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ORDER IN A CHAOTIC SUBSYSTEM: A COMPARATIVE ANALYSIS OF NUCLEAR FACILITY SITING USING COALITION OPPORTUNITY STRUCTURES AND THE ADVOCACY COALITION FRAMEWORK

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ORDER IN A CHAOTIC SUBSYSTEM: A COMPARATIVE ANALYSIS OF NUCLEAR FACILITY SITING USING COALITION OPPORTUNITY STRUCTURES AND THE ADVOCACY COALITION FRAMEWORK

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF POLITICAL SCIENCE

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Dedication

For my incredible parents, Anil and Alpana Gupta, for making all of this possible, and my husband, Joseph T. Ripberger, for being a constant inspiration.

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Abstract

This dissertation attempts to highlight existing patterns surrounding *locally unwanted land uses (LULUs)* and explain how institutional features of a country influence the likelihood those LULUs become operational. Focusing on cases of nuclear facility siting from around the world, the primary empirical research question is: ***does variation in coalition opportunity structures influence the siting of nuclear facilities? If so, how?*** Using Coalition Opportunity Structures (COS) to answer this question, the dissertation also contributes to the theoretical advancement of the Advocacy Coalition Framework (ACF) and its applicability to varying political systems. To this end, the primary theoretical question explored in the dissertation is: ***what are the mechanisms through which coalition opportunity structures influence the policy process?*** Using both quantitative and qualitative methodology, I test the influence of COS on three separate but interrelated elements of the siting process—coalition formation, coalition strategies, and policy change. Findings indicate that both openness of a political system and norms of consensus affect policy outcomes. Additionally, I find that opportunity structures influence the emergence of organized opposition against the project as well as the nature of the strategies adopted by policy opponents.

Chapter 1: Nuclear Facility Siting Dilemmas

1.1. Introduction

In July 2006, the United States Congress passed a civil-nuclear agreement with India, allowing the two countries to trade nuclear raw materials for civilian purposes (Levi, Ferguson, and Relations 2006; Perkovich 2010; Potter 2005). This agreement was further reinforced in 2008, when the Nuclear Suppliers Group (NSG)[1] approved a similar India specific exemption (Rai 2009). Subsequent to this, the Indian government has signed multiple trade agreements pertaining to the import of civilian nuclear raw material and technologies with countries like France, Russia, and the United States. These agreements are at the center of India's growing nuclear energy policy, which includes the construction of numerous "energy parks" throughout the country.[2] However, having spent several years and a considerable amount of resources on choosing suitable locations for these facilities, many of them are currently stagnant. For example, the Jaitapur Nuclear Power Plant (JNPP) in Maharashtra was recommended by the Site

[1] The Nuclear Suppliers Group (NSG) was instituted in 1974 and is a group of nuclear supplier countries that seeks to contribute to the non-proliferation of nuclear weapons by controlling the export and re-transfer of materials that could be used for nuclear weapons development.

[2] These parks have been announced in Jaitapur (Maharashtra), Mithi Virdi (Gujarat), Gorakhpur (Haryana), Kovvada (Andhra Pradesh), and Chutaka (Madhya Pradesh).

Selection Committee[3] in 1985. Feasibility studies on the site started in 2002, and the site was approved in 2005.[4] Despite receiving regulatory and environmental clearance in December 2010, construction is yet to begin at the site. Similarly, after spending over $3.5 billion to construct the Kudankulam Nuclear Power Plant (KNPP) in Tamil Nadu, the facility was weeks away from going online when a series of events brought the whole project to a halt in September 2011 (Fried and Dimon 2004). These events have significant implications for the Indian nuclear energy policy, as well as for more pragmatic issues such as the growing demand for electricity (according to the International Energy Agency, roughly 400 million people do not have access to electricity in India).[5]

This experience is not unique to India. There are numerous cases in other countries where the government has spent billions of dollars on developing a site for a nuclear facility that never becomes operable. For example, in the case of

[3] The site selection for is carried out by the Site Selection Committee, notified by the Government of India which selects site for setting up a nuclear power plant, reviews various parameters as per the requirements laid down in the code of Atomic Energy Regulatory Board and the laid-down criteria.

[4] "A Brief on Jaitapur Nuclear Power Project", accessed from the Nuclear Power Corporation of India Limited (NPCIL) webpage. Document can be found at: http://www.npcil.nic.in/main/A_Brief_on_JNPP.pdf

[5] International Energy Agency report, found at http://www.iea.org/work/2006/gb/publications/india_electricity.pdf

Yucca Mountain in Nevada, the United States spent an enormous amount of time and resources on research and development of the site. Thirty years and over $10 billion later, in 2010, the Secretary of Energy Stephen Chu was directed by President Obama to withdraw the license for the facility. Even though the fate of Yucca Mountain and KNPP have yet to be decided, it is clear that the siting of nuclear facilities is a major challenge.

It is not always the case that the government decides where and when these facilities should be sited, only to be shot down by the public and other opposition. For instance, in Bulgaria the construction of Belene Nuclear Power Plant has been cancelled once (in the 1970s) and is currently stalled after resurfacing in 2002. Prime Minister Boyko Borisov of the right-wing Citizens for European Development of Bulgaria **(**GERB) party has stalled the development of the power plant twice, despite efforts from the opposition party (Bulgarian Socialist Party) to open the plant. More recently, the socialist party called for a public referendum in Bulgaria, which resulted in a majority of the vote in favor of the plant siting. Despite these political and social initiatives, the future of Belene nuclear site remains uncertain.[6]

The examples presented here are not meant to suggest that all efforts to site nuclear facilities are bound to get cancelled. For example, Big Rock Point

[6] http://blogs.ft.com/beyond-brics/2013/01/28/bulgarians-vote-for-new-nuclear-power-but-referendum-is-not-binding/#axzz2JIwJhe9D

Nuclear Power Plant (now decommissioned) was a nuclear power plant in Michigan, US. It became operational in about two and half years from when construction began and was operational from 1962 to 1997. It was eventually shut down after owner Consumers Energy decided not to apply for relicensing. An original dataset that records both operational and cancelled siting efforts globally used in subsequent chapters of this dissertation provides some additional insight into trends of policy outcomes and what percentage of nuclear facilities became operational versus cancelled.

Among other things, it reveals that overall, approximately 20 percent of cases in the database experienced policy change. In these cases, the designated site for construction of a nuclear facility was cancelled before it became operational. In the remainder of the cases (about 80 percent), the status quo was maintained and the site became operational as intended. This ratio is much higher in the US, where about 32 percent of cases experienced policy change. This is offset by the low percentage of policy change in international cases. With these examples and siting trends in mind, how can we best understand the complexities associated with nuclear energy policy and nuclear fuel cycle (NFC) facility siting in various political and social contexts?[7]

[7] For the purposes of this dissertation, NFC siting includes nuclear power plants, low and intermediate level waste repositories, as well as high-level waste disposal facilities.

1.1.1. Why Nuclear Energy?

When studying complex social problems like siting contentious facilities, the goal for political scientists and public policy scholars is to look for systematic trends that help explain and—perhaps—alleviate some of the apparent randomness of policy outcomes. Identification of systematic patterns can also help broaden our understanding and generalize to cases and issues beyond those at hand. Studying the case of nuclear facility siting is useful and important for several reasons. First, nuclear energy is a salient issue both within the US and globally. Within the US, nuclear energy is inherently tied to the principles of attaining energy independence in a sustainable way and dealing with growing problems of climate change. Internationally, nuclear energy is touted as the answer to growing energy deficits but its expansion is complicated because of issues regarding nuclear raw materials management and the proliferation of nuclear weapons technology more broadly.

Second, as more and more countries continue to add nuclear energy to their existing sources of energy, issues of used nuclear fuel management will require greater attention. Experience tells us that siting nuclear repositories is extremely complex and lengthy, and findings from this dissertation will have significant implications for siting these facilities in different political and institutional contexts. Third, the issue of nuclear facility siting is well suited for an international comparative analysis. The perceived risks of nuclear energy make it a highly polarizing issue with strong incentives for people to participate in the

decision making process. Variations in participation, mobilization, and policy outcomes during nuclear facility siting lend themselves well to comparisons of different opportunity structures. Fourth, the issue of nuclear energy and the lessons drawn from this dissertation will also help to inform policy decisions in other areas of contentious facility siting. The examples, trends, and complexities highlighted here go far beyond the purview of nuclear facility siting. Similar principles apply to other forms of *locally unwanted land uses (LULUs)* such as airports, prisons, and landfills. Accordingly, this dissertation attempts to highlight existing patterns and explain how the institutional makeup surrounding LULUs impacts the mobilization of *Not In My Backyard (NIMBY)* sentiment and the likelihood that LULUs become operational. The empirical focus of the dissertation is nuclear facility siting, and the primary empirical research question is: ***does variation in coalition opportunity structures influence the siting of nuclear facilities? If so, how?*** However, to be clear, the patterns uncovered and lessons learned apply to cases and issues beyond nuclear facility siting and will have implications for LULUs more generally.

1.2. Previous Research

Findings from previous research and the ongoing experiences described above indicate that siting NFC facilities is complex, and predicting outcomes of siting efforts is extremely challenging (Carter 1987; Gerrard 1995; Keeney and Nair 1975). In general, the risks and benefits associated with nuclear energy are constantly debated, both by scientists and lay-men (Sjöberg et al. 2000). These

debates about the pros and cons of nuclear energy also manifest in decisions on siting particular nuclear facilities—when, how, and if nuclear plants should be constructed; what is the best way to dispose nuclear waste; how economical and safe is nuclear energy as compared to other sources; how do public risk perceptions affect siting; and the role of equity, fairness, and compensation in the siting process (Easterling and Kunreuther 1995; Gowda and Easterling 2000; Jenkins-Smith and Kunreuther 2001; Kraft 2000; Kunreuther and Easterling 1996). Often times this means that even though the government chooses to site nuclear facilities, sections of the scientific community and the public oppose that decision. Therefore, finding a suitable location with all of the desirable attributes like public acceptance, technical safety, and economic viability can be extremely challenging.

In an effort to understand the dynamics associated with siting nuclear facilities, for decades now, scholars have been studying individual risk perceptions, government policy designs, and other elements of the siting process (Bonano et al. 2011; Dunlap, Kraft, and Rosa 1993; Morton, Airoldi, and Phillips 2009; Ramana and Kumar 2010; Sjöberg 2003). Studies focusing on nuclear facility siting are closely tied with research on the siting of contentious and noxious facilities more generally, which include landfills and prisons (Kunreuther, Fitzgerald, and Aarts 1993). In all of these cases, the siting of the facility is seen as a social and technical problem that faces public and political opposition, with concerns of fairness and equity among the host populations

(Brion 1991; Clary and Kraft 1988; Freudenberg and Rosa 1984; Goldsteen and Schorr 1991; Ladd and Laska 1991). Previous research has focused on a range of issues such as how do individual risk perceptions affect the siting process, including perceptions about the impact of the facility and perceptions of the quality of the siting process (Schively 2007). These studies subsequently led to the proliferation of acronyms such as NIMBY (Not In My Backyard) and LULUs that are commonly used to describe various forms of opposition to the siting of unwanted facilities (Amour 1984; Benford, Moore, and Williams Jr 1993).

For the purposes of this dissertation, I am most interested in understanding the political outcomes of siting processes. In other words, why do some facilities get completed and become operational, while others get cancelled? One way to think about these outcomes is from a risk vs. benefit viewpoint, which argues that people are likely to support the siting of a facility whose perceived benefits are higher than its perceived risks. On the other hand, cases where the perceived risks outweigh the perceived benefits; the site is likely to face public opposition. A majority of the research on LULUs (including nuclear facility siting) use this general framework to explain public reactions to facilities and the political outcomes we experience. In contrast, research on the effects of institutions and political contexts on siting outcomes remains understudied. The remainder of this section briefly presents this research, with the ultimate goal of highlighting the gaps in it and how this dissertation fills some of those gaps. Most research on

facility siting can be broken down into a few broad categories:[8] individual and group risk perceptions, ideological and cultural identity effects, and the tools used by government and industry groups in an effort to garner public support (primarily through financial compensation and/or stakeholder engagement). Finally, scholarship on the influence of political and institutional contexts on nuclear facilities remains broad and focuses mostly on the evolution of nuclear energy in different countries and the rise of social movements against nuclear energy. As I illustrate, this scholarship has some methodological and theoretical shortcomings, some of which are addressed by this dissertation.

Studies focusing on individual risk perceptions argue that people's attitudes on how 'risky' they perceive nuclear energy to be in turn influences their policy beliefs (de Groot, Steg, and Poortinga 2013; Sjöberg and Drottz-Sjöberg 2001; Sjöberg 2003, 2004). Although individual risk perceptions do not have a direct determine facility siting outcomes, they are crucial for tracing the roots of individual-level and organized opposition to some facilities. For example, de Groot, Steg, and Poortinga (2013) examine how personal values and individual perceptions of risks and benefits are associated with the acceptability of nuclear energy in the Netherlands. They find that people's perceptions of risks associated with nuclear energy do impact their acceptability towards it. The more risky

[8] These categories have been devised for the purposes of a broad literature review of the somewhat disparate topic of nuclear facility siting. The goal here is to summarize the critical themes that bind these studies together.

people perceived nuclear energy to be, the less accepting they were, and vice versa.

The examples cited in the introduction reflect the power of public opposition, among other things, in delaying the siting process as well as influencing its final outcome. Therefore, understanding these risk perceptions and their genesis can help design better policies and public engagement measures to alleviate public concerns and increase institutional trust. For these reasons, research on risk and risk perception has also ventured into how best to alleviate the perceived risks such that the public can become more supportive of siting decisions. One of the tools recommended by some scholars is risk communication—how to communicate the various risks to the public. Risk communication programs aim to better educate stakeholders and in the process make them more willing to accept the siting of nuclear facilities in their community. Studies on this topic have postulated that increasing awareness about the facility through public education and other means can help increase public acceptance. For instance, Slovic, Fischhoff, and Lichtenstein (1981) argue that the "NIMBY syndrome" is a result of a general lack of public awareness. Similarly, Matheny and Williams (1985) in their article titled "Knowledge vs. NIMBY" suggest using an educational approach to deal with public opposition to a particular site.

However, the effectiveness of risk communication strategies and public education as a solution for contentiousness remains weak. One body of research

suggests that it may be due to the lack of trust in the agencies and institutions in charge of siting nuclear facilities (Kasperson, Golding, and Tuler 1992; Leiss 1996; Slovic 1993). According to Kasperson et al. (1992) for instance, conflicts regarding the siting of hazardous facilities in the US can be traced back to social trust relating to perceptions of commitment, competence, caring, and predictability. They argue that effective risk communication can help alleviate some of this distrust, but until that is achieved, a broad loss in leaders and major institutions in the US will continue. There is another body of research suggesting that the lack of effectiveness does not stem from a "knowledge deficit" or a lack of trust in certain agencies, but rather underlying ideological and cultural identity effects (Kahan and Braman 2006). According to this research, these distinct ideological and cultural identities lead to cognitive biases that ultimately make risk communication fruitless. In essence, they argue that an individuals' cultural worldview precedes their views and opinions on highly charged political issues such as nuclear energy.

Another potential tool to downplay perceived risks and increase the benefits to be gained by siting is providing compensation and recommend economic benefits to the host community. Focusing on economic models of rationality, some scholars have studied the effectiveness and fruitfulness of mechanisms like financial compensation and an increased stress on the economic benefits of the proposed facility (Bacot, Bowen, and Fitzgerald 1994; Ferreira and Gallagher 2010; H. Jenkins-Smith and Kunreuther 2001, -; ter Mors, Terwel, and

Daamen 2012). The gist of the argument, in line with rational choice theory assumptions, is that compensation in the form of economic benefits and incentives can potentially tip the balance of risk vs. benefits in favor of perceived benefits, thereby increasing public acceptance towards the project (Hadden and Hazelton 1980; O'Hare 1977; Portney 1985). While some have found that direct monetary payments to individuals and/or communities can increase facility acceptance (Bacot, Bowen, and Fitzgerald 1994; Groothuis, Groothuis, and Whitehead 2008), a majority of studies have found no significant relationship between compensation and acceptability (Claro 2007; Ferreira and Gallagher 2010; Frey, Oberholzer-Gee, and Eichenberger 1996; Kunreuther et al. 1990). For instance, Kunreuther et al. (1990) conducted a study where respondents were asked to vote for or against a nuclear repository in Nevada. Some respondents were offered monetary compensation in the form of tax rebates while others were not offered any financial incentives. Among other things, the authors found that the compensation offers had no significant effect on the respondents and their willingness to vote for the facility.

In addition to financial compensation, some scholars have looked at the use of more normative tools such as stakeholder engagement, public deliberation, and the values of equity and fairness. In contrast to compensation, these studies assert that monetary incentives can sometimes actually deter individuals from supporting a siting initiative. In a study measuring support for a nuclear waste repository in Switzerland, Frey et al. (1996) found that the percentage of support

actually dropped (from 50.8 percent to 24.6 percent) when the host community was offered compensation in return for accepting the facility. Supplementing these findings, some scholars have found that non-monetary compensation in the form of public goods is better received than money (Claro 2007; H. Jenkins-Smith and Kunreuther 2001; Kunreuther and Easterling 1996; Mansfield, Houtven, and Huber 2002). For example, in an experimental survey of eight different compensation measures for the siting of LULUs (a medium security prison, a municipal landfill, a hazardous waste incinerator, and a high-level nuclear waste repository), Jenkins-Smith and Kunreuther (2001) asked respondents to rate different compensation measures (financial and in-kind). Each respondent was asked about one of the four facilities and were directed to rate compensation measures on a scale from 1 (completely acceptable) to 5 (completely unacceptable).

Findings revealed that across all facilities, in-kind compensation measures were ranked higher and viewed as more appropriate than financial ones. This relationship between facility acceptability and the nature of the incentives offered (financial vs. in-kind) gets at the heart of the intrinsic versus extrinsic motivation debate. Intrinsic motivation is derived from an individual's personal sense of altruism or justice connected to an act and is activated when in-kind benefits are offered. Extrinsic motivation on the other hand, is related to factors on the outside, such as monetary incentives and deterrents, which are consistent with the generalized economic law of demand (Frey and Oberholzer-Gee 1997).

Finally, a tool that has received a lot of attention recently is the concept of stakeholder engagement and inclusion of all the relevant parties in the siting process (Devine-Wright 2012; Fan 2008; Lawrence 2002; Sjöberg 2003; Tompkins, Few, and Brown 2008). Both experience and recent policy recommendations have contributed to this increased attention. For instance, the final report of the Blue Ribbon Commission (BRC) for America's Nuclear Future (BRC 2012) calls for scrapping the top-down, primarily technically driven facility siting approach outlined in the 1987 Amendments to the Nuclear Waste Policy Act in favor of a more flexible consent-based siting approach that is dependent on potential host communities, in collaboration with states and tribes, "opting in" for consideration as candidates in a competitive process for choosing technically *and* socially acceptable sites. This recommendation, which is based on past experiences, in conjunction with the political deadlock and possible cancellation of the proposed Yucca Mountain repository in Nevada because of the lack of public consent highlight the significance of engendering and maintaining public involvement and ownership of the facility.

The literature reviewed above mostly deals with the underlying risk perceptions individuals have regarding nuclear energy or any other elements of contentious facility siting. The scholarship, as discussed, has remained focused on the nature of the risk perceptions, how these perceptions affect the acceptability of these facilities, and the tools that can help alleviate some of the perceived risks and increase the perceived benefits of the facility. These tools range from risk

communication, public education programs, different forms of compensation, and stakeholder engagement mechanisms. While these studies play an important role in advancing our understanding of public opposition or acceptability towards LULUs, the factors listed above are not the only ones that might impact policy outcomes. In addition to these dynamics, we must also consider the impact of macro political and institutional factors on nuclear facility siting. Individual and group level dynamics such as risk perceptions, risk communication, and stakeholder engagement exist within a broader institutional context. This context provides structure to how some of the other tools are used and defines the "baseline" on what is possible and what is not. Some contexts inhibit the use of such tools whereas others enable their institutionalization. For instance, pluralist systems such as the US have a central place for communication and engagement tools as compared to systems like France that centralize decision making authority and place less value on pluralism.

In studying the impact of institutions and political context on siting contentious facilities, the trend has been to draw long-term historical comparisons between somewhat similar cases with divergent outcomes or vice versa (for example, scholars study the different nuclear movements in France and the US, or France and Germany). These studies are interested in the long-term evolution of nuclear energy and its use as a function of political and institutional contexts. Macro-political structures are sticky and unlikely to change drastically in the short-term, making long-term analysis almost necessary. In so doing, these

analyses tease out key differences that can then help explain divergence in actual experience. For example, Hsiao et al. (1999) study the evolution of anti-nuclear movements in three East Asian countries (Taiwan, South Korea, and Hong Kong) with a focus on the state structures and how that impact the strength of these movements. Similarly, Jasper (1990) analyzes the divergence in the use and expansion of nuclear energy in United States, Sweden, and France. He presents a 'state-centered explanation' and argues that the differences in commitments to nuclear energy in the three cases can be best explained using the dynamics of state policymaking and the political and economic structures within which policymakers acted.

This research is useful in that it highlights the importance of macro political and institutional factors such as electoral shifts, political autonomy, regime type, and judicial independence. Studies like the ones mentioned above allow for the identification of the rich array of factors that may have influenced the course of issue evolution in a specific context at a particular location. However, the body of research suffers from critical drawbacks, both methodological and theoretical. The remainder of this section briefly presents these weaknesses and how this dissertation remedies them.

1.2.1. Methodological Contributions

While long-term case studies provide important insights into how an issue (in this case nuclear energy) evolved over time, there are a few key shortcomings that need to be addressed. First, the body of research focusing on political and

institutional factors using case study analysis has a tendency to choose cases in an unsystematic way, making wide generalizability complicated. Sometimes the choice of cases is driven by the type of political system, other times by the divergence in outcome. In most instances however, the studies run a risk of cherry-picking cases, which threatens their ability to generalize. To remedy this shortcoming, this dissertation uses an original large-N dataset comprising the universe of known cases (excluding North Korea, Iran, Russia, and China). Using this dataset alleviates concerns about picking cases that make sense in some instances and not others.

Second, these studies, by design, suffer from two closely interrelated problems—many variables and not enough cases (Lijphart 1971). More specifically, the number of variables available to explain the outcome of interest (in this case variation in the importance of nuclear energy) employed in these studies exceeds the number of cases, rendering hypothesis testing and the drawing of general conclusions difficult. When making cross-national comparisons as these studies often do, they engage in the testing of "macro hypotheses" that usually concern the "interrelations of structural elements of total systems"(Merritt and Rokkan 1966). Furthermore, use of notable cases (or notable features of particular cases) as the basis for "lessons learned" poses the risk of overemphasizing particular variables that may have different effects in other cases. For example, focusing on France and Germany as notable cases, where France is highly reliant on nuclear energy and Germany has chosen to phase it

out, can be problematic. These cases might be outliers, which would make generalizations drawn from their experience difficult. This can be particularly dangerous when too much significance is attached to a negative finding based on a single or a few cases (Galtung 1967). At the same time, some apparent relationships in a case will inevitably be stochastic (or ideocratic), and when they draw attention they may result in learning the wrong lessons.

For these reasons, scholars have asserted the importance of supplementing case studies with quantitative *comparative* analyses of larger sets of cases, permitting hypothesis testing and the accumulation of evidence and provide crucial control in the study (Lijphart 1971). Again, it is important to reiterate the value of small case comparisons, especially in the theory building stage and in helping to understand the rich context behind political outcomes. However, in order to test hypotheses and draw generalizable findings, these studies need to be supplemented with larger comparisons. To do this, this dissertation uses an original dataset of the universe of nuclear facility efforts globally to overcome this key shortcoming. Doing so provides critical leverage and allows us to engage in hypothesis testing and draw generalizable findings. It is important to remember that comparative studies have their own limitations; the need for quantification across a large number of cases limits the subtlety and precision with which important variables can be operationalized, and some potentially important variables may be omitted altogether from the analysis because relevant documentation is unavailable or due to the absence of valid and reliable measures.

In short, qualitative and quantitative analyses have different strengths and limitations, yet both are needed to provide the kind of cumulative knowledge base for effective facility siting that was called for in the BRC's final report (BRC 2012). To remedy this problem, this dissertation presents both quantitative and qualitative analyses of nuclear facility siting in different political and institutional contexts around the world.

1.2.2. Theoretical Contributions

In addition to the methodological weaknesses described above, the literature on how political and institutional contexts impact the evolution of nuclear energy and facility siting outcomes more generally contains some theoretical shortcomings that need to be addressed. Closely related to the issue of too many variables and too few cases mentioned in the previous section, this literature suffers from a lack of theoretical organization. Research on this topic does not have a common theoretical framework that is used to analyze different cases. I do not mean to suggest that a single framework is necessary or desirable, but in fact that theory building, hypothesis testing, and the accumulation of evidence is easier when there is a broad theoretical framework to organize some portion of the research on nuclear siting and its findings. By organizing the influence of institutional and political contexts under an overarching theoretical framework, we can begin to accumulate knowledge rather than running the risk of talking past one another. In addition to formulating and testing a suitable theoretical framework, it must also start by focusing on "key" variables and aim

for parsimony. These key variables must be broad enough to incorporate a multitude of cases and in so doing, increase the generalizability of the findings. Jasper (1990) for example uses a whole array of variables ranging from partisan cleavages, policy styles, bureaucratic politics, elite opinions, cultural meanings, and political and economic structures to compare three countries in their divergent commitments to nuclear energy. However, examining this entire array of variables can get overwhelming and makes highlighting broad overarching lessons difficult.

In an attempt to overcome this weakness, this dissertation draws on a parsimonious, overarching theoretical framework that can be used to analyze a multitude of siting cases both across and within political systems. Using the concept of Coalition Opportunity Structures (COS) as found in the Advocacy Coalition Framework (ACF), I formulate a list of key variables that can be used to analyze the influence of political and institutional contexts on outcomes of facility siting efforts. The explicit reasons for choosing COS and the ACF will be discussed in detail in Chapter 2, where I also define and outline the theoretical framework at length. The use of this parsimonious framework, I argue, will help policy scholars to study contentious issues like LULUs and generate testable hypotheses with potentially generalizable findings.

Finally, while relying on institutional structures provides some crucial explanatory power, it is necessary to recognize the existence of other factors that might influence the siting process. As a result, this dissertation employs a *probabilistic model* of decision-making and policy outcomes, which represents a

theoretical compromise between the extremes of the deterministic and stochastic models of public policy. On the one hand, the probabilistic model recognizes that collective decision-making is significantly impacted by stochastic elements and contextual variables that are difficult if not impossible to fully define *a priori*. On the other hand, the model recognizes that the collective decision-making process is characterized by important systematic elements consisting of patterns and relationships that constrain the seemingly chaotic policymaking process.

1.3. Dissertation Outline

As alluded to in an earlier section, the research questions that motivates this dissertation are twofold: ***does variation in coalition opportunity structures influence the siting of nuclear facilities?***[9] ***If so, how?*** These questions have both empirical and theoretical significance. Empirically, they help us understand some of the complexities associated with nuclear facility siting in a systematic, generalizable manner. The knowledge gained will help policymakers to understand the patterns of outcomes from past siting efforts, and – perhaps – to facilitate the design of siting processes that are more robust to the political and institutional environments within which they operate. In other words, lessons from this dissertation can aid in designing policies that would be conscious of, and apply to, different contexts ranging from democracies, non-democracies,

[9] For the purposes of this dissertation, NFC siting includes nuclear power plants; low and intermediate level waste repositories, as well as high-level waste disposal facilities.

parliamentary systems, presidential systems, to one-party, two-party, and multi-party systems. They also apply to policy problems other than siting of nuclear facilities. The findings will speak to issues of LULUs more generally, with relevance for the siting of all contentious facilities. Thus, while the specified research question is defined narrowly, in reality the theoretical and practical implications go well beyond the issue of nuclear energy.

Theoretically, the dissertation applies the ACF with particular attention to the previously under-developed concept of "coalition opportunity structures" (COS) to answer these empirical questions. In so doing, the research is a simultaneous effort to build upon the fuzzy, largely untested concept of COS. The dissertation achieves this by answering the following question: ***what are the mechanisms through which coalition opportunity structures influence the policy process?***

To answer these empirical and theoretical questions, the chapters in this dissertation address three distinct but interconnected questions. These questions relate to critical elements of the policy process, and help highlight important aspects of the siting process: siting outcomes (policy outcomes/policy change), organized opposition to siting (coalition formation), and oppositional strategies (coalition strategies). This leads into the three specific questions:

1. ***Once a site has been designated for use as a future nuclear facility, how do coalition opportunity structures influence whether the site becomes operable?***

2. ***Why do revisionist coalitions form in some siting processes and not others? Do coalition opportunity structures influence the formation of organized opposition to some nuclear facilities and not others?***

3. ***Do coalition opportunity structures influence the strategies adopted by revisionist coalitions in pursuit of policy change?***[10]

Again, all three of these sub-questions contribute to the larger research question and are of both empirical and theoretical significance. Before answering them, however, Chapter 2 describes in length the theoretical framework that provides the conceptual basis for understanding the nuclear facility siting problem. Chapters 3, 4 and 5 form the empirical core of the dissertation, each pursuing one of the sub-research question outlined above. Chapter 3 focuses on how COS impact policy outcomes; to achieve this, I construct and analyze new data in the form of an original dataset of 269 cases of attempted nuclear facility sitings all around the world. The cases vary on several aspects, including the final

[10] Revisionist coalitions are defined in this dissertation as coalitions that pursue policy change by actively challenging the status quo policy decision. They are, by extension, the opposite of hegemonic coalitions that support the status quo and benefit from it in some way. With reference to the empirical issue, revisionist coalitions are coalitions that are opposed to the de facto policy decision to site the nuclear facility and are engaged in challenging that status quo by attempting to get the facility cancelled.

policy outcome—whether the facility became operational or not. Chapter 3 studies how COS impact a change in policy from the status quo (the attempt to site the facility). I argue that the two dimensions of COS (degree of openness of a political system and the degree of consensus required for major policy change within a system) influence the likelihood that policy change will occur. Certain configurations of COS make policy change less likely and vice versa. Moving on to chapter 4, I use COS to explain coalition formation in different nuclear facility siting subsystems. In particular, this chapter uses a smaller, randomly selected sample of 50 cases from 13 different democracies to look at how COS in these countries influence whether 'revisionist' coalitions challenging the attempt to site nuclear facilities form or not. Finally, chapter 5 uses COS to explain varying strategies adopted by 'revisionist' coalitions. In particular, this chapter focuses on how different forms of COS affect the strategies revisionist coalitions adopt in the pursuit of policy change. To conclude, chapter 6 presents a summary of the main results, as well as a discussion of the theoretical and empirical implications of the study. This chapter also discusses the implications of the findings for nuclear facility siting to other kinds of LULU and NIMBY cases. It also outlines general themes for future research.

Chapter 2: The ACF and Coalition Opportunity Structures

2.1. Introduction

Chapter 1 outlined the empirical problem driving this dissertation, and why the issue of nuclear facility siting presents a significant opportunity to understand the role of institutional structures in siting these facilities and in contentious politics more generally. The siting of nuclear facilities is an excellent example of LULUs, where individual risk perceptions are heightened and stakeholders have a strong incentive to participate in the siting process. The process of siting begins with a decision (usually by the government or a private company) to site a nuclear facility at a particular location. However, not all these decisions translate into operational facilities. As such, the process of nuclear facility siting also presents an intriguing policy change question: why does policy change occur in some cases and not others? By policy change, I refer to cases where the status quo policy to site the facility is cancelled before the facility becomes operational. The lack of policy change, by extension, refers to cases where the facility was constructed and became operational as intended. I argue in this dissertation that studying a large number of siting efforts across varying institutional and political contexts can provide crucial insights into how these variations influence siting outcomes and policy change.

Having described the real world problem and reviewed the existing literature on it in chapter 1, the primary goal of this chapter is to outline the theoretical framework used in this dissertation. In the previous chapter I briefly

discussed the theoretical contributions of this dissertation, which will be elaborated here. I begin by explaining why the ACF provides a suitable theoretical frame to answer the empirical problem summarized above, and how it can help overcome some of the weaknesses of the siting literature as described in Chapter 1. Specifically, I discuss how the concept of COS can provide an overarching theoretical framework that can then be used to analyze the role of institutions across different cases of contentious siting over time. In addition to the contributions made to the substantive literature on facility siting, I also highlight the contributions this dissertation makes to the ACF. The operationalization, measurement, and analysis of COS conducted in this dissertation fill an important vacuum within the ACF and the public policy literature, which can be employed in future research to other issues and in different policy contexts.

2.2. Why the ACF?

As alluded to in an earlier section, the research questions that motivated this dissertation are twofold: ***does variation in coalition opportunity structures influence the siting of nuclear facilities? If so, how?*** This section describes why I employ the ACF (specifically the concept of COS as defined within the ACF) to answer these questions and why I think it is both relevant and ideal for understanding this issue. To be clear, more than one of the existing theories of the policy process can provide a platform to explain some of the complexities of the siting process and the outcomes associated with it. As argued by Parsons (1995, p.

xvi), in order to study the policy process, we must focus on "how problems are defined, agendas set, policy formulated, decisions made policy evaluated and implemented." In response to this, scholars have formulated theoretical models and frameworks intended to capture different aspects of the policymaking process, policy change, and policy outcomes. Some of the theories of policy process that have been widely utilized in the public policy literature include the ACF, Punctuated Equilibrium Theory (PET), Institutional Analysis and Development (IAD), Multiple Streams (MS), and Social Construction (SC). Essentially, by observing decision-making patterns over time and space, scholars have been able to develop widely used theories that can explain what is likely to occur given a specific set of circumstances (Kingdon 1984; Olstrom 1990; Sabatier and Jenkins-Smith 1993; Baumgartner and Jones 1993).

Of these, the ACF is not the only theory of the policy process that can adequately help to understand the siting process associated with nuclear facilities. Nonetheless, I argue that the ACF is the ideal framework to answer the research questions for several reasons. First, compared to other theories, the ACF pays more attention to policy issues involving seemingly irresolvable goal conflicts, important technical disputes, and multiple actors from various levels of government (Hoppe and Peterse 1993). Developed to deal with "wicked" policy problems, the ACF was applied to energy and environmental policy issues before scholars began testing its applicability to other issue areas (Sabatier and Weible 2007). These characteristics make the ACF capable of capturing key elements of

the problems associated with siting--the highly technical nature of nuclear energy policy and NFC facility siting, the presence of strong competing coalitions, different agencies and elected officials from all levels of government, as well as actors outside the 'iron triangle' (consisting of the Congress, Bureaucracy, and Interest groups) like journalists, activists, and the public.

The second reason for choosing the ACF relates to the level of analysis at which the framework deals with policy issues. For instance, PET (that has since evolved into the politics of attention project), as developed by Baumgartner and Jones (1991, 1993) functions at the macro level of analysis, focusing on large scale changes in public policies. It is primarily interested in two related elements of the policy process: issue definition and agenda setting. As such, it studies large scale, macro flows of information, how issues are defined in policy arenas, and what issues make it on to the policy agenda. For example, in a recent article, Baumgartner, Breunig, Green-Pedersen, Jones, Mortensen, Nuytemans, and Walgrave (2009) employ a comparative approach to study the policy process in different political systems—Belgium, Denmark, and the United States. Their main research question is whether governmental efficiency and the level of institutional friction differs across countries based on institutional configuration.[11] The PET framework would be useful to study the rise and fall of nuclear energy on the

[11] The concept of friction originated in the authors' earlier work on politics of attention, where they argue that certain issues emerge to the political agenda while others get marginalized (Jones and Baumgartner 2005).

legislative agenda, as well as big changes in the trajectory of the use of nuclear energy. However, in this dissertation, I am more interested in policy change experienced by each effort to site nuclear facilities. Therefore, PET and its macro level of analysis is not an ideal framework for the purposes of this dissertation.

While the PET focuses on issues at a macro level of analysis, another policy process theory—the IAD—studies them from a micro level of analysis. First introduced by Kiser and Ostrom (1982), the IAD is the most influential strand of institutional rational choice thinking in the field of public policy. At its base, the IAD is a framework designed to answer questions about the way in which various institutional arrangements can help people come together in order to solve collective action or common-pool resource problems. The primary analytical focus of the IAD is on the action arena (subsystem), which is where public decision-makers and other interested actors "interact, exchange goods and services, solve problems, dominate one another, or fight" (Ostrom 2007, 28). Institutions are important to the IAD in that some institutional configurations promote trust, cooperation, and encourage collaboration by reducing transaction costs (Ostrom 2005; Weber 1998). However, the focus of the IAD is at the micro level of analysis—the rational individual and citizen self governance. The IAD would be useful if this dissertation was motivated by how rational actors can overcome self-interest and develop trust in the context of common pool resource management (Ostrom 2005). However, this is not the case and this is why I do not employ the IAD in this dissertation.

In sum, while all three theories—PET, IAD, and the ACF—incorporate institutions, individual rationality or belief systems, and subsystems to some extent; the different level of analyses they operate at makes the ACF the ideal framework for this dissertation. The PET is at the most "coarse" scale of inquiry, mainly interested in system-level *patterns* of decisions (Schlager 2007, 297). IAD is at the other extreme, with its fine grain attention to institutional configurations that individuals create to overcome self-interest in the interest of a larger community goal. In contrast, the ACF provides an ideal middle ground, by operating on a meso level of analysis. The ACF explains policy outcomes and policy change in a subsystem over long periods of time. It is not interested in patterns of decision making as such, nor is it interested in how individuals overcome common pool resource issues. By identifying and measuring belief systems, issue specific subsystems, and mechanisms of policy change, the ACF provides the most relevant and ideal backdrop for this dissertation. The next section of this chapter presents a brief overview of the ACF, some key critiques of the framework, and how this dissertation is an effort to respond to these critiques.

2.3. Brief Overview and Key Components of the ACF

The ACF, initially developed by Paul Sabatier and Hank Jenkins-Smith (1993), argues that individuals with similar core beliefs form coalitions to advance their policy preferences. These coalitions, which act within policy specific subsystems, interact through nontrivial coordination with the intent to influence policy outcomes. Rather than focusing exclusively on governmental

actors such as congress, the executive, etc., the fundamental unit of analysis in the ACF is the subsystem—the issue-specific unit within which interested actors from all levels of government as well as advocates such as journalists, consultants, and scientists interact to influence policy outcomes (Sabatier and Jenkins-Smith 1993). Within each subsystem (provided that it is relatively mature) a small number of opposing advocacy coalitions form and fight to preserve the status quo or to change a particular policy. The number and nature of these coalitions will be determined by the distribution of hierarchical beliefs within the subsystem.

The ACF's main hypotheses and causal arguments rest on a set of assumptions: (1) scientific and technical information play a central role in the policy process; (2) a long term policy perspective of more than a decade or so in required to fully understand the complexities associated with the policy process; (3) policy subsystem is the primary unit of analysis; (4) a wide array of subsystem actors from different levels and branches of government, media, the public, and scientists; and (5) policy goals and programs are essentially a translation of belief systems held by coalition members (Sabatier and Jenkins-Smith 1999, 118-120). In addition to these assumptions, the ACF argues that individuals are boundedly rational and that they rely on a hierarchical set of beliefs as the primary heuristic to simplify and filter policy positions.

The ACF argues that a vast majority of policymaking—i.e. efforts to shape and influence the course of public policies--takes place among experts within issue specific subsystems. As described above, competing coalitions exist

in these subsystems and fight policy battles by devising strategies to impact the policy process and influence policy change. Policy change comes about when a previously dominant coalition looses ground to an oppositional coalition. However, to explain policy change within the ACF, one must identify the reasons why the balance of power between coalitions within the subsystem suddenly shifts. According to recent versions of the ACF, this shift in power can arise endogenously or exogenously (Weible and Sabatier 2007). On the exogenous end, there are two sets of variables that influence the balance of power within the subsystem—relatively stable parameters (such as the basic attributes of the problem, sociocultural values, and constitutional rules) and external events (such as changes in socio-economic conditions, public opinion, or changes in government).

Among other things, external events shape the policy beliefs and strategies of coalitions, as well as their ability to influence policy change (Fenger and Klok 2001). Although the relatively stable parameters rarely change themselves, they are crucial for establishing the distribution of resources and constraints within which subsystem actors operate. Both these exogenous variables ultimately shape the dynamics between different coalitions, including the balance of power among them. The relatively stable parameters set the stage for basic rules and regulations that constrain or enable coalitions, and the external events hold the potential to alter the amount of influence a coalition has compared to its opponents. For example, incidents like Chernobyl and Fukushima are external system events that

can act as windows of opportunity for anti-nuclear coalitions, allowing them to shift public opinion in their favor, gain additional resources, and tip the balance of power.[12]

In terms of endogenous policy change, the ACF points to three different catalysts—policy oriented learning, internal shocks, and negotiated agreements (Sabatier and Weible 2007). Learning occurs when coalitions use information (practical or scientific) to gain an advantage over their opponents. Internal shocks come about when a coalition suddenly gains a significant amount or resources allowing them to surpass their competitors. Lastly, a negotiated agreement between coalitions because of unsustainable conflict or the sudden realization of mutual interests can cause sudden changes in policy outcomes.

[12] To be clear, whether external events are actually "external" depends on the boundaries of the subsystem in question. For instance, in this case, Fukushima was an internal shock to the Japanese subsystem but external for the rest of the world. Similarly, Chernobyl was a major external event for the rest of the world except for the USSR. It is important to note that the boundaries of subsystems are not always clear, and events can sometimes be difficult to deem external or internal, especially in the case of broad ranging subsystems whose scope goes beyond national boundaries.

2.3.1. Defining Action and Institutional Context within the ACF

Though there are numerous advantages to the ACF, there are a number of shortcomings as well as theoretical voids that remain unfilled and/or underspecified. One long standing critique of the ACF relates to its incorporation of institutions. This criticism questions the applicability of the framework to policymaking contexts outside of the US, which is where it was developed and initially tested (Sabatier and Weible 2007). More specifically, critics have argued that the "pluralistic" institutional arrangements that govern policy making in the US (i.e., numerous and fragmented decision making venues that are relatively easy to access) are different in kind than the institutional arrangements that govern policy making in other settings, like the "neo-corporatist" regimes found throughout Europe which are characterized by a smaller set of relatively centralized decision making venues that are difficult to access and governed by consensual rather than majoritarian traditions (Lulofs and Hoppe 2010). Until recently, a significant number of the efforts to apply and test the ACF were limited to the US and North American context, which is defined by a specific set of institutions and pluralism. This, according to some scholars, is problematic because it is not clear whether the ACF is suitable for explaining and predicting policy processes in other types of institutional settings (Kübler 2001, 627). In reaction to these critiques, the concept of "coalition opportunity structures" was incorporated into the ACF. The next section will describe the genesis, incorporation, and evolution of this concept in more detail.

Also related to the concept of COS, the ACF has been critiqued for the lack of specification about how these structures influence the policy process. As Schlager (1995, 259) notes, "[I]f the AC framework is to better account for action, the institutional structure and characteristics of the situation in which coalitions form and act need to be better specified. The institutional setting which both constraints and promotes action must be further developed." As described above, the ACF recognizes the role of institutions in the form of relatively stable parameters, but fails to explicitly account for the links between these parameters and the policy outcomes we witness. For instance, though the ACF clearly accounts for the fact that relatively stable parameters and opportunity structures influence the resources available to coalitions and constrain the scope of their actions, the link between these structures and coalition behavior is relatively unclear (Schlager 1995). Do structures cause coalitions to behave in theoretical predictable ways? To what extent or when are coalitions able to overcome structural constraints in order to influence policy outcomes?

Furthermore, though the ACF is rather strong on explaining the balance of power between coalitions within subsystems, it is somewhat weaker on explaining the strategies that actors might use in order to win a policy battle (Schlager 1995; Kübler 2001). In addition to the amount resources a coalition has, it is feasible that coalitions might strategically act in ways that enhance the likelihood of winning a policy battle. For instance, coalitions might try to expand the scope of conflict beyond the traditional subsystem by shifting policy venues

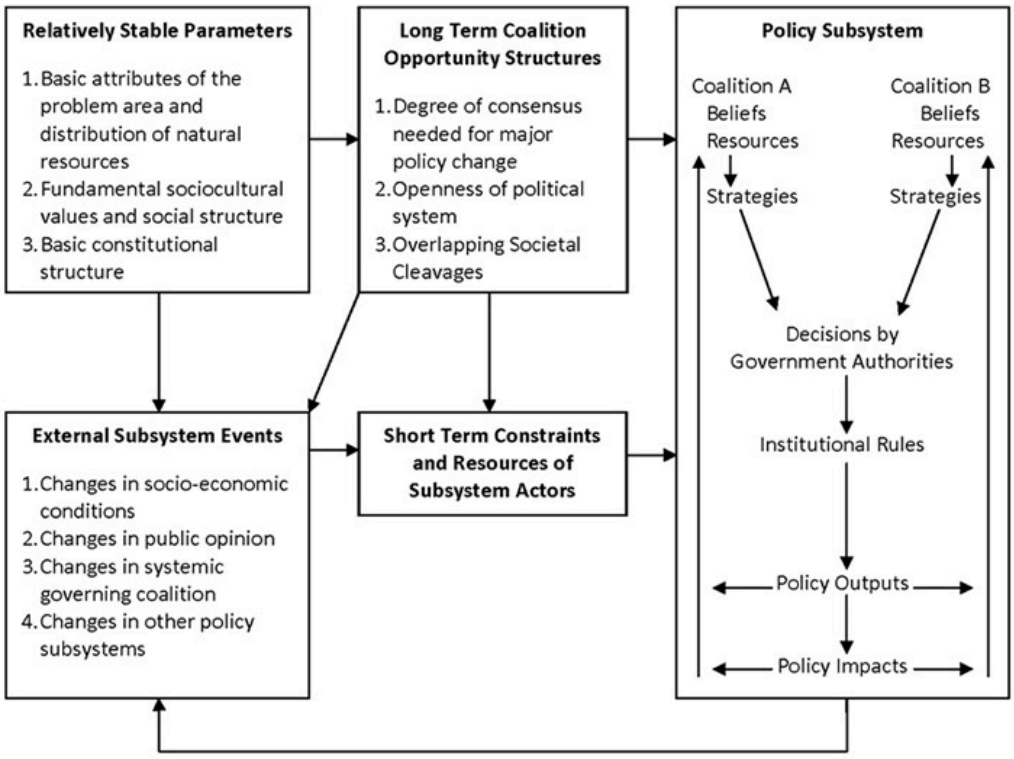
(Schattschneider 1965), they might try to strategically manipulate policy images via heresthetics (Riker 1986), or they might network with coalitions from adjacent subsystems in order to bolster their position vis-à-vis their opponents. Though ACF scholars have devised and incorporated the concept of COS to account for coalition behavior and strategies, the theoretical concept needs to be refined and tested before we can fruitfully answer these questions. These critiques are a major impetus for this dissertation. In addition to formulating a parsimonious theoretical framework to study contentious facility siting, this dissertation also answers these longstanding questions that fill some important gaps within the ACF. Accordingly, the next section of this chapter describes the concept of COS at length, in genesis in social science, and some general hypotheses derived from current knowledge.

2.4. The ACF and Coalition Opportunity Structures

In response to the critiques discussed above, Sabatier and Weible (2007) amended the ACF by incorporating a new set of variables—collectively referred to as "long-term coalition opportunity structures" (COS) —that mediate the relationship between relatively stable parameters like political institutions and external events and the dynamics (coalition formation, coalition behavior, strategies, and policy change) that occur within policy subsystems (see Figure 2.1). Simply put, COS are features of institutions that enable or constrain actions and outcomes within a political system. These structures can be formal (such as federalism) or informal (such as the norms of consensus prevalent in a society).

In updated versions of the ACF, COS are conceptualized along two interrelated dimensions—(1) the openness of a political system and (2) the degree of consensus needed in that political system for major policy change (Weible and Sabatier 2007). The relative openness of a political system is defined along two sub-dimensions—(a) the number of decision making venues that policy proposals in that system must go through and (b) the accessibility of those venues. According to this conceptualization, pluralist countries such as the US are relatively open. Policy making authority is separated across multiple institutions and different levels of government, all of which are relatively accessible to actors that wish to involve themselves in the policymaking process. Corporatist and neo-corporatist countries (like Norway, Sweden, and Austria), by comparison, are traditionally categorized as less open, because decision-making is more centralized and access to the policymaking arena is relatively difficult to come by (Sabatier and Weible 2007; Lulofs and Hoppe 2010).

Figure 2.1: Flow Diagram of the Advocacy Coalition Framework



Source: Workshop on Policy Process Research, maintained by the School of Public Affairs at the University of Colorado Denver.

The second dimension characterizing COS, concerning the degree of consensus needed for policy change, specifies the number of people, organizations, opinions, and/or votes necessary to alter public policy in a given setting (Sabatier and Weible 2007). The authors argue that the higher the degree of consensus required for any major policy decision, the greater the incentives coalitions have to be open, inclusive, and to make compromises with their opponents. The degree of consensus required can be viewed as a continuum. At one end, countries like Switzerland are governed by strong norms of consensus, wherein major change requires the consent of as many people as possible—including minority groups. In middle of this continuum are countries like the US

and UK are governed by plurality, majority, or supermajority norms, wherein change requires the consent of the majority or relative majority, but not the minority. At the low end of the continuum, policymaking in authoritarian countries, like North Korea, is governed by powerful minorities capable of changing policy without the consent of the others, much less the majority (Sabatier and Weible 2007; Lulofs and Hoppe 2010).

2.4.1. The Intellectual Roots of Coalition Opportunity Structures

Although a nascent concept in public policy, COS, also known as "political opportunity structures," has been used extensively in the social movement literature to illustrate how the outcomes of protests and social movements are shaped by the political, institutional, and social structures of a country (Eisinger 1973; Piven and Cloward 1979; Tarrow 1983; Kitschelt 1986; Kriesi et. al. 1995; McAdam et. al. 1996; Tarrow 1998; Kolb 2007). The basic premise of this concept is that exogenous factors built into the political structure of a state influence the fate of a protest movement. More specifically, these structures work to either enable or constrain essential elements of a social movement like the ability of protestors to mobilize, to advance certain types or claims over others, to carry out certain strategies, and ultimately to impact mainstream institutional politics (Meyer and Minkoff 2004). Scholars have tested the concept using a variety of different contexts ranging from Southern Italy, highland Peru, and to a 1940s farm workers' movement in the US. Simply put, scholars argue that the choice of protest strategies and their degree of success

depends, in part, on the COS of a country, as measured by the unique configuration of resources, institutional setups, and historical precedents for mobilization (Kitschelt 1986: 58). Findings from these studies illustrate that the course of social movements did in part depend on "the political opportunity structure *within* which they revolt" (Tarrow 1967; Hobsbawm 1974; Jenkins and Perrow 1977; Tarrow 1983: 3 emphasis added).

Inspired by this research and contentious politics more broadly (Kitschelt 1986; Kriesi et al. 1995; S. Tarrow 1989), the concept of COS was incorporated into the ACF in 2007. It allows the ACF, among other things, to broaden its scope to include political systems and institutional characteristics other than American pluralism. In the context of the ACF, COS remind theorists that people do not form advocacy coalitions, amass resources, make strategic decisions, and affect public policy in a vacuum. Rather, the opportunity structures within which people and coalitions exist provide the incentives, rules, and norms (i.e., the opportunities) that make some decisions more attractive and some actions more effective, than others (Meyer 2004). Thus, if we want to understand and explain the policy process, we must account for the role of opportunity structures, which vary across institutional contexts.

2.5. Mechanisms Linking COS and the Policy Process

Since the incorporation of COS into the ACF in 2007, only a handful of studies have attempted to use the concept. In a general sense, these studies argue that opportunity structures affect the policymaking process in one of two ways.

First, they influence coalition behavior. For example, Kübler (2001) and Gupta (2013) find that opportunity structures demarcate the 'venues' available to coalitions and thereby influence the strategies (litigation, public protest, etc.) they will adopt in pursuit of policy change. On a related note, Leifeld and Schneider (2012) find that opportunity structures also mediate the transaction costs associated with information exchange in policy networks (advocacy coalitions) and thereby influence patterns of communication and coordination within and across advocacy coalitions. Second, coalition opportunity structures affect the probability of policy change in a given subsystem. For example, a number of scholars have recently argued that a political system (or subsystem) with a large number of COS leads to a proliferation of "veto players", which can induce stalemate and reduce the likelihood of policy change (e.g., Tsebelis 1995; Sotirov and Memmler 2012; Ingold and Varone 2012).

However, this research is somewhat disparate in the way that COS are measured and tested. To remedy this, this dissertation offers standardized measures of COS derived from its two dimensions as defined by Sabatier and Weible (2007). Doing so, I argue, can provide a common theoretical core with uniform measures that can be used in future research. In addition to presenting measures, I also test these measures to gauge the utility of the concept and its role in the policy process. This is of critical value to the ACF, in that it is the first time COS have been measured and tested using a mixed methods strategy. I do so by testing COS using large-N, quantitative data across different institutional and

political contexts; as well as using qualitative case studies. The former allows me to maximize comparative leverage across different opportunity structures over time, and the latter provides some much needed depth to the analysis. As such, this mixed method strategy allows for a thorough test of the utility of this concept, which has not been conducted thus far. To do this, this dissertation explores the following theoretical question: ***what are the mechanisms through which coalition opportunity structures influence the policy process?*** I argue that COS influence the policymaking process through three primary mechanisms: coalition formation, coalition behavior, and policy change.

To test the utility of COS, I use the issue of LULUs, specifically the siting of nuclear facilities. Nuclear facility siting presents an excellent opportunity to study the influence of COS on the policy process. From a theoretical and research design point of view, the efforts to site nuclear facilities in different countries all over the world provide the critical variation on the independent variable—the varying opportunity structures that characterize these systems. The issue of nuclear siting is ideal not only for theoretical/research design reasons, but also because it is an increasingly important political and social issue. Significant amounts of time and resources are spent on planning and constructing these facilities only to see some of them get cancelled. The findings from this dissertation can help minimize some of the uncertainty inherent to siting contentious facilities and provide policymakers with insight into how existing opportunity structures might affect the policy process.

Again, the main empirical research question of this dissertation is: ***does variation in coalition opportunity structures influence the siting of nuclear facilities? If so, how?*** The empirical core of the dissertation focuses on demonstrating how these relationships function. There are three questions that will be the focus of chapters 3, 4 and 5 pertaining to policy change, coalition formation, and coalition behavior respectively. The next section of this chapter presents synopses of the theoretical arguments and general hypotheses on each of the three mechanisms.

2.5.1. COS and Policy Change

Referring back to Figure 2.1, this chapter explores the relationship between COS and "policy outputs." Policy outputs, for the purposes of this dissertation, are defined as instances of policy change or lack thereof. Policy change took place in cases where the status quo policy decision to site the facility was overturned and the facility was cancelled. In cases where the status quo was upheld and the facility became operational, policy change did not happen. This chapter is an effort to analyze the COS that enable policy change, and which ones make change increasingly difficult, by answering the following research question: ***Once a site has been designated for use as a future nuclear facility, how do coalition opportunity structures influence whether the site becomes operable?*** I argue that a country's broad national opportunity structures enable or constrict the ability of actors to change a policy status quo. They create barriers to change that are difficult to overcome in some cases, while in other cases the policy can be

implemented with little competition. The choice of nuclear facility siting as the empirical issue used to test this relationship is critical here because it provides the necessary variation both on the independent and dependent variables. With reference to the independent variable, the comparative analysis is supported by the variation in political systems and the resulting COS in different cases. With reference to the dependent variable, the case of nuclear facility siting provides the much needed variation on the dependent variable of this chapter—policy outputs or policy change. In some cases of siting, the nuclear facility was constructed and became operational as intended. However, in other cases, the siting efforts did not go as planned and the status quo was overturned resulting in a cancelled facility. This variation allows us to test the influence of our independent variable—COS—on the dependent variable—policy change.

I use a unique and original dataset of 269 cases of nuclear facility siting in 30 different countries, which will be described in more detail in chapter 3. Opportunity structures are measured along the two dimensions specified by Sabatier and Weible (2007): degree of openness and degree of consensus required. Political systems that have a higher degree of openness and require a higher degree of consensus are more likely to experience policy change. Such systems are more open, providing opportunities for challengers to become a part of the policy process, thus giving them a chance to overturn the status quo.[13]

[13] An alternative hypothesis postulating the relationship between the degree of consensus required and the likelihood of policy change is plausible. The

Additionally, political systems with a higher number of decision-making venues provide opportunities for outside actors to become involved in the policymaking process. If this is true, then the following hypotheses will hold:

H_1: Political systems characterized by a larger number of decision-making venues are more likely to experience policy change.

H_2: Political systems characterized by a higher degree of accessibility are more likely to experience policy change.

H_3: Political systems that require higher degrees of consensus are more likely to experience policy change.

2.5.2. COS and Coalition Formation

Chapter 4 focuses on an understudied but important element of the policy subsystem box in Figure 2.1: Coalition A and Coalition B. In particular, this

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alternative hypothesis, which would correspond with the majority of the veto player literature in comparative politics, would suggest that given that a decision to site was made, countries with a lower degree of consensus could be more likely to produce policy change. This depends in large part on what the status quo is defined to be, which in this case is the official policy to site the facility. In future research, I plan to test this alternative hypothesis. However, for the purposes of this dissertation, I focus exclusively on the theoretical relationships specified within the ACF.

chapter explores how COS influence the formation of advocacy coalitions. The ACF makes a big assumption about when and how actors with similar belief systems decide to come together and form coalitions to pursue common policy goals (Schlager 1995; Kübler 2001). However, the factors that lead to the formation of coalitions need to be examined further. As a remedy, this chapter looks specifically at how varying COS impact the likelihood of coalition formation. For the purposes of analytical clarity, this dissertation looks solely at the formation (or lack thereof) of revisionist coalitions. As described in Chapter 1, revisionist coalitions are defined in this dissertation as coalitions that pursue policy change by actively challenging the status quo policy decision. They are, by extension, the opposite of hegemonic coalitions that support the status quo and benefit from it in some way. With reference to the empirical issue, revisionist coalitions are coalitions that are opposed to the de facto policy decision to site the nuclear facility and are engaged in challenging that status quo by attempting to get the facility cancelled. Again, the issue of nuclear facility siting is ideal to study this relationship because it provides the necessary variation on the independent and dependent variables. With reference to the independent variable, the comparative analysis is supported by the variation in political systems and the resulting COS in different cases. With reference to the dependent variable, some cases of facility siting faced organized opposition in the form of revisionist coalitions whereas other cases did not. This provides the critical variation on the

dependent variable. The research question driving chapter 4 is simple: ***Why do revisionist coalitions form in some siting processes and not others?***

In answering this question, I theorize that opportunity structures influence coalition formation; they (in addition to other factors, like resource availability) define the transaction costs and shape the perceived benefits that individuals weigh when deciding whether or not to form (or join) a coalition that challenges the status quo in a given subsystem. When the barriers to entry (costs) are relatively low (i.e., access is easy) and the potential benefits of coalition formation are high (i.e., there are a relatively large number of potentially sympathetic venues that are inclined towards consensus), decisions to form (or join) revisionist coalitions will be more likely to form. When barriers to entry are high (i.e., access is restricted) and potential benefits are low (i.e., the number of potentially sympathetic venues is relatively small and/or dominated by a select group of people), decisions to form (or join) revisionist coalitions will be less likely to form. The analysis in chapter 4 uses a subset of cases from the larger dataset used in chapter 3. If the theoretical logic posed above is true, then the following hypotheses will hold:

H4: revisionist coalitions are more likely to emerge in open settings characterized by a large number of decision-making venues

H5: revisionist coalitions are more likely to emerge in open settings characterized by a high degree of accessibility

H6: revisionist coalitions are more likely to emerge in settings where higher degrees of consensus is needed (or highly valued) for policy change

2.5.3: COS and Coalition Strategies

Chapter 5 explores the relationship between COS and another critical element of the subsystem box in Figure 2.1: strategies. The ACF argues that in the fight for their policy beliefs and preferences, competing coalitions adopt specific strategies to gain more resources, mobilize these resources, and ultimately tip the balance of power in their favor. Although this is a significant element of the framework, we know very little about why coalitions adopt the strategies they do. The chapter is driven by the following research question: ***Do coalition opportunity structures influence the strategies adopted by revisionist coalitions in pursuit of policy change?*** Again, the issue of nuclear energy provides an ideal backdrop for this analysis because of the heightened risk perceptions and the resulting incentive to engage in the policy process. Once revisionist coalitions form, if they do (as illustrated in chapter 4), what strategies do they adopt and why? Is there a pattern to the adopted strategies? To gain additional comparative leverage, this chapter compares the issue of nuclear energy to that of forest management in India. Using a base country allows us to keep the national opportunity structures constant, while analyzing the variation at the sub-national/subsystem level. This is crucial because thus far, COS and its analysis within public policy has been limited to the broad national level. However, given

the centrality of the 'subsystem' to multiple policy process theories, it is essential to gage the existence and influence of COS at that level.

While chapters 3 and 4 employ a quantitative analytical strategy, chapter 5 uses a qualitative case study comparison to answer the research question. This methodology complements the quantitative findings from earlier chapters and provides a more holistic view of the role of COS in the policy process. I argue that revisionist coalitions will adopt different strategies in pursuit of policy change, based upon the openness of a political system and the resulting nature of the COS. To study COS at the subsystem level using a qualitative analytical strategy, I borrow from Kitschelt and his operationalization of the concept (Kitschelt 1986). I posit that political systems with more open decision making structures encourage coalitions to use more "assimilative" strategies, whereas coalitions operating within closed COS are prodded to use "confrontational" strategies (Kitschelt 1986, 66). Assimilative strategies are those mechanisms that are employed through existing policy channels and institutional venues. Confrontational strategies, on the other hand, are employed outside of the already established institutional access points. Examples of assimilative strategies include lobbying, petitioning, judicial appeals, referendum campaigns, and participation in electoral campaigns. Confrontational strategies include methods such as civil disobedience, violent protests, demonstrations, and mass rallies. Using the cases, the following two hypotheses explore the role played by COS and their impact on strategies adopted by coalitions:

H7: In policy subsystems where decision-making authority is concentrated and access to decision-making is restricted, revisionist coalitions will be more likely to adopt confrontational strategies such as public protest and rallies that are designed to disrupt the subsystem.

H8: In policy subsystems where decision-making authority is dispersed and access to decision-making is open, revisionist coalitions will be more likely to adopt assimilative strategies such as deliberation, appeals, and petitions that are designed to work within the subsystem.

Having summarized the empirical focus, scope of inquiry, and the theoretical framework for this dissertation, the next three chapters test the hypotheses listed above. Chapter 3 explores the hypothesized relationships between COS and policy change, which are then broken down further in chapters 4 and 5 by asking *how* they are connected. For this, I focus on two mechanisms—coalition formation (analyzed in chapter 4) and coalition strategies (analyzed in chapter 5).

Chapter 3: Nuclear Facility Siting, Coalition Opportunity Structures and Policy Change

3.1. Introduction

This chapter explores the hypothesized relationships between the characteristics of COS and prospects for policy change. Each individual case of nuclear facility siting commenced with a policy decision by governmental authorities to build that facility. For our purposes, the decision to site sets the "status quo" for the case. The development of the case is therefore subject to one of two possible policy outcomes: the maintenance of the status quo that results in an operational facility or policy change that results in a cancelled facility.[14] This chapter studies how variations in COS influence the patterns of policy change. It begins with a description of the theoretical framework and the testable hypotheses listed in the previous chapter. Then it outlines the analytical procedure employed

[14] By framing the cases in this dichotomous way, a "delay" in siting is considered a continuation of the status quo. The final outcome of interest here is policy change, which (under this coding scheme) can only be ascertained once the siting process has ended. The siting process can end in one of two ways—continuation of the status quo where the site becomes operational, and cancellation of the status quo where the site never opens. To be included in the database, a case has to fall into one of the two categories—cancelled or operational. Therefore, cases that are delayed but were never cancelled or never opened (for example the Yucca Mountain repository) are not included in this database.

to explore this link and test the hypotheses, along with the data collection and coding process used to measure the attributes and outcomes of the cases. Finally, it presents the findings and the implications to be drawn from them.

3.2. Theoretical Framework

Public policy, as conceived by most policy scholars, is a purposive course of action undertaken by an authoritative actor or body of government to deal with matters of public concern. It includes the initial decision to adopt a policy, as well as the subsequent decisions needed to implement and revise that policy. In systems such as the U.S., policy can be created in the legislature, within agencies, or in the courts – each of which is a "venue" in which policies can be influenced. The U.S. is an example of a system with "rich" COS that provides a lot of opportunities and incentives for opponents and challengers of the status quo to attempt to intervene and change it. In contrast, systems with "sparse" COS provide fewer or no opportunities for opponents of the status quo to intervene in the policy process and attempt to change the status quo. Centralized political systems such as France are examples of the latter. In addition, it is important to note that policies typically evolve over long periods of time and along the way, a host of decisions must be made across multiple policy-making institutions, many of which can delay, derail, or fundamentally alter the initial policy decision. This might also suggest that systems with rich COS where policy decisions have to pass through multiple venues are more prone to delays or derailment than systems with sparse COS. To understand the factors that will influence these decisions, it

is important to consider the way in which collective decisions are made. This chapter explores the concept of COS as one mechanism that provides conceptual order in an otherwise bewildering and chaotic process of collective decision-making.

Conceptual order comes from the enactment and enforcement of rules and norms—both formal and informal—meant to govern the decision-making process. In doing so, COS define the central features of the public policy process, including the rules for political elections[15], the federal separation of powers, and the rules that govern policymaking agencies. By extension, the opportunity structures built into the system also influence public policy because they dictate which coalitions/actors may engage in the process, how they are able to act, and how much influence each coalition/actor has once they seek to engage in the policymaking process. In essence, COS are the points of access that provide coalitions and actors the ability to influence the policy process. Systems with rich COS have multiple points of access that can be used by opponents to the status quo in their attempts to overturn it. In contrast, systems with sparse COS have very few, if any, points of access that are available to status quo opponents. The absence of these points of access reflects a limited ability of coalitions to impact policy decisions, whereas their presence reflects an increased ability of coalitions

[15]Recent Supreme Court decisions concerning campaign finance, for example, changed the institutional arrangements for elections by disallowing government limits on campaign spending by corporations and unions.

challenging the status quo to impact policy decisions and bring about policy change.

As discussed in Chapter 2, the concept of COS was incorporated into the ACF to account for the differences between the US and other political systems throughout the world. Theoretical assumptions based on features unique to American-style pluralism consisting of well organized interest groups, mission-oriented agencies, weak political parties, numerous decision making venues and the need for supermajorities for major policy change, for example, may not be applicable to European corporatist regimes or developing countries with strong patronage networks (Chandra 2004; Greer 2002; Larsen, Vrangbæk, and Traulsen 2006; Lulofs and Hoppe 2010; Parsons 1995)). In light of this consideration, scholars have begun to offer theoretical explanations of these opportunity structures, but their theoretical conjectures have outpaced empirical tests (Kübler 2001; Leifeld and Schneider 2012; Sotirov and Memmler 2012). For example, borrowing extensively from the largely European literature on "political opportunity structures" (Kriesi et al. 1995; Kübler 2001; McAdam, McCarthy, and Zald 1996), the ACF argues that opportunity structures represent the "relatively enduring features of a polity that affect the resources and constraints of subsystem actors" (Sabatier and Weible 2007, 200).

More specifically, Sabatier and Weible (2007) identify two sets of variables borrowed from comparative politics literature on consensual democracy and the work of Lijphart (1999)—degree of consensus needed for major policy

change and openness of political system. The openness of political systems is further divided into two sub-dimensions: the number of decision-making venues that any major policy proposal must go through and the accessibility of each venue. They argue that, in general, the higher the degree of consensus required in a political system for any major policy change, the more incentive coalitions have to be inclusive and seek compromise with their adversaries. Coalitions in such systems have an incentive to share information and minimize the "devil shift", leading to a higher likelihood of policy change.[16]

With reference to the openness of a political system, the higher the number of decision making venues, the more open the system is to opponents of the status quo. Coalitions in such systems have more opportunities to become a part of the policy process and pursue their policy goals. Systems where the number of decision making venues is low (for example corporatist systems) tend to be less open to outside players. Following the same logic, coalitions in these systems will have fewer opportunities to get involved in the policy process and pursue policy change. For example, countries like the US with clear separation of powers and strong regional governments have multiple decision making venues built in. Systems like the US also provide multiple institutional bases for alternative venues, such as the bureaucracy, legislature and strong independent

[16] The "devil shift", as conceived within the ACF, is the tendency for actors to view their adversaries as less trustworthy, more evil, and more powerful than they actually are.

courts, creating an open policy environment with multiple opportunities for actors to get involved. In contrast, parliamentary systems like Britain that lack clear separation of powers between the executive and legislative branches of government have fewer decision making venues built in. As a result, such systems provide fewer opportunities for coalitions to get involved. In addition to the number of decision making venues, it matters how accessible these venues are. For instance, pluralist systems like the US have multiple decision making venues, which are also accessible to different political actors and interest groups. On the other hand, unitary systems with corporatist traits have centralized decision making structures, which lead to fewer decision making venues that are not easily accessible.

How do openness and norms of consensus relate to policy change? This chapter is dedicated to answering this question and exploring the relationship between COS and policy change. Having described the dimensions of COS in the previous chapter as well as in the section above, I move on to understanding what these concepts mean and how they might play out in a policy scenario. Doing so will provide the necessary substance to the theoretical explanations posed above, and also help visualize how these dynamics would function. The significance of COS in the overall framework is clear: it boosts the applicability of the framework to different types of political systems and translates the relatively stable parameters into more specific constraints and resources influencing policymaking both in the short and long term (Sabatier and Weible 2007).

Building upon this addition, I attempt to offer some clarity to the key concepts that make-up these opportunity structures. For instance, how should the concepts of openness, accessibility, and consensus be defined, measured, and operationalized? Sabatier and Weible (2007) offer brief explanations of what the dimensions of COS are and how they might influence the policy process. The remainder of this section adds to their explanations by using the example of a revisionist coalition—a coalition that exists with the purpose of challenging the status quo—and how it will function in different opportunity structures.

Revisionist coalitions, once a part of a policy subsystem, are driven by their pursuit of policy change. In order to achieve this change, some revisionist coalitions are aided by the existing rules and norms of consensus in place. At other times, revisionist coalitions find themselves stranded without the help of existing institutional pathways that might help them make their case for policy change. In the former case, where rules and norms exist as possible enablers for revisionist coalitions, these coalitions can choose to use these opportunities to their advantage. For instance, systems requiring a high degree of consensus for major policy change provide revisionist coalitions with the ability to disrupt the implementation of the status quo. For example, countries like Switzerland with strong norms of consensus value the opinions of the minority and regularly employ direct democracy measures like referendums as a means of political decision making. In such systems, revisionist coalitions will generally have more opportunities to voice their opposition and get involved in the policy process. This

is apparent in Switzerland's history of neutrality, strong welfare state characteristics, and stress on direct democracy (Daalder 1971). In contrast, countries like Pakistan with strong authoritarian traits and low norms of consensus provide fewer opportunities for revisionist coalitions to voice their opposition in the political arena. Moreover, the range of the degree of consensus varies substantially across countries ranging from 1) less than a majority (in non-democratic countries and strong centralized systems like Pakistan and France; 2) a bare majority (in Westminster systems like the UK and New Zealand; 3) a supermajority (in separation-of-power systems like the US); and 4) to a consensus (in systems with strong cultural norms of consensus like Switzerland, Austria and the Netherlands) (Sabatier and Weible 2007). It is important to remember that as with any other institutional/structural argument, these rules and norms only provide revisionist coalitions with an opportunity to impact the policy process. The final outcome is still dependent on their actions and willingness to use these opportunities.

Using the norms of consensus as a built in opportunity, we can now look at a real world example to understand how revisionist coalitions might use these established norms. As specified above, the US falls in the middle of the range of the degree of consensus required, which can be employed by coalitions opposed to the status quo. For example, the siting of the proposed Yucca Mountain Nuclear Waste Repository in Nevada was disrupted when strong political players and some revisionist groups (including state actors such as the senator Harry Reid

and state Attorney General Catherine Masto; and advocacy groups like the Nuclear Energy Institute) entered the subsystem with the goal of disrupting the implementation of the status quo. The status quo, which was established by the passing of the 1987 Nuclear Waste Policy Act, clearly designated Yucca Mountain as the only option to be considered for the siting of the high level waste repository. This consideration was delayed and the status quo disrupted when the revisionist coalitions chose to use the opportunity structures in place to oppose the status quo. In addition to the norms of consensus in place, these coalitions also took advantage of the openness of the American system and the accessibility of various venues like the judicial system and the regulatory agencies. The US, with its strong pluralist traits, is an example of an open system with accessible venues that can enable revisionist coalitions in their pursuit of policy change. In contrast, countries like China, with its highly closed-off centralized decision making and weak norms of consensus are example of closed systems with very few opportunities for revisionist coalitions to become involved in the policy process. Again, the US is a good example of a political system with "rich" COS, whereas China is an example of a system with "sparse" COS.

Taking the two dimensions of COS as specified by Sabatier and Weible (2007), the goal in this chapter is to provide some analytical clarity and to test the propositions about how norms of consensus and openness influence policy change. In general, building upon their work, I argue that open political systems with a higher number of accessible decision-making venues and a high degree of

consensus required for policy change will be more susceptible to such changes. More specifically, the following hypotheses will hold:

H_1: Political systems characterized by a higher number of decision-making venues are more likely to experience policy change.

H_2: Political systems characterized by a higher degree of accessibility are more likely to experience policy change.

H_3: Political systems characterized requiring higher degrees of consensus are more likely to experience policy change.

The remainder of this chapter uses the issue of nuclear facility siting to test these hypotheses.

3.3. Research Design, Variable Operationalization and Data Collection

As conceptualized in this dissertation, the siting of a nuclear facility is a long-term policy process, which includes a problem (whether nuclear facilities are beneficial/necessary), different policy options (what is the best way to site these facilities), policy decisions (laws, rules, and regulations attached to facility siting), and policy implementation (agencies and authorities in charge of implementing the policy decisions). This chapter theorizes that the broad national opportunity structures enable or constrict the ability of actors to bring about policy change by challenging and perhaps overturning the policy status quo. In this instance, for example, the status quo is established when a particular piece of land is officially designated for future use as a nuclear facility. In some cases this status quo is

disrupted and plans to site the facility are cancelled. Instances where the status quo is overturned are termed as cases that experience policy change. On the other hand, cases where the status quo remains in place and the site become operational as intended never experience policy change. The question raised in this chapter is about the relationship between a country's built in COS and policy change. Do COS influence whether some cases of nuclear facility siting experience policy change whereas others do not? The issue of nuclear facility siting is an important one because siting efforts have been attempted in many different political systems, which provide the necessary variation on the independent variable—COS. Also, this issue has a unique ability to speak to other cases of LULUs more generally, which increases the ability of this dissertation to generalize beyond nuclear energy.

3.3.1. Variables and Measures

3.3.1.1. Policy Change

The dependent variable for the analysis in this chapter is policy change. To measure it, this chapter uses an original dataset comprising 269 cases of proposed nuclear facilities that result in one of two policy outcomes: an operational facility or a cancelled one. In cases that resulted in a cancelled facility, policy change took place. In other cases where the facility became operational, the initial policy decision was upheld, thereby maintaining the established status quo. This variable is operationalized as a dichotomous variable with a 0 for siting efforts where the status quo was maintained and the facility

became operational and a 1 for cases with cancelled facilities (policy change took place). These codes represent the status of a facility at the time of the final decision to either cancel the facility or when the facility reaches criticality (in case of nuclear power plants) or begins accepting used nuclear fuel (in case of nuclear repositories).

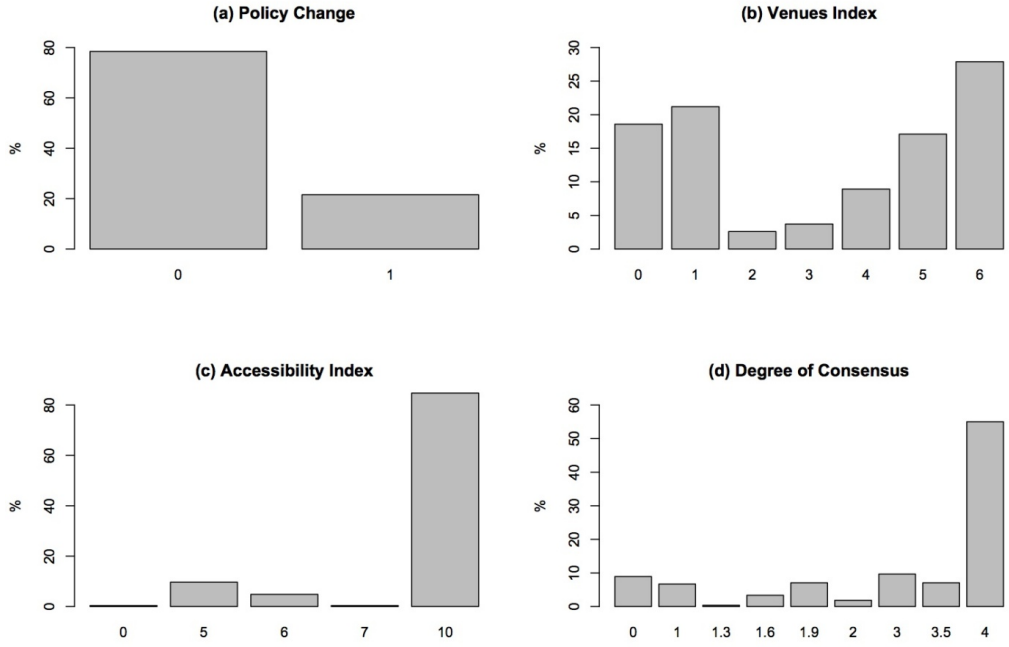
By framing the cases in this dichotomous way, a "delay" in siting is considered a continuation of the status quo. The final outcome of interest here is policy change, which (under this coding scheme) can only be ascertained once the siting process has come to an end. The siting process can end in one of two ways—continuation of the status quo where the site becomes operational, and cancellation of the status quo where the site never opens. To be included in the database, a case has to fall into one of the two categories—cancelled or operational. Some facilities remain at a standstill for decades without being formally cancelled or becoming operational. Such cases that are delayed but were never cancelled or never opened (for example the Yucca Mountain repository) are not included in this database.

Table 3.1: Descriptive Statistics

Variable	Min	Max	Mean	SD
Policy Change	0	1	0.22	0.41
Number of Venues Index	0	6	3.26	2.40
Accessibility of Venues Index	1	10	9.28	1.76
Degree of Consensus Required	0	4	3.03	1.35
Time	0 (1956)	56 (2012)	23.15	10.4
Crisis Events	0	1	0.24	0.43

As Table 3.1 and Figure 3.1 illustrate, approximately 20 percent of cases in the database experienced policy change. In these cases, the designated site for construction of a nuclear facility was cancelled before it became operational. In the remainder of the cases (about 80 percent), the status quo was maintained and the site became operational as intended.

Figure 3.1: Descriptive Statistics



3.3.1.2. Opportunity Structures

3.3.1.2.1. Relative Openness of a Political System

According to the ACF, the relative openness of a political system can be defined along two sub-dimensions—(a) the number of decision making venues that policy proposals must go through and (b) the accessibility of those venues.

These concepts have been described in more detail in the theoretical section of this chapter and in the previous chapter. The primary goal in this section is to describe how I measure these concepts.

To measure the former (number of venues), this analysis uses an additive index based on the following institutional characteristics, which (from low to high) specify the availability of decision making venues at the time of the siting decision: strength of federalism, strength of bicameralism, executive-legislative separation of power and regulatory insulation/independence. This measure was recorded at the end of the siting decision, in the year when the final decision was made. This constitutes the year that the site became operational or the year that the site was formally cancelled. The measures in this category are not prone to short term changes, other than in cases that experienced a major regime change. To keep the analytical logic simple and uniform, I chose to record the measures at the point in time when a final decision was made either to cancel the facility or when it reached criticality. Strength of federalism and strength of bicameralism were coded according to the data and procedures outlined in the Comparative Political Dataset compiled by Armingeon, Weisstanner, Engler, Potolidis, and Gerber (CPDS I).[17] Strength of federalism is assessed according to three categories, where 0 = no federalism, 1 = weak federalism, and 2 = strong federalism. Strength of bicameralism is also measured according to three

[17] For data and more information, see: http://www.nsd.uib.no/macrodataguide/set.html?id=6&sub=1.

categories, where 0 = no or very weak second chamber, 1 = weak separate chamber, and 2 = strong second chamber. Executive-legislative separation of power is also measured as a dichotomy, where 0 = no or little separation of power (as in parliamentary systems of government) and 1 = strong separation of power (as in presidential systems). Last but not least, regulatory independence is measured as a dichotomy, where 1 demarcates the existence of an independent agency exclusively charged with regulating the nuclear industry (like the US Nuclear Regulatory Commission (NRC), which began operations in 1975) and 0 indicates the absence of an independent regulator or the existence of a regulatory agency that is organizationally subordinate to the agency responsible for developing, managing, and/or promoting nuclear energy in the country (like the US Atomic Energy Commission, which regulated the industry prior to the NRC). When these items are summed, we get a "number of venues" index that ranges from 0 (few venues) to 6 (many venues). Again, as reflected in Table 3.1 and Figure 3.1, this index has a mean of 3.26 indicating ample variation across the cases with a majority of the cases occupying the two ends of the scale.

For the second sub-dimension (accessibility of decision making venues) this chapter employs an index of public participation within a political system. This index is created using two scales of public participation: a) the competitiveness of participation and b) the regulation of participation. Both of these variables were coded according to the data and procedures outlined in the Polity IV 2012 Database founded by Robert Gurr and supported by the Political

Instability Task Force, Societal-Systems Research Inc, and Center for Systemic Peace.[18] The competitiveness of participation gauges the extent to which individuals have the ability to pursue alternative preferences for policy and leadership within the political arena. Coded on a five point scale, the measure ranges from 1 (repressed polities where no significant opposition activity is permitted outside the ruling party); 2 (suppressed polities where some political competition occurs but is sharply limited to exclude substantial groups of people); 3 (factional polities with parochial or ethnic-based political factions that regularly compete for political influence in order to promote particularistic agendas); 4 (transitional polities that are open to competing interests and where sectarian and secular groups coexist); and 5 (competitive polities where secular political groups regularly compete at the national level and transfer of power is regular and voluntary).

The regulation of participation refers to the existence of rules about when and how political preferences can be expressed. All political systems regulate participation in different ways and to different degrees. This variable captures the opportunities (or lack thereof) that actors and coalitions might have to participate in the policy process. The Polity IV database scores countries on a five point scale ranging from 1 (unregulated systems where political participation is fluid with no systematic regime controls on political activity but the number and relative

[18] For data and more information about the Polity IV project can be found here: http://www.systemicpeace.org/polity/polity4.htm

importance of such groups in national political life varies substantially over time); 2 (multiple identity systems with relatively stable and enduring political groups that compete at the national level); 3 (sectarian systems where political groups are based on restricted membership and significant portions of the population historically have been excluded from access to positions of power); 4 (restricted systems where some organized participation is allowed but significant groups and issues are regularly excluded from the political process); and 5 (regulated systems where stable and enduring groups regularly compete for political influence with little use of coercion. No significant groups or issues are excluded from the political process in these systems).

Combining these two variables—competitiveness of participation and regulation of participation—generates an "accessibility index" that ranges from 1 (low accessibility) to 10 (high accessibility). If the theoretical logic and the hypotheses posed are correct, countries with a high accessibility score will be more likely to experience policy change than countries with a low accessibility score. This is because more accessibility creates venues that can be used by opponents of the status quo, giving them opportunities to change the policy decision to site the facility. Low accessibility, on the other hand, reflects a general lack of available venues and opportunities to challenge the status quo and bring about policy change.

3.3.1.2.2. Degree of Consensus Needed for Policy Change

The degree of consensus required for policy change varies across countries, subsystems and time. Due in part to the difficulties and controversies associated with measuring norms of consensus at the national level (see Lijphart 1999), and the general lack of relevant information regarding such variables for some cases (example, those in post-USSR countries and East Germany), this chapter employs a broad-ranging measure that closely mirrors the theoretical explanation provided by Sabatier and Weible (2007). In its description of this sub-dimension of COS, the ACF argues that strong norms of consensus provide added incentives for coalitions to be more open and for actors to reconcile, thus increasing the likelihood of policy change. On the other hand, political systems with weak/no norms of consensus lack such incentive, therefore making policy change more difficult without the consent of those in power.

To operationalize the degree of consensus dimension, this chapter uses a measure of constitutional rigidity, coded according to the data and procedures outlined by Lijphart (1999). Simply put, this measure captures the degree of consensus required for amending the constitution.[19] Countries are scored on a scale ranging from 0 to 4, based on the level of difficulty in place to amend the constitution. Non-democratic countries with no constitution and/or method for amendments receive a 0. Countries at this end of the scale with a score of 0 reflect

[19] Note that the original measure focused exclusively on democracies so the scale used here was expanded to include the non-democracies in the dataset.

the least formalized requirements for consensus before amendments can be adopted. Countries requiring an ordinary majority for passing constitutional amendment receive a 1; those requiring more than an ordinary but less than two-thirds majority or ordinary majority plus referendum receive a 2; those requiring a two-thirds majority or equivalent get a 3; and finally those requiring more than a two-thirds vote get a 4. Countries at this end of the scale with a score of 4 reflect the most extensive formalized rules of consensus that have to be met before amendments can be adopted. This measure is a proxy for the norms of consensus in a political system. So countries with strict formalized rules required to amend the constitution reflect the existence of high degrees of consensus required for policy change. Countries with no formalized rules in place to amend the constitution do not require high degrees of consensus for other policy changes either. Table 3.1 and Figure 3.1 include some descriptive information about this variable.

If the theoretical logic and the hypotheses posed are correct, countries scoring low on the constitutional rigidity scale will be less likely to experience policy change than countries scoring high on the scale. This is because countries with lower degrees of consensus required are more likely to be able to maintain the status quo than countries with a higher degree of consensus required, where numerous opponents to the status quo can get involved and attempt to change the policy.

3.3.1.3. Control Variables

In addition to COS, the ACF posits another major driver of policy change—external subsystem events. It argues that external system events can alter the available resources and level of influence a coalition has compared to its opponents, thereby affecting the likelihood of policy change. Depending on the nature of the event, it may make change less or more likely. To account for this, this analysis incorporates two important control variables that are of direct relevance to nuclear facility siting cases, to ensure robust findings: linear time and proximity to major nuclear crisis events.

Controlling for time neutralizes any effects suffered due to the huge range of years and cases incorporated into the dataset. Over time, nuclear energy has become more common and more countries have decided to use it as a source of electricity. As a result, more people have become exposed to the issue of nuclear energy and its associated risks, which have contributed to growing public opinion against it. Finally, the cumulative effect of nuclear power plant accidents, both big and small, have added to the public's general distrust towards nuclear energy. The dataset used in this analysis includes cases ranging from 1956 to 2012, and this control measure will ensure that any impact of time in and of itself does not bias the results.

Additionally, the analysis controls for three major crisis events that have impacted the nuclear energy industry—the Three Mile Island accident, the Chernobyl disaster, and most recently the Fukushima disaster. The Three Mile

Island accident was a partial nuclear meltdown that occurred in one of the two reactors at Three Mile Island power plant in the US in 1979. It is arguably the worst accident in the US commercial nuclear power plant history.[20] The Chernobyl disaster was a nuclear accident that occurred in 1986 at the Chernobyl Nuclear power plant in Ukraine (then USSR). Fire and an explosion resulted in the release of large quantities of radioactive particles into the atmosphere. It is widely considered to be the worst nuclear accident in global history (Medvedev 1992). Finally, and most recently, the Fukushima disaster occurred in 2011 at the Fukushima Daiichi power plant in Japan. Triggered by a tsunami, the accident caused equipment failures, nuclear meltdowns, and the release of radioactive materials into sea water. It is considered to be the biggest nuclear catastrophe since the Chernobyl disaster (Wittneben 2012).

Crisis events or "focusing" events as they are often referred to in the policy literature can fundamentally alter subsystem dynamics to bring about policy change (Baumgartner and Jones 1991; Birkland 1997; Nohrstedt and Weible 2010; Nohrstedt 2005). A negative policy image arising from a crisis event can lead to increased attention towards the policy issue and act as an aid to opponents who are seeking to alter the status quo (Baumgartner and Jones 1991). Accidents such as those listed above focus public attention on the costs, safety, risks, and nuclear waste issues associated with nuclear energy (Birkland 1997).

[20] For more on the Three Mile Island accident, see http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html (last accessed on 10/18/2013).

Additionally, crisis events are external shocks that can often open up windows for revisionist coalitions and increase their ability to access new resources and appeal to new institutional venues (Nohrstedt and Weible 2010; Nohrstedt 2008, 2013). These resources often come in the form of increased political attention towards the issue, bringing the nuclear issue to the national agenda, and creating the need for congressional hearings and political debate more generally. More resources and an ability to mobilize the masses can be crucial in changing the balance of power in the favor of revisionist coalition, ultimately making policy change more likely.

To control for these effects, each case was coded as having been proximate to a major nuclear event if the siting decision was made within 3 years following the TMI, Chernobyl or Fukushima events. The decision to code for proximity within 3 years of these crises was a result of a separate analysis where I tested for alternative time lags following the major nuclear events, ranging from one year to ten years. The best model fit was obtained with the three year lag, and therefore we used the three year window to code the cases for proximity to a nuclear event. This is an important finding in and of itself because although scholars have studied the relationship between crisis events/external shocks/focusing events and policy change, the ACF is largely silent about the period of time over which crises advantage one coalition over another. The findings from this empirical data and time lag analysis indicate that the span for nuclear facility siting is about 3 years. This means that following a major crisis

event in the nuclear facility siting industry, the most potent "window of opportunity" for revisionist coalitions to influence the policy process is about 3 years. This is corroborating evidence for the "window of opportunity" that results from crises, providing insight into how these events can impact policy change (Kingdon 1984). This lag could be different for other issues of course, which is something to keep in mind.

3.3.2. Data Collection

To develop the data for this analysis, I compiled a nearly exhaustive list of 269 cases, combining operational, decommissioned, and cancelled nuclear facility sites from the United States and 29 other countries (See Appendix 1 for a complete listing of cases). My interest in final political outcomes (policy change or maintenance of status quo) required that I exclude sites that are still being considered. The dataset does not include, for example, the proposed Yucca Mountain repository site because the Obama Administration's action to withdraw the license application to the NRC is still under legal review. The reasons for this decision have been described in more detail in the previous section.

Note that due to information gaps, efforts to formulate a complete list of nuclear facilities proved to be quite challenging, especially for sites outside the United States and in the earlier years of nuclear development. The difficulty in finding accurate data is particularly acute for cancelled, non-US sites (nuclear facilities that were firmly proposed by the governments but never became operational). Nevertheless, the list of cases compiled for this project covers a

majority of the known operational, decommissioned, and cancelled nuclear fuel cycle facilities from the United States and globally. I realize that there may be some cases of siting efforts that were cancelled but never became publically known or covered in the media, which makes them hard to find. Also, the database excludes cases from present day Russia, North Korea, China, and Iran. This decision was primarily driven by the lack of availability of accurate data from these countries.

The population of cases for this analysis was compiled using a three-step process. In the first step, a number of sources were used to compile a list of operational and decommissioned plants. For the US, the primary source was the NRC website. For international cases, the primary source of information on operational and decommissioned plants was the Power Reactor Information System (PRIS), which is developed and maintained by the International Atomic Energy Agency (IAEA). In the second step, a list of cancelled facilities was compiled using country reports produced by the World Nuclear Association and the list of cancelled sites mentioned in a recent report by the Nuclear Energy Institute (NEI 2011). In the third step, I comprehensively searched the Internet, newspaper archives, and academic literature (journal articles and books) for additional mentions of cancelled nuclear facilities.

The dataset includes a total of 115 US facility-siting efforts, and 154 international facility-siting efforts (excluding Russia, China, North Korea, and Iran due to the lack of access to relevant information). I understand that these

cases will be systematically different from the other cases because of the nature of the COS present in these countries. This limits to some extent the ability of the findings to speak to these cases, but countries similar to Russia, China, North Korea, and Iran in the database (for example, Pakistan, South Korea during its authoritarian rule, and former USSR countries like Ukraine) will provide some basis for predicting how cases from these countries would fare. Of the 115 US observations, 78 are currently operational (or now decommissioned but once operational) facilities and 37 are siting efforts that were cancelled before they could become operational. Of the 154 international observations, 133 are currently operational or now decommissioned but once operational facilities, and 21 are siting efforts that were cancelled before becoming operational. A listing of the number of proposed facilities for which data were available, and the percentage of the identified facilities that experienced policy change, is shown in Table 3.2. Again, policy change as conceptualized in this dissertation occurs when a pre-designated site fails to become an operational nuclear facility. Alternatively, status quo is upheld any time a siting effort is completed and the facility becomes operable. As you can see in the table below (Table 3.2), the percentage of cases that experienced policy change is much higher in the US—about 32. This is offset by the lower percentage of cases for which policy changed in international cases.

Table 3.2: Percentage of Policy Change of Proposed Facilities by Country

Country	Total Cases	Percent Policy Change
United States	115	32.2
France	24	8.3
Germany	22	18.2
Japan	19	10.5
United Kingdom	16	12.5
Spain	10	30.0
India	7	14.3
Switzerland	6	33.3
Canada	5	0
Italy	5	20.0
Sweden	5	20.0
USSR	7	0
Other	28	10.7

3.4. Analytical Procedure and Findings

In order to test H_1, H_2, and H_3, I estimate a set of logistic regression models that predict the outcomes of nuclear facility siting efforts (whether policy change occurs or not) as a function of the coalition opportunity structures surrounding each case. More specifically, the first model tests H_1 by predicting policy change as a function of the venue index explained above; the second model tests H_2 by regressing policy change on the accessibility index; and the third model tests H_3 by modeling the impact of the degree of consensus required on policy change.[21] Then, I run a fourth model that estimates the impact of each

[21] In separate models, I modeled within country (rather than between country) variation by including fixed country effects in the models. The results were largely similar, so I chose to present the more parsimonious models.

structure when accounting for the other structures. All four models include controls for time and crisis events.

Table 3.3 and Figure 3.2 summarize and illustrate the estimates derived from these models and (in so doing) provide support for the three hypotheses. Beginning with the openness of a political system, the results indicate that there is a positive and statistically significant relationship between the venues index and policy change (i.e. the likelihood that a nuclear facility siting effort will be cancelled before the facility becomes operational). When venues or access points are relatively sparse (X = 0), the predicted probability that policy change will occur is 0.05[22]; when venues are myriad (X = 6), the probability increases to 0.27. This finding is consistent with H_1, which posits that policy change is more likely to occur in open systems characterized by a larger number of decision-making venues. The finding is indicative of the argument that the more points of decision-making exist, the more likely it is that actors and coalitions can get involved and topple the status quo and bring about policy change. This finding is consistent when accounting for all the other variables in the model, including the accessibility index, the degree of consensus required and the control measures (time and crisis events).

[22] Predicted probabilities and 90% confidence intervals (in brackets) were calculated using the simulation procedures outlined in King, Tomz, and Wittenberg (2000) and Gelman and Hill (2007).

Table 3.3: Logistic Regression Models Predicting Policy Change

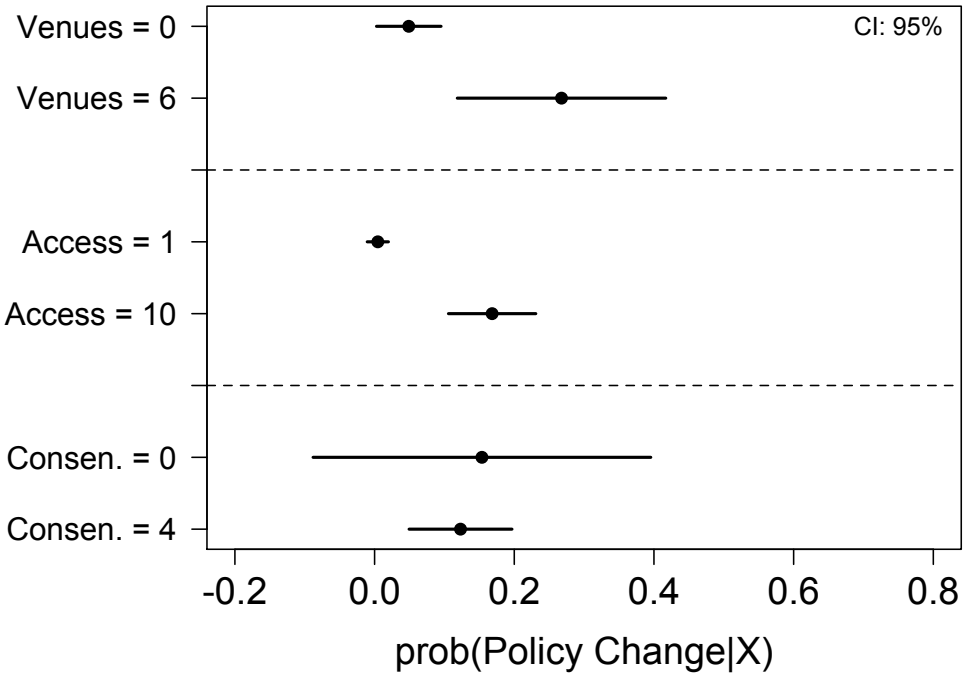
	Model 1	Model 2	Model 3	Model 4
Openness of Political System				
Number of Venues Index	0.376*** (0.083)	--	--	0.327** (0.126)
Accessibility Index	--	0.569** (0.179)	--	0.419* (0.190)
Degree of Consensus Needed for Policy Change				
Constitutional Rigidity	--	--	0.644*** (0.184)	-0.064 (0.293)
Control Variables				
Crisis	0.718* (0.357)	1.011** (0.350)	0.947** (0.351)	0.813* (0.367)
Time	0.090*** (0.019)	0.086*** (0.018)	0.076*** (0.018)	0.100*** (0.020)
Intercept	-5.253*** (0.730)	-9.239*** (1.968)	-5.652*** (0.885)	-9.163*** (2.060)
P	0.000	0.000	0.000	0.000
Log-likelihood	-109.898	-113.900	-113.918	-106.686
Deviance	219.796	227.800	227.835	213.372
AIC	227.796	235.800	235.835	225.372
BIC	242.175	250.179	250.214	246.940
N	269	269	269	269

Notes: Standard errors in parentheses; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

The findings also indicate that accessibility (as indicated by the competitiveness and regulation of political participation in a country) has a positive and statistically significant relationship with policy change. This finding is consistent with H_2, which infers that policy change is more likely to occur in systems that are more accessible. When the points of accessibility are low (X=1), the likelihood that policy change will occur is less that 0.01; when accessibility is at its highest (X=10), the likelihood of policy change goes increases to 0.17. This

finding provides support for the idea that openness is a combination of the number of venue points a policy must pass through *and* how accessible those (and other) venues are. A system where accessibility is limited does not provide coalitions the ability to pursue policy change. It is also important to note that this relationship was consistent when accounting for the other independent variables in the model as well as the control measures.

Figure 3.2: Predicted Probability of Policy Change



In contrast to the openness of a political system, the relationship between the degree of consensus required for policy change (as measured by the relative constitutional rigidity of a country) and policy change is not clearly defined.

While on its own, the variable has a positive and statistically significant relationship with policy change, this relationship does not hold when accounting for the effects of the openness of the system. As seen in Table 3.3 and results from Model 4, the degree of consensus required for policy change is not significantly related to the likelihood of whether a nuclear facility becomes operational or not. Among other things, this null finding could be due to the crude nature of this measure.

Finally, the relationship between both control measures (time and crisis events) and policy change is positive and statistically significant, reflecting the notion that external events and long term changes in the global nuclear domain have made it more difficult to site new facilities. Beginning with time, for example, the predicted probability of policy change in 1956 is 0.015, in 1984 is 0.19, and in 2012 is 0.80. These figures, in tandem with the coefficient from the combined logit model in Table 3.3 illustrate the increasing likelihood of policy change over time. Similarly, with reference to crisis events, the predicted probability of policy change when proximity to crisis is 0 (not within 3 years of a crisis event) is 0.11 and when proximity to crisis is 1 (within 3 years of a crisis event) is 0.22, indicating that the likelihood of policy change is higher in the aftermath of a crisis.[23]

[23] Note: In alternative model specifications, I explored the possibility that time and crisis might interact with openness and consensus to influence policy change.

3.5. Conclusions

In Chapter 2 I explained the theoretical basis for this dissertation and outlined three sets of hypotheses. This chapter was motivated by a simple yet critical question: how does the nature of the COS influence the likelihood of policy change? To answer this question, I proceeded to test three separate hypotheses, each derived from the dimensions of COS put forth within the ACF. As illustrated by the analysis, I found tentative support for all the hypotheses. Both sub-dimensions of openness—the number of decision making venues and the accessibility of those venues—have a positive and statistically significant relationship with policy change. As the number of decision making venues increases, the likelihood of policy change goes up. Similarly, the more accessible these venues are, the more likely policy change is. In contrast, the relationship between the degree of consensus required and policy change is less clear. When policy change is estimated as a function of the degree of consensus alone (controlling for time and crisis events), the two have a statistically significant relationship. However, in Model 4, incorporating the dimensions of openness of a political system dissipates that relationship. One reason for this could be the crude nature of the measure; constitutional rigidity might not be capturing the norms of consensus sufficiently. The next chapter will explore a more nuanced way to

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However, these interactions did not improve model fit and they were not statistically significant.

operationalize the degree of consensus required, which will shed more light on how this variable might influence the policy process.

A few important implications can be drawn from these results. First, and perhaps the broadest is the insight gained into the non-stochastic elements of the policy process. Simply put, the findings in this chapter suggest that the structural forces within which policymakers operate influence some portion of the policy process. This is an important and relevant finding, especially when trying to make sense of seemingly random policy outcomes that occur in domains like nuclear energy. However, this is not a novel finding, and several scholars have studied the relationship between structural features of the policy context and corresponding policy outcomes. What is new are the specific results of the hypotheses tests. In other words, what influence do structural features in different political systems have on policy outcomes? The answer to this question leads us into the second set of implications to be drawn from this chapter.

Given the findings presented here, it is important to ask what it means for countries to have certain COS in place—how do these structures impact their policy process and the ability of actors to attempt to pursue policy change. An interpretation of the findings reveals some trends for countries depending on the nature of the COS in place, which in turn has important implications for the likelihood of policy change. Countries like the US, with rich COS (defined by the large number of venues, high accessibility of those venues, and the high degree of consensus required for policy change), provide numerous access points to

opponents of the status quo, making policy change more likely. This means that siting efforts within the US will face strong opposition and have a higher likelihood of being cancelled than efforts in countries with sparse COS (defined by a small number of decision making venues, low accessibility of those venues, and the low degree of consensus required for policy change). The latter, because of the lack of available opportunities, does not experience policy change as often. This is not to say that status quo cannot be sustained in countries with rich COS (US is a good example with the largest number of operational nuclear power plants in the world), or that countries with sparse COS will never experience policy change. The gist of the argument, which is largely supported by the analysis presented here, is that the COS built into a political system provide a baseline access to opponents of the status quo, either increasing or limiting their ability to pursue policy change.

Related to this, the third implication speaks to the real-world global problems of the future of nuclear energy and how best to deal with used nuclear fuel (UNF). Growing demand for energy, coupled with concern for climate change and the dearth of non-renewable energy sources have driven countries like Australia, Jordan, South Africa and Turkey to consider nuclear energy as a viable solution. Similarly, countries like Sweden, Finland, Canada and the US are in the midst of planning and implementing deep geological repositories as a solution to the UNF issue. These actions require the siting of new nuclear facilities, and this chapter sheds light on the baseline factors that will influence these processes.

Fourth, the external validity of these findings is important to discuss—do these findings on nuclear facility siting apply to other types of policy issues? The findings presented here certainly have some bearing on the issue of LULUs more generally, providing important insight into the siting of contentious facilities such as prisons, landfills, and airports. Generally speaking, this chapter provides insight into how structural features of a political system can provide a baseline on what is possible for coalitions to do in the midst of collective action problems. Given the number of venues built into a system and their accessibility, coalitions have an option to try and impact policy change. Additionally, the norms of consensus within a system also enable or constrict coalitions from attempting to change the status quo. The model developed in this chapter applies well to situations similar to nuclear facility siting, where risk perceptions are heightened and individuals have an incentive to become a part of the policy process. Issue areas where this incentive is missing may not be as easily studied using this model. This is something that requires further research. For instance, do COS have varying influence depending upon the kind of issue at hand? Are they more consequential for some issues than others? I plan to pursue this in the future.

The final implication is most directly relevant to this dissertation and the ACF; findings from this chapter speak to the growing literature on COS and the role they play in the policy process. Building upon the detailed case studies (Kübler 2001) and the more general hypothesis listing (Sotirov and Memmler 2012), this chapter analyzes data to demonstrate how these opportunity structures

influence policy change. This was established through empirical testing of theoretically derived hypotheses, which will be valuable as we continue to understand and build upon this concept. Countries like the US, with its numerous venues and high accessibility, would imply that nuclear facilities would be extremely difficult to site. Despite all the roadblocks, the US has successfully sited multiple nuclear facilities. Understanding this paradox requires us to break open the black box of this relationship and ask: how do COS influence policy change? What happens in the midst of this relationship? To further understand these complex dynamics, the next two chapters focus on the two of the mechanisms through which COS affect policy change—coalition formation and behavior.

Chapter 4: Coalition Opportunity Structures and the Formation of Revisionist Coalitions

4.1. Introduction

In the previous chapter, I explored the relationship between COS and policy change. My findings indicate that opportunity structures do, indeed, influence policy change. However, the mechanisms that connect opportunity structures and policy change (or a lack thereof) remain unexamined. What specifically, do COS do to increase or decrease the likelihood of policy change in a given subsystem? Chapters 4 and 5 seek to answer this question by analyzing the relationship between COS and two potentially significant intervening mechanisms—coalition formation and behavior. The former is explored in this chapter and the latter in Chapter 5.

Coalition formation is an important link to understanding the policy process and policy change within the ACF. Studies have shown that in the battle for policy change, some subsystems are dominated by single coalitions that are able to translate their beliefs into policy with relative ease. Other subsystems are inhabited by multiple coalitions fueled by competing belief systems (Weible, Sabatier, and McQueen 2009). In such instances, the hegemonic coalitions that once dominated a subsystem (and enacted the policies they preferred) face varying degrees of pressure from revisionist coalitions keen on disrupting the status quo—when the latter are successful, policy change occurs. In the nuclear siting domain, for example, some subsystems are controlled by hegemonic

coalitions that establish the status quo by instituting a policy decision to build a facility. Other subsystems, in contrast, are inhabited by one or more rival coalitions that constantly challenge the status quo by attempting to overturn the decision to site the facility.

Why do revisionist coalitions form in some subsystems and not others? To answer this question, this chapter focuses upon COS, arguing that relatively stable political institutions (i.e., basic constitutional structures) create opportunity structures that incentivize or disincentivize and (by extension) explain individual decisions to form coalitions that challenge the status quo in a given subsystem. When it is relatively easy to enter (access) the subsystem and the potential benefits of doing so are high, the likelihood that a revisionist coalition will emerge is relatively high. When barriers to entry are high and potential benefits are low, the probability that a coalition will emerge that challenges the status quo is significantly lower. To test this proposition, this chapter systematically analyzes the COS surrounding 50 nuclear facilities in 13 democratic countries around the world. The analysis reveals tentative support for the hypotheses and (in so doing), further empirical support for the oft theorized but empirically untested notion that COS impact the policymaking process.

4.2. Theoretical Framework

Advocacy coalitions are an integral part of the ACF. They are comprised of a multitude of actors from "public and private organizations who are actively concerned with a policy problem" (Sabatier 1988, p. 131). Held together by a

shared set of belief systems, these actors engage in non-trivial degrees of coordination to pursue common policy goals. Over the years, considerable attention has been paid to the structure, content, stability, and evolution of belief systems held by coalition members (Sabatier and Jenkins-Smith 1993). The majority of research on coalitions has focused on the study of coordination and collaboration within networks, belief stability, and change within coalitions (Ingold 2011; H. C. Jenkins-Smith, Clair, and Woods 1991; Lubell, Henry, and McCoy 2010; Matti and Sandström 2011; Pierce 2011; Weible and Sabatier 2005; Weible 2005; Zafonte and Sabatier 1998). While significant, this literature says relatively little about why, how, and when coalitions are likely to form in the first place (Weible and Nohrstedt 2012).

This is an important omission because in the face of important societal problems, actors who seek to form coalitions are required to initiate and sustain coordination internally, often without the existence of clear hierarchy and rules (S. G. Tarrow 1994). This is usually accompanied by high costs of coordination, the potential benefits of which remain uncertain. For example, in the nuclear energy domain, some communities are faced with a policy decision to site a facility without a process that registers their consent. In such a scenario, some actors in that community may want to oppose the decision but may lack the resources and collective motivation to initiate and sustain the coordination and effort required to do so. Even if they come together to seek policy change, there is no guarantee that they will succeed. In some cases, this may mean that the policy

decision goes unchallenged. In other cases, interested groups, local communities, and other stakeholders come together and form a "revisionist" coalition designed to oppose the siting decision.[24] With these collective action problems in mind, why do revisionist coalitions arise in some nuclear energy subsystems but not others?

Answering this type of question has beguiled ACF scholars for some time now. In fact, the framework is commonly criticized for its inability to account for how and why actors overcome collective action problems to form advocacy coalitions (Kübler 2001; Schlager 1995). As Schlager (1995) notes, "[F]or a framework significantly oriented to individual behavior, AC raises, but does not satisfactorily address, many behavioral issues. For instance, there is no attempt to account for how actors with similar belief systems overcome collective action problems and cooperate to pursue common strategies and common goals" (p. 246). Responding to this critique, ACF theorists offer three conditions that help explain how individuals overcome collective action problems: (1) similar beliefs among actors reduce transaction costs, (2) actors can choose varying levels of coordination (ranging from weak coordination to strong coordination), and (3) in high conflict situations, the "devil shift" will exacerbate the power and maliciousness of opponents as well as the rising costs of inaction (Sabatier and

[24] As described in Chapters 1, 2, and 3, revisionist coalitions are defined in this dissertation as coalitions that pursue policy change by actively challenging the status quo policy decision.

Weible 2007; Zafonte and Sabatier 1998, p. 197). However, these explanations do not describe how factors like shared beliefs and "devil shift" lead actors to decide whether or not to form coalitions in the first place. Rather, it is assumed that if concerned individuals share common beliefs, and share common adversaries, then they will form a coalition. Also, such explanations are heavily reliant on belief systems and ignore the role played by external parameters and structural characteristics of the subsystem.

To explore the relationship between institutional factors and the policy process, some ACF scholars have stressed the role played by institutions in coalition formation, stability, and behavior over time. They argue that institutions define the parameters around which individuals decide to form coalitions. These institutions also dictate the level of coordination within a coalition and the strategies they can pursue (Fenger and Klok 2001; Nohrstedt 2010; Weible and Nohrstedt 2012; Zafonte and Sabatier 1998). Some scholars have also studied the role of organizational structures (purposive vs. material) on coalition formation and defection (H. C. Jenkins-Smith, Clair, and Woods 1991). However, none of these studies have looked at variations in COS and how that might impact coalition formation. Inspired by this research, this chapter theorizes that COS (as defined in previous chapters), influence coalition formation. They (in addition to other factors, like resource availability) influence the transaction costs and perceived benefits that individuals weigh when deciding whether or not to form (or join) a coalition that challenges the status quo in a given subsystem. When the

barriers to entry (costs) are relatively low (i.e., access is readily achieved) and the potential benefits of coalition formation are high (i.e., there are a relatively large number of potentially sympathetic venues that require consensus and therefore give weight to those who dissent from the status quo decision) the likelihood that individuals and organizations will decide to form (or join) revisionist coalitions will increase. When barriers to entry are high (i.e., access is restricted) and potential benefits are low (i.e., the number of potentially sympathetic venues is relatively small and/or dominated by a select group of people), decisions to form (or join) revisionist coalitions will be significantly less likely. If this is true, then the following hypotheses will hold:

H_1: revisionist coalitions have greater incentives to form and are therefore more likely to emerge in open settings characterized by a high number of decision-making venues

H_2: revisionist coalitions have a greater incentive to form and are therefore more likely to emerge in open settings characterized by a high degree of accessibility

H_3: revisionist coalitions have a greater incentive to form and are therefore more likely to emerge in settings where consensus is a needed (or highly valued) precondition for policy change.

4.3. Research Design, Variable Operationalization and Data Collection

4.3.1. Nuclear Facility Siting

To test these hypotheses, I systematically analyze the subsystem dynamics associated with nuclear facility siting in 13 different democracies. Similar to the last chapter, nuclear siting presents an intriguing opportunity to study the formation of revisionist coalitions for a variety of reasons. First, policymakers around the world have made hundreds of decisions about when and where nuclear power plants and/or storage facilities should be constructed. This provides a large pool of substantively comparable cases from which to draw upon for purposes of quantitative hypothesis testing. Second, this pool of cases provides considerable variation on the dependent variable—in some cases, governmental decisions to site a facility are challenged by revisionist coalitions seeking to derail and project. In other cases, revisionist coalitions fail to emerge and the status quo (i.e., the decision to site the facility) is upheld. Last but not least, the cross-national context within which these decisions are made provides the variation necessary to systematically analyze the impact of political institutions on opportunity structures and, ultimately, coalition formation.

4.3.2. Data

4.3.2.1 Population and Sampling Procedure

The dataset used in this analysis was compiled in two stages. In the first stage, a population database that consists of 269 known nuclear facilities that have been proposed in the US and 31 other countries around the world was

constructed.[25] It includes a total of 115 US cases and 154 international cases. 68% (n = 78) of the facilities proposed in the US are currently or were once operational (now decommissioned), while 32% (n = 37) were cancelled prior to operation. By comparison, 86% (n = 133) of the international cases included in the database became operational and 14% (n = 21) were cancelled prior to operation. The previous chapter used this dataset in its entirety for analyzing the relationship between COS and policy change.

In the second stage of this study, the population database was restricted to democratic countries[26] and 50 cases were randomly selected from this subset to analyze in the sections that follow. The population was restricted to democratic countries because theory (backed by preliminary analysis) suggests that revisionist coalitions are 1) unlikely to form in non-democratic settings, or 2) extremely private in their behavior, which makes them difficult to detect and therefore difficult to study. Random selection was used in order to ensure that the results of the analysis are generalizable to the universe of proposed facilities included in the population database. Every case had an equal opportunity of being selected so there are no a priori reasons to believe that the relationships observed

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[25] I excluded Russia, China, North Korea, and the former Soviet Union due to lack of access to relevant information.

[26] Countries were coded as democratic if they received a score +6 or higher on the -10 to +10 Polity IV scale, which is described here: http://www.systemicpeace.org/polity/polity4.htm.

in this subset of 50 cases are any different than the relationships that might be observed if a different set of cases is selected. As indicated in Table 4.1, this selection procedure yielded cases from 13 different countries.

Table 4.1: Number of Cases by Country

Country	Number of Cases
United States	20
Japan	5
United Kingdom	5
France	5
Germany	3
Italy	3
Sweden	2
Spain	2
Switzerland	1
Finland	1
Austria	1
Belgium	1
Netherlands	1

4.3.3. Variables and Measures

4.3.3.1. Evidence of a Revisionist Coalition

As indicated in the preceding sections, I am interested in the impact of COS on the formation of revisionist coalitions. To measure coalition formation, I amassed and then searched newspaper archives and secondary literature for documentary evidence of at least one revisionist coalition in each of the 50 cases included in the sample. Evidence, in this case, was defined as one or more textual

indicators that a group of actors mounted an organized challenge to the siting decision.[27] The following quotes represent examples of such evidence:

1. Kashiwazaki-Kariwa Nuclear Power Plant (Japan): "Despite… attempts to garner public trust and acceptance, the decision to site new reactors…set off years of struggle and forced MITI to create more sophisticated strategies for handling resistance. By late 1969, declaring that the ground under the site was "as soft as tofu," local high school teachers and others in Kashiwazaki formed an anti-nuclear-power union and demonstrated against the plant. In 1972 anti-nuclear citizens gained a majority on the town council and successfully brought up a referendum that opposed construction" (Aldrich 2008, 129).

2. Atlantic Nuclear Power Plant (US): "Opposition had formed among the beach communities, and the Atlantic County Citizens Council on the Environment had petitioned to intervene. Before the plant could be built, hearings would be held at every level, & the fate of the project depended on the outcome of each hearing" (Janson 1978, 27).

If such evidence was found, the case received a 1 and the formation of a revisionist coalition was assumed; if evidence was not found the case received a 0.[28] Descriptive statistics listed in Table 4.2 illustrate the variation of this variable; revisionist coalitions formed in roughly 50% of the cases.

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[27] I recognize that this is a fairly relaxed indicator of advocacy coalitions, which the ACF defines as groups of actors that 1) share policy beliefs and 2) coordinate their behavior in a nontrivial manner (Sabatier and Weible 2007). However, the large-N nature of this research in addition to inequalities in the availability of information on international cases prohibits the depth of analysis necessary to establish these two conditions in all 50 cases.

[28] In order to ensure inter-coder reliability, two different researchers independently collected data, searched for evidence, and coded each case

Table 4.2: Descriptive Statistics

Variable	Min	Max	Mean	SD
Evidence of a Revisionist Coalition	0	1	0.54	0.50
Number of Venues Index	0	6	3.94	2.62
Accessibility of Venues Index	1	5	4.04	1.58
Evidence of an Engagement Program	0	1	0.50	0.51

4.3.3.2. Opportunity Structures

4.3.3.2.1 Relative Openness of the Political System

Similar to the previous chapter, the relative openness of a political system are defined here along two sub-dimensions—(a) the number of decision making venues that policy proposals must go through and (b) the accessibility of those venues of those venues.

To measure the former (number of venues), I employ the same additive index as Chapter 3, based on the following institutional characteristics that (from low to high) demarcate the proliferation of decision making venues: strength of federalism, strength of bicameralism, executive-legislative separation of power, and regulatory insulation/independence. Strength of federalism and strength of bicameralism were coded according to the data and procedures outlined in the Comparative Political Dataset compiled by Klaus Armingeon, David Weisstanner,

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according to their findings (Cohen's kappa = 0.92). All discrepancies were resolved by way of group agreement.

Sarah Engler, Panajotis Potolidis, and Marlene Gerber (CPDS I).[29] Strength of federalism is assessed according to three categories, where 0 = no federalism, 1 = weak federalism, and 2 = strong federalism. Strength of bicameralism is also measured according to three categories, where 0 = no or very weak second chamber, 1 = weak separate chamber, and 2 = strong second chamber. Executive-legislative separation of power is also measured as a dichotomy, where 0 = no or little separation of paper (as in parliamentary systems of government) and 1 = strong separation of power (as in presidential systems). Last but not least, regulatory independence is measured as a dichotomy, where 1 demarcates the existence of an independent agency exclusively charged with regulating the nuclear industry (like the US Nuclear Regulatory Commission (NRC), which began operations in 1975) and 0 indicates the absence of an independent regulator or the existence of a regulatory agency that is organizationally subordinate to the agency responsible for developing, managing, and/or promoting nuclear energy in the country (like the US Atomic Energy Commission, which regulated the industry prior to the NRC). When these items are summed, I get a "number of venues" index that ranges from 0 (few venues) to 6 (many venues). The Cronbach's Alpha value for this index is 0.78, indicating that the index is internally consistent.

[29] For data and more information, see: http://www.nsd.uib.no/macrodataguide/set.html?id=6&sub=1.

Following the advice outlined by Sabatier and Weible (2007), I measure accessibility by accounting for important distinctions between corporatist and pluralist systems. Compared to pluralistic systems (like the US), corporatist systems (like Austria) are generally less open—policymaking is highly centralized and participation is restricted to a relatively small number of peak associations and government authorities (Sabatier and Weible 2007, 200). To account for this, I use a reversed version of Manfred Schmidt's (1982) corporatism scale, which scores countries on a 1 to 5 scale, ranging from low (1) to high (5) corporatism. Reversing this measure achieves an "accessibility of venues" scale that ranges from 1 (high corporatism/low accessibility) to 5 (low corporatism/high accessibility). Descriptive statistics for both these sub-dimensions are listed in Table 4.2.

4.3.3.2.2. Degree of Consensus Needed for Policy Change

As discussed in the previous chapter, the degree of consensus needed for policy change is a complex concept that varies across countries, subsystems, and time. The measure used in Chapter 3 provided mixed results; while the variable had a statistically significant relationship with policy change on its own, the results waned when controlling for the openness variables. As a result, this chapter explores a more nuanced measure of consensus that could capture underlying norms in each subsystem rather than at a broad national level. One such measure is whether there exist stakeholder engagement mechanisms to ensure that opposition groups have an opportunity to voice their concerns

throughout the siting of the facility. The presence of stakeholder engagement programs suggests an underlying respect for the norms of inclusiveness and deliberation. The absence of such mechanisms, on the other hand, reflects a disregard for broad norms of consensus.

To create this measure, I began by systematically searching newspaper archives and secondary literature for evidence of public outreach/stakeholder engagement in each of the 50 cases included in the sample. Evidence, in this case, was defined as one or more textual indicators that the decision makers responsible for siting the nuclear facility attempted (in some way or another) to engage the public and/or relevant stakeholders (via public information campaigns, hearings, referendums, etc.) prior to the construction/operation of the faculty. The following quotes represent examples of such evidence:

1. Flamanville Nuclear Power Plant (France): "Caught between pro- and anti-nuclear groups, Falmanville's mayor experimented with a referendum. Although anti-nuclear groups published booklets and provided information to the people, EDF representatives also visited the village, offering information and tours of nearby plants. Approximately half the residents voted, the majority supporting the siting" (Aldrich 2008, 167).

2. Douglas Point Nuclear Generating Station (US): "The Chesapeake Bay Foundation and the Citizen's Council for a Clean Potomac have been granted intervener status in the joint hearings by the Nuclear Regulatory Commission and the Maryland Public Service Commission on the two-reactor plant, which is proposed across the Potomac River from Stafford's Widewater Beach. The evidentiary hearings, which start at 1 p.m. Monday in Thomas Stone High School in Waldorf, are also open to members of the public who want to make statements about the proposed 2.3 million Kilowatt power plant, one of the largest in the nation" (Epstein 1976, 5).

3. Maine Yankee Nuclear Power Plant (US): "Public hearings open here Wednesday on Maine Yankee Atomic Power Co.'s request for a federal

> license to operate a nuclear power plant here. Radiological issues will first be discussed at the first session before the Atomic Energy Commission's safety licensing board. Harold P. Green, attorney for Citizens for Safe Power, the group intervening in the AEC hearings, said he expects the first set of hearings to run through Friday" (Bangor Daily News 1972, 25).

If evidence of engagement was found, the case received a 1 and it was assumed that the decision makers responsible for siting the facility were interested (for legal or normative reasons) in achieving some degree of consensus; if no evidence was found the case received a 0.[30] Descriptive statistics for this variable, listed in Table 4.2 indicate that 50% of cases had some evidence of stakeholder engagement. This suggests that in roughly half of the cases, the norms of consensus were relatively high leading to the formulation of programs designed to provide people an opportunity to get involved in the policy making process.

4.3.3.3. Control Variables

As in Chapter 3, I control for two important variables. The first is external crisis events designed to control for big events in the global nuclear energy arena like Three Mile Island (TMI), Chernobyl and most recently the Fukushima disaster. This is a crucial variable because events like these have the ability to reverberate to multiple subsystems. These external shocks can often open up windows for revisionist coalitions and increase their ability to access new resources (Nohrstedt and Weible 2010; Nohrstedt 2008, 2013). New windows and

[30] Again, two different researchers independently collected data, searched for evidence, and coded each case according to their findings (Cohen's kappa = 0.88). All discrepancies were resolved by way of group agreement.

access to more resources in turn provide higher incentives to actors, perhaps making them more likely to form revisionist coalitions. Controlling for these crises, therefore, will neutralize any coalition formation activity that might have taken place as a response to said events. Similar to Chapter 3, each case was coded as having been proximate to a major nuclear event if the siting decision was made within 3 years following the TMI, Chernobyl or Fukushima events.[31] The second control variable is linear time, which helps us to account for any underlying trends over the range of years and cases incorporated into the sample.

4.4. Analytical Procedure and Findings

In order to test H_1, H_2, and H_3, I estimate a set of logistic regression models that predict the formation of a revisionist coalition based upon the configuration of COS surrounding each case. More specifically, the first model tests H_1 by predicting formation as a function of the venue index explained above; the second model tests H_2 by regressing formation of a revisionist coalition on the openness (venue accessibility) scale; and the third model tests H_3 by modeling the impact of engagement programs (consensus needed) on evidence that a revisionist

[31] The analysis tested for alternative time lags following the major nuclear events, ranging from one year to ten year. The best model fit was obtained with the three year lag, and therefore we used the three year window to code the cases for proximity to a nuclear event.

coalition formed.[32] Then, I run a fourth model that estimates the impact of each structure when accounting for the other structures. All four models include controls for time and crisis events.

Table 4.3 and Figure 4.1 summarize and illustrate the estimates derived from these models and (in so doing) provide mixed support for the hypotheses. Beginning with the openness of a political system, the results indicate a mixed albeit weak relationship between the number of decision making venues in a political system and the formation of revisionist coalitions. When estimated as a bivariate model (Model 1), there is a statistically significant positive relationship between the two variables. However, the magnitude of this relationship is small, and it loses its statistical significance when accounting for the other independent variables in the multivariate model (Model 4). These findings provide weak, if any, support for H_1, which posits that revisionist coalitions have an incentive to and are therefore more likely to form in open systems characterized by a high number of decision-making venues.

[32] In separated models, I modeled within country (rather than between country) variation by including fixed effects in the models. The results were largely similar, so I only present the more parsimonious bivariate models.

Table 4.3: Logistic Regression Models Predicting Coalition Formation

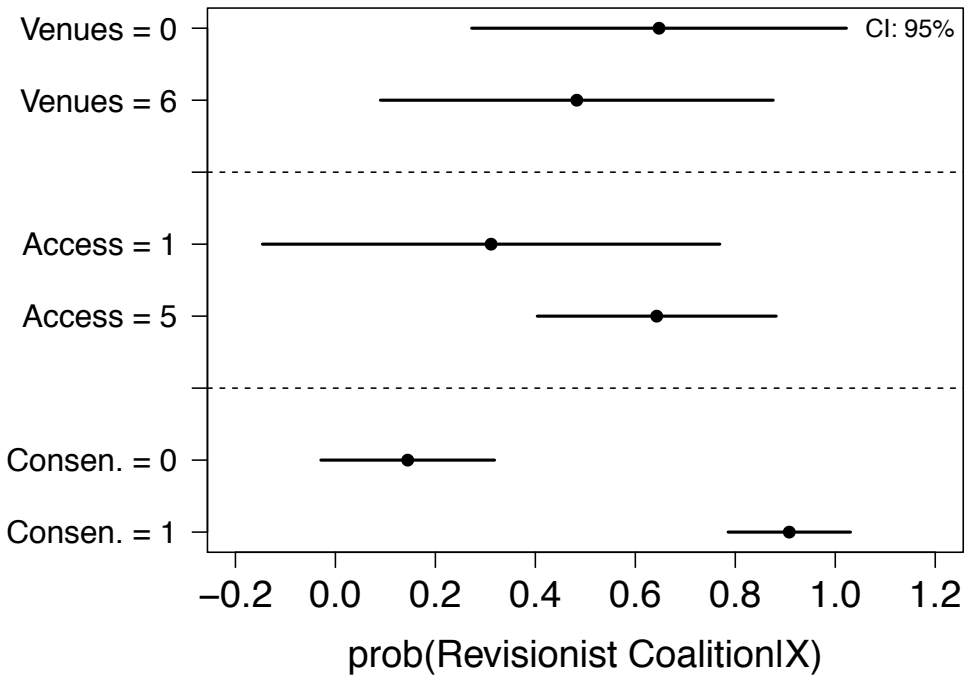
	Model 1	Model 2	Model 3	Model 4
Openness of Political System				
Number of Venues Index	0.257* (0.141)	--	--	-0.113 (0.230)
Accessibility Index	--	0.145 (0.207)	--	0.345 (0.322)
Degree of Consensus Needed for Policy Change				
Evidence of Stakeholder Engagement	--	--	3.689*** (0.966)	4.067*** (1.167)
Control Variables				
Crisis	-0.201 (0.797)	-0.205 (0.782)	0.740 (1.103)	-0.855 (1.123)
Time	0.121** (0.047)	0.126** (0.045)	0.151* (0.062)	0.166* (0.066)
Intercept	3.400** (1.228)	3.253** (1.415)	-4.888** (1.698)	-6.476*** (2.485)
P	0.003	0.011	0.000	0.000
Log-likelihood	-27.393	-28.930	-17.688	-17.106
Deviance	54.785	57.860	35.376	34.211
AIC	62.785	65.860	43.376	46.211
BIC	70.433	73.508	51.024	57.684
N	50	50	50	50

Notes: Standard errors in parentheses; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

With respect to accessibility of different venues, the analysis reveals that there is no statistically significant relationship between accessibility and the formation of revisionist coalitions. Both the bivariate model (Model 2) and the multivariate model (Model 4) reveal similar results. This finding is inconsistent with H_2, which infers that revisionist coalitions have an incentive to and are therefore more likely to form in systems that are more accessible. This finding is also inconsistent with the findings in the previous chapter, where accessibility (as

measured by regulation of participation and competitiveness of participation) had a statistically significant relationship with policy change.

Figure 4.1: Predicted Probability of a Revisionist Coalition



With respect to the degree of consensus required, the analysis reveals a strong, positive, and statistically significant relationship between evidence of a stakeholder public engagement program and evidence of a revisionist coalition. When no such programs exist (X = 0), the predicted probability that a revisionist coalition formed is 0.14; in cases were engagement programs do exist (X = 1), the probability increases to 0.90. This finding is consistent with H_3, which states that revisionist coalitions have an incentive to and are therefore more likely to form in systems where consensus is needed (or valued) for major policy change. This

relationship remains robust when accounting for all the other variables in the model, including the venues and accessibility indices and the control measures (time and crisis events).

Finally, the relationship between both control measures (time and crisis events) and coalition formation is mixed. While there is a positive and statistically significant relationship between coalition formation and linear time, no such relationship is apparent between coalition formation and crisis events. The first finding is indicative of the notion that long term trends in the global nuclear domain have made it more likely that revisionist coalitions opposing status quo policy decisions to site a facility will form. However, the results do not indicate that proximity of crisis events has a substantive effect on the formation of these coalitions. This finding is interesting, especially given theoretical expectations, which suggest that crisis events provide new opportunities to actors who wish to form pro-change coalitions, thus making coalition formation more likely (Nohrstedt 2008). Perhaps the lack of skillful exploitation by individuals explains the absence of a relationship, but the behavior of coalitions in the aftermath of crises is critical to answer this question. Scholars have begun looking at coalition mobilization and policy learning post crises, but future research can benefit from the addition of COS and the role they play to the mix of explanatory variables (Nohrstedt and Weible 2010; Nohrstedt 2013). In addition to explaining the actions and strategies adopted by coalitions in the aftermath of crisis events,

future research should also look at how these events might impact the genesis of revisionist coalitions in the first place.

4.5. Conclusions

In Chapter 3 I explored the link between COS and policy change. In essence, the analysis revealed that specific opportunity structures, varying across different countries, influence the likelihood of policy change. In this chapter, I untangle one of the mechanisms that might account for this finding by answering a simple yet important question pertaining to coalition formation: why do revisionist coalitions form in some subsystems and not others? I did so by exploring the relationship between COS and the likelihood that a given nuclear facility will face opposition in the form of a revisionist coalition during the siting process. Inspired by recent improvements to the ACF, I posit and empirically test the proposition that political institutions create coalition opportunity structures that incentivize and (by extension) explain decisions to form revisionist coalitions.

The findings reveal partial support for the theory. First, with respect to openness of a political system, the analysis reveals little to no support for the hypotheses. Theory would suggest that when the potential benefits of entering a subsystem are high and the barriers to entry are small, more revisionist coalitions will form. However, I find that the number of decision making venues and their accessibility do not seem to matter much for the formation of revisionist coalitions. This can mean any number of things. It may mean, for example, that

proliferation of venues and their accessibility does not matter—that it does not incentivize nor impact the formation of revisionist coalitions. Alternatively, it could mean that openness of a political system does not matter in this (the nuclear) domain, but may matter in other (i.e., less technical) domains. Last but not least, it could be that these variables do matter, but that our measure is not sufficiently sensitive to the variations in openness and accessibility that meaningfully incentivize policy actors.

Second, and perhaps the most important and interesting finding is the strong, positive, and statistically significant relationship between the norms of consensus required for policy change and the formation of revisionist coalitions. In cases where strong norms of consensus (as measured by the presence or absence of stakeholder engagement programs) existed, revisionist coalitions were more likely to form. The interpretation of this finding requires some thought, as it is possible that the relationship suffers from an endogeneity problem. Do stakeholder engagement programs lead to the formation of revisionist coalitions or vice versa? If the existence of stakeholder engagement programs does make revisionist coalitions more likely to form, the policy implications could be far reaching. On the one hand, public consent and deliberative decision making achieved through stakeholder engagement programs is critical for sustaining the essence of democratic governance. Governments in advanced democracies thrive on the principles of empowering citizens (or subjects), providing access to resources that allows opposition groups to form revisionist coalitions in the face

of policy decisions. It is not surprising, then, that giving local residents and other affected parties the means to engage in the siting process would stimulate the formation of organized forms of opposition. On the other hand, the formation and growth of revisionist coalitions often leads to political deadlock, putting important policy decisions in limbo and draining both time and money. The case of the Yucca Mountain repository is a good example—over ten years and $12 billion dollars were spent characterizing and evaluating the site—resources that have gone to waste without solving the issue of storing the country's increasing stock of spent nuclear fuel.

If, on the contrary, it is the case that revisionist coalitions are leading to the establishment of stakeholder engagement programs, then the lessons could be drastically different. It is possible that in the face of heavy opposition, the government is forced to adopt stakeholder engagement programs as a way to alleviate (and recognize) public backlash. If this is true, it suggests the ability of strong revisionist coalitions to create opportunity structures in the form of stakeholder engagement mechanisms as a way to influence the siting process. This is an important feedback loop that could provide crucial insight into the dynamics of the siting process and the policy process more generally.

Lastly, it is interesting to note the there was no relationship between crisis events and formation of revisionist coalitions. This contradicts theoretical expectations that crisis events open windows of opportunity for actors to come together and get involved in the policy process. One reasons for this contradiction

could be the absence of strategic behavior on the part of coalition actors. It could also mean that while crisis events are crucial for policy change (as we saw in Chapter 3), they do not matter much for actual formation of new coalitions. In other words, already existing revisionist coalitions might take advantage of crisis events, but that such events do not appear to influence the formation of new coalitions in a significant way. Nonetheless, this is an important link that needs to be explored further in future research.

While these findings provide both theoretical and empirical insights, perhaps one reason for the mixed results is not the theory but the manner in which the concepts were operationalized and analyzed. It could be the case that some of these relationships are too nuanced and cannot be teased through quantitative analyses where detail and context are sacrificed to incorporate more cases. It is also possible (as reflected in the robustness of the stakeholder engagement measure) that broad national level variables need to be supplemented with case specific subsystem variables. To explore this further, the next empirical chapter adds value to this dissertation in four ways: (1) it employs a more detail oriented qualitative comparative methodology for comparing two different case studies; (2) it focuses on case specific subsystem level COS; (3) it expands the substantive focus of the dissertation by comparing nuclear energy subsystem to forest management subsystem in India; and (4) it does all this by exploring how the mechanism of coalition behavior can shed light on the relationship between COS and policy change.

Chapter 5: Coalition Opportunity Structures at the Subsystem Level: Comparing Coalition Strategies Using Case Studies of Nuclear Energy and Forest Management in India

5.1. Introduction

Thus far, this dissertation has presented empirical analyses of two separate but interconnected theoretical relationships. First, in Chapter 3 I analyzed the relationship between COS and policy change, and found strong evidence that specific structural features of a political system influence the probability of policy change in that system. Second, in chapter 4 I explored the relationship between COS and coalition formation. Part of the goal in chapter 4 was to uncover one of the mechanisms through which COS influence policy change. I argued that the formation of organized opposition challenging the policy status quo is one link that connects COS to policy change. Among other things, the analysis revealed a strong, positive, and statistically significant relationship between the norms of consensus required for policy change in a political system (as measured by the existence of stakeholder engagement mechanisms) and the formation of revisionist coalitions. Chapter 5 aims to focus on another link in the policy process that might connect opportunity structures to policy change—coalition behavior. By coalition behavior, I mean the strategies adopted by revisionist coalitions in their pursuit of policy change. I argue that the choice of specific strategies also connect opportunity structures to policy change. Coalition strategies, as conceptualized in this chapter, refer to the process of choosing and

executing a plan of action to help coalitions realize their policy goals (Pralle 2006b). The motivation behind this chapter is a simple but important question: what motivates coalitions to pursue one strategy over another?

In answering this question, the chapter also adds value to this dissertation in two ways. First, this chapter helps to expand the theoretical scope of the dissertation by supplementing the measurement and operationalization of COS at the national level by studying the variation of opportunity structures at the subsystem level. When measuring the dimensions of openness and consensus, this chapter focuses on subsystem specific actors and institutions instead of broad national features such as strength of bicameralism, type of political system, and degree of corporatism. Second, this chapter adds to the depth of analysis by employing a qualitative case study methodology to study the relationship between COS and coalition behavior. The use of qualitative controlled case comparison in this chapter complements the large-N analysis employed in chapter 3 and 4. Besides providing a different vantage point from which to understand the role of COS and a more thorough understanding of the dynamics involved, it also provides an important check on both the internal and external validity of the study (Slater and Ziblatt 2013).

Why should we care about coalition behavior and the strategies they adopt? In addition to the ability of actors to form revisionist coalitions (as explored in chapter 4), the host of strategies they have available to them shapes their ability to gain more resources and eventually impact the decision-making

process. The ACF contends that policymaking is the end result of a long-term struggle between conflicting groups (coalitions) that are trying to advance their beliefs about how the world should work (Sabatier and Jenkins-Smith 1993). In their endeavor to influence policy outcomes, coalitions adopt specific strategies that would provide them the greatest amount of leverage and tip the balance of resources in their favor. The coalition that is able to amass more resources, as compared to the competing coalition (i.e., legal authority, public opinion, information, financial resources, skillful leadership, and mobilizable public) will be the most successful in achieving their preferred outcomes (Sabatier and Weible 2007). The ACF and political science more generally recognizes the importance of coalition behavior and strategies used by actors/groups in pursuit of additional resources to influence policy change (Elgin and Weible 2013). However, scholars are only beginning to understand the underlying forces that impact coalition behavior. Using case studies of nuclear energy and forest management subsystems in India, this chapter explores how COS at the subsystem level impact coalition strategies. It analyzes how coalitions function within different institutional and policy contexts and why they choose one strategy over another.

The impetus behind choosing these two cases is simple; I wanted to analyze the influence of COS within a political system across two different issue areas. This comparison plays a critical role in the dissertation for two reasons. First, the case of nuclear energy in India provides a check on the large-N analyses presented in chapters 3 and 4. Second, the case of forest management provides a

check on the generalizability of the findings with respect to COS and nuclear energy. It is a first step towards applying the concept of opportunity structures to issue areas other than nuclear energy and LULUs, to gage its overall utility for policy scholars and policymakers.

5.2. Theoretical Framework

Though policy scholars have dabbled in the area, extant research spends relatively little time characterizing and systematically analyzing the nature of the strategies that coalitions employ in order to bolster their resources and influence policy outcomes (Mintrom and Vergari 1996). When this does come up, researchers tend to focus on the strategies that coalitions use in order to augment their legal authority by "shopping" for different "venues" within which to wage their battle (e.g., Baumgartner and Jones 1993; Sabatier and Jenkins-Smith 1999; Guiraudon 2000; Pralle 2003; Nohrstedt 2011; Burnett and Davis 2002; Godwin and Schroedel 2000; Hansen and Krejci 2000). Broadly speaking, venue shopping refers to the activities adopted by coalitions who seek out a political access point where they can petition alternative policy preferences. In federal systems, for example, coalitions can move between the national, state, and local levels of government in search of a favorable venue that is willing to hear their argument. In unitary systems, on the other hand, policymaking authority tends to be concentrated at the federal level, providing coalitions with limited opportunities to garner traction at other levels of government.

In a comparative study of environmental advocacy in the US and Canada, for example, Pralle (2006b) outlines how the agenda-setting literature can help understand the divergent political outcomes in the two cases. Ultimately interested in the political success of Canadian environmental groups with regard to attracting global attention and achieving province wide forestry reform, and the lack of success in the case of American environmentalists, Pralle argues that the ability of the former to sufficiently expand the scope of conflict explains their favorable outcome. The successful expansion of the scope of conflict, in part, depends on their ability to define and redefine key issues, form successful alliances, and their ability to seek out new institutional venues. Similarly, Burnett and Davis (2002) study the shifts in national forest policy in the US as a result of environmental coalitions' ability to use new information and find favorable decision-making venues. They find that the increasing role of congressional members as a sympathetic venue provided the environmental coalitions with the necessary push to overcome the existing structural biases of the decision-making system.

This growing area of research fills an important theoretical gap within the field of public policy. It also strengthens the call by ACF scholars for the need to better understand coalition strategies (Elgin and Weible 2013). Despite these acknowledgments, a lot remains unanswered about why coalitions choose certain strategies over others when fighting policy battles. I argue in this chapter that COS can help us understand some of the motivation behind strategy adoption by

revisionist coalitions. To maintain analytical clarity, I focus exclusively on revisionist coalitions, which are coalitions that form with the explicit purpose of challenging the status quo policy decision. Governing coalitions, which are coalitions that establish and support the status quo policy decision, also strategize in order to maintain their political position. However, because of the underlying interest in comprehending policy change, for the purposes of this dissertation, I focus exclusively on revisionist coalition strategies. The remainder of this section describes COS and existing literature in the social movement sub-field as well as public policy regarding these structures and their possible influence on coalition/group strategies.

As described in previous chapters, COS represent the broad structural features of a political system or subsystem that influence the actions and interactions of individuals and groups inhabiting it. Surrounded with unique venues points, coalitions are forced to "interact in the context of nested institutional arrangements, uneven power relations, and uncertain scientific and technical information about problems and alternatives" (Weible, Sabatier, and McQueen 2009: 121). In other words, COS can influence strategies in multiple ways, including providing opportunities or constraining access to new resources within a subsystem; and by shaping the opportunities for venue exploitation, establishing norms of consensus, and setting legal impediments that can impact the range of available political strategies. Institutions—defined as the "formal or informal procedures, routines or norms and conventions embedded in the

organizational structure of the polity or political economy"—are the basis for understanding COS within a particular system (Hall and Taylor 1996: 938).[33] COS provide a unique window into understanding institutions, particularly in the way that they either enable or constrain political action. For example, knowing that a country has a parliamentary system with a bicameral legislature is useful for some studies. However, COS embedded within such institutions helps to comprehend how political actors and/or coalitions can use these institutions to their advantage.

Within the public policy literature, COS has been applied to policy problems only a handful of times (see chapter 2). With respect to coalition strategies in particular, these instances are even fewer. One such example is Kübler (2001), who uses the concept of political opportunity structures to understand coalition strategies. In so doing, he hypothesizes that "coalitions adopt their strategies according to characteristic openings in a given political opportunity structure, measured by the degree of territorial decentralization, of functional separation of power, of party system fragmentation, as well as by the extent of direct democratic procedures" (p. 629). He borrows the measurement of opportunity structures from Kriesi et al. (1995) in their study of social movements

[33] See, for example Evrard (2012), where the author compares partisan influence on the national energy policy in France and Germany. In particular, the article highlights how the institutional context in Germany made it possible for actors to have more influence than their French counterparts.

in Western Europe. Ultimately interested in drug policy change in Switzerland, he finds that some elements of his measurement of opportunity structures were more influential on coalition strategies than others. For instance, he finds that strong independent judiciary shaped the strategies of one of the coalitions, leading them to adopt litigation as one of their tools. However, party system fragmentation seemed to have little effect on the strategies different coalitions adopted.

While the link between COS and coalition strategy is understudied in the field of public policy, social movement scholars have been studying it for decades. Kitschelt (1986) for example, compared anti-nuclear movements in four democracies (France, Sweden, United States, and West Germany) using the framework of "political opportunity structures" to understand the nature of the protest and varying political outcomes. He argues that, among other things, "political opportunity structures influence the choice of protest strategies and the impact of social movements on their environments" (Kitschelt 1986, p. 58). Ultimately interested in the varying outcomes of the anti-nuclear protest movements in the four democracies, Kitschelt focuses on the role of institutional constraints faced by these movements. Borrowing loosely from the resource-mobilization literature in the social protest research, Kitschelt argues that groups within social movements act as rational decision-makers choosing the best available strategies given the external opportunity structures they face.[34] While

[34] For more on resource-mobilization and social protest, see McCarthy and Zald (1977).

cognizant of the fact that these opportunity structures do not explain the movements' outcome in its entirety, the author argues that these in-built structures can still explain a good deal about how movements mobilize and what their outcome is. He hypothesizes that political systems with more open decision making structures allow coalitions to use more "assimilative" strategies, whereas coalitions operating within closed opportunity structures are forced to use "confrontational" strategies (Kitschelt 1986, 66). Assimilative strategies are those mechanisms that are employed through existing policy channels and institutional venues. Confrontational strategies, on the other hand, are employed outside of the already established institutional access points.

Borrowing from Kitschelt's (1986) operationalization of protest strategies, this chapter suggests that revisionist coalitions will adopt different strategies in pursuit of policy change based upon the openness of a political system and the resulting nature of the COS. Thus, the dependent variable of this chapter, coalition strategies, is measured using a dichotomous typology—assimilative versus confrontation strategies. The independent variables—COS—and their operationalization remains the same, identified along two dimensions: (1) the openness of a political system and (2) the degree of consensus needed in a political system for major policy change (Weible and Sabatier 2007). These will be discussed in more detail in the next section.

I argue in this chapter that depending on the type of political system and COS, revisionist coalitions are afforded different "baseline" options for pursuing

their goals. In some cases, where enough opportunity structures are built in to the system to provide some prospect of success and the system is relatively open, revisionist coalitions will use *assimilative* strategies in pursuit of their policy goal. In other cases, where the systemic access points are absent and the system is closed, revisionist coalitions are forced to invent their own opportunity structures and are likely to use *confrontational* strategies to achieve their policy goals. In essence, in cases where the subsystem is inclusive rather than exclusive, revisionist coalitions have an incentive to work within the system and "assimilate". On the other hand, in cases with a closed-off subsystem that tends to exclude important stakeholders, revisionist coalitions will tend to "confront" the system to try and topple the status quo.

Using the cases of nuclear energy and forest management, the following two hypotheses explore the role played by COS and their impact on strategies adopted by coalitions:

H_1: In policy subsystems where decision-making authority is concentrated and access to decision-making is restricted, coalitions will adopt confrontational strategies such as public protest and rallies that are designed to disrupt the subsystem.

H_2: In policy subsystems where decision-making authority is dispersed and access to decision-making is open, coalitions will adopt assimilative

strategies such as deliberation, appeals, and petitions that are designed to work within the subsystem.

The section below presents the research design, variable operationalization, data, and methods used in this chapter, followed by an in-depth comparison of two policies in India: nuclear energy and forest management. The goal of this comparison is to capture the role of varying COS across subsystems. In addition, the role of varying COS within a single subsystem over time is analyzed using the case of forest management in India. After laying out the advocacy coalitions and opportunity structures that inhabit each subsystem, the findings section presents the results from the comparative analysis, which adds to and enriches the findings of the large-N study from chapters 3 and 4.

5.3. Research Design, Variable Operationalization, and Data Collection

5.3.1. Nuclear Facility Siting and Forest Management

To test the hypotheses listed in the previous section, I analyze the subsystem dynamics associated with two different issue areas within India: nuclear energy and forest management. Any comparative analysis must clearly state why a particular case was chosen rather than others, and what the comparisons are going to be. With reference to the substantive issue areas analyzed in this chapter, the goal was to pick two somewhat similar mainstream policy areas that have historically received both political and public attention. Nuclear energy and forest management fit that description because they both inherently deal with the notion of resource management and resource allocation.

Nuclear energy in India is portrayed as the country's answer to increasing energy deficits. Similarly, forest management is crucial in dealing with increasing population size and deforestation. The debate surrounding nuclear energy in India is topical and important, both because of the country's policy to substantially expand the role of nuclear energy by building huge "energy parks", and international focusing events like the Fukushima crisis. At the same time, the issue of nuclear energy is not new and has been an integral part of Indian energy policy since the 1940s. The forest management policy also represents an issue that has been part of the national development plan since India gained independence in 1947. Both these issues lend themselves well to an ACF study, which is chiefly applicable for analyzing subsystems where a policy struggle has persisted for a decade or more.

The reason for focusing on India is simple but significant: India provides a unique opportunity to apply the ACF to a non-western political system, where most of the scholarship has focused in the past. This is changing, with more studies attempting to push the limits of ACF to other contexts; this paper is a contribution in this direction. India has a parliamentary federal political system, but what makes it stand out most is its political diversity. India's political landscape incorporates a wide variety of religious, caste, and class based platforms. It also has a strong role for regional and local political parties, which impacts the political resources advocacy coalitions have access to.

5.3.2. Variables and Measures

5.3.2.1. Coalition Strategies

The measure of coalition strategies employed in this chapter mirrors Kitschelt's (1986) analysis, breaking them down into two main categories—assimilative and confrontational. Assimilative strategies are those mechanisms that are employed through existing policy channels and institutional venues. Confrontational strategies, on the other hand, are employed outside of the already established institutional access points. Examples of assimilative strategies include lobbying, petitioning, judicial appeals, referendum campaigns, and participation in electoral campaigns. Confrontational strategies include methods such as civil disobedience, violent protests, demonstrations, and mass rallies. Assimilative strategies are employed by coalitions wishing to act "within" the system and bring about policy reform from the inside through peaceful means. Confrontational strategies, on the other hand, are employed by coalitions who find that they are "outsiders" to the subsystem and are thus forced to bring about policy reform through unconventional means.

5.3.2.2. Coalition Opportunity Structures

As discussed in previous chapters, the ACF operationalizes COS along two dimensions—relative openness of a political system and the degree of consensus required for policy change in that system. Unlike chapters 3 and 4 where quantitative measures of COS were developed, this chapter measures COS qualitatively. To achieve this, I measure and trace the evolution of COS at the

subsystem level as a function of the openness of the subsystem and the degree of concentration of decision making authority. These characteristics are determined by the level of hierarchy of the institutional setup within the subsystem, the distribution of political authority, and how open the system is to outside actors.

In addition to exploring a new mechanism through which COS can impact policy change (i.e. coalition strategies), this chapter also expands the way in which these structures are measured. Both Kübler's (2001) research, and its subsequent incorporation into the broader ACF framework has focused on the opportunity structures that exist at the national or system level. All of the variables laid out by Kübler--the degree of territorial decentralization, of functional separation of power, of party system fragmentation, as well as by the extent of direct democratic procedures—capture institutional variation at the national level. I argue that in addition to opportunity structures at the national level, there exist crucial parallel dynamics at the subsystem level; and including these critical features that exist at the domain specific subsystem level can increase our explanatory power.[35] For example, a cursory look at the national

[35] This conception of unique subsystem level COS and their influence on coalition strategies is reminiscent of the argument made by Jeremy Richardson (1982) and Gary Freeman (1985) in the field of comparative public policy. The authors argued that in addition to focusing on "national" styles of policy making, scholars should pay attention how different "sub-national" policy sectors shape the politics surrounding them and the policy outcomes that result from these policy styles.

level suggests that India is a relatively open system (federal, multi-party), where multiple access points exist for different types of actors to seek to influence the policymaking process. One could argue that the parliamentary arena in India provides coalitions with some unique avenues for action. The multi-party system and coalition governments, which has flourished in India since the late 1980s, aids coalitions with additional access points in the policy making process.

5.3.3. Data

The qualitative content analysis presented in this chapter required data that allow the researcher to record and evaluate the different types of strategies employed by the revisionist coalitions in each case. Before this is possible, however, revisionist coalitions had to be identified. To do this, an exhaustive search on Google News database for newspaper articles about each case, as well as on Google Scholar, Google Books for scholarly accounts of each case was conducted. During this search, groups were defined as part of a revisionist coalition if: (1) they expressed anti-nuclear or anti-state forest control policy core beliefs and (2) there was evidence that they coordinated their efforts with like-minded revisionist groups. Since this chapter does not analyze the strategies employed by status quo coalitions (pro-nuclear and pro-state forest control groups), these are not explicitly identified here.

Once the list of revisionist coalitions was complete, the search for the various strategies used by these revisionist coalitions commenced. These were primarily derived from public consumption documents (such as those available on

the website by the anti-nuclear coalition in the Jaitapur Nuclear Power Plant (JNPP) called "Jaitapur Speaks"), newspaper accounts (both national and local archives accessed through Google News), petitions and letters written to the government, and existing historical accounts. These were collected and evaluated in two phases. In the first phase, an exhaustive search for any documents and accounts directly related to the coalitions was conducted. The websites of coalition groups were also combed for any available documents. During this search, any strategies or mechanisms used by the coalitions were archived.

In the second phase, the archived list of strategies and mechanisms was evaluated using a base rubric, which divided the strategies according to their core type: assimilative or confrontational. Again, assimilative strategies work within the established policy channels whereas confrontational strategies work outside the existing access points. Additionally, assimilative strategies aim to maintain the system while at the same time influencing how policies are made and implemented. However, confrontational strategies aim to overhaul the existing system and bring about a larger change affecting the underlying structure as well as the proximate implementation of the policy.

5.3.2. Methods

The analysis that follows compares the issues of nuclear energy and forest management in India using the most similar systems approach (Przeworski and Teune 1970; Lijphart 1971). Based on Mill's method of difference or similarity, the logic of comparison used in this approach is quite simple—if you have two

systems that are similar but diverge on the dependent variable, you should look to any existing differences in order to establish the reason for the divergence. To illustrate the influence of COS both within and across subsystems, the chapter employs this method in two different ways. First, the comparative method of similarity is used to analyze and compare the nuclear energy subsystem to date and the forest management subsystem in the post-1970s. Second, the same method is used to analyze and compare the forest management subsystem in India during two separate time periods, one being from the mid-19th century to the late 1970s and the other beginning in the late 1970s. The subsystem during these two time periods is similar on most accounts, including the coalitions involved and the seemingly irresolvable goal conflicts surrounding it. The choice of similar cases within the same national context allows for a comparison of the two issues and the influence the COS might have on coalition strategies. Simultaneously, the decision to study forest management was also driven by the resulting opportunity to compare the same issue across two different time periods. This type of comparison allows for everything except the changing COS to be held constant, which helps highlight the impact these changes might have on coalition strategies. As a result, the comparative method applied here is simple but effective. This chapter employs two different comparisons, one studying the role of opportunity structures across different subsystems and the other within a single subsystem over time.

It is also important to note that for the purposes of analytical simplification and clarity, this chapter focuses on revisionist coalitions in each issue area. Revisionist coalitions are those coalitions that form and exist specifically to challenge the existing status quo. In the case of nuclear energy, revisionist coalitions are those coalitions that form to challenge the construction of specific nuclear power plants. In the case of forest management, revisionist coalitions are those coalitions that form to challenge the rising state control over national forests. For the nuclear energy subsystem, the chapter focuses on the strategies adopted by anti-nuclear coalitions during the siting of two nuclear power plants in different parts of India—Jaitapur nuclear power plant in Maharashtra and Kudankulam nuclear power plant in Tamil Nadu. For the forest management subsystem, the chapter analyzes the strategies adopted by anti-state forest control coalitions during the two separate time periods—before and after the implementation of the JFM policy in various states across India.

5.4. Analytical Procedure

This section begins by presenting a brief description of the coalitions that inhabit the nuclear energy policy subsystem and the COS they function within.[36]

[36] The definition of coalitions in this chapter corresponds with that of most ACF studies, where groups with share beliefs engage in a nontrivial degree of coordination. Coalitions are identified, for the purposes of this chapter, during the historical analysis of each case. However, in both cases, the coalitions were largely localized and limited around the area most affected by the policy.

This includes the history of nuclear energy in India, the nature of its nuclear establishment, and other relevant institutional characteristics. Following this, a parallel description of the forest management policy subsystem is presented, which includes a description of the COS surrounding the forest management subsystem and major changes that occurred in 1990 after the adoption of the Joint Forest Management (JFM) policy.

5.4.1. Nuclear Energy Subsystem in India

The nuclear energy subsystem in India is inhabited by two main coalitions. The first coalition, which includes pro-nuclear actors and organizations, are united by their belief that nuclear energy is the only feasible solution to the country's increasing energy deficits. The second coalition, which is comprised of anti-nuclear actors including interest groups and national and international NGOs, believes that nuclear energy is dangerous and unnecessary (Bidwai and Ramana 2007; Rao and Ramana 2008). The foundations for the strong and autonomous nuclear establishment were laid in the 1940s and 50s when under the leadership of Jawahar Lal Nehru (then prime minister), India institutionalized its existing atomic research wing. The Board of Atomic Research was set up, led by physicist Homi Bhabha, also known as the father of the nuclear program in India (Frey 2006: 33). Bhabha, who shared a close personal and professional relationship with Nehru, recommended in 1948 that "[T]he development of atomic energy should be entrusted to a very small and high powered body composed of say, three people with executive power, and answerable directly to the Prime Minister

without any intervening link. For brevity, this body may be referred to as the Atomic Energy Commission" (Venkatraman 1994: 145). This marked the beginning of a small but powerful nuclear program in India.

The COS surrounding this subsystem consist of a few intricately linked organizations, that are uniquely autonomous and closed-off from external scrutiny (Tellis 2001: 6; Ramana and Kumar 2010: 53). Unlike other public sector organizations that are accountable to the national legislative body, the nuclear establishment is constitutionally placed under the direct authority of the Prime Minister of India (Frey 2006: 61; Abraham 1999). Critics of India's nuclear establishment argue that policymaking related to nuclear issues has historically been handled by the Indian Prime Minister in a personal *ad hoc* manner, based on input from a key group of elite bureaucrats and scientists (Frey 2006: 49). At the top of the nuclear establishment apex lays the Atomic Energy Commission (AEC), which was set up in 1948 under the Atomic Energy Act. The AEC was formulated for promoting the peaceful use of atomic energy in India (Frey 2006: 49). Following this, the Department of Atomic Energy (DAE) was established in 1954 for carrying out all activities related to the research and development of nuclear energy and commercial reactor operation (Ramana 2012). As mentioned before, these organizations are intricately linked to one another. For instance, there have been instances where the Secretary of the DAE has also served as the chairman of the AEC. Starting in 1954, the AEC was responsible for formulating the policies of the DAE for the consideration and approval of the Prime Minister

along with the implementation of official policy in all matters concerning atomic energy (Reddy and Ramana 2003: 213-214).

The DAE consists of a number of subsidiary organizations, including five research centers, five government owned companies ("public sector enterprises"), three industrial organizations, and three service organizations (DAE 2010). The research centers include the Bhabha Atomic Research Centre (BARC), Indira Gandhi Centre for Atomic Research (IGCAR), and Atomic Mineral Directorate (AMD). The public sector enterprises include the Nuclear Power Corporation of India Limited (NPCIL), Bharatiya Nabhikiya Vidyut Nigam (BHAVINI), and Uranium Corporation of India Limited (UCIL). Of these, the NPCIL is responsible for designing, constructing, commissioning, and operating nuclear power reactors throughout the country. Breeder reactors are the responsibility of BHAVINI and UCIL is in charge of mining and milling of uranium. Finally, the nuclear establishment also contains the Atomic Energy Regulatory Board (AERB), which is responsible for the safety of all nuclear installations that have not been demarcated as military, including research reactors, reprocessing facilities, and uranium enrichment plants. AERB also regulates other facilities in the country that involve radiation in some way, for example, medical facilities and educational laboratories that use radiation sources. The AERB is also intricately

linked to the nuclear establishment, and it is constitutionally required to "be responsible to the AEC."[37]

5.4.2. Forest Management Subsystem in India

Much like the nuclear energy subsystem, the forest management subsystem in India is characterized by seemingly irresolvable goal conflicts, as well as conflicting beliefs and interests. The two primary coalitions that inhabit this subsystem are: the state and the forest industry, which includes groups united by their belief that forests are a national asset and therefore, should be used for national interests. The second coalition includes the villages, tribes, and local populations surrounding forests united by their belief that forests are a community resource that should be used to sustain their daily livelihood (Tiwary 2004: 7). These coalitions have taken form over long periods of time, as a result of historical practices adopted by the state as well as village communities. Historically, forests played a crucial role in India, both in the form of revenue for the government (resulting from the production of goods such as timber, paper, bamboo, and pine resin), and in the form of daily livelihood for tribes and other rural populations. State monopoly over forests was instated during the British rule

[37] For more on the constitutional order specifying the role and powers of the AERB, see http://www.aerb.gov.in/AERBPortal/pages/English/Constitution/gazzette_aboutUs.action (Last accessed on 11/13/2013).

in the 19th century, with the abolishment of local rights over forest land, and the belief that forests are a national resource that should serve national interests (Guha 1983). For village communities and tribal populations, forests represented a source of food and raw materials that helped them to sustain their daily livelihood.

Beginning in the 1970s, forestry became a contested environmental issue, primarily due to the vast amounts of forest cover that has been lost as a result of deforestation. Both coalitions offer different explanations for this deforestation: on the one hand, the state forest departments argue that unscientific practices followed by the villages and tribes are the culprit. For example tribes in the states of Andhra Pradesh and Orissa used forests for engaging in shifting agriculture or "podu" cultivation. Considered as a way of life, podu cultivation requires them to move from place to place, leaving the ecology of the land in shambles. On the other hand, villagers argue that indigenous practices have maintained a balanced ecosystem for centuries, and it is state acquisition of forest land that has disrupted this balance (Guha 1983; Guha and Gadgil 1989; Sen 1992). At the heart of this debate is the issue of "access" to forest land and how best to manage it, something that has been contested or decades.

The nature of the COS surrounding this subsystem can be divided into two eras: the pre-1970s and the post-1970s. The foundations for COS that define the pre-1970s era can be traced back to the Indian Forest Act of 1865 passed under colonial rule, giving the "imperial Forest Departments" the power to declare any

land covered with trees as government owned, and to make the necessary rules to manage them (Guha 1983). The goal was to provide the government with extensive control over forests, and allow them to maximize the production and sale of commercial products such as timber (Guha and Gadgil 1989). The nature of this forest management regime during this period led to large scale conflicts between the government and the local people who were dependent on forests for daily sustenance. After 1947, independent India continued on this path of alienating people from the forests, and accentuating the conflictual relationship between the government and the local communities. The opportunity structure during this period was characterized by a limited number of decision making venues, low accessibility levels, and low degrees of consensus required for policy change, where most policy decisions were restricted to high-level political and bureaucratic personnel.

Beginning in the late 1970s, there were several social forestry programs developed to deal with rising deforestation and the seemingly incongruent interests of the two coalitions (Robinson 1998). These programs, above all, aimed to put the power back into the hands of the people. The most recent and most widely implemented of these is the Joint Forest Management (JFM) policy, which was introduced in 1990 (Agarwal 1999). Under this policy, states are given directives by the federal Ministry of Environment and Forests (MOEF) wherein they are advised to reach out and engage the local communities. In a nutshell, this program was put in place "for giving to the village communities living close to

the forest land usufructory benefits to ensure their participation in the afforestation programme. …if they successfully protect the forests, they may be given a portion of the proceeds from the sale of trees when they mature" (Government Of India 1990, cited in Tiwary 2004: 22). Unlike the centre heavy policy formulation and implementation in the case of nuclear energy, the COS surrounding forest management in India provides considerable autonomy to state and local officials. It is up to the Forest Department (FD) in each state, for example, to formulate how the JFM policy will be implemented, including how to name village forest committees, what the actual size and structure of these committees will be, and how much forest produce the villagers will have access to (Tiwary 2004). At the grassroots level, this policy is implemented by a general body that consists of one member from every village household, an executive committee that is elected from this general body called forest protection committees (FPCs) (Murali, Murthy, and Ravindranath 2006). In addition to local populations, this policy has also accommodated NGOs by urging them to play the role of a mediator between the locals and the state officials, and by educating people and raising their awareness about forest management (Saxena 1997).

From this brief overview of these two subsystems and their respective COS, a few main features stand out. Perhaps the biggest distinction lies in the way that the structures of the nuclear energy subsystem and the forest management subsystem in the post 1970s differ greatly despite the fact that they exist within the same overarching federal structure. The nuclear energy subsystem is

characterized by a limited number of decision making venues, low accessibility levels, and low degrees of consensus required for policy change that provides a few key federal agencies the power to dictate everything. In contrast, the forest management subsystem is characterized by a larger number of decision making venues, high accessibility, and a high degree of consensus required that provides greater discretion to state and divisional authorities as well as more opportunities for revisionist coalitions to become part of the policy process. Even though the level of decentralization varies, both subsystems are comprised of competing coalitions with seemingly irresolvable goals, values, and interests. In the case of the nuclear energy subsystem, state officials believe in the usefulness of nuclear energy and its importance for the continued development of the nation; contrasted by local communities and activists who categorically oppose nuclear energy as a viable solution. Similarly, in the case of the forest management subsystem, the two competing coalitions have differing views on how to protect forests and prevent further deforestation.

The next section of the chapter explores the strategies adopted by revisionist coalitions in both subsystems. If my hypotheses are correct, we should see the adoption of different strategies in the two issue areas. Specifically, the strategies adopted by anti-state forest control coalitions in the post-1970s forest management subsystem should be less disruptive and less challenging to the system that those adopted by the anti-nuclear coalitions in the nuclear energy subsystem and the anti-state forest control coalitions in the pre-1970s forest

management subsystem. This is because the decentralized nature of the post-1970s forest management subsystem should provide more autonomy to state and local groups, giving them greater opportunities to work within the system to further their policy positions. Some scholars have argued that "the participatory regime resulted in the transition of the Forest Department from a "closed system" to an "open" one, where cross-sectoral integration gained importance" (Chaturvedi and Godbole 2005: 13). The persistent centralized nature of the nuclear energy subsystem on the other hand has worked to curtail these opportunities, forcing opposition groups to work outside the subsystem and try to disrupt it.

5.5. Findings

This section explores the different strategies adopted by coalitions in the two subsystems. For the nuclear energy subsystem, the chapter focuses on the strategies adopted by anti-nuclear coalitions during the siting of two nuclear power plants in different parts of India—Jaitapur nuclear power plant in Maharashtra and Kudankulam nuclear power plant in Tamil Nadu. For the forest management subsystem, the chapter analyzes the strategies adopted by anti-state forest control coalitions during the two separate time periods—before and after the implementation of the JFM policy in various states across India.

5.5.1. Strategies Adopted by Anti-Nuclear Coalitions

Currently, India has a total of 20 nuclear reactors that produce roughly 2.8% of the total electricity. In 2005, the nuclear energy industry received a major

impetus when India and the US signed a treaty allowing them to trade in civilian nuclear raw materials (Potter 2005; Levi et. al. 2006; Perkovich 2010). Following this, the Indian government announced plans to expand the role of nuclear energy with the construction of four new 'energy parks' across the country. The Jaitapur Nuclear Power Plant (JNPP) in the western state of Maharashtra and Kudankulam Nuclear Power Plant (KNPP) in the southern state of Tamil Nadu are two of these energy parks.[38] Feasibility studies for the JNPP project began in 2002, and the site was approved in 2005.[39] Despite receiving additional regulatory and environmental clearance in December 2010, construction has yet to begin. KNPP on the other hand, has finished constructing its first reactor unit but has yet to produce any electricity. It has been at this stage for over 18 months now, facing significant delays that have contributed to rising costs associated with the project (*world-nuclear-news.org* 2012). Efforts by the anti-nuclear coalitions have presumably played a part in delaying the progress at both projects, making it imperative to study the strategies that these coalitions have adopted.[40] Although

[38] The other two proposed sites include Kakrapar in Gujarat and Rawatbhata in Rajasthan.

[39] "A Brief on Jaitapur Nuclear Power Project," accessed via the Nuclear Power Corporation of India Limited's webpage, available at: http://www.npcil.nic.in/main/A_Brief_on_JNPP.pdf.

[40] Looking at the impact these strategies have had on the siting process is an interesting empirical question, but it remains outside the scope of this study.

the efforts have been led by different coalitions, both cases of nuclear facility siting witnessed several common strategies. In particular, both coalitions have resorted to the use of two main strategies in their campaigns against the projects—mass mobilization efforts using tactics such as rallies, protests, and hunger strikes; and venue shopping strategies using tactics such as legal petitions.

In Jaitapur, following the environmental approval in December 2010, protests intensified at the site. Led by local activist organizations such as Janhit Seva Samiti (JSS) and Konkan Vinashkari Prakalp Bachao Samiti (KVPBS), people from surrounding villages protested on the streets, attempting to block officials from going to the site. The intensity of the protests can be judged from the fact that the local police was forced to make mass arrests after warnings to retreat were ignored by the protestors. The following statement from a news article covering the protests on the streets of Jaitapur offers a description, "[H]undreds of activists protesting the Jaitapur nuclear power project Tuesday blocked traffic and torched trucks and buses in different parts of Ratnagiri to protest the police firing a day ago in which one person was killed. … More than two thousand people took part in the demonstrations against the proposed 9,900-MW JNPP coming up in Jaitapur" (*nerve.in* 2011). Continuing this strategy of mass mobilization using protests, the anti-nuclear coalition in Jaitapur also organized rallies in the national capital of Delhi, hoping to get more publicity and spread the word. Approximately 1500 people marched from Mandi House to Jantar Mantar in New Delhi. According to an interview conducted by an Indian

magazine *Tehelka* with one of the coalition members, their strategy included expanding the scope of conflict as much as possible by incorporating more people from across the country (Schattschneider 1957). For instance, he stated that "We are also trying to mobilise people from Haryana, Bhavnagar, Mithivirdi where nuclear plants are coming up" (Ghanekar 2011). A similar story can be told about KNPP, where the anti-nuclear coalition is led by an activist group called People's Movement Against Nuclear Energy (PMANE). In order to mobilize people and launch their anti-nuclear campaign in South India, the coalition urged people to adopt Gandhian means of protest. Among other things, this included the adoption of indefinite fasting by men and women from villages surrounding the site for nine days (*hindustantimes.com* 2012a). The fast was initiated in response to the government's decision to approve the commissioning of the project (*indiatoday.intoday.in* 2012a).

In addition to efforts of mass mobilization, anti-nuclear coalitions in both cases adopted strategies of venue shopping, including legal petitions and formation of citizen-led advisory panels. Note that these were independent panels, formed and funded without government aid. For example, the anti-nuclear coalition in Jaitapur formed a people's tribunal composed of a panel of three former high court justices. The aim of this tribunal was to provide the people with a platform to speak about their grievances and to implement an independent study of the likely social and environmental effects of the project (Deshpande 2011). The coalition also petitioned to the regional high court against the manner in

which the government was acquiring the land for the project, how the environmental impact assessment was carried out, and the lack of information provided to the people. Similarly, the anti-nuclear coalition in Kudankulam has petitioned to the regional high court on multiple occasions. In the most recent petition, the coalition has argued that clearance given by the Atomic Energy Regulatory Board (AERB), the national regulator, is premature and does not take into account the full security review conducted by a task force (*hindustantimes.com* 2012b). The petition stated that on behalf of the people of Kudankulam, we (environmental activists) file this petition "to undertake a fresh review of Kudankulam Nuclear Power Project by affording an opportunity to the public to express their views on the feasibility of commissioning Kudankulam Nuclear Power Project and forbearing the respondents from commissioning the said project until such review is completed in all respects" (Sundarrajan 2011). The coalition has also filed other Public Interest Litigations (PILs) based on the lack of transparency of the siting process, and the absence of sufficient emergency preparedness to ensure the safety of local communities (*indiatoday.intoday.in* 2012b). At one point, the Madras High Court was hearing a total of 17 PILs.

5.5.2. Strategies Adopted by Anti-State Forest Control Coalitions

Historically, anti-state forest control coalitions (which consisted of local villagers and tribes) have long employed the strategy of mass mobilization against private forest reservation by the government. This strategy can be traced back to the 1850s (popularly known as forest satyagraha), and continued until the Forest

Policy Act of 1988 was passed, ultimately leading to the adoption of JFM policy in 1990. United by their belief that forests are a crucial means of subsistence and daily livelihood for them, villagers and local populations all across India protested the leasing of forests to private contractors leading to tree felling and deforestation (Weber 1989). Perhaps the most widely cited example of these coalitions' use of mass mobilization strategy is the "Chipko Movement" or "Embrace-the-Tree" movement, which originated in the Garhwal Himalayas of Uttar Pradesh in the 1970s. Similar to the anti-nuclear coalitions' strategies in recent years, the Chipko Movement was inspired by Gandhian values of civil disobedience. For example, in 1978 a villager in Badiyargarh went on an indefinite fast as a protest against tree felling in the local forest (Shiva and Bandyopadhyay 1986). This movement was successful in achieving a 15 year long ban on tree felling in the state of Uttar Pradesh by then Prime Minister, Indira Gandhi (Mawdsley 1998). The movement soon spread to other parts of India including Uttaranchal, Himachal Pradesh, Rajasthan, and Karnataka. The core belief of the movement was that forests must be maintained as a source of sustained ecology, not used as a fleeting source of commerce and industry. In some ways, this movement was a culmination of the prolonged struggle of this coalition against post-colonial policies such as the zamindari (landlord) system, which had solidified private ownership of traditionally common village resources (Shiva and Bandyopadhyay 1986). The Chipko Movement played a significant role in the adoption of the JFM policy in 1990, which came with the realization

that the government could no longer alienate the people from the forests. This shift in core values can be attributed to several factors. In the early 1980s, Indira Gandhi, the then Prime Minister, placed a 15-year long ban on tree felling in several states, including Uttar Pradesh, Uttaranchal, and Himachal Pradesh. This victory of the Chipko movement and several smaller anti-state forest control efforts reflects a shift in the values of the governing regime. Simultaneously, there was also an increase in the levels of ecological awareness among the Indian masses, providing critical momentum to the anti-forest control coalitions.

Shifting the official policy from maximizing state interests (such as maximization of timber production) to increasingly using state owned forest land for ecological purposes required overhauling the relationship between the forest department employees and local villagers. The biggest change with the advent of this policy was in the way that the COS surrounding this subsystem were defined. Before the adoption of the policy of JFM, most of the political and administrative power was concentrated in the hands of upper level bureaucrats starting from the minister of environment and forests, which is a political appointment. Below him were other bureaucratic layers that included the secretary of environment and forests, the principal chief conservator of forests and the chief conservator of forests (Tiwary 2004). Even though there existed state officials at the local level—the range forest officer, the beat officer, and the forest guard—their role was limited and they were trained to deal with villagers and forest encroachers by policing them and often arresting or fining them. However, under the new policy,

the states began to actively engage people and make them a part of the decision-making apparatus. The biggest shift in the opportunity structure came with the setting up of FPCs at the village level, which were composed of villagers, placing them in charge of forest protection. So the anti-state forest control coalitions now found themselves to be a part of the system, possibly leading them to revise their strategies. To give you an idea of the extent of the possible decentralization, by 2001, 27 out of 28 states had adopted this policy; instituting a total of about 63,000 FPCs (MOEF 2001). The change in strategies is evident in the way that these coalitions have shaped their response to government actions in different parts of India.[41] In contrast to earlier strategies aimed at changing the balance of power within the subsystem, these coalitions now focused on ensuring that the implementation of the JFM policy was as efficient as possible. For example, village FPCs commonly expressed their grievances regarding a lack of administrative and financial freedom. State FDs have been slow to hand over

[41] The "coalition" is united by its belief that state owned forests rightly belong to the people, and thus, should be handed over to them. However, because of the localized nature of this policy issue, the actual coalitions were composed of different local actors in various forested zones throughout India. While the coordination among local anti-state forest control coalitions is minimal, there were some national efforts like the "Chipko Movement" and the "Save Himalaya Movement" that super ceded local boundaries and had regional and/or national implications.

decision-making responsibilities to FPCs for issuing contracts and implementing strict protection rules. In the state of Gujarat, for instance, FPCs raided houses to confiscate illegally poached wood. However, when it came to decisions about what should be done with the confiscated goods, the FD overruled the FPCs (Saxena 1997: 134). In addition to the issue of administrative and financial freedom, there has also been some pushback from the villagers regarding the role of women in FPCs. It is argued that women do not have the required legal rights, and are not adequately represented under this policy framework (Roy 1992; Saxena 1997). The crucial difference between the more recent complaints and the earlier grievances is the manner in which they were expressed. Instead of mass protests, more recent complaints are generally expressed through peaceful administrative channels, such as talking to local forest officials.

In sum, it is evident from comparing the two subsystems that the distinct characteristics of the COS at the subsystem level influenced coalition strategies in an expected manner. In the case of the nuclear energy subsystem, the lack of openness (i.e. small number of decision making venues and low accessibility) and the lack of consensus required for policy change alienated the anti-nuclear coalition, leading it to adopt strategies aimed at disrupting the system. We also saw similar strategies adopted by the anti-state forest control coalitions in the pre-1970s forest management subsystem. Again, these strategies were driven in part by the closed nature of the COS at the subsystem level and a general lack of consensus required for policy change. In contrast, the strategies adopted by anti-

state forest control coalitions in the post-1970s forest management subsystem were less disruptive, due in part to the proliferations of decision making venues, higher accessibility levels, and higher degrees of consensus required following the adoption of the JFM policy. These findings, albeit preliminary, support the proposed hypotheses, and illustrate the influence of varying COS both within and across subsystems. In the future, I plan to measure and trace coalition strategies and tactics used by revisionist coalitions in a way that allows for streamlined data collection. Doing so will help to confirm the findings of this chapter and test the validity of the measures presented here.

5.6. Conclusions

The findings presented in this chapter provide important insights into opportunity structures, their influence on strategies that revisionist coalitions pursue, and the applicability of the ACF to India. The analysis provides qualitative support for the hypotheses listed above. Again, I hypothesized that subsystems with a limited number of decision-making venues and restricted access to these venues will lead revisionist coalitions to adopt confrontation strategies. On the other hand, subsystems with a large number of decision-making venues and open access to these venues will lead revisionist coalitions to adopt assimilative strategies. Findings suggest that policy subsystems where the number of decision-making venues is small and the accessibility to those venues is limited lead coalitions to adopt confrontational strategies such as public protest, hunger strikes, and rallies that are designed to disrupt the subsystem status quo. This was

evidenced in the strategies adopted by the anti-nuclear coalitions in the cases of JNPP and KNPP, and the anti-state forest control coalitions during the "Chipko movement". By contrast, findings from policy subsystems with relatively open decision-making processes illustrate that revisionist coalitions operating in these subsystems are likely to adopt assimilative strategies such as deliberation, appeals, and petitions that are designed to work within the subsystem status quo. This was evident in the case of JFM beginning in 1970, when the subsystem COS were sufficiently reorganized providing the previously excluded anti-state forest control coalitions more access to decision-making. This resulted in these coalitions altering their strategies from attempts to disrupt the subsystem through protests, to now work within the subsystem in an attempt to make it more efficient. Despite these distinctions, it is important to note that that coalitions operating in centralized subsystems can also use deliberative methods. For example, the anti-nuclear coalitions in the case of both JNPP and KNPP used judicial appeals as a strategy.

The chapter contributes to the broader ACF literature in the following ways: first, the multi-layered comparative analysis of how opportunity structures can vary both across subsystems and within subsystems over time is an interesting addition to the existing methods of illustrating the role of COS adopted by previous scholars. Second, by refining the concept of COS to include subsystem level dynamics this research is a step towards bolstering the generalizability of the ACF and its applicability in different institutional and political settings. The third

contribution relates to the insights of this analysis regarding political behavior and strategies that fill a significant gap in public policy. Scholars in the field of comparative politics have long studied the concept of political opportunity structures and how they affect group behavior and social movements. Bringing the concept into mainstream comparative public policy and theories of the policy process research marks an attempt to build an important bridge between the fields. Doing so can help assimilate knowledge across both fields. The social movement literature can draw from the detailed analysis of coalition formation and subsystem level dynamics; whereas the policy process literature can benefit from the use of the comparative method as well as knowledge of varying institutional and political contexts.

Finally, this chapter marks the first attempt to apply the ACF in India and the findings illustrate that for the most part, the framework of COS within the ACF does an adequate job of explaining the variation in coalition strategies in the two policy areas. Nonetheless, the findings from the analysis should be generalized with some caution. India with its unique and diverse political, social, and economic features could skew some findings from the analysis. The differences in strategies and behavior of the coalitions in the two issue areas could also be a result of underlying distinctions of the nature of these issues. Nuclear energy and forest management are different, but were comparable in this instance due to their similar underlying division into competing coalitions along the lines of seemingly irresolvable goal conflicts. It is somewhat difficult to say whether

the strategies adopted by revisionist coalition within the nuclear energy issue are a result of the inherent nature of that policy area. However, as the analysis demonstrates, the revisionist coalitions in the forest management subsystem also used confrontational strategies in the pre-1970s phase, suggesting that the nature of the policy is not the sole driver of coalition strategies. In the future, the preliminary results of shown here could be strengthened with a more detailed analysis of the issue areas, perhaps across different countries and across different issues. The concept of COS at both the national and subsystem level also requires continued attention, as doing so would allow us to better our understanding of how and why actors/groups act the way they do.

Chapter 6: Conclusions, Implications, and Directions for Future Research

6.1. Conclusions

This dissertation was motivated by the pressing need to understand the dynamics behind *Locally Unwanted Land Uses* (LULUs); why are some efforts to site contentious facilities (like nuclear facilities, prisons, landfills, and airports) successful and not others? As with most dissertations, I commenced the project by examining previous research on siting contentious facilities, specifically nuclear facilities. The literature review revealed, among other things, that scholarship on siting nuclear facilities is somewhat disparate, with most studies focusing on risk perceptions and risk alleviation at the individual level. To complement this array of scholarship, this dissertation studied the influence of political and institutional contexts—in the form of COS—on siting outcomes. The primary empirical research question that motivated the dissertation was: ***does variation in coalition opportunity structures influence the siting of nuclear facilities? If so, how?*** This structural approach to studying contentious siting fills an important gap in the empirical literature and provides a core theoretical framework that can be used to study contentious facility siting in the future. While this dissertation focuses on structural variations and how they might affect the policy process, this does not imply that these are the only variables that matter. As the literature review in chapters 1 and 2 illustrated, scholars have studied a wide array of influential factors, ranging from individual risk assessments to policy design and

implementation. This dissertation focused on the study COS because of the relative dearth of scholarship (both empirical and theoretical) on how these structures shape and influence the policy process. The goal is to understand the role played by COS, and to use the knowledge generated in this dissertation to complement what we already know about siting contentious facilities and the policy process more generally.

The findings from chapters 3, 4, and 5 explore the relationship between COS and three different elements of the siting process—the final policy outcome of the siting process, the emergence of organized opposition to siting, and the strategies used by revisionist coalitions. With reference to the emergence of organized opposition to siting, the findings indicated that the norms of consensus in a political system (as measured by the existence of stakeholder engagement measures) affect the likelihood that revisionist coalitions will emerge. On average, siting efforts that incorporated stakeholder engagement mechanisms of some sort witnessed more organized opposition in the form of revisionist coalitions. This is an interesting and important finding, and its possible policy implications will be discussed in the next section. Findings from chapter 5 provided strong qualitative evidence that the nature of the opportunity structures at the subsystem level influences the strategies that these revisionist coalitions use in pursuit of policy change. In particular, I found that revisionist coalitions in closed, centralized subsystem are more likely to use confrontational strategies like public protest and rallies designed to disrupt the subsystem than revisionist coalitions that exist in

open, decentralized subsystems. Coalitions that occupy subsystems with more open and decentralized COS tended to adopt assimilative strategies such as deliberation, appeals, and petitions that are designed to work within the subsystem. These findings have important theoretical implications about the expected patterns of behavior of coalitions within distinct kinds of subsystems. On the one hand, confrontational strategies within closed and/or centralized subsystems may increase the likelihood of conflict and contention, which can in turn be disruptive to the policy process. On the other hand, open subsystems with multiple points of access can lead to significant delays and political deadlocks. From a policy efficacy standpoint, it may be that the latter are more desirable because ultimately, they engender institutional trust and confidence rather than disdain.

Finally, with reference to the relationship between COS and policy change, two dimensions of COS stood out—the number of decision making venues in a political system, and the accessibility of those venues. The number of decision making venues, as described in chapter 3, were operationalized using an additive index based on the following key institutional characteristics—strength of federalism, strength of bicameralism, executive-legislative separation of power and regulatory insulation/independence. The accessibility of these venues was operationalized using a combination of two measures—competitiveness of participation in a polity and the degree to which that participation is regulated by the government. Both of these variables were shown to directly affect the

likelihood of policy change (whether or not a nuclear facility becomes operational). Subsystems with relatively sparse decision making venues were less likely to experience policy change than subsystems with multiple decision-making venues. This pattern is consistent with the notion that decision-making venues provide opponents to the status quo with opportunities to disrupt the policy status quo and bring about policy change. The larger the number of decision-making venues, the more likely this is. The accessibility of these decision-making venues also matters. Venues that are easier to access will attract revisionist coalitions and provide them with extra incentives in their attempt to disrupt the status quo.

In addition to these findings, the analysis in this dissertation fills a theoretical vacuum in the public policy literature. The concept of COS used to answer the empirical questions outlined above is underspecified and largely untested within the field of public policy. In addressing these empirical questions, this dissertation provides an example of how to measure and empirically explore the role of COS in the policy process. The primary theoretical impetus behind this dissertation is: ***what are the mechanisms through which coalition opportunity structures influence the policy process?*** By and large, the findings from the three empirical chapters indicated that COS play an important role in the policy process. As reviewed above, openness and norms of consensus have an influence on the policy process through dynamics such as coalition formation, coalition strategies, and policy change. The dissertation was able to demonstrate this

overall relationship both through quantitative and qualitative analyses. Additionally, the analysis in chapter 5 was conducted at the subsystem level rather than at the national level, which provided insights into sub-national relationships that had not yet been explored. Findings suggested that COS in which subsystems operate have an influence on coalition strategies, particularly whether coalitions were more likely to choose confrontational strategies than assimilative ones.

The dissertation serves an additional theoretical purpose, in that it contributes to two relatively understudied questions within the ACF. First, chapter 4 analyzes the link between COS and the likelihood of the formation of revisionist coalitions. This analysis not only adds to our knowledge on COS, but it also speaks to why coalitions form in the first place. The concept of advocacy coalitions is central to the ACF, yet we know little about when and why coalitions form in some subsystems and not others. Second, chapter 5 analyzes the link between COS and the strategies adopted by revisionist coalitions. Again, this analysis contributes to our knowledge about COS, but also about why coalitions adopt the strategies they do. ACF scholars argue that coalitions adopt specific strategies in pursuit of their policy beliefs, yet we know little about which strategies they choose to adopt and why.

6.2. Implications

A number of important conclusions can be drawn from this dissertation. First, this analysis makes clear that scholars, policy makers, and practitioners who are interested in LULUs and the dynamics behind contentious facility siting need to consider the role of COS and the underlying features of the political and institutional context within which the siting effort takes place. This dissertation analyzed how the opportunity structures of a country can influence the policy process and the ability of opposition groups to form and act within these structures. So, when designing policies related to nuclear facility siting or other forms of contentious facilities, it is important to keep in mind that countries have varying institutional structures and different norms of engagement; any policy design must keep these institutional characteristics in mind—the US is different from Sweden and Sweden is different from India. The underlying characteristics of a country provide different obstacles and incentives for groups to form and act within a policy subsystem and attempt to influence the policy process. As such, there are no "one size fits all" siting policies that will work equally well in all political systems. A policy that worked in Sweden is not necessarily going to work in the US or the UK and vice versa. Rather, policies must be designed with a country's specific COS in mind; doing so will change the probability that facilities will be successfully sited.

This dissertation studied the influence of two different types of COS—broad, national level characteristics that do not change over long periods of time,

and subsystem or policy specific features that lend themselves to change in the near term. The former opportunity structures include characteristics such as judicial independence and quality of democracy. The most effective way for policy makers to deal with these relatively fixed opportunity structures is to acknowledge them and to design policies around and within them. In other words, policy makers and practitioners are unlikely to be able to (or desire to) transform these features in the short term. Understanding the role played by these features is critical for understanding the existing or default benchmark for key political activities like the formation of opposition groups and the tactical utilization of institutional venues in pursuit of policy change. The more readily modified aspects of opportunity structures include subsystem or policy specific features such as stakeholder engagement mechanisms and the regulatory independence of key agencies. These features of COS are more malleable in the near term, and policy makers can actively seek to design them to influence the likely outcomes of the policy process. For example, chapter 5 illustrated that revisionist coalitions tend to choose confrontational strategies when faced with closed subsystems. If policy makers seek to avoid or minimize confrontation, they can attempt to design more open subsystems where the access to decision making authority is decentralized. Doing so might alleviate some of the contention that we sometimes witness during many cases of nuclear facility siting.

The relationship between open subsystems with dispersed decision making authority and confrontational strategies is not straightforward. For instance, the

analysis in chapter 4 revealed a positive relationship between the existence of strong norms of consensus and the likelihood of the formation of revisionist coalitions that oppose the existing status quo. Interpreting this finding requires some thought, especially with reference to its policy implications. Do stakeholder engagement programs *lead to* the formation of revisionist coalitions, or vice versa? If the existence of stakeholder engagement programs does make revisionist coalitions more likely to form, the policy implications could be far reaching. On the one hand, public consent and deliberative decision making achieved through stakeholder engagement programs may be critical for sustaining the essence of democratic governance. Governments in advanced democracies thrive on the principles of empowering their publics, providing access to resources that allows opposition groups to form revisionist coalitions in the face of policy decisions. It is not surprising, then, that giving locals and other affected parties the means to engage in the siting process would lead to organized forms of opposition. On the other hand, the formation and growth of revisionist coalitions often leads to political deadlocks, putting important policy decisions in limbo and draining both time and money.

Note that the reverse can also hold true—the formation of revisionist coalitions is often times seen as a signal by governments of the need to establish stakeholder engagement programs as an effort to mitigate opposition. In such scenarios, opposition precedes stakeholder engagement measures. The case of the Yucca Mountain repository may be a good example—over ten years and $12

billion dollars were spent to evaluate the suitability of the site—resources that have gone to waste without solving the issue of disposing of the country's increasing stock of spent nuclear fuel. In the Nuclear Waste Policy Act of 1982, the US Congress outlined a plan to study three sites for possible use as nuclear waste repositories. The goal was to pick the 'best' site based on geographical equity and technical attributes. However, this plan was abandoned with the passing of an amended Nuclear Waste Policy Act in 1987, which singled out Yucca Mountain as the only potential repository.

This shift in policy generated strong public opposition from residents in Nevada, who felt as though the decision to single them out was unfair. While the 1987 Act did include a nuclear waste negotiator who was tasked with engaging the local communities, it did not garner success. The initial decision in 1982 to study Yucca Mountain as a potential site was characterized by a lack of public engagement measures. This lack of early engagement measures, coupled with the 1987 "decide-announce-defend" approach adopted by the US Congress and the Department of Energy (DOE) further heightened public opposition and prevented the development of any sort of citizen-based consensus on the issue. This, among other factors, contributed to the strong backlash against the proposed facility, and the ultimate stagnation of the project (BRC 2012). Whether stakeholder engagement measures precede or follow the emergence of organized opposition is an empirical question that should be tackled in future research.

6.3. Directions for Future Research

As discussed in the previous section, the theory and findings presented in this dissertation address a number of important questions that have direct and indirect implications for the field of public policy. The results presented here should—like all ongoing research programs—be subjected to future testing and refinement using additional data, alternative research designs/methods, and different issue areas. As a first step in this direction, a study of this sort should be replicated using different issues, other than nuclear facility siting. Nuclear siting efforts are characterized by heightened risk perceptions and an incentive for individuals and groups to participate in the policy process. Additionally, the issue of nuclear facility siting is unique in that it is highly technical and access to decision making authority is often limited to a few key agencies and individuals. These characteristics provide an ideal frame to study the influence of the underlying COS in a system. However, in order to judge the generalizability of the framework, future research should study how COS function in issues where the subsystem dynamics are either less contentious or less technical. Chapter 5 presented some preliminary analysis of how COS impact the strategies adopted by revisionist coalition in the case of forest management in India. The issue of forest management, while contentious, is not as technical as nuclear energy. Results indicated that shifts in the nature of COS (an increase in the number of decision making venues and the accessibility of those venues) led to a corresponding change in coalition strategies in the forest management subsystem from

confrontational to assimilative. In the future, I plan to measure and trace coalition strategies and tactics used by revisionist coalitions in a way that allows for streamlined data collection.

Second, future research should provide evidence from the kinds of political systems missing in this database (i.e. Russia, China, North Korea, and Iran). These cases are systematically different and could offer new insights. It is important to note, however, that the database used in this dissertation and the analysis conducted can still speak to these cases because of the inclusion of countries like present day Ukraine (then USSR) and Pakistan. However, the ability to infer conclusions based on the current findings remains limited and studying the siting efforts from the countries excluded from this dissertation is important, both to improve our empirical and theoretical understanding of the process and to increase confidence in our empirical findings.

The third area of future research relates to experimenting with new ways to operationalize both the dependent and independent variables used in this dissertation. For instance, this dissertation measured policy change in a simplified dichotomous manner, where facilities that became operable were coded as 0 on policy change and those that were officially cancelled as a 1 on policy change. While this measurement technique was useful in this dissertation for the purposes of keeping the research design clear and concise, it also meant that cases that experienced a lengthy delay but were never cancelled, or eventually became operational, had to be excluded from the database. In future research, it would be

useful to experiment with other ways to operationalize policy change; perhaps one that included delayed cases in some form. Doing so will allow us to understand how specific COS might increase the likelihood of delays or modified designs in the course of the siting process than others, even if those facilities eventually go on to become operational. This refined measure of policy change will be able to track changes in facility design such as limits on the type and amount of waste to be included or adding a research laboratory to the facility, but nevertheless resulted in an operable facility.

Different measures for openness and consensus should also be explored. Chapter 5 analyzed the impact of openness of an issue specific subsystem on coalition strategies. In future research, I plan to develop measures of subsystem specific COS measures that can be used to conduct a large-N analysis. With reference to the degree of consensus required for policy change, future research should continue to refine the stakeholder engagement measure. Among other things, a refined measure of stakeholder engagement should include a temporal element that helps us track when these measures were implemented in the policy process.

The fourth focus for future research concerns untangling some of the complex relationships identified in the dissertation. One such relationship is that between norms of consensus (specifically stakeholder engagement mechanisms) and the likelihood of emergence of opposition to siting. As suggested before, this dissertation found that these two variables share a strong, positive, and

statistically significant relationship but the causal direction of this relationship remains unclear. Does stakeholder engagement policy cause the emergence of opposition or vice versa? Future research should study this relationship in more detail and attempt to disentangle the direction of causality. Developing refined measures of stakeholder engagement as described above will help that effort. Similarly, this dissertation found that there exists a relationship between the nature of the COS surrounding a subsystem and the strategies revisionist coalitions tend to adopt. Future studies of the link between specific strategies and their influence on policy outcomes would be important and interesting.

Finally, future research should pay close attention to how the different elements of the policy process might in turn affect the nature of COS in a political system. This "feedback loop" is an important link that needs to be explored in detail. For example, once revisionist coalitions have formed in a system with sparse COS, how do they push the boundaries of that subsystem to transform the opportunity structures over time? In sum, this chapter has sought to convey the depth and breadth of the knowledge generated in this dissertation. It also provides a sense of the important policy implications of the findings, and the rich array of future directions for research concerning the nature and role of COS in the public policy process.

List of References

Abraham, Itty. 1999. *Making of the Indian Atomic Bomb: Science, Secrecy and the Postcolonial State*. 1st ed. London: Zed Books.

Agarwal, A. 1999. "Community in Conservation: Tracing the Outlines of an Enchanting Concept." In *New Moral economy for India's forests? Doscourses of community and participation*, New Delhi: Sage Publications Pvt. Ltd, 92–108.

Aldrich, Daniel P. 2008. *Site Fights: Divisive Facilities and Civil Society in Japan and the West*. 2nd edition. Ithaca and London: Cornell University Press.

Amour, Audrey. 1984. *The Not-In-My-Backyard-Syndrome*. Downsview, Ontario: York University Press.

Annual Report 2009-2010. 2010. Mumbai: Department of Atomic Energy.

Bacot, Hunter, Terry Bowen, and Michael R. Fitzgerald. 1994. "Managing the Solid Waste Crisis." *Policy Studies Journal* 22(2): 229–44.

Bahuguna, V. K., and Anup Upadhyay. 2001. *Strengthening of Joint Forest Management*. New Delhi: Ministry of Environment and Forests, Government of India. http://moef.nic.in/divisions/forprt/jfm/html/strength.htm (September 5, 2012).

Baumgartner, Frank R, Christian Breunig, Christoffer Green-Pedersen, Bryan D Jones, Peter B Mortensen, Michiel Nuytemans, and Stefaan Walgrave. 2009. "Punctuated Equilibrium in Comparative Perspective." *American Journal of Political Science* 53(3): 603–20.

Baumgartner, Frank R., and Bryan D. Jones. 1991. "Agenda Dynamics and Policy Subsystems." *The Journal of Politics* 53(04): 1044–74.

———. 1993. *Agendas and Instability in American Politics*. Chicago, IL: University of Chicago Press.

Benford, R. D., H. A. Moore, and J. A. Williams Jr. 1993. "In Whose Backyard?: Concern About Siting a Nuclear Waste Facility." *Sociological Inquiry* 63(1): 30–48.

Bidwai, Praful, and M. V. Ramana. 2007. “Home, Next to N-Reactor.” *Tehelka*. http://www.tehelka.com/story_main31.asp?filename=Ne230607home_next_SR.asp (November 16, 2012).

Birkland, Thomas A. 1997. *After Disaster: Agenda Setting, Public Policy, and Focusing Events*. Washington D.C.: Georgetown University Press.

Bonano, Evaristo, Peter Swift, Gordon Appel, and Paul Meacham. 2011. “Can Repository Scientists and Social Scientists Work Together to Find Solutions to Nuclear Waste Management Problems? A Repository Scientist’s Perspective.” *Risk, Hazards & Crisis in Public Policy* 2(1).

BRC. 2012. *Report to the Secretary of Energy*. Washington D.C.: Blue Ribbon Commission on America’s Nuclear Future. www.brc.gov.

Brion, Denis J. 1991. *Essential Industry and the NIMBY Phenomenon*. New York: Quorum.

Burnett, Miles, and Charles Davis. 2002. “Getting Out the Cut Politics and National Forest Timber Harvests,1960-1995.” *Administration & Society* 34(2): 202–28.

Carter, Luther J. 1987. *Nuclear Imperatives and Public Trust: Dealing with Radioactive Waste*. Washington D.C.: RFF Press.

Chandra, Kanchan. 2004. *Why Ethnic Parties Succeed: Patronage and Ethnic Head Counts in India*. New York; Cambridge: Cambridge University Press.

Chaturvedi, R., and G. Godbole. 2005. *Perceptions of the Madhya Pradesh Forest Department*. Cambridge, MA: Cambridge University. Harda Project.

Claro, Edmundo. 2007. “Exchange Relationships and the Environment: The Acceptability of Compensation in the Siting of Waste Disposal Facilities.” *Environmental Values* 16(2): 187–208.

Clary, Bruce B., and Michael E. Kraft. 1988. “Impact Assessment and Policy Failure: The Nuclear Waste Policy Act of 1982.” *Review of Policy Research* 8(1): 105–15.

Daalder, Hans. 1971. “On Building Consociational Nations: The Cases of the Netherlands and Switzerland.” *International Social Science Journal* 23(3): 355–70.

Annual Report 2009-2010. 2010. Mumbai: Department of Atomic Energy.

Deshpande, Vinaya. 2011. "No Safety Study Undertaken on Jaitapur Project: Justice Shah." *The Hindu*. http://www.thehindu.com/news/national/article2040287.ece (September 5, 2012).

Devine-Wright, Patrick. 2012. *Renewable Energy and the Public: From NIMBY to Participation*. Washington D.C.: Earthscan.

Dunlap, Riley E., Michael E. Kraft, and Eugene A. Rosa, eds. 1993. *Public Reactions to Nuclear Waste: Citizens' Views of Repository Siting*. Durham, NC: Duke University Press Books.

Easterling, D., and H. Kunreuther. 1995. *The Dilemma of Siting a High-level Nuclear Waste Repository*. Boston, MA; London, UK: Kluwer Academic Publishers.

Elgin, Dallas J., and Christopher M. Weible. 2013. "A Stakeholder Analysis of Colorado Climate and Energy Issues Using Policy Analytical Capacity and the Advocacy Coalition Framework." *Review of Policy Research* 30(1): 114–33.

Evrard, Aurélien. 2012. "Political Parties and Policy Change: Explaining the Impact of French and German Greens on Energy Policy." *Journal of Comparative Policy Analysis* 14(4).

Fan, Mei-Fang. 2008. "Environmental Citizenship and Sustainable Development: The Case of Waste Facility Siting in Taiwan." *Sustainable Development* 16(6): 381–89.

Fenger, Menno, and Pieter-Jan Klok. 2001. "Interdependency, Beliefs, and Coalition Behavior: A Contribution to the Advocacy Coalition Framework." *Policy Sciences* 34(2): 157–70.

Ferreira, Susana, and Louise Gallagher. 2010. "Protest Responses and Community Attitudes Toward Accepting Compensation to Host Waste Disposal Infrastructure." *Land Use Policy* 27(2): 638–52.

Freeman, Gary P. 1985. "National Styles and Policy Sectors: Explaining Structured Variation." *Journal of Public Policy* 5(04): 467–96.

Freudenberg, William, and Eugene A. Rosa, eds. 1984. *Public Reaction to Nuclear Power: Are There Critical Masses?* Boulder, CO: Westview Press.

Frey, Bruno S., and Felix Oberholzer-Gee. 1997. "The Cost of Price Incentives: An Empirical Analysis of Motivation Crowding- Out." *The American Economic Review* 87(4): 746–55.

Frey, Bruno S., Felix Oberholzer-Gee, and Reiner Eichenberger. 1996. "The Old Lady Visits Your Backyard: A Tale of Morals and Markets." *Journal of Political Economy* 104(6): 1297–1313.

Frey, Karsten. 2006. *India's Nuclear Bomb and National Security*. 1st ed. New York: Routledge.

Fried, Stephanie, and Josh Dimon. 2004. *At What Cost? ECAs in India: Bankrolling Nuclear Power Plants, Mega-Dams, and Scandal-Ridden Projects*. Environmental Defense.

Galtung, Johan. 1967. *Theory and Methods of Social Research*. New York: Columbia University Press.

Gerrard, Michael B. 1995. *Whose Backyard, Whose Risk: Fear and Fairness in Toxic and Nuclear Waste Siting*. Cambridge, MA: The MIT Press.

Ghanekar, Nikhil. 2011. "N-plant Protests to Reach Jantar Mantar." *Tehelka*. http://www.tehelka.com/story_main50.asp?filename=Ws270711NUCLEAR.asp (September 5, 2012).

Godwin, Marcia L., and Jean Reith Schroedel. 2000. "Policy Diffusion and Strategies for Promoting Policy Change: Evidence From California Local Gun Control Ordinances." *Policy Studies Journal* 28(4): 760–76.

Goldsteen, Raymond L., and John K. Schorr. 1991. *Demanding Democracy After Three Mile Island*. Gainesville: University of Florida Press.

Gowda, M. V. Rajeev, and Doug Easterling. 2000. "Voluntary Siting and Equity: The MRS Facility Experience in Native America." *Risk Analysis* 20(6): 917–30.

De Groot, Judith I. M., Linda Steg, and Wouter Poortinga. 2013. "Values, Perceived Risks and Benefits, and Acceptability of Nuclear Energy." *Risk Analysis* 33(2): 307–17.

Groothuis, Peter A., Jana D. Groothuis, and John C. Whitehead. 2008. “Green Vs. Green: Measuring the Compensation Required to Site Electrical Generation Windmills in a Viewshed.” *Energy Policy* 36(4): 1545–50.

Guha, R. 1983. “Forestry in British and post-British India: a Historical Analysis.” *Economic and Political Weekly*: 1882–96.

Guha, R., and M. Gadgil. 1989. “State Forestry and Social Conflict in British India.” *Past & Present* 123(1): 141–77.

Guiraudon, Virginie. 2000. “European Integration and Migration Policy: Vertical Policy-making as Venue Shopping.” *Journal of Common Market Studies* 38(2): 251–71.

Hadden, Susan G., and Jared Hazelton. 1980. “Public Policies Toward Risk.” *Policy Studies Journal* 9(1): 109–17.

Hall, Peter A., and Rosemary C. R. Taylor. 1996. “Political Science and the Three New Institutionalisms.” *Political Studies* 44(5): 936–57.

Hansen, Kenneth N., and Daniel T. Krejci. 2000. “Rethinking Neoinstitutional Interaction Municipal Arena-Specific Strategies and the Base Closure Process.” *Administration & Society* 32(2): 166–82.

Henry, Adam Douglas. 2011. “Ideology, Power, and the Structure of Policy Networks.” *Policy Studies Journal* 39(3): 361–83.

Hindustan Times. 2012a. “Indefinite Fast Against Kudankulam N-plant Resumes.” http://www.hindustantimes.com/India-news/Chennai/Indefinite-fast-against-Kudankulam-N-plant-resumes/Article1-849108.aspx (September 5, 2012).

———. 2012b. “Madras High Court Reserves Order on Kudankulam.” http://www.hindustantimes.com/India-news/TamilNadu/Madras-high-court-reserves-order-on-Kudankulam/Article1-918132.aspx (September 5, 2012).

Hsiao, Hsin-Huan, Haw-Jen Liu, Su-Hoon Lee, On-Kwok Lai, and Yok-Shiu F. Lee. 1999. “The Making of Anti-Nuclear Movements in East Asia: State-Movements Relationships and Policy Outcomes.” In *Asia’s Environmental Movements: Comparative Perspectives*, eds. Alvin Y. So and Yok-Shiu F. Lee. New York: M E Sharpe Inc., 252–68.

India Today. 2012a. “Kudankulam: Centre Appeals Protestors to End Fast.” http://indiatoday.intoday.in/story/kudankulam-centre-appeals-protesters-to-end-fast-in-the-interest-of-nation/1/179306.html (September 5, 2012).

———. 2012b. “Madras HC Raps Centre over Kudankulam Nuclear Plant.” http://indiatoday.intoday.in/story/madras-hc-raps-centre-over-kudankulam-nuclear-plant/1/213476.html (September 5, 2012).

Jasper, James M. 1990. *Nuclear Politics: Energy and the State in the United States, Sweden, and France*. Princeton Univ Pr.

Jenkins-Smith, Hank C., Gilbert K. St. Clair, and Brian Woods. 1991. “Explaining Change in Policy Subsystems: Analysis of Coalition Stability and Defection over Time.” *American Journal of Political Science* 35(4): 851–80.

Jenkins-Smith, Hank, and Howard Kunreuther. 2001. “Mitigation and Benefits Measures as Policy Tools for Siting Potentially Hazardous Facilities: Determinants of Effectiveness and Appropriateness.” *Risk Analysis* 21(2): 371–82.

Kahan, Dan M., and Donald Braman. 2006. “Cultural Cognition and Public Policy.” *Yale Law & Policy Review* 24(1): 149–72.

Kasperson, Roger E., Dominic Golding, and Seth Tuler. 1992. “Social Distrust as a Factor in Siting Hazardous Facilities and Communicating Risks.” *Journal of Social Issues* 48(4): 161–87.

Keeney, R. L, and K. Nair. 1975. “Decision Analysis for the Siting of Nuclear Power plants—The Relevance of Multiattribute Utility Theory.” *Proceedings of the IEEE* 63(3): 494– 501.

Kingdon, John W. 1984. *Agendas, Alternatives, and Public Policies*. Boston, MA: Little,Brown and Company.

Kitschelt, Herbert P. 1986. “Political Opportunity Structures and Political Protest: Anti-Nuclear Movements in Four Democracies.” *British Journal of Political Science* 16(01): 57–85.

Kraft, Michael E. 2000. “Policy Design and the Acceptability of Environmental Risks: Nuclear Waste Disposal in Canada and the United States.” *Policy Studies Journal* 28(1): 206–18.

Kriesi, Hanspeter, Ruud Koopmans, Jan Willem Duyvendak, and Marco Giugni. 1995. *New Social Movements In Western Europe: A Comparative Analysis*. Minneapolis: University of Minnesota Press.

Kübler, Daniel. 2001. "Understanding Policy Change with the Advocacy Coalition Framework: An Application to Swiss Drug Policy." *Journal of European Public Policy* 8(4): 623–41.

Kunreuther, Howard, and Doug Easterling. 1996. "The Role of Compensation in Siting Hazardous Facilities." *Journal of Policy Analysis and Management* 15(4): 601–22.

Kunreuther, Howard, Douglas Easterling, William Desvousges, and Paul Slovic. 1990. "Public Attitudes Toward Siting a High-Level Nuclear Waste Repository in Nevada." *Risk Analysis* 10(4): 469–84.

Kunreuther, Howard, Kevin Fitzgerald, and Thomas D. Aarts. 1993. "Siting Noxious Facilities: A Test of the Facility Siting Credo." *Risk Analysis* 13(3): 301–18.

Ladd, Anthony E., and Shirley Laska. 1991. "Opposition to Solid Waste Incineration: Pre- Implementation Anxieties Surrounding a New Environmental Controversy*." *Sociological Inquiry* 61(3): 299–313.

Larsen, Jakob Bjerg, Karsten Vrangbæk, and Janine M. Traulsen. 2006. "Advocacy Coalitions and Pharmacy Policy in Denmark—Solid Cores with Fuzzy Edges." *Social Science & Medicine* 63(1): 212–24.

Lawrence, A. T. 2002. "The Drivers of Stakeholder Engagement: Reflections on the Case of Royal Dutch/Shell." *Journal of Corporate Citizenship* 6(1): 71–85.

Leifeld, Philip, and Volker Schneider. 2012. "Information Exchange in Policy Networks." *American Journal of Political Science* 56(3): 731–44.

Leiss, William. 1996. "Three Phases in the Evolution of Risk Communication Practice." *Annals of the American Academy of Political and Social Science* 545: 85–94.

Levi, Michael A., Charles D. Ferguson, and Council on Foreign Relations. 2006. *U.S.-India Nuclear Cooperation: a Strategy for Moving Forward*. New York: Council on Foreign Relations.

Lijphart, Arend. 1971. “Comparative Politics and the Comparative Method.” *The American Political Science Review* 65(3): 682–93.

Lubell, Mark, Adam Douglas Henry, and Mike McCoy. 2010. “Collaborative Institutions in an Ecology of Games.” *American Journal of Political Science* 54(2): 287–300.

Lulofs, K. R. D., and R. Hoppe. 2010. *ACF and Policy Change on Both Sides of the Atlantic. Towards a More Diversity-oriented and Comparative Policy Subsystem Approach*. University of Twente. http://www.afsset.fr/index.php?pageid=2505&parentid=949 (April 5, 2013).

Mansfield, Carol, George L. Van Houtven, and Joel Huber. 2002. “Compensating for Public Harms: Why Public Goods Are Preferred to Money.” *Land Economics* 78(3): 368–89.

Matheny, Albert R., and Bruce A. Williams. 1985. “Knowledge Vs. Nimby: Assessing Florida’s Strategy for Siting Hazardous Waste Disposal Facilities.” *Policy Studies Journal* 14(1): 70–80.

Matti, Simon, and Annica Sandström. 2011. “The Rationale Determining Advocacy Coalitions: Examining Coordination Networks and Corresponding Beliefs.” *Policy Studies Journal* 39(3): 385–410.

Mawdsley, Emma. 1998. “After Chipko: From Environment to Region in Uttaranchal.” *Journal of Peasant Studies* 25(4): 36–54.

McAdam, Doug, John D. McCarthy, and Mayer N. Zald. 1996. *Comparative Perspectives on Social Movements: Political Opportunities, Mobilizing Structures, and Cultural Framings*. Cambridge, MA: Cambridge University Press.

McCarthy, John D., and Mayer N. Zald. 1977. “Resource Mobilization and Social Movements: A Partial Theory.” *American Journal of Sociology* 82(6): 1212–41.

Medvedev, Zhores. 1992. *The Legacy of Chernobyl*. New York: W. W. Norton & Company.

Merritt, Richard Lawrence, and Stein Rokkan. 1966. *Comparing Nations; the Use of Quantitative Data in Cross-national Research*. New Haven: Yale University Press.

Meyer, David S, and Debra C Minkoff. 2004. “Conceptualizing Political Opportunity.” *Social Forces* 82(4): 1457–92.

Meyer, David S. 2004. “Protest and Political Opportunities.” *Annual Review of Sociology* 30: 125–45.

Mintrom, Michael, and Sandra Vergari. 1996. “Advocacy Coalitions, Policy Entrepreneurs, and Policy Change.” *Policy Studies Journal* 24(3): 420–34.

Ter Mors, Emma, Bart W. Terwel, and Dancker D.L. Daamen. 2012. “The Potential of Host Community Compensation in Facility Siting.” *International Journal of Greenhouse Gas Control* 11, Supplement: S130–S138.

Morton, Alec, Mara Airoldi, and Lawrence D Phillips. 2009. “Nuclear Risk Management on Stage: A Decision Analysis Perspective on the UK’s Committee on Radioactive Waste Management.” *Risk Analysis* 29(5): 764–79.

Murali, K. S., Indu K. Murthy, and N. H. Ravindranath. 2006. “Sustainable Community Forest Management Systems: A Study on Community Forest Management and Joint Forest Management Institutions from India.” *International Review for Environmental Strategies* 6(1): 23–40.

Nerve. 2011. “Violent Protests Rock Ratnagiri over Death of anti-Jaitapur Activist.” http://www.nerve.in/news:253500387668 (September 5, 2012).

Nohrstedt, Daniel. 2005. “External Shocks and Policy Change: Three Mile Island and Swedish Nuclear Energy Policy.” *Journal of European Public Policy* 12(6): 1041–59.

———. 2008. “The Politics of Crisis Policymaking: Chernobyl and Swedish Nuclear Energy Policy.” *Policy Studies Journal* 36(2): 257–78.

———. 2010. “Do Advocacy Coalitions Matter? Crisis and Change in Swedish Nuclear Energy Policy.” *Journal of Public Administration Research and Theory* 20(2): 309 –333.

———. 2011. “Shifting Resources and Venues Producing Policy Change in Contested Subsystems: A Case Study of Swedish Signals Intelligence Policy.” *Policy Studies Journal* 39(3): 461–84.

———. 2013. “Advocacy Coalitions in Crisis Resolution: Understanding Policy Dispute in the European Volcanic Ash Cloud Crisis.” *Public Administration*: n/a–n/a.

Nohrstedt, Daniel, and Christopher M. Weible. 2010. “The Logic of Policy Change after Crisis: Proximity and Subsystem Interaction.” *Risk, Hazards & Crisis in Public Policy* 1(2): 1–32.

O’Hare, Michael. 1977. “Not on My Block You Don’t--Facilities Siting and the Importance of Compensation.” *Public Policy* 25: 407–58.

Parsons, Wayne. 1995. *Public Policy: An Introduction to the Theory and Practice of Policy Analysis*. Cheltenham, UK: Edward Elgar Pub.

Perkovich, George. 2010. “Global Implications of the U.S.-India Deal.” *Daedalus* 139(1): 20–31.

Pierce, Jonathan J. 2011. “Coalition Stability and Belief Change: Advocacy Coalitions in U.S. Foreign Policy and the Creation of Israel, 1922-44.” *Policy Studies Journal* 39(3): 411–34.

Portney, Kent E. 1985. “The Potential of the Theory of Compensation for Mitigating Public Opposition to Hazardous Waste Treatment Facility Siting: Some Evidence from Five Massachusetts Communities.” *Policy Studies Journal* 14(1): 81–89.

Potter, W.C. 2005. “India and the New Look of US Nonproliferation Policy.” *Nonproliferation Review* 12(2): 343.

Pralle, Sarah. 2003. “Venue Shopping, Political Strategy, and Policy Change: The Internationalization of Canadian Forest Advocacy.” *Journal of Public Policy* 23(03): 233–60.

———. 2006a. *Branching Out, Digging In: Environmental Advocacy and Agenda Setting*. Washington D.C.: Georgetown University Press.

———. 2006b. “The ‘Mouse That Roared’: Agenda Setting in Canadian Pesticides Politics.” *Policy Studies Journal* 34(2): 171–94.

Przeworski, Adam, and John Sprague. 1986. *Paper Stones: A History of Electoral Socialism*. Chicago; London: University of Chicago Press.

Rai, Ajai K. 2009. *India's Nuclear Diplomacy after Pokhran II*. New Delhi: Pearson Education India.

Ramana, M. V. 2012. *The Power of Promise: Examining Nuclear Energy in India*. New Delhi: Viking.

Ramana, MV, and A. Kumar. 2010. "Safety First? Kaiga and Other Nuclear Stories." *Economic & Political Weekly* 45(7): 47.

Rao, D.B., and MV Ramana. 2008. "Violating Letter and Spirit: Environmental Clearances for Koodankulam Reactors." *Economic & Political Weekly* 43: 14–18.

Reddy, C. Rammanohar, and M. V. Ramana, eds. 2003. *Prisoners of the Nuclear Dream*. New Delhi: Orient Longman.

Richardson, Jeremy John. 1982. *Policy Styles in Western Europe*. London; New York: Unwin Hyman.

Robinson, Eva Cheung. 1998. *Greening at the Grassroots: Alternative Forestry Strategies in India*. New Delhi: Sage Publications Pvt. Ltd.

Roy, S. B. 1992. "Forest Protection Committees in West Bengal." *Economic and Political Weekly* 27(29): 1528–30.

Sabatier, Paul A, and Christopher M Weible. 2007. "The Advocacy Coalition Framework: Innovations and Clarifications." In *Theories of the Policy Process*, Cambridge, MA: Westview Press.

Sabatier, Paul A. 1988. "An Advocacy Coalition Framework of Policy Change and the Role of Policy-oriented Learning Therein." *Policy Sciences* 21(2-3): 129–68.

Sabatier, Paul A., and Hank Jenkins-Smith. 1993. *Policy Change And Learning: An Advocacy Coalition Approach*. Boulder, Colorado: Westview Press.

———. 1999. "The Advocacy Coalition Framework: Innovations and Clarifications." In *Theories of the Policy Process*, ed. Paul A Sabatier. Boulder, CO: Westview Press.

Saxena, N. C. 1997. *The Saga of Participatory Forest Management in India*. Indonesia: Center for International Forestry Research.

Schattschneider, E. E. 1957. “Intensity, Visibility, Direction and Scope.” *The American Political Science Review* 51(4): 933–42.

Schively, Carissa. 2007. “Understanding the NIMBY and LULU Phenomena: Reassessing Our Knowledge Base and Informing Future Research.” *Journal of Planning Literature* 21: 255–66.

Schlager, Edella. 1995. “Policy Making and Collective Action: Defining Coalitions Within the Advocacy Coalition Framework.” *Policy Sciences* 28(3): 243–70.

Schmidt, Manfred G. 1982. “Does Corporatism Matter? Economic Crisis, Politics and Rates of Unemployment in Capitalist Democracies in the 1970s.” In *Patterns of corporatist policy-making*, eds. G. Lehmbruch and P. Schmitter. Beverly Hills and London: Sage, 237–58.

Sen, Geeti, ed. 1992. *Indigenous Vision: Peoples of India, Attitudes to the Environment*. New Delhi: SAGE Publications Inc.

Shiva, Vandana, and J. Bandyopadhyay. 1986. “The Evolution, Structure, and Impact of the Chipko Movement.” *Mountain Research and Development* 6(2): 133–42.

Sjöberg, Lennart. 2003. “Attitudes and Risk Perceptions of Stakeholders in a Nuclear Waste Siting Issue.” *Risk Analysis* 23(4): 739–49.

———. 2004. “Explaining Individual Risk Perception: The Case of Nuclear Waste.” *Risk Management* 6(1): 51–64.

Sjöberg, Lennart, and Britt-Marie Drottz-Sjöberg. 2001. “Fairness, Risk and Risk Tolerance in the Siting of a Nuclear Waste Repository.” *Journal of Risk Research* 4: 75–101.

Sjöberg, Lennart, J. Truedsson, L. Frewer, and A. Prades. 2000. “Through a Glass Darkly: Experts’ and the Public’s Mutual Risk Perception.” *Foresight and precaution* 1: 1157–62.

Slater, Dan, and Daniel Ziblatt. 2013. “The Enduring Indispensability of the Controlled Comparison.” *Comparative Political Studies* 46(10): 1301–27.

Slovic, Paul, Baruch Fischhoff, and Sarah Lichtenstein. 1981. “Perception and Acceptability of Risk from Energy Systems.” In *Advances in Environmental*

Psychology, eds. A. Baum and J. Singer. Hillsdale, NJ: Lawrence Erlbaum Associates.

Sotirov, Metodi, and Michael Memmler. 2012. "The Advocacy Coalition Framework in Natural Resource Policy Studies — Recent Experiences and Further Prospects." *Forest Policy and Economics* 16: 51–64.

Sundarrajan, G. 2011. "PIL Filed in Madras High Court Against the Koodankulam Nuclear Power Project." *DiaNuke*. http://www.dianuke.org/pil-filed-in-madras-high-court-against-the-koodankulam-nuclear-power-project/ (September 5, 2012).

Tarrow, Sidney. 1989. *Democracy and Disorder: Protest and Politics in Italy, 1965-1975*. Clarendon: Oxford University Press.

Tarrow, Sidney G. 1994. *Power in Movement: Social Movements, Collective Action and Politics*. Cambridge, MA: Cambridge University Press.

Tellis, Ashley J. 2001. *India's Emerging Nuclear Posture: Between Recessed Deterrent and Ready Arsenal*. Santa Monica, CA: RAND Publications.

Tiwary, Manish. 2004. *Participatory Forest Policies and Politics in India*. Hampshire, England: Ashgate.

Venkatraman, G. 1994. *Bhabha and His Magnificent Obsessions*. Hyderabad: Universities Press (India) Limited.

Weber, Thomas. 1989. *Hugging the Trees: The Story of the Chipko Movement*. New Delhi; New York: Penguin Books.

Weible, Christopher M, and Daniel Nohrstedt. 2012. "The Advocacy Coalition Framework: Coalitions, Learning, and Policy Change." In *Routledge Handbook of Public Policy*, eds. Eduardo Araral, Scott Fritzen, Michael Howlett, M. Ramesh, and Xun Wu. Oxon; New York: Routledge.

Weible, Christopher M. 2005. "Beliefs and Perceived Influence in a Natural Resource Conflict: An Advocacy Coalition Approach to Policy Networks." *Political Research Quarterly* 58(3): 461–75.

Weible, Christopher M., and Paul A. Sabatier. 2005. "Comparing Policy Networks: Marine Protected Areas in California." *Policy Studies Journal* 33(2): 181–201.

Weible, Christopher M., Paul A. Sabatier, and Kelly McQueen. 2009. "Themes and Variations: Taking Stock of the Advocacy Coalition Framework." *Policy Studies Journal* 37(1): 121–40.

Wittneben, Bettina B.F. 2012. "The Impact of the Fukushima Nuclear Accident on European Energy Policy." *Environmental Science & Policy* 15(1): 1–3.

World Nuclear News. 2012. "Kudankulam Delays Mount Up." http://www.world-nuclear-news.org/NN_Kudankulam_delays_mount_up_1701121.html (September 5, 2012).

Appendix 1: Table of Cases

*Indicates case was included in the randomly drawn subset of cases for Stage 2 analysis

Name of Facility	Country	Year of Decision	Outcome
Atucha I Nuclear Power Plant	Argentina	1974	Operational
Embalse Nuclear Power Plant	Argentina	1983	Operational
Metsamor Nuclear Power Plant*	Armenia (USSR)	1976	Operational
Zwentendorf Nuclear Power Plant	Austria	1978	Cancelled
Doel Nuclear Power Station	Belgium	1974	Operational
Tihange Nuclear Power Station	Belgium	1975	Operational
Angra Nuclear Power Plant*	Brazil	1982	Operational
Belene Nuclear Power Plant	Bulgaria	2012	Cancelled
Kozloduy Nuclear Power Plant*	Bulgaria	1974	Operational
Bruce Nuclear Generating Station	Canada	1976	Operational
Darlington Nuclear Generating Station	Canada	1990	Operational
Gentilly-I Nuclear Generating Station	Canada	1970	Operational
Pickering Nuclear Generating Station	Canada	1971	Operational
Point Lepreau Nuclear Generating Station	Canada	1982	Operational
Temelin Nuclear Power Station	Czech Republic	2000	Operational
Dukovany Nuclear Power Station	Czech Republic (Czechoslovakia)	1985	Operational
Loviisa Nuclear Power Plant	Finland	1977	Operational
Olkiluoto Nuclear Power Plant	Finland	1978	Operational
Belleville Nuclear Power Plant	France	1987	Operational
Blayais Nuclear Power Plant*	France	1981	Operational
Brennilis Nuclear Power Plant	France	1966	Operational

Bugey Nuclear Power Plant	France	1972	Operational
Cattenom Nuclear Power Plant	France	1986	Operational
Chinon Nuclear Power Plant	France	1962	Operational
Chooz Nuclear Power Plant	France	1966	Operational
Civaux Nuclear Power Plant	France	1997	Operational
Cruas Nuclear Power Plant	France	1983	Operational
Dampierre Nuclear Power Plant	France	1980	Operational
Fessenheim Nuclear Power Plant	France	1977	Operational
Flamanville Nuclear Power Plant*	France	1985	Operational
Golfech Nuclear Power Plant*	France	1990	Operational
Gravenlines Nuclear Power Plant	France	1980	Operational
Le Carnet Nuclear Power Plant	France	1997	Cancelled
Marcoule Nuclear Site	France	1958	Operational
Nogent Nuclear Power Plant	France	1987	Operational
Paluel Nuclear Power Plant	France	1984	Operational
Penly Nuclear Power Plant	France	1990	Operational
Plogoff Nuclear Power Plant	France	1981	Cancelled
Saint-Alban Nuclear Power Plant*	France	1985	Operational
Saint-Laurent Nuclear Power Plant*	France	1969	Operational
Superphenix Nuclear Power Plant	France	1985	Operational
Tricastin Nuclear Power Plant	France	1980	Operational
Stendal Nuclear Power Plant	Germany	1990	Cancelled
Greifswald nuclear power station*	Germany (East)	1973	Operational
Rheinsberg Nuclear Power Station	Germany (East)	1966	Operational
Wurgassen Nuclear Power Plant	Germany (East)	1971	Operational
Biblis Nuclear Power Plant	Germany (West)	1974	Operational

Breisach Nuclear Power Plant	Germany (West)	1973	Cancelled
Brokdorf Nuclear Power Plant	Germany (West)	1986	Operational
Brunsbuttel Nuclear Power Plant	Germany (West)	1976	Operational
Emsland Nuclear Power Plant	Germany (West)	1988	Operational
Grafenrheinfeld Nuclear Power Plant	Germany (West)	1981	Operational
Grohnde Nuclear Power Plant	Germany (West)	1984	Operational
Gundremmingen Nuclear Power Plant	Germany (West)	1966	Operational
Isar Nuclear Power Plant	Germany (West)	1977	Operational
Kruemmel Nuclear Power Plant*	Germany (West)	1983	Operational
Mulheim-Karlich Nuclear Power Plant	Germany (West)	1986	Operational
Neckarwestheim Nuclear Power Station	Germany (West)	1976	Operational
Obrigheim Nuclear Power Plant	Germany (West)	1968	Operational
Philippsburg Nuclear Power Plant	Germany (West)	1979	Operational
SNR-300 Fast Breeder Reactor*	Germany (West)	1995	Cancelled
Stade Nuclear Power Plant	Germany (West)	1972	Operational
Unterweser Nuclear Power Plant	Germany (West)	1978	Operational
Wyhl Nuclear Power Plant	Germany (West)	1977	Cancelled
Paks Nuclear Power Plant	Hungary	1982	Operational
Haripur Nuclear Power Plant	India	2011	Cancelled
Kaiga Atomic Power Station	India	2000	Operational
Kakrapar Atomic Power Station	India	1992	Operational
Madras Atomic Power Station	India	1983	Operational
Narora Atomic Power Station	India	1989	Operational
Rajasthan Atomic Power Station*	India	1972	Operational
Tarapur Atomic Power Station	India	1969	Operational
Caorso Nuclear Power Plant	Italy	1977	Operational

Enrico Fermi (Trino Vercellese) Nuclear Power Plant*	Italy	1964	Operational
Garigliano Nuclear Power Plant	Italy	1963	Operational
Latina Nuclear Power Plant	Italy	1962	Operational
Montalto di Castro (Alto Lazio) Nuclear Power Plant*	Italy	1987	Cancelled
Fukushima Daiichi Nuclear Power Plant	Japan	1970	Operational
Genkai Nuclear Power Plant	Japan	1975	Operational
Hamaoka Nuclear Power Plant	Japan	1974	Operational
Higashidori Nuclear Power Plant	Japan	2005	Operational
Ikata Nuclear Power Plant	Japan	1977	Operational
Kashiwazaki-Kariwa Nuclear Power Plant*	Japan	1984	Operational
Maki Nuclear Power Plant*	Japan	2004	Cancelled
Mihama Nuclear Power Plant	Japan	1970	Operational
Monju Nuclear Power Plant	Japan	1994	Operational
Ohi Nuclear Power Plant	Japan	1977	Operational
Onagawa Nuclear Power Plant	Japan	1983	Operational
Sendai Nuclear Power Plant	Japan	1983	Operational
Shika Nuclear Power Plant	Japan	1992	Operational
Shimane Nuclear Power Plant	Japan	1973	Operational
Suzu Nuclear Power Plant	Japan	2003	Cancelled
Takahama Nuclear Power Plant	Japan	1974	Operational
Tokai Nuclear Power Plant	Japan	1965	Operational
Tomari Nuclear Power Plant*	Japan	1988	Operational
Tsuruga Nuclear Power Plant	Japan	1969	Operational
Kori Nuclear Power Plant	Korea	1977	Operational
Uljin Nuclear Power Plant*	Korea	1988	Operational
Wolseong Nuclear Power Plant*	Korea	1982	Operational

Yeonggwang/Youngkwang Nuclear Power Plant	Korea	1986	Operational
Ignalina Nuclear Power Plant	Lithuania (USSR)	1983	Operational
Laguna Verde Nuclear Power Plant	Mexico	1988	Operational
Borssele Nuclear Power Plant*	Netherlands	1973	Operational
Dodewaard Nuclear Power Plant	Netherlands	1968	Operational
Chashma Nuclear Power Plant	Pakistan	2000	Operational
Karachi Nuclear Power Plant	Pakistan	1971	Operational
Cernavoda Nuclear Power Plant	Romania	1996	Operational
Bohunice Nuclear Power Plant*	Slovakia (Czechoslovakia)	1972	Operational
Mochovce Nuclear Power Plant	Slovakia (Slovac Republic)	1998	Operational
Krsko Nuclear Power Plant	Slovenia (Yugoslovia)	1981	Operational
Koeberg Nuclear Power Station	South Africa	1984	Operational
Almaraz Nuclear Power Plant	Spain	1981	Operational
Asco Nuclear Power Plant	Spain	1983	Operational
Cofrentes Nuclear Power Plant*	Spain	1984	Operational
Jose Cabrera Nuclear Power Station	Spain	1968	Operational
Lemoniz Nuclear Power Plant	Spain	1983	Cancelled
Santa Maria de Garona Nuclear Power Plant	Spain	1970	Operational
Sayago Nuclear Plant*	Spain	1983	Cancelled
Trillo Nuclear Power Plant	Spain	1988	Operational
Valde Caballeros Nuclear Power Plant	Spain	1983	Cancelled
Vandellos Nuclear Power Plant	Spain	1972	Operational
Barseback Nuclear Power Plant	Sweden	1975	Operational

Brodalen Nuclear Power Plant	Sweden	1980	Cancelled
Forsmark Nuclear Power Plant	Sweden	1980	Operational
Oskarshamn Nuclear Power Plant*	Sweden	1970	Operational
Ringhals Nuclear Power Plant	Sweden	1973	Operational
Beznau Nuclear Power Plant	Switzerland	1969	Operational
Gosgen Nuclear Power Plant*	Switzerland	1979	Operational
Kaiseraugst Nuclear Power Plant	Switzerland	1990	Cancelled
Leibstadt Nuclear Power Plant	Switzerland	1984	Operational
Muhleberg Nuclear Power Plant	Switzerland	1971	Operational
Niederamt Nuclear Power Plant	Switzerland	2011	Cancelled
Akkuyu Nuclear Power Plant	Turkey	2012	Cancelled
Chernobyl Nuclear Power Plant	Ukraine (USSR)	1977	Operational
Khmelnytsky Nuclear Power Plant	Ukraine (USSR)	1987	Operational
Rivne Nuclear Power Plant	Ukraine (USSR)	1980	Operational
South Ukraine Nuclear Power Plant	Ukraine (USSR)	1982	Operational
Zaporizhia Nuclear Power Plant	Ukraine (USSR)	1984	Operational
Berkeley Nuclear Power Station	United Kingdom	1961	Operational
Bradwell Nuclear Power Station	United Kingdom	1961	Operational
Braystones Nuclear Power Station	United Kingdom	2010	Cancelled
Calder Hall Nuclear Power Station	United Kingdom	1956	Operational
Chapelcross Nuclear Power Station	United Kingdom	1958	Operational
Dungeness Nuclear Power Station	United Kingdom	1965	Operational
Hartlepool Nuclear Power Station*	United Kingdom	1983	Operational
Heysham Nuclear Power Station	United Kingdom	1983	Operational

Hinkley Point Nuclear Power Station*	United Kingdom	1964	Operational
Hunterston Nuclear Power Station*	United Kingdom	1963	Operational
Kirksanton Nuclear Power Station	United Kingdom	2010	Cancelled
Oldbury Nuclear Power Station	United Kingdom	1967	Operational
Sizewell Nuclear Power Station	United Kingdom	1965	Operational
Torness Nuclear Power Station*	United Kingdom	1988	Operational
Trawsfynydd Nuclear Power Station	United Kingdom	1964	Operational
Wylfa Nuclear Power Station	United Kingdom	1969	Operational
Alan R. Barton Plant	USA	1975	Cancelled
Allens Creek Nuclear Power Plant	USA	1982	Cancelled
Arkansas Nuclear One	USA	1974	Operational
Atlantic Nuclear Power Plant*	USA	1978	Cancelled
Bailly Nuclear Power Plant	USA	1981	Cancelled
Beaver Valley Power Station*	USA	1976	Operational
Bellefonte Nuclear Generating Station	USA	1988	Cancelled
Big Rock Point Power Plant	USA	1962	Operational
Black Fox Nuclear Power Plant	USA	1982	Cancelled
Blue Hills Nuclear Power Plant	USA	1978	Cancelled
Bodega Bay Nuclear Power Plant	USA	1964	Cancelled
Braidwood Station	USA	1987	Operational
Browns Ferry Nuclear Plant	USA	1974	Operational
Brunswick Steam Electric Plant	USA	1975	Operational
Byron Station	USA	1985	Operational
Callaway Plant	USA	1984	Operational
Calvert Cliffs Nuclear Power Plant	USA	1975	Operational

Carroll County Nuclear Power Plant*	USA	1988	Cancelled
Catawba Nuclear Station	USA	1985	Operational
Cherokee Nuclear Power Plant	USA	1983	Cancelled
Clinton Power Station	USA	1987	Operational
Columbia Generating Station*	USA	1984	Operational
Comanche Peak Steam Electric Station	USA	1990	Operational
Connecticut Yankee Nuclear Power Plant*	USA	1968	Operational
Cooper Nuclear Station	USA	1974	Operational
Crystal River Nuclear Generating Plant	USA	1977	Operational
Davis-Besse Nuclear Power Station	USA	1978	Operational
Diablo Canyon Nuclear Power Plant*	USA	1985	Operational
Donald C. Cook Nuclear Power Plant	USA	1975	Operational
Douglas Point Nuclear Generating Station*	USA	1977	Cancelled
Dresden Nuclear Power Station	USA	1960	Operational
Duane Arnold Energy Center	USA	1974	Operational
Edwin I. Hatch Nuclear Plant	USA	1974	Operational
Enrico Fermi Atomic Power Plant	USA	1972	Operational
Erie Nuclear Power Plant*	USA	1980	Cancelled
Forked River Nuclear Power Plant	USA	1980	Cancelled
Fort Calhoun Station	USA	1973	Operational
Fort St. Vrain Generating Station	USA	1977	Operational
Grand Gulf Nuclear Station	USA	1985	Operational
Greene County Nuclear Power Plant*	USA	1979	Cancelled

H. B. Robinson Steam Electric Plant*	USA	1971	Operational
Hartsville Nuclear Plant*	USA	1984	Cancelled
Haven Nuclear Power Plant*	USA	1980	Cancelled
Hope Creek Generating Station	USA	1986	Operational
Humboldt Bay Nuclear Power Plant	USA	1963	Operational
Indian Point Nuclear Generating*	USA	1962	Operational
James A. FitzPatrick Nuclear Power Plant	USA	1975	Operational
Joseph M. Farley Nuclear Plant	USA	1977	Operational
Kewaunee Power Station	USA	1974	Operational
LaSalle County Station	USA	1982	Operational
Limerick Generating Station*	USA	1986	Operational
Lyons Kansas Nuclear Waste Repository	USA	1972	Cancelled
Maine Yankee Nuclear Power Plant*	USA	1972	Operational
Marble Hill Nuclear Power Plant	USA	1985	Cancelled
McGuire Nuclear Station	USA	1981	Operational
Midland Cogeneration Venture	USA	1986	Cancelled
Millstone Power Station	USA	1970	Operational
Montague Nuclear Power Plant	USA	1980	Cancelled
Monticello Nuclear Generating Plant	USA	1971	Operational
Nine Mile Point Nuclear Station	USA	1969	Operational
North Anna Power Station	USA	1978	Operational
Oconee Nuclear Station	USA	1973	Operational
Oyster Creek Nuclear Generating Station	USA	1969	Operational
Palisades Nuclear Plant*	USA	1971	Operational

Palo Verde Nuclear Generating Station	USA	1988	Operational
Pathfinder Atomic Power Plant	USA	1966	Operational
Peach Bottom Atomic Power Station	USA	1966	Operational
Pebble Springs Nuclear Power Plant	USA	1982	Cancelled
Perkins Nuclear Power Plant	USA	1982	Cancelled
Perry Nuclear Power Plant*	USA	1986	Operational
Phipps Bend Nuclear Power Plant	USA	1982	Cancelled
Pilgrim Nuclear Power Station	USA	1972	Operational
Point Beach Nuclear Plant	USA	1970	Operational
Prairie Island Nuclear Generating Plant	USA	1973	Operational
Quad Cities Nuclear Power Station	USA	1972	Operational
Quanicassee Nuclear Power Plant	USA	1974	Cancelled
R.E. Ginna Nuclear Power Plant	USA	1970	Operational
Rancho Seco Nuclear Generating Station	USA	1975	Operational
River Bend Station	USA	1986	Operational
Salem Nuclear Generating Station	USA	1977	Operational
San Onofre Nuclear Generating Station	USA	1968	Operational
Saxton Nuclear Generating Station	USA	1961	Operational
Seabrook Station	USA	1990	Operational
Sears Isle Nuclear Power Plant	USA	1977	Cancelled
Sequoyah Nuclear Plant*	USA	1981	Operational
Shearon Harris Nuclear Power Plant	USA	1987	Operational
Shippingport Atomic Power	USA	1957	Operational

Station*			
Shoreham Nuclear Power Plant*	USA	1989	Cancelled
Skagit Nuclear Power Plant	USA	1983	Cancelled
Skull Valley Repository	USA	2007	Cancelled
Somerset Nuclear Power Plant/Kintigh Generating Station	USA	1975	Cancelled
South River Nuclear Power Plant*	USA	1978	Cancelled
South Texas Project*	USA	1988	Operational
St. Lucie Plant*	USA	1976	Operational
Stanislaus Nuclear Power Plant	USA	1979	Cancelled
Sterling Nuclear Plant	USA	1980	Cancelled
Sundesert Nuclear Power Plant*	USA	1978	Cancelled
Surry Nuclear Power Station	USA	1972	Operational
Susquehanna Steam Electric Station	USA	1982	Operational
Three Mile Island Nuclear Station	USA	1974	Operational
Trojan Nuclear Power Plant	USA	1976	Operational
Turkey Point Nuclear Generating	USA	1972	Operational
Tyrone Nuclear Power Plant	USA	1979	Cancelled
Vandalia Nuclear Project	USA	1982	Cancelled
Vermont Yankee Nuclear Power Plant	USA	1973	Operational
Virgil C. Summer Nuclear Station	USA	1984	Operational
Vogtle Electric Generating Plant	USA	1987	Operational
Waste Isolation Pilot Plant	USA	1999	Operational
Waterford Steam Electric Station	USA	1985	Operational
Watts Bar Nuclear Plant	USA	1996	Operational
William H. Zimmer Power Station	USA	1984	Cancelled
Wolf Creek Generating Station	USA	1985	Operational

Yankee Rowe Nuclear Power Station	USA	1960	Operational
Yellow Creek Nuclear Power Plant	USA	1984	Cancelled
Zion Nuclear Power Station	USA	1973	Operational