg, where the CDU had dominated for 58 years, the Green Party produced the state governor by winning the election in that region for the first time in Germany's political history. Significantly, the Green Party, which gained 19 more seats in comparison to the state election of 2006, was most successful among the parties.¹⁷⁴ Also, the Green Party, which won 18 seats in contrast to 0 seats in the 2006 election, illustrated outstanding achievements in Rhineland-Palatinate.¹⁷⁵ This result reflected German citizens' willingness to accept the nuclear phase-out policy, a decision re-boosted by the Fukushima accident. Especially, from the perspective of the CDU and Merkel, the defeat in Baden-Württemberg was the most serious result and her leadership was in danger even within the CDU. Moreover, the official poll suggested that the public had changed its supporting party. The SPD and the Green Party received more support, while the CDU/CSU and the FDP struggled. As a result, Merkel convened "The Ethics Commission for a Safe Energy Supply" to overcome this political crisis.

<Table 4>-Change of Supporting Party after Fukushima Accident

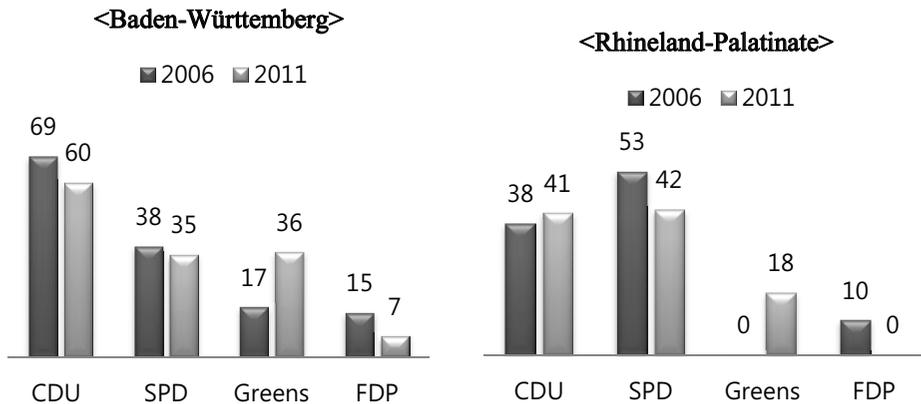
	October, 2010	April, 2011
CDU/CSU	33.8	32.0
SPD	23.0	28.0
Greens	10.7	23.0
FDP	14.6	5.0
The Left	11.9	7.0

Source: 이서원, "후쿠시마원전사고이후글로벌에너지정책의변화," LGERI 리포트, 2011년, 6.

¹⁷⁴Judy Dempsey, "Merkel Loses Key German State on Nuclear Fears," *The New York Times*, March 27, 2011, accessed November 11, 2013, http://www.nytimes.com/2011/03/28/world/europe/28germany.html?_r=1&

¹⁷⁵Spiegel Online International, "The World From Berlin: Election Debacle 'Will Shake CDU, But Won't Topple Merkel,'" Spiegel Online International, March 28, 2011, accessed November 11, 2013, <http://www.spiegel.de/international/germany/the-world-from-berlin-election-debacle-will-shake-cdu-but-won-t-topple-merkel-a-753553.html>

<Figure 11>-State Election Result in 2011



Source: Spiegel Online International, “The World From Berlin: Election Debacle ‘Will Shake CDU, But Won’t Topple Merkel,” Spiegel Online International, March 28, 2011, accessed November 11, 2013, <http://www.spiegel.de/international/germany/the-world-from-berlin-election-debacle-will-shake-cdu-but-won-t-topple-merkel-a-753553.html>

In April 4, 2011, Merkel convened “The Ethics Commission for a Safe Energy Supply” to overcome the difficulties she faced. This commission aimed at reconsidering nuclear energy usage and various professionals with different backgrounds such as the former Minister of the Environment, Klaus Töpfer, religious groups, political leading figures, scientists, and industry leaders participated in the commission. To decide whether to use nuclear energy or not in a German context, it picked three core issues: safety of operating nuclear power plants, necessity of nuclear power plants for Germany, and existence of alternative energy sources without an increase in electricity price. Hence, the commission endeavored to clarify the necessity of nuclear energy in a German context.

The commission used an important method in the decision-making process. Its discussions were opened to the public via media and it respected many different opinions from various actors.¹⁷⁶ To deduce an agreement, for example, it invited the public, external professionals, and 17 members of the commission to a public dialogue which was broadcasted on air.¹⁷⁷ Moreover, it also collected citizens’ ideas on nuclear energy usage and permitted the media to report the discussion details to the people. The decision-making process was largely made transparent so that the results of the discussion

¹⁷⁶Ethics Commission for a Safe Energy Supply, “Germany’s energy transition-A collective project for the future,” *Office of the Ethics Commission for a Safe Energy Supply in the Federal Chancellery*, (2011), 8.

¹⁷⁷‘脫원전’ 독일을 가다, <주간조선>, 2013/11/10,

could legitimize the decision on whether or not to phase-out nuclear energy usage.

The commission concluded that the decision of the nuclear power plants' lifetime extension in 2010 should be reversed. Although Germany had sufficient safety measures with high standards, the commission stated that it was impossible to prevent all nuclear accidents and there was always an inherent risk of severe irrevocable aftermath.¹⁷⁸ Furthermore, renewable energy was considered as the main alternative energy source in that it was safer than the nuclear source and it was expected to provide better competitiveness to Germany's energy industry.¹⁷⁹ The commission submitted a recommendation report to Merkel and she accepted the recommendation. She reversed the lifetime extension decision and adopted the nuclear phase-out policy through the 13th amendment of the Atomic Energy Act which passed the Bundestag with 513 agreement votes.

V. Conclusion

This thesis sought to investigate the causes behind Germany's recent nuclear phase-out policy and clarified important findings. First, before the Chernobyl accident, there were already existing anti-nuclear movements in Germany which later became the key enforcement factor when deciding the nuclear phase-out policy. The Green Party was established and entered into the political system, providing a political channel for anti-nuclear advocates. Second, the Chernobyl accident changed German public perception on nuclear energy. Public opinion shifted to an anti-nuclear position and the anti-nuclear movement became more systematic. Politically, the nuclear energy agenda changed to nuclear phase-out from extending the lifetime of nuclear energy usage. In particular, the SPD changed their position to nuclear phase-out. However, renewable energy sources

¹⁷⁸DetlefJahn and Sebastian Korolczuk, "German exceptionalism: the end of nuclear energy in Germany!" *Environmental Politics* 21, no. 1 (2012): 161.

¹⁷⁹Ethics Commission for a Safe Energy Supply, "Germany's energy transition-A collective project for the future," *Office of the Ethics Commission for a Safe Energy Supply in the Federal Chancellery*, (2011), 4-5.

were not ready to replace nuclear energy. Third, the Red-Green coalition government reached their first agreement on nuclear phase-out, providing a foothold for the phase-out policy by amending the Atomic Energy Act and enacting the Renewable Energy Sources Act. This was the first step to implementing the nuclear phase-out policy. Fourth, before the Fukushima accident, Merkel’s decision on the lifetime extension of nuclear power plants was the key issue for Germany’s nuclear energy policy. The public opinion inclined toward phase-out policy after her decision and anti-nuclear movement from the regions, which selected as high radioactive waste disposal site fertilized this trend. In the realm of politics, the government was condemned because it attempted to amend the Act without proper procedures. Moreover, Germany was able to abandon nuclear energy due to the existence of alternative energy sources. Lastly, after the Fukushima accident, the state election results fertilized the nuclear phase-out decision of CDU because the party lost a key state that it had never lost in 58 years. This was the first time they had experienced this defeat in election history.

<Table 5>-Summary and Important Findings

Settlement		Chernobyl	Red-Green	CDU led Government	Fukushima	Result
<ul style="list-style-type: none"> • Anti-nuclear movement • Establishment of Green Party • No existence of alternatives • Public opinion was not extremely opposed 	Public Opinion	<ul style="list-style-type: none"> • Broadened Anti-nuclear • Public opinion leaned to oppose nuclear energy usage 	<ul style="list-style-type: none"> • Policy change toward nuclear phase-out • The amendment of Atomic Energy Act • The Renewable Sources Act • Ambiguous of CDU/CSU position on phase-out 	<ul style="list-style-type: none"> • Half-in-half on nuclear energy usage • Anti-nuclear movements were alive due to the various accident 	<ul style="list-style-type: none"> • Lost State Election • Public opinion dramatically leaned to nuclear phase-out • Ethic Commission for Safe Energy Supply • Opened dialogue for deciding future of nuclear energy 	<ul style="list-style-type: none"> • Determination of Nuclear phase-out
	Political Dynamics	<ul style="list-style-type: none"> • No more new construction • SPD changed policy to phase-out • Green maintained its position • 1998 election result 		<ul style="list-style-type: none"> • Reversed phase-out policy to the nuclear lifetime extension • The procedural problem on implementing the lifetime extension 		
	Existence of Alternative	<ul style="list-style-type: none"> • Renewable Energy Development 		<ul style="list-style-type: none"> • Renewable as feasible alternative with good performance 		

Source: By Author

This study offers key implications for understanding Germany's nuclear phase-out decision. The most compelling factor for nuclear phase-out was the state election results. Some literature argued that Merkel's personal background was the most important factor in this decision, but it is more logical to argue that any chancellor would have made the phase-out decision in the face of an unprecedented, major defeat and the Fukushima accident, combined with other internal situations. Moreover, Germany had already actualized the phase-out policy in 2000 and the nuclear lifetime extension decision in 2010 had brought about strong resistance. The phase-out decision was made not because of Merkel's personal background but because of the state election results, combined with internal factors.

This study also verified previous studies' arguments. Previous studies had largely tried to examine three significant factors: the anti-nuclear movement, the importance of the Green Party, and the waste disposal problem. The anti-nuclear movement was continuously viable in German society due to the final radioactive waste disposal problem. This movement was consolidated through history, and public opinion switched to supporting phase-out, putting pressure on the political sphere. Moreover, the Green Party survived in the political system since the 1980s, and this kept an open channel for the nuclear phase-out argument. The previous acts on nuclear phase-out and renewable energy would not have been possible without the Green Party. These factors contributed to Germany's nuclear phase-out decision.

Ultimately, this thesis identified the causes of the nuclear phase-out decision in Germany with an expanded time frame. It demonstrated the dynamics of nuclear energy policy and proved the difficulty of implementing a nuclear phase-out policy. This thesis also has implications for countries that still use nuclear energy sources. Nuclear energy inherently contains potential problems because it cannot be free from radioactive waste and the danger of accidents, resulting in serious aftereffects. However, more research is needed because this study focused only on Germany's domestic situation, and focused more on political aspects than on economic factors. With this study as a foundation, further research could bring about insight into the processes behind Germany's nuclear energy policy.

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Abstract in Korean

(국문초록)

후쿠시마 사태 이후 독일의 핵 에너지 포기 결정에 관한 연구

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본 논문은 후쿠시마 사태 이후 독일이 핵 에너지를 포기한 원인을 밝히고자 한다. 독일은 후쿠시마 원전 사태 이후 신속하게 핵 에너지 포기 정책을 이행하였고, 이러한 결정은 다른 핵 에너지 사용 국가에서는 쉽게 나타나지 않은 현상이다. 독일의 과감한 결정에 대한 원인을 밝히기 위해 여론, 정치 역학, 대안적 에너지의 존재라는 세 가지 독립변수를 두었으며 후쿠시마 사태는 독일에게 외부적 요소로써 정책 변화의 기회를 제공하는 역할로 간주하였다. 이를 통한 논문의 함의는 크게 네 가지로 압축될 수 있다. 첫째, 핵 에너지 포기의 가장 중요한 요소로는 2011년 주 선거가 있었다. 기민당은 후쿠시마 사태 직후 치러진 주 선거에서 58년 동안의 수성했던 주에서 녹색당에게 패배하고 독일 내의 핵 에너지 포기 문제에 대해 심각하게 고민한다. 둘째, 독일 대중들은 시간이 지나면서 점차적으로 핵 에너지 포기를 지지한다. 이러한 점진적 움직임이 후쿠시마 사태를 만나면서 전국적으로 퍼지게 된다. 셋째, 녹색당은 1982년부터 독일 정치에서 살아남아 핵 포기 의견을 반영하였고 기민당은 체르노빌 사태 이후부터 핵 에너지 사용에서 포기로 입장을 변화한다. 마지막으로 독일의 재생 에너지 분야가 핵 에너지를 충분히 대체할 수 있을 만큼 성장하였다. 이는 핵 에너지 없이도 독일의 예상되는 에너지 관련 문제들을 헤쳐나갈 수 있는 자신감의 기반이 되었다. 결론적으로, 독일내부의 역사적 및 정치적인 축적요인이 후쿠시마 사태 및 집권당의 주 선거 패배와 시기적으로 수렴하여

핵 에너지 포기 결정을 이끌어 냈다고 볼 수 있다.

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주요어:여론, 정치역학, 대안적에너지존재, 주선거결과, 핵에너지포기

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