ATOMKRAFT, NEIN DANKE: EXPLAINING GERMANY'S NUCLEAR POWER POLICY AFTER FUKUSHIMA

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Table of Contents

Abstract

The 2011 meltdown at the Fukushima Daiichi nuclear power plant in Japan shocked countries into reconsidering the safety of nuclear power. Although, the majority of the world continued business as usual after, Germany decided to eliminate nuclear as a power source altogether. The policy to phase-out nuclear power was the result of four decades of struggle between the pro-nuclear coalition, made up primarily of the CDU and the nuclear power industry, and the anti-nuclear coalition, made up of the anti-nuclear movement and the green party. I used the MACF to explain, why after so many years of struggle, the nuclear phase-out policy was finally put in place. The MACF combines two policy development frameworks: the advocacy coalition framework (Sabatier 1988) and the Environmental Movement Impact Model (Rucht 1999). The framework explains that Germany's nuclear phase-out was not an impulsive decision, but a drawn out battle between the pro- and anti-nuclear coalitions, which was affected by a variety of external shocks including three nuclear disasters as well as the development of as strong anti-nuclear movement.

Introduction

On March 11, 2011, tragedy struck Japan. An 8.9 magnitude earthquake shook the country's western coast sending a tsunami with 30 ft. waves barreling towards the coast within just 15 minutes. The earthquake and the following tsunami wrought havoc on the coastal towns, factories, and threatened nuclear power plants. The next day, the world learned that the nuclear power plant in Fukushima had been hit hard by both the earthquake and the tsunami, and that three reactors were possibly leaking radiation because the plant's cooling system was no longer functioning. The leakage was partially due to the loss of power both from outside and from within the plant (Goodman 2011). On March 12th, a hydrogen explosion erupted from one of the reactor buildings, sending radioactive debris flying. Throughout the next few days, the situation only worsened further as pressurized hydrogen gas caused a second explosion at a second reactor on March 14th , and a third explosion at a third reactor on the 15th. The plant operators were forced to pump seawater into the reactors in hopes of stabilizing the cores, which had been uncovered and threatened a full scale nuclear meltdown. The cooling process required the periodic release of radioactive steam to prevent an even bigger nuclear catastrophe (Behr 2011).

The nuclear meltdown at Fukushima provoked questions around the world regarding the safety of nuclear energy as a power source. Germany in particular reacted strongly to the event, instating a plan to phase out nuclear energy by 2022. This decision was a reversal of a previous 2010 commitment by Angela Merkel's coalition to lengthen the life of nuclear plants by an average of 12 years. The newest version of the phase out will not have a revision clause, making this decision permanent (Germany to close 2011).

The German nuclear power policy change is a rare marked policy shift. Reacting to the same event, other Western countries including England, France, and the United States, did little or nothing beyond a safety review of their nuclear power plants. For example, England decided to shut down one of its nuclear fuel reactors after the event, but approved the construction of a new power plant in July of 2011 (McDonagh, 2012). Other than a few safety reforms, neither France nor the US changed their nuclear power policy after this event. Japan, the country in which the Fukushima nuclear disaster occurred, originally set a policy to phase-out all nuclear plants by 2040 (Tabuchi, 2012). Recently, however, public and political indecision on the issue of nuclear power as well as the restarting of a number of nuclear power plants within Japan has led to an unclear vision of nuclear power's future role in Japan's energy portfolio (Fackler, 2014). It becomes clear that the policy change that happened in Germany was unique because it completely rejected nuclear power.

The change in nuclear power policy in Germany after Fukushima was seen as from the outside as a radical shift in policy. However, nuclear power became a highly contested issue in Germany long before the Fukushima meltdown took place. The country has had an intensely passionate anti-nuclear movement since the mid-1970's, which was both revived by the Three Mile Island and Chernobyl nuclear accidents, and supported by the Green Party. What seems like Germany's reaction to a disastrous event, is really rooted in 40 years of political organizing and activism around the issue of nuclear power. By the time Fukushima happened, Germany had already implemented a nuclear phase-out policy for ten years. Although this policy was essentially reversed by Angela Merkel's approval of increased run times of nuclear power plants, the previous

phase-out policy as well as political support of renewable energies laid the groundwork that allowed Germany to adopt a second nuclear phase-out policy after Fukushima. In contrast to Germany at the time of Fukushima, countries like France and the UK did not have the same strength anti-nuclear movements or green parties to create the political and social context in which a policy shift such as the one that occurred in Germany was possible.

In order to explain the shift that occurred in Germany over the past forty years, I have developed the Movement Advocacy Coalition Framework (MACF), which combines two existing policy development frameworks: the Advocacy Coalition Framework (Sabtier & Jenkins-Smith 1988) and the Environmental Movement Impact Model (Rucht 1999). This new framework seeks to combine the advocacy coalition approach to policy change while allowing environmental movements to impact the constraints and resources of those coalitions.

Explaining Environmental Policy Change by Incorporating Environmental Movements

To understand the major shift in nuclear power policy in Germany after the Fukushima Daiichi nuclear power plant meltdown, we have to understand the policy change process as well as how the anti-nuclear social movement contributed to it. In order to accomplish this, I combined the Advocacy Coalition Framework (ACF) with Rucht's Environmental Movement Impact Model (EMIM) to create what I call the Movement Advocacy Coalition Framework (MACF). The ACF focuses on the power

dynamics of advocacy coalitions within a certain policy domain to explain why policy change happens. The EMIM examines key factors that can enable an environmental movement to impact environmental policy. The MACF combines these models by addressing both the standard structural policy process and the environmental movement's impact on this process. In other words, I explain environmental policy change by incorporating the impacts of environmental movements on the context in which the policy domain described in the ACF operates. In combining the two theories into the MACF, I am able to integrate the impacts of shock events and the contributions of environmental movements into the greater scheme of policy change that the ACF and EMIM do not address individually.

The Advocacy Coalition Framework

The Advocacy Coalition Framework has become a popular explanatory framework for understanding policy change. Developed by Sabatier and Jenkins-Smith (1988) and later edited by Weible and Sabatier (2007), the framework was created to explain the important role of advocacy coalitions in policy change. In order to do this, the ACF divides policy issues into policy subsystems. Each issue category (e.g. nuclear power, water quality, labor rights, etc.) has its own subsystem. Within each subsystem are a wide variety of actors, which include interest groups, government officials of all levels of government, government agencies, researchers, and journalists. These subsystems are shaped by the belief systems of the actors within them and by the systemic constrains under which they operate.

The actors in each policy subsystem divide into coalitions based on their policy core beliefs, which represent normative and empirical commitments within the given policy domain. The shared beliefs within a coalition are what make each one unique. The actors and the coalitions are assumed to "act at least in part to translate their beliefs in to public policy" (Sabatier & Jenkins-Smith 1988, 132), and coalitions compete with one another to accomplish their policy goals. The coalitions are constantly vying for power in the subsystem to push through their policy objectives. Usually, the coalition that has the most resources and public backing gains dominant decision or policy making power. The dominant coalition has control of the power and policy mechanisms within a subsystem, so the minority coalition has little to no impact on policy decisions and their beliefs are not translated into policy. Minority coalitions work strategically to gain more resources and information that help them become more dominant within the policy subsystem. Changes in coalition dominance or even changes in policy core beliefs of certain coalitions must occur for policy change to happen. Therefore, the make-up of the subsystem, the power dynamics between coalitions, and policy core beliefs of subsystem actors are crucial to explaining why policy change happens.

The framework puts the subsystem within the broader political context by incorporating external constraints that limit both advocacy coalitions and individual actors. External constraints include long term coalition opportunity structures and short term constraints and resources of subsystem actors. Long term coalition opportunity structures are defined as external factors that affect the behavior of advocacy coalitions as a whole. Overlapping societal cleavages and the degree of consensus needed for major policy change are both considered long term coalition opportunity structures. The degree

of consensus relates to the consensus needed within formal government structure to get legislation or policy passed. An overlapping societal cleavage is when two or more cleavages such as wealth, ethnicity, or religion overlap to reinforce the cleavage. An example of overlapping societal cleavage is where one ethnic group is rich and the other is poor. Here the cleavage of ethnic groups (e.g. white and black) is reinforced by the cleavage of wealth (eg. white/wealthy and black/poor). Another set of constraints focuses on individual actors. Short term constraints and resources of subsystem actors are incorporated into the framework and include financial support, information such as new research, and citizen mobilization. Beyond those constraints, there are relatively stable system parameters which are assumed to remain constant over long periods of time. Relatively stable system parameters include the basic attributes of the problem or good that the policy subsystem is based on, the basic distribution of natural resources, the fundamental sociocultural values and social structure, and the basic constitutional structure or rules. The relatively stable system parameters influence and define the long term opportunity structures. These constraints affect the coalitions and actors within the subsystem and shape the way in which they can accomplish their policy objectives.

The ACF understands policy change in two ways. Minor policy change is seen to occur as the result of policy-oriented learning, a process where coalitions gain information and change their belief structures based on that information. Major policy change, however, can only come from major disturbances external to the policy subsystem. These external events or perturbations are considered a necessary condition for policy change. External system events include a change in a variety of system conditions. First, external system events include changes socio-economic conditions. For

example, a changes in socio-economic conditions could be an increase or decrease in the standard of living for the nation as a whole, or for a particular demographic. Changes in dispensable income could change how individuals value certain services such as unemployment support or environmental protection. Another result of external system events includes significant changes in public opinion. When public opinion changes, it is possible that politicians will respond to the change and develop legislation in line with the change in opinion. Regime change is another event external to the subsystem. Regime change is when a new leader or party comes into power. Different beliefs could lead to advantages for minority coalitions within a subsystem. A subsystem could be influenced by the policy outcomes of another subsystem. For example, if there are changes in the efficiency for houses, both the efficiency ratings subsystem and the renewable energy subsystem are impacted. Finally, there are disasters, which are a shock to a nation or even the world, can cause changes in belief systems as policies are found to be inadequate or failing in some manner. Furthermore, a disaster can cause changes in public opinion that are sudden. The external events are thought to give advantages to minority coalitions within a subsystem because they can shift agendas, focus public attention, and attract the attention of key decision makers.

While the ACF does a good job of "describing the patterns of participation and explaining policy change" (Nohrsted 2005, 1041), it does have some weaknesses. First, there are many different types of actors included in the framework, but the effectsthat social movements have on the policy process are downplayed. The ACF lists interest groups as possible actors within the policy subsystem, but does not address the impact an environmental movement may have on the political context in which the policy

subsystem finds itself. For example, the effects that a social movement could have on the external constraints and resources of subsystem actors are not incorporated into the framework. Also, the ACF explains major policy change through the idea of an external shock to the policy subsystem, but fails to describe major policy change that does not come after a shock (Roßegger & Ralf Ramin 2012). Crucially, the framework is also unable to explain why policy change does not always occur after a shock or triggering event. In order for environmental policy change to be more accurately analyzed and explained, environmental movements must be incorporated into a new framework.

Environmental Movement Impact Model

Rucht (1999) developed the EMIM to explain how environmental movements shape the policy process. He explains that environmental movements can have three indirect impacts, or as Rucht calls them, intervening factors: 1) change public opinion (as displayed through the media), 2) change individual attitudes and beliefs (as shown by opinion surveys), and 3) gain access to the policy making structure through a green party (or equivalent). The one way in which the environmental movement can have a direct impact is through lobbying, though he does not emphasize this direct impact.

As opposed to the advocacy coalition framework, the EMIM looks at environmental policy as a product of environmental movements. Because movements are not in power nor do they have direct access to power holders, the movement concentrates on influencing the three factors listed above. According to Rucht, policymakers cannot ignore public opinion as long as it is relatively unified on one side of an issue.

Environmental movements that mobilize the country behind a given issue can be viewed as working to achieve a more unified public opinion. If successful, environmental movements would be indirectly forcing the hand of policymakers by unifying public reaction which manifests itself in a public outcry.

Rucht identifies individual attitudes and behaviors as something social movements can impact. Again, the model suggests that environmental movements can change these attitudes. The movements can be influential in environmental policy because they are important to politicians. Since a politician's ability to get into and stay in power is based on the opinions of those who vote for him, the politician must pay attention to them. Rucht mentions two phenomena that demonstrate a politician's need to be aware of people's opinions. The first is that politicians often initiate special surveys to properly gauge people's attitudes. The second is that politicians go on information campaigns in order to gain acceptance for certain policies. These suggest that environmental movements that inform the public about policy issues and change people's attitudes could encourage policy makers to develop new or change existing policies.

Lastly, a green party or equivalent is considered the third mediating factor through which environmental movements can impact environmental policy. Rucht considers the green party as separate from the environmental movement because although it may have formed out of a social movement, the green party has taken on the structure of established political parties and concerns itself with political issues outside of environmental policy. The strength of this party is important when looking at the development of environmental policy as political actors and parties react very sensitively to electoral competition. When an issue becomes appealing enough to be the focus of an

electorally relevant political party, other parties will feel the need to take the issue into account, and at least discuss it. Rucht uses Germany's Green Party as an example of this pattern, as they have become a politically and electorally relevant party on all levels of government since 1983. Environmental movements can identify the environmental issues that a Green Party could support, making the concerns voiced by the environmental movement an issue of national politics.

The EMIM's focus on the importance of social movements fills an important gap in the ACF. However, it does not include what happens when there are external shocks as explained in the ACF. Shocks are an important way of getting the attention of policy makers and the public on the policy issue. This extra interest in the issue could catalyze policy change. I found this model to be an incomplete way of looking at an environmental movement's impact on policy change because there have been numerous examples where an industrial or other accident was instrumental in bringing about the dialogue that led to policy change. Also, Rucht's model, as it is geared towards finding the impact of environmental movements, excludes certain actors from the policy making process. He makes the assumption that the only people within the government who agree with the beliefs of the movement are the green parties, and that they are indirectly promoting the environmental movement's agenda. This assumption leaves out all governmental actors that are outside of the green party. Combining this model with the ACF remediates these issues. The Movement Advocacy Coalition Framework (MACF) acknowledges the impact social movements have on the external constraints of a policy subsystem and incorporates external shocks such as disasters like Hurricane Katrina or Chernobyl that could catalyze policy change

The Movement Advocacy Coalition Framework

In my research, I use the MACF to get a better understanding of the dynamics of coalition dominance and what creates policy change. My theorization of the MACF enables an examination of the relationship between the constraints and resources of subsystem actors, external events, and the social movements surrounding the issue. As with the ACF, policy change in the MACF happens in two ways; policy oriented learning and shocks to the system. Policy oriented learning relates research to policy change. As research on a given topic reaches those within that issue's policy subsystem, it is possible that the information can create policy change. On the other hand, a triggering event or shock can bring attention to a given issue and change public opinion or a variety of other factors. The event can change the way in which citizens support subsystem actors. The difference in the MACF is that policy change is further influenced by an environmental movement. The environmental movement in turn can change public opinion further and perhaps even cause a change in the systemic governing coalition.

The MACF borrows its structure from the ACF, but adds the EMIM's three indirect channels of policy impact. Policy issues are divided into policy subsystems, and the actors within those subsystems divide into coalitions based on their policy core beliefs. The combined model begins with the assumption that Rucht set out with, that the environmental movement is external to the policy subsystem. Being outside of the policy subsystem, the movement has to use its three channels of indirect influence to affect change. Using Rucht's model as a guide to how an environmental movement can impact policy, the MACF illustrates how social movements impact three aspects of the basic

ACF structure; external system events, short term and long term constraints and resources, and the subsystem itself. A social movement will work to support a certain policy coalition within the policy subsystem. Therefore, by having social movements in the MACF, there is a new avenue through which a coalition or actor within a policy subsystem can get the resources it needs to become the dominant coalition. These resources include public opinion, money, people to mobilize for the cause, information, etc. However, unlike the ACF, the MACF also explains how focusing or trigger events can spur policy change.

An environmental movement can take advantage of a major event such as an environmental disaster by using it as an opportunity to change public opinion and individual attitudes around the issue while there is a lot of attention it. Public opinion is important for political agenda setting. As stated by Rucht, politicians react to public opinion as well as rely on it to make decisions. In the ACF, an external event itself may change public opinion. What is different in the MACF is that I included that the environmental movement could magnify the changes that are created by an external event. In order to successfully change public opinion movements must strategically influence three things. First, the movement's ability to influence the media's portrayal of the problem is crucial in getting the public behind a given issue. This can be done through protests and other appeals to the media. Second, the ability of the movement to take advantage of a given shock is vital in keeping the issue relevant in public and political discussion. Third, the movement must have infrastructure and resources available to react to a given event, and to mobilize people while their feelings about a policy are still strong. Previous and present external shocks such as an environmental

accident or disaster will create a historical context through which present environmental accidents or disasters will be viewed. This influences individual's attitudes about a problem and can suggest how willing they are to let an environmental incident slide. The concept of the trigger or focusing event is vital to the MACF as it provides the environmental movement with momentum and materials to affect the different parameters of, and actors and coalitions within the policy subsystem. As the policy subsystem matures, the movement becomes more organized and more able to exploit the shocks effectively. Changes in public opinion can even cause systemic regime change. The MACF explains how an external event can give a movement the momentum it needs to affect changes in public opinion and individual attitudes. These changes can have a huge impact on the policy subsystem and the dominance of the coalitions within it.

Because it changes individual attitudes and public opinion, the movement also has the ability to change the short term constraints and resources affecting a policy subsystem. Resources that can be affected by a movement include public opinion, information, people that can be mobilized to support an issue, and financial resources. As discussed above, changes in public opinion are important for coalition actors who are worried about being reelected. A social movement can affect change in policy by changing public opinion to be in the favor of the coalition it supports. The movement can also create an arsenal of people with the same beliefs that can be mobilized to show support for a given coalition. These people support subsystem actors because they help to develop public opinion in their favor. Furthermore, changes in public and individual support due to an active movement can provide the subsystem actors with the financial resources to research and develop the beliefs of the coalition. A social movement that

provides new information through research is vital in creating policy oriented learning within a policy subsystem. For example, when a new type of renewable energy like wind or solar power was founded, it opened the door to a new type of energy supply that did not require fossil fuels. The more research shows supports a new coalition's ideas, the more likely it is that policy oriented learning will happen, and policy change is possible. Social movements are therefore very important in developing the resources that the actors within the policy subsystem can use to gain dominance.

Lastly, the movement could influence the framework through the development of a Green Party. The Green Party would directly impact the composition of the policy subsystem and potentially develop a new, electorally competitive coalition. The addition of government actors whose policy core beliefs center on environmental issues, changes the dynamic of environmental oriented policy issues. Where previously perhaps no parties favored environmental protection or regulations, a green party would introduce a side of the argument that is electorally relevant and attractive to a more environmentally oriented public. Other parties may see their position on a given environmental issue as a threat to their electoral success, which could at the very least create a conversation around the policy issue. This change may provide a previously minority subsystem with a more favorable political opportunities and alter the resource distribution within the subsystem. Therefore, an environmental movement's relationship with a green party is important because it is through the party that it gains access to the policy subsystem and is able to influence environmental policy.

As discussed above, long term coalition opportunity structures include the degree of consensus needed to create major policy change and overlapping societal cleavages.

These are not usually affected by social movements. The only movement that would be able to do so would have to be centered on changing the existing structure or rules of the political system. Because these constraints are considered to be stable over time and dictated by the stable parameters of the framework, it is unlikely that a social movement would be able to change them significantly.

Using the MACF to explain the German Nuclear Phase-out after Fukushima

As explained above, shocks are vital to policy change in environmental policy. These events give the issue within a policy subsystem saliency in the public and keeps the issue on the agenda of policy makers. Social movements are important for policy change as well because they bring shock events to the attention of the public and are vital in the framing of a given event. Environmental movements that capitalize on shocks are also able to influence the short term constraints and resources as well as the dynamic parameters of the MACF and affect policy change that may not have happened otherwise.

Germany's nuclear power policy shift after Fukushima was the result of a successful grassroots anti-nuclear movement that was able to bring nuclear power to the attention of the German populace and political leaders over a span of forty years. External shocks including Three Mile Island and Chernobyl contributed to the development of anti-nuclear sentiment in Germany where as many as 80 percent of people were against nuclear power by August of 1986. Finally, the development of Germany's Green Party gave the anti-nuclear coalition access to policy making. Together these three things were able to change the dynamics and composition of the nuclear

power subsystem so that Angela Merkel and the Christian Democratic Union did not find it attractive to pursue a pronuclear position.

Nuclear power regulation in Germany began in 1960 with the Atomic Energy Act (Deutsche Welle 2009), which allowed the use of nuclear energy for commercial electricity production (Böhm 2001). The act both encouraged the research and development of the peaceful uses of nuclear power and was aimed at protecting the health and safety of the lives of the citizens as well as any material goods of Germany (ibid). At the time nuclear power was seen as the power of the future that would solve the world's energy problems. The oil crises of the 1970s only increased the rate of proliferation of nuclear power, as the country realized how dependent it was on foreign oil (Deutsche Welle 2009).

Advocacy Coalition Prior to Fukushima.

If we refer back to the MACF, the policy subsystem in this case would be the German domestic nuclear power policy subsystem. Until the 1970s this subsystem was essentially made up of a single coalition, the pro-nuclear coalition. The coalition developed throughout the 1950s and 1960s when there were questions about where Germany's domestic energy supply would come from. In the mid-1970s after the oil shocks, this pro-nuclear coalition promoted the energy source as a secure, domestic source of energy that would allow the country to grow (Glaser 2012). It was not until the 1970s and early 1980s that the subsystem's coalition structure and dynamics changed. The mid-1970s also marked the beginning of the anti-nuclear protests and with them, the

anti-nuclear coalition of Germany was formed. Originally, the coalition consisted primarily of citizen's initiatives and anti-nuclear interest groups that made up the anti-nuclear movement. The anti-nuclear and environmental protests brought a new cast of interest groups, researchers, and eventually politicians into the policy subsystem, and formed the anti-nuclear coalition. Germany's nuclear power policy is the story of the struggle between these two coalitions throughout the forty years that followed.

Support for nuclear power primarily came from the conservative Christian Democratic Union (CDU) and the Free Democratic Party (FDP) as well as the nuclear power industry and its interest groups. The anti-nuclear movement framed the issue of nuclear power in a way that Germans recognized the risks and the dangers of it. It is out of this and other environmental movements that the German Green Party emerged, capturing the ideas of the environmental and anti-nuclear movement while gaining direct access to the policy making mechanism.

The Antinuclear Movement before Nuclear Accidents

Even before any of the nuclear accidents at Three Mile Island, Chernobyl, or Fukushima, the anti-nuclear movement had an impact on public opinion as Germans became more skeptical about nuclear power. The anti-nuclear movement had its beginnings in Wyhl. Protests there from 1974-75 resulted from a proposed nuclear plant. The citizens of Wyhl were outraged that they were not consulted in the decision-making process and feared for their safety as well as the safety of their produce, as most were farmers. The protests initially surrounded concerns that steam block the sun and reduce

crop yield as many of the nuclear power stations were put in rural farm areas (Glaser 2012). They decided to protest the construction of the nuclear power plant. On February 17, 1975 the construction of the plant was granted and on February 18th several hundred people peacefully demonstrated, and occupied the construction site (Patterson 1986.). As the tension between the protesters and the authorities escalated, the demonstrator's numbers grew to 10,000 held their ground. The police had to resort to more brutal tactics in order to ultimately break up the protest. They sprayed the protesters with water cannons and beat them with batons (Burchardt, 1976). With the reaction of the police and politicians becoming national news, the Wyhl protest became a national issue that gained support from people throughout the country (Patterson 1986, Fehr 1975). The nuclear power station was never built, and the land became a nature preserve (Deutsche Welle 2009).

A second set of protests broke out a few years later, further setting the stage for Germany's anti-nuclear power movement. This time the Nordwestdeutsche Kraftwerke AG (NWK), a power company, announced that it intended to build a nuclear power plant near Brokdorf in the state of Schleswig Holstein in 1972. The citizens of Brokdorf joined together to form the Buergerinitiative Umweltschutz Unterelbe, which translates into the Citizen's Initiative for Environmental Protection of the Lower Elbe. By creating the citizen's initiative, they aimed to fight the construction of the power plant. In response to the Wyhl incident a few years earlier, the city and police surrounded the site with barbed wire and in the middle of the night (Buchardt 1976). A week after, on October 30, 1976, more than 5,000 people demonstrated the construction of the plant. About 2000 of the demonstrators violently broke into the protected construction site and were confronted by

the police with water and tear gas. The brutality of the police reaction to protesters attracted even more media attention and mobilized people from around the country. On November 13th, 30,000 people participated in a second demonstration in Brokdorf, again trying to break into the construction site. City officials tried to quell the masses by temporarily halting the construction of the plant while inquiries were made, but it was too little too late. On February 19, 1977, the third and largest demonstration against the Brokdorf plant had brought in circa 50,000 protesters (NDR 2007).

The events at Brokdorf and Wyhl were by no means the only protests of the German anti-nuclear movement. However, these protests and ones like it put nuclear power policy on the agenda of politicians and the citizens of Germany, as huge numbers of citizens from around the country mobilized for the anti-nuclear movement. The protests increased the attention around the issue, and increased the ability for the anti-nuclear movement to frame the events in a way that made the public even more skeptical of nuclear power. As the nation and other individuals became involved in the discussion on nuclear power, other risks were identified, which then became the center of the protests. The protests also served to change the dynamics of the nuclear power policy subsystem. Not only were the demonstrations able to change public opinion, but the actors within the nuclear power subsystem changed. The effects of the anti-nuclear movement during this time can be seen in polls. The events also encouraged policy oriented learning, as scientists did more research on the effects that nuclear power plants might have on the areas surrounding them (Kühnen 1979). When German's were asked: If electricity was produced by nuclear power, do you think this could be done in a way that did not endanger human health or do you feel that it does entail certain risks? In June

1973, 48 percent of people thought there was a risk. By September 1976 that percentage jumped 18 points as 65 percent of people thought nuclear power entailed certain risks. Just three month later there is another 5 point jump in the poll when 70 percent of people feel there are certain risks with building nuclear power plants (Papadakis 1984). Furthermore, when asked: If there were plans to build a nuclear power station in your neighborhood and the population took a vote on the issue, how would you vote personally- for or against? The population was originally for building nuclear power stations in their neighborhoods in 1975 when 40 percent of people were for it, 28 percent against it, and 32 percent undecided. A year later in September of 1976 a number of Germans changed or made up their minds as 35 percent of people were for it and 36 were against it. This trend continues as more people decided they do not want nuclear power in their neighborhoods. In December 1976, still 35 percent of people are for nuclear power plants, but the ranks of the undecided have diminished as 47 percent of people would be against building nuclear power plants in their neighborhood (Papadakis 1984). Both of these polls span the time in which there were protests in Wyhl and Brokdorf as well as a many other locations within Germany.

As suggested by the MACF, social movements are an important part of the policy change framework because they affect the composition of the policy subsystem as well as how important the policy issue is for individuals and governments. In this case, the citizen's initiatives brought their concerns both to the media and to the court, changing the way nuclear power developed, and even halting the construction of a plant. For example, in the case of Wyhl, it was finally decided by the courts that the reactor would not be built (Schils 2011). On the other hand, the Brokdorf power plant was fully

constructed and put into use. The anti-nuclear protests did much to bring attention to nuclear power policy in Germany, but ultimately the protests themselves only changed nuclear power policy minimally, if at all. However, they did begin to change public opinion and therefore were able to create conditions where policy change was more likely.

Nuclear Accidents and the Development of the Green Party

The accident in Harrisburg, Pennsylvania in 1979, known as Three Mile Island, changed Germany's perception of Nuclear Power even further. To many Germans it confirmed the fear they had expressed in the nuclear reactor protests earlier in the decade that the nuclear reactors come with many life threatening risks. The event made those risks a reality, and opened the debate about nuclear power on a broader political level. German newspapers reacted to the accident with force, describing the accident as a small-scale example of what could happen if a nuclear power plant had a meltdown. They also criticized the world, and the politicians of their own country of inaction in the face of known risks. They saw Three Mile Island as an avoidable disaster that should be taken as a lesson (Atomkraft 1979).

This event also impacted the individual attitudes of Germans, who after learning of the accident increasingly supported the anti-nuclear coalition. In fact, a survey asking if people were in favor of the principle of building nuclear power stations showed that the percent of people over the age 14 who were against building nuclear power stations doubled from 1974 to June 1979 from 19 percent to 38 percent. When Germans 16 and

over were asked if they followed the reports about the incident at Three Mile Island, 82

percent followed the reports closely (Deboer & Catsburg, 1988). These surveys show that

the nuclear accident in Harrisburg captured the attention of the people of Germany, and

that the event in conjunction with the protests described above resulted in a public that

was less likely to support nuclear power.

The development of the anti-nuclear coalition continued with the emergence of

the Green Party, which was particularly concentrated on environmental issues. The

German Green Party is a crucial part of the anti-nuclear coalition as its origins lie in part

in grassroots mobilization for environmental causes. The Green Party developed out of

the post World War II movements, student movements and citizen initiatives of the 1960s

and 1970s, particularly those surrounding environmental concerns (Papadakis 1984).

These included the anti-nuclear movements described above. The citizen's initiatives

then grew and developed into political groups that sought and gained seats on local and

state councils throughout Germany. These smaller green groups began gaining political

ground in the late 1970s and gained seats in local and provincial councils throughout

Germany. The smaller environmental and green parties in the 1970s were not yet a

cohesive group, but rather a coalition of a variety of the different environmental groups

and citizens initiatives that had similar beliefs (Bahro).

Just a month before Three Mile Island, in March 28, 1979 coalitions of

environmental groups and citizen's initiatives formed "die Grünen" or the Green Party,

and becomes an official part of Germany. It was not until March 1983, however, that the

Green party finally surpassed the five percent margin necessary to gain seats in the

Parliament (gruene.de). With the establishment of the Green Party as a power within the

German parliament, the anti-nuclear coalition was strengthened. It now had a direct access to the policy making mechanism as described in MACF. The Green Party and the interest groups it has its origins from were now within the nuclear power policy subsystem, and offering a challenge to the pro-nuclear subsystem that had previously been uncontested within government.

Then in 1986, the Chernobyl nuclear accident occurred. Until the Fukushima Daiichi disaster, Chernobyl was the biggest nuclear power accident the world had seen. The accident in Soviet Ukraine grabbed the world's attention as the radioactive plume drifted over national borders and vast oceans. Because of the path the radioactive fallout and Germany's proximity to the Ukraine, the German population was particularly affected compared to its western neighbors. Crops that were contaminated were discarded, milk had to be imported from unaffected areas, and people were told to stay inside. Even the sand on playgrounds was replaced (Augstein 1986). Chernobyl made the risks and consequences of nuclear power a reality to the citizens of the German republic and provided a huge shock to the nuclear power policy subsystem. It was the first time a complete phase-out of nuclear power was mentioned by a number of leaders including the opposition leader of Schleswig-Holstein Björn Engholm and SPD Chancellor Candidate Johannes Rau (Augstein 1986).

Chernobyl was a severe shock to the policy subsystem that ultimately changed the game for nuclear power policy in Germany. A major nuclear power plant disaster was no longer just a risk, it was a reality. Within just six months of Chernobyl tens of thousands of German demonstrators took to the streets to protest nuclear power. In one event tens of thousands gathered in Burglengenfeld for a rock concert to protest nuclear power, just 20

miles away from a heavily contested nuclear reprocessing plant site (Markham 1986).

Another protest of 40,000 people occurred in June at the Brokdorf site, where the power

plant was to go online a week later (Bernstein 1986).

It can be seen through these demonstrations that Chernobyl gave the anti-nuclear

movement the momentum it needed to push forward, and it used the event to further its

policy agenda. While the environmental groups organized protests, the Green Party

helped spur on the anti-nuclear movement by presenting signs at a news conference on

April 30, 1986 saying "Chernobyl is Everywhere". These signs served as a reminder to

the public not only of the disaster in Chernobyl, but were presented to evoke memories of

Three Mile Island, when the signs read "Harrisburg is Everywhere"(Eckholm 1986). The

anti-nuclear movement was propelled into high gear. The previous protests had provided

the movement with the resources (interest groups, money, people and leaders) to be able

to take advantage of this event.

The public attitude towards nuclear power became more skeptical in the months

after the Chernobyl accident. When asked: on the subject of nuclear power, some say that

we must build nuclear power stations in the years to come if we are to preserve our

prosperity. Others say the risks are too great, also that no nuclear power stations should

be built. Which view do you agree with? It is clear that from 1980-1982 there is only

marginal change, whereas in 1980, 42 percent of respondents were against building

nuclear power plants, 1982, 46 percent of respondents were against building them. In

May 1986, one month after Chernobyl this number had jumped to 69 percent and in June

and August it was 82 and 80 percent respectively (Deboer & Catsburg, 1988). Clearly,

the majority of Germans no longer supported nuclear power.

With such a jump in public opinion, the ACF predicts there would be a change in policy,

but after Chernobyl that was not the case. Though discussions of nuclear phase-out

emerged from political leaders, no proposals were adopted. Because the MACF

incorporates environmental movements, it stresses the importance of the development of

a green party in creating environmental policy change. When looking at what happened

after Chernobyl, the MACF can explain the lack of policy change by the fact that the

Green Party was not yet powerful enough to have a significant impact on policy

decisions, and although the anti-nuclear coalition was gaining increasing power within

the subsystem, the pro-nuclear coalition was still the dominant coalition.

Changing Dominance within the Policy Subsystem

The dominance of the pro-nuclear coalition begun to dwindle as a result of

another key outcome of the Chernobyl accident. After the accident, the SPD switched its

position on nuclear power. Previously a proponent of nuclear power, the SPD reacted to

pressure from the Green Party and reacted to Chernobyl with a change of party policy.

Within the policy change framework I described above, the SPD acted the way the ACF

would predict. Chernobyl would be considered a major shock to the policy subsystem

because it not only altered public opinion, but it also disturbed the way of life of the

people within Germany. Chernobyl also made the risks associated with nuclear power

production very real not only to the people of Germany, but also its politicians. The SPD,

originally a member of the pro-nuclear coalition, essentially switched coalitions within

the German nuclear power policy subsystem, a change which, according to the ACF, would require a change in policy-core belief by a member of a coalition within the subsystem. The SPD Leader Jochen Vogel explains the change in policy in a speech on May 1986 in the Bundestag. For him and his party, "after Tschernobyl, nothing is the same as it was before" (SPD 2011). Vogel goes on to say that those who ignore or deny the possibility of a nuclear disaster happening in Germany, have not learned from this tragedy or Three Mile Island. He also calls on all Germans, not just the experts, to take part in rethinking the role of nuclear power in Germany and rejects the use of nuclear power as anything but a transitional source of power(SPD 2011). With the SPD's position change within the policy subsystem came a change in the political opportunity structure for the Green Party with regard to nuclear power. The Green Party was not able to affect change alone. Because of its share of parliamentary seats, it had to develop a coalition with another party in order to become the governing coalition. In this case, the change of policy position by the SPD made such a coalition possible.

The CDU reacted differently. It saw political reactions to Chernobyl as a response to widespread, and primarily unfounded fear. The Chancellor of Germany and member of the CDU at the time, Helmut Kohl, turned against this "fomenting mood of catastrophe" by saying the issue had to be discussed realistically and honestly. He went on to say that nuclear power has its benefits, but that it has to be used carefully, and then clarifying that the nuclear power plants in Germany were the safest in the whole world. Because of Germany's strict safety regulations, the risks associated with nuclear power are "justifiable" and its use is "ethically conscionable". His colleague Gerhart Baum, the CDU Party Leader agrees with the Chancellor and suggests that Germany strive to be the

leader in nuclear reactor safety in Europe and throughout the world. He goes on to explain that a nuclear phase-out would not better the safety of nuclear power plants because the safety of "neighboring" plants would still exist and remain a threat, even if Germany did not have any (Deutscher Bundestag 2011).

After the 1998 general election, the SPD and the Greens had the votes to form a Governing coalition. This new coalition marked the end of the CDU's 16 year dominance of the parliament. With this new power, the SPD and Green coalition begun to introduce nuclear regulation as a way to reduce the use of nuclear power. This included the development of a Nuclear Phase-out plan. Before the plan was signed, contracts with German utility companies had to be formulated. These contracts ensured the investment in these plants would not be lost, and gave power plants an average operational life of 32 years (World Nuclear Association 2014). The government and the utilities agreed to a set timetable for phase-out on June 14, 2000 when negotiations were completed (Böhm 2001). Implementation of the phase-out begun in 2002, and the phase-out called for all reactors used for the commercial generation of electricity to be taken offline by 2021.

The nuclear power phase-out implemented in 2002 marks a distinct shift in the nuclear power subsystem. After 30 years of protest the anti-nuclear movement has finally achieved its goal of eliminating nuclear power. External shocks like Three Mile Island grabbed the attention of both the public and politicians, and made them question the safety of nuclear power and its future in Germany. By capitalizing on these shocks, the anti-nuclear movement was able to make nuclear power a national issue. The beliefs of the anti-nuclear movement were also supported by a subsystem actor, the Green Party, which had access to the policy making structure. Their coalition with the SPD marked a

regime change. Due to the shifting of coalition composition anti-nuclear coalition has become dominant. Resources such as public opinion, financial resources, and information have shifted to support the anti-nuclear coalition, allowing them to change nuclear energy policy to fit their own belief system. The first nuclear phase-out also laid the groundwork for the policy decisions that followed. Following this agreement a new national energy policy was developed and implemented in 2002 (World Nuclear Association 2014). It aimed to support the development of renewable energy such as wind and solar power. In 2000, renewable energy contributed less than 20,000 GWh to the grid. By 2010 this share increased five-fold to over 100,000 GWh, and accounted for over 11 percent of the nation's energy supply (Renewable Energy Statistics 2010).

Although the Green Party/SPD coalition passed legislation to phase-out nuclear, the CDU continued to support it. Since 2000, Angela Merkel has been the leader of the CDU, which promoted nuclear power as a great transfer fuel to renewable energy. Merkel and her party vowed to reverse the decision to phase-out nuclear energy that was put in place by the SPD/Green coalition in 2001. In 2009, a CDU coalition with the FDP won back its control of the parliament. In 2010, Merkel's coalition government acted on their promised to reverse the phase-out by extending the life-spans on the nuclear power plants by up to 14 years. According to a ZDF poll, 61 percent opposed the decision (Bloomberg 2010). Merkel's decision to extend the lives of the nuclear power plants is the pro-nuclear coalition's reaction to regaining dominance within the policy subsystem because of a regime change in the systemic governing coalition. Throughout all of the anti-nuclear movement and the shocks of Three Mile Island and Chernobyl, the pro-nuclear coalition still has not gone through a change in their core policy beliefs to stop supporting nuclear

power. It is the meltdown in Japan that ultimately catalyze a change in Germany's remaining pro-nuclear coalition. The change is indicated by the decision to cancel the run-time extension after the events that occurred in Japan and continue the path of nuclear phase-out.

After Fukushima

A state election in Baden-Wuerttemberg that came a few weeks after Fukushima also shed some like on why Angela Merkel and the CDU changed their nuclear power policy. The CDU and FDP and the coalition leader Angela Merkel were preparing for the election that was to occur in late March. After the events in Japan, Merkel suspended 8 of the oldest nuclear reactors and instituted a 90 day moratorium the running time extensions that she had signed into law in 2010. She was even accused of doing it as an election strategy by Sigmar Gabriel, the head of the SPD (Springer 2011).It was clear that the elections would be considered more of a vote on the future of nuclear power rather than a vote for the next governing coalition. The elections proved to be just that, as Angela Merkel's CDU was defeated for the first time in about six decades in that state. The Merkel blamed the loss on the events in Fukushima. Her conservative colleagues agreed, calling her change in nuclear policy "sensible", "a decision without alternative", and "completely correct"(Alexander 2011).

Merkel identified a number of differences between the events Fukushima and other nuclear reactor meltdowns in the speech she gave revealing her plan to reinstitute the nuclear phase-out. It is in this speech that she even explicitly says that her policy core

beliefs have changed, which in the MACF is a vital component of policy change. She explains that she has come to a new valuation of nuclear power, and that she finds it entails too much risk to human life to support. One of the things she identified was that the event happened in country that was not only technologically advanced, but in fact at the forefront of nuclear technology. Chernobyl, on the other hand, was considered to be the result of a lack of resources in an underdeveloped country. She also recognized that the engineers in Japan had done their best to account for all the possible risks, but that in the case of nuclear power, being able to mitigate all risks is impossible because of the unpredictability of the natural world. She then explained that she had come to reevaluate nuclear power and feels it has too many risks to be developed within Germany (Tages Anzeige 2011).

Conclusion

The 2011 meltdown at the Fukushima Daiichi nuclear power plant in Japan shocked countries into reconsidering the safety of nuclear power. Although, the majority of the world continued business as usual after, Germany decided to eliminate nuclear as a power source altogether. The policy to phase-out nuclear power was the result of four decades of struggle between the pro-nuclear coalition, made up primarily of the CDU and the nuclear power industry, and the anti-nuclear coalition, made up of the anti-nuclear movement and the green party. I used the MACF to explain, why after so many years of struggle, the nuclear phase-out policy was finally put in place.

The MACF combines two policy development frameworks. The first is the Advocacy Coalition Framework developed by Sabatier and Jenkins-Smith which theorizes policy change as the result of shocks to the external subsystem and the resources available to subsystem actors. It is an effective way at looking how actors are placed within their political context, but disregards the impact environmental movements have on policy development. The second framework is Rucht's Environmental Movement Impact Model, which describes how environmental movements can impact policy change through three indirect paths: public opinion, individual attitudes and behaviors, and a green party. While this framework includes the impacts of an environmental movement may have on policy, it fails to recognize the impact shocks like Chernobyl and Fukushima have on policy change. The MACF fills the gaps in both frameworks by combining them. It incorporates both the environmental movement and shocks into the development of policy.

The Movement Advocacy Coalition Framework that is theorized here does have some limitations. The MACF is developed to look primarily at the changes that come about in environmental policy, and in this case has only been tested on one example of one par of environmental policy in one country. It lacks the power of a comparison with a country that also has a strong environmental movement, but did not change its nuclear power policy after Fukushima. Unfortunately, such a comparison was beyond the scope of this paper. Obviously it is also limited by the fact that it draws from Rucht's explicitly environmental model, which could bias the model toward accommodating environmental policy change, but exclude the application of the framework to other policy issues.

Further research with the MACF could branch of in a variety of different directions. As explained above, a comparative study of nuclear power policy after Fukushima across two or more countries would better evaluate the framework's ability to explain changes in environmental policy. Going beyond environmental policy, it would be interesting to test its applicability to other policy issues. It would be interesting to investigate if other social movements use the same channels of influence, or how the channels of influence differ. For example, applying the framework to the Gun Policy subsystem in the U.S. Because the MACF incorporates both social movements and external perturbations, it could open a new avenue of explaining policy change on both a social and political level.

Germany's change in nuclear power after Fukushima is the result of a variety of factors being affected in the MACF framework. First, the anti-nuclear movement that begun in the mid-1970s before any nuclear disasters happened influenced public opinion. The environmental groups and citizens initiatives of the time were the foundation of a German Green Party that gained access to national politics in 1983. Through the development of the Green Party, the anti-nuclear movement gained indirect access to the policy making structure and changed the composition of the nuclear power subsystem. The anti-nuclear movement gained momentum with two important shocks: Three Mile Island in 1979 and Chernobyl in 1986. Public opinion against nuclear power skyrocketed during these shocks, reaching 80 percent in 1986. These unexpected disasters not only made the risks of nuclear power apparent to the German public, but even changed the nuclear power position of Germany's Social Democratic Party (SPD).

The election of 1998 marked a regime change for Germany. The SPD and the Green Party formed a governing coalition that would rule through 2005. With the power of this coalition, the SPD and Greens were able to pass a nuclear phase-out plan that went into effect in 2002. The plan, which would phase out nuclear power completely by 2021, was vehemently opposed by the CDU. It was implemented until 2010, and successfully encouraged the development of renewable energy, especially wind and solar power. In 2010, just one year before the Fukushima Daiichi meltdown, Angela Merkel signed legislation that would extend the lives of Germany's nuclear reactors by an average of 14 years. A decision she took back quickly in June, 2011 after she recognized that she had lost the election in Baden-Wuerttemburg because of her and her party's position on nuclear power. She declared she had come to a new evaluation of nuclear power, and decided to implement a second nuclear phase-out that would eliminate nuclear power by 2022. Truly, this policy change has been one in the making since the beginning of the use of nuclear power in Germany. Fukushima was just the last in a long chain of catalysts that spurred change.

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